

RECORDS

of the

INDIAN MUSEUM

(A JOURNAL OF INDIAN ZOOLOGY)

Vol. XLIV, 1942-1946

EDITED BY
THE DIRECTOR
ZOOLOGICAL SURVEY OF INDIA

PUBLISHED BY THE MANAGER OF PUBLICATIONS, DELHI.
PRINTED BY THE GOVERNMENT OF INDIA PRESS, CALCUTTA, INDIA,
1947

Price As. 12 or 1s.

PART IV.—*Published December, 1946.*

Zoological Survey of India, 1942-1945	347
Description of a new Filariid worm, <i>Squamofilaria choprai</i> , sp. nov. (Nematoda) from the lung of a Sea-Tern, from Addu Atoll, Maldives Island	357
A new species of Rhinopterid Fish from South India ..	361
Acanthocephala from India. III. On a new genus of Acanthocephalan parasite of the family Quadrigyridae, from a Calcutta fish, <i>Mystus cavasius</i> (Ham.)	363
Studies in the Intraspecific variation. I. On the existence of two colour-types in the adults and hoppers of the <i>solitaria</i> phase in the Desert Locust, <i>Schistocerca gregaria</i> (Forskål). [Orthoptera, Acrididae]	369
On variation in the number of ovarioles and its probable origin in the Desert Locust, <i>Schistocerca gregaria</i> (Forskål). [Orthoptera Acrididae]	375
<i>Megacepon choprai</i> , gen. et sp. nov., a Bopyrid Isopod from the gill chamber of <i>Sesarma tetragonum</i> (Fabr.)	385

LIST OF PLATES.

				<i>Follow Page.</i>
Plate I. <i>Rhinoptera sewelli</i> , sp. nov.	...	—	—	362

LIST OF AUTHORS.

	<i>Page.</i>
ALEXANDER, CHARLES P.	
The Oriental Tipulidae in the collection of the Indian Museum.	
Part II	29
BASIR, M. A.	
Nematodes parasitic on <i>Gryllotalpa</i>	95
BHALERAO, G. D.	
On two Helminths of <i>Mastacembelus pancalus</i> (Ham.) ..	191
BHALERAO, G. D.	
On <i>Strigieda</i> (Trematoda) from India	207
CHAUHAN, B. S.	
Description of a new Filariid worm, <i>Squamofilaria choprai</i> , sp. nov. (Nematoda) from the lung of a Sea-Tern, from Addu Atoll, Maldivo Island	357
CHOPRA, B.	
Zoological Survey of India, 1942-1945	347
DATTA, M. N.	
Acanthocephala from India. III. On a new genus of Acan- thocephalan parasite of the family Quadrigyridae, from a Calcutta fish, <i>Mystus cavasius</i> (Ham.)	363
GEORGE, P. C.	
<i>Megasepon choprai</i> , gen. et sp. nov., a Bopyrid Isopod from the gill chamber of <i>Sesarma tetragonum</i> (Fabr.) ..	385
HORA, SUNDER LAL	
Notes on Fishes in the Indian Museum.	
XLII. On the systematic position of the Indian species of <i>Scaphiodon</i> Heckel. XLIII. On the systematic position of <i>Cyprinus nukta</i> Sykes	1
HORA, SUNDER LAL	
A list of Fishes of the Mysore State and of the neighbouring Hill ranges of the Nilgiris, Wynaad and Coorg ..	193
LINDBERG, KNUT	
Cyclopoides nouveaux du continent Indo-Iranien. III-IV ..	15

LINDBERG, KNUT

Cyclopides (Crustacés Copépodes) de l'Inde.

- XI. Contribution à la connaissance de *Cyclops* (*Microcyclops*) *varicans* Sars et *Cyclops* (*Microcyclops*) *linjanticus* Kiefer. XII. Remarques sur quelques membres du sous-genres *Tropocyclops* Kiefer. XIII. Notes sur quelques membres du sous-genre *Eucyclops* s. str. .. 73

LINDBERG, KNUT

- Cyclopides (Crustacés Copépodes) de l'Inde. XIV. Notes sur quelques membres du sous-genre *Metacyclops* Kiefer .. 139

LINDBERG, KNUT

- Crustacés de l'état de Djodhpour (Radjpoutana) .. 341

MAPLESTONE, P. A.

- Helminth parasite of certain rats in India 201

MISRA, K. S.

- A new species of Rhinopterid Fish from South India .. 361

MISRA, P. L.

- On the Life-history of a new Gregarine, *Grebneckiella pixellae*, sp. nov., from the Centipede, *Scolopendra morsitans* Linn. with a note on the family Dactylophoridae Léger, 1892 .. 323

MISRA, P. L.

- A new Gregarine, *Stylocephalus indicus*, sp. nov. from a beetle 339

RANJAH, A. R.

- The Embryology of the Indian Apple-snail, *Pila globosa* (Swainson) [Mollusca, Gastropoda] 217

ROONWAL, M. L.

- On a collection of Birds from the Hoshangabad District (Central Province, India) 107

ROONWAL, M. L.

- Studies in the Intraspecific variation. I. On the existence of two colour-types in the adults and hoppers of the *solitaria* phase in the Desert Locust, *Schistocerca gregaria* (Forskål). [Orthoptera, Acrididae.] 369

ROONWAL, M. L.

- On variation in the number of ovarioles and its probable origin in the Desert Locust, *Schistocerca gregaria* (Forskål). [Orthoptera, Acrididae.] 375

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. The page on which a species, etc., is described is indicated by thick type.]

	Page.		Page.
A		Amblycipitidae ..	349
Abramadinæ ..	194	Amblypharyngodon ..	199
Acanthocephala ..	202, 263, 265	<i>melettina</i> ..	194
Acanthocyclops ..	154	<i>microlepis</i> ..	194
Acanthocyclops bicuspidatus ..	155, 156, 158, 159, 163, 165, 166, 168, 169, 170, 171, 172, 173, 189	<i>mola</i> ..	194
<i>bicuspidatus odessanus</i> ..	155, 156, 159, 160, 161, 162, 163, 164, 189, 168, 169	Amiidae ..	350
<i>bisetosus</i> ..	155, 156, 158, 159, 170, 171, 163, 164, 172, 189	Ammomanes phoenicura ..	110, 124
<i>languidus</i> ..	153	<i>phoenicura</i> ..	350
<i>robustus</i> ..	153, 155, 159, 171, 172, 189,	Amphibia ..	350
<i>vernalis</i> ..	155, 159, 169, 171, 172, 173, 188	Amphibians ..	350
Acanthosentis ..	366, 367	Ampullaria ..	283
Accipitres ..	110, 131	<i>canaliculata</i> ..	222, 227, 236, 258, 260, 265, 305, 314
Accipitres ..	351	<i>depressa</i> ..	245
Acipenseridae ..	350	<i>gigas</i> ..	236, 282
Acra ..	227	<i>polita</i> ..	222, 245, 246, 258, 260, 265, 302, 305
Acridiidae ..	352, 369, 375, 383, 384	Ampullaria (Pila) depressa ..	282
Acridinae ..	334	<i>gigas</i> ..	245, 275
Acutispora ..	334	<i>polita</i> ..	236, 299
Adephaga ..	352	Ampullariidae ..	275
Adiposidae ..	350	Anabantoidea ..	198
Aegyptiidae ..	110, 131	Anabas ..	199
Agamidae ..	350	Anacridium aegyptium ..	383
Agromyzidae ..	353	Anatidae ..	351
Ailia ..	199	Ancylus ..	307
Alaria ..	214	Anguilla ..	199
<i>alata</i> ..	214	<i>bengalensis</i> ..	197
<i>robusta</i> ..	214	Anguillidae ..	197
Alariinae ..	212	Anhinga melanogaster ..	216
Alaudidae ..	110, 124	Annulata ..	353
Alcedinidae ..	110, 127	Anodonta ..	267
Alcedo althis bengalensis ..	128	Anseres ..	351
<i>taprobana</i> ..	110, 128	Anthicidae ..	353
Alcyonaria ..	353	Anthus hodgsoni hodgsoni ..	110, 123
Alepocephalidae ..	350	Aorurus ..	104
Aleyrodidae ..	352	Apatemon ..	209
Allodiplostomum hindustani ..	212	<i>casarcus</i> ..	209
Altigena ..	7, 8	<i>indicus</i> ..	209
Ambassidae ..	198	<i>pandubi</i> ..	209
Ambassis ..	199	<i>sarcogyponis</i> ..	209
Ambassis nama ..	198	Aphaniptera ..	353
<i>ranga</i> ..	198	Apharynogostrigea ..	207
		<i>ardenlina</i> ..	207
		<i>egretii</i> ..	207
		<i>indiana</i> ..	207
		<i>simplex</i> ..	207
		Aphididae ..	352
		Aplocheilus blockii ..	197
		<i>lineatus</i> ..	197
		Aplysia ..	227
		Apocrita ..	353
		Apocyclops ..	141, 154
		<i>dengizicus</i> ..	155, 159, 160, 162, 189
		Apodes ..	197
		Apodes (Anguillidae) ..	198
		Apotettix eurycephalous ..	383

	Page.
Aproctinae ..	357
Araohuida ..	352
Arctopsychidae ..	352
Ardeidae ..	136
Ardeidae ..	213
Ardeola grayii ..	137
Argya candata candata ..	109, 113
Ariidae ..	349
Arion ..	267, 268, 286, 287, 296, 309, 310, 315
Ascalaphidae ..	352
Asilidae ..	353
Asionidae ..	110, 130, 351
Athene brama ..	211
brama indica ..	110, 130
Azygia angusticauda ..	191

B

Bagridae ..	197, 349
Bagarius ..	199
bagarius ..	197
Balitora brucei var. mysorensis ..	196
Barbus ..	199
Barbus (Puntius) amphilius ..	194
carnaticus ..	195
chola ..	195
dorsalis ..	195
dubius ..	195
filamentous ..	195
jerdoni ..	195
kolus ..	195
lithopidos ..	195
melanamphyx ..	195
micropogon ..	195
narayani ..	195
neilli ..	195
parrah ..	195
pleurotaenia ..	195
pulcheilus ..	195
sarana ..	195
sophore ..	195
ticto ..	195
vittatus ..	195
Barbus (Tor) khudree ..	195
Barilius ..	199
barila ..	194
barna ..	194
bendelisis ..	194
canarensis ..	194
gatensis ..	194
vagre ..	194
Basommatophora ..	286, 287
Batasio ..	14
Batoidei ..	350
Batrachotetriginae ..	384
Bhavana ..	200
australis ..	196
Binema ..	104
Blattelicola ..	104
Blatticola ..	104
Blattophila ..	105
Bodellostmontidae ..	350
Bolbophorus ..	211, 216
Bombyliidae ..	353
Bombyoidae ..	352
Bopyrid ..	385, 389

Page.

Bopyridae ..	385, 389
Borboridae ..	353
Botaurus stellaris ..	213
Botia striata ..	196
Bovidae ..	351
Brachycera ..	353
Brachydanio rerio ..	194
Brenthidae ..	353
Bruchidae ..	353
Bucerotidae ..	129, 351
Buprestidae ..	353
Buteo magnirostris ..	208
rufinus ..	212
rufinus rufinus ..	209, 211
Byrrhidae ..	352
Bythinia ..	256, 259, 267, 268, 300, 307

C

Calamoceratidae ..	352
Callichrons ..	199
bimaculatus ..	197
Callidulidae ..	352
Calliphoridae ..	353
Calyptraea ..	267, 268, 305
Camelidae ..	351
Campophagidae ..	109, 119
Canidae ..	351
Capillaria ..	204
auritae ..	205
felis-cati ..	205
linsi ..	205
muris-sylvatici ..	205
†prashadi ..	201, 204, 205
Capitonidae ..	110, 125, 351
Capparidaceae ..	341
Caprimulgidae ..	351
Caprimulgus europaeus ..	358
Carabidae ..	352
Carassius auratus ..	11
Carchariidae ..	350
Carnivora ..	351
Carp ..	198
Carpodacus ceylonensis ceylonensis ..	118
erythrinus erythrinus ..	122
erythrinus roseatus ..	110, 121, 122
Catla catla ..	195
Celyphidae ..	353
Centipede ..	323
Centropagide ..	342
Centropagides ..	341, 342
Cephalina ..	335
Cephalobellus ..	105
Cephaloidophoridae ..	336
Cerambycidae ..	353
Ceroopidae ..	352
Ceryle rudis ..	214
rudis leucomelanura ..	110, 127, 213
Cervidae ..	251
Cestoda ..	201, 202, 205
Chacidæ ..	349
Chanidae ..	350
Charadriidae ..	111, 135, 351
Charadriiformes ..	111, 135, 351
Chela ..	199
argentina ..	194

	Page.		Page.
<i>Chelubaicala</i> ..	194	<i>Ctenacrosceles serricornis</i>	34, 35
<i>clupeoides</i> ..	194	<i>Ctenobranch</i> ..	284
<i>Chelonia</i> ..	350	<i>Cuculidae</i> ..	351
<i>Chilopods</i> ..	334	<i>Culicicapa</i> ..	
<i>Chimeridae</i> ..	350	<i>ceylonensis</i> ..	109, 117, 118
<i>Chirocentidae</i> ..	350	<i>lonensis</i> ..	109, 117, 118
<i>Chiton</i> ..	284	<i>Curculionidae</i> ..	353
<i>Chloropsis</i> ..	114	<i>Cyathocotyle</i> ..	216
<i>jerdoni</i> ..	109, 114	<i>calvusi</i> ..	214
<i>Chondrostei</i> ..	349, 350	<i>gravieri</i> ..	216
<i>Chrysididae</i> ..	353	<i>Cyathocotylineas</i> ..	216
<i>Chrysomelidae</i> ..	353	<i>Cyclas</i> ..	268
<i>Chtysopidae</i> ..	352	<i>Cyclopide</i> ..	156
<i>Cichlidae</i> ..	198	<i>Cyclopides</i> ..	139, 153, 156,
<i>Cirous cyaneus</i> ..	208		157, 341, 342, 345
<i>Cirrhinia</i> ..	2, 199	<i>Cyclops</i> ..	17, 141, 192
<i>afghana</i> ..	1	<i>bicuspidatus</i> ..	16
<i>cirrrosa</i> ..	195	<i>caspicus</i> ..	17, 18, 19, 20,
<i>fulungee</i> ..	195		159, 155, 169, 188
<i>reba</i> ..	196	<i>dengizicus</i> ..	142, 154
<i>Cladoceres</i> ..	341, 342	<i>furcifer</i> ..	17
<i>Claduroides sordida</i> ..	61	<i>insignis</i> ..	17
<i>Clarias</i> ..	199	<i>kolensis</i> ..	17
<i>batrachus</i> ..	197	† <i>kozminskii</i> ..	15, 16, 155, 171,
<i>Clariidae</i> ..	197, 149		188
<i>Cleistogamia holothuriana</i>	207, 215	<i>strenuus</i> ..	17, 19, 21
<i>Clupeidae</i> ..	194, 350	<i>strenuus divergens</i>	155, 156, 158, 159,
<i>Cobitidae</i> ..	196, 198, 349		162, 163, 165, 166,
<i>Coccidae</i> ..	352		168, 169, 170, 171, 188
<i>Coelentrata</i> ..	353	<i>vicinus</i> ..	17
<i>Coenomyiidae</i> ..	353	<i>vicinus kikuchii</i>	17
<i>Coleoptera</i> ..	352	<i>vicinus vicinus</i> ..	17
<i>Colletidae</i> ..	353	<i>viridis</i> ..	16
<i>Colubridae</i> ..	350	<i>Cyclops (Apocyclops) dengizicus</i>	140
<i>Columbae</i> ..	111, 133		141, 174
<i>Columbidae</i> ..	111, 133	<i>panamensis</i> ..	142
<i>Copépodes</i> ..	139, 153	<i>royi</i> ..	142
<i>Copsychus saularis saularis</i>	109, 116	<i>Cyclops (Metacyclops) minutus</i> ..	139
<i>Coracias benghalensis bengha-</i>		<i>planus</i> ..	77, 139, 174
<i>lensis</i> ..	110, 126	<i>Cyclops (Microcyclops) bicolor</i> ..	23, 24
<i>Coracias garrula</i> ..	358	<i>linjanticus</i> ..	73, 74, 86
<i>Coraciidae</i> ..	110, 126, 351	<i>minutus</i> ..	77
<i>Coraciiformes</i> ..	351	<i>moghulensis</i> ..	24, 25, 26
<i>Coraciiformes</i> ..	110, 125	† <i>richardi</i> ..	22
<i>Cordyluridae</i> ..	353	<i>tricolor</i> ..	74
<i>Coronofilaria</i> ..	357, 358	<i>uenoi</i> ..	26
<i>coronata</i> ..	358	<i>varicans</i> ..	73, 85, 86
<i>pillersi</i> ..	358	<i>varicans subaequalis</i>	73
<i>Corvidae</i> ..	109, 111	<i>Cyclorrhapha</i> ..	353
<i>Cossidae</i> ..	352	<i>Cyclostoma</i> ..	349, 350
<i>Cotylurus</i> ..	209	<i>Cylindrotoneinae</i> ..	52
<i>orientalis</i> ..	209	<i>Cymatophoridae</i>	352
<i>Crassiphiala</i> ..	213, 214, 216	<i>Cyprinidae</i> ..	7, 194, 198, 349
<i>Crepidula</i> ..	223, 226, 227, 233,	<i>Cyprininae</i> ..	194
	256, 304, 314	<i>Cyprinion</i> ..	1, 2, 5
<i>adunca</i> ..	296	<i>irregulare</i> ..	1
<i>fornicata</i> ..	227	<i>microphthalmum</i>	2
<i>Crocodicicola</i> ..	211	<i>Cyprinodontidae</i> ..	197
<i>Crossochilus latea</i> ..	210	<i>Cyprinoid</i> ..	198
<i>Crustacea</i> ..	351	<i>Cyprinoidea</i> ..	194, 198
<i>Crustaces</i> ..	139, 341, 342, 345	<i>Cyprinus</i> ..	10
<i>Ctenacrosceles</i> ..	35	<i>auratus</i> ..	10
† <i>cerbereanus</i> ..	29	<i>nukta</i> ..	10, 13, 200
<i>dives</i> ..	33	<i>Cypselidae</i> ..	351
<i>dravidicus</i> ..	32	<i>Cyrtacanthacridinae</i>	384
<i>flavoides</i> ..	34	<i>Cyrtidae</i> ..	353
† <i>umipennis</i> ..	29	<i>Cysticercus fasciolaris</i>	201, 202
<i>pallifrons</i> ..	33		

	Page.
D	
Dactylolabis ..	63
Dactylophoridae ..	334, 335
Dactylophorus ..	334
Danio ..	199
aequipinnatus ..	194
Dascillidae ..	353
Decapoda ..	389
Delsman ..	306
Dendrocitta vagabunda ..	
vagabunda ..	109, 111
Dendrorhynchus ..	334
systemi ..	335
Dermestidae ..	352
Desert Locust ..	369, 371, 372, 373, 375, 377, 379, 381, 383
Diacyclops ..	154
Dicranomyia ..	55
albitarsis ..	53
ornatipes ..	67
tinctipennis ..	53
Dicranota (Rhaphidolabis) ..	
sordida ..	61
Dicruridae ..	109, 120
Dicrurus coerulesceus coerulesceus ..	109, 120
macrocerus ..	120
macrocerus peninsularis ..	109, 120
peninsularis ..	120
Diplostomidae ..	216
Diplostomini ..	212, 213
Diplostominae ..	212
Diplostomum ..	210, 213, 216
Diplostomum (Syn. Proalaria) ..	210
buteii ..	209
ketupanensis ..	209
thaparia ..	210
Diptera ..	31, 352, 353
Diopsidae ..	353
Diotocardia ..	274
Discobola ..	54
Discognathus (= Garra) ..	199
Doliocystis ..	335
Dorosomidae ..	350
Dracunculus medinensis ..	343, 344, 345
Dreissensia ..	267, 268
Drepanulidae ..	352
Dryobates mahrattensis ..	110, 125
Dussumieriidae ..	350
Dytiscidae ..	352

E	
Echinodermata ..	353
Echinomera ..	328, 334
Ectocyclops phaleratus ..	158, 164, 188
rubescens ..	155, 159, 161, 162, 188, 165, 170, 172, 173
Egretta alba ..	207
garzetta garzetta ..	137

	Page.
Elasmobranchii ..	349, 350
Elasmobranchs ..	350
Elateridae ..	353
Elopidae ..	350
Emydidae ..	350
Endomychidae ..	352
Engraulidae ..	350
Epicaardae ..	390
Epiplemidæ ..	352
Esomus barbatus ..	194
Eriopterini ..	64
Etioplus ..	199
suratensis ..	197
Eucamptus ..	358
obtusus ..	358
Eucyclops ..	78, 82
agiloides ..	78, 81, 93, 159, 169, 188
errulatus ..	82
eucanthus ..	83, 94, 155, 159, 164, 167, 188
farsicus ..	159, 164, 188
macruroides ..	83, 84, 94, 155, 159, 188
serrulatus ..	16, 26, 77, 78, 79, 80, 81, 83, 88, 89, 92, 93, 155, 156, 158, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173
speratus ..	82, 83, 93
ruttneri elburziensis ..	155, 157, 159, 166, 167, 168, 188
Eucyclops (Tropocyclops) ..	
confinis ..	75, 77, 87
frequens ..	75
multicolor ..	75
prasinus ..	75, 76, 87, 139
Eugregarinida ..	335
Enhydria enhydria ..	215
Eumasticidae ..	384
Eupterotidae ..	352
Eurhamphidia ..	61
Eurycoma ..	105
F	
Falconidae ..	132, 351
Filaria coronata ..	358
Filariidae ..	357
Filarioidea ..	357, 358, 359
Fiona ..	233
Fissurella ..	284
Fontonema ..	105
Formicidae ..	353
Fusus ..	231, 296, 305, 306, 315
Fringillidae ..	110, 121
Fulgoridae ..	352

G	
Gagata itchkoea ..	197
Garra bicornuta ..	196
jerdoni ..	196
mullya ..	196
stenorhynchus ..	196
Gastropoda ..	217, 296, 303, 313
Gastropods ..	219
Gavialis gangeticus ..	211

	Page.		Page.
J			
Jaassidae ..	352	Limonia (Dicranomyia) innocua	55
Jerdonia ..	199	<i>lutea</i> ..	30
		<i>pallida</i> ..	30
		<i>punctipennis</i> ..	30
		<i>sphagnicola</i> ..	30
K		Limonia (Dacobola) sp. prox.	
†Kantaka ..	8, 9	<i>annulata</i> ..	53
		Limonia (Doanecmyia)	
		<i>altitarsis</i> ..	53
L		Limonia (Geranomyia)	
Labeo ..	5, 6, 11, 199	† <i>cernua</i> ..	55, 56, 58
<i>ariza</i> ..	196	<i>feuerborni</i> ..	57, 58
<i>boga</i> ..	6, 196	<i>flaviventris</i> ..	57
<i>boggut</i> ..	196	<i>fletcheri</i> ..	60
<i>calbasu</i> ..	196	† <i>fortibasis</i> ..	57, 58
<i>dussumieri</i> ..	196	<i>genitalis</i> ..	60
<i>fibriatus</i> ..	196	† <i>gravellyana</i> ..	58, 59
<i>Kawrus</i> ..	196	<i>pallida</i> ..	30
<i>kontius</i> ..	196	<i>poliophara</i> ..	57
<i>nukta</i> ..	11, 12	<i>semistriata</i> ..	57
<i>potail</i> ..	196	Limonia (Libnotes) <i>affinis</i>	30
Lacertidae ..	350	† <i>buruicola</i> ..	30
Lamiidae ..	109, 118, 353	† <i>depicta</i> ..	30
Lanius schach erythronotus	109, 118, 119	† <i>diaphana</i> ..	30
Lasiocampidae ..	352	<i>greeni</i> ..	53
Laubuca atpar ..	194	<i>lutea</i> ..	30
Lecudina ..	335	† <i>musciicola</i> ..	30
Lecythion ..	335	† <i>palaeta</i> ..	30
<i>thalassemiae</i> ..	335	<i>poeciloptera</i> ..	53
Leidynema ..	104	<i>punctipennis</i> ..	30
Leidynemella ..	104	<i>sphagnicola</i> ..	30
Lepidocephalichthys (= Lepido-		† <i>solicita</i> ..	30
<i>cephalus</i>) ..	199	<i>subcostalis</i> ..	30
Lepidocephalus thermalis ..	196	<i>tripunctata</i> ..	30
Lepidoptera ..	352	Limonia (Limonia) <i>albitarsis</i> ..	53
Leporidae ..	351	† <i>flagellaris</i> ..	30
Leptoceridae ..	352	<i>tripunctata</i> ..	30
Leptocoma asiatica asiatica	110, 124	Limonia (Rhipidia) † <i>productina</i>	30
Leucocirca aureola aureola	109, 118	<i>pulchra</i> ..	30
Libnotes <i>greeni</i> ..	53	<i>rostrifera</i> ..	30
Limax ..	223, 233, 256, 260, 261,	<i>subcostalis</i> ..	30
267, 286 296, 302, 303, 315		Limoniinae ..	53
<i>agrestis</i> ..	268	Limoniini ..	53
<i>maximus</i> ..	268, 300	Littorina ..	223, 233, 234, 254, 256,
Limnobia ..	53	257, 259, 267, 268,	
Limnophila ..	63	295, 296, 298, 300,	
<i>bivittata</i> ..	62	303, 304, 314, 315	
† <i>manipurensis</i> ..	63, 64	<i>obtusata</i> ..	227
<i>multipunctata</i> ..	62	Lobivanellus indicus indicus	111, 135
<i>pendleburyi</i> ..	62	Locusta migratoria	375, 377, 383, 384
† <i>racana</i> ..	61, 62	Locusta migratoria migratorioides	371,
<i>senior-whitei</i> ..	62	372, 373, 384	
Limnophilidae ..	352	Locustana pardalina ..	371
Limonia ..	55	Locusts ..	374
<i>flagellata</i> ..	30	<i>Lumbricus muris</i> ..	203
Limonia (Dapanoptera)		Lygaeidae ..	352
† <i>candidata</i> ..	30	Lymantriidae ..	352
† <i>meijereana</i> ..	30	Lymnaea ..	261, 286, 300, 302, 307
<i>pallida</i> ..	30		
<i>pulchra</i> ..	30	M	
<i>taivanella</i> ..	54		
Limonia (Dicranomyia) <i>absens</i>	55	Machlolophus xanthogenys	
<i>affinis</i> ..	30	<i>aplonotus</i> ..	109, 112
<i>annulata</i> ..	54	Macrocylops <i>albidus</i>	155, 158, 164
<i>aperta</i> ..	55	168, 170, 172, 188	
<i>armorica</i> ..	54	<i>fuscus</i> ..	155, 158, 170, 188
† <i>bhutanica</i> ..	54, 55		

	Page.		Page.
Macrones (= <i>Mystus</i>)	199	Metazoa ..	332
Macropodus capanus	198	Microcyclops	73, 342
Macrura ..	389	bicolor 153, 159, 168,	189
Madreporaria ..	353	linjanticus 155, 159, 164, 166, 171,	172, 173, 189, 344, 345
Malacodermidae ..	353	moghulensis 159, 165, 189,	344
Malacopterygii ..	349, 350	richardi ..	159, 171, 189
Mantispidae ..	352	varicans 23, 24, 155, 156, 158, 161,	162, 163, 164, 165, 166, 169,
Mastacembelidae ..	198	170, 171, 172, 173, 189,	344
Mastacembelus ..	199	sp.	345
armatus ..	198	Microcyprini ..	197
puncalus ..	191, 198	Microcyprini (Cyprinodontidae) ..	198
Mastophorus ..	203	Milvus migrans govinda ..	132
columbiana ..	203	†Mirzaiella ..	100, 102, 105
echinurus ..	203	†asiatica ..	95, 101, 102
gracilis ..	203	Mochokidae ..	349
labiodentata ..	203	Molannidae ..	352
marsupialis ..	203	Mollusca ..	217, 284, 351
muris ..	201, 202, 203	Molpastes cafer pallidus	109, 114
muris ascaroides ..	203	Molophilus tetracanthus	31
muris muria ..	203	Molophilus (Molophilus)	
oligodonta ..	203	†tetrodonta ..	31
Mecoptera ..	352	Moniliformis moniliformis ..	202
†Megacepon ..	385, 389, 390	Monotocardia ..	284
†choprai ..	385, 386, 387, 388	Monotocardian ..	274, 284
Megaocyclops viridis 155, 156, 158, 159,		Monticola solitaria pandoo	109, 116
160, 161, 162, 163,		Motacilla cinerea caspica	110, 123
166, 167, 168, 169,		maderaspatensis	110, 122
170, 171, 172, 173, 188		Motacillidae ..	110, 122
Megalopidae ..	350	Muridae ..	351
Megaloptera ..	352	Mus decumanus ..	201, 204
Megapodidae ..	351	musculus ..	202
Melanoplus differentialis 383,	384	Muscicapidae ..	109, 117
Meropidae ..	110, 127, 351	Mustelidae ..	351
Merops orientalis orientalis 110, 127		Mutillidae ..	353
Mesocyclops ..	153, 342	Mycetophilidae ..	353
hyalinus ..	190	Myliobatidae ..	350
iranicus ..	143	Myophonus coeruleus	
leuckarti 26, 142, 143, 145, 151,		horsfieldii ..	109, 117
153, 155, 156, 158,		Mystacoleucus ogilbii ..	196
160, 161, 162, 163,		Mystus aor ..	197
164, 165, 166, 167,		cavasius ..	197, 363, 365
169, 170, 171, 172,		keletius ..	197
173, 174, 189, 343,		malabaricus ..	197
344, 345		montanus ..	197
rylovi ..	145, 190	oculatus ..	197
vermifer ..	145, 190	punctatus ..	197
M. (Thermocyclops) analogus ..	150	vittatus ..	197
hyalinus ..	149, 150	Myrmeleonidae ..	352
†microspinulosus 151, 152, 153, 187		Myxinidae ..	350
rylovi 145, 146, 147, 148,			
149, 150, 152, 153,			
181, 182, 183, 184			
tinetus ..	21		
vermifer 145, 146, 147, 148, 149,			
150, 151, 182, 185			
Mesostephanus appendiculatoides 215			
burmanicus ..	215		
Metacyclops ..	139, 141, 154		
grandispinifer 155, 159, 160, 161,			
163, 164, 165, 166,			
169, 189			
minutus 155, 156, 158, 159, 160,			
161, 162, 164, 165, 166,			
167, 168, 169, 170			
planus 155, 156, 159, 160, 162,			
163, 167, 169, 170, 189			
Metamera ..	334		
schubergi ..	335		

N

Nakta ..	11
Naktashendva ..	11
Nassa ..	268, 305
mutabilis ..	315
Natrix piscator	214, 215
Nectariniidae	110, 124
Nematostrirea serpens	214
Nemachilus ..	199
bhimachari ..	196
botia ..	196
dayi ..	196
denisonii ..	196
evezardi ..	196
monilis ..	196

	Page.
Patagonia	31
Patella	256, 257, 300
Pauliniinae	384
Paussidae	352
Pectinibranchiata	284
Pectinibranchiata	284, 285
Pediciini	61
Pentatomidae	352
Percoidae	198
Percomorphi	198
Pericrocotus peregrinus pere-	
grinus	109, 119
oinnamomeus	119
Perilampus (= Laubuca)	199
Periplaneta americana	104
Periplaneticola	102, 104
mirzaia	95, 104
†periplaneticola	95, 102, 103, 104
Petromyzontidae	350
Philopotamidae	352
Phoenicurus ochruros rufi-	
ventris	109, 115, 116
Phryganeidae	352
Pharyngostomum	212
Phasianidae	135, 351
Phasmidae	352
Phylloscopus	107
Physa 223, 227, 233, 256, 261, 263,	
267, 268, 304, 306, 307, 314	
Pioidae	110, 125
Pila	220, 221, 225, 227,
	228, 231, 237, 240,
	254, 256, 257, 258,
	259, 261, 264, 267,
	268, 274, 279, 281,
	284, 285, 287, 295,
	296, 298, 300, 302,
	303, 304, 305, 306,
	307, 309
gigas 260, 263, 265, 267, 314	
globosa 217, 219, 222, 223,	
	227, 274, 275, 279,
	282, 286, 304, 314
turbinis	222
Pilidae (= Ampullaridae)	285
Pistia	220
Placobdella marginata	335
Planipennia	352
Planorbis 223, 226, 227, 233, 256,	
	260, 261, 267, 268, 286,
	300, 302, 307, 314, 315
Platyhelminths	353
Plegadidae	136
Plotosidae	349
Podargidae	351
Polyacanthidae	198
Polyacanthus	199
Polycentropidae	352
Polychaeta	353
Polyphaga	352
Polyzoa	353
Porifera	353
Portunicepon	389, 390
Posthodiplostomum	213
botaui	213
grayii	213
Potamogeton crispus	341
Pristidae	350

	Page.
Proacetabulorchis	215
Proalaria	210, 213
alcodensis	210
Proarioides	214
Proarioides	214, 216
tropidonotis	214
Procellariidae	351
Procrassiphiala	210, 212, 215
halcyonae	212
triticum	212
Procyonidae	351
Prohemistomineas	216
Prohemistomum	215
serpentum	215
Proscopiidae	384
Prosobranchs	257, 307
Prosopis spicigera	341
Protospirura	203
ascaroidea	203
bonnei	203
muricola	203
muris	203
suslica	203
numidica	203
Pseudeutropius	199
atherinoides	197
Pseudodiplostomum	214
cochlearis	214
fraterni	214
Pseudogyps bengalensis 110, 126, 131,	
	132
ginginianus	132
Pseudolimnophila	63
Pseudonymus	104
Pseudostrigea	209
Psilorhynchidae	349
Psittacidae	110, 126, 351
Psittacula cyanocephala cyan-	
ocephala	110, 126
Psychidae	352
Psychomyidae	352
Pterocephalus	323, 324
giardi	324
giardi corsicum	324
nobilis	323, 324
Pulicidae	353
Proeutropiichthys taakree	197
Pulmonata 256, 286, 287, 306	
Pulmonates	268, 286, 307
Pulvinifer	208
Pycnonotidae	109, 114
Pyrgomorphinae	384
Q	
Quadrigyridae	363, 365, 366
Quadrigyris	366, 367
R	
Raillietina celebensis 201, 205	
celebensis paucicapsulata	205
Rajidae	350
†Raosentis	363, 366, 367
†podderi	363, 364
Raphidiidae	352
Rasbora	199
caverii	194
daniconius	194
rasbora	194

	Page.		Page.
Rasborinae	194	niger	210
Rattus rattus	202	Scincidae	350
Reduviidae	352	Sciomyzidae	353
Reptilia	350	Scolopacidae	111, 136
<i>Rhaphidolabis indica</i>	61	Scolopacinae	351
Rhinobatidae	350	Scolopendra	324
Rhinidae	350	cingulata	323, 324
Rhinoptera	361	morsitans	323, 324, 325, 326, 327, 331, 334, 335
<i>adpersa</i>	362	<i>morsitans sensu stricto</i>	324
<i>encenadae</i>	362	<i>oraniensis</i>	324
<i>javanica</i>	362	<i>oraniensis lusitanica</i>	324
<i>jayakari</i>	362	<i>subspinipes</i>	323, 324
<i>jussieui</i>	362	<i>sp.</i>	324
<i>lalandii</i>	362	Scombresocoidae	197
<i>neglecta</i>	362	Scyllidae	350
<i>peli</i>	362	Selachii	350
<i>polyodon</i>	362	Semiplotus brevidorsalis	9
<i>quadriloba</i>	362	Sericostomatidae	352
<i>tsewelli</i> 361, 361A, 362, 362A		Serpentes	350
<i>steindachneri</i>	362	Sesarma tetragonum	385
Rhinopterid	361	Sessiidae	352
Rhinopteridae	350	Seticephalus	334
Rhopalocera	352	Sevirianoia	105
Rhopalonia	334	Sialidae	352
Rhynchobdellidae	335	Sicydium	200
Rhyacophilidae	352	Sicydium (in par= <i>Sicyopterus</i>)	199
Rhynchota	352	Silonopangasius childreni	197
Rhysodidae	352	Silundia (=Silonia)	199
Ridgeworthia rami	208	Siluridae	197, 349
Rita	199	Siluroidea	197, 198
<i>hastata</i>	197	Silurus	14, 199, 200
Rodentia	351	<i>cochinchinensis</i>	193, 197
Rohtee	199	<i>wynaadensis</i>	193
<i>cotio var. cunma</i>	196	Sisoridae	197, 349
<i>neilli</i>	196	Sitta castanea castanea	109, 112
S		Sitta frontalis	112
Saccobranchus (=Heteropneustes)	199	Sittidae	109, 112
Salmonidae	350	Sphingidae	352
Sapromyzidae	353	Sphyrinidae	350
Sarcogyps calvus	209, 211, 214	Spinacidae	350
Saturniidae	352	Squamata	350
Sauria	350	Squamofilaria	357, 358
Saxicola caprata bicolor	109, 115	<i>†choprai</i>	357, 358
<i>torquata indica</i>	109, 115	<i>coronata</i>	358
Scaphiodon	1, 2, 5, 8, 200	<i>pillersi</i>	358
<i>brevidorsalis</i>	1, 3, 5, 8, 9	Staphylinidae	352
<i>irregularis</i>	1, 2	Stenopsychidae	352
<i>nashii</i>	1, 3, 4, 5, 8, 9	<i>Stibadocerella latifurcata</i>	52
<i>readingi</i>	1	<i>pristina</i>	52
<i>thomassi</i>	1, 2, 3, 4, 5, 8, 9	Stomiatidae	350
<i>watsoni</i>	1	Streblidae	353
Scaphiodon (in part = Osteo- chilus)	199	Streptoneura	285
Scarabaeidae	353	Streptopelia	107
Schilbeidae	197, 349	<i>chinensis suratensis</i>	111, 133
Schismatorhynchus	11, 12, 14, 200	<i>decaocto decaocto</i>	111, 134
<i>heterorhynchus</i>	11, 12	<i>orientalis meena</i>	111, 133
Schismatorhynchus (Nukta) nukta	10, 11, 12, 13, 196	<i>senegalensis cambayensis</i>	111, 134
Schismatorhynchus (Schismator- hynchus, heterorhynchus)	11, 12	Strigea	207, 208, 209, 216
Schistocerca gregaria	369, 372, 373, 375, 376, 377, 384	<i>annandalei</i>	208, 210
Schistocerca perigrina	373	<i>elongata</i>	208
Scizothorax cuvivrons	210	<i>elongata var. indica</i>	208
		<i>falconis</i>	208
		<i>falconis var. eaglesi</i>	208
		<i>globocephala</i>	208

	Page.
<i>Strigea orientalis</i> ..	209
<i>nephronis</i> ..	209
<i>streptocorpus</i> ..	209
<i>Strigeida</i> 207, 211, 215, 216, 351	
<i>Strigeides</i> ..	208
<i>Stylocephalus bahli</i> ..	340
† <i>indicus</i> ..	339, 340
<i>Stylommatophora</i> ..	286, 287
<i>Styrgomyia flava</i> ..	70
<i>fryeri</i> ..	72
<i>jacobsoni</i> ..	72
† <i>kempiana</i> ..	68, 69
<i>solocipennis</i> ..	70
† <i>susilae</i> ..	70, 71, 72
<i>Subulura andersoni</i> ..	201, 202, 203
<i>hindi</i> ..	202, 203
<i>Succinea</i> ..	223
<i>Suifunema</i> ..	105
<i>Symbranchus</i> ..	199
<i>Synentognathi</i> ..	197
<i>Synentognathi</i> (Xenentodonti- dae) ..	198
<i>Syphacia</i> ..	202
† <i>baylisi</i> ..	201, 202
<i>obvelata</i> ..	202
<i>stroma</i> ..	202
<i>Systemus</i> ..	335

T

<i>Tabanidae</i> ..	353
<i>Tachinidae</i> ..	353
† <i>Talpicola</i> ..	99, 104
† <i>talpicola</i> ..	95, 99, 100
<i>Teleostei</i> ..	349
<i>Teleostomi</i> ..	350
<i>Telosporidia</i> ..	335
<i>Testudines</i> ..	350
<i>Tetrigidae</i> ..	
<i>Teucholabis angusticapitis</i> ..	64, 65
<i>nocticolor</i> ..	64
<i>Teucholabis</i> (<i>Teucholabis</i>) an- nuloabdominalis ..	66, 67
<i>angusticapitis</i> ..	64
† <i>pruthiana</i> ..	65, 66
<i>Thalassema neptuni</i> ..	335
<i>Thelastoma</i> ..	105
<i>Thelastomatinae</i> ..	95, 102, 104, 105
<i>Thereiceryx zeylanicus</i> ..	110, 125
<i>Thereiceryx zeylanicus caniceps</i> ..	125
<i>kangrae</i> ..	125
<i>Therevidae</i> ..	353
<i>Theriskiornis melanocephala</i> ..	136
<i>Thermocyclops</i> ..	21, 145, 148, 149, 151, 153
<i>consimilis</i> ..	148
<i>decipiens</i> ..	148
<i>dybowskii</i> ..	155, 159, 165, 172, 189
<i>hyalinus</i> ..	158, 168, 189, 344, 345
<i>infrequens</i> ..	148
<i>microspinulosus</i> ..	159, 161, 189
<i>neglectus</i> ..	148
<i>oithonoides</i> ..	153

<i>Thermocyclops rylovi</i> 155, 156, 158, 159, 160, 161, 162, 163, 164, 167, 180, 172, 189	
<i>Thermocyclops</i> sp. ..	160, 167, 168
<i>tinctus</i> 155, 158, 159, 164, 165, 166, 168, 169, 189	
<i>vermifer</i> 155, 156, 158, 159, 160, 161, 162, 163, 164, 165, 166, 169, 170, 173, 189	
<i>Thrinchinae</i> ..	384
<i>Thynnichthys</i> ..	14
<i>Timaliidae</i> ..	109, 113
<i>Tinaegeriidae</i> ..	352
<i>Tipula</i> ..	29
<i>Tipula annulata</i> ..	53
<i>aluco</i> ..	49
<i>cinerea</i> ..	30
<i>dives</i> ..	33
<i>flavoides</i> ..	34
<i>fumipennis</i> ..	29
<i>himalayensis</i> ..	41
† <i>lombokensis</i> ..	30
<i>marmoratipennis</i> ..	49
<i>mittelli</i> ..	39
<i>princeps</i> ..	37
† <i>praeses</i> ..	29
<i>quasimarmoratipennis</i> ..	46
<i>serricornis</i> ..	34
<i>serrulata</i> ..	30
† <i>serrulifera</i> ..	30
<i>simillima</i> ..	47
<i>striatipennis</i> ..	48
<i>subtincta</i> ..	42
<i>tessellatipennis</i> ..	36
<i>Tipula</i> (<i>Acutipula</i>) <i>princeps</i> 29, 37, 38	
<i>Tipula</i> (<i>Lunatipula</i>) <i>holoteles</i> ..	50
<i>marmoratipennis</i> ..	29, 49, 50
<i>naviculifer</i> ..	50
<i>shogun</i> ..	50
<i>Tipula</i> (<i>Oreomyza</i>) <i>quadrifasciata</i> 49	
<i>striatipennis</i> ..	29, 48, 49
<i>T.</i> (<i>Sinotipula</i>) <i>tessellatipennis</i> 29, 36	
<i>T.</i> (<i>Tipulodina</i>) <i>annuloabdominalis</i> 66	
<i>simillima</i> ..	47
<i>Tipula</i> (<i>Vestiplex</i>) <i>biserra</i> ..	43
<i>brevis</i> ..	41
<i>distifurca</i> ..	44, 45
<i>himalayensis</i> ..	29, 41, 46
<i>mittelli</i> ..	39
<i>quasimarmoratipennis</i> ..	29, 43, 44, 46, 47
<i>reposita</i> ..	39, 41
<i>subtincta</i> ..	29, 42, 43, 44, 46
† <i>subreposita</i> ..	39, 41
<i>Tipulidae</i> ..	29, 31, 32, 353
<i>Tipulinae</i> ..	32
<i>Tockus birostris</i> ..	129
<i>Torpedinidae</i> ..	350
<i>Totaminae</i> ..	351
<i>Toxorhina</i> (<i>Ceratocheilus</i>) <i>fumi-</i> <i>pennis</i> ..	31
<i>Toxorhina</i> (<i>Toxorhina</i>) <i>fumi-</i> <i>pennis</i> ..	31
† <i>infumipennis</i> ..	31
<i>Tragulidae</i> ..	351
<i>Trapezicepon</i> ..	389, 390
<i>Travassosstominae</i> ..	214

	Page.		Page.
Travassosstomum ..	214	Upupidae ..	110, 130
natritis ..	215	Uraniidae ..	.. 352
tropidonotis ..	214	Uropeltidae ..	.. 350
Trematoda ..	207	Ursidae ..	.. 351
Trematode ..	216	Uvulifer ..	213, 214
Trematodes ..	215	ceryliformis ..	.. 213
Trichorhynchus ..	334	stunkard i ..	.. 213
Trichoptera ..	352		
Trictenotomidae ..	353		
Tringa hypoleucos ..	111, 136	V	
Trionychidae ..	350	Vallisneria ..	.. 220
Trochophore ..	217	Vermetes ..	231, 267, 268, 296
Trogonidae ..	351	Vespidæ ..	.. 353
Tropocyclops ..	75, 77	Viviparidae ..	.. 313
Tropocyclops confinis ..	155, 159, 164,	Vestipler ..	.. 44
	165, 166, 169, 188		
Tropocyclops prasinus ..	158, 167, 188		
Trygonidae ..	350	W	
Turbinars ..	351	Wallago (= Wallagonia) ..	199
Turbo ..	257	Wallagonia attu ..	197
Turdidae ..	109, 115		
Tursiops perniger ..	351	X	
Turdoides somervillei ..	109, 113	Xenentodon cancila ..	197
somervillei orientalis ..	113	Xenentodontidae ..	197
Tylognathus ..	11	Xylophilidae ..	353
Tylokepon bonnierii ..	389		
Tyto alba stertens ..	211	Z	
		Zygasmidae ..	352
U		Zizyphus ..	341
Umbrella ..	227		
Ungulata ..	351		
Upupa epos ceylonensis ..	110, 130		

RECORDS

of the

INDIAN MUSEUM

(A JOURNAL OF INDIAN ZOOLOGY)

Vol. XLIV, Part I

MARCH, 1942

	Page
Notes on Fishes in the Indian Museum.	
XLII. On the Systematic Position of the Indian Species of <i>Scaphiodon</i> Heckel. XLIII. On the Systematic Position of <i>Cyprinus nukta</i> Sykes. <i>Sunder Lal Hora</i>	1
Cyclopoides nouveaux du continent indo-iranien. III-IV. Knut <i>Lindberg</i>	15
The Oriental Tipulidae in the collection of the Indian Museum. Part II. Charles P. Alexander	29
Cyclopides (Crustacés Copépodes) de l'Inde.	
XI. Contribution à la connaissance de <i>Cyclops</i> (<i>Microcyclops</i>) <i>varicans</i> Sars et <i>Cyclops</i> (<i>Microcyclops</i>) <i>linjanticus</i> Kiefer.	
XII. Remarques sur quelques membres du sous-genres <i>Tropo-</i> <i>cyclops</i> Kiefer. XIII. Notes sur quelques membres du sous- genre <i>Eucyclops</i> s. str. <i>Knut Lindberg</i>	73
Nematodes parasitic on <i>Gryllotalpa</i>. M. A. Basir	95
On a collection of Birds from the Hoshangabad District (Central Provinces, India). M. L. Roonwal	107

Edited by the Director, Zoological Survey of India

PUBLISHED BY MANAGER OF PUBLICATIONS, DELHI
 PRINTED BY MANAGER, GOVERNMENT OF INDIA PRESS, CALCUTTA
 1942

NOTES ON FISHES IN THE INDIAN MUSEUM, XLII, XLIII.

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

XLII. ON THE SYSTEMATIC POSITION OF THE INDIAN SPECIES OF *SCAPHIODON* HECKEL.

Day¹ described five species from India in the genus *Scaphiodon* Heckel, and divided them into two groups on the presence or absence of barbels. The first group comprising two species—*S. watsoni* Day and *S. irregularis* Day—from the Sind Hills and the Salt Range, Punjab, is characterized by the possession of “A pair of maxillary barbels. Last undivided dorsal ray osseous, serrated” From their descriptions, it is also clear that they possess 7 branched rays in the anal fin, as is characteristic of other species of the genus known from Baluchistan, Southern Persia, Mesopotamia and Syria. The second group comprises three species—*S. thomassi* Day, *S. nashii* (Day) and *S. brevidorsalis* (Day)—which are found in the Western Ghats as low as the Nilgiri Hills. In these forms the barbels are absent, the last undivided ray of the dorsal fin is smooth and the anal fin is generally provided with 5 branched rays. The distinguishing features of the two groups make it abundantly clear that they are not congeneric and that *Scaphiodon*, as recognised by Day, is a heterogeneous assemblage of diverse forms.

In his note on *Cirrhina afghana* Günther, Berg² showed that the Sind and Punjab species of *Scaphiodon* belong to *Cyprinion* Heckel which is characterized by the following salient features :—

- i. Seven branched rays in the anal fin.
- ii. A more or less developed scaleless furrow between the occiput and the origin of the dorsal fin.
- iii. Dorsal with an osseous ray serrated behind and with 9-16 branched rays.
- iv. Scales subcircular.
- v. Barbels 2, angular.
- vi. Intestinal canal very long, with many convolutions.
- vii. Posterior chamber of the air-bladder long and narrow.

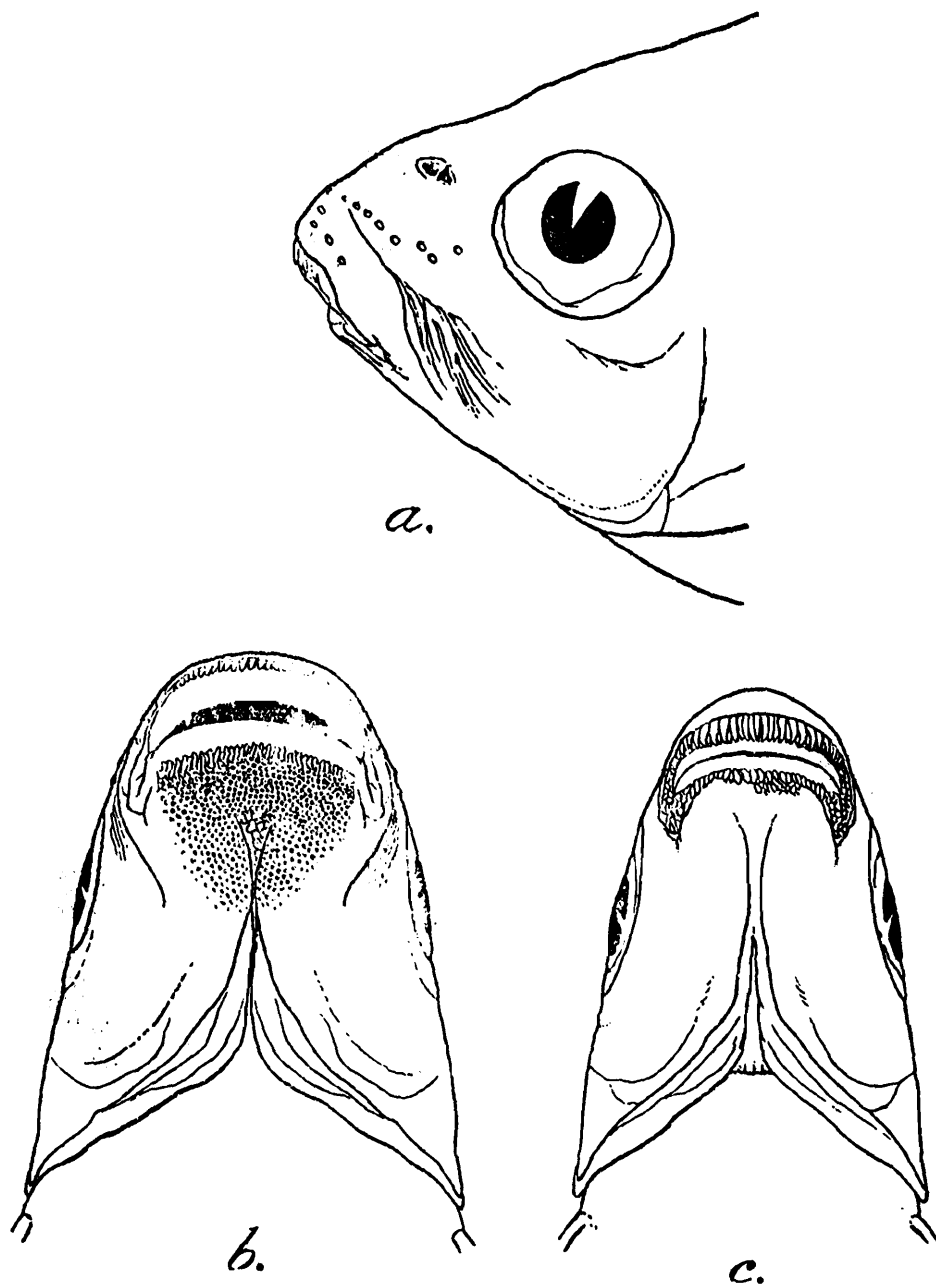
Berg also gave a preliminary list of all the species of *Cyprinion* belonging to the *watsoni*-group [small forms with (9) 10-11, mostly 10, branched rays in the dorsal and occurring in Southern Persia, Baluchistan, Sind and the Salt Range], with their respective synonyms and range of distribution. There would thus seem to be no uncertainty about the systematic position of the Indian species belonging to *Cyprinion* Heckel. For a general account and good figures of this type reference may be made to my³ account of *Scaphiodon readingi*, which, according to Berg, is synonymous with *Cyprinion irregulare* (Day).

¹ Day, F., *Fish. India*, p. 551 (1877); *Faun. Brit. Ind. Fish.* I, p. 283 (1889).

² Berg, L. S., *Rec. Ind. Mus.* XXXV, pp. 193-196 (1933).

³ Hora, S. L., *Rec. Ind. Mus.* XXV, p. 379, pl. viii (1923).

Though Berg has recently shown that *Cirrhina afghana* Günther is a synonym of *Cyprinion microphthalmum* (Day), it may be noted that Day¹ was already familiar with the fact that Günther's species belonged to *Scaphiodon*, for, in referring it to the synonymy of *S. irregularis*, he observed "Not only does this fish differ from those of the



TEXT-FIG. 1.—*Osteochilus* (*Osteochilichthys*) *thomassi* (Day).

a. Lateral view of head of one of Day's specimens (No. 2192): $\times 1\frac{2}{3}$; b. Ventral surface of head of same: $\times 1\frac{2}{3}$; c. Ventral surface of head of a young specimen (No. F12430/1): $\times 3\frac{1}{4}$.

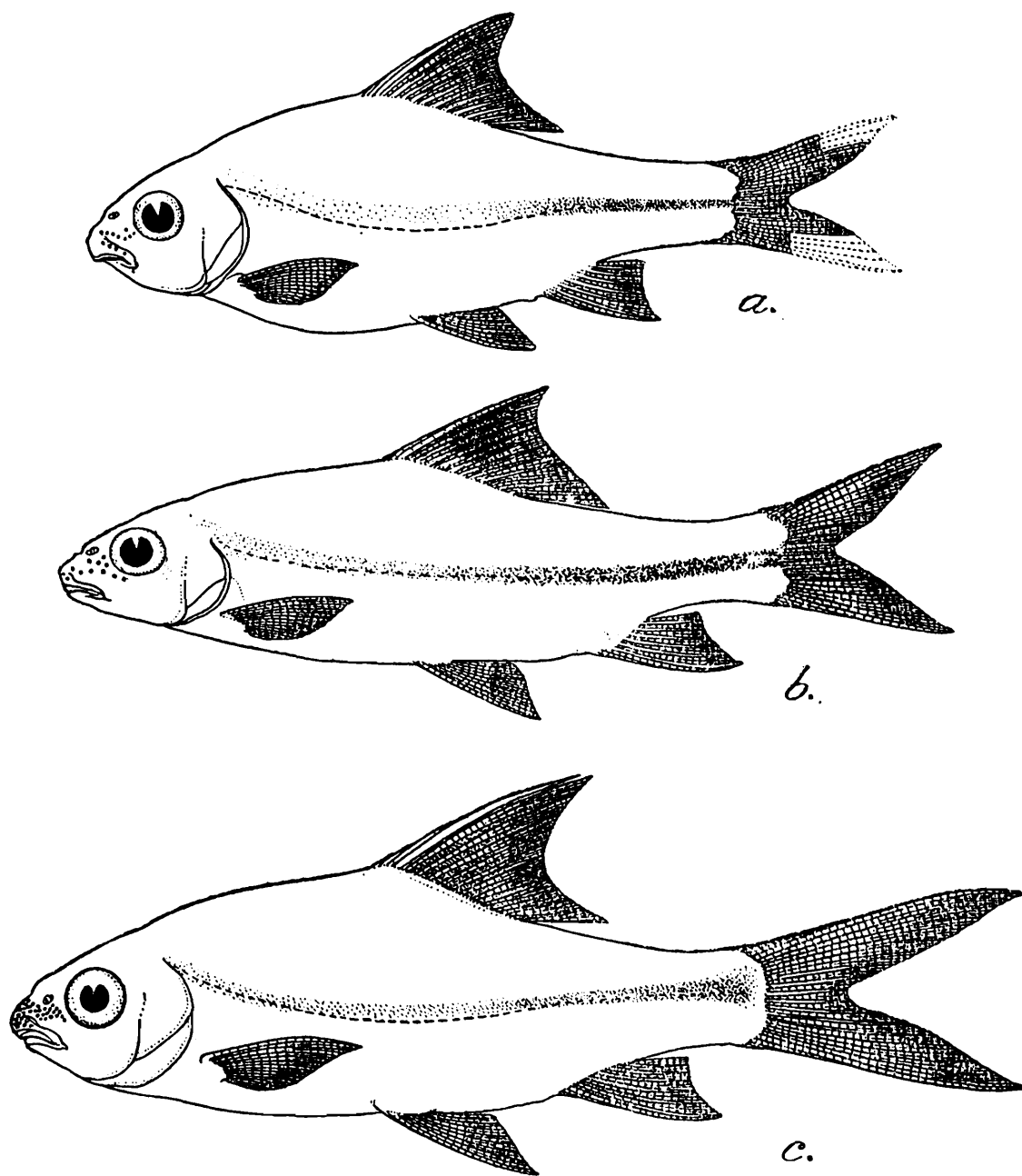
genus *Cirrhina* in the character of its mouth, but it likewise possesses a serrated osseous ray in the dorsal fin "

The position of the three South Indian species is somewhat difficult to define, for they not only differ in fundamental characters from *Cyprinion* and allied genera, but also among themselves in several important features. For instance, in *Scaphiodon thomassi* the lips are stated to be discontinuous, "the upper one fringed. Large pores on the snout and upper lip, and a line of them continued to under the eye" The

¹ Day, F., *Fish. India, Suppl.*, p. 807 (1888).

last undivided ray of the dorsal is weak and articulated. The lips of *S. nashii* are "thin, without any transverse fold across the lower one. Snout in the adult covered by papillae" In this species also the dorsal is without an osseous ray. In *S. brevidorsalis*, there are "three rows of large pores across the snout, and extending on to the preorbital bone; knob at symphysis badly developed: a thin cartilaginous covering to both jaws. Upper lip crenulated" The last undivided ray of the dorsal fin is osseous, very strong and entire.

Fortunately, specimens of all the three species are present in the collection of the Indian Museum so I am in a position to give further

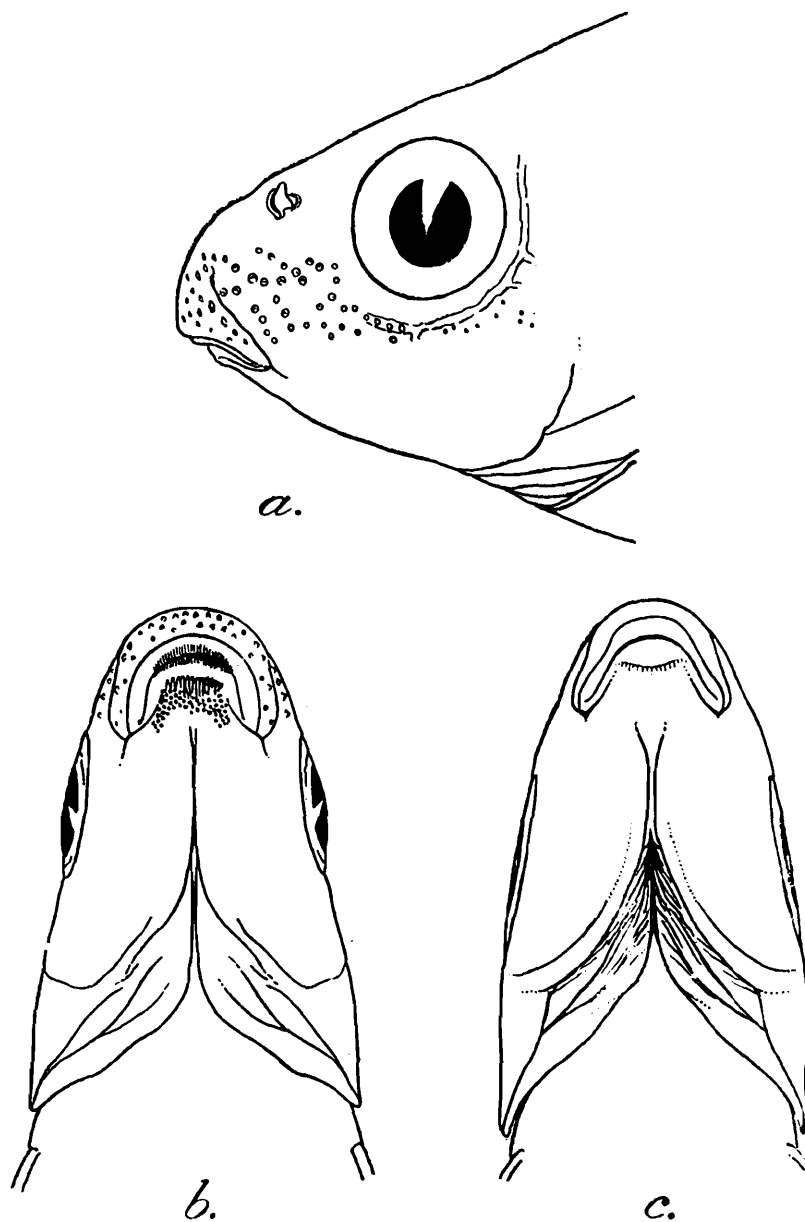


TEXT-FIG. 2.—Species of *Osteochilus* Günther from Peninsular India : Nat. Size.

a. *Osteochilus* (*Osteochilichthys*) *thomassi* (Day); b. *Osteochilus* (*Osteochilichthys*) *nashii* (Day); c. *Osteochilus* (*Kantaka*) *brevidorsalis* (Day)!

details regarding their salient features. Of *Scaphiodon thomassi*, Day had two examples from South Canara. One of these (No. 2192), probably the original of his figure in the *Fishes of India*, is now preserved in the collection of the Indian Museum. I find (text-fig. 1 b) that the lips are continuous and fleshy at the angles of the mouth, the upper lip, the basal and adnate part of which is covered by the rostral fold, has a free and

pendulous portion which is markedly fimbriated. The lower lip is transverse, does not cover the jaw and is attached to it at a short distance behind the mouth, only the lateral portions near the angles of the mouth are free and continuous with the upper lip; it is papillated along its anterior border which is followed by a transverse series of small



TEXT-FIG. 3.—*Osteochilus (Osteochilichthys) nashii* (Day).

a. Lateral view of head of the specimen No. F11145/1 from the Bhavani river: $\times 2$; b. Ventral surface of head of same: $\times 2$; c. Ventral surface of head of a young specimen from Shimoga, Mysore.

pores. There are oblique grooves on the sides of the snout running to the ventral surface which are more marked when the mouth is closed. Other features are as described by Day.

On further examination I find that the specimen from Coorg referred by me¹ to *S. thomassi* belongs to *S. nashii* and that one (No. F 12430/1) of the four specimens with broad mouth and fimbriated lips described by me² as *S. nashii* is referable to *S. thomassi* (text-fig. 1 c). The confusion had arisen owing to the fact that in the young of *S. thomassi* also the body is marked with a dark lateral band and the dorsal and anal fins are

¹ Hora, S. L., *Rec. Ind. Mus.* XXXIX, p. 19 (1937).

² Hora, S. L., *ibid.*, p. 9 (1937).

marked with dark bands (text-fig. 2 *a* & *b*). In spite of the common colour markings and uniformity in scale-counts and number of fin rays the two species can readily be distinguished by the structure of the mouth and associated parts and by the greater depth of body in *S. thomassi* ($3\frac{1}{2}$ in *thomassi* versus 4-5 in *nashii*).

In *S. nashii* the mouth is narrower, the lips are simple and continuous at the angles of the mouth; the portion of the lower lip between the lateral portions of the labial groove is considerably behind the tip of the jaw, to which it is firmly attached, and is plicated. Mukerji¹ redescribed this species from a specimen from the Bhavani River in the Nilgiri Hills. Attention may here be directed to a footnote by Day² on variation in the form of the snout in this species. He stated:—

“The mouth in this species alters so with age, that until I had compared specimens of my *Osteochilus Malabaricus* with gradations of *Scaphiodon Nashii* since obtained, I could not have believed in their being identical. In the young the jaws are compressed, each with a cartilaginous covering: the lips at the angles are thick and continuous, not continued across the chin. As age increases the mouth widens, the cartilaginous covering becomes more horny, and the colours of the fish alter.”

It has already been pointed out by Mukerji that Day's *Osteochilus malabaricus* is probably a misnomer as he seems to have described no species under this name. However, one thing is clear that Day regarded a certain fish from Malabar allied to *Osteochilus* Günther. *S. thomassi*, with fimbriated lips, has certainly great affinities with Günther's genus. I shall refer to this later.

Scaphiodon brevidorsalis (text-fig. 2 *c*) is readily distinguished from the other two species referred to above in the possession of a strong dorsal spine. In the young stage, the upper lip is feebly but distinctly fimbriated and the lower lip is papillated (text-fig. 4 *b*), but with growth the upper lip becomes crenulated (text-fig. 4 *d*) as described by Day. In the structure of the mouth and the associated parts, this species is more or less intermediate between the other two, and there can be no doubt that the three forms have much in common to be included in a single genus.

As remarked above, Day's species of *Scaphiodon* from the Western Ghats are abundantly distinct from *Cyprinion* Heckel (= *Scaphiodon* Heckel) and somewhat allied to *Osteochilus* Günther. The latter genus was established by Günther³ to accommodate a group of Cyprinid fishes from the 'East-Indian Archipelago' with the following characteristics:

“Scales rather large. Dorsal fin without osseous ray, with from thirteen to twenty-one rays, commencing in advance of the ventrals. Snout obtusely rounded, maxillary region scarcely thickened, and but slightly projecting beyond the mouth. Mouth transverse, inferior or subinferior, with the lips more or less thickened, fringed or crenulated; instead of the inner fold, as described in *Labeo*, the osseous part of the mandible forms a hard sharp transverse prominence; no symphysial tubercle. Barbels small, nearly always four. Anal scales not enlarged. Anal fin very short. Pharyngeal teeth 5.4.2—2.4.5.”

“Snout sometimes with horny tubercles which periodically fall off, leaving their former bases as shallow round depressions (pores).”

Day⁴ included three species from Burma under *Osteochilus*, but on an examination of the specimens in the collection of the Indian Museum I find that Day's specimens of *O. chalybeatus* (Cuv. & Val.) do not belong

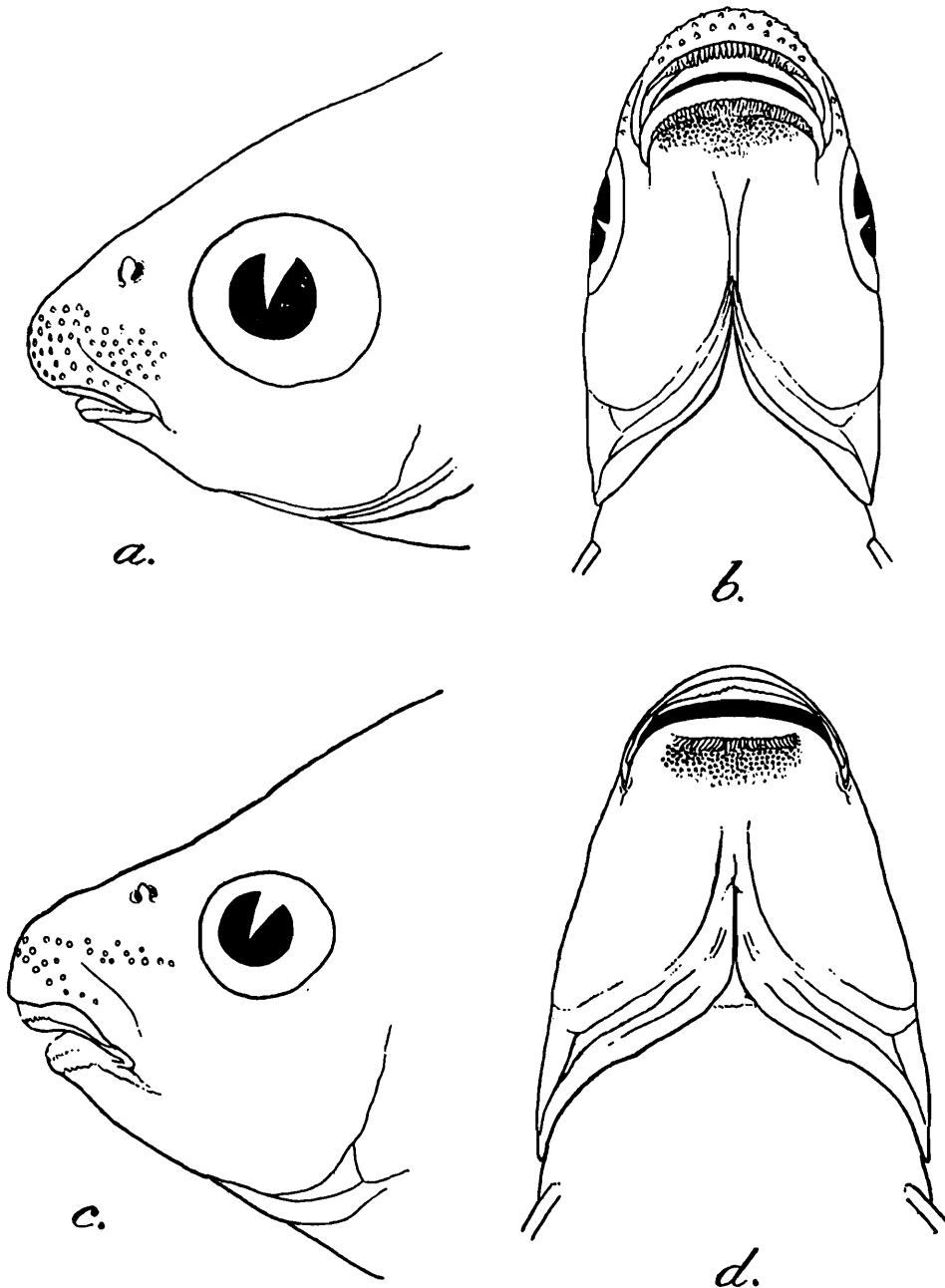
¹ Mukerji, D. D., *Journ. Bombay Nat. Hist. Soc.* XXXV, p. 169 (1931).

² Day, F., *Fish. India*, p. 552 (1877).

³ Günther, A., *Cat. Fish. Brit. Mus.* VII, p. 40 (1868).

⁴ Day, F., *Fish. India*, p. 545 (1877).

to this genus, but are referable to *Labeo* Cuvier. In fact, the two specimens of *O. chalybeatus* in the collection (Nos. 1527 and 1528) were,



TEXT-FIG. 4.—*Osteochilus (Kantaka) brevidorsalis* (Day).

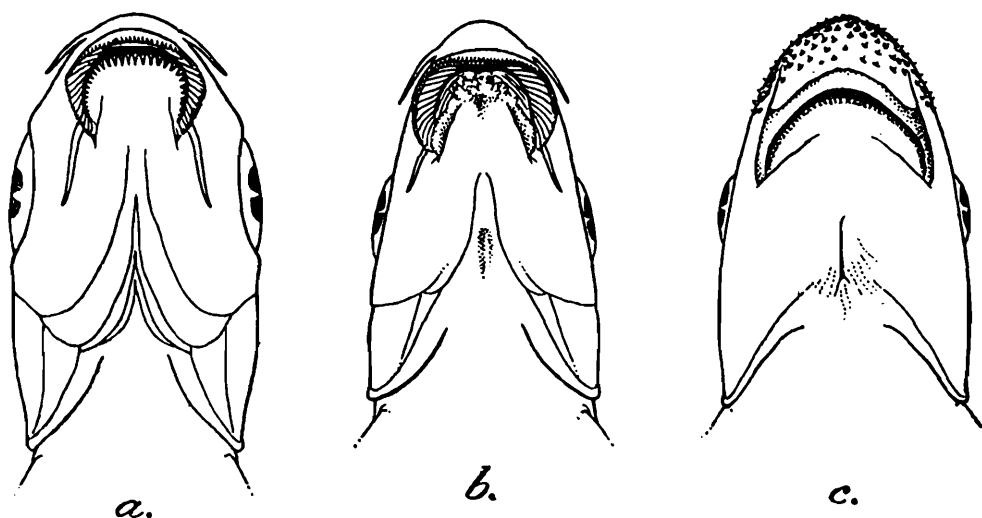
a. Lateral view of head of a young specimen from the Bhavani river: $\times 2\frac{2}{3}$; b. Ventral surface of head of same: $\times 2\frac{2}{3}$; c. Lateral view of head of an adult specimen from Mysore: $\times 1\frac{1}{6}$; d. Ventral surface of head of same: $\times 1\frac{1}{6}$.

entered in the Register on 21st May, 1879, as *Labeo*; they had been collected at Moulmein. One of these specimens (No. 1527) is probably the original of Day's description and figure, while the other has only 39 scales along the lateral line and 9 branched rays in the dorsal fin. The snout is covered with large well developed pores. This specimen seems to belong to *Labeo boga* (Hamilton). There are four specimens (Cat. Nos. 667-669) of *Osteochilus neilli* (Day) from Mandalay and Sittang but there is no specimen of *O. cephalus* (Cuv. & Val.). The last species was described by Cuvier and Valenciennes¹ as a *Labeo* and Vinciguerra² also showed that it is not referable to *Osteochilus*. It would thus appear

¹ Cuvier, G., and Valenciennes, A., *Hist. Nat. Poiss.* XVI, p. 374 (1842).

² Vinciguerra, D., *Ann. Mus. Civ. Stor. Nat. Genova* (2) IX, p. 265 (1890).

that Day had only one species of *Osteochilus* from Burma which is very similar to the large number of species known from the East Indies. Since



TEXT-FIG. 5.—Ventral surface of head and anterior part of body of three species of *Osteochilus* Günther from Burma.

a. *Osteochilus* (*Osteochilus*) *neilli* Day : $\times 2\frac{1}{3}$; b. *Osteochilus* (*Osteochilus*) *vittatus* (Cuv. & Val.) : $\times 1\frac{1}{3}$; c. *Osteochilus* (*Altigena*) *sondhii* Hora and Mukerji : $\times 1\frac{1}{3}$.

then Mukerji¹ recorded *O. vittatus* (Cuv. & Val.) from the Mergui District, Lower Burma, and Mukerji and I² described *O. sondhii* from the Salween River at Takaw in the Kengtung State, Burma. The last species possesses only two short maxillary barbels and the lips are only slightly fimbriated, but the lower lip, though free, still covers the jaw and is finely striated along its entire inner surface.

In recent years several new species of *Osteochilus*, with considerable variation in structure and form, have been described from Southern China and Siam, and it appears that the genus is widely distributed in south-eastern Asia with its range extending as far west as Burma. Two attempts have been made to group the species into subgenera. Lin³ in his account of the Chinese species of *Osteochilus* observed that :

"The Chinese species of this genus show some notable variations from those of the Indo-Australian Archipelago and the mainland of India. The small, superior eye, and the striate or smooth upper lip of *O. tungting* and *O. brevis*, for example, are characters not known to be present in Indian species. But variations of this sort are quite common among the closely allied species of *Cyprinidae* and can not be of generic significance. In my description, therefore, I have taken the liberty to add these two characters and other small points to the original diagnosis of *Osteochilus* by Günther."

Lin recognised two sub-genera in the genus *Osteochilus*, which he defined as follows :—

- A. Eye moderate or large, less than 5 in head ; cheek narrow ; skin of head not thickened. Lips thick, the upper one strongly striate, usually dilated laterally, continuous. Lower lip more or less papillate or fimbriate. Mandibular margin with transverse, hard, sharp, horny sheath. Barbels 4, or 2 maxillary ones only *Osteochilus*.
- AA. Eye small, its diameter more than $5\frac{1}{2}$ in head, immediately below upper profile of head. Cheek deep. Skin of head thickened. Mouth distinctly inferior ; lips thick, papillose, not fimbriate. Mandible with transverse, sharp horny edge. 2 minute maxillary barbels or none *Altigena*.

¹ Mukerji, D. D., *Rec. Ind. Mus.* XXXIV, p. 286 (1932).

² Hora, S. L., and Mukerji, D. D., *Rec. Ind. Mus.* XXXVI, p. 359 (1934).

³ Lin, S. Y., *Lingnan Sci. Journ.* Canton XII, p. 340 (1933).

Fowler¹ distinguished two subgenera among the species from Siam and the East Indies, *Osteochilus* and *Neorohita*, on the size of scales (small, 45 to 55 in lateral line in *Osteochilus* while moderate or large, 30 to 40 in lateral line in *Neorohita*) and general physiognomy—the eyes being more elevated and snout short in *Neorohita*.

It will be clear from the above that though Day's three species of *Scaphiodon* from the Western Ghats cannot be assigned to *Osteochilus* Günther (*sensu stricto*), they are very closely related to *Altigena* Lin in the structure of the mouth and associated parts though the eyes are relatively much larger. Relying on the number of scales, their position would appear to be among *Neorohita* Fowler, but the structure of the mouth parts is very different. I am, therefore, obliged to separate them from the large number of species that have hitherto been described under *Osteochilus*. For the two species without an osseous ray in the dorsal fin, *Scaphiodon thomassi* and *S. nashii*, I propose the subgenus *Osteochilichthys*; while for the unique species with a strong dorsal spine in the dorsal fin, *S. brevidorsalis*, Kantaka². Of the species of *Osteochilus* known from Burma, *O. neilli* Day, with 34 scales along the lateral line, four barbels, fimbriated lips and eye $3\frac{1}{2}$ times in length of head is referable to the subgenus *Osteochilus* Lin. *O. vittatus* (Cuv. & Val.), with 33-34 scales along the lateral line, four barbels, fimbriated lips and eye 3-4 times in length of head also pertains to the same subgenus. As regards general physiognomy, however, *O. neilli* is allied to *O. melanopleura* (Bleeker), the type of Fowler's subgenus *Osteochilus*, though its scales are of a moderate size. The third Burmese species, *O. sondhii* possesses 39-40 scales along the lateral line, two short maxillary barbels which are hidden in deep grooves, lips are slightly fimbriated or papillated (the lower lip, though free from the jaw, covers it entirely) and the eye is contained from 3.5—3.9 times in the length of the head. On the number of scales, therefore, all the three Burmese species should be included in the subgenus *Neorohita* Fowler, which is the commonest type in south-eastern Asia. It seems, however, that the species of *Osteochilus* from Southern China, Indo-China, Siam, Malay Peninsula and the Indo-Australian Archipelago are greatly in need of revision and regrouping.

Genus **Osteochilus** Günther.

Subgenus **Osteochilichthys**, nov.

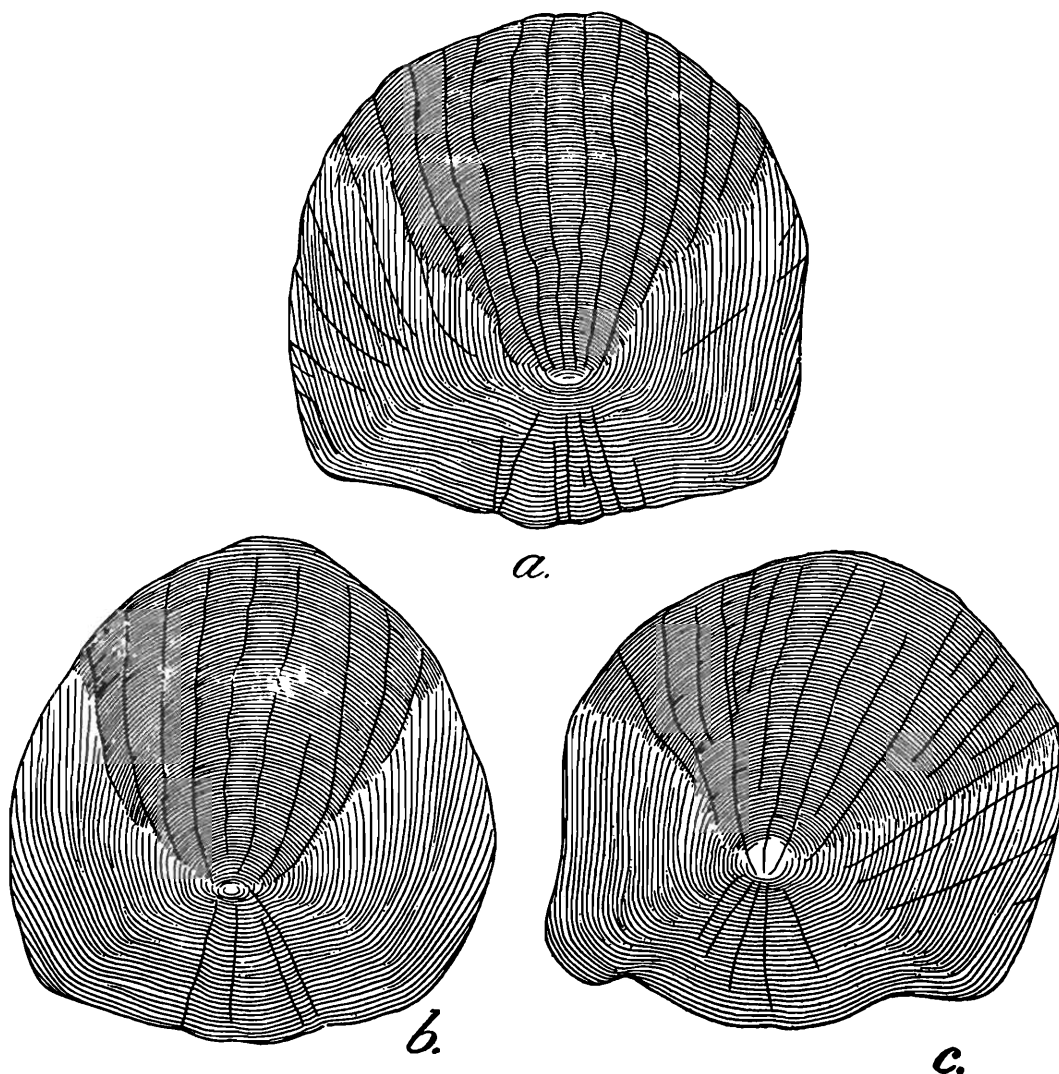
The members of this subgenus differ from the other subgenera of *Osteochilus* in having the lower lip attached to the lower jaw at some distance from the mouth, with the result that the lower jaw is not covered by the lip as is also the case in *Scaphiodon* Heckel. The eye is of a moderate size ($3-4\frac{1}{3}$ in length of head) and the number of scales along the lateral line varies from 39 to 43. ¹

¹ Fowler, H. W., *Proc. Acad. Nat. Sci. Philad.* LXXXIX, p. 179 (1937).

² Derived from a Sanskrit word meaning spine.

Type-species.—*Scaphiodon thomassi* Day.

The other species referable to *Osteochilichthys* is *S. nashii* (Day). Though agreeing in lepidosis and number of fin-rays, the two species



TEXT-FIG. 6.—Scales from below base of dorsal fin of species of *Osteochilus* from Peninsular India.

a. *Osteochilus* (*Kantaka*) *brevidorsalis* (Day), young specimen : $\times 12\frac{1}{2}$; *b.* *Osteochilus* (*Osteochilichthys*) *thomassi* (Day) : $\times 15$; *c.* *Osteochilus* (*Osteochilichthys*) *nashii* (Day) : $\times 12\frac{1}{2}$.

differ in their respective relative depth of the body and the structure of the mouth and associated parts as indicated above.

Subgenus **Kantaka**, nov.

This subgenus is proposed for *Scaphiodon brevidorsalis* (Day). It is closely allied to *Osteochilichthys* described above, but differs from it in the possession of a very strong osseous dorsal spine. So far as I am aware, this is the only species of *Osteochilus* in which the dorsal spine is osseous and strong.

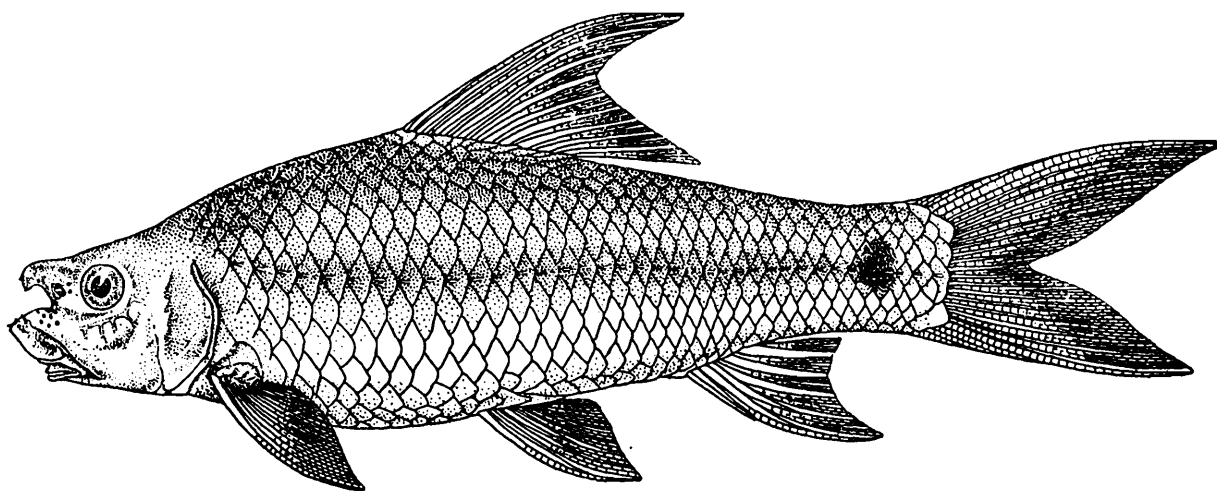
Type-species.—*Semiplotus brevidorsalis* Day.

Measurements in millimetres, scale-counts and fin-rays of *Osteochilus* (*Osteochilichthys*) *thomassi* (Day), *O.* (*Osteochilichthys*) *nashii* (Day) and *O.* (*Kantaka*) *brevidorsalis* (Day).

	<i>O. thomassi.</i>			<i>O. nashii.</i>				<i>O. brevidorsalis.</i>	
Total length	.. 166	143 + C.	82	141	104	95	92	264	103
Length of caudal	33	—	20	29	23	22	19	63	29
Depth of body	47	56	24	35	26	21	20	77	25
Length of head	31	33	16	26	19	18	17	43	18
Width of head	18	22	10	16	12	11	10	32	11
Height of head	26	28	13	19	16	14	14	41	15
Diameter of eye	9	10	5	7	6	6	6	11	7
Interorbital distance	12	17	7	11	8	7	7	23	8
Length of caudal peduncle.	19	21	9	18	12	11	12	32	11
Least height of caudal peduncle.	16	20	8	14	10	9	9	26	10
Scales along lateral line	40	39	40	43	41	41	41	40	41
Transverse rows of scales.	13	12	14	14	13	14	14	14	14
No. of predorsal scales	13	13	13	14	13	13	13	12	12
No. of rows of scales between L. 1. and V.	5	4½	5	5	5	5	5	5	5
No. of rays in dorsal	4/11	4/11	4/11	4/11	4/11	4/11	4/11	4/12	4/11
No. of rays in pectoral	14	14	14	14	14	14	14	14	14
No. of rays in ventral	9	9	9	9	9	9	9	9	9
No. of rays in anal	.. 2/6	3/6	3/6	3/5	3/5	3/6	3/5	3/6	3/5
No. of rays in caudal	19	19	19	19	19	19	19	19	19

XLIII. ON THE SYSTEMATIC POSITION OF *CYPRINUS NUKTA* SYKES.

In describing his *Cyprinus nukta* from the Inderanee river, 18 miles north of Poona, Sykes¹ stated that the character of its head—"with

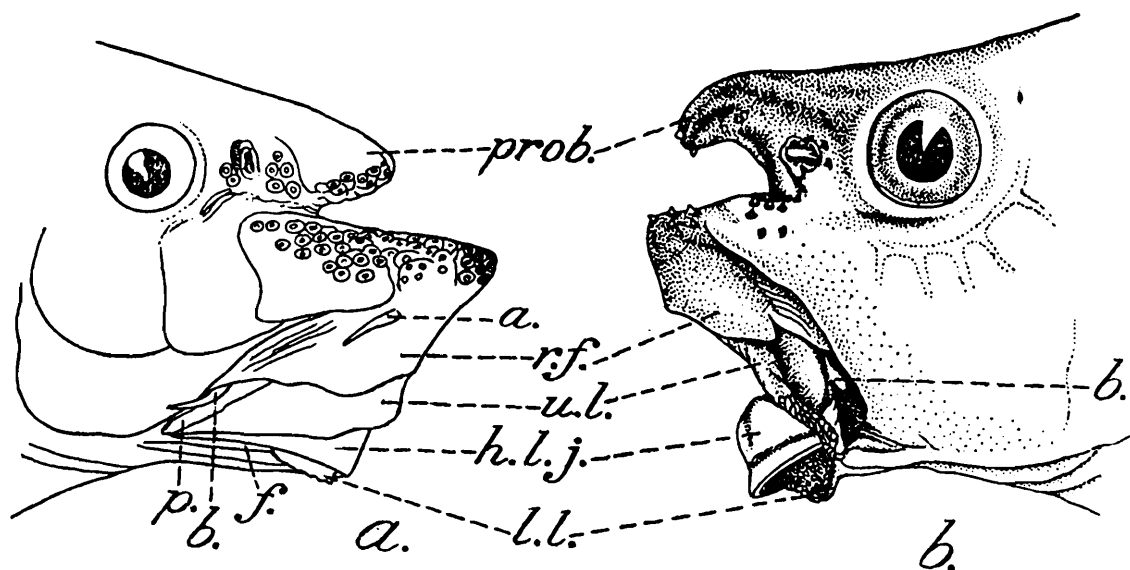


TEXT-FIG. 7.—Lateral view of *Schismatorhynchus* (*Nukta*) *nukta* (Sykes) : $\times \frac{1}{2}$.

two short horns or bosses on the space between the eyes"—is sufficient to distinguish it from all other species of *Cyprinus*. According to him, both Rüppell and Yarrell, after examining the fish, pronounced it as "a monstrosity of *C. auratus*" Sykes, however, found it very common in the Deccan and the local people recognised it as a distinct kind and called it by the specific name *Nukta*, in which reference is made to the

¹ Sykes, W. H., *Trans. Zool. Soc. London* II, p. 325 (1841).

fist-shaped proboscis on the snout. Jerdon¹ referred to it with a query, but Günther² included it definitely under the synonymy of *Carassius auratus*. Day,³ after examining two specimens from Poona, 10 and 12 inches respectively in length, included the species under *Labeo* Cuvier and gave a complete account of the fish. With regard to the structure of the head he observed, "Head compressed, snout projecting over the mouth and having a deep groove passing from one orbit to the opposite one, thus occasioning the appearance as if there were a blunt compressed knob, between and before the orbits" When further material became available to Day⁴ from "the rivers of the Deccan", he emended his first description to a certain extent. In the *Fauna* he⁵ gave two Marathi names of the species, *Nakta* and *Naktashendva*. A reference to the literature shows that this remarkable character in *Labeo*-like fishes is shared by only one other species, *Schismatorhynchus heterorhynchus* (Bleeker), for which Bleeker⁶ had proposed a distinct



TEXT-FIG. 8.—Lateral view of head of two species of *Schismatorhynchus* Bleeker.

a. *Schismatorhynchus* (*Schismatorhynchus*) *heterorhynchus* (Blkr.): $\times$ Nat. Size. After Weber and de Beaufort; *b.* *Schismatorhynchus* (*Nukta*) *nukta* (Sykes): $\times 1\frac{1}{4}$.

a. rostral barbel; *b.*, maxillary barbel; *f.*, frenulum; *h. l. j.*, horny layer of lower jaw; *l. l.*, lower lip; *p.*, prolongation of the lip; *prob.*, proboscis; *r. f.*, rostral fold; *u. l.*, upper lip.

genus, though Günther⁷ and later authors included it under *Tylognathus* Heckel or *Labeo* Cuvier. Weber and de Beaufort⁸ have recognised Bleeker's genus as valid and in giving its distribution noted "Fresh water of Indo-Australian Archipelago (Sumatra and Borneo); perhaps also represented on the Indian continent" Presumably the authors had in mind *Labeo nukta* (Sykes), for no other species of *Labeo* on the Indian mainland possesses a proboscis on the snout.

¹ Jerdon, T. C., *Madras Journ. Litt. Sci.* XV, p. 303 (1849).

² Günther, A., *Cat. Fish. Brit. Mus.* VII, p. 32 (1868).

³ Day, F., *Journ. As. Soc. Bengal* XLI, p. 319 (1872).

⁴ Day, F., *Fish. India*, p. 543 (1877).

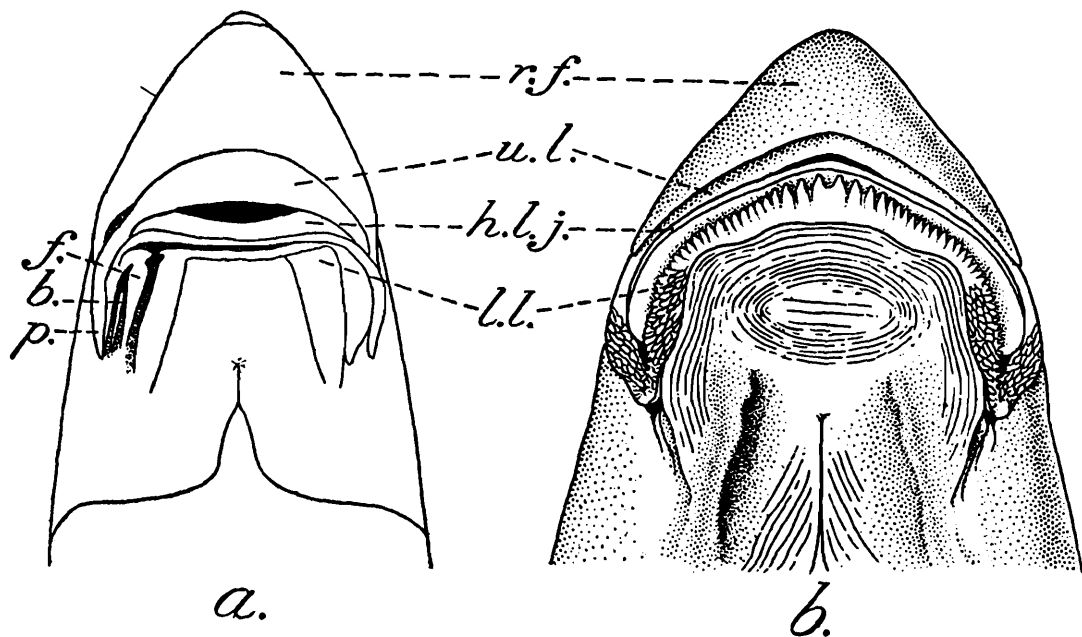
⁵ Day, F., *Faun. Brit. Ind.* Fish I, p. 270 (1889).

⁶ Bleeker, P., *Nat. Tijdschr. Ned. Ind.* IX, pp. 258, 269 (1855).

⁷ Günther, A., *loc. cit.*, p. 67 (1868).

⁸ Weber, M. and de Beaufort, L. F., *Fish. Indo-Austral. Archipel.* III, p. 216 (1916).

There is undoubtedly a great similarity between the Indo-Australian species *Schismatorhynchus heterorhynchus* and the Deccan form *Labeo nukta*, but when the specimens of the latter are compared with Weber



TEXT-FIG. 9.—Ventral surface of head in two species of *Schismatorhynchus* Bleeker.

a. *Schismatorhynchus* (*Schismatorhynchus*) *heterorhynchus* (Blkr.). Nat. Size, After Weber and de Beaufort; b. *Schismatorhynchus* (*Nukta*) *nukta* (Sykes): $\times 2$.

b., maxillary barbel; f., frenulum; h. l. j., horny layer of lower jaw; l. l., lower lip; p., prolongation of jaw; r. f., rostral fold; u. l., upper lip.

and de Beaufort's description of the former the following points of difference may be noted :

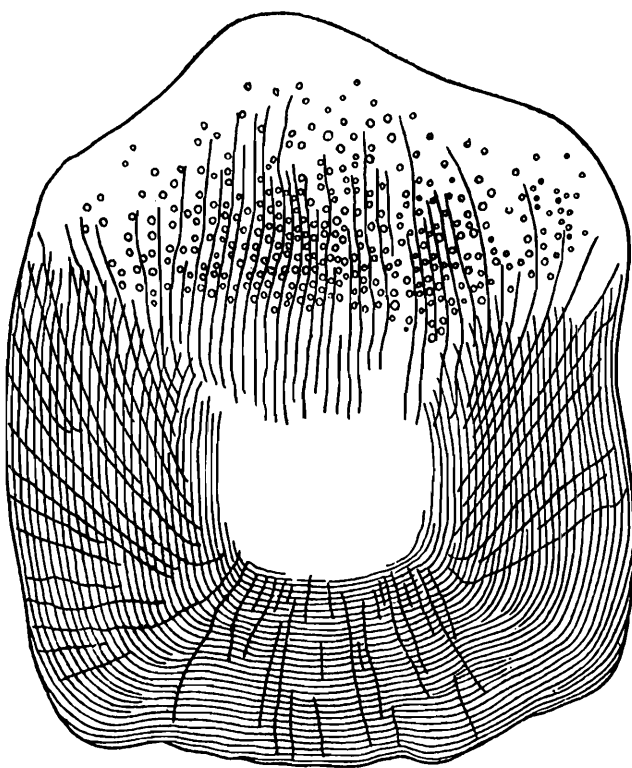
Schismatorhynchus heterorhynchus.

Labeo nukta.

- | | |
|--|--|
| 1. Lower part of snout much longer and more prominent than the upper. | Lower part of snout generally longer than the upper, but, though more prominent, may be equal to it. |
| 2. Corner of mouth prolonged as a kind of gutter. | Corner of mouth not prolonged. |
| 3. Lower lip reflected, not continuous with the upper lip. | Lower lip reflected, inner surface studded with large papillae, continuous with upper lip. |
| 4. Lower lip separated from the posterior prolongation of the soft covering of the jaw by a longitudinal postlabial groove, which is divided by a longitudinal fleshy frenulum in a median and a lateral part, the last of which contains the maxillary barbel and the gutter-like prolongation. | Labial groove restricted to the corners of the mouth and contains flaplike, crenulated, small maxillary barbels. No longitudinal grooves continuous with the labial groove run backwards from the angles of the mouth. |
| 5. Pair of rostral barbels. | Rostral barbels absent. |

The differences noted above in the structure of the lips and associated parts are of sufficient value to separate the two species generically, but I wish at the same time to stress, particularly from a zoogeographical point of view, the great general similarity in the form and structure of the two species and have accordingly divided the genus *Schismatorhynchus* into two subgenera, *Schismatorhynchus* for *S. heterorhynchus*

and *Nukta*, subgenus nov., for *Cyprinus nukta* Sykes. (Type-species for the subgenus *Nukta* is *Cyprinus nukta* Sykes.) The distinguishing



TEXT-FIG. 10.—A scale of *Schismatorhynchus (Nukta) nukta* (Sykes) from below base of dorsal fin : $\times 6$.

characters of these two subgenera are given in the table above. In the three specimens of *S. (Nukta) nukta* that I have examined, the extent of the proboscis varies considerably. As sufficient material of the species is not available, I give below a table of measurements, scale-counts and fin-rays to facilitate reference in future.

Measurements in millimetres, scale-counts and fin-rays of Schismatorhynchus (Nukta) nukta (Sykes).

Total length	..	..	..	..	224	296	299
Length of caudal	..	..	..	..	54	66	72
Depth of body		..	..	..	56	67	73
Length of head		..	..	..	41	46	45
Width of head				..	28	31	32
Height of head	..		..	..	35	40	41
Length of proboscis from anterior margin of orbit				..	15	17	13
Diameter of eye	..	..	..	..	9	9	9
Interorbital distance			..	..	18	20	21
Length of caudal peduncle			..	..	26	31	30
Least height of caudal peduncle			..	..	24	31	32
Scales along lateral line	..		..	..	38	37	37
Transverse rows of scales			..	..	14	15	14
No. of predorsal scales			..	..	15	14	14
No. of rows of scales between L. 1. and V.			..	..	5	5	5
No. of rays in dorsal				..	3/9	2/9	3/8
No. of rays in pectoral			..	..	1/15	1/13	1/13
No. of rays in ventral	..	..	..	..	9	9	9
No. of rays in anal	..		..	..	2/5	2/5	2/5
No. of rays in caudal	..	..			19	19	19

ZOOGEOGRAPHICAL REMARKS.

The great significance of the taxonomic findings reported above lies in the fact that further valuable evidence has become available to stress the Malayan affinities¹ of the fish fauna of Peninsular India; the distribution of *Osteochilus* is at par with that of the Homalopteridae², *Silurus*,³ *Batasio*,⁴ *Thynnichthys*, etc. All of these fishes are widely represented in the fauna of south-eastern Asia, but a few forms are also found in Peninsular India in the Western Ghats or the hill ranges associated with them. The distribution of *Schismatorhynchus* is still more remarkable; it is represented by one species in Sumatra and Borneo, Malay Archipelago, and by a second species, subgenerically distinct, in Peninsular India. It is remarkable that though a number of the Malayan Cyprinoid genera have undergone structural changes as a result of their long isolation in Peninsular India and have proliferated into new genera or subgenera the typically Malayan catfishes of Peninsular India, such as *Silurus* and *Batasio*, have not shown any marked change from their respective ancestral stock in the Far East.

¹ Hora, S. L. and Law, N. C., *Rec. Ind. Mus.* XLIII, p. 242 (1941).

² Hora, S. L., *Rec. Ind. Mus.* XLIII, p. 222 (1941).

³ Bhimachar, B. S. and Subba Rau, A., *Journ. Mysore Univ.* (B) I, p. 147 (1941).

⁴ Hora, S. L. and Law, N. C., *loc. cit.* XLIII, p. 28 (1941).

CYCLOPOÏDES NOUVEAUX DU CONTINENT INDO-IRANIEN. III-IV.

Par KNUT LINDBERG.

III.

Cyclops kozminskii, sp. nov.

Description.—Longueur sans soies apicales 1164 μ ; céphalothorax 765 μ , queue (abdomen+furca) 399 μ . La largeur maximum, de 418 μ , se trouve un peu en arrière du milieu du premier segment céphalothoracique. La largeur des 4 autres segments thoraciques est la suivante : 371, 314, 266, 219 μ . Les angles latéraux des bords postérieurs du deuxième et du troisième segments thoraciques sont légèrement allongés mais ne présentent pas d'élargissements appréciables. Les parties correspondantes du quatrième et du cinquième segments thoraciques montrent une prolongation en pointe dirigée en bas et en dehors, à termination papilliforme tournée légèrement en avant. Il n'y a aucune expansion aliforme de ces parties. La longueur du segment génital surpasse celle des 3 segments abdominaux suivants combinés ; il est un peu plus long que large et se rétrécit graduellement d'avant en arrière. Sa partie proximale est nettement moins large que le cinquième segment thoracique. Bords postérieurs des 3 premiers segments abdominaux grossièrement dentés ; celui du quatrième segment abdominal porte sur la face ventrale une rangée continue de petites épines. Furca à branches légèrement divergentes, environ 6 fois aussi longues que larges, à bords internes ciliés. Longueur : largeur (102+37) : 23=6.04 : 1. La petite encoche pourvue de 1 à 2 épines minuscules se trouve sur le bord externe à 35 μ de la base de la furca. Soies apicales (du dehors en dedans) 63 : 334 : 464 : 83 μ . Ainsi la soie apicale interne n'est que légèrement plus longue que la soie apicale externe. La soie latérale externe est insérée un peu en avant de l'union des trois quarts proximaux avec le quart distal. Soie dorsale de 66 μ , de longueur à peu près égale à celle de la soie apicale externe. Première antenne à 17 articles, assez courte (longueur totale 436 μ) ; rabattue, elle atteint à peine le tiers postérieur du premier segment céphalothoracique. La longueur des articles en μ est la suivante :

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII
83	23	11	35	27	13	32	15	14	15	15	22	15	15	27	32	42

Pattes natatoires tri-articulées. Formule des épines 2-3-3-3. Article terminal de l'endopodite de la quatrième paire de pattes un peu plus de deux fois aussi long que large (longueur : largeur 74 : 34 μ =2.18 : 1) ; épines apicales de longueur à peu près égale, l'externe surpassant très légèrement celle de l'interne ; elles sont beaucoup moins longues que l'article (épine interne : épine externe 43 : 45 μ =0.96 : 1 ; article : épine interne 74 : 43 μ =1.72 : 1). Lamelle basale réunissant la quatrième paire de pattes à petites éminences latérales et à très faible con-

cavité au centre du bord libre. Cinquième patte à deuxième article 2 fois aussi long que large ; épine insérée en arrière du milieu du rebord interne ; soie apicale 2 fois plus longue que la soie externe du premier article (soie du premier article $53\ \mu$; soie apicale $100\ \mu$; épine $13\ \mu$). Réceptacle séminal montrant deux moitiés dissemblables. La partie distale était difficile à distinguer et est représentée sur la figure d'une

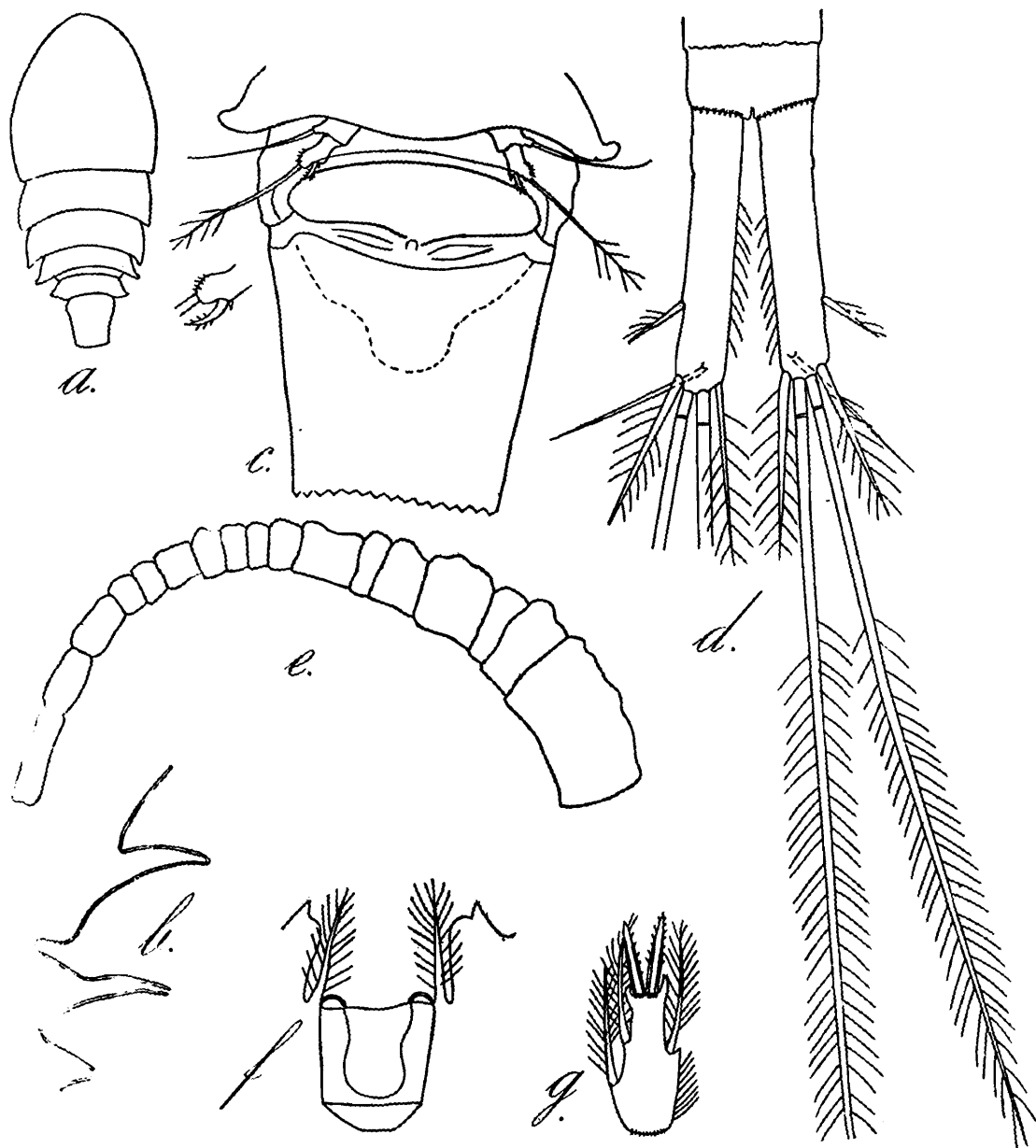


FIG. 1.—*Cyclops kozminskii*, sp. nov. ♀.

a. Céphalothorax et premier segment abdominal. b. Angles latéraux des troisième quatrième et cinquième segments thoraciques. c. Cinquième patte et réceptacle séminal. d. Furca. e. Première antenne. f. Lamelle basale de P 4. g. Article 3 de l'endopodite de P 4.

façon approximative ; la partie proximale par contre était d'une grande netteté ; elle remplissait de ce côté transversalement la plus grande partie du segment génital. Ovisacs très grands, dépassant l'extrémité de la furca ; ils étaient légèrement écartés du corps ; l'un renfermait 27 oeufs, l'autre 31. Mâle inconnu.

Habitat.—Une fosse contenant de l'eau de pluie à Lahidjan (Guilan). Une seule femelle pêchée fin octobre 1939. Dans la même fosse se trouvaient d'assez nombreux *C. viridis* Jurine, quelques *C. bicuspidatus* Claus, et une seule *E. serrulatus* Fischer.

Remarques.—La forme présente n'a pu être décrite que d'après un seul individu, mais ses caractéristiques sont si définies et si frappantes qu'il n'est possible de la rapprocher d'aucune autre espèce connue jusqu'à maintenant, pour autant que je le sache. Elle offre une structure du réceptacle séminal semblable à celle de *C. insignis* Claus, mais s'en distingue par des différences notables dans la première antenne, la furca et l'article 3 de l'enp. 4. De *C. kolensis* Lilljeborg elle se sépare nettement par la configuration du réceptacle séminal et de l'article 3 du l'enp. 4. Pour autant qu'il me soit connu aucun autre *C. strenuus* s. l. possède un article terminal de l'endopodite de P 4 à épines apicales de longueur à peu près égale.

J'ai nommé cette espèce intéressante et très remarquable en honneur du savant polonais Zygmunt Kozminski, envers lequel tous ceux qui étudient le sous-genre *Cyclops* s. str. ont contracté une dette de reconnaissance durable.

***Cyclops caspicus*, sp. nov.**

A Bender Gaz j'ai trouvé dans trois habitats différents des animaux qui se sont montrés difficiles à classer.

Leur formule des épines était de 2-3-3-3. Les angles latéraux des bords postérieurs des quatrième et cinquième segments thoraciques offraient des prolongements notables avec un certain degré d'élargissement, qui cependant semblait moins prononcé que chez *C. vicinus* Uljanine. Leur segment génital avait vers le milieu une constriction assez brusque, mais, par suite de la structure des angles latéraux des segments thoraciques déjà mentionnés, et des branches de la furca comparativement courtes, il ne m'a pas semblé possible de les identifier avec *C. furcifer* Claus. De *C. vicinus vicinus* ils se différenciaient nettement par le peu de développement de la soie apicale interne de la furca, sa longueur en pour cent de la longueur de la soie apicale externe variant chez les cinq femelles examinées de 112 à 138, avec une moyenne de 122 p. cent. Ceci semblait exclure une comparaison même avec *C. vicinus kikuchii* Smirnov, chez qui ce pourcentage est de 170.9 (selon Kozminski). La longueur des branches de la furca ne s'accordait pas avec celle de *C. vicinus vicinus* et encore moins avec celle de *C. vicinus kikuchii*. La structure de l'article 3 de l'enp. 4 et celle de la cinquième patte ressemblait à celle de *C. furcifer*.

Les faits étant ainsi il ne m'a été possible de traiter ces spécimens comme appartenant à une sous-espèce ni de *C. vicinus* ni de *C. furcifer*, et je n'ai pas vu d'autre solution que de les considérer comme représentant une espèce nouvelle pour la science.

Description.—Femelle, 5 individus examinés (spécimens ayant la première antenne à 14 articles 3 ; à 16 et à 17 articles une de chaque). Longueur sans soies apicales de 1500 à 1786 μ ; largeur de 522 à 570 μ . Habitus général assez élancé ; angles latéraux des bords postérieurs des deuxième et troisième segments thoraciques sans expansions ou accentuations appréciables ; ceux des quatrième et cinquième segments notablement allongés en pointe, tournée en dehors et un peu en avant. Segment génital à peu près aussi large que long. Sa partie proximale est renflée et elle se rétrécit assez subitement en arrière, la partie distale offrant

un aspect cylindrique. Bords postérieurs des trois premiers segments abdominaux grossièrement dentés. Le quatrième segment abdominal

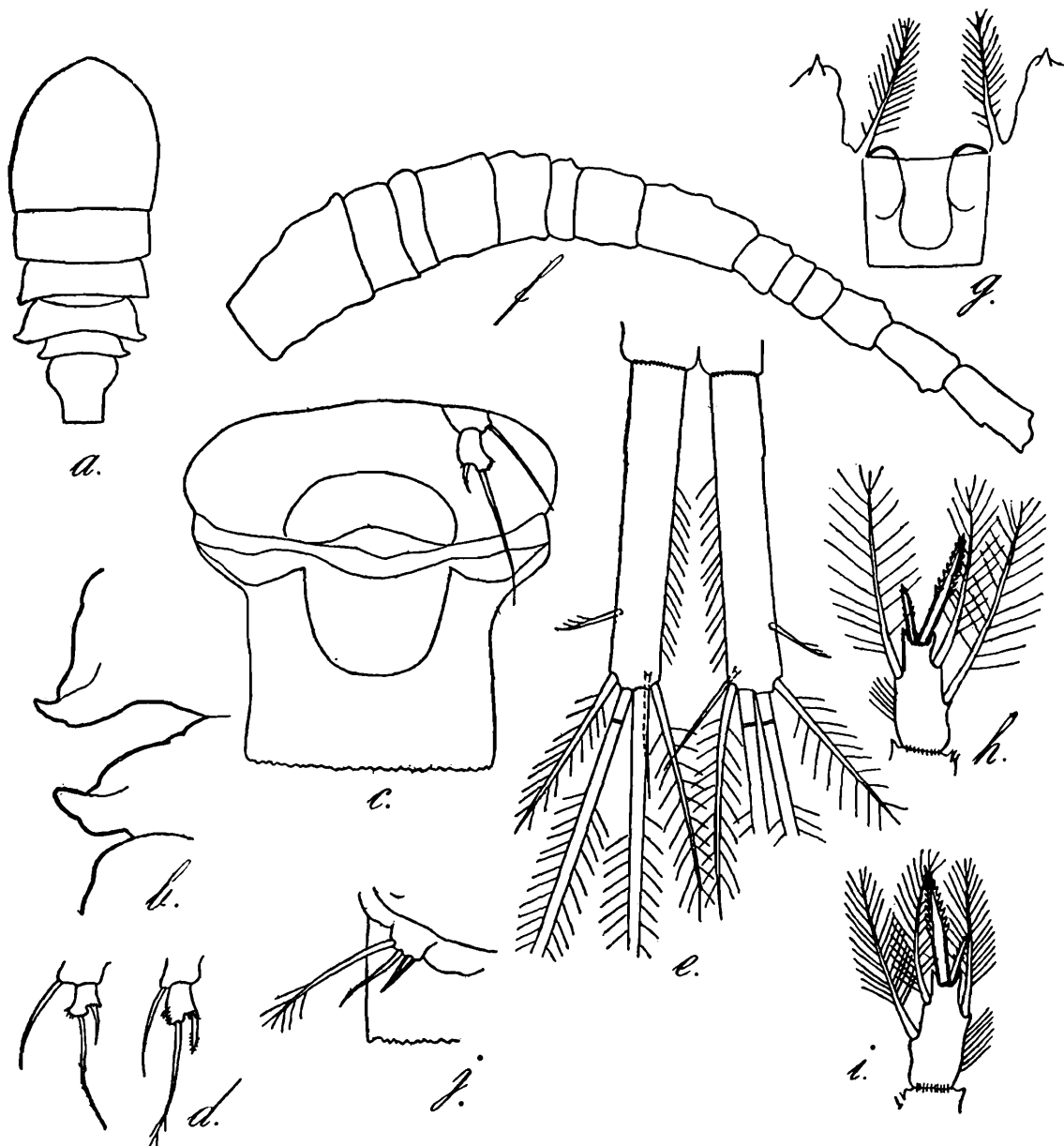


FIG. 2.—*Cyclops caspicus*, sp. nov. (Marais au bord de la mer).

a. ♀ Céphalothorax et premier segment abdominal. b. ♀ Angles latéraux des quatrième et cinquième segments thoraciques. c. ♀ Réceptacle séminal. d. ♀ Cinquième patte (deux individus). e. ♀ Furca. f. ♀ Première antenne. g. ♀ Lamelle basale de P 4. h. ♀ Article 3 de l'endopodite de P 4. i. ♀ Article 3 de l'endopodite de P 4. (autre spécimen). j. ♂ P 6.

porte sur sa face ventrale une rangée d'épines minuscules. Furca, à branches d'environ 6 fois aussi longues que larges, le plus souvent légèrement divergentes ou parallèles ; chez un spécimen à première antenne composée de 17 articles, de même que chez celui comptant 16 articles de cette antenne, elles étaient fortement divergentes ; leur bord interne porte des cils et sur la face dorsale se voit une crête chitineuse. Le bord externe présente vers le tiers proximal une petite entaille ou protubérance. Soie latérale externe à insertion dorsale, à la jonction des quatre cinquièmes proximaux avec le dernier cinquième distal. Soie dorsale plus courte que la soie apicale externe. Soie apicale interne un peu plus longue que la soie apicale externe. Soie apicale médiane interne plus de deux fois aussi longue que la branche de la furca. Première antenne à 14, 16 ou 17 articles ; rabattue, elle atteint le plus sou-

vent le bord postérieur du premier segment céphalothoracique et parfois le milieu du deuxième segment thoracique. La longueur des articles de la première antenne était la suivante chez la femelle à 14 articles la plus grande :

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV
100	31	17	48	35	18	43	80	28	20	22	40	53	60 μ .

La longueur respective des articles de l'individu dont la première antenne en comptait 16 est donnée ci-dessous :

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI
108	27	17	47	33	18	47	40	22	25	30	17	25	43	58	68 μ .

Ainsi la longueur totale de 625 μ représentait 478 pour mille de la longueur du corps (prise dans le sens de Kozminski, c'est-à-dire céphalo-thorax+abdomen sans furca).

Les deux branches des pattes natatoires à 3 articles. Formule des épines 2-3-3-3. Article terminal de l'enp. 4 deux fois ou un peu moins que 2 fois aussi long que large. Epine apicale interne surpassant considérablement la longueur de l'article ; elle est plus de deux fois et peut même être presque trois fois aussi longue que l'épine apicale externe.

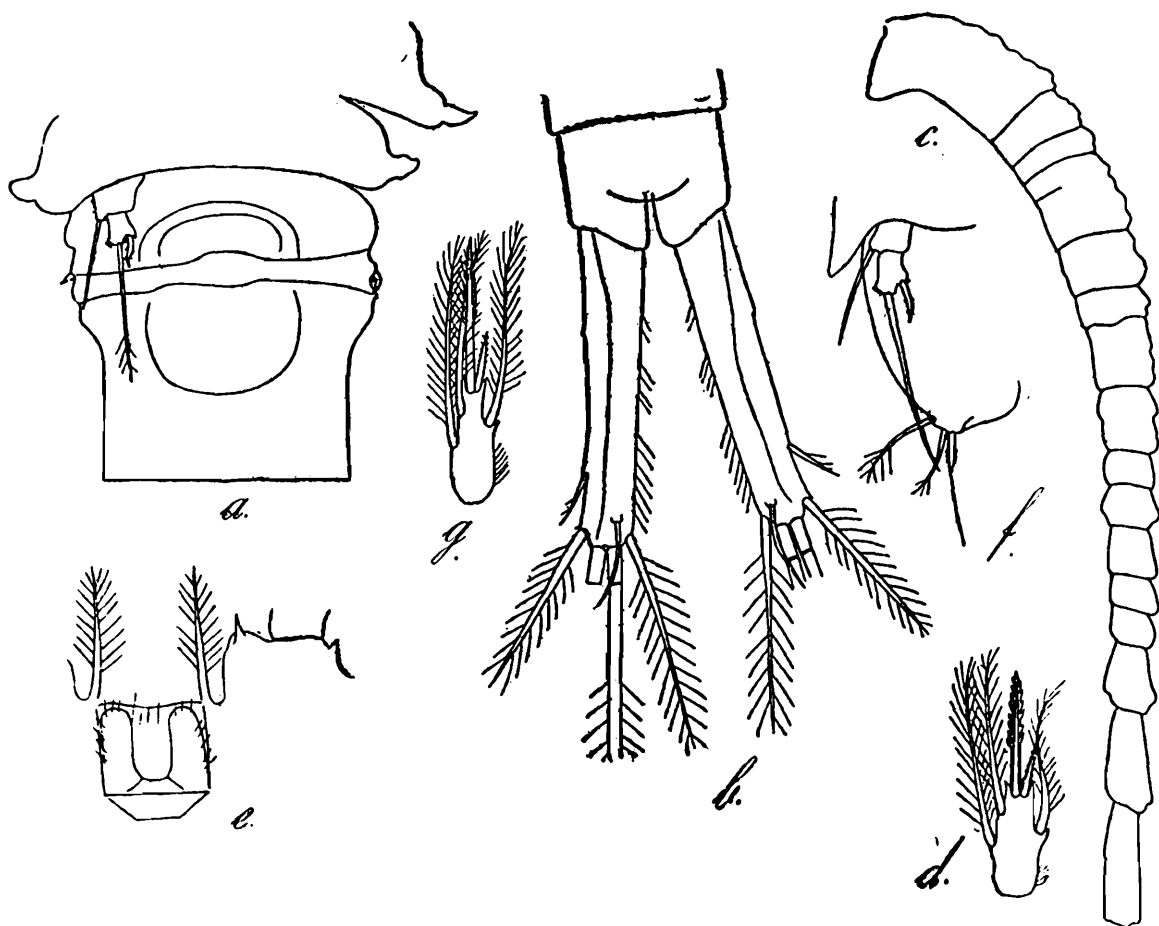


FIG. 3.—*Cyclops caspicus*, sp. nov. (Mare près de la voie ferrée).

a. ♀ Angles latéraux des segments thoraciques 4 et 5, segment génital et P 5. b. ♀ Furca. c. ♀ Première antenne. d. ♀ Article 3 de l'enp. 4. e. ♀ Lamelle basale de P 4. f. ♂ P 5 et P 6. g. ♂ Article 3 de l'enp. 4.

Lamelle basale de la quatrième paire de pattes offrant la structure usuelle des membres du groupe *strenuus*. Cinquième patte à deuxième article trapu, à épine du rebord interne prenant son origine près de

Cyclops caspicus, sp. nov.

Habitat.	Longueur μ	Furca.	Soie dorsale.	Soies apicales.	Enp. 4. Art. 3. Long. : larg.	Enp. 4. Art. 3. Ep. ap. int. : ép. ap. ext.	Enp. 4. Long. art. 3 : ép. ap. int.	P 6 Epine : soie méd : soie ext.	Première antenne. Nombre d'articles.
Marais au bord de la mer.	♀ 1786	(154 + 40) : 32 = 6.06 : 1	75	112 : 384 : 461 : 155	67 : 34 = 1.97 : 1	78 : 30 = 2.60 : 1	0.86 : 1	...	14
	♀ 1601	(150 + 40) : 30 = 6.33 : 1	75	120 : 406 : 501 : 150	67 : 33 = 2.03 : 1	70 : 32 = 2.19 : 1	0.96 : 1	...	14
	♀ 1734	(170 + 42) : 35 = 6.06 : 1	72	128 : 381 : 476 : 144	62 : 38 = 1.63 : 1	88 : 30 = 2.93 : 1	0.70 : 1	...	14
	♂ 1283	(115 + 33) : 27 = 5.48 : 1	92	103 : 300 : 401 : 123	62 : 31 = 2 : 1	95 : 30 = 3.17 : 1	0.65 : 1	28 : 50 : 68	...
	♂ 1188	.....	...	.....	...	...	...	30 : 50 : 75	...
	♂ 1235	(110 + 33) : 27 = 5.29 : 1	97	102 : $\times$: $\times$: 140	63 : 30 = 2.10 : 1	95 : 27 = 3.52 : 1	0.66 : 1	28 : 47 : 87	...
Mare près de la voie ferrée.	♀ 1501	(153 + 41) : 31 = 6.26 : 1	55	113 : $\times$: 518 : 133	68 : 33 = 2.06 : 1	82 : 33 = 2.48 : 1	0.83 : 1	...	16
	♂ 1421	(110 + 37) : 30 = 4.90 : 1	83	107 : $\times$: $\times$: 133	68 : 30 = 2.27 : 1	97 : 37 = 2.62 : 1	0.70 : 1	28 : 50 : 67	...
Marécage entre la ville et la mer.	♀ 1596	(155 + 43) : 32 = 6.19 : 1	73	133 : 401 : 551 : 155	70 : 37 = 1.89 : 1	83 : 40 = 2.07 : 1	0.84 : 1	...	17

l'extrémité de l'article. Réceptacle séminal de configuration semblable à celui de *C. strenuus* s. str. Ovisacs grands, pouvant dépasser l'extrémité de la furca, légèrement écartés du corps. J' ai compté de 33 à 62 oeufs dans un ovisac.

Mâle. Longueur sans soies apicales de 1188 à 1421 μ ; largeur de 332 à 375 μ . Furca à branches parallèles ou légèrement divergentes. Sixième patte rudimentaire composée d'une épine ventrale forte mais courte, d'une soie médiane plus longue et d'une soie dorso-externe qui est l'appendice le plus long.

Habitat.—Bender Gaz, port de mer du département du Gorgan (Astérad) : (1) Marais près du bord de la mer, 2 ♂♂ et quelques ♀♀ à première antenne à 14 articles. (2) Mare d'eau de pluie près de la voie ferrée, 1 ♂ et 1 ♀ à première antenne à 16 articles. (3) Marécage situé entre la ville et la mer, 1 ♂ et quelques ♀♀ à première antenne à 17 articles.

Mesocyclops (Thermocyclops) tinctus Lindberg.

En 1937 j'ai récolté à Ellora (Etat de Hadéirabad) une femelle unique, qui, en tant qu'il s'agissait d'un animal de provenance indienne, avait un aspect tout à fait inusité. M'ayant semblé avoir l'habitus général d'un petit *C. strenuus*, j'en avais remis l'examen jusqu'au jour qu'il me serait possible d'étudier un matériel suffisant d'autres spécimens du même groupe. En examinant cette année le petit animal en question j'ai à ma surprise trouvé qu'il ne s'agissait d'aucune façon d'un membre du groupe *strenuus*, mais bien d'un *Thermocyclops*, et qu'elle offrait une structure si semblable à celle de l'espèce persane *M. (Th.) tinctus* Lindberg, que je crois nécessaire de l'identifier avec cette forme. Comme le

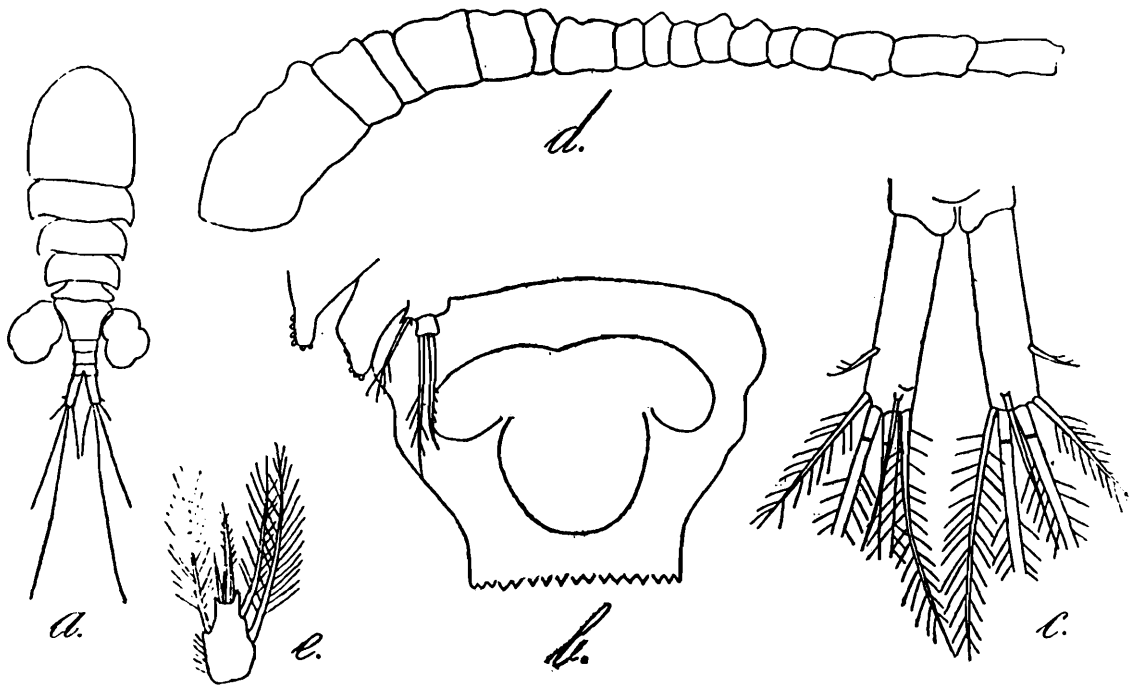


FIG. 4.—*Mesocyclops (Thermocyclops) tinctus* Lindberg ♀.

a. Configuration générale. b. Segment génital c. Furca. d. Première antenne. e. Article 3 de l'endopodite de P 4.

M. (Th.) tinctus n'a jamais été rapporté de l'Inde, il semble intéressant de donner ici quelques mensurations et des figures de l'animal d'Ellora. Elle a été pêchée au mois de décembre dans une des citernes des grottes

de cette localité et il convient de rappeler qu'en Iran j'ai trouvé cette espèce plusieurs fois dans des habitats de ce même genre.

Description.—Longueur 941 μ (céphalothorax 675, queue 266 μ) ; largeur 333 μ . Ailes latérales des bords postérieurs des quatrième et cinquième segments thoraciques pourvues de petites excroissances irrégulières. Branches de la furca divergentes, à bord interne glabre. Longueur : largeur (71+32) : 27 μ = 3.81 : 1. Soie dorsale 80 μ . Soies apicales : 83 : 267 : 367 : 122 μ . Première antenne à 17 articles ; rabattue elle atteignait le milieu du deuxième segment thoracique. Article terminal de l'enp. 4, longueur : largeur 37 : 26 μ = 1.42 : 1 ; épine apicale interne : épine apicale externe 53 : 27 μ = 1.96 : 1. Lamelle basale réunissant la quatrième paire de pattes munie de chaque côté d'une éminence arrondie portant quelques petites épines. Cinquième patte et réceptacle séminal semblables aux parties correspondantes des animaux de l'Iran. Ovisacs petits, écartés du corps ; ils contenaient chacun 4 oeufs.

IV

Cyclops (Microcyclops) richardi, sp. nov.

Description.—Petite espèce. Longueur (sans soies apicales) 622 et 646 μ ; largeur 228 μ (céphalothorax 399 μ , queue 223 μ de l'une des femelles). Segment génital considérablement plus long que large. Bord postérieur des trois premiers segments abdominaux sans découpeure ; celui du quatrième segment abdominal porte sur sa face ventrale une rangée d'épines assez grosses. Furca courte, à branches parallèles,

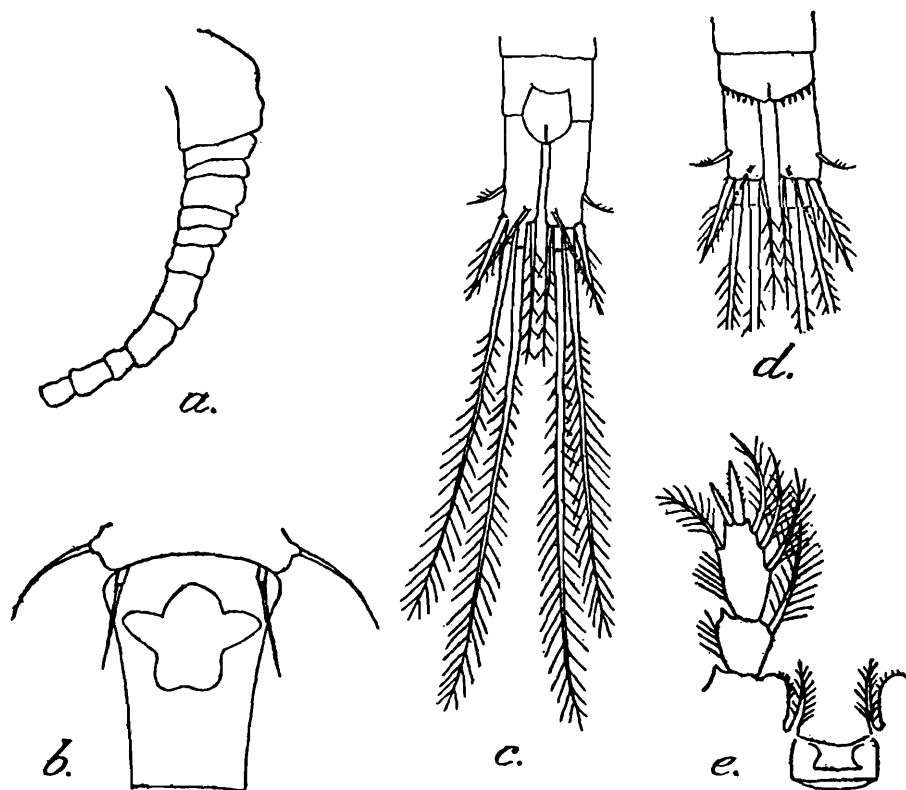


FIG. 5.—*Cyclops (Microcyclops) richardi*, sp. nov. ♀.

a. Première antenne ; b. P 5 et segment génital ; c. Furca, face dorsale ; d. Furca, face ventrale (autre spécimen) ; e. Lamelle basale et endopodite de P 4.

environ 2 et demi fois aussi longues que larges. Soie latérale externe divisant la branche de la furca dans la proportion d'environ 70 à 30.

Soie apicale interne dépassant en longueur celle de la soie apicale externe ($63 : 43 \mu = 1.46 : 1$; $67 : 42 \mu = 1.59 : 1$). Pennation des soies médianes légèrement hétéronyme. Première antenne courte, à 12 articles ; rabattue elle atteint ou dépasse légèrement le milieu du premier segment céphalothoracique. Pattes natatoires à branches bi-articulées ; formule des épines 3-4-4-3. Article terminal de l'endopodite de P 4 un peu moins de deux fois aussi long que large. Epine apicale interne légèrement plus longue que l'épine apicale externe, mais considérablement plus courte que l'article. Cinquième patte se réduisant à un article peu allongé, dépourvu d'épine et portant une soie ciliée. Soie thoracique assez forte. Réceptacle séminal représenté sur la figure d'une façon approximative. Les animaux ne portaient pas de sacs ovigères. Mâle inconnu.

Longueur. μ .	Furca Long : larg.	Furca Soie dors.	Furca Soies apicales.	Enp. 4. Art. 2. Long. : larg.	Enp. 4. Art. 2 Ep. ap. int. : ép. ap. ext.	Enp. 4 Long : art. 2 : ép. ap. int.
622	$(32 + 14) : 19 = 2.42 : 1$	42	$43 : 194 : 247 : 63$	$52 : 27 = 1.93 : 1$	$33 : 25 = 1.32 : 1$	$1.58 : 1$
646	$(33 + 14) : 17 = 2.76 : 1$	53	$42 : 204 : 255 : 67$	$48 : 25 = 1.92 : 1$	$33 : 26 = 1.27 : 1$	$1.45 : 1$

Habitat.—Une fosse d'eau douce à Lahidjan (Guilan). Deux femelles adultes seulement furent récoltées fin octobre 1939.

Remarques.—Les traits caractéristiques de cette espèce intéressante sont sa petite taille ; un segment génital allongé, à réceptacle séminal du type *varicans* ; une furca courte, à branches parallèles ; la première antenne de longueur très réduite, composée de 12 articles ; un article terminal de l'endopodite de P 4 à épines apicales assez courtes et offrant peu de différence de longueur entre elles. Pour autant qu'il me soit connu on ne peut rapprocher cette forme d'aucune de celles déjà décrites, et par conséquent elle est présentée comme une espèce nouvelle. Je l'ai nommée en souvenir de J. Richard.

Cyclops (Microcyclops) bicolor Sars.

Pour autant que je le sache *C. (M.) bicolor* n'a été rapporté de l'Inde que par Sewell, qui l'avait trouvé en 1924 au voisinage du lac Tchilka sur la côte nord-est de la péninsule. Dans l'Iran il a été pêché par le Dr. Buxton à Pahlévi en 1921, et par le Dr. Tarnogradsky dans ce même port en 1928 (identifications de Gurney et de Rylov). Au cours de mes récoltes assez nombreuses en Iran j'ai eu l'impression qu'il doit y être rare. En effet je ne l'ai trouvé que dans une seule localité et je n'y ai retiré qu'un individu unique, une femelle adulte sans sacs ovigères. Comme elle diffère à certains égards de *C. (M.) bicolor* tel qu'il a été décrit en Europe, quelques notes et des figures semblent nécessaires.

Description.—Longueur (sans soies apicales) 731μ ; largeur 228μ . Angles latéraux du bord postérieur du cinquième segment thoracique régulièrement arrondis. Segment génital plus long que large. Bord postérieur du quatrième segment abdominal portant une rangée de petites épines sur la face ventrale. Furca allongée, à branches parallèles (longueur : largeur $(55 + 17) : 15 \mu = 4.80 : 1$). Soie dorsale 33μ . Soies

apicales (du dehors au dedans) $32 : 145 : \times : 70 \mu$. La soie apicale interne est ainsi un peu plus de deux fois aussi longue que la soie apicale externe.

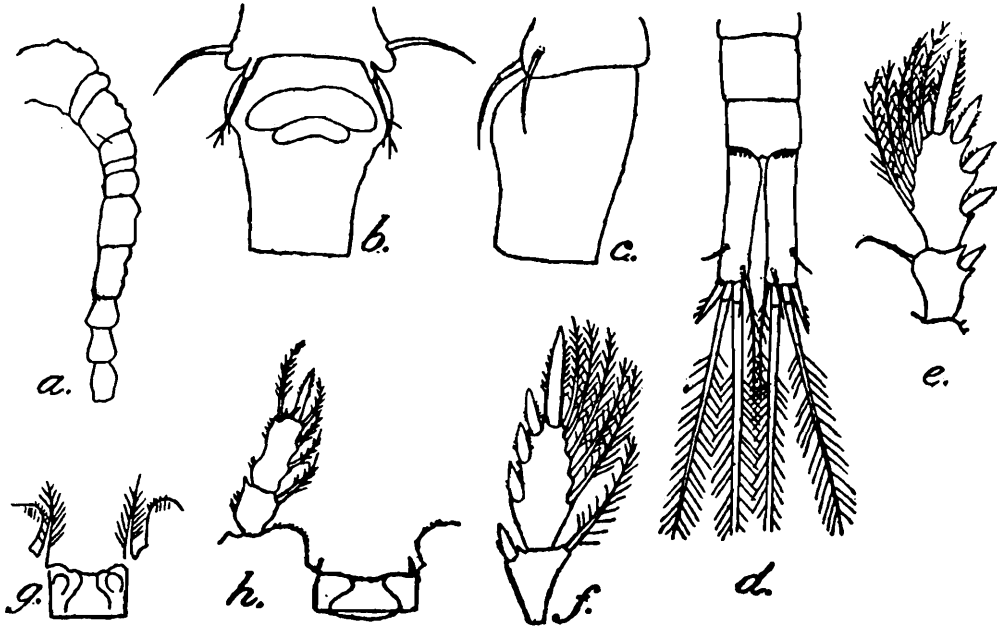


FIG. 6.—*Cyclops (Microcyclops) bicolor* Sars. ♀.

a. Première antenne. b. P 5 et segment génital; c. P 5 et segment génital, face latérale; d. Furca, face ventrale; e. Exopodite de P 2; f. Exopodite de P 3; g. Lamelle basale de P 3; h. Lamelle basale et endopodite de P 4.

Branches des pattes natatoires à deux articles. Formule des épines 3-4-4-3. Epines des exopodites, notamment des P 3 et P 4 fortes, et ayant quelque peu un aspect en lancette. Article 2 de l'enp. 4 un peu plus de 2 fois aussi long que large. Epine apicale interne plus courte que l'article et 3 fois aussi longue que l'épine apicale externe, qui est recourbée en dedans. (Article 2 longueur : largeur $43 : 19 \mu = 2.26 : 1$; épine apicale interne : épine apicale externe $33 : 11 \mu = 3 : 1$; longueur article : épine apicale interne $1.30 : 1$.) P 5 formée d'un article très allongé, environ 4 fois plus long que large. Il n'est pas pourvu d'épine et ne montre aucun renflement angulaire de son rebord interne. Réceptacle séminal représenté approximativement sur la figure. Ovisacs pas observés.

Habitats.—Inde : Lac Tchilka (Sewell).

Iran : Pahlévi (Gurney et Rylov). Qazvine, bassin d'un caravan-sérail, nov. 1939.

Remarques.—Le spécimen récolté est remarquable par l'aspect en lancette des épines, surtout des exopodites de P. 2 et P 3. Une structure semblable s'observe cependant aussi chez certains individus de *C. (M.) linjanticus*, et ne saurait à elle seule justifier la séparation de ces animaux comme appartenant à des variétés distinctes. Du reste l'article de P 5 paraît être d'une longueur insolite chez l'unique exemplaire trouvé dans l'Iran.

***Cyclops (Microcyclops) moghulensis* Lindberg.**

En 1939 j'ai décrit d'après un spécimen unique sous le nom de *C. (M.) moghulensis* un membre du groupe *varicans* ayant la première antenne composée de seulement 10 articles. Dans une seule localité du Sud de l'Iran j'ai trouvé une femelle ressemblant beaucoup à cette espèce, et,

malgré certaines divergences, je me crois justifié à identifier l'animal iranien avec celui des grottes d'Ellora. La différence principale me semble tenir dans le rapport de longueur entre la soie apicale interne et la soie apicale externe de la furca, ces deux soies étant presque de longueur égale chez le spécimen indien, tandis que l'échantillon de l'Iran possède une soie apicale interne considérablement plus longue que la soie apicale externe. La concordance entre les deux animaux est très remarquable en ce qui concerne la structure de la première antenne. Celle-ci n'a que 10 articles distinctes, et chez tous les deux animaux le troisième article présente une division incomplète du côté interne, et le quatrième une ébauche de division sur la partie externe. Je donne ci-dessous quelques notes et des mensurations avec des gravures du spécimen de l'Iran, ainsi que quelques images nouvelles de l'animal de l'Inde pour servir de comparaison.

Description.—Longueur 798 μ (sans soies apicales). Segment génital plus long que large. Bord postérieur du quatrième segment abdominal à rangée de petites épines sur la face ventrale. Furca à branches parallèles, environ 3 fois aussi longues que larges (longueur : largeur, $(43+30)$:

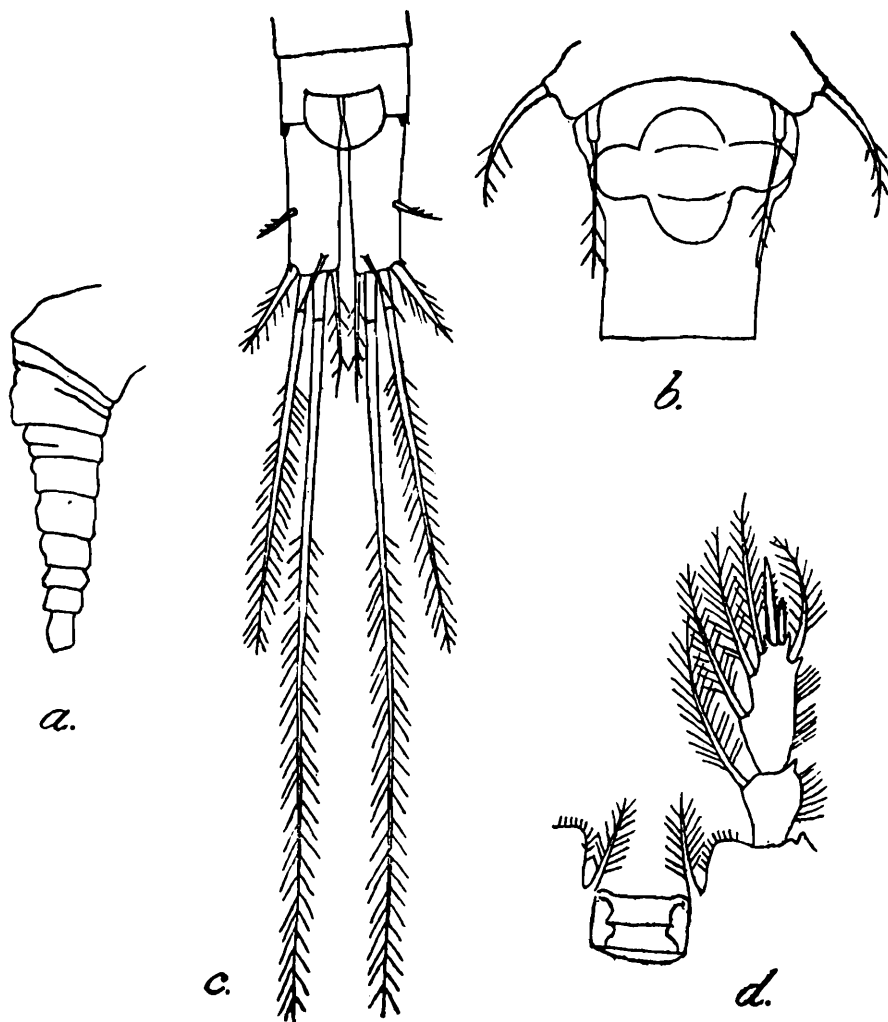


FIG. 7.—*Cyclops* (*Microcyclops*) *moghulensis* Lindberg. ♀ (Béhbéhan).

a. Première antenne; b. P 5 et segment génital; c. Furca, face dorsale; d. Lamelle basale et endopodite de P 4.

25 μ = 2.92 : 1). Soie dorsale 43 μ . (Soie dorsale du spécimen d'Ellora 45 μ). Soies apicales (du dehors au dedans) 52 : 190 : 361 : 68 μ . Une mention au sujet de la première antenne a déjà été faite ; elle est remarquablement courte et n'atteint pas le milieu du premier

segment céphalothoracique lorsqu'elle est rabattue. Les articles les plus longs sont les premier, troisième et sixième, et les plus courts, les deuxième et huitième. Article terminal de l'enp. 4 plus de 2 fois aussi long que large ($67 : 30 \mu = 2.23 : 1$). Epine apicale interne un peu moins que 2 fois aussi longue que l'épine apicale externe ($43 : 24$

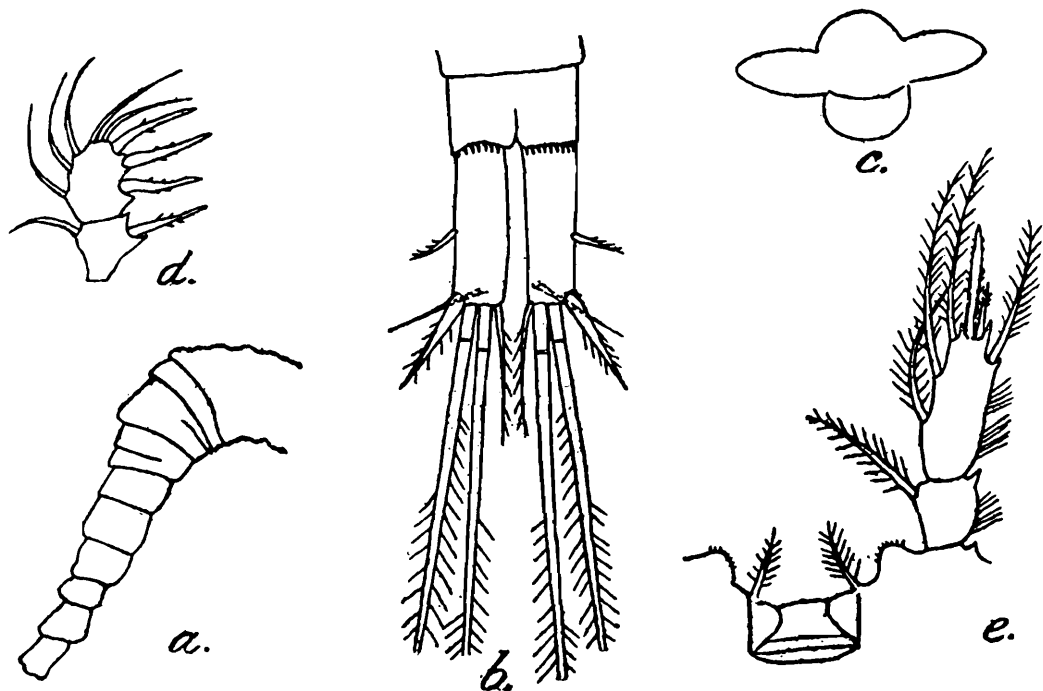


FIG. 8.—*Cyclops (Microcyclops) moghulensis* Lindberg ♀ (Ellora).

a. Première antenne; b. Furca, face ventrale; c. Réceptacle séminal; d. Exopodite de P 1 (montrant fortes épines); e. Lamelle basale et endopodite de P 4.

$\mu = 1.79 : 1$). Article terminal de moitié plus long que l'épine apicale interne ($67 : 43 \mu = 1.56 : 1$). Article de P5 environ 3 fois aussi long que large. Il présente une très légère protubérance sur la partie distale du rebord interne, un peu au-delà du milieu de l'article. Longueur de la soie apicale 67μ ; longueur de la soie thoracique 73μ . L'aspect du réceptacle séminal est montré sur la figure. L'animal manquait de sacs ovigères.

Habitats.—Inde : Ellora (Etat de Haïdérabad), citerne naturelle, décembre 1937 Iran : Béhbéhan, un réservoir voûté souterrain, d'eau de pluie. Un seul spécimen récolté en février 1940, avec de nombreux *E. serrulatus* Fischer et quelques *M. leuckarti* Claus.

Remarques.—L'animal de l'Inde et celui de l'Iran, dont il a été question dans ses notes, offrent une grande ressemblance avec une forme rapportée par le Dr. Ueno de l'île de Formose et décrite par Kiefer en 1937 sous le nom de *C. (M.) uenoi*. Les deux femelles étudiées par Kiefer possédaient cependant une première antenne formée de 11 articles.

BIBLIOGRAPHIE.

- GURNEY, R., 1921.—Freshwater Crustacea collected by Dr. P. A. Buxton in Mesopotamia and Persia. *Journ. Bomb. Nat. Hist. Soc.* XXVII.
KIEFER, F., 1937.—Süsswassercopepoden aus Ostasien. *Zool. Anz.* CXIX, p. 64.

- KIEFER, F., 1938.—Freilebende Ruderfusskrebse (Crustacea Copepoda) von Formosa. *Bull. biogeogr. Soc. Jap.* VIII, pp. 58, 59.
- LINDBERG, K., 1939.—Cyclopïdes (Crustacés Copépodes) de l'Inde. I. *Bull. Soc. Zool. France* LXIV, pp. 120-122.
- LINDBERG, K., 1939.—Cyclopides (Crustacées Copépodes) de l'Inde. II. Une revision des représentants indiens du sous-genre *Microcyclops* Claus, du genre *Cyclops* Müller. *Rec. Ind. Mus.* XLI, pp. 235-262.
- RYLOV, W. M., 1928.—Zur Eucopopoden-Fauna von Kaukasus, Transkaukasien und Nord-Persien (en russe). *Trav. Sta. biol. Caucase du Nord*. Vladicaucase II. Fas. 2-3, 1-15 (Résumé allemand, 16-17).
- SEWELL, R. B. S., 1924.—Fauna of the Chilka lake. Crustacea Copepoda. *Mem. Ind. Mus.* V, pp. 771-851.

THE ORIENTAL TIPULIDAE IN THE COLLECTION OF THE INDIAN MUSEUM. PART II.

By CHARLES P. ALEXANDER,
Amherst, Massachusetts, U. S. A.

(Contribution from the Entomological Laboratory, Massachusetts State College.)

The preceding part under this general title was published in the *Records of the Indian Museum* XXIX, pp. 167-214, 1927. In the present instalment I wish to continue the study of the extensive series of Tipulidae received during the intervening years through the various authorities in charge of the Zoological Survey of India. My deepest thanks and appreciation are herewith extended to Dr. B. N. Chopra, Dr. Hem Singh Pruthi, Dr. Baini Prashad, Lt.-Col. R. B. S. Sewell and Dr. H. A. Hafiz. It is the friendly interest of these men, and of the entomologists of the Indian Museum, that has so advanced our knowledge of this neglected group of flies in British India. The types and uniques will be returned to the Indian Museum; besides these materials, I have included two species received from other sources, but paratypes of both of these will be added to the Museum collection.

During the course of the past several years I have been particularly privileged to have had sent to me in America the type-specimens of certain of the Brunetti Tipulidae whose strict identity remained in question. Most of such as are discussed in the present paper belong to the vast genus *Tipula* and particularly to those species having marmorate wings, considered by Brunetti to be very closely inter-related and to be virtually unkeyable but now known to belong to sections and subgenera different from one another and all clearly definable. In the present paper, re-descriptions of several of these doubtful species are given, these including *Tipula* (*Acutipula*) *princeps* Brunetti, *T* (*Vestiplex*) *himalayensis* Brunetti, *T* (*V.*) *quasimarmoratipennis* Brunetti, *T* (*V.*) *subtincta* Brunetti, *T* (*Sinotipula*) *tessellatipennis* Brunetti, *T* (*Oreomyza*) *striatipennis* Brunetti and *T* (*Lunatipula*) *marmoratipennis* Brunetti.

PREOCCUPIED NAMES.

A considerable number of names in Tipulidae have been found to be pre-occupied by earlier names in the same genus and substitutes for such homonyms are proposed herewith. My thanks are due to Dr. Alan Stone, of the United States National Museum, for calling to my attention certain of these preoccupied names.

Ctenacroscelis cerbereanus, nom. nov., for *Ctenacroscelis fumipennis* Brunetti; *Tipula fumipennis* Brunetti, *Rec. Ind. Mus.* VI, p. 250, 1911; nec *Tipula fumipennis* Hudson, *Manual New Zealand Ent.*, p. 48, 1892.

Tipula praeses, nom. nov., for *Tipula fumipennis* Alexander, *Ann. Ent. Soc. Amer.* V, pp. 359, 360, 1912; nec *Tipula fumipennis* Hudson, *Manual New Zealand Ent.*, p. 48, 1892; nec *Tipula fumipennis* Brunetti, *Rec. Ind. Mus.* VI, p. 250, 1911.

- Tipula lombokensis*, nom. nov., for *Tipula cinerea* Brunetti, *Rec. Ind. Mus.* VI, p. 252, 1911; XV, p. 274, 1918; nec *Tipula cinerea* Fabricius, *Spec. Ins.* II, p. 405, 1781; nec *Tipula cinerea* Strobl, *Mittheil. Naturwiss. Ver. Steirmark* for 1894, p. 207, 1895.
- Tipula serrulifera*, nom. nov., for *Tipula serrulata* Lackschewitz, *Proc. R. Ent. Soc. London* (B) V, p. 110, 1936; Edwards, *Ent. Mon. Mag.* LXXV, p. 242, 1939; nec *Tipula serrulata* Loew, *Berl. Ent. Zeitschr.* VIII, p. 58, 1864.
- Limonia* (*Limonia*) *flagellaris*, nom. nov., for *Limonia flagellata* Alexander, *Bornstein-forschungen* II, pp. 38, 39, 1931; nec *Limonia* (*Limonia*) *flagellata* Edwards, *Journ. Fed. Malay States Mus.* XIV, pp. 68, 69, 1928.
- Limonia* (*Rhipidia*) *productina*, nom. nov., for *Limonia* (*Rhipidia*) *rostrifera* Edwards, *Ann. Mag. Nat. Hist.* (8) XVII, pp. 352, 353, 1916; nec *Limonia* (*Dicranomyia*) *rostrifera* Osten Sacken, *Mon. Dipt. N. Amer.* IV, p. 65, 1869.
- Limonia* (*Libnotes*) *diaphana*, nom. nov., for *Limonia* (*Libnotes*) *lutea* Edwards, *Ann. Mag. Nat. Hist.* (8) XVII, p. 357, 1916; nec *Limonia* (*Dicranomyia*) *lutea* Meigen, *Klass.* I, p. 55, 1804.
- Limonia* (*Libnotes*) *buruicola*, nom. nov., for *Limonia* (*Libnotes*) *subcostalis* Edwards, *Treubia* VII, pp. 138, 139, 1926; nec *Limonia* (*Rhipidia*) *subcostalis* Alexander, *Proc. U. S. Nat. Mus.* LX, pp. 3, 4, 1922.
- Limonia* (*Libnotes*) *depicta*, nom. nov., for *Limonia* (*Libnotes*) *affinis* de Meijere, *Nova Guinea* IX, p. 308, 1913; nec *Limonia* (*Dicranomyia*) *affinis* Schummel, *Beitr. zur Entomol.* I, p. 127, 1829.
- Limonia* (*Libnotes*) *musculicola*, nom. nov., for *Limonia* (*Libnotes*) *sphagnicola* Edwards, *Treubia* VII, p. 138, 1926; nec *Limonia* (*Dicranomyia*) *sphagnicola* Alexander, *Proc. Boston Soc. Nat. Hist.* V, pp. 173, 174, 1925.
- Limonia* (*Libnotes*) *palaeta*, nom. nov., for *Limonia* (*Libnotes*) *punctipennis* de Meijere, *Tijd. voor Ent.* LIV, p. 35, 1911; nec *Limonia* (*Dicranomyia*) *punctipennis* Skuse, *Proc. Linn. Soc. N. S. W.* (2) IV, p. 761, 1890.
- Limonia* (*Libnotes*) *solicita*, nom. nov., for *Limonia* (*Libnotes*) *tripunctata* de Meijere, *Bijd. tot de Dierkunde*, Feest-nummer, p. 14, 1919; nec *Limonia* (*Limonia*) *tripunctata* Fabricius, *Spec. Ins.* II, p. 405, 1781.
- Limonia* (*Dapanoptera*) *candidata*, nom. nov., for *Limonia* (*Dapanoptera*) *pallida* de Meijere, *Nova Guinea* IX, p. 307, 1913; nec *Limonia* (*Dicranomyia*) *pallida* Macquart, *Dipt. exot.* I, pt. 1, p. 72, 1838; nec *Limonia* (*Geranomyia*) *pallida* Williston, *Trans. Ent. Soc. London*, p. 284, 1896.
- Limonia* (*Dapanoptera*) *meijereana*, nom. nov., for *Limonia* (*Dapanoptera*) *pulchra* de Meijere, *Tijd. voor Ent.* LVIII, p. 103, 1915; nec *Limonia* (*Rhipidia*) *pulchra* de Meijere, *Bijd. tot de Dierkunde* XVII, p. 91, 1904.

Gonomyia (*Lipophleps*) *calverti pleurotaenjata*, nom. nov., for *Gonomyia* (*Lipophleps*) *calverti pleurostriata* Alexander, *Rev. de Entomol.* X, p. 627, 1939; nec *Gonomyia* (*Gonomyia*) *nigrodorsata pleurostriata* Alexander, *Proc. Linn. Soc. N. S. W.* LXI, p. 30, 1936.

Molophilus (*Molophilus*) *tetrodonta*, nom. nov., for *Molophilus tetracanthus* Alexander, *Proc. Linn. Soc. N. S. W.* LIX, p. 183, 1934; nec *Molophilus tetracanthus* Alexander, *Dipt. Patagonia & S. Chile* I, p. 203, 1929.

Toxorhina (*Toxorhina*) *infumipennis*, nom. nov., for *Toxorhina* (*Toxorhina*) *fumipennis* Alexander, *Puerto Rico Univ. Journ. Agric.* XXIII, p. 100, 1939; nec *Toxorhina* (*Ceratocheilus*) *fumipennis* Alexander, *Proc. Linn. Soc. N. S. W.* LXI, p. 337, 1936.

ENRICO BRUNETTI AND FRED. WALLACE EDWARDS.

The death of Frederick Wallace Edwards on November 15, 1940, at the untimely age of 51, was an incalculable loss to Dipterology. This sad occurrence recalls to mind some of the relations that existed between Edwards and the foremost worker on the Indian Diptera, the late Enrico Brunetti.

As has been indicated by the Director, Dr. Bains Prashad and Dr. Ronald Senior-White in their joint obituary account of Brunetti (*Rec. Ind. Mus.* XXIX, pp. 287-296, 1927), this pioneer worker on the Dipterous fauna of British India, from the date of his first arrival in India in 1904 until his permanent removal from the country in May 1921, had worked at the Indian Museum for irregular periods only and very much of his work at the Museum had been gratuitous. As a partial result, the extensive collections that were made by Brunetti himself were, in some cases, the property of the Museum but in many other instances became the personal property of Brunetti and these latter were eventually bequeathed by him to the British Museum (Natural History), London. The end result of this arrangement was that a considerable proportion of the Brunetti types are preserved in the Indian Museum while the somewhat comparable balance is in London.

The difficulties under which Brunetti worked while in India have been detailed by others. It is certain that his work was of a pioneer nature and that vast chaos existed when he first began his investigation of the Indian Dipterous fauna in 1904. Certain of Brunetti's works are models of study and application, as for example, his "Catalogue of Oriental and South Asiatic Nemocera", *Rec. Ind. Mus.* XVII, pp. 1-300, 1920. As concerns his strictly taxonomic work, however, the fact cannot be ignored that throughout his work on the Tipulidae, at least, a considerable number of partly incredible errors have crept in and many of the assignments of species to genera are entirely erroneous. It is here that the almost incredibly accurate taxonomic eye of Edwards came in to unravel what otherwise must have become an almost unsolvable mystery. In a letter from Edwards to the writer, dated February 16, 1923, he writes: "For the last week or so I have been working with Brunetti at his Tip. types. There have been a good

many disappointments, because in very many cases it is not the actual types which he has brought, but only specimens from his series, and as these were picked out and labelled hastily, it is evident he has made a lot of mistakes in determining his own species. Many of those he has brought do not agree with his descriptions, as he himself admits when I point it out to him. Still he has brought quite a large number of the actual types and we have been able to get a great deal of useful information from them. One surprise to both of us was that in three cases he had omitted to notice that a species possessed white tarsi, and other serious omissions in his descriptions are frequent. Many of his generic references are utterly and sometimes unaccountably wrong. I shall try to get him to write up the results of this critical study when we have finished. It would be rather a tall order for me to make so many corrections of someone else's work and I think he ought to do it himself as a penance."

It is certain that of all persons who have ever concerned themselves with the Oriental Tipulidae, Edwards possessed the fullest knowledge of the subject. His placing in synonymy of many of the Brunetti species may strike some as being drastic but it should never be lost sight of that combined with his unparalleled knowledge of the group, he was the only student who had such an opportunity to see so many of Brunetti's actual types and authentically named specimens. The fact that part of these types are in Calcutta and part in London has made it virtually impossible for any other worker to examine all of this material. Edwards' treatment of the Oriental Tipulidae and his systematic arrangement of the species, with his synonymy, should be followed by all future workers and it seems to the present writer that if errors have crept into this revisional work, such must be few and far between.

In concluding these brief remarks concerning some of the relations existing between Edwards and Brunetti, one further point of interest may be noted. Edwards joined the staff of the British Museum (Natural History) on November 24, 1910. It was shortly before this date that he became engaged to be married (to Miss Florence Mary Williams, of Shelford, Cambridge) and, almost coincidentally, was offered an appointment as Entomologist to the Indian Museum, a position later filled by Dr. Stanley W. Kemp. Family objections to his moving to India caused Edwards to give up the idea. One cannot but wonder what the present status of our knowledge of the Diptera of British India might have been had Edwards removed to India in 1910 and devoted his remaining years and unsurpassed talents to a study of the subject.

Subfamily *TIPULINAE*.

***Ctenacroscelis dravidicus* Edwards.**

1932. *Ctenacroscelis dravidicus*, Edwards, *Stylops* I, p. 146.

The type, 1 ♀ was from Kodaikanal, Shola, in the Palni Hills, September 15, 1921 (T. B. Fletcher). One further female in the Indian Museum from the type-locality, altitude 6,700-7,000 feet, August 1922 (S. W. Kemp).

Ctenacroscelis pallifrons Edwards.

1932. *Ctenacroscelis pallifrons*, Edwards, *Stylops* I, p. 147.

The type, 1 ♂ Regd. No. 3973/H1, was from Pashok, Darjiling District, Eastern Himalayas, May 26-June 14, 1916 (F. H. Gravely). One further male from the same locality, Pashok Spur (R. S. Lister).

Ctenacroscelis dives (Brunetti).

1912. *Tipula dives*, Brunetti, *Fauna Brit. India, Dipt. Nemat.*, pp. 307, 308.

The type, a unique ♂ Regd. No. 2394/20, was from Kurseong, June 23, 1910 (N. Annandale). The following re-description of this type is given.

Male.—Length about 25 mm.; wing 32.5 mm.

Nasus reduced to a mere stub. Frontal prolongation of head dark liver brown. Antennae apparently only 11-segmented; first flagellar segment long-cylindrical, the second segment about two-thirds this length; fourth to sixth segments with the lower face conspicuously protuberant and densely covered with a microscopic grey pubescence; on the succeeding segments the ventral face is less protuberant but densely pubescent; terminal segment elongate, nearly twice the penultimate, narrowed gradually to the tip, apparently formed of two segments. Head behind greyish, the front and anterior vertex more yellow.

Mesonotal praescutum dark reddish brown, the four dark olive brown stripes narrowly margined by still darker brown, restricting the interspaces to narrow lines; scutum rich brown, each lobe with two olive green areas which have a darker narrow border; scutellum and mediotergite black, heavily pruinose. Dorso-pleural region with a conspicuous orange yellow stripe, beneath which is a broad brown longitudinal stripe that is darkest along the dorsal margin, paling ventrally, the ventral pleurites more olive brown; posterior pleurites and pleurotergite clearer yellow. Legs with the coxae pale, sparsely pruinose, the base of fore coxae narrowly darkened; femora yellow, the tips broadly dark brown; tibiae and first two tarsal segments narrowly tipped with brown; terminal tarsal segments darkened; claws slender, each with a basal lobe or shoulder. Halteres dark brown, the base of stem narrowly yellow. Wings with a strong yellowish brown tinge, the cubital and anal cells somewhat paler; conspicuous darker brown seams along posterior cord, Cu_1 , 2nd A , and somewhat less distinctly on the veins beyond cord. Venation: Vein R_1 , approximately its own length before the fork of R_{1+2} and R_3 , thus forming a fusion of veins R_{1+2+3} ; R_{1+2} straight, slightly furcate at apex in both wings.

Abdomen brownish black, the hypopygium conspicuously paler. Male hypopygium with the ninth tergite long and depressed, the median notch deep and narrow. Outer dististyle nearly smooth, pruinose. broad at base, narrowed to the obtuse apex.

Ctenacroscelis flavoides (Brunetti).

1918. *Tipula flavoides*, Brunetti, *Rec. Ind. Mus.* XV, p. 267.

The types, 1 ♂, Regd. No. 3935/H2, 2 ♀♀, Regd. Nos. 3936-37/H2, were from above Tura, Garo Hills, Assam, altitude 3,500-3,900 feet, September 1917 (Mrs. S. W. Kemp). The following re-description of the types is given.

Male.—Length about 28 mm. ; wing 33 mm.

General colouration of head and thorax deep orange yellow, the praescutal interspaces somewhat darker. Antennae with the scape orange, the pedicel brown; flagellum black; first flagellar segment a little longer than the second, both cylindrical; third flagellar segment a trifle bulging beneath; succeeding segments shorter and conspicuously protuberant on lower face. Legs with femora yellowish brown, the tips darkened; tibiae and tarsi darker brown. Wings relatively long and narrow. Venation about as usual in the genus; R_1 distinctly before fork of R_{1+2} and R_3 , forming a fusion of R_{1+2+3} . Abdomen relatively slender, dark velvety brown, including the hypopygium. Male hypopygium as described by Brunetti, the ninth tergite squarely truncated across caudal margin, not at all bilobed, the median area of caudal margin a trifle convex, the edge fringed with long yellow setae. Outer dististyle relatively short and broad, the apex obtuse. One female, a paratype from the type-locality, has the abdomen with beautiful iridescent blue reflexions, especially basally.

Ctenacroscelis serricornis (Brunetti).

1912. *Tipula serricornis*, Brunetti, *Fauna Brit. India, Dipt. Nemat.*, pp. 309-310.

1918. *Tipula serricornis*, Brunetti, *Rec. Ind. Mus.* XV, pl. viii, fig. 4.

The types ♂, Regd. No. 2398/20, ♀, Regd. No. 2399/20, were from Naini Tal, Western Himalayas, May and June 1893, originally from the Lucknow Museum, now in the Indian Museum. The following re-description of the types is given.

Male.—Length about 24.5 mm. ; wing 29 mm.

Female.—Length about 34 mm. ; wing 33 mm.

Frontal prolongation of head relatively long, obscure yellow; nasus long and slender. Antennae with scape and pedicel obscure yellow, the flagellum more brownish yellow; flagellar segments beyond the first strongly serrate, as described and figured by Brunetti, the ventral face of flagellar segments two to ten, inclusive, produced, more evidently so on the basal segments, the outer segments more elongate, with the serrations less evident; terminal segment elongate, simple. Head pale olive; anterior vertex flat but produced cephalad between the antennal bases.

Pronotum obscure orange. Mesonotal praescutum with the stripes greenish grey, each bordered by a slightly paler line, a little more broadly so on the lateral stripes; intermediate stripes separated by a slightly darker capillary vitta; posterior interspaces darker than the remainder of the ground colour. Pleura striped longitudinally with reddish brown

and buffy yellow, the former appearing as a longitudinal stripe extending from the cervical sclerites, crossing the ventral anepisternum onto the pteropleurite where it is much narrower. Legs with the femora brown, the outer half gradually darkened; tibiae and basal segments of tarsi somewhat brighter; femoral comb with slender teeth; tibial spurs slender. Wings with a pale brownish tinge, the small stigma a trifle darker brown; radial vein in the prearcular region greatly incrassated, dark brown. Venation (text-fig. 1b): Sc_1 preserved as a



TEXT-FIG. 1.—*Ctenacroscelis serricornis* (Brunetti), type; a., details of male hypopygium; b., venation.

stout spur that does not reach costa; free tip of Sc_2 long; R_1 with macrotrichia, uniting with R_{2+3} at the fork; vein R_{1+2} entirely preserved; vein R_3 strongly arcuated, closely approximated to the sinuous R_{4+5} , strongly narrowing the cell at near midlength; cell M_1 sessile or extremely short-petiolate; cell 1st M_2 correspondingly large, m being long and oblique.

Abdomen with the basal segments relatively bright fulvous orange, the basal tergite and extreme base of the second with a brown sublateral stripe; subterminal segments (segments seven to nine, with the caudal half of six) dark brown, pruinose; sternites similar, less darkened outwardly, the median region pruinose. Male hypopygium not incrassated, relatively short. Ninth tergite (text-fig. 1a, 9t) short, the caudal margin with a broad flattened lobe on either side, the apices obliquely obtuse, the median notch very narrow; lateral lobes densely provided with short adpressed brown setae. Basistyle and sternite produced caudad beyond the level of the tergite, as in the genus. Outer dististyle flattened, broadest at the base, gradually narrowed to the obtuse tip. Ninth sternite with a very acute V-shaped notch, the margins sparsely fringed with short setae. Eighth sternite unarmed.

Female. Generally similar to the male. Antennae with flagellar segments similarly produced but the serrations a little less distinct. Praescutal stripes darker olive brown. Ovipositor with the valves of moderate length only, the tergal valves slender, straight; sternal valves flattened, their tips acute.

The flagellar pectinations are more accentuated than in most other species of *Ctenacroscelis* but in other respects the species conforms well to the essential characters of the genus.

Tipula (Sinotipula) tessellatipennis Brunetti.

1912. *Tipula tessellatipennis*, Brunetti, *Fauna Brit. India, Dipt. Nemat.*, pp. 317, 318, pl. v, fig. 12 (wing).

The types ♂, Regd. No. 2423/20, ♀, Regd. No. 2424/20, were from Naini Tal, Kumaon, Western Himalayas, May and June 1893, originally from the Lucknow Museum, now in the Indian Museum. The following re-description of the types is given.

Male.—Length about 17 mm.; wing 19 mm.

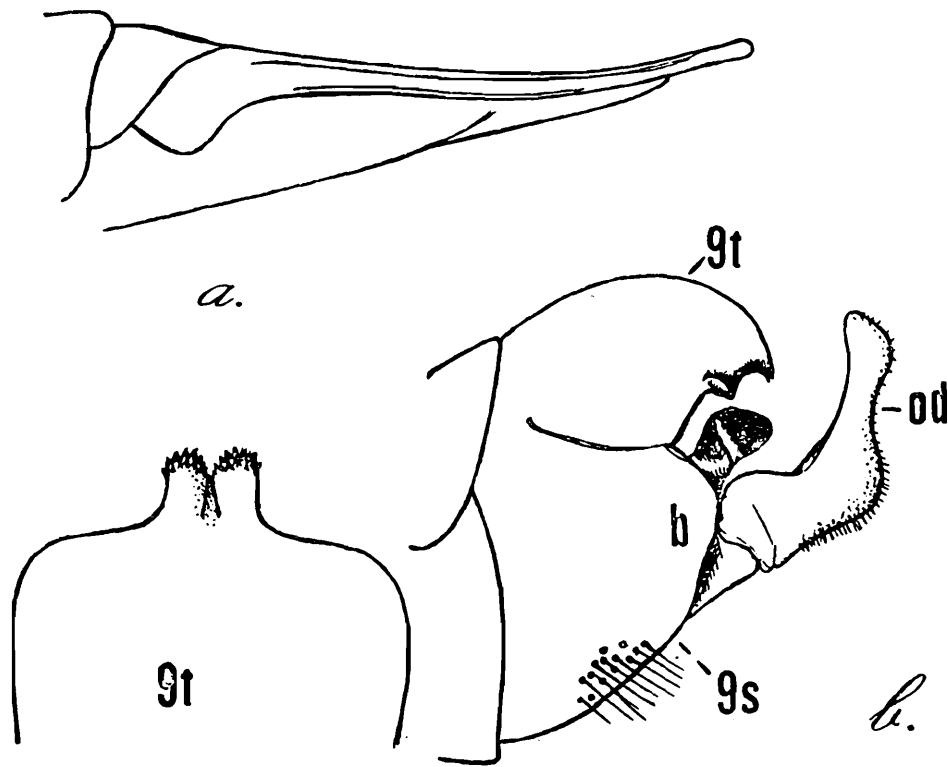
Female.—Length about 25 mm.; wing 22 mm.

Male. Frontal prolongation of head elongate, pale brownish ochreous; nasus short and stout; palpi dark brown. Antennae short, if bent backward scarcely attaining the wing-root; scape and pedicel yellow, flagellum obscure yellow, the basal enlargements of the segments dark brown; flagellar segments with basal enlargement of moderate size, the remainder of segments cylindrical or nearly so, not incised; each segment with about three elongate verticils on dorsal surface and two very short stout ones on ventral face. Head pale grey, with a relatively broad, pale brown, median vitta, a little expanded in front on the low vertical tubercle.

Mesonotal praescutum clear light grey, with four brown stripes, the intermediate pair more olive brown, almost confluent, separated only by their narrow darker brown margins; all praescutal stripes bordered by darker brown; lateral stripes with the mesal border very broad, including approximately one-half the entire width of stripe; besides the four primary stripes, the grey ground colour is invaded by paler brown areas that include the centres of the interspaces, the humeral region and the broad lateral borders; the clear grey ground is thus restricted to narrow borders to the darker stripes; scutum light grey, each lobe with olive brown areas, the larger one behind; scutellum brown, pruinose; mediotergite relatively short, grey, with a conspicuous median brown line that is not mentioned in the original diagnosis. Pleura clear grey, the dorso-pleural membrane more buffy. Halteres relatively short, brown, the knob a little darker, with its base slightly yellow. Legs with the coxae light grey; femora brownish yellow, the tips rather narrowly but conspicuously dark brown; tibiae obscure yellow, the tips narrowly dark brown; basitarsi obscure brownish yellow, soon passing into dark brown, concolorous with remainder of tarsi. Wings pale brown, tessellated with darker brown and cream coloured areas, as figured by Brunetti (*loc. cit.*). Venation: R_2 very short; R_{1+2} very pale, entirely without macrotrichia, not more than two-thirds as long as R_1 .

Abdominal tergites dark reddish brown, the basal tergites very slightly pruinose; segments four and five with a blackened median spot; a broad conspicuous sublateral black line on either side, extending from segment two to the end of segment five, the lateral margins of the segments narrowly buffy; sternites dark greyish brown, the caudal margins of the segments vaguely more reddish; subterminal segments, with the hypopygium, reddish brown. Male hypopygium (text-fig. 2b) relatively small, the tergite separate from the sternite except on the cephalic fifth. Ninth tergite, $9t$, a transversely subquadrate

plate, gently convex, the caudal margin truncated, with a small cylindrical lobule on either side of the median line, these connate on their



TEXT-FIG. 2.—*Tipula* (*Sinotipula*) *tessellatipennis* Brunetti, types: a., ovipositor; b., details of male hypopygium.

basal halves, the tips free and set with microscopic blackened spicules. Viewed from the side, these submedian lobes are strongly decurved, bifid at tips. Basistyle small. Outer dististyle, *od*, elongate, simple in structure, the basal half stouter, the distal half or less more slender. Inner dististyle very small and simple in structure. Eighth sternite unarmed.

Female. Generally similar to the male in most respects. Abdominal tergites one to four obscure yellow, the first a trifle more pruinose; succeeding tergites darker; all tergites with a broad, darker brown, sublateral stripe, darker brown outwardly, margined abruptly with buffy; basal sternites orange yellow, the outer segments more greyish. Ovipositor (text-fig. 2a) with the genital shield short and inconspicuous; tergal valves long and slender, with a basal lobe; valves gently up-curved, the tips obtuse, margins smooth.

***Tipula* (*Acutipula*) *princeps* Brunetti.**

1912. *Tipula princeps*, Brunetti, *Fauna Brit. India, Dipt. Nemat.*, pp. 306, 307.

1924. *Tipula princeps*, Edwards, *Rec. Ind. Mus.* XXVI, p. 305.

1932. *Tipula* (*Acutipula*) *princeps*, Edwards, *Stylops* I, p. 233.

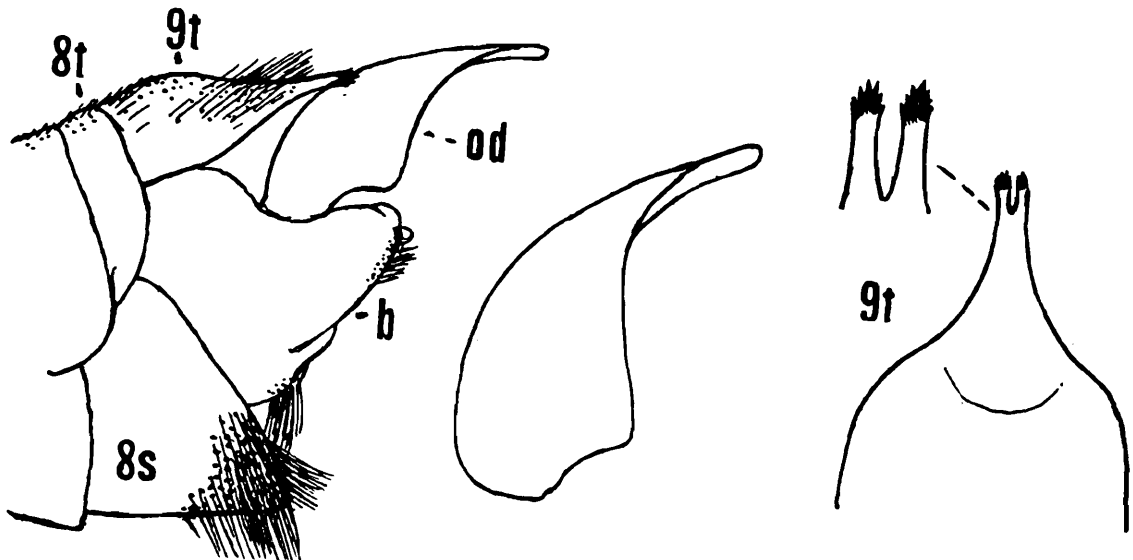
The types ♂, Regd. No. 2392/20, ♀, Regd. No. 2393/20, were from Kurseong, Eastern Himalayas, altitude 4,700-5,000 feet, June 18-19, 1910 (N. Annandale). The following re-description of the types is given.

Male.—Length about 24 mm.; wing 29 mm. Fore-leg, femur, 17.6 mm.; tibia 20.6 mm.; tarsus about 45 mm. Middle leg, femur, 19.5 mm.; tibia 18.6 mm.; tarsus about 56 mm. Hind leg, femur, 20.5 mm.; tibia 25.5 mm.; tarsus about 62 mm.

Female.—Length about 35 mm.; wing 30 mm.; abdomen 24.5 mm.

Frontal prolongation of head of moderate length, the nasus long and slender. Antennae relatively short; scape and pedicel brownish yellow; succeeding segments dark brown with the apices narrowly reddish brown, the outer segments uniformly darkened; terminal segment only about one-third the length of the penultimate and much more slender. Head brown, the posterior orbits very narrowly pale.

Mesonotal praescutum olive brown with four relatively indistinct reddish brown stripes; scutum olive brown. Pleura olive, sparsely pollinose. Pronotum and dorsopleural region orange fulvous. Halteres relatively long and slender, dark brown, the base reddish brown. Legs excessively long and slender, as shown by the above measurements; femora reddish brown, the tips infuscated; tibiae reddish brown; tarsi brown, passing into dark brown. Wings pale brown, the base and costal region more yellowish brown; stigma darker brown; a paler brown suffusion in the radial cells and as distinct spots in outer end of cell *M* and just before midlength of cell *Cu*.



TEXT-FIG. 3.—*Tipula* (*Acutipula*) *princeps* Brunetti; details of male hypopygium of type.

Abdomen reddish brown, the outer segments dark brown; a narrow dark brown lateral stripe on the tergites, beginning at the base of tergite two, widening behind, on the fifth and succeeding segments becoming confluent with the dark colour of the segment. Male hypopygium (text-fig. 3) with the ninth tergite, 9t, black, relatively tumid, the caudal margin produced into a flattened median lobe, the distal third or less of which is divided into two slender parallel lobes the tips of which are blackened and microscopically spiculate. Outer dististyle, od, widely expanded just beyond base, the outer ventral margin produced into a broadly triangular lobe, the style thence narrowed to the slender apex. Ninth sternite with a V-shaped notch in which hang two relatively stout dark brown lobes, each bearing at tip a stout brush of reddish yellow setae, these brushes decussate on the median line. Caudal margin of eighth sternite provided with a dense fringe of golden yellow setae, the sublateral ones longer.

Additional records: Eastern Himalayas, Darjiling District ♂, Regd. No. 1038/H1, ♀, Regd. No. 1039/H1, legs incomplete, Soom, June 16, 1914 (F. H. Gravely); Rakyong, May 28, 1930 (S. L. Hora).

***Tipula (Vestiplex) mitchelli* Edwards.**

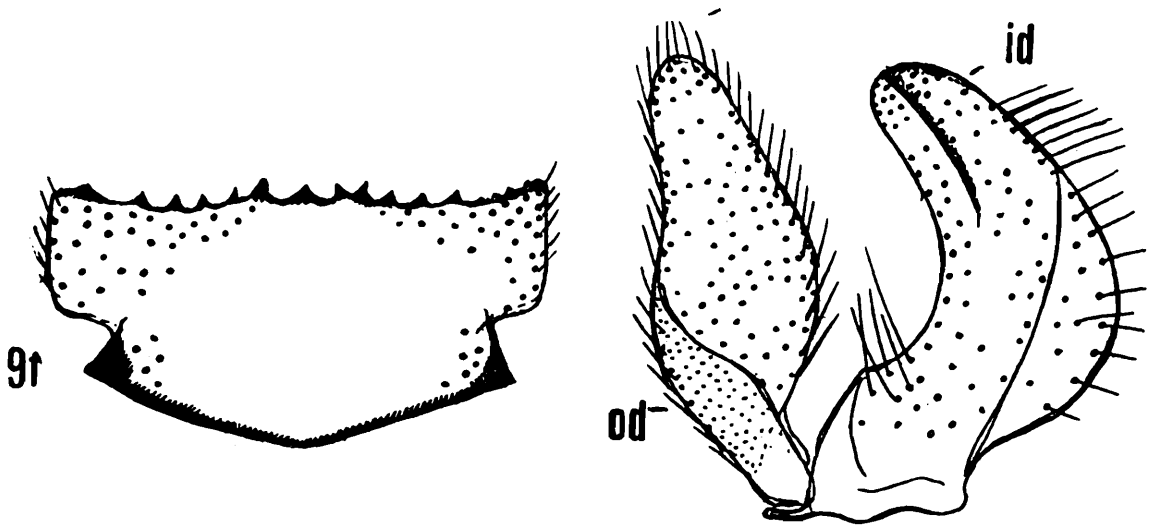
1927. *Tipula mitchelli* Edwards, *Ann. Mag. Nat. Hist.* (9) XX, pp. 229, 230.

Edwards' types were from an unknown station in Kashmir, altitude 11,000-13,000 feet, collected by F. J. Mitchell.

Additional records: Kashmir, Sonamarg, altitude about 9,000 feet, May 17-23, 1921 (Kashmir Survey); Indian Museum. Killanmarg, altitude 10,000 feet, July 19, 1923 (T. B. Fletcher); in writer's collection.

The latter specimen is a metatype received from Edwards and showing the white of the wings even more extensive than in the types, including major parts of cells *R* and *R*₁, the post-stigmal band wider, and the white areas in cells *M* and 2nd *A* even more extensive.

Male hypopygium (text-fig. 4) with the ninth tergite, *9t*, appearing as a flattened, heavily sclerotized saucer, the caudal margin and cephalic rim narrowly more blackened than the disk; caudal border almost straight but provided with a series of about a dozen denticles, including



TEXT-FIG. 4.—*Tipula (Vestiplex) mitchelli* Edwards; details of male hypopygium.

a lower median tooth and five or six sharper teeth on either side, arranged in a descending series from the submedians to the laterals; although there must be considerable variation in these teeth in different individuals, nevertheless the general arrangement as described seems to hold. The setigerous punctures of the lateral portions of the saucer are very distinct. Basistyle not produced into a spine, thus differing from most other Oriental species of the subgenus. Both dististyles relatively small and simple, the outer style, *od*, an elongate-oval pale blade, its setae pale; inner style, *id*, gently arcuated, the obtuse tip more blackened, the outer margin elevated into a high rounded compressed crest, the whole style with abundant scattered setae.

***Tipula (Vestiplex) subreposita*, sp. nov.**

Allied to *reposita*; general colouration of mesonotal praescutum grey, with four dark blackish grey stripes that are not or scarcely margined by darker; antennal scape and pedicel clear yellow, flagellar segments weakly bicoloured; a distinct dark median vitta on vertex; thoracic pleura chiefly yellow, restrictedly variegated with brown;

femora dark brown, the tips blackened, preceded by an obscure yellow subterminal ring; tibiae dark brown; wings with a weak brown ground colour, variegated by cream-coloured areas, including a post-stigmal fascia extending into the base of cell M_3 ; Rs about two and one-half times $m-cu$; abdominal tergites black, the basal segment more reddish; male hypopygium with the tergite entirely pale, the caudal margin broadly and evenly emarginate, without blackened points; basistyle produced into a very powerful spine; outer dististyle a blackened clavate blade; rostral prolongation of inner dististyle narrow, before apex with an acute spinous point.

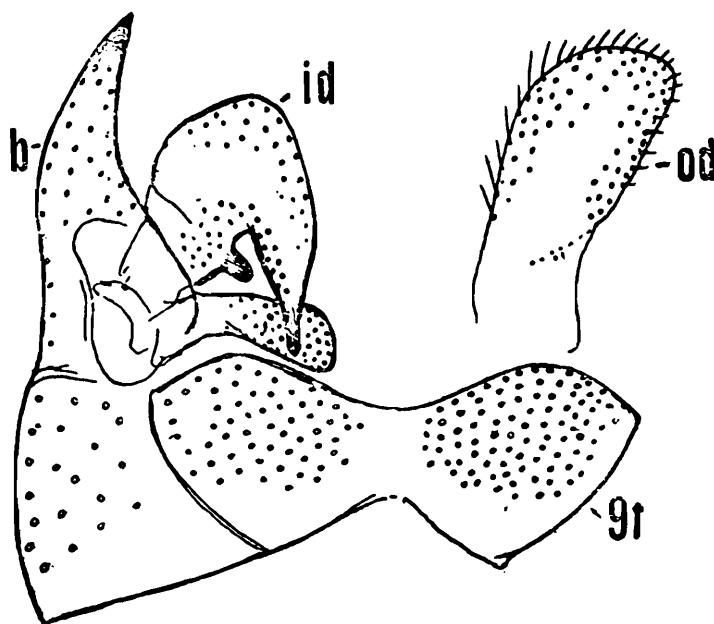
Male.—Length about 16 mm.; wing 17.5 mm.; antenna about 4.4 mm.

Frontal prolongation of head yellow, narrowly darkened on sides; nasus similarly yellow, distinct; palpi with basal segments yellowish brown, the relatively short terminal segment clearer brown. Antennae relatively short; scape and pedicel clear yellow; first flagellar segment brown, succeeding segments dark brown to brownish black basally, the remainder medium brown; flagellar segments moderately incised; verticils subequal to or a trifle exceeding the segments; terminal segment reduced to a tiny thimble. Head light cinnamon brown, the surface sparsely pruinose, with a distinct, median, dark brown vitta extending from the low vertical tubercle almost to the occiput.

Pronotum brownish yellow. Mesonotal praescutum with the ground colour grey, with four dark blackish grey stripes, the mesal edges of the intermediate pair very narrowly bordered by still darker, the remainder of stripes not or scarcely margined; humeral region and antero-lateral portions of praescutum yellow; interspaces of the ground colour, with numerous yellow setae; median region of scutum grey, more brownish at the suture, the lobes grey, each with two blackish grey areas; scutellum chiefly infuscated, the parascutella paler; mediotergite obscure brownish yellow, the posterior third more darkened. Pleura chiefly yellow, including the dorsopleural region, the anepisternum, ventral sternopleurite and ventral meron more infuscated. Halteres with stem yellow, knob dark brown, the apex again paler. Legs with the coxae obscure yellow, with long abundant setae; trochanters yellow; femora dark brown, the bases brightened, tip black, preceded by a conspicuous, obscure yellow ring that is about two-thirds as extensive as the blackened tip; tibiae dark brown; tarsi black. Wings with a weak brownish tinge, variegated by more cream-coloured areas, including a more or less distinct band beyond arculus, almost crossing the wing; a prestigmal area in cell R_1 ; a poststigmal fascia extending from costa through cell $1st\ M_2$ into the base of cell M_3 ; a conspicuous oval area at three-fourths the length of cell M ; wing-tip beyond the poststigmal band uniformly of the ground; stigma oval, darker brown; prearcular field clearer yellow; cells C and Sc yellow; veins brown. Venation: Rs long, about two and one-half times $m-cu$; tip of R_{1+2} pale but entire, without trichia; petiole of cell M_1 one-half longer than m .

First abdominal tergite and extreme base of second reddish, the succeeding tergites black; basal sternites reddish brown, passing into black on outer segments. Male hypopygium (text-fig. 5) with the tergite,

9t, entirely pale, the caudal margin broadly and evenly emarginate, apparently with no ventral lobes or blades and thus entirely unarmed



TEXT-FIG. 5.—*Tipula (Vestiplex) subreposita*, sp. nov.; male hypopygium, type.

except for abundant setae. Basistyle, *b*, produced caudad into an unusually strong and powerful spine, broad-based, the acute tip narrowly blackened. Outer dististyle, *od*, a simple flattened clavate blackened blade, its setae relatively short and sparse. Inner dististyle, *id*, of normal form, the rostral prolongation long, its tip obtuse, before apex with an acute spinous point (not shown in figure). Aedeagus short and stout, the penis slender.

Habitat.—India.

Holotype, ♂, Sureil, Mangpu, Darjiling District, Eastern Himalayas, altitude 5,000 feet, April-May 1917 (S. W. Kemp).

The nearest ally of the present fly is *Tipula (Vestiplex) reposita* Walker (*brevis* Brunetti) of which I have a wing available for comparison. In this latter species, *Rs* and *R*₂₊₃ are shorter and there are very definite pale areas in the outer ends of cells 1st *A* and 2nd *A*. Edwards (*Rec. Ind. Mus.* XXVI, p. 307, 1924) is responsible for the synonymy as given above. He further indicates that the species has the dististyle of very peculiar shape which is not the case in the present fly.

***Tipula (Vestiplex) himalayensis* Brunetti.**

1911. *Tipula himalayensis*, Brunetti, *Rec. Ind. Mus.* VI, p. 252.

Lectotype, ♂ Regd. No. 2407/20, Darjiling, Eastern Himalayas, altitude 6,000 feet, September 29, 1908 (E. Brunetti); in Indian Museum. This is the same as determined by Alexander, Brunetti and Edwards and evidently represents the true *himalayensis*.

Male hypopygium with the ninth tergite very small, largely concealed beneath the eighth tergite, the caudal margin deeply emarginate. Outer dististyle a flattened blackened lobe. Basistyle complete, the outer end produced caudad into a long point, the ventral margin with yellow setae. Eighth sternite unarmed.

Tipula (Vestiplex) subtineta Brunetti.

1912. *Tipula subtineta*, Brunetti, *Fauna Brit. India, Dipt. Nemat.*, p. 326, pl. vi, fig. 18 (genitalia).

Described from various stations in the Eastern and Western Himalayas and in the Khasi Hills, Assam. The following records of the species are available :

♂, Regd. No. 2477/20, Darjiling, Eastern Himalayas, altitude 7,000 feet, May 8, 1917 (E. Brunetti) ; Shamdang, Sikkim, altitude about 3,000 feet, September 7, 1909 (Indian Museum Collector), in poor condition ; Above Tura, Garo Hills, Assam, altitude 3,500-3,900 feet, September 1917 (Mrs. Kemp) ; Cherrapunjee, Assam, altitude 4,400 feet, October 2-8, 1914 (S. W. Kemp).

Are-description of the types is given below.

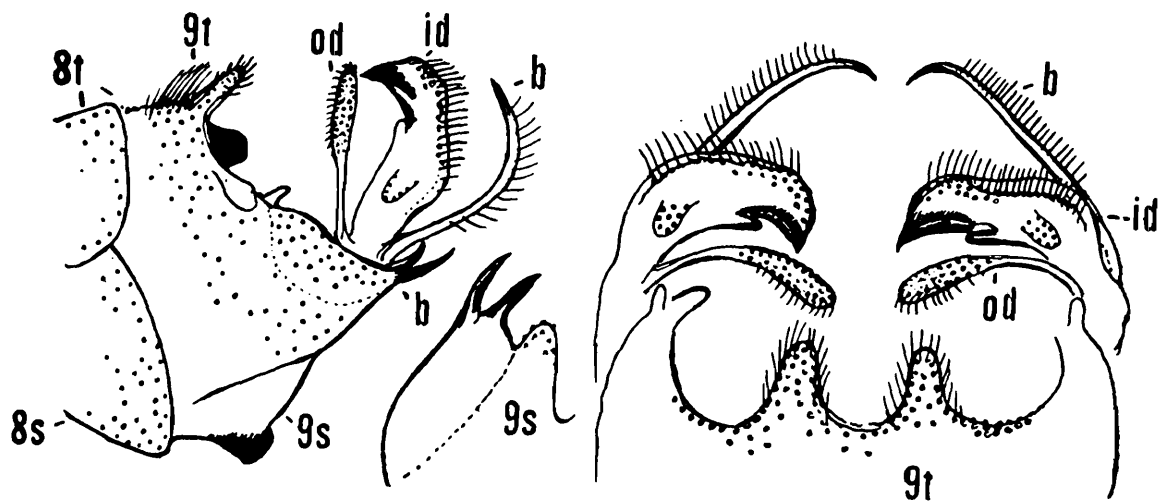
Male.—Length about 15—17 mm. ; wing 19—22 mm., antenna about 3.3—3.6 mm.

Frontal prolongation of head obscure yellow above, somewhat darker on sides ; nasus distinct ; palpi yellowish brown to obscure yellow. Antennae with basal three segments yellow ; succeeding segments dark brown, the distal ends of segments narrowly pale to produce a weak bicoloured appearance ; beyond the fourth or fifth flagellar segment, the organ becomes uniformly dark brown ; verticils very long and conspicuous. Head yellow, with a central vitta and the posterior borders of eyes darker brown.

Pronotum obscure yellow, variegated with darker. Mesonotal praescutum with ground colour light brown or yellowish brown, with four dark brown stripes that are narrowly bordered by darker brown, especially the intermediate stripes and the mesal edges of the lateral pair ; scutum obscure brownish yellow, each lobe with two dark brown areas ; posterior sclerites of mesonotum yellow, the scutellum and mediotergite with a narrow, dark brown, central vitta. Pleura yellow, the anepisternum, sternopleurite and ventral meron variegated with more brown areas ; ventral pleurotergite with a paler yellow pollinosity. Halteres yellow, the base of knob dark brown. Legs with the coxae pale, sparsely pruinose ; trochanters obscure yellow ; femora brownish black, restrictedly brightened at bases ; tibiae and tarsi dark brown to brownish black ; legs very long and slender, especially the tarsi (middle leg, femur, 14 mm. ; tibia, 16 mm. ; tarsus, 37 mm.). Wings relatively narrow, with a conspicuous basal petiole ; ground colour pale brown, very sparsely variegated by darker brown and whitish subhyaline areas, the darker markings including a restricted post-arcular darkening ; small areas at origin of *Rs*, along cord, a wash along mid-length of outer radial cells, and a seam along vein *Cu* ; wing tip and outer medial field somewhat paler brown ; outer half of cell *M* weakly darkened, enclosing a restricted pale area about three-fourths the length of cell ; cell *C* uniformly brownish yellow, cell *Sc* darker brown ; veins brown, paler in the obliterative portions. Venation : *Rs* long, nearly two and one-half times *m-cu* ; *m-cu* shortly before fork of *M*₃₊₄.

Abdomen relatively short and stout ; tergites brown medially, more reddish on either side, sublaterally with a narrow brownish black streak, the actual lateral border yellow ; fifth and succeeding segments

more uniformly dark brown to black, only the lateral borders pale; sternites reddish-brown, the outer segments darker, with very narrow yellow posterior margins; hypopygium black. Male hypopygium (text-fig. 6) with the tergite, *9t*, not separated from the sternite; basistyle, *b*, completely separated by a suture. Ninth tergite narrow, the caudal border with two finger-like fleshy lobes separated by a broad U-



TEXT-FIG. 6.—*Tipula (Vestiplex) subtinctoria* Brunetti; male hypopygium, details.

shaped notch, provided with short abundant setulae; dorsal surface of tergite with long erect setae; submedially on ventral face the tergite is produced caudad into two compressed blackened plates that lie parallel to one another, their margins microscopically roughened. Basistyle, *b*, at apex produced into two subequal short black spines lying side by side; in the Sikkim specimen, the outermost of these spines is longer and more slender, nearly twice the inner spine. At base of inner dististyle and the spines of the basistyle a conspicuous elongate pale rod that is gently curved, the acute tip narrowly blackened, the outer margin with a series of very long pale setae. Ventral median region of ninth sternite produced into an obtuse darkened lobe, directed ventral and slightly caudal. Outer dististyle, *od*, long and slender, narrowly spatulate on outer half, provided with long erect setae. Inner dististyle conspicuous, its face with an erect setiferous lobe. Penis very stout and conspicuous. Eighth sternite, *8s*, with margin straight and simple, not modified by lobes or hair pencils.

The only described species with which *subtinctoria* requires comparison is *Tipula (Vestiplex) quasimarmoratipennis* Brunetti, the type of which came from Darjiling; the species evidently being on the wing in spring (May). As indicated elsewhere in this paper, I am not entirely certain that the second female of *quasimarmoratipennis*, a paratype from Kurseong collected in September, is identical with the actual type. Edwards (*Rec. Ind. Mus.* XXVI, p. 305, 1924) who saw the type of this fly in Brunetti's collection believed that it was identical with the Formosan *T. (V.) biserra* Edwards. If this is indeed the case, I do not believe that *subtinctoria* is very close to *quasimarmoratipennis* since it differs conspicuously in the pattern of the antennae, legs and body. Both Edwards and Brunetti describe their species as having three praescutal stripes instead of the four in the present fly but the paratype of *quasimarmoratipennis* above mentioned has four such stripes. Brunetti

(*Rec. Ind. Mus.* XV, p. 262, 1918) records six further specimens of *quasimarmoratipennis* from the Garo Hills, Assam, with exactly the same data as one of the present *subtinctor* records. Whether both *subtinctor* and *quasimarmoratipennis* are included in such material remains in question. It should be noted that the presence of two spines on each basistyle of the male hypopygium of *subtinctor* provides an almost unique character for the separation of the species from the other numerous regional forms of *Vestiplex* having the basistyle unarmed or with a single such spine.

***Tipula (Vestiplex) distifurca*, sp. nov.**

General colouration yellow or greyish yellow, the praescutum with four very conspicuous brown stripes that are narrowly bordered by darker; head, scutellum and mediotergite with a capillary brown central vitta; femora dark brown with a narrow yellow subterminal ring; wings with a long basal petiole, pale brown, variegated with cream-coloured areas, including a post-stigmal band; abdomen reddish yellow basally, the tergites with three narrow brown stripes, much broader and more conspicuous in female; outer segments, including genitalia of both sexes, black; male hypopygium with the spine of basistyle very small, the outer mesal angle further produced into a stouter arm; basistyle bearing a long pale arm that splits at apex into two acute spines; ovipositor with serrate cerci.

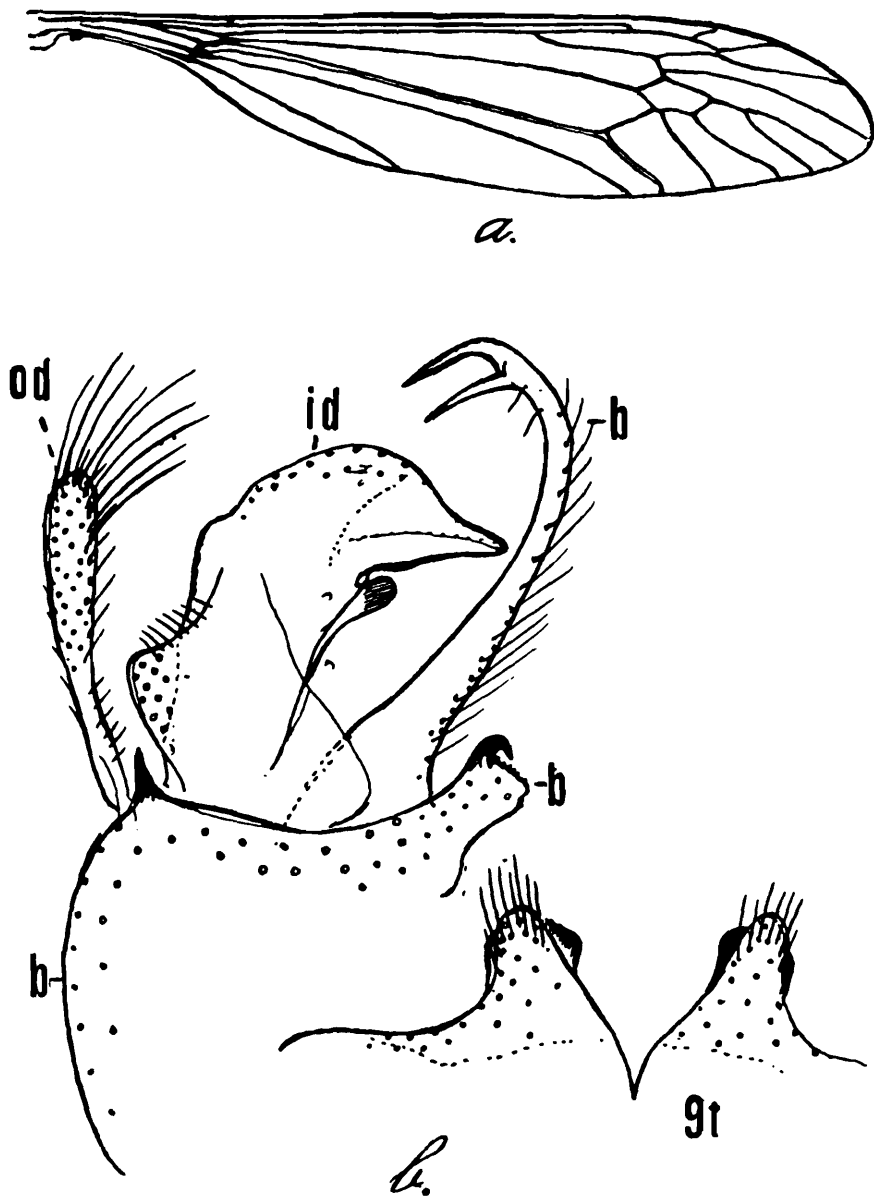
Male.—Length about 13-14 mm.; wing 17-18 mm.; antenna about 5 mm.

Female.—Length about 19 mm.; wing 17 mm.

Frontal prolongation of head yellow pollinose over a darkened ground; nasus elongate; palpi with basal segments obscure brownish yellow, terminal segment black. Antennae of moderate length; scape and pedicel yellow; first flagellar segment brownish yellow, succeeding segments black, the incisures but especially the apices of the segments vaguely pale; outer segments uniformly blackened; flagellar segments moderately incised; longest verticils nearly equal in length to the segments. Head obscure greyish yellow with a narrow dark brown median line.

Pronotum brown, yellow pollinose. Mesonotal praescutum greyish yellow, with four narrow brown stripes that are very distinct against the ground, the stripes more or less bordered by darker brown, the mesal edges of the intermediate pair involving the cephalic portion of the median interspace; cephalic ends of intermediate dark stripes a little paler; scutum greyish yellow, each lobe with two conspicuous dark brown areas, the more posterior one longer; outer posterior portion of each scutal lobe restrictedly darkened; posterior sclerites of notum obscure yellow, with a continuous median brown vitta that is somewhat narrower on the scutellum. Pleura almost uniform yellow, without distinct markings. Halteres with stem yellow, knob dark brown. Legs with coxae and trochanters yellow; femora narrowly yellow at bases, the remainder dark brown with a narrow yellow subterminal ring before the broader black apex; tibiae and tarsi brownish black to black. Wings (text-fig. 7a) with a long basal petiole; ground colour

pale brown, variegated with cream-coloured areas, including a post-stigmal band from *C* to cell R_5 ; numerous smaller pale areas in cells



TEXT-FIG. 7.—*Tipula* (*Vestiplex*) *distifurca*, sp. nov; a., venation; b., male hypopygium.

before cord, the largest in R_1 , near outer end of cell *M*, a common area near bases of cells *R* and *M*, and across the bases of cells *Cu* to 2nd *A*, inclusive; cell *Sc* uniformly dark brown; obliterative areas across cell 1st M_2 from the extreme outer end of cell *R* into the base of cell M_3 ; veins brown, not markedly different in colour in the pale areas Venation: R_{1+2} distinct; *m-cu* a short distance before fork of M_{3+4} .

Abdomen with basal four segments reddish yellow, the fifth and succeeding segments black; in male with a median dark stripe on tergites, widest on first segment and base of second, thence narrowed and indistinct to almost obliterated; lateral borders of tergites restrictedly grey; fifth tergite more reddish brown basally and sublaterally; sternites with a more or less distinct median brown vitta. In female the basal seven tergites yellow with a broad, continuous, median, black vitta, with indications of a much narrower and less distinct sublateral stripe; lateral tergal borders narrowly grey; genital shield brownish black; ovipositor with cerci long and slender, brownish black, the lateral teeth small but numerous. Male hypopygium (text-fig. 7b) with

the dorsal lobes of tergite, *9t*, pale, gently divergent, narrowly obtuse and tufted with long setae at tips; immediately ventrad of these lobes are slightly broader, more blackened lobes, their apices obliquely truncate. Basistyle, *b*, with apex terminating in a small black spine, the mesal-caudal portion of style further produced into a strong arm that is directed mesad, its outer angle further produced into a curved black spine; from near the bases of the dististyles arises a long conspicuous arm that is split at apex into two powerful spines. Dististyles as figured, the outer, *od*, elongate-clavate, pale; inner style, *id*, with the rostral portion blackened, relatively narrow.

Habitat.—India (Punjab).

Holotype, ♂, round about Hurst Cottage, Bakrota Hill, Dalhousie, altitude 7,000 feet, May-June, 1927 (S. L. Hora). *Allotopotype*, ♀. *Paratopotypes*, 4 ♂♂, with the types.

The nearest relative of the present fly seems unquestionably to be *Tipula* (*Vestiplex*) *subtineta* Brunetti, which differs conspicuously in the hypopygial structures, as the simple pale arm and entirely different apical spines of the basistyle. The pale subterminal femoral ring is more like the otherwise quite distinct *T* (*V.*) *himalayensis* Brunetti and differs from other relatives that are actually closer, as *subtineta* and *T* (*V.*) *quasimarmoratipennis* Brunetti.

***Tipula* (*Vestiplex*) *quasimarmoratipennis* Brunetti.**

1912. *Tipula quasimarmoratipennis*, Brunetti, *Fauna Brit. India, Dipt. Nemat.*, pp. 320, 321, pl. v, fig. 14 (wing).

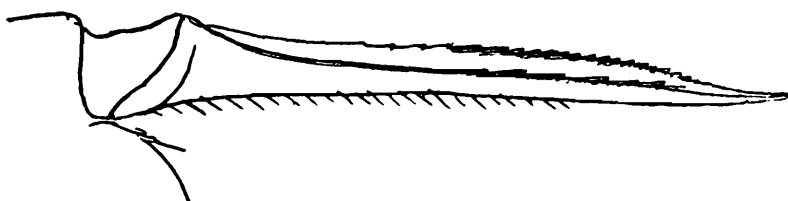
The type, ♀, Regd. No. 2427/20, was from Darjiling, May 23, 1910, collected by Brunetti, and has not been seen by the present writer. A paratype, ♀, Regd. No. 2428/20, collected at Kurseong in the Eastern Himalayas, altitude 5,000 feet, September 9, 1909, by N. Annandale, has been reexamined, but as indicated under the discussion of *subtineta*, is doubtfully conspecific with the type. This paratype may be re-described as follows:

Female.—Length about 23 mm.; wing 20 mm.

Frontal prolongation of head ochreous above, darker laterally, the stout nasus brownish ochreous; palpi dark brown. Antennae short; scape and pedicel obscure yellow; first flagellar segment fulvous yellow; succeeding flagellar segments weakly bicoloured, the basal enlargement of the segments brownish black, the apical portions paler brown; outer segments more uniformly darkened. Head buffy, with a broad, conspicuous, dark brown, median line extending from the anterior end of the vertical tubercle to the occiput.

Mesonotal praescutum obscure yellow, with four brown stripes, the intermediate pair narrowly margined internally with dark brown; lateral stripes greyish brown, the mesal margin broadly darker brown; scutum obscure brownish yellow, each lobe with two separated, darker brown areas; scutellum and postnotum brown, the former brighter at base; an interrupted brown median line. Pleura discoloured, the katepaurotergite silken olive grey. Halteres pale brown, the base of stem brighter, knob darker brown with paler tips. Legs with the coxae brownish ochreous; trochanters pale brown; femora brownish yellow,

the tips narrowly but distinctly dark brown; tibiae light brown, the tips dark brown; tarsi passing into dark brown. Wings with pattern as figured by Brunetti (*loc. cit.*) but the venation slightly different: Distal section of R_2 straight; R_3 elongate, at tip deflected caudad so cell R_2 at margin is extensive, about one-third wider than cell R_3 . Veins, excepting C , Sc and R , apparently destitute of macrotrichia.



TEXT-FIG. 8.—*Tipula (Vestiplex) quasimarmoratipennis* Brunetti; ovipositor.

Abdomen of moderate length only; tergites obscure yellow, with conspicuous dark brown median and sublateral stripes, the extreme margins of the tergites narrowly pale; sternites obscure yellow, a little darker medially. Ovipositor (text-fig. 8) with the elongate cerci slender, their outer margins serrate on distal two-thirds; hypovalvae rudimentary.

***Tipula (Tipulodina) simillima* Brunetti.**

1918. *Tipula simillima*, Brunetti, *Rec. Ind. Mus.* XV, p. 265.

The type, ♂, Regd. No. 6841/H1, was from Castle Rock, North Kanara District, on the Goa Frontier, western coast of Bombay Presidency, collected October 11-26, 1916, by S. W. Kemp. A re-description of the type is given below.

Male.---Length about 17 mm.; wing about 17 mm. (Brunetti gives the length as 12-13 mm. but this is far too little).

Antennae very short, if bent backward ending far before the wing-root; scape pale yellow at base, the apex darkened; pedicel obscure yellow; flagellum brownish black. Anterior vertex produced into a very slender, acute, median tubercle.

Fore and middle legs with the pale subapical ring of femur about twice as wide as the dark apex; on posterior femora the yellow ring greatly reduced, scarcely one-half as extensive as the blackened apex; fore and middle tibiae with only the subapical white rings, these broad, nearly apical in position, only the extreme tip of the segment blackened; posterior tibiae with this ring a trifle wider, together with a subbasal white ring shortly beyond proximal end of segment; basitarsi black, the tips broadly whitened, narrowest on fore legs where it includes less than the distal third, widest on posterior legs where about the distal two-fifths is included; second tarsal segment broadly blackened at base, most extensive on the fore legs where about the basal half is included, narrowest on the posterior legs where only the extreme base is blackened; fore legs with tarsal segment three dark basally, paler distally; remainder of tarsi white, the terminal two segments blackened. Wings hyaline, iridescent; brown pattern restricted; wing apex including outer ends of cells R_2 , R_3 and R_5 , together with the extreme cephalic margin of M_1 ; stigma small, confluent with a small cloud on anterior

cord; *m-cu* and distal section of *Cu*₁ narrowly bordered with brown; no dark marking in cell *M*.

Male hypopygium with the ninth tergite dark grey, transverse, the caudal margin broadly emarginate, fringed with dark setae. Hypopygium entirely blackened; suture between tergite and sternite incomplete; eighth tergite telescoped beneath the seventh; seventh and eighth sternites with conspicuous yellow setae. Inner dististyle profoundly bifid, both arms blackened, more or less setiferous.

Three males were sent to me for study by the Indian Museum in 1928, presumably the three specimens mentioned in the original diagnosis. However, I have a still additional male, received by exchange with Edwards, bearing exactly the same data and agreeing entirely with the type.

***Tipula (Oreomyza) striatipennis* Brunetti.**

1912. *Tipula striatipennis*, Brunetti, *Fauna Brit. India, Dipt. Nemat.*, pp. 325, 326, pl. v, fig. 16 (wing).

The type, ♀, Regd. No. 2432/20, was from Kurseong, Eastern Himalayas, altitude 5,000 feet, collected July 6, 1908, by N. Annandale. Edwards (*Rec. Ind. Mus.* XXVI, p. 305, 1924) believed that the species was identical with *Tipula (Oreomyza) quadrifasciata* Matsumura [*Thousand Insects Japan, Addit.* II, p. 460, pl. xxv, fig. 3 (wing and body), 1916] but in my opinion the two species are entirely distinct, as will be shown by the following comparison.

A re-description of type is given below.

Females.—Length about 11-11.5 mm.; wing 10.6 mm.

Frontal prolongation of head, including the nasus, brownish black; palpi black. Antennae with scape and pedicel light brown; first flagellar segment black, its tip reddish brown; succeeding flagellar segments bright reddish brown, only the terminal segments becoming darker brown. Head dark grey, with a capillary brown median vitta and numerous dark setigerous punctures.

Mesonotal praescutum yellowish grey, with three brown stripes, the median one broad in front and here indistinctly divided by a dull grey area; scutum and scutellum grey, with a continuous, capillary, brown, median vitta; scutal lobes each with two confluent brown spots; post-notum brownish grey. Pleura dark grey, with a relatively indistinct longitudinal paler stripe. Halteres obscure yellow, the knobs brown. Legs brownish black, the femoral bases only very narrowly and vaguely brightened. Wings whitish subhyaline, quadrivittate with brown, almost as figured by Brunetti (*loc. cit.*). Distal section of *R*₁₊₂ atrophied, leaving only a minute spur.

Abdominal tergites brownish yellow, the outer segments darker brown, the caudal and sublateral margins of the segments dark, the extreme caudo-lateral portions of the tergites restrictedly pale; outer sternites chiefly darkened. Ovipositor with the elongate cerci slender, chestnut to horn coloured; margins smooth.

***Tipula (Oreomyza) quadrifasciata* Matsumura.**

1918. *Tipula aluco*, Alexander, *Journ. N. Y. Ent. Soc.* XXVI, pp. 70, 71.

The types of *aluco* are preserved in alcohol which has changed the colour of the pruinosity. The following description was made from freshly preserved dry females. It may be noted that the measurements given by Matsumura for his species are too great. I have paratypes of *quadrifasciata* from Kyoto, Japan, kindly presented to me by Dr. Akio Nohira who discovered the species.

Frontal prolongation of head longer, clear light grey above, the nasus conspicuous, light yellow; palpi dark brown. Antennae with the scape, pedicel and first flagellar segment yellow, the remaining flagellar segments dark brown. In the male the flagellum weakly bicoloured, the basal enlargements of the segments a little darker than the apical portions.

Praescutal interspaces with the brown setigerous punctures much larger and more conspicuous than in *striatipennis*; median brown line on scutum and scutellum obsolete or nearly so. Pleura clear light grey. Wings with the brown bands narrower, that at origin of *Rs* only about one-half as wide as the preceding white band. Venation: Cell 1st M_2 small, pentagonal, the longest face being the second section of M_{1+2} , the next being the basal section of M_3 which is longer than M_{3+4} , *m* shortest. In *striatipennis* M_{3+4} longer than M_3 , as figured by Brunetti.

Abdominal tergites obscure yellow with a conspicuous dorso-median dark brown stripe that is broader behind; caudal margins of the subterminal segments narrowly pale. Ovipositor with the genital shield shiny chestnut brown, the elongate cerci blackened.

***Tripula (Lunatipula) marmoratipennis* Brunetti.**

1912. *Tipula marmoratipennis*, Brunetti, *Fauna Brit. India, Dipt. Nemat.*, pp. 319-320, pl. v, fig. 13 (wing).

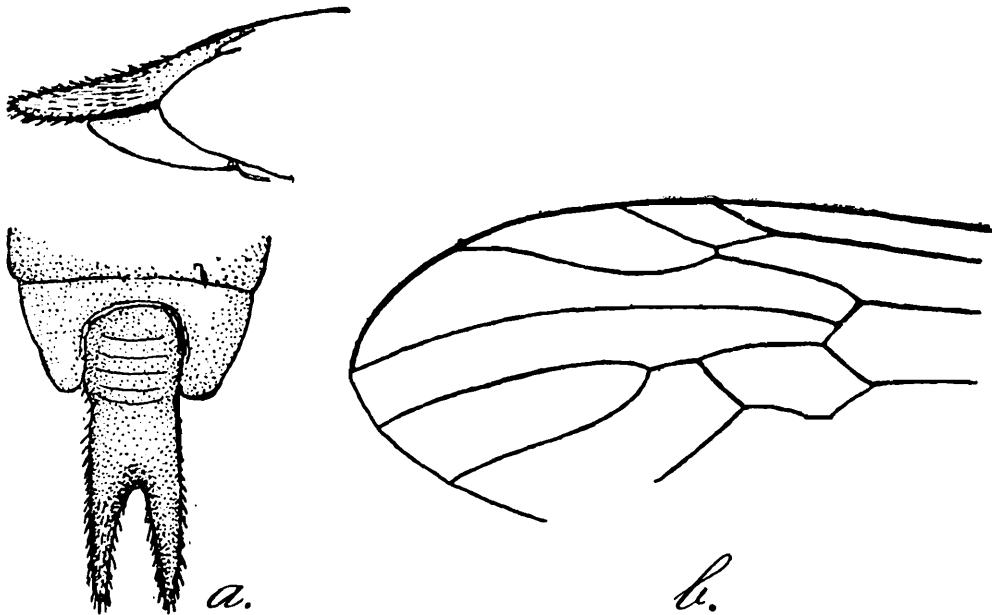
The holotype, ♀, Regd. No. 2425/20, was from Darjiling, Eastern Himalayas, altitude 7,000 feet, May 24, 1910 (not April, as stated by Brunetti), collected by E. Brunetti. A paratype, ♀, Regd. No. 2426/20, likewise from Darjiling, taken August 7, 1909, by C. Paiva. Both types were studied. The re-description follows.

Female.—Length about 16 mm.; wing 22 mm.

Frontal prolongation of head obscure yellow above, with a vague median brown line, the sides darker; nasus short and stout; palpi brown, the outer segments passing into orange. Antennae short, obscure yellow; flagellar segments obscure fulvous, their bases scarcely darkened. Head light ochreous, the vertical tubercle whitened; vertex with a narrow dark brown median vitta, widened in front.

Mesonotal praescutum yellowish grey with four olive brown stripes that are narrowly margined with darker brown, the lateral stripes more conspicuously darkened along the mesal margin; interspaces with numerous pale erect setae, the punctures inconspicuous; pseudosutural foveae small, circular; scutum grey, each lobe with two confluent olive brown areas, the triangular posterior one larger; scutellum and medio-tergite yellowish grey with a continuous median brown vitta; para-

scutella dark, smooth. Pleura pruinose with grey and pale olive. Halteres obscure yellow, the knobs dark brown with orange apices. Legs with the coxae pale olive grey; trochanters reddish brown; femora obscure yellow, the tips narrowly brownish black; tibiae and tarsi brownish black. Wings pale yellowish, cells *C* and *Sc* darker yellow; stigma yellowish brown; wing surface variegated with grey and pale brown; pattern entirely as figured by Brunetti (*loc. cit.*). Venation of Brunetti's figure slightly inaccurate, especially in the shape



TEXT-FIG. 9.—*Tipula* (*Lunatipula*) *marmoratipennis* Brunetti, type; *a.*, ovipositor; *b.*, venation.

of cell R_2 and the course of vein R_3 which is strongly arched, constricting cell R_3 so that it is narrowest before midlength (text-fig. 9b) petiole of cell M_1 shorter than m .

Abdomen with tergites one to five inclusive dark orange fulvous, trivittate with black, the median stripe interrupted; sublateral stripes more continuous; segments with silvery grey lateral areas; remainder of tergites darker brown, pruinose, more heavily so on segments seven to nine; sternites pale, the basal segments pruinose, the segments with a darker brown lateral stripe. Ovipositor (text-fig. 9a) with the valves small and fleshy, the cerci lying side by side, parallel, their margins setiferous; hypovalvae smaller, compressed.

Related to *Tipula* (*Lunatipula*) *holoteles* Alexander, *T* (*L.*) *naviculifer* Alexander, and *T* (*L.*) *shogun* Alexander, all of Japan.

***Nephrotoma perhorrida*, sp. nov.**

General colouration yellow, the praescutum with three blackish grey or plumbeous stripes that are narrowly bordered by velvety black, the central stripe entire or nearly so; antennae black, only the pedicel more brownish; head with a conspicuous T-shaped brown area, the stem reaching the occipital brand; pleura heavily patterned with brownish black; wings with cells before cord strongly infuscated, those beyond cord clearer; abdominal tergites obscure yellow with three broad dark brown stripes, the outer segments uniformly blackened; male hypopygium very conspicuous; basistyle produced caudad into a cylindrica

lobe, the ventral margin with unusually long, coarse setae ; eighth sternite produced medially into a long tongue-like lobe.

Male.—Length about 10-11 mm. ; wing 9-11 mm. ; antenna 3.3-3.4 mm.

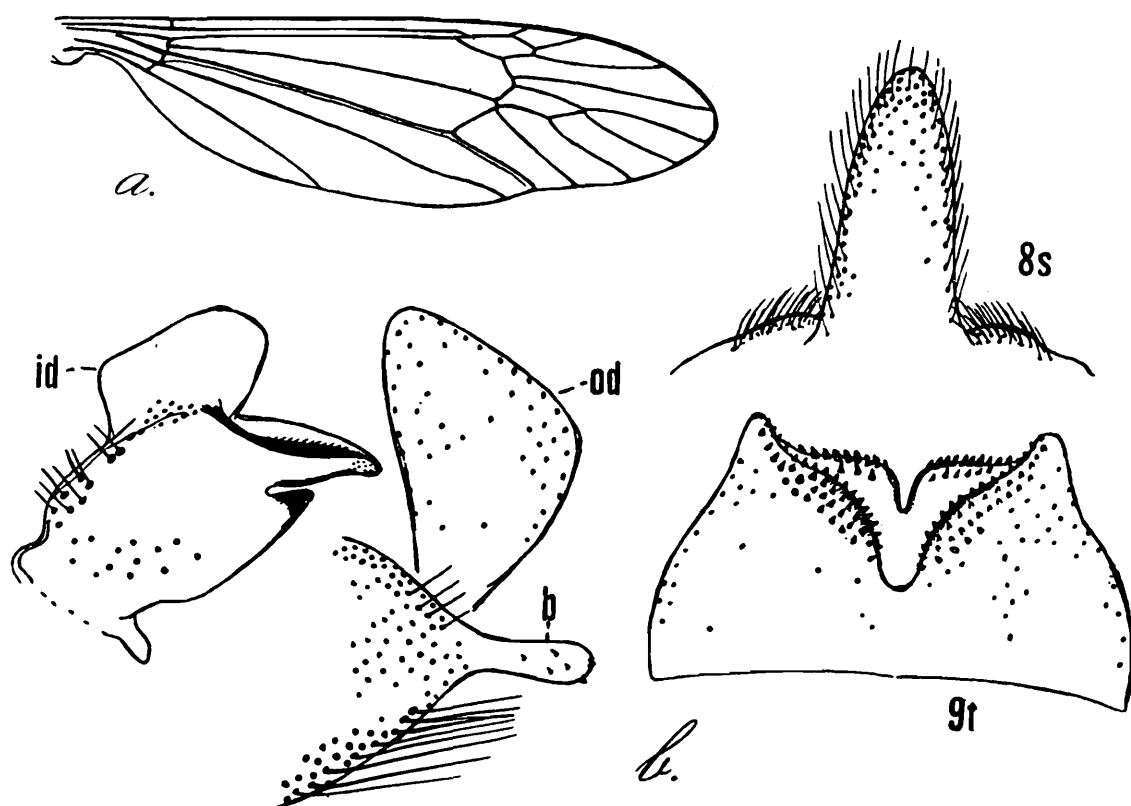
Female.—Length about 13-14 mm. ; wing 11-12 mm.

Frontal prolongation of head above black, including the nasus, on sides and beneath yellow ; palpi black. Antennae black, the pedicel more brownish ; flagellar segments only moderately incised, the basal enlargements relatively small ; longest verticils subequal in length to the segments, unilaterally arranged, those on opposite face of segment reduced to short spinous bristles. Vertical tubercle yellow, with a conspicuous median impressed line ; posterior vertex with a T-shaped dark mark extending from either eye behind the vertical tubercle, the stem extending as a median area to the occiput ; occipital brand small and ill-delimited in the general darkened area ; head behind with conspicuous black and longer yellow setae.

Pronotum yellow, the sides conspicuously dark brown. Mesonotal praescutum with the ground light yellow, with three blackish grey or plumbeous stripes that are narrowly bordered by velvety black, the intermediate pair barely indicated by these mesal edges so the central stripe is entire or virtually so ; a conspicuous dark brown cloud opposite anterior ends of lateral stripes, not quite reaching the lateral border, the stripes themselves not outcurved ; scutum with median area and extreme lateral portions of lobes yellow, each lobe chiefly covered by a blackish grey area that is narrowly bordered by velvety black, the suture chiefly dark ; scutellum brownish black, parascutella obscure yellow ; mediotergite with a broad dark brown central stripe, wider and darker on posterior border ; posterior lateral portions of mediotergite with relatively few but conspicuous coarse black setae ; pleurotergite with katepaleurotergite obscure yellow, just above the halteres bordered by dark brown, the anepaleurotergite more infuscated. Pleura yellow, very conspicuously patterned with dark brown or brownish black on the anepisternum, ventral sternopleurite, ventral meron, and along the suture between anepisternum and pteropleurite. Halteres with stem obscure brownish yellow, knob dark brown, the apex vaguely pale yellow. Legs with coxae obscure yellow, more or less infuscated basally, especially in front ; trochanters yellow ; femora pale brown to yellowish brown, the tips weakly darkened ; remainder of legs obscure yellow, the terminal tarsal segments passing into black. Wings (text-fig. 10a) with cells before cord rather strongly infuscated, beyond the cord much paler ; stigma oval, dark brown ; a distinct, paler brown cloud on anterior cord ; veins brown. Stigma with numerous trichia before R_2 ; wing dilated in the Anal field. Venation : R_s a little shorter than $m-cu$; cell M_1 narrowly to broadly sessile.

Abdominal tergites obscure yellow, with three broad, dark brown stripes, the median one narrowly interrupted at the posterior border of the intermediate segments ; sixth and succeeding segments uniformly darkened, sternites yellow. Male hypopygium (text-fig. 10b) having the tergite, $9t$, with an upper plate that bears a broad U-shaped notch, the lobes densely set with microscopic blackened points, and a lower plate

divided into lobes by a shorter and much narrower median notch, the truncated margins of the lobes likewise set with points. Basistyle, *b*,



TEXT-FIG. 10.—*Nephrotoma perhorrida*, sp. nov.; *a.*, venation; *b.*, male hypopygium, details.

conically produced, the apex abruptly prolonged into a cylindrical lobe that bears a few chitinized triangular points; ventral surface of basistyle with very long, conspicuous yellow setae, the dorsal surface with less conspicuous bristles. Outer dististyle, *od*, unusually broad, the tip obtuse. Inner dististyle, *id*, with a high dorsal crest; beak slender. Eighth sternite, *8s*, produced medially into a very long and conspicuous liguliform lobe, the apex narrowly obtuse, the surface with abundant long black setae; subtending shoulders of the lobe likewise with long conspicuous setae.

Habitat.—India (Khasi Hills).

Holotype, ♂, Cherrapunji, altitude 4,000 feet, 1935 (Sircar).

Allotopotype, ♀. *Paratopotypes*, 15 ♂ ♀. Paratypes deposited in the Indian Museum.

Nephrotoma perhorrida is very different from all other described regional species. The remarkable male hypopygium, especially the long-produced basistyle and the elongate liguliform lobe of the eighth sternite, will readily separate the fly from other generally similar regional forms, as *Nephrotoma pleurinotata* (Brunetti).

Subfamily CYLINDROTOMINAE

Stibadocerella pristina Brunetti.

1918. *Stibadocerella latefurcata*, Brunetti (*lapsus calami*), *Rec. Ind. Mus.* XV, p. 280.

1918. *Stibadocerella pristina*, Brunetti, *Ibid.*, p. 283.

A paratype, ♂, Regd. No. 3967/H2 from above Tura, Garo Hills, Assam, altitude 3,500-3,900 feet, July 1917 (S. W. Kemp).

Male.—Length about 10 mm.; wing 9.2 mm.; antenna about 13 mm.

Antennae (male) much longer than the body, pale yellow, the outer segments of flagellum darker. Body colouration as described by Brunetti. Praescutal stripes distinctly separated. Pale ring at base of tibia distinct; pale apex of fore tibia relatively wide (1.7 mm.), slightly thickened, the setae similarly white; fore and middle basitarsi about as long as tibia, brown, only the extreme apex of each a little whitened. Wings hyaline, the veins black. Venation: Sc_1 ending before $r-m$, Sc_2 at its tip; second section of Rs a little shorter than the basal section; R_{2+3} oblique; free tip of Sc_2 and R_{1+2} entirely atrophied; cell $1st\ M_2$ large, roughly rectangular; $m-cu$ longer than the distal section of Cu_1 ; vein Cu_2 evident to opposite $m-cu$; vein $1st\ A$ long, nearly straight; vein $2nd\ A$ very short, opposite the arculus becoming confluent with the Anal margin of wing, to all intents and purposes, lacking.

~Subfamily LIMONIINAE.

Tribe LIMONIINI.

***Limonia (Limonia) albitarsis* (Alexander).**

1915. *Dicranomyia albitarsis*, Alexander, *Proc. U. S. Nat. Mus.* XLIX, pp. 159, 160.

1916. *Dicranomyia tinclipennis*, de Meijere, *Tijd. v. Ent.* LVIII, Suppl., p. 66.

A broken specimen, Federated Malay States, Selangor-Pahang Boundary, Ginting Bidai, altitude 1,000 feet, April 1917 (C. Boden Kloss).

Limonia (Doaneomyia) altitarsis (Edwards) from New Hebrides [*Ann. Mag. Nat. Hist.* (9) XX, p. 233, 1927] was erroneously so printed though obviously intended for *albitarsis*. Since the specific name *albitarsis* would have been preoccupied in the genus by the present name, it seems advisable to retain the misprinted name *altitarsis*, even though without significance in the instance where used.

***Limonia (Libnotes) greeni* (Edwards).**

1928. *Libnotes greeni* Edwards, *Journ. Fed. Malay States Mus.* XIV, pp. 76, 82.

Metatypes of both sexes from Suduganga, Ceylon, bred October 21, 1921 from diseased bark of *Hevea* (R. Senior-White). Ceylonese specimens had been determined by Senior-White and Brunetti (*Rec. Ind. Mus.* XV, pp. 294, 295, 1918) as *Limonia (Libnotes) poeciloptera* (Osten Sacken).

***Limonia (Discobola) sp. prox. annulata* (Linnaeus).**

1758. *Tipula annulata*, Linnaeus, *Syst. Nat.*, Ed. 10; p. 586.

1824. *Limnobia*, Argus, Say, *Long's Exped. to St. Peter's River*, Append. 2, p. 358.

One badly injured specimen of indeterminate sex, Assam, Khasi Hills, forest west of dak bungalow, Mawphlong, April 13, 1927 (Gopi Ram). Despite its poor condition this specimen is of unusual interest

since the subgenus *Discobola* Osten Sacken had not before been recorded from British India. I feel relatively certain that the specimen pertains to *annulata*.

L. (D.) annulata has a vast range throughout the Holarctic Region, including northern North America and northern Eurasia as far south as the high mountains of the Philippines and Borneo (Kinabalu). From Kinabalu, two additional species of the subgenus have been described by Edwards. Two further species have been recorded from the Indo-Himalayan Region, including western China ; *L. (D.) taivanella* Alexander (Mount Omei, Szechwan, altitude 9,000 feet) and *L. (D.) armorica* Edwards, Mss., (Adung Valley, northeast Burma, altitude 12,000 feet). The latter fly is most similar to *taivanella* yet amply distinct, being very large (wing, male, 12 mm.) and with a distinctive wing pattern, the nuclei of the annulata areas being unusually large and dark, almost obliterating the inner pale ring of the annulus, such being the condition of all costal ocellate markings ; furthermore the supplementary brown dots are more numerous than in any other regional species, being especially numerous in cells R_1 , R , M , $1st\ M_2$, Cu , $1st\ A$ and $2nd\ A$. The male hypopygium agrees somewhat closely with that of *taivanella*, especially in the very conspicuous lateral lobes of the tergite and the long slender rostral prolongation of the ventral dististyle. There are distinct differences in the dorsal dististyle which is longer and more gently curved than in *taivanella*, and in the spines of the rostral prolongation which are more widely separated from one another. The more elongate ventromesal lobe of basistyle, the unexpanded tips of the gonapophyses, and the slightly capitate apex of the aedeagus show further minor but apparently constant differences for separating *armorica* from *taivanella*. *L. (D.) annulata* shows no supplementary brown dots in any of the cells of wing and the structure of the male hypopygium is entirely distinct.

***Limonia (Dicranomyia) bhutanica*, sp. nov.**

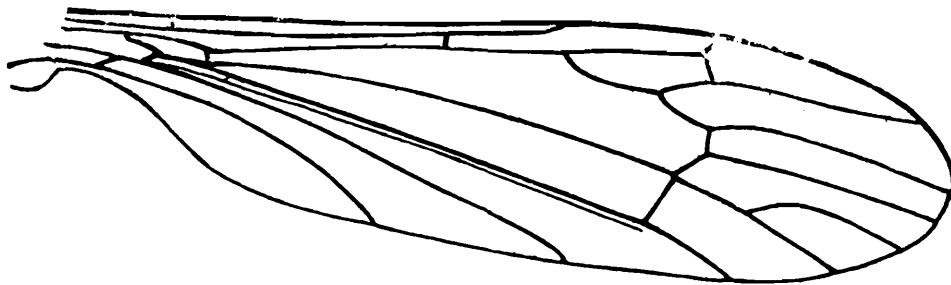
Size very small (wing, female, 3.5 mm.) ; general colouration brown, the praescutum with three more or less confluent, darker brown stripes ; antennae brownish black ; flagellar segments oval, all but the three or four outer ones with conspicuous apical pedicels ; anterior vertex wide ; legs obscure yellow ; wings greyish subhyaline, stigma lacking ; Sc_1 ending opposite origin of R_s ; Sc_1 very long, exceeding R_s in length ; cell M_2 open by the atrophy of m ; cell $2nd\ A$ wide.

Female.—Length about 3 mm. ; wing 3.5 mm.

Rostrum dark brown ; palpi pale brown. Antennae brownish black throughout ; flagellar segments oval, with conspicuous glabrous apical pedicels, especially long, conspicuous and abrupt on the basal segments ; distal three or four segments with pedicels short to lacking ; terminal segment a very little longer than the penultimate ; verticils long and conspicuous, exceeding the segments in length. Head light brown ; anterior vertex wide, approximately four times the diameter of scape ; ommatidia of eyes relatively coarse.

Pronotum and mesonotum uniformly medium brown, the praescutum with three more or less confluent darker brown stripes ; posterior sclerites of notum destroyed by pinning. Pleura brown, with indica-

tions of more blackened areas on propleura above the fore coxae and beneath the wing root. Halteres obscure yellow. Legs with the coxae brown ; trochanters obscure yellow ; only a single detached leg remains, this obscure yellow, the terminal two tarsal segments darkened ; claws simple. Wings (text-fig. 11) greyish subhyaline, the base slightly more



TEX-FIG. 11.—*Limonia (Dicranomyia) bhutanica*, sp. nov. ; venation.

brightened ; stigma lacking ; veins very pale brown. Venation : Sc_1 ending opposite origin of R_s , Sc_2 very far from its tip so vein Sc_1 is longer than the arcuated R_s ; basal section of R_{4+5} arcuated, about two-thirds R_s ; cell M_2 open by atrophy of m ; petiole of cell M_3 about two-thirds the cell ; cell 2nd A unusually wide, vein 2nd A arcuated.

Abdomen yellowish brown, somewhat darkened laterally ; sternites paler ; valves of ovipositor horn-yellow, the hypovalvae blackened basally ; cerci very slender.

Habitat.—Assam-Bhutan Border.

Holotype, ♀, northeast Mangaldai District, December 30-31, 1910 (S. W. Kemp).

The most generally similar regional species of *Dicranomyia* having cell M_2 of the wings open by the atrophy of m are *Limonia (Dicranomyia) innocua* (Alexander) and *L. (D.) absens* (Brunetti). Both of these species are much larger than the present fly and with the colouration of the body and wings distinct. Superficially the present fly is more like *L. (D.) aperta* (Wahlgren) of northern Europe and *L. (D.) brevivena* (Osten Sacken) of North America. The structure of the antennae indicates that the present fly is very distinct from all of the above mentioned species, more nearly approaching several species in the subgenus *Limonia* Meigen. The fly is one of the smallest members of the entire genus *Limonia* yet made known.

***Limonia (Geranomyia) cernua*, sp. nov.**

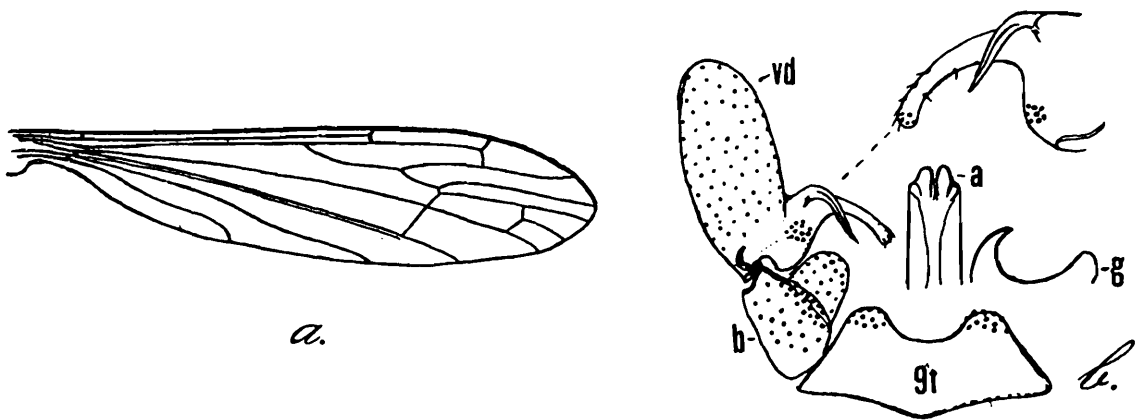
General colouration of mesonotum obscure yellow, the praescutum with three narrow dark brown stripes ; scutellum yellow with a conspicuous brownish black median vitta ; postnotum darkened ; pleura obscure brownish yellow, the dorsal pleurites vaguely darker ; knobs of halteres brownish black ; femora obscure yellow with a vague darker subterminal ring ; wings cream yellow, slightly darker around margin, with very conspicuous brown costal areas, those over origin of R_s and at stigma very large ; no brown spots along vein Cu ; Sc relatively long ; cell 1st M_2 elongate, exceeding any of the veins beyond it ; $m-cu$ close to fork of M ; male hypopygium with the dorsal dististyle lacking ; ventral dististyle very large and fleshy, its rostral prolongation slender,

with two decurved spines from a common tubercle, these spines fused basally or very closely approximated on their outer portion.

Male.—Length, excluding rostrum, about 6.5-7 mm.; wing 7.5-8 mm.; rostrum about 2.3-2.5 mm.

Rostrum relatively short, black. Antennae black throughout; flagellar segments oval; verticils relatively inconspicuous. Anterior vertex light grey, the colour vaguely continued caudad onto the dark brownish grey posterior portion of head; anterior vertex reduced to a narrow strip, less than the diameter of scape.

Pronotum obscure yellow, darkened laterally. Mesonotal praescutum obscure yellow, with three narrow dark brown stripes, the median vitta narrower than the laterals, subequal in width to the interspaces; lateral stripes widened behind and here more greyish, crossing the suture and broadly suffusing the scutal lobes, the latter area narrowly bordered mesally by more brownish black; lateral borders of scutal lobes and the median area of scutum yellow, the latter with vague indications of a darkened median vitta; scutellum yellow, with a very conspicuous brownish black median dash that does not reach the posterior border, parascutella pale brown; postnotum chiefly dark brown, paler along the suture between anepisternum and sternopleurite. Pleura chiefly obscure brownish yellow or reddish yellow, with indications of a darker dorso-longitudinal stripe extending from the propleura backwards, the exact limits difficult to determine because of damage caused by pinning. Halteres with stem yellow, knob brownish black. Legs with the coxae and trochanters yellow; femora obscure yellow with very vague indications of a darker ring about equal in extent to the yellow apex; tibiae and tarsi yellow, the terminal tarsal segments darkend. Wings (text-fig. 12*a*) with a weak brown tinge, the central portion of disk more cream



TEXT-FIG 12.—*Limonia (Geranomyia) cernua*, sp. nov.; *a.*, venation; *b.*, male hypopygium.

coloured; a heavy brown pattern, chiefly costal in distribution, arranged as follows: At *h*, continued caudad over the arcular region; at supernumerary crossvein in cell *Sc*, extending from *C* to *M*, narrower in cell *R*; a very extensive costal area from above origin of *Rs* to beyond fork of *Sc*, continuously darkened in cells *C* and *Sc* or very narrowly interrupted; in cell *R* following along *Rs* for about one-half the length of the vein, not reaching vein *M* behind; a further posterior extension in cell *R*₁ opposite fork of *Sc*, not quite reaching *Rs* behind; a further major darkening in region of the stigma, in extent subequal to the last

area, with a narrow posterior extension across cell R_3 before midlength ; beyond the stigma are further narrower areas at tip of R_{2+3} , continued caudad to vein R_{4+5} , and more diffusely at wing-tip ; cord and outer end of cell 1st M_2 more narrowly seamed with brown ; narrow brown marginal clouds at ends of longitudinal veins, especially *Cu*, 1st *A* and 2nd *A* ; veins obscure yellow, very slightly darker in the patterned areas. Costal fringe (male) short and inconspicuous. Venation : *Sc* relatively long, Sc_1 ending about opposite three-fifths *Rs*, Sc_2 at its tip ; a supernumerary crossvein in cell *Sc* ; *Rs* weakly angulated at origin ; cell 1st M_2 elongate, longer than any of the veins beyond it, more than twice as long as the distal section of M_4 ; *m-cu* close to fork of *M* ; vein 2nd *A* sinuous.

Abdominal tergites dark brown, the posterior borders of the segments broadly more greyish ; sternites reddish yellow ; hypopygium dark. Male hypopygium (text-fig. 12*b*) with the caudal margin of ninth tergite, 9*t*, broadly emarginate, the lateral lobes obtuse, slightly darkened, provided with numerous coarse setae. Basistyle, *b*, small, the ventromesal lobe short and stout, simple. Dorsal dististyle apparently lacking. Ventral dististyle, *vd*, large and fleshy, elongate, its total area about four or five times the basistyle ; rostral prolongation long and slender, at its base on upper face with a common tubercle bearing two strong confluent or very closely approximated spines that are bent cephalad across the face of the prolongation, one of the spines longer and a trifle stouter than the other, both acute at tips ; apex of prolongation a little dilated, provided with microscopic setae. Mesal-apical lobe of gonapophysis, *g*, appearing as a smooth, darkened, slightly curved horn.

Habitat.—British India (Punjab, Assam).

Holotype, ♂, Punjab, Dalhousie, stream next to Punj-pul Nallah, altitude 6,500 feet, May 8, 1927 (S. L. Hora). *Paratypes*, alcoholic ♂ ♀, in poor condition, Assam, Khasi Hills, Dümpep, October 2-18, 1929 (S. L. Hora).

By means of Brunetti's key to the species of British India (*Fauna*, etc., p. 388), the present fly runs to *Limonia* (*Geranomyia*) *semistriata* (Brunetti), which with the subsequently described *L. (G.) flaviventris* (Brunetti) and *L. (G.) poliophara* Alexander, and the fly described here-with as *L. (G.) fortibasis*, sp. nov., are the most similar species. The fly is readily told from all of the above with the exception of *fortibasis* by the structure of the male hypopygium, especially the loss of the dorsal dististyle. The three Oriental species possessing this character are *L. (G.) feuerborni* Alexander, of the Malayan Islands ; *L. (G.) fortibasis*, sp. nov. ; and the present fly ; all differ among themselves in the nature of the wing pattern and the details of structure of the male hypopygium.

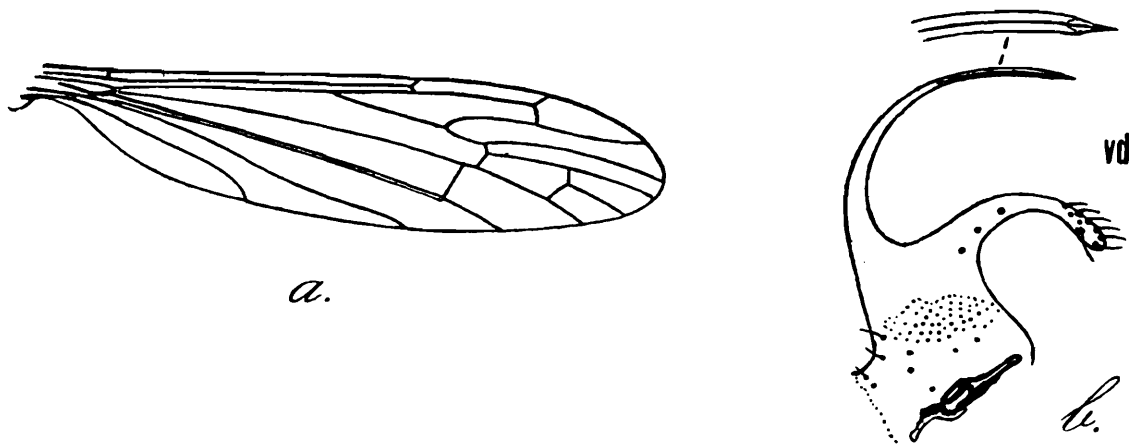
***Limonia (Geranomyia) fortibasis*, sp. nov.**

Male.—Length, excluding rostrum, about 6-7 mm. ; wing 6.5-8 mm. ; rostrum about 2.5-3 mm.

Female.—Length, excluding rostrum, about 6 mm. ; wing 7 mm. ; rostrum about 2.5-3 mm.

Very similar to *L. (G.) cernua*, sp. nov., differing especially in the details of structure of the male hypopygium.

Rostrum black throughout. Praescutal stripes narrow but relatively ill-defined; scutal lobes extensively darkened; median area of scutum and the scutellum obscure yellow, with a narrow dark brown median vitta; postnotum uniformly darkened. Pleura obscure yellow, the dorsal portions slightly more darkened. Femora light brown, the tips narrowly and vaguely yellow, without a distinct brown subterminal ring; tibiae and tarsi brown, the terminal tarsal segments darker. Wings (text-fig. 13a) with the dark pattern much as in *cernua*, the areas



TEXT-FIG. 13.—*Limonia (Geranomyia) fortibasis*, sp. nov.; a., venation; b., male hypopygium, details.

over origin of *Rs* and fork of *Sc* entirely separate. Venation: Cell 1st M_2 a little shorter; *m-cu* a short distance before fork of *M*, in cases this distance between one-third to one-fourth the length of *m-cu*.

Abdominal tergites dark brown, the sternites obscure yellow; hypopygium brownish yellow. Male hypopygium (text-fig. 13b) much as in *cernua* but differing conspicuously in the rostral prolongation of the ventral dististyle, *vd*. This latter is unusually wide across the base, the point of attachment with the main body of the style evidently very weak since this latter is broken and lost in almost all specimens examined; spines of the prolongation arising from a powerful base, the spines entirely fused and without trace of suture on basal half; on distal half the dividing suture is evident but to all intents and purposes there remains a single spine clear to the acute tip; spine from one-third to one-half longer than the length of the prolongation beyond it and not lying across the face of the prolongation, as in *cernua*; prolongation beyond the spine long and slender, gently curved, provided with several long setae at apex. Dorsal dististyle lacking, as in *feuerborni* Alexander and *cernua*, sp. nov.

Habitat.—Assam (Khasi Hills).

Holotype, alcoholic ♂, Dumpep, October 2-18, 1929 (S. L. Hora).

Allotopotype, ♀. *Paratopotype*, 1 broken ♂.

***Limonia (Geranomyia) gravelyana*, sp. nov.**

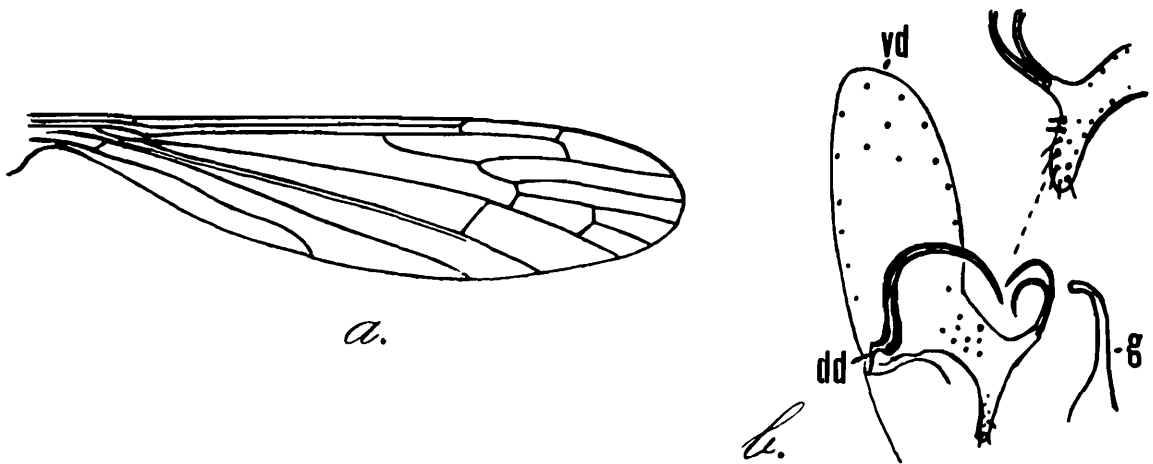
General colouration grey, the praescutum with a broad blackish median stripe; knob of halteres darkened; femora pale brown, tibiae and tarsi darker brown; wings weakly tinged with brown, unpatterned

except for the short-oval pale brown stigma ; costal fringe relatively long and dense ; *Sc* long ; male hypopygium with the dorsal dististyle long and strongly curved ; ventral dististyle very large and fleshy ; rostral prolongation bearing two strongly curved spines from a stout common tubercle ; mesal-apical lobe of gonapophysis long and slender, entirely pale.

Male.—Length, excluding rostrum, about 4.8-5.2 mm. ; wing 5-5.7 mm. ; rostrum about 1.9-2 mm.

Rostrum relatively long, dark brown throughout. Antennae short, black ; flagellar segments oval, relatively crowded. Head dark grey, the anterior vertex and a line of equal width back from it to the occiput clear light grey.

Pronotum blackish, grey laterally. Mesonotal praescutum grey, with the disk chiefly occupied by a very broad, more blackish stripe, this more pruinose behind and with indications of a paler median line in the holotype specimen ; lateral stripes lacking or fused with the central discal area ; posterior sclerites of notum dark grey. Pleura grey, vaguely patterned with darker grey. Halteres with stem pale, knob darkened. Legs with coxae dark, pruinose ; trochanters light brown ; femora yellowish brown to pale brown, unvariegated ; tibiae and tarsi darker brown. Wings (text-fig. 14a) with a weak brown tinge,



TEXT FIG. 14.—*Limoniu (Geranomyia) gravellyana*, sp. nov. ; a., venation ; b., male hypopygium.

the prearcular field yellow ; stigma short-oval, pale brown ; veins brown. Costal fringe dense and relatively long. Venation : *Sc* long, *Sc*₁ ending a short distance before fork of *Rs*, *Sc*₂ at its tip ; *m-cu* variable in position, at the fork of *M* to almost one-half its length before this fork ; supernumerary crossvein in cell *Sc* not clearly evident in type specimens.

Abdominal tergites brownish black, including the hypopygium ; caudal borders of segments slightly paler ; basal sternites reddish brown, the fifth and succeeding segments blackened. Male hypopygium (text-fig. 14b) with the ventral dististyle very long and fleshy, in area very much exceeding the basistyle ; setae on surface small and sparse ; rostral prolongation, *vd*, stout basally, at apex narrowed into a compressed beak, at base of which on outer margin with a single strong tubercle bearing two strongly curved spines at its apex ; the tubercle is about one-third the length of the rostral prolongation beyond it and nearly one-third the length of the longest spine. Dorsal dististyle,

dd, an unusually long and strongly curved chitinized hook, the long drawn out tip acute. Mesal-apical lobe of gonapophysis, *g*, long and slender, gently curved, entirely pale.

Habital.—Eastern Himalayas (Darjiling District).

Holotype, ♂, Peshoke (Pashok) Spur, altitude 2,000-3,500 feet, April 23-May 11, 1915 (F. H. Gravely). *Paratopotype*, ♂.

The type material had been questionably determined by Brunetti (*Rec. Ind. Mus.* XV, p. 287, 1918) as being *Limonia* (*Geranomyia*) *genitalis* (Brunetti), which is identical with *L. (G.) fletcheri* (Edwards), both originally described in 1911 but with *fletcheri* having a slight priority. The present fly is entirely distinct from *fletcheri*, differing in all details of colouration of the body and wings, and especially in the structure of the male hypopygium. *L. (G.) fletcheri* has the rostral spines of the male hypopygium short and straight, from a short tubercle, the prolongation beyond them short and obtuse. I am very pleased to dedicate this fly to the collector, Dr. F. H. Gravely.

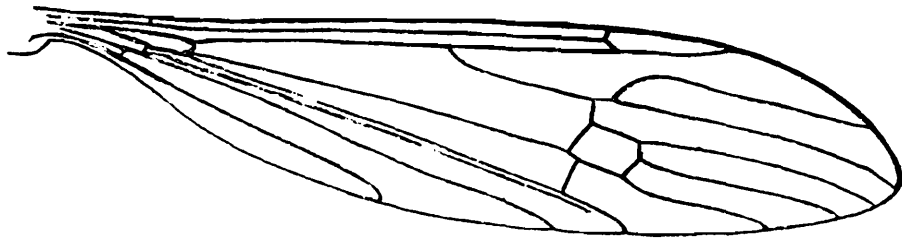
***Helius (Helius) boops*, sp. nov.**

General colouration of mesonotum dark brown, the sides of the praescutum broadly obscure yellow; knobs of halteres dark brown; wings subhyaline, sparsely patterned with brown; costal fringe and macrotrichia of veins short, *Rs* relatively long; cell 1st M_2 rectangular, with *m-cu* at near one-fourth to one-fifth its length; abdominal tergites reddish brown, sternites more yellow.

Female.—Length, including rostrum, about 8.6 mm.; wing 7.3 mm.; rostrum 0.6 mm.

Rostrum brown, subequal in length to the remainder of head; palpi dark. Antennae dark brown, broken beyond the base, the first flagellar segment a little shorter than the scape. Head brownish grey; eyes large; anterior vertex reduced to a narrow strip that is about one-half the diameter of scape.

Pronotum dark brown. Mesonotal praescutum dark brown medially, the broad lateral portions more obscure yellow, the lateral margins behind the pseudosutural foveae restrictedly more darkened; posterior



TEXT-FIG. 15.—*Helius (Helius) boops*, sp. nov.; venation.

sclerites of notum dark brown, the median region of scutum pale. Pleura pale reddish brown, the meral and dorsopleural regions paler. Halteres with stem yellow, knob dark brown. Legs with coxae brownish yellow to yellow; trochanters yellow; remainder of legs broken. Wings (text-fig. 15) subhyaline restrictedly patterned with brown, as follows: Arculus; origin of *Rs*; cord and outer end of cell 1st M_2 ; the narrow wing-tip; stigma oval, slightly darker brown; veins dark brown. Com-

pared with *longinervis*, costal fringe and macrotrichia of veins shorter ; wings longer and narrower, more pointed at apex. Venation : *Rs* relatively long ; *r-m* connecting with *Rs* about one-half its length before fork ; cell 1st M_2 more rectangular than in *longinervis*, *m-cu* at near one-fourth to one-fifth the length.

Abdominal tergites reddish brown ; sternites more yellow ; a narrow dark pleural stripe ; bases of ovipositor obscure yellow.

Habitat.—Assam (Khasi Hills).

Holotype, alcoholic ♀, Stream below Power House, Shillong, altitude about 5,000 feet, December 5, 1930 (H. S. Rao).

The nearest ally of the present fly is *Helius* (*Helius*) *longinervis* Edwards (Pahang-Java) which differs from the present species especially in colouration, venation and in the much longer macrotrichia of the wing veins. Edwards refers his species to the subgenus *Eurhamphidia* Alexander and from the position of the *r-m* crossvein before the fork of *Rs*, this assignment may well be more correct despite the very different general appearance of *longinervis* and *boops* from the normal type of *Eurhamphidia*.

Tribe PEDICIINI.

Dicranota (Rhaphidolabis) sordida (Brunetti).

1911. *Claduroides sordida*, Brunetti, *Rec. Ind. Mus.* VI, p. 290.

1912. *Rhaphidolabis indica*, Brunetti, *Fauna Brit. India, Dipt. Nemat.*, p. 519, pl. x, fig. 15.

Punjab, Dalhousie, stream next to Punj-pul Nallah, altitude 6,500 feet, May 8, 1927 (S. L. Hora) ; Dalhousie, round about Hurst Cottage, Bakrota Hill, altitude 7,000 feet, May-June 1927 (S. L. Hora). Brunetti's types were from Simla and vicinity. Without an actual study of the holotype, the present determinations are as safe as is possible.

Tribe HEXATOMINI.

Limnophila raoana, sp. nov.

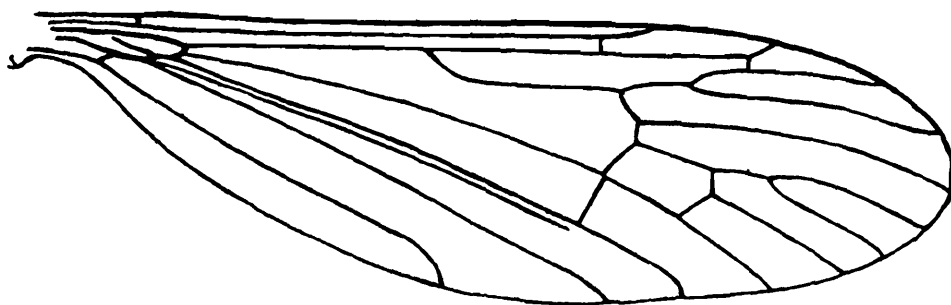
General colouration of head, thorax and abdomen dark brown to brownish black ; antennae with scape and pedicel black, flagellum brown ; flagellar segments provided with an abundant pale pubescence and elongate verticils ; anterior vertex wide ; halteres black throughout ; femora black, the tips narrowly but abruptly and conspicuously yellow ; tibiae and tarsi yellow ; legs provided with long conspicuous setae ; wings with the very restricted ground, whitish subhyaline, very heavily patterned with brown, especially dense in the radial field where the ground is reduced to linear transverse dashes ; *Sc* long ; R_{2+3+4} unusually long, about one-third *Rs* ; *m-cu* very close to the fork of *M* ; cerci black, the tips paling to horn-yellow.

Female.—Length about 8.5 mm. ; wing 7.7 mm.

Rostrum and palpi black. Antennae with scape and pedicel black, flagellum brown ; scape elongate ; pedicel relatively stout, about twice as long as thick ; flagellar segments subcylindrical to elongate-oval, with truncate ends, provided with a dense erect pale pubescence and

elongate verticils, the longest of these latter unilaterally distributed, exceeding the segments in length. Head with anterior vertex wide, exceeding twice the diameter of scape; eyes protuberant (possibly due to the position in mounting), with relatively coarse ommatidia; head dark brown.

Thorax almost uniform dark brown, the praescutum without distinct stripes; setae of praescutal interspaces sparse but elongate, black. Pleura uniformly dark brown. Halteres black throughout. Legs with coxae brownish black; trochanters dark brown; femora black, the tips narrowly but abruptly and conspicuously yellow; tibiae and tarsi yellow, the terminal tarsal segments darkened; legs with very long coarse setae, black on the femora, yellow on the tibiae and tarsi; tibial spurs black, long and conspicuous, hairy; claws slender, simple. Wings (text-fig. 16) with the very restricted ground colour, whitish subhyaline,



TEXT FIG. 16.—*Limnophila raoana*, sp. nov.; venation.

chiefly obliterated by unusually heavy brown markings, in the radial field restricting the pale ground to linear transverse lines and dashes; in cells basad of cord and in outer medial and cubital fields the pale ground areas more numerous, more nearly equal in extent to the dark spots; two major dark spots along vein *2nd A*, one at apex, the second beyond midlength; cells *C* and *Sc* with series of dark spots and dashes; veins dark brown, *C* pale yellow except where variegated by dark dashes. Costal fringe moderately long and conspicuous. Venation: *Sc* long, *Sc*₁ ending about opposite midlength of *R*₂₊₃₊₄, *Sc*₂ a short distance removed from its tip; *Rs* arcuated at origin, nearly three times the long *R*₂₊₃₊₄; *R*₁₊₂ relatively short, from one-third to one-half times *R*₂₊₃; cell *M*₁ about twice its petiole; cell *1st M*₂ rectangular, with *m-cu* very close to the fork of *M*, in one wing about one-fifth its length beyond the fork, in the opposite wing even closer to the fork; anterior arcus present; vein *2nd A* elongate, extending generally parallel to the anal border of wing.

Abdomen brownish black to black, the genital segment narrowed; valves of ovipositor blackened, the distal half of cerci paling to horn-yellow; cerci long and slender, gently upcurved.

Habitat.—Bombay Presidency (North Kanara District).

Holotype, ♀. Hill stream on Jog-Sagar Road, November 30, 1928 (H. S. Rao).

This distinct species is named in honour of the collector, Dr. H. S. Rao. There are several allied forms in the Oriental fauna, including *Limnophila bivittata* Edwards, *L. multipunctata* Brunetti, *L. pendleburyi* Edwards and *L. senior-whitei* Alexander. The present fly differs

from all of these by the colouration of the body and legs, by the unusually heavy dark pattern of the wings, and by the position of *m-cu* close to the fork of *M*, in this latter respect suggesting species of the genus *Dactylolabis* Osten Sacken. I had formerly believed that certain of these species more properly fell in *Pseudolimnophila* Alexander but since the anterior arculus is preserved in all and other characters fail to agree, it seems best to place them all in *Limnophila* Macquart until the Oriental species of the group are better known.

***Limnophila manipurensis*, sp. nov.**

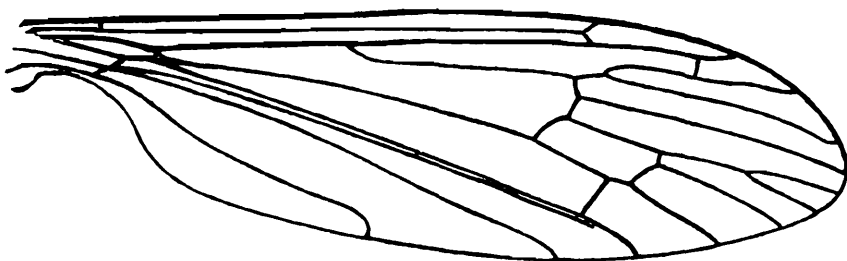
General colouration dark, sparsely grey pruinose; praescutum with three darker brown stripes; scutellum with a dark median vitta; antennae short, basal segments short and crowded, flagellum yellow; halteres obscure yellow; legs with femora yellow, the tips rather narrowly blackened; tips of tibiae narrowly darkened; legs provided with long conspicuous setae; wings yellow, spotted and very abundantly dotted with brown; *R*₂ very faint, placed near midlength of the pale yellow stigma; *m-cu* lying very far distad, about four-fifths the length of cell 1st *M*₂.

Female.—Length about 10 mm.; wing 10 mm.

Rostrum and palpi brown. Antennae with scape black, relatively short; pedicel dark brown; flagellum obscure yellow, the outer segments more darkened; antennae short, basal flagellar segments short and crowded, the first flagellar segment with a short basal pedicel, the succeeding segments closely applied to one another; fifth and following segments becoming more elongate and provided with long verticils, on the outer segments being nearly three times as long as the segments themselves; terminal segment elongate, exceeding twice the penultimate. Head dark brown.

Pronotum dark brown, relatively massive. Mesonotal praescutum brownish grey, with three somewhat conspicuous brown stripes, the median one more or less divided by a pale central line, narrowed and entire before the suture; lateral stripes more distinct and more or less confluent at their anterior ends with the median vitta, obliterating the interspaces at this point; suture conspicuously darkened medially; scutum grey each lobe variegated with a dark brown area, the broad median region with vague indications of a capillary dark line; scutellum dark grey, with a conspicuous median brown vitta, parascutella dark; postnotum dark grey, the mediotergite more darkened posteriorly. Pleura chiefly brownish black, more or less pruinose. Halteres obscure brownish yellow, the knob weakly darkened. Legs with the coxae dark brown; trochanters brownish yellow; femora yellow, the tips rather narrowly but conspicuously blackened; tibiae yellow, the tips very narrowly dark brown; tarsi yellow, the tips of the first three segments narrowly and vaguely darkened; terminal two segments darkened; legs with long conspicuous setae, especially long and outspreading on tibiae and tarsi; tibial spurs elongate. Wings (text-fig. 17) with the ground colour yellow, spotted and very abundantly dotted with brown; major dark areas at origin of *Rs*; along cord, beginning as a relatively small spot at proximal end of the otherwise pale stigma;

smaller dark marginal areas at ends of veins R_3 and R_4 ; the brown dots include all cells, in the outer and posterior fields somewhat larger



TEXT FIG. 17.—*Limnophila manipurensis*, sp. nov.; venation.

and tending to become confluent; tip of vein *2nd A* with a small darkened area; veins yellow, darker in the patterned areas. Costal fringe relatively long and abundant but subappressed. Venation: *Sc* long, Sc_2 longer than Sc_1 , ending a short distance before end of R_{2+3+4} ; R_2 very faint to subatrophied, at near midlength of the pale stigma; cell M_1 subequal in length to or a little shorter than its petiole; *m-cu* lying unusually far distad, about four-fifths the length of the cell, the distal section of M_{3+4} only about one-half *m-cu* and much shorter than the basal section of M_3 ; cell *2nd A* wide; anterior arcus preserved.

Abdomen dark brown, indistinctly variegated with more reddish areas; genital segment dark; valves of ovipositor horn-yellow; cerci elongate, only gently upcurved near tips, the latter acute.

Habitat.—Assam (Manipur).

Holotype, ♀, Thanga Island, Loktak Lake, at light, February 1920 (Manipur Survey).

Limnophila manipurensis is readily separated from other related forms listed under the preceding species by the details of colouration of the body, legs and wings, and especially by the venation, in the unusual position of *m-cu* far out toward the end of cell *1st M*₂.

Tribe ERIOPTERINI.

Teucholabis (Teucholabis) angusticapitis Brunetti.

1918. *Teucholabis angusticapitis*, Brunetti, *Rec. Ind. Mus.* XV, p. 305, pl. viii, fig. 11 (head).

1919. *Teucholabis nocticolor*, Edwards, *Journ. Fed. Malay States Mus.* VIII, pp. 18, 19, pl. iii, fig. 6 (hypopygium); pl. iv, fig. 13 (wing).

The Holotype, ♂, Regd. No. 8520/H2, was from above Tura, Garo Hills, Assam, altitude 3,500-3,900 feet, August 1917 (S. W. Kemp).

Male.—Length about 7 mm.; wing 7.6 mm.

Head long and narrow, as mentioned by Brunetti; rostrum more than one-half the remainder of head. Antennae dark brown. Head pruinose.

Pronotum relatively conspicuous. Thorax blackish, the cephalic portion of praescutum paler, more reddish brown. Pleura and postnotum sparsely pruinose. Halteres dusky, including the knobs. Legs blackish, with relatively conspicuous black setae. Wings blackish, with two narrow whitish crossbands, as described. Venation: *Sc*

relatively long, Sc_1 ending a short distance before the fork of R_s ; R_s relatively short, straight; R_2 a little shorter than R_{2+3+4} ; cell $1st\ M_2$ relatively small, subrectangular, shorter than vein M_3 beyond it; $m-cu$ nearly its own length beyond fork of M , only about one-fourth the length of distal section of Cu_1 .

Abdomen black throughout; sternal pocket present.

Edwards (*Rec. Ind. Mus.* XXVI, p. 300, 1924) places his *nocticolor* as a synonym of *angusticapitis*. It should be noted in this insect as well as in most others described by Brunetti that his measurements of the body length are under the actual dimensions.

Teucholabis (Teucholabis) pruthiana, sp. nov.

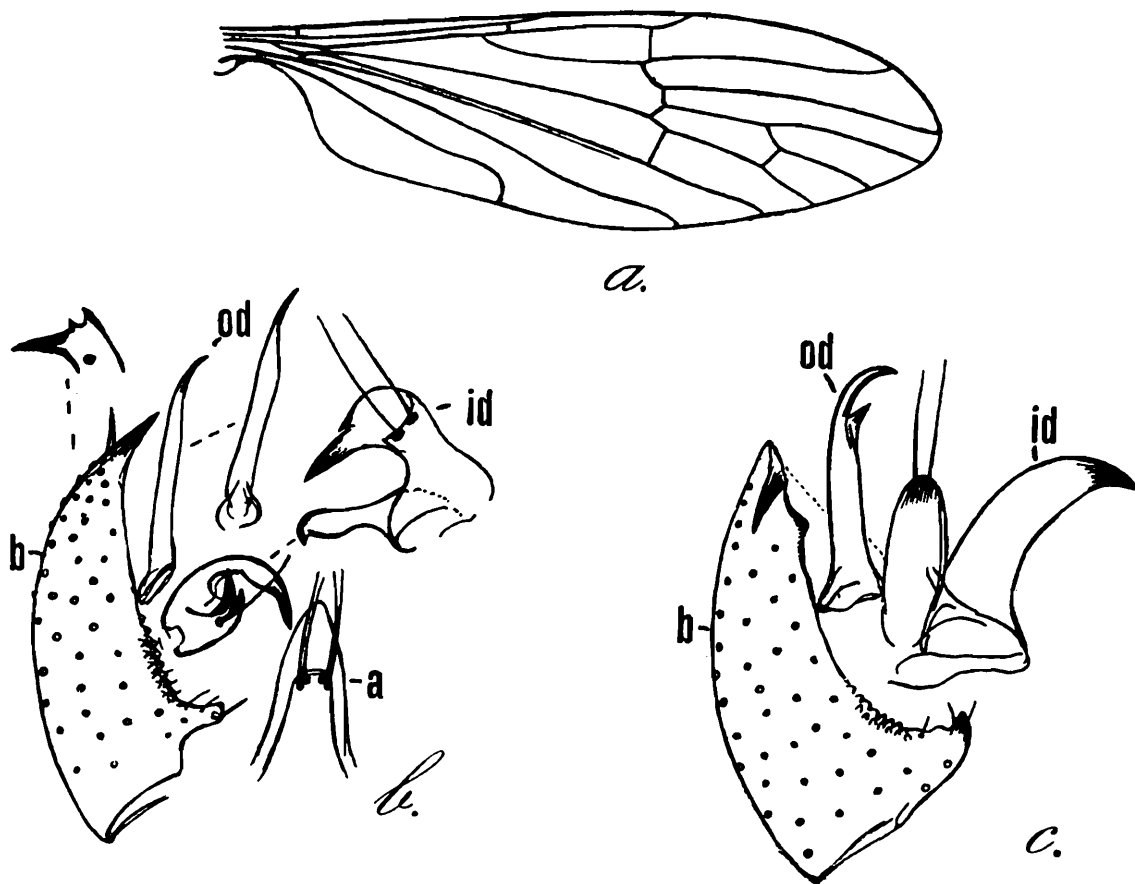
General colouration of mesonotum polished black, the humeral region of praescutum, the suture, the broad median region of scutum and the scutellum yellow; pleura black, the dorsal sternopleurite and meral region yellow; femora yellow, the tips broadly black, most extensive on the fore legs; wings yellow, restrictedly patterned with pale brown and darker brown, including a broken crossband at level of origin of R_s and a complete band at the cord; wing-tip broadly paler brown; abdomen dark brown, the incisures rather narrowly yellow; subterminal segments uniformly yellow, the styli of hypopygium dark; male hypopygium with the outer dististyle simple; inner dististyle with two arms that terminate in blackened points.

Male.—Length about 7.5 mm.; wing 6.5 mm.

Rostrum black, relatively long and slender, subequal in length to remainder of head; palpi and mouthparts black. Antennae black; basal flagellar segments short-oval, the segments passing through oval, the outer ones long oval; verticils subequal in length to the segments. Head black.

Pronotum orange yellow. Mesonotal praescutum polished black, the humeral triangles extensively yellow, the suture and vicinity more narrowly but continuously yellow; scutum with lobes polished black, the broad median area and the scutellum yellow; parascutella black; postnotum black. Propleura black. Mesopleura broadly black above and on the ventral sternopleurite, the dorsal sternopleurite and meral region yellow, the pleurotergite and metapleura black. Halteres with stem blackened, knob light yellow. Legs with coxae and trochanters yellow; femora yellow, the tips broadly blackened, on the fore pair including about the distal two-fifths, narrower on the middle and posterior legs where the outer fourth to fifth is blackened; tibiae dark brown, the tips narrowly blackened; tarsi black. Wings (text-fig. 18a) with the ground colour yellow, restrictedly patterned with pale brown and darker brown, the darker areas appearing as a broken crossband at level of origin of R_s , including dark clouds at origin of R_s and end of vein $2nd\ A$, the band much paler brown in the intervening cells; a second dark band at cord, beginning at the oval, darker brown stigma, extending to vein Cu ; the paler brown areas include the broad wing apex and narrower posterior margin, the former extending basad to the general level of outer end of cell $1st\ M_2$, the latter including the outer ends of cells M_4 to $2nd\ A$, inclusive, the base and axillary region remaining pale; cell

C yellow, *Sc* brown; veins brown. Costal fringe relatively short and dense. Venation: *Sc* of moderate length, *Sc*₁ ending near two-fifths the length of *Rs*, *Sc*₂ a little closer to origin of *Rs* than to tip of *Sc*₁.



TEXT FIG. 18.—*Teucholabis* (*Teucholabis*) *pruthiana*, sp. nov.; a., venation; b., male hypopygium; c, male hypopygium of *T. (T.) annuloabdominalis* Senior-White (right) shown for comparison.

Abdomen dark brown, the incisures rather narrowly yellow, including the narrow apical borders of the segments and the subequal extreme base of the succeeding segments; segments eight and nine yellow, the styli of the male hypopygium brownish black. Sternal pockets well-developed, especially the major one on fifth segment; this latter pocket is much larger than in *annuloabdominalis*, occupying most of the width of the segment, with the setae more numerous and differently distributed. Male hypopygium (text-fig. 18b) with the apical lobe of basistyle, *b*, bispinous; mesal flange consisting of numerous low triangular points and interpolated setae, at cephalic end of flange produced into a more elongate lobe. Outer dististyle, *od*, a simple slender rod, the narrowed tip acute. Inner dististyle, *id*, bifid; the arm bearing the two elongate setae produced into two blackened spinous points, the more elongate simple arm more or less narrowed to a blackened point. Aedeagus, *a*, bearing four elongate setae on shorter lobe.

In *annuloabdominalis* (text-fig. 18c), the apical lobe of basistyle, *b*, extended into a single spine. Outer dististyle, *od*, stouter, the apical spine gently curved, bearing a shorter lateral spine before apex. Inner dististyle, *id*, of entirely different conformation, the arm bearing the two elongate setae shorter, simple, obtuse at apex; simple arm longer, appearing as a cultriform blade, the acute apex blackened.

Habitat.—South India (Palni Hills).

Holotype, ♂, Muliar, below Kodaikanal, altitude about 5,000 feet, July 1-3, 1929 (H. S. Pruthi); Eastern Ghats Survey.

I take very great pleasure in dedicating the species to the collector, Dr. Hem Singh Pruthi. The nearest ally is *Teucholabis* (*Teucholabis*) *annuloabdominalis* Senior-White, of Ceylon, which differs in the details of colouration of the thorax, legs and wings, in the broader yellow abdominal rings, and, especially, in the structure of the male hypopygium.

***Gonomyia* (*Lipophleps*) *ornatipes* (Brunetti).**

1912. *Dicranomyia ornatipes*, Brunetti, *Fauna Brit. India, Dipt. Nemat.*, p. 380, pl. vii, fig. 10 (wing).

One ♂ Coimbatore, South India, September 2, 1938 (Susai Nathan); one ♂ Nedungadu, Tanjore District, February 17, 1938 (Susai Nathan). Edwards had considered this species as being a synonym of the earlier described East Indian *Gonomyia* (*Lipophleps*) *pilifera* (de Meijere), but in my opinion the two flies are quite distinct though belonging to the same group of species which has been named the *pilifera*-group.

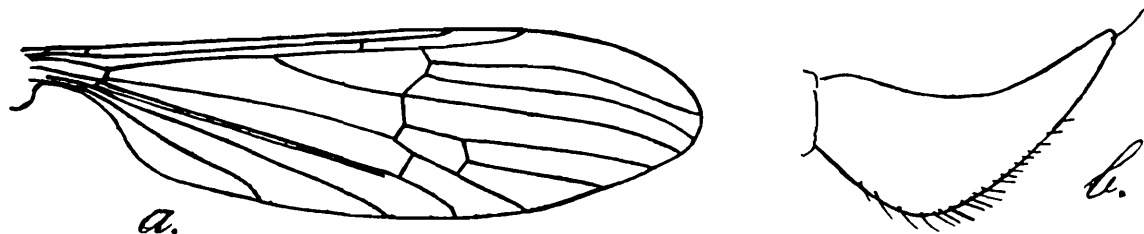
***Gnophomyia* (*Gnophomyia*) *klossiana*, sp. nov.**

General colouration dark brown; pleura brownish black, the ventral pteropleurite and meral region more brownish yellow; antennae relatively elongate, black; legs dark brown to brownish black; wings with a weak brown tinge, the large diffuse stigma conspicuously darker brown; *Rs* in direct longitudinal alignment with *R*₅; *r-m* at end of *Rs*; *R*₂₊₃₊₄ unusually erect, *R*₂₊₃ subperpendicular, only a little longer than *R*₂ alone; cell *R*₂ at margin very extensive, approximately six or seven times as wide as cell *R*₃; cell 1st *M*₂ relatively small; abdominal tergites brownish black; ovipositor yellow, the cerci strongly compressed.

Female.—Length about 5 mm.; wing 5.4 mm.

Rostrum and palpi black. Antennae with scape and pedicel dark brown; flagellum black; flagellar segments cylindrical, relatively elongate in the female sex; longest verticils nearly equal in length to the segments, appressed. Head brownish black.

Mesonotum almost uniformly dark brown. Pleura chiefly blackened, the propleura, ventral pteropleurite and meral region more brownish yellow; pleurotergite brownish black. Halteres with stem dusky, knob dark brown. Legs with coxae and trochanters reddish brown;



TEXT FIG. 19.—*Gnophomyia* (*Gnophomyia*) *klossiana*, sp. nov.; a., venation; b., ovipositor.

remainder of legs dark brown to brownish black; tarsi considerably shorter than tibiae. Wings (text-fig. 19a) with a weak brownish tinge,

the large diffuse stigma conspicuously dark brown; veins dark brown. Costal fringe long and conspicuous. Venation; R_s in direct longitudinal alignment with R_5 ; R_{2+3+4} unusually erect, R_{2+3} even more so, only a little exceeding R_2 alone; $r-m$ at end of R_s ; veins R_3 and R_4 unusually long and extending generally parallel to one another, the cell being a trifle wider about midlength; cell R_2 at margin very extensive, being from six to seven times that of cell R_3 ; cell 1st M_2 relatively small, subequal in length to vein M_4 beyond it; $m-cu$ about one-third the length of cell 1st M_2 ; cell 2nd A of moderate width only.

Abdominal tergites brownish black, the basal sternites more reddish brown. Ovipositor (text-fig. 19b) with the cerci light yellow, appearing as very compressed blades, widest on basal half, the upcurved distal portion strongly narrowed, the ventral margin with long setae.

Habitat.—Federated Malay States (Selangor-Pahang Boundary).

Holotype, ♀, Ginting Bidai, altitude 2,000 feet, April 1917 (C. Boden Kloss).

From the numerous oriental species of the genus that center about *Gnophomyia* (*Gnophomyia*) *orientalis* de Meijere and *G. (G.) strenua* Brunetti, the present fly is most readily told by the venation, especially the unusually precipitous veins R_{2+3+4} and R_{2+3} , and by the unusual marginal extent of cell R_2 . The strongly compressed-flattened ovipositor is likewise somewhat different from the usual type found in the genus.

***Styringomyia kempiana*, sp. nov.**

General colouration dark grey, the praescutum bordered in front and on sides by a narrow black line; pronotum, posterior border of scutellum and a capillary median vitta on postnotum obscure yellow; pleura black, sparsely pruinose; halteres uniformly brownish black; femora brownish black, the fore and middle pair with a very narrow, obscure yellow, subterminal ring, the posterior femora with this ring much more diffuse; tibiae brownish black, the fore and middle pair with the bases and a subterminal ring obscure yellow; posterior tibiae uniformly darkened; wings with a strong brownish yellow tinge; vein 2nd A curved to the wing margin, without angulation or spur; male hypopygium with the basistyle terminating in three strong spinous bristles; inner arm of dististyle very large, oval, provided with abundant long retrorse setae.

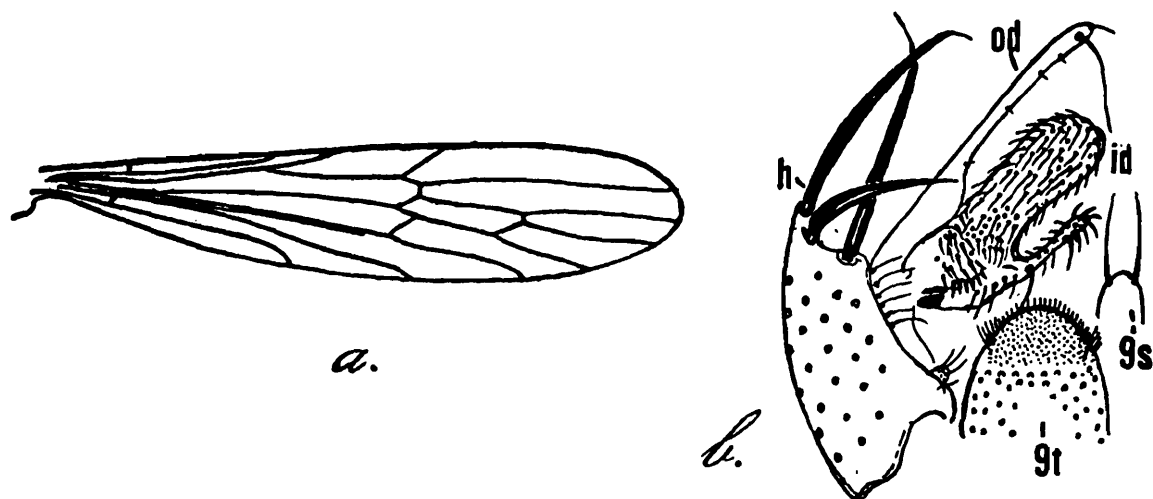
Male.—Length about 6.5 mm.; wing 4.3-4.4 mm.

Female.—Length about 6 mm.; wing about 4 mm.

Rostrum and palpi black. Antennae with scape dark, grey pruinose; pedicel brown, flagellum obscure yellow, the outer segments more darkened; flagellar segments long-oval, the outer ones becoming even more attenuated; terminal segment shorter than the penultimate. Head light brown; setae delicate.

Pronotum obscure yellow, darkened and impressed medially. Mesonotum chiefly dark grey, the praescutum bordered in front and on sides by a narrow black line, the usual interspaces less distinctly darkened; posterior sclerites of notum blackened, pruinose, the scutal lobes slightly darker; posterior border of scutellum and a capillary median vitta on postnotum obscure yellow. Pleura black, sparsely pruinose. Halteres

uniformly brownish black. Legs with coxae brown; trochanters brownish yellow; femora brownish black, the bases restrictedly paler; fore and middle femora with a very narrow, obscure yellow ring placed some three times its length before the tip, the posterior femora with the ring indicated but much more diffuse; fore and middle tibiae brownish black, the very narrow bases and a narrow ring about two-thirds the length obscure yellow; posterior tibiae uniformly dark brown; tarsi brownish black, the proximal ends of basitarsi slightly paler, on the posterior legs with both the first and second segments somewhat more obscure yellow, the outer segments blackened. Wings (text-fig. 20a) with a strong brownish yellow tinge, without pattern, a little clearer



TEXT FIG. 20.—*Styringomyia kempiana*, sp. nov.; a., venation; b., male hypopygium.

in the prearcular field and just beyond; veins brown. Costal fringe long and conspicuous. Venation: Anterior branch of R_s oblique, from two to four times the basal section of R_5 ; cell 2nd M_2 broadly to narrowly sessile; vein 2nd A evenly curved into the margin, without angulation or spur.

Abdomen elongate in male; basal segments blackened, succeeding segments pale brown or brownish yellow, narrowly blackened laterally, the posterior borders of the individual segments much less distinctly so; hypopygium and preceding segments more uniformly brownish black; abdomen with long conspicuous black, setae. Female with abdomen more uniformly darkened, possibly due to discolouration; genital segment dark brown, terminating in unusually slender black lobes, each tipped with two long setae. Male hypopygium (text-fig. 20b) with the ninth tergite, $9t$, broad, terminating in a semicircular cushion; ninth sternite, $9s$, with the two terminal bristles relatively weak. Basistyle, h , terminating in three strong spinous bristles, two of which are produced into hair-like points. Outer arm of dististyle, od , entirely pale, dilated on basal third, at apex bearing one very small and one very long bristle; margin of arm with about four small setae extending to the dilated basal portion. Inner arm of dististyle, id , an oval lobe with a slender lateral arm, both with abundant long black setae, the slender arm with two more spinous bristles of larger size.

Habitat.—Southwest India (North Kanara District).

Holotype, ♂, Castle Rock, October 11-26, 1916 (S. W. Kemp).

Allotype, ♀, Talewadi, near Castle Rock, October 3-10, 1916 (S. W. Kemp). *Paratopotypes*, 2 broken ♂♂, with the type. Only the Holotype is in a well-preserved state.

This conspicuous species is named in honour of the collector, Dr. Stanley W. Kemp, who has added vastly to our knowledge of the insect fauna of British India. Except for the ringed tibiae, the present fly runs to the group of species including *Styringomyia flava* Brunetti and *S. solocipennis* Enderlein, all having three conspicuous spinous setae on the basistyle of the male hypopygium. It differs from all previously described species by the colouration of the body and legs, and, especially, the structure of the male hypopygium. Edwards placed *S. obscura* Brunetti in this same group of species having trispinous basistyles and in all probability it belongs to this group but since the species seems still to be known only from the unique type (a female from Nepal), it may be that the male hypopygium will not be found to conform to this group.

***Styringomyia susilae* sp. nov.**

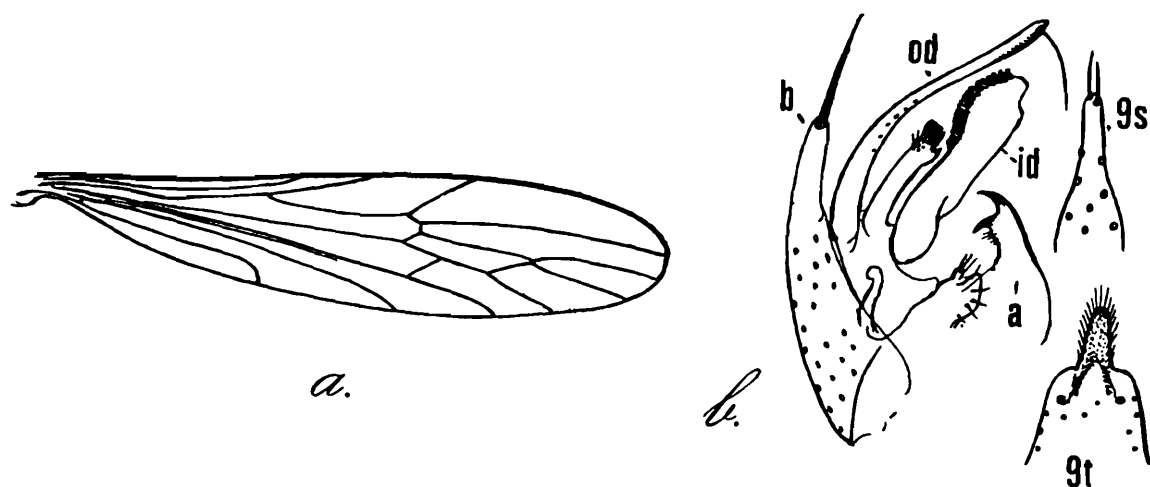
General colouration yellow, the mesonotum patterned with black, including two circular spots placed laterally on the suture; praescutum behind with a central pale line bordered laterally by black, the pale vitta continued caudad across the suture on to the scutellum; pleura uniformly pale; dark rings on legs very reduced, the posterior femora being unpatterned; all tibiae abruptly tipped with black; tarsi yellow, the terminal segment blackened; wings yellow, restrictedly patterned with dark brown, the chief area being a cloud over *r-m*; vein *2nd A* without angulation or spur; abdominal pattern pale and reduced; male hypopygium with both tergal and sternal lobes very narrow, especially the former; dististyle with inner lobe large, its margin bearing a linear series of about 18 to 20 blackened spinous points.

Male.—Length about 6.5-7 mm.; wing 4.4-4.6 mm.

Rostrum obscure yellow; palpi brownish yellow. Antennae with basal segments obscure yellow, the scape more or less infuscated; outer flagellar segments weakly bicoloured, the apices a little brighter yellow than the bases. Head yellow, with normal slender setae.

Pronotum and mesonotum yellow, the latter with a pale to whitish median stripe that is indicated especially by the blackened lateral borders, these becoming wider and more evident at cephalic ends, the pale median vitta crossing the suture and scutum on to the scutellum; near lateral ends of suture a conspicuous circular black spot occupies parts of both praescutum and scutum; posterior sclerites of notum chiefly brownish yellow; posterior borders of scutal lobes each with an infuscated area; pleura yellow. Halteres yellow. Legs with the coxae and trochanters yellow; femora yellow, the usual dark rings very incomplete to scarcely indicated, on fore and middle legs appearing as weak clouds on the upper surface only, on the posterior femora quite lacking; tibiae yellow, the tips of all pairs narrowly but very conspicuously black; tarsi very pale yellow to whitish yellow, only the last segment abruptly blackened, the tips of other segments not darkened. Wings (text-fig. 21a) strongly yellow, the costal border, especially in the outer radial field, more saturat-

ed yellow ; a restricted dark brown cloud at *r-m* and less distinct very narrow seams and darkening of the veins at outer end of cell *1st M*₂, *m-cu*, and distal third or more of *2nd A* ; remaining veins uniformly yellow, including their tips. Venation : Anterior branch of *Rs* normally oblique ; cell *2nd M*₂ very short-petiolate to narrowly sessile ; vein *2nd A* curved evenly but rather strongly into the border, not angulated or spurred.



TEXT FIG. 21.—*Styringomyia susilae*, sp. nov. ; a., venation ; b., male hypopygium.

Abdomen yellow, the dark pattern very restricted, appearing as paired brown dots at the posterior borders of the tergites, on the seventh segment with an additional median basal streak ; sternites unpatterned ; hypopygium yellow. Male hypopygium (text-fig. 21b) with the ninth tergite, *9t*, terminating in an unusually narrow apical lobe that is narrower than the lobe of the ninth sternite, this lobe provided with long abundant setae, subtended on either side by glabrous shoulders. Ninth sternite, *9s*, long and narrow, the setae relatively weak, one placed slightly more distad than the other. Basistyle, *b*, terminating in a long lobe that bears a single strong spinous seta that is subequal in length to or a trifle longer than the lobe itself. Dististyle with outer arm, *od*, slender, strongly blackened along lower border at tip ; setae two, the outer one unusually reduced, the longer seta of normal length ; face of arm with six or seven scattered setae but with no spinous points ; intermediate and inner arms of dististyle as figured, the intermediate arm more slender but elongate, tipped with six to eight short but strong black spines in a compact mass, with a group of normal setae immediately basad ; inner arm, *id*, a little longer and wider, appearing as a flattened blade, the outer margin with a row of blackened blunt-tipped spines, totalling 18 to 20, arranged in a close linear series. Aedeagus, *a*, terminating in two pairs of blackened acute spinous points.

Habitat.—South India (Southern Malabar).

Holotype, ♂, Walayar Forest, altitude 2,000 feet, August 8, 1938 (Susai Nathan). *Paratopotypes*, several ♂♂ with the type. Paratypes in collection of Indian Museum.

I am pleased to name this species after Miss Susila Nathan, the infant daughter of Mr. Susai Nathan, to whom I am indebted for several interesting species of Tipulidae from Malabar. By Edwards' key to the then known species of the genus (*Trans. Ent. Soc. London*, pp. 210-212, 1914)

Styringomyia susilae runs to *S. jacobsoni* Edwards, of Java, a very different species. The slenderness of the simple apical lobe of the ninth tergite suggests *S. fryeri* Edwards, which is likewise entirely distinct from the present fly. The chief characteristics for the separation of *susilae* from its allies, aside from hypopygial differences, lie in the very reduced dark pattern of the legs and in the somewhat peculiar pattern of the mesonotum.

CYCLOPIDES (CRUSTACÉS COPÉPODES) DE L'INDE. XI-XIII.

Par KNUT LINDBERG.

XI. CONTRIBUTION A LA CONNAISSANCE DE *CYCLOPS* (*MICROCYCLOPS*) *VARICANS* SARS ET *CYCLOPS* (*MICROCYCLOPS*) *LINJANTICUS* KIEFER.

Cyclops (*Microcyclops*) *varicans* Sars.

Dans ma revision en 1939 des représentants indiens du sous-genre *Microcyclops* j'avais cru devoir maintenir le *C. (M.) varicans subaequalis*

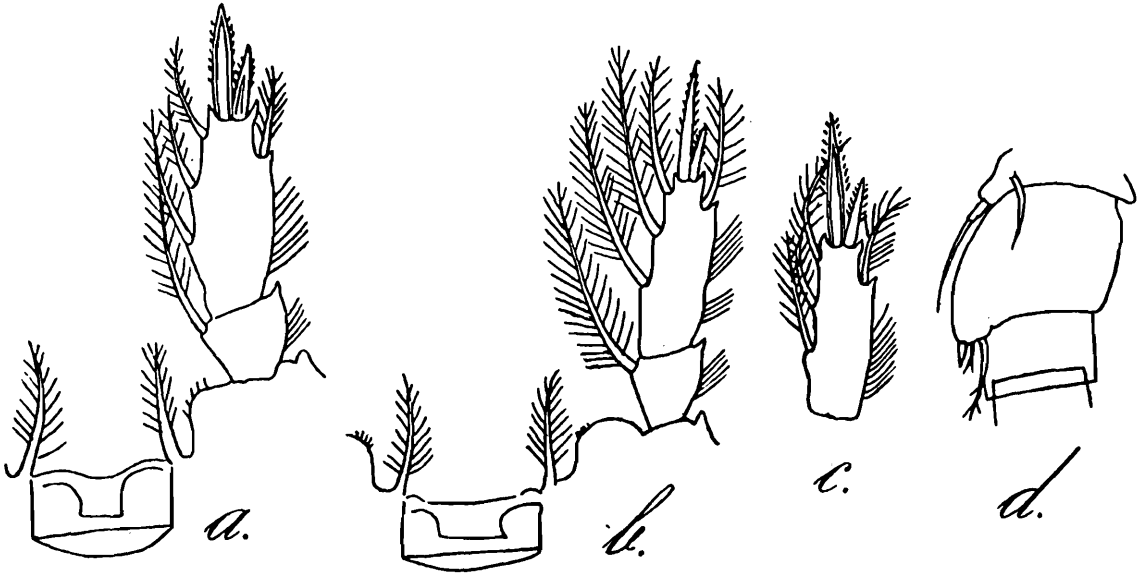


FIG. 1.—*Cyclops* (*Microcyclops*) *varicans* (Sars).

a. ♀ Endopodite et lamelle basale de P 4. (Suse); b. ♀ Endopodite et lamelle basale de P 4 (Tang-Qil); c. ♀ Article 2 de l'endopodite de P 4 (Chahi); d. ♂ P 5 et P 6 (Chahi).

comme une sous-espèce ou variété de *C. (M.) varicans* par suite de la structure de l'épine apicale interne de l'article terminal de l'enp. 4, celle-ci ne présentant pas de renflement à sa base et étant en général plus allongée par rapport à la longueur de l'article que chez le *C. (M.) varicans* typique. De plus, les animaux indiens offrant ces caractéristiques possédaient un article de P 5 muni d'une petite épine sur le rebord interne.

Parmi les *C. (M.) varicans* récoltés dans plusieurs localités différentes de l'Iran, certains ont été du type *varicans* et d'autres ont répondu au diagnostic de la variété *subaequalis*, en ce qui concerne la structure de l'article terminal de l'enp. 4 et de ses appendices, mais sans qu'il y ait eu de séparation tranchée entre les deux formes. Comme d'ailleurs tous les animaux examinés ont présenté un article de P 5 de configuration identique, et que je n'ai chez aucun d'eux aperçu d'épine sur le rebord interne, je ne crois plus justifié à conserver le *C. (M.) varicans subaequalis* comme une variété distincte. Les mensurations les plus importantes sont données de 22 femelles et de 4 mâles.

Habitats.—Inde : Semble réparti dans toute l'étendue de la péninsule.

Iran Nord : Chahi, mare eutrophique, fosse près du fleuve Talar, rizière ; Gorgan, mare sans végétation, bassin ; Lahidjan, rizière, étang eutrophique à l'Institut agricole ; Ramsar, petit étang ; Recht, mare, ruisseau ; Sari, rizière, fosse d'excavation du chemin de fer.

Iran Sud : Chouch (Suse), fosse et citerne près de la gare ; marécage près du village ; Dihak, source ; Tang-Qil, mare de rivière.

Cyclops (Microcyclops) linjanticus (Kiefer).

Syn. *Cyclops (Microcyclops) tricolor* Lindberg.

En étudiant l'espèce qu'en 1937 j'ai nommée *C. (M.) tricolor* je me suis rendu compte de sa ressemblance avec le *C. (M.) linjanticus* décrit

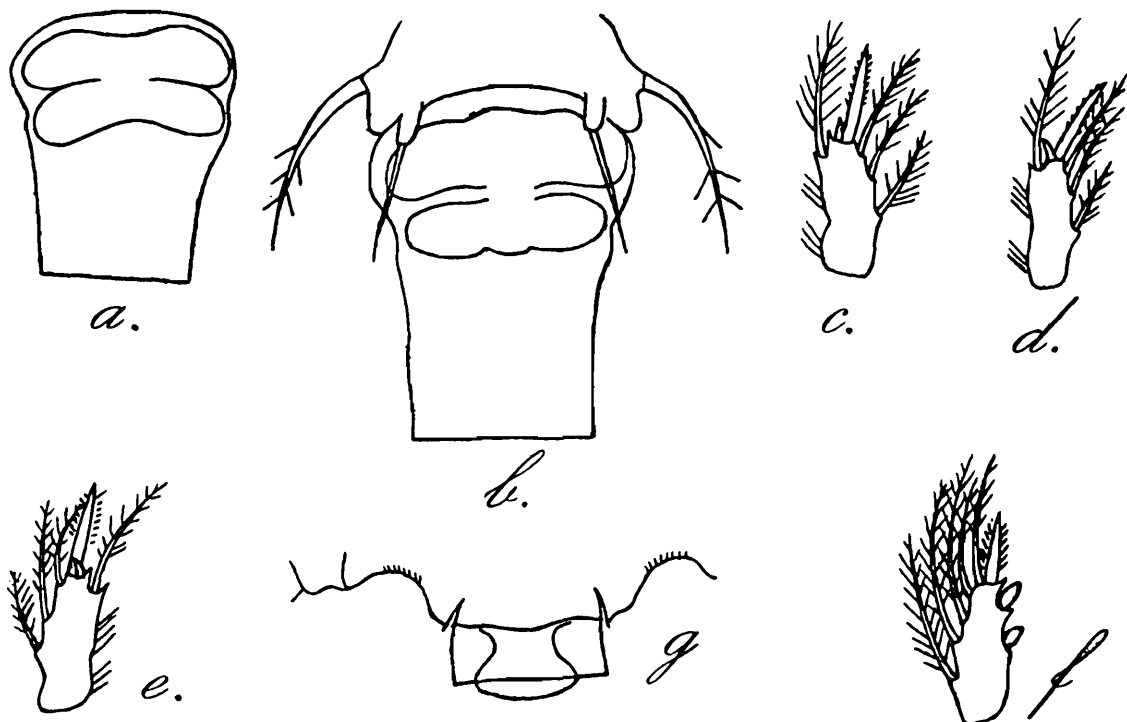


FIG. 2.—*Cyclops (Microcyclops) linjanticus* (Kiefer). ♀.

a. Réceptacle séminal, aspect commun (Rechir) ; b. Réceptacle séminal, aspect inusité (Recht) ; c. Article 2 de l'endopodite de P 4 (Recht) ; d. Article 2 de l'endopodite de P 4 (Rechir) ; e. Article 2 de l'endopodite de P 4, apparence lancéolée de l'épine apicale interne (Pahlévi-Ghazian) ; f. Article 2 de l'exopodite de P 4, apparence lancéolée des épines (Pahlévi-Ghazian) ; g. Lamelle basale de P 4 (Recht).

par Kiefer en 1928, qui cependant ne m'était connu que par les notes données dans le "Tierreich" (1929). En me basant sur cette description il ne m'a pas été possible d'identifier mes animaux avec le *C. (M.) linjanticus*. Dernièrement j'ai eu accès à deux études plus récentes publiées en 1933 et 1938 dans lesquelles Kiefer, utilisant un matériel plus abondant provenant des îles de la Sonde et de Formose, a apporté, des amplifications et des modifications assez considérables à sa description originale de *C. (M.) linjanticus*. A la lumière de cette redescription et des figures qui l'accompagnent je me crois à présent justifié à considérer le *C. (M.) tricolor* comme identique avec le *C. (M.) linjanticus* nonobstant le fait que certains désaccords subsistent encore.

Au cours de mes derniers voyages en Iran j'ai rencontré cette espèce en petit nombre dans 7 localités (4 du Sud, 3 du Nord) et je donne des mensurations de quelques uns de ces animaux.

Habitats.—Inde : Paraît avoir une répartition générale.

Iran Nord : Lahidjan, étang à l'Institut agricole ; Pahlévi-Ghazian, étang ; Recht, mare ; Sari, bassin.

Iran Sud : Dihak, source d'eau douce dans les montagnes entre Dar-ol-Mizan et Kourdéh (région comprise entre Firouzabad et Djam) ; Réchir (Richehr) près de Bouchir, puits d'eau douce ; rivière d'eau douce entre Djam et Makkou.

XII. REMARQUES SUR QUELQUES MEMBRES DU SOUS-GENRE *TROPOCYCLOPS* Kiefer.

En étudiant il y a quelques années des *Tropocyclops* de l'Inde, à formule des épines de 3-4-4-3 j'avais trouvé qu'ils différaient notablement de *E. (T.) prasinus* (Fischer) tel qu'il a été décrit en Europe. Chez les animaux indiens la furca, à branches divergentes, était considérablement plus longue (rapport moyen 3.29 : 1) ; la soie apicale médiane interne seulement de 3 à 4 fois aussi longue que la branche de la furca (rapport moyen 3.59 : 1) l'épine apicale interne de l'article 3 de l'enp. 4 le plus souvent un peu plus de 2 fois aussi longue que l'article, tandis que cette épine n'en atteint pas 2 fois la longueur chez *E. (T.) prasinus* ; enfin la cinquième patte avait une structure bien différente, possédant une épine comparativement très courte. Comme évidemment les spécimens de l'Inde représentaient une forme distincte de *E. (T.) prasinus* (Fischer) je les avais décrit comme appartenant à une espèce nouvelle que j'avais nommée *E. (T.) multicolor*.

Des *Tropocyclops* à formule des épines de 3-4-3-3 se sont montrés beaucoup moins fréquents dans les régions de l'Inde où mes pêches ont été faites. J'ai pu les référer tous sans difficulté à l'espèce *E. (T.) confinis* Kiefer. (La distinction d'une forma *frequens*, différant seulement dans ce qu'elle présente un article 3 de l'enp. 4 plus court, n'est plus justifiée, ce que Kiefer a fait observer lui-même en 1934).

Dans un article paru en 1930 Lowndes a attiré l'attention sur le fait que des *Tropocyclops* récoltés en Ethiopie, à formule des épines de 3-4-3-3, ne possédaient pas de soie au niveau de l'angle interne du deuxième article basal de P 1, une forte soie étant présente à cet endroit chez les animaux d'Europe à formule des épines de 3-4-4-3. Après avoir pris connaissance de ce travail j'ai examiné des animaux indiens à cet égard et j'ai trouvé que les *E. (T.) multicolor* à formule des épines de 3-4-4-3 possédaient bien cette soie, mais qu'elle manquait chez les *E. (T.) confinis*, qui appartiennent au groupe des " terni ".

Ayant rapporté des *Tropocyclops* de 5 localités du Sud de l'Iran, pays dans lequel aucun représentant de ce sous-genre n'était connu jusqu'à présent, j'ai pensé que l'étude de ces animaux pourrait apporter quelques faits d'intérêt général. Il s'est trouvé que tous les animaux, sauf un seul, répondaient assez bien aux caractéristiques de *T. confinis* ; l'exception était une femelle unique aberrante, qui cependant, sans aucun doute, doit être considérée comme une *T. prasinus* tératologique.

Eucyclops (Tropocyclops) prasinus (Fischer).

Un seul spécimen récolté ; une femelle d' une longueur de 852 μ (sans soies apicales). Furca à branches parallèles, 2 et demi fois aussi

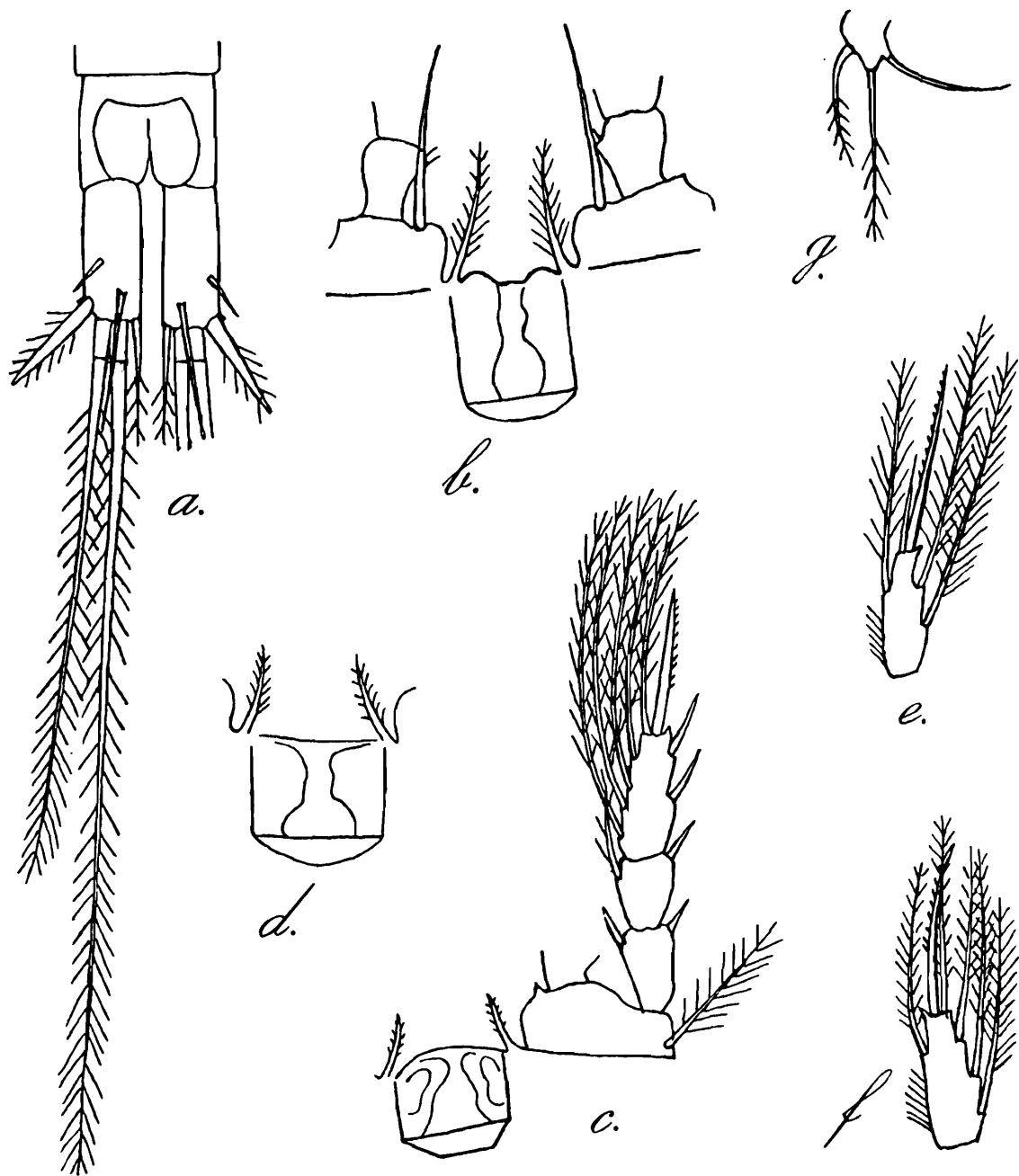


FIG. 3.—*Eucyclops (Tropocyclops) prasinus* (Fischer). ♀.

a. Furca, face dorsale ; b. Lamelle basale de P 1 ; c. Lamelle basale et exopodite de P 3 (côté gauche) ; d. Lamelle basale de P 4 ; e. Article 3 de l'endopodite de P 4 (côté droit, face dorsale) ; f. Article 3 de l'endopodite de P 4 (côté gauche, face ventrale) ; g. P 5.

longues que larges. Soie dorsale ciliée considérablement plus longue que la soie apicale externe. Soie apicale médiane interne 6 fois aussi longue que la branche de la furca. Soie apicale externe et soie apicale interne de longueur à peu près égale. Première antenne à 12 articles, atteignant le milieu du cinquième segment thoracique. Formule des épines de 3-4-4-3 du côté droit, et de 3-4-3-3 du côté gauche. Forte et longue soie au niveau de l'angle interne du deuxième article basal de la première paire de pattes. Article 3 de l'endopodite de P 4 a un aspect normal du côté droit. Il est plus de 2 et demi fois aussi long que large et porte deux épines apicales dont l'interne est 2 fois plus longue

que l'externe et l'épine apicale interne beaucoup plus longue que l'article lui-même. Du côté gauche l'article 3 de l'endopodite de P 4 est téra-tologique. Au lieu de 2 soies il porte sur le rebord interne 3 soies ; l'épine apicale interne est remplacée par une longue soie et au lieu d'une courte et mince épine apicale externe il y a une longue et forte épine barbelée qui égale presque en longueur celle de la soie apicale interne. Article 2 de l'enp. 4 montrant aussi une structure asymétrique en comparant les deux côtés. A droite, longueur : largeur, $40 : 25\mu = 1.60 : 1$; à gauche, $33 : 27\mu = 1.22 : 1$. P 5 à longue et mince épine interne. Longueur des 3 appendices du dedans au dehors respectivement $42 : 70 : 50 \mu$. Le réceptacle séminal n'a pas pu être distingué d'une façon satisfaisante. Ovisacs appliqués contre l'abdomen, atteignant le tiers antérieur de la furca. Ils contenaient 10 et 12 oeufs.

Habitats.—Une mare d'eau saumâtre à surface couverte d'une couche épaisse d'algues vertes, à Mansouriyéh, village à 6 kilomètres au nord-est de Béhbéhan. L'unique spécimen qui vient d'être décrite a été récolté en février dans cette mare, en compagnie d'assez nombreux *C. (M.) minutus* Claus, de plusieurs *C. (M.) planus* Gurney et d'un seul *E. serrulatus* Fischer. Il m'a semblé être un fait exceptionnel de trouver un *Tropocyclops* dans ce genre de biotope ; presque tous les animaux de ce sous-genre que j'ai récoltés dans l'Inde et dans l'Iran ayant été pêchés dans de l'eau claire, surtout dans des puits, des citernes et des mares de rivières.

***Eucyclops (Tropocyclops) confinis* Kiefer.**

Les spécimens de l'Iran à formule des épines de 3-4-3-3 ont différé légèrement à certains égards des animaux correspondants de l'Inde.

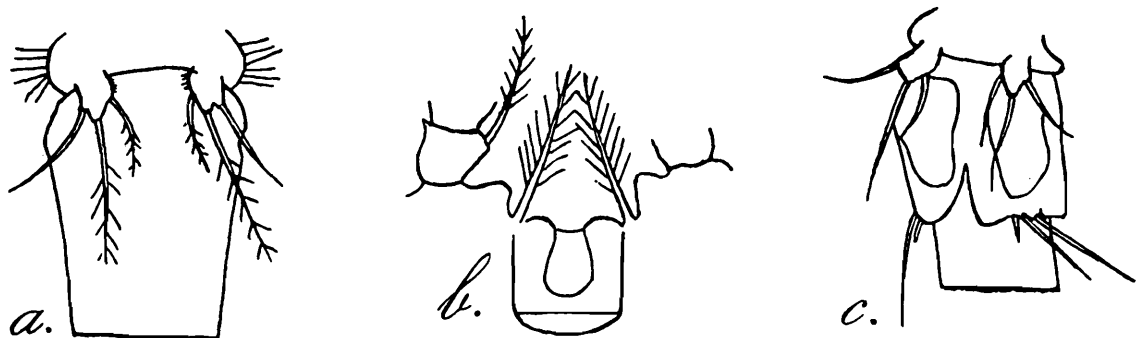


FIG. 4.—*Eucyclops (Tropocyclops) confinis* (Kiefer).

a. ♀ P 5 et segment génital (Baba Hadji) ; b. ♀ Lamelle basale de P I (Djam-Makkou) ; c. ♂ P 5 et P 6 (Baba Hadji).

Leur furca a en général été un peu plus longue, la soie dorsale (ciliée) mieux développée, la soie apicale externe de la furca a chez tous été nettement plus longue que la soie apicale interne, enfin, l'épine de P 5 a été trouvée considérablement plus longue et amincie que chez les animaux indiens, cette épine ayant chez ceux-là mesuré le plus souvent de 35 à 38 μ . Le nombre des oeufs a varié de 8 à 15 dans un ovisac.

Habitats.—Baba Hadji, étang eutrophique d'eau douce très claire, à 30 kilomètres au sud de Chiraz ; Bourm, mare de rivière d'eau douce dans la direction de Fal ; Djam, mares de rivière d'eau douce sur la route vers Makkou ; Tang-Qil, mares de rivière d'eau douce.

XIII. NOTES SUR QUELQUES MEMBRES DU SOUS-GENRE *EUCYCLOPS*
S. STR.

***Eucyclops serrulatus* (Fischer).**

Dans ma revision des représentants indiens du groupe *serrulatus*, parue en 1939, j'avais conclu à la possibilité de l'existence d'*E. serrulatus* et d'*E. agiloides* comme deux espèces distinctes, mais j'avais fait remarquer qu'on rencontre de nombreuses formes de passage reliant les deux types extrêmes, et qu'on a parfois de grandes difficultés à décider à quelle espèce qu'il faut référer certains animaux. En effet, aucune caractéristique isolée ne m'a paru posséder à elle seule une valeur diagnostique absolue en vue de la distinction des deux formes, et c'est seulement la coexistence chez un même individu de plusieurs particularités morphologiques qui a rendu possible la séparation des deux espèces en question. Ces remarques s'appliquaient au matériel de provenance indienne que j'avais étudié.

Les faits ont été un peu différents en ce qui concerne les spécimens iraniens. De même que dans l'Inde des *Eucyclops* s. str. à longue serra sont très communs dans l'Iran et se trouvent dans un grand nombre d'habitats divers. Cependant il a été évident qu'avec une seule exception tous les animaux récoltés ont bien été des *Eucyclops serrulatus* (Fischer). Ceci acquis il faut toutefois admettre que cette espèce

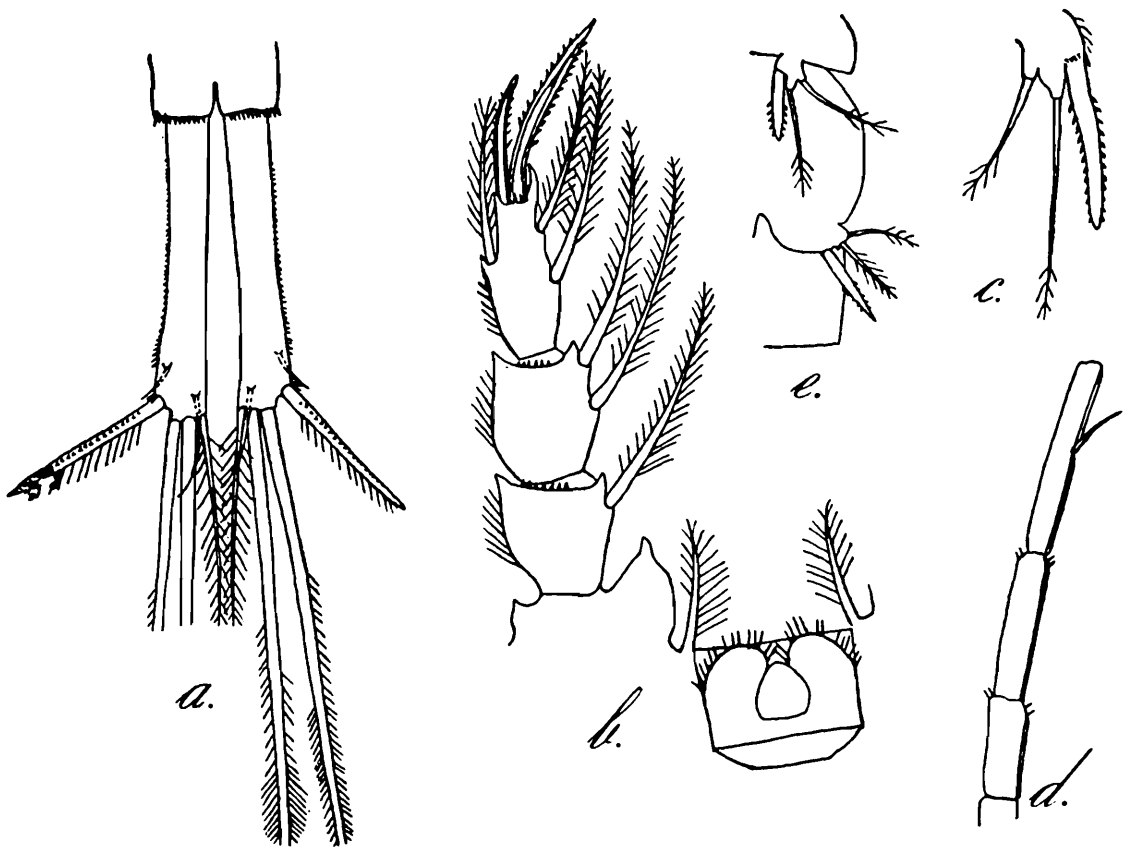


FIG. 5.—*Eucyclops serrulatus* (Fischer). ?

a. ♀ (2) Furca, face ventrale, b. ♀ (1) Lamelle basale et enp.4 ; c. ♀ (1) P 5 ; d. ♀ (1) Première antenne, trois derniers articles ; e. ♂ P 5 et P 6.

puisse offrir des variations très considérables dans ses dimensions générales, dans la structure de la furca et de ses appendices, dans la con-

figuration de l'article terminal de l'enp. 4 et celle de la cinquième patte, pour ne faire mention que des parties les plus importantes au point de vue diagnostique.

Toutes les femelles étudiées ont été porteuses d'ovisacs. Leur longueur a varié de 864 à 1368 μ ; la plupart ont mesuré de 900 à 1100 μ (sans soies apicales). La cuticule des segments abdominaux a parfois été ornée de rangées de petites fossettes. Les branches de la furca ont le plus souvent été bien divergentes ; plusieurs des femelles de quelques localités ont cependant présenté des branches parallèles.

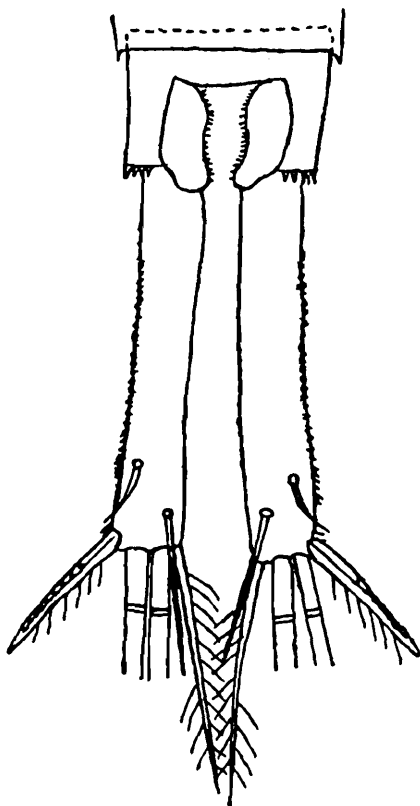


FIG. 6.—*Eucyclops serrulatus* (Fischer).

♀ Furca face dorsale (Adjanta).

Le rapport entre la longueur et la largeur est allé de 3.68 : 1 à 6.58 : 1. Le rapport de longueur entre la soie apicale interne et la soie apicale externe a varié de 1.03 : 1 à 1.59 : 1, la moyenne pour les 50 femelles étudiées a été de 1.25 : 1 (1.19 : 1 dans le cas des animaux du Sud et 1.30 : 1 chez ceux du Nord). Les mensurations de l'article 3 de l'enp. 4 et des épines apicales sont données dans le tableau et il me semble inutile de les analyser. L'article a presque toujours été inférieur en longueur à celle de l'épine apicale interne ; chez 3 individus cette épine et l'article ont été de longueur égale et chez 4 l'article a dépassé en longueur celle de l'épine apicale interne. Plusieurs animaux ont présenté des épines des pattes natatoires en forme de lancette. La base de l'épine de P 5 a, chez la grande majorité des spécimens, été plus de 3 fois aussi large que celle de la soie médiane. Le nombre des oeufs a varié de 9 à 38 dans un sac, les femelles à oeufs nombreux provenant de collections d'eau eutrophiques des provinces Caspiennes. La longueur du mâle a varié de 627 à 997 μ (sans soies apicales), la plupart

mesurant environ 800 μ . La longueur de l'épine interne de la sixième patte a chez les 19 animaux du Sud varié de 33 à 47 μ et chez ceux du Nord de 37 à 50 μ , donnant une moyenne d'environ 41 μ pour le total des 38 mâles étudiés.

Habitats.—Inde : Apparemment réparti dans toute l'étendue de la péninsule indienne y compris le Cachemire, tant au niveau de la mer qu'à une altitude supérieure à 4,000 mètres. Ceylan.

Iran : Sud. Abd Imam, étang oligotrophique d'eau douce ; Ahvaz, petite mare dans jardin potager municipal près de la rivière, petite mare près d'un canal d'irrigation, bassin dans jardin près du Karoun, rive gauche, étang à l'eau saumâtre près de la cimetière musulmane ; Béhbéhan, réservoir souterrain voûté, mare de rivière temporaire à l'eau saumâtre, bassin du jardin national, citerne d'eau de puits saumâtre près de l'Imam Zadéh Bachir-un-Nasir, puits à l'eau saumâtre dans les champs, bassin de l'hôpital municipal, petite rivière temporaire ; Bender Chahpour, mare à l'eau saumâtre, citerne d'eau douce ; Bourm, source d'eau douce, mare de rivière entre Bourm et Fal ; Chouch (Suse), fosse près de la gare, citerne près de la gare, marécage près du village ; Chouchter, mares dans le lit de la rivière Minaou ; rivière Minaou ; Djam, mares de rivière entre Djam et Makkou ; Djavakan, mare près d'un canal ; Firouzabad, bassin ; Gatch Saran, mare près d'un torrent d'eau douce ; Khorramchahr, fosses, ruisseau (1935) ; Mansouriyéh, mare à surface couverte d'algues vertes ; Marghazar, fosse près de la gare ; Tang-Gaz, mares de rivière à l'eau saumâtre, environ 6 km. d'Ahmédabad ; Tang-Qil, mares de rivière à l'eau douce.

Provinces Caspiennes. Chahi, mare du fleuve Talar, fosse, rizière, autre fosse, fosse près du fleuve Talar, mare eutrophique près d'un ruisseau ; Gorgan, mare sans végétation, bassin, autre mare sans végétation, autre mare ; Lahidjan, rizière, marais, fosses ; Langueroud, mare ; Pahlévi, rivière, lagune (2 échantillons) ; Ramsar, mare près d'un torrent, petit étang, marais, mare, autre mare ; Recht, ruisseau ; Sari, mare, bassin, fosse d'excavation près de la voie ferrée, rizière.

Plateau et Est. Broudjerd, étang (1935) ; Chahrud, bassin d'un caravansérail, mare à fond de feuilles décomposées, mare près d'un canal d'irrigation, bassin de la Banque Mellie ; Chiraz, bassin d'un jardin, puits (1935) ; Isfahan, petit étang près d'un ruisseau, étang (1935) ; Keredj, mare à feuilles décomposées, petite mare eutrophique, mare de rivière à l'eau remplie d'algues, autre mare de rivière semblable, mare à végétation émergente ; Méchhed, bassin (1935) ; Pasghaléh, chute d'eau dans de la mousse ; Qoum, rivière à l'eau saumâtre (1935) ; Robat-Khan, étang salin (1935).

Comme il a déjà été mentionné l'*E. serrulatus* se rencontre dans les biotopes les plus divers. On le voit aussi bien dans des étangs à végétation abondante que dans de petites mares d'eau de pluie et des bassins oligotrophiques. Il n'est pas rare dans l'eau souterraine des puits et se laisse pêcher assez fréquemment dans l'eau courante des rivières, et il tolère une grande variation de température et de salinité. Je donne ci-dessous un tableau récapitulatif des habitats dans lesquels

je l'ai récolté au cours de mes voyages en automne 1935 et pendant l'hiver 1939-40.

Mares à l'eau douce	..	..	..	..	17
Mares à l'eau saumâtre				..	3
Bassins			..	..	10
Mares de rivières à l'eau douce					7
Mares de rivières à l'eau saumâtre				..	2
Fosses à l'eau douce		..		..	7
Fosse à l'eau saumâtre			..	..	1
Etangs d'eau douce		..	..	..	4
Etangs d'eau saumâtre	..			..	3
Rivières et ruisseaux d'eau douce		..		..	4
Rivières d'eau saumâtre	..			..	2
Rizières	..	..	..	..	3
Marécages à l'eau douce	..			..	3
Citernes d'eau douce		..	..	..	2
Citerne d'eau saumâtre		..		..	1
Réservoir souterrain d'eau douce	..			..	1
Puits à l'eau douce	.	..	..	..	1
Puits à l'eau saumâtre	..	..	..	..	1
Source d'eau douce	..			..	1
Lagune	..	..	..	..	2
Chute d'eau dans de la mousse	..	..	..	..	1

Eucyclops agiloides (Sars).

J'ai déjà mentionné, que tandis que des formes offrant les caractéristiques d'*E. serrulatus* sont très répandues dans toute l'Empire, je n'ai récolté des animaux répondant à la description d'*E. agiloides* que dans une seule localité (dans le Roud Ambar Safed, tributaire du fleuve Mand).

Une épine peu élargie de la cinquième patte chez la femelle et une épine ventrale relativement courte de la sixième patte du mâle semblent constituer deux traits essentiels de cette espèce dont la signification reste toujours douteuse, les formes de passage étant nombreuses et semblant la relier insensiblement à l'*E. serrulatus*. Des mensurations sont données de quelques animaux sans qu'il ne me soit possible à présent d'entrer plus en avant dans ce sujet. Les femelles examinées avaient les branches de la furca parallèles.

Habitats.—Inde : Semble se rencontrer dans toute l'étendue de la péninsule indienne.

Iran : Tchamelki, rivière à l'eau saumâtre (région située entre Djam et Firouzabad).

Eucyclops speratus (Lilljeborg).

Dans la revision déjà mentionnée des espèces connues de l'Inde du sous-genre *Eucyclops* s. str. j'avais cru devoir référer à l'espèce *E. speratus* des spécimens récoltés d'une petite mare aux grottes d'Adjanta. A cette époque je n'avais pas été à même d'examiner des *E. speratus* d'Europe et je ne connaissais cette forme que d'après les descriptions de Lilljeborg, Sars et Kiefer. Dernièrement, grâce à la grande obligeance du Professeur Sixten Bock de Stockholm, j'ai pu examiner deux femelles d'*E. speratus* provenant du lac Maelaren en Suède. Cet examen m'a montré que les animaux d'Adjanta en diffèrent trop pour pouvoir être identifiés avec *E. speratus* et qu'ils se rapprochent davantage d'*E. errulatus* et doivent, je crois, être considérés comme une forme à furca très longue de cette espèce.

Dans un bassin de l'hôtel des "Quatres jardins" à Isfahan j'ai récolté deux femelles et trois mâles qui ont offert certaines ressemblances tant avec *E. speratus* qu'avec les animaux d'Adjanta, sans qu'il ait

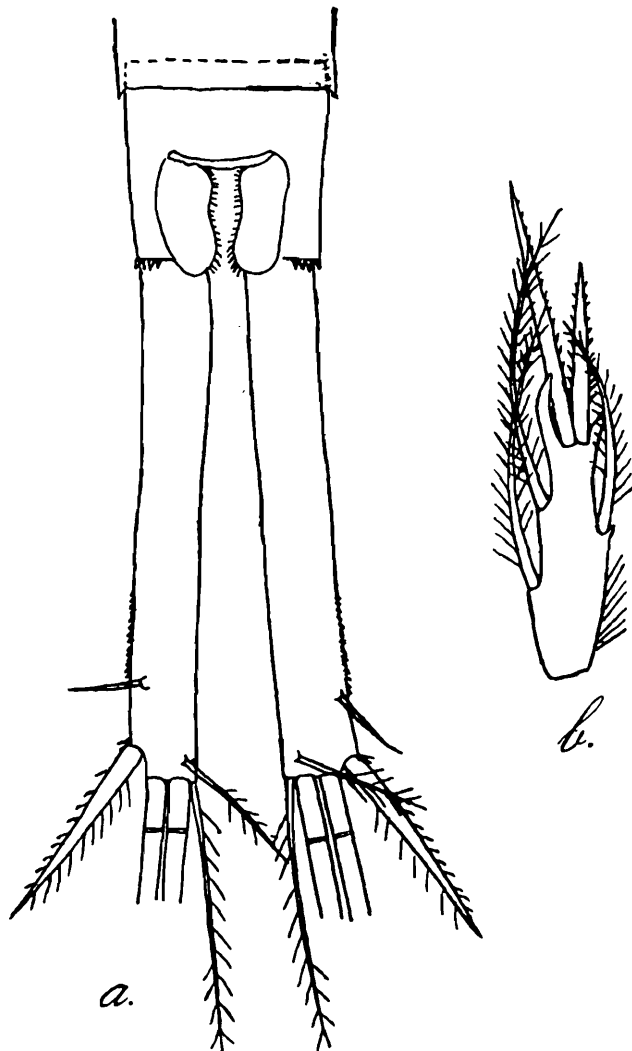


FIG. 7.—*Eucyclops speratus* (Lilljeborg).
a. ♀ Furca, face dorsale ; b. ♀ Article 3 enp. 4.

été possible de les identifier ni avec l'un ni avec les autres. Par suite de l'état actuel très imparfait de nos connaissances sur *E. serrulatus*

et son amplitude de variations il ne me semble pas justifié de décrire les animaux d'Isfahan comme représentant une forme nouvelle et je me borne à les présenter ici sous le nom d'*E. serrulatus* ? et d'en donner quelques mensurations et des figures. J'ajoute aussi un dessin montrant la furca et l'article terminal de l'enp. 4 d'un des spécimens du lac Maelaren et celui de la furca d'une femelle d'Adjanta. En ce qui concerne les mensurations des animaux de cette dernière localité il faudrait se rapporter au tableau p. 397 de la revision déjà citée. La première antenne atteignait rabattue respectivement le tiers antérieur et le bord postérieur du deuxième segment thoracique chez les deux *E. speratus*, le tiers antérieur et le milieu du deuxième segment thoracique chez les deux femelles d'Isfahan, et le bord postérieur du deuxième segment thoracique chez la plupart des individus d'Adjanta. L'échancrure anale était pourvue de petits poils chez les *E. speratus* et de longs poils chez les animaux d'Isfahan et d'Adjanta. Pour autant que je le sache *E. speratus* Lilljeborg n'a encore jamais été rencontré ni dans l'Inde ni dans l'Iran.

Eucyclops euacanthus (Sars).

Je n'ai rencontré des spécimens réferables à cette espèce que dans deux localités. Dans l'étang d'eau douce à Baba Hadji il s'est trouvé parmi de nombreux *E. farsicus* Lindberg une femelle unique qui répondait bien à la description d'*E. euacanthus* par Sars et par Kiefer, tout en possédant une première antenne plus longue. Elle avait une furca à branches divergentes, écartées à la base, à soie apicale interne glabre et courbée, légèrement inférieure en longueur à celle de la branche de la furca. La serra était complète, composée d'environ 34 spinules peu serrées, les dernières un peu plus longues que les autres. L'échancrure anale, très béante, semblait dépourvue de poils. La première antenne atteignait, lorsqu'elle était rabattue, le tiers postérieur du deuxième segment céphalothoracique. Les trois derniers articles portaient une membrane hyaline découpée en petites spinules très distinctes. Les épines des pattes natatoires offraient l'aspect typique en lancette. L'épine interne de P 5 était assez courte (30 μ) et bien moins de deux fois aussi large que la soie médiane de cette patte. Dans une rivière à l'eau saumâtre à Khorab (au sud de Firouzabad) j'ai récolté trois mâles qui semblaient aussi appartenir à cette même espèce. La soie apicale interne de la furca était courbée et manquait de cils également chez eux, et je n'ai pas pu voir des poils au niveau de l'échancrure anale. Les épines des pattes natatoires présentaient la structure lancéolée. L'épine de P 6 était considérablement plus courte que le deuxième segment abdominal.

Eucyclops macruroides (Lilljeborg).

Dans un étang eutrophique à l'eau douce à Chahi j'ai trouvé quelques individus répondant bien aux caractéristiques d'*E. macruroides*,

tel qu'il a été décrit par Lilljeborg. J'en donne quelques mensurations et des figures.

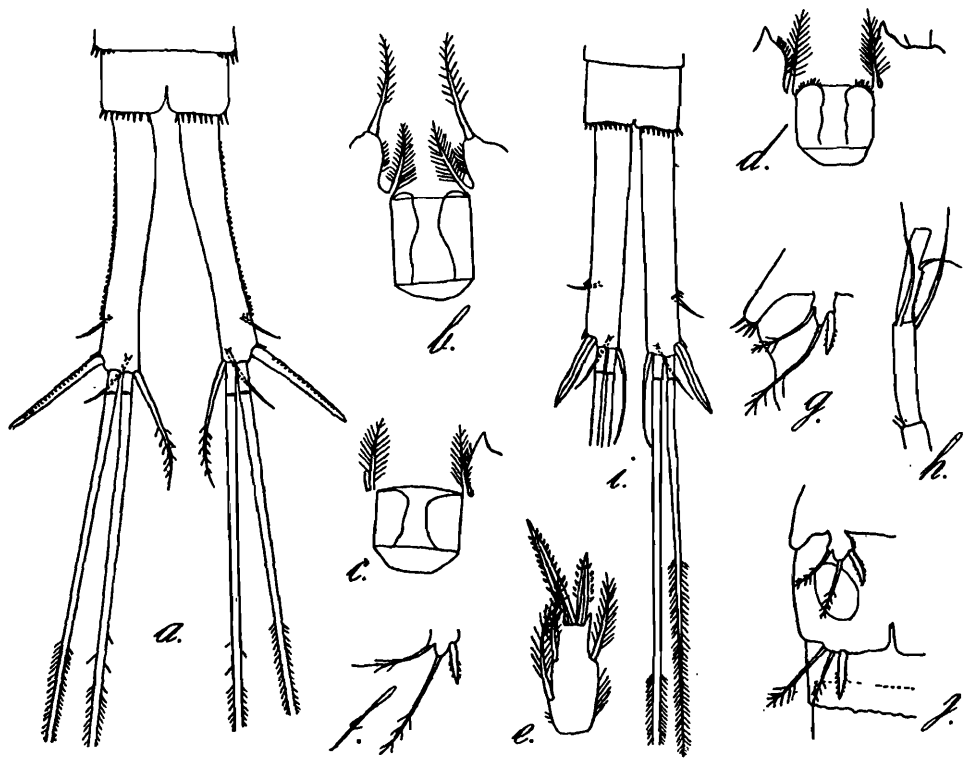


FIG. 8.—*Eucyclops macruioides* (Lilljeborg).

a. ♀ (1) Furca, face ventrale ; b. ♀ (2) Lamelle basale de P 1 ; c. ♀ (1) Lamelle basale de P 4 ; d. ♀ (2) Lamelle basale de P 4 ; e. ♀ (1) Article 3 enp. 4 ; f. ♀ (1) P 5 ; g. ♀ (2) P 5 ; h. ♀ (2) Première antenne, deux derniers articles ; i. ♂ Furca, face ventrale ; j. ♂ P 5 et P 6.

BIBLIOGRAPHIE.

- Kiefer, F., 1931.—Die Untergattung *Tropocyclops* der Gattung *Eucyclops* (Copepoda Cyclopoida). *Zeit. f. wiss. Zool.* CXXXVIII, pp. 487-514.
- Kiefer, F., 1934.—Die freilebenden Copepoden der Binnengewässer von Insulinde. *Arch. f. Hydrobiol.* Suppl. XII, p. 519.
- Kiefer, F., 1938.—Freilebende Ruderfusskrebse (Crustacea Copepoda) von Formosa. *Bull. biogeogr. Soc. Jap.* VIII, pp. 59, 60.
- Lindberg, K., 1939a.—Etude de représentants indiens du sous-genre *Tropocyclops* (Crustacés Copépodes Cyclopoïdes). *Rec. Ind. Mus.* XLI, pp. 1-15.
- Lindberg, K., 1939b.—Cyclopides (Crustacés Copépodes) de l'Inde. II. Une revision des représentants indiens du sous-genre *Microcyclops* Claus, du genre *Cyclops* Müller. *Rec. Ind. Mus.* XLI, pp. 237-243.
- Lindberg, K., 1939c.—Cyclopides (Crustacés Copépodes) de l'Inde. III. Une revision des représentants indiens du sous-genre *Eucyclops* s. str. (Groupe *serrulatus*). *Rec. Ind. Mus.* XLI, pp. 373-400.
- Lowndes, A. G., 1930.—Fresh-water Copepoda from Abyssinia, collected by Mr. J. Omer Cooper. *Proc. Zool. Soc. Lond.* pp. 161-179.

Cyclops (Microcyclops) varicans Sars ♀.

Localité.	Longueur. μ	Furca. Long. : larg.	Soie dors.	Soie ap. int. : soie ap. ext.	Enp. 4. Art. 2. Long. : larg.	Enp. 4. Art. 2. Ep. ap. int. : ép ap. ext.	Enp. 4. Long. art. 2 : ép. ap. int.	P 6 Epine : soie méd. : soie ext.
<i>Chahi</i> Mare.	788	(45 + 20) : 22 = 2.95 : 1	67	X : 50 = X : 1	73 : 29 = 2.52 : 1	62 : 35 = 1.77 : 1	1.18 : 1	..
	784	(50 + 20) : 20 = 3.50 : 1	67	85 : 58 = 1.46 : 1	..	..	..	..
Rizièrè.	741	(47 + 20) : 19 = 3.53 : 1	52	77 : 50 = 1.54 : 1	69 : 30 = 2.30 : 1	41 : 27 = 1.52 : 1	1.68 : 1	..
	769	(50 + 23) : 22 = 3.32 : 1	53	83 : 52 = 1.59 : 1	77 : 32 = 2.40 : 1	55 : 28 = 1.96 : 1	1.40 : 1	..
<i>Gorgan</i> Mare.	908	(55 + 20) : 23 = 3.26 : 1	62	93 : 60 = 1.55 : 1	82 : 32 = 2.56 : 1	59 : 37 = 1.59 : 1	1.39 : 1	..
	988	(44 + 23) : 22 = 3.04 : 1	60	103 : 58 = 1.78 : 1	83 : 36 = 2.30 : 1	55 : 37 = 1.49 : 1	1.50 : 1	..
Bassin.	831	(60 + 25) : 23 = 3.69 : 1	52	83 : 58 = 1.43 : 1	83 : 35 = 2.37 : 1	50 : 33 = 1.52 : 1	1.66 : 1	..
<i>Lahidjan</i> Etang.	940	(46 + 22) : 20 = 3.40 : 1	57	X : 53 = X : 1	85 : 33 = 2.57 : 1	50 : 28 = 1.78 : 1	1.70 : 1	..
	769	(48 + 22) : 18 = 3.89 : 1	58	75 : 55 = 1.36 : 1	78 : 32 = 2.33 : 1	55 : 35 = 1.57 : 1	1.42 : 1	..
	817	(44 + 24) : 20 = 3.40 : 1	67	75 : 53 = 1.42 : 1	75 : 32 = 2.34 : 1	58 : 32 = 1.81 : 1	1.29 : 1	..
Rizièrè.	893	73 : 23 = 3.17 : 1	..	..	75 : 33 = 2.27 : 1	52 : 32 = 1.62 : 1	1.44 : 1	..
	826	73 : 21 = 3.48 : 1	..	..	67 : 27 = 2.48 : 1	50 : 28 = 1.78 : 1	1.34 : 1	..
	826	(51 + 22) : 22 = 3.32 : 1	..	85 : 57 = 1.49 : 1	73 : 30 = 2.43 : 1	52 : 32 = 1.62 : 1	1.40 : 1	..
<i>Ramsar</i> Petit étang.	921	(60 + 23) : 22 = 3.77 : 1	62	102 : 53 = 1.92 : 1	82 : 32 = 2.56 : 1	48 : 32 = 1.50 : 1	1.70 : 1	..
<i>Recht</i> Ruisseau.	807	(55 + 20) : 20 = 3.75 : 1	58	X : 58 = X : 1	75 : 30 = 2.50 : 1	50 : 30 = 1.67 : 1	1.50 : 1	..
Mare.	883	(27 + 25) : 22 = 2.36 : 1	60	88 : 67 = 1.31 : 1	91 : 37 = 2.46 : 1	50 : 33 = 1.52 : 1	1.82 : 1	..
<i>Sari</i> Rizièrè.	855	(54 + 23) : 22 = 3.50 : 1	62	87 : 58 = 1.50 : 1	85 : 33 = 2.57 : 1	58 : 40 = 1.45 : 1	1.46 : 1	..
<i>Chouch (Suse)</i> gare Citerne.	921	(53 + 22) : 20 = 3.75 : 1	50	77 : 53 = 1.45 : 1	82 : 32 = 2.56 : 1	46 : 28 = 1.64 : 1	1.78 : 1	..
<i>Chouch (Suse)</i> village Marécage.	860	(48 + 22) : 21 = 3.33 : 1	63	93 : 63 = 1.48 : 1	85 : 30 = 2.83 : 1	61 : 37 = 1.65 : 1	1.39 : 1	..
	883	(47 + 20) : 22 = 3.04 : 1	53	85 : 55 = 1.55 : 1	77 : 30 = 2.57 : 1	52 : 33 = 1.58 : 1	1.48 : 1	..

1942.]

K. LINDBERG : *Cyclopides de l'Inde.*

Cyclops (Microcyclops) varicans Sars ♀—contd.

Localité.	Longueur. μ	Furca. Long : larg.	Soie dors.	Soie ap. int. : soie ap. ext.	Enp. 4. Art. 2. Long. : larg.	Enp. 4. Art. 2. Ep. ap. int. : ép. ap. ext.	Enp. 4. Long. art. 2 : ép. ap. int.	P 6 Epine : soie méd. : soie ext.
<i>Dihak</i> Source.	798	(57+25) : 20=4.10 : 1	60	83 : 53=1.57 : 1	72 : 28=2.57 : 1	53 : 28=1.89 : 1	1.36 : 1	..
<i>Tang-Qil</i> Mare de rivière.	841	(58+27) : 20=4.25 : 1	83	97 : 59=1.64 : 1	73 : 30=2.43 : 1	59 : 32=1.84 : 1	1.24 : 1	..

Cyclops (Microcyclops) varicans Sars ♂.

<i>Chahi</i> Rizièrè.	598	....	..	..	50 : 20=2.50 : 1	33 : 17=1.94 : 1	1.52 : 1	16 : 10 : 28
<i>Gorgun</i> Mare.	651	(25+17) : 18=2.33 : 1	42	77 : 42=1.83 : 1	55 : 24=2.29 : 1	41 : 22=1.86 : 1	1.34 : 1	16 : X : 25
<i>Lahidjan</i> Etau.	608	(31+15) : 17=2.70 : 1	45	70 : 43=1.63 : 1	42 : 18=2.33 : 1	37 : 19=1.95 : 1	1.13 : 1	10 : X : 28
<i>Chouch (Suse)</i> village Marécage.	693	(30+18) : 17=2.82 : 1	43	72 : 45=1.60 : 1	53 : 23=2.30 : 1	37 : 21=1.76 : 1	1.43 : 1	15 : 20 : 35

Cyclops (Microcyclops) linjanticus Kiefer.

<i>Lahidjan;</i>	♀ 655	(45+18) : 17=3.70 : 1	..	72 : 33=2.18 : 1	..	..	..	..
<i>Pahlèri-Ghazian</i>	♀ 651	(51+17) : 18=3.78 : 1	..	87 : 37=2.35 : 1	44 : 20+2.20 : 1	35 : 9=3.81 : 1	1.26 : 1	..
	♂ 532	(29+13) : 16=2.62 : 1	..	102 : 37=2.76 : 1	42 : 16=2.62 : 1	40 : 7.5=5.33 : 1	1.05 : 1	16 : 10 : 28
<i>Recht</i>	♀ 680	(52+18) : 19=3.68 : 1	33	83 : 37=2.24 : 1	48 : 20=2.40 : 1	38 : 9 =4.22 : 1	1.26 : 1	..
<i>Dihak</i>	♀ 646	(42+15) : 18=3.16 : 1	..	87 : 42=2.07 : 1	47 : 17=2.76 : 1	33 : 10=3.30 : 1	1.42 : 1	..
<i>Rèchir</i>	♀ 627	(33+15) : 18=2.67 : 1	..	80 : 40=2 : 1	42 : 16=2.62 : 1	30 : 10=3 : 1	1.40 : 1	..
	♀ 693	(43+17) : 18=3.33 : 1	..	95 : 45=2.11 : 1	47 : 17=2.76 : 1	35 : 9=3.81 : 1	1.34 : 1	..
	♀ 613	(42+15) : 17=3.35 : 1	33	92 : 42=2.19 : 1	44 : 18=2.44 : 1	29 : 8=3.62 : 1	1.52 : 1	..
<i>Djam-Makkou</i>	♀ 610	(39+18) : 18=3.17 : 1	42	88 : 39=2.26 : 1	43 : 15=2.87 : 1	33 : 11=3 : 1	1.30 : 1	..

Eucyclops (Tropocyclops) prasinus (Fischer).

Localité.	Longueur. μ	Furca. Long. : larg.	Soie dors.	Soie ap. méd. int. : furca.	Soie ap. ext. : soie ap. int.	Enp. 4. Art. 3. Long. : larg.	Enp. 4. Art. 3. Ep. ap. int. : ép. ap. ext.	Enp. 4. Ep. ap. int. : long. art. 3.	P 6 Epine.	Formule des épines.
Mansourieyh	♀ 852	(27 + 23) : 2·50 : 1	58	302 : 50 = 6 : 1	46 : 45 = 1·02 : 1	47 : 18 = 2·61 : 1 (droite) 50 : 22 = 2·27 : 1 (gauche)	73 : 37 = 2·03 : 1 (droite)	1·59 : 1 (droite)	..	$\left\{ \begin{array}{l} 3-4-4-3 \\ 3-4-3-3 \end{array} \right.$

Eucyclops (Tropocyclops) confinis Kiefer.

<i>Djam-Makkou</i>	♀ 646	(25 + 16) : 16 = 2·56 : 1	47	267 : 41 = 6·51 : 1	38 : 31 = 1·23 : 1	29 : 13 = 2·23 : 1	72 : 35 = 2·06 : 1	2·48 : 1	..	3-4-3-3
	♀ 703	(25 + 16) : 16 = 2·56 : 1	47	264 : 41 = 6·44 : 1	40 : 30 = 1·33 : 1	..	..	..	..	3-4-3-3
	♀ 710	(25 + 18) : 17 = 2·53 : 1	50	259 : 43 = 6·02 : 1	42 : 32 = 1·31 : 1	28 : 14 = 2 : 1	75 : 38 = 1·97 : 1	2·68 : 1	..	3-4-3-3
	♂ 503	(15 + 12) : 15 = 1·80 : 1	35	175 : 27 = 6·48 : 1	25 : 19 = 1·32 : 1	26 : 11 = 2·36 : 1	59 : 33 = 1·79 : 1	2·27 : 1	17	3-4-3-3
<i>Baba Hadji</i>	♀ 646	(26 + 15) : 15 = 2·73 : 1	53	230 : 41 = 5·61 : 1	37 : 30 = 1·23 : 1	31 : 12 = 2·58 : 1	75 : 35 = 2·14 : 1	2·42 : 1	..	3-4-3-3
	♀ 632	(25 + 15) : 16 = 2·50 : 1	50	200 : 40 = 5 : 1	37 : 33 = 1·12 : 1	31 : 14 = 2·21 : 1	80 : 38 = 2·10 : 1	2·58 : 1	..	3-4-3-3
	♀ 627	(24 + 16) : 15 = 2·66 : 1	50	225 : 40 = 5·62 : 1	37 : 31 = 1·19 : 1	32 : 13 = 2·46 : 1	78 : 36 = 2·17 : 1	2·33 : 1	..	3-4-3-3
	♀ 617	(24 + 16) : 16 = 2·50 : 1	55	200 : 40 = 5 : 1	37 : 31 = 1·19 : 1	32 : 13 = 2·46 : 1	78 : 35 = 2·23 : 1	2·33 : 1	..	3-4-3-3
	♂ 503	(17 + 15) : 13 = 2·46 : 1	38	184 : 32 = 5·75 : 1	27 : 20 = 1·35 : 1	28 : 11 = 2·54 : 1	65 : 33 = 1·97 : 1	2·32 : 1	15	3-4-3-3
<i>Tang-Qil</i>	♀ 693	(29 + 16) : 18 = 2·50 : 1	43	225 : 45 = 5 : 1	42 : 33 = 1·27 : 1	30 : 14 = 2·14 : 1	75 : 37 = 2·03 : 1	2·50 : 1	..	3-4-3-3
	♀ 656	(25 + 16) : 17 = 2·41 : 1	42	247 : 41 = 6·02 : 1	38 : 30 = 1·27 : 1	28 : 12 = 2·33 : 1	72 : 37 = 1·95 : 1	2·57 : 1	..	3-4-3-3
<i>Bourm</i>	♀ 655	(26 + 15) : 17 = 2·41 : 1	48	247 : 41 = 6·02 : 1	38 : 33 = 1·15 : 1	29 : 14 = 2·07 : 1	75 : 35 = 2·14 : 1	2·58 : 1	..	3-4-3-3

Eucyclops serrulatus (Fischer) ♀.

88

Localité.	Longueur. μ	Furca. Long. : larg.	Furca. Soie ap. int. : soie ap. ext.	Enp. 4. Art. term. Long. : larg.	Enp. 4. Ep. ap. int. : ép. ap. ext.	Enp. 4. Art. term. : ép. ap. int.	Cinquième patte Epine : soie méd. (larg. approx.).
<i>Ahvaz</i>	1064	130 : 26=5 : 1	87 : 78=1·12 : 1	67 : 27=2·48 : 1	83 : 57=1·46 : 1	0·80 : 1	3·2 : 1
Petite mare	1226	148 : 24=6·17 : 1	100 : 73=1·37 : 1	67 : 27=2·48 : 1	75 : 52=1·44 : 1	0·89 : 1	3·1 : 1
Autre petite mare	1045	130 : 27=4·81 : 1	88 : 75=1·17 : 1	63 : 32=1·96 : 1	75 : 57=1·32 : 1	0·84 : 1	3·1 : 1
Bassin	1045	117 : 25=4·68 : 1	83 : 67=1·24 : 1	60 : 23=2·60 : 1	58 : 48=1·20 : 1	1·03 : 1	3·1 : 1
<i>Béhbéhan</i>							
Réservoir souterrain	1083	133 : 27=4·93 : 1	92 : 72=1·28 : 1	63 : 26=2·42 : 1	77 : 53=1·45 : 1	0·82 : 1	3·1 : 1
Petite rivière à l'eau saumâtre	1055	125 : 26=4·80 : 1	80 : 70=1·14 : 1	65 : 28=2·32 : 1	73 : 55=1·33 : 1	0·89 : 1	3·1 : 1
Bassin	1083	132 : 27=4·89 : 1	87 : 83=1·05 : 1	72 : 27=2·67 : 1	75 : 58=1·29 : 1	0·96 : 1	3·1 : 1
Mare de rivière temporaire	1007	117 : 25=4·68 : 1	83 : 72=1·15 : 1	60 : 28=2·14 : 1	70 : 52=1·35 : 1	0·86 : 1	3·1 : 1
<i>Bender Chahpour</i>							
Citerne d'eau douce	1092	138 : 23=6 : 1	85 : 80=1·06 : 1	63 : 27=2·33 : 1	78 : 58=1·34 : 1	0·80 : 1	3·1 : 1
Mare à l'eau saumâtre	1054	123 : 23=5·35 : 1	87 : 75=1·16 : 1	62 : 27=2·29 : 1	75 : 52=1·44 : 1	0·83 : 1	3·1 : 1
<i>Bourm</i>							
Source	903	108 : 25=4·32 : 1	78 : 68=1·14 : 1	58 : 28=2·07 : 1	67 : 50=1·34 : 1	0·81 : 1	3·4 : 1
Mare de rivière entre Bourm et Fal.	940	117 : 23=5·09 : 1	88 : 73=1·20 : 1	57 : 26=2·19 : 1	75 : 50=1·50 : 1	0·76 : 1	3·1 : 1
<i>Chouch (Suse)</i>							
Fosse près de la gare	1102	140 : 27=5·18 : 1	88:83=1·06 : 1	67 : 27=2·48 : 1	75 : 50=1·50 : 1	0·89 : 1	3·1 : 1
<i>Chouchter</i>							
Rivière Minaou	940	103 : 22=4·68 : 1	92 : 63=1·46 : 1	58 : 25=2·32 : 1	60 : 43=1·39 : 1	0·97 : 1	3·1 : 1
Mare dans le lit d'une petite rivière	1045	125 : 26=4·8 : 1	85 : 60=1·42 : 1	62 : 25=2·48 : 1	63 : 48=1·31 : 1	0·98 : 1	3·1 : 1
<i>Djam</i>							
Rivière entre Djam et Makkou	1007	98 : 23=4·26 : 1	78 : 58=1·34 : 1	60 : 25=2·40 : 1	67 : 46=1·46 : 1	0·89 : 1	3·1 : 1
	959	118 : 23=5·13 : 1	83 : 52=1·59 : 1	60 : 25=2·40 : 1	67 : 48=1·39 : 1	0·89 : 1	2·8 : 1
	998	122 : 25=4·88 : 1	93 : 75=1·22 : 1	58 : 28=2·07 : 1	77 : 53=1·45 : 1	0·75 : 1	3·3 : 1

<i>Djavakan</i>							
Mare près d'un canal	1045	125 : 23 = 5.43 : 1	85 : 67 = 1.27 : 1	63 : 28 = 2.25 : 1	70 : 50 = 1.40 : 1	0.90 : 1	3.1 : 1
<i>Firouzabad</i>							
Bassin	1016	115 : 25 = 4.6 : 1	75 : 52 = 1.44 : 1	67 : 27 = 2.48 : 1	75 : 53 = 1.42 : 1	0.89 : 1	3.6 : 1
<i>Khorramchahr</i>							
Fosse	1150	158 : 30 = 5.27 : 1	100 : 97 = 1.03 : 1	72 : 32 = 2.25 : 1	83 : 67 = 1.24 : 1	0.84 : 1	3.1 : 1
Marécage	997	133 : 26 = 5.12 : 1	83 : 80 = 1.04 : 1	63 : 27 = 2.33 : 1	72 : 50 = 1.44 : 1	0.87 : 1	3.1 : 1
<i>Mansouriyéh</i>							
Mare	988	125 : 27 = 4.63 : 1	75 : 68 = 1.10 : 1	53 : 29 = 1.83 : 1	68 : 50 = 1.36 : 1	0.78 : 1	3.4 : 1
<i>Tang-Gaz</i>							
Rivière	908	92 : 25 = 3.68 : 1	87 : 83 = 1.05 : 1	57 : 25 = 2.28 : 1	67 : 50 = 1.34 : 1	0.85 : 1	3.1 : 1
	941	93 : 25 = 3.72 : 1	90 : 77 = 1.17 : 1	52 : 25 = 2.08 : 1	67 : 45 = 1.49 : 1	0.77 : 1	2.4 : 1
<i>Chahi</i>							
Mare du fleuve Talar	988	132 : 26 = 5.08 : 1	78 : 67 = 1.16 : 1	63 : 27 = 2.33 : 1	84 : 65 = 1.29 : 1	0.75 : 1	3.3 : 1
Mare eutrophique près d'un ruisseau	988	123 : 25 = 4.92 : 1	80 : 70 = 1.14 : 1	65 : 27 = 2.40 : 1	70 : 52 = 1.35 : 1	0.93 : 1	3.6 : 1
Fosse	1225	158 : 24 = 6.58 : 1	87 : 68 = 1.28 : 1	65 : 30 = 2.17 : 1	75 : 56 = 1.34 : 1	0.87 : 1	3.1 : 1
<i>Chakroud</i>							
Bassin	1368	150 : 31 = 4.84 : 1	103 : 68 = 1.51 : 1	77 : 28 = 2.75 : 1	80 : 57 = 1.40 : 1	0.96 : 1	4.1 : 1
Autre bassin	1140	135 : 27 = 5 : 1	100 : 72 = 1.39 : 1	77 : 28 = 2.75 : 1	75 : 55 = 1.36 : 1	1.03 : 1	3.6 : 1
Marécage près d'un canal	1159	147 : 27 = 5.44 : 1	100 : 68 = 1.47 : 1	70 : 27 = 2.59 : 1	78 : 57 = 1.37 : 1	0.89 : 1	4.1 : 1
Petite mare à feuilles décomposées	1045	113 : 25 = 4.52 : 1	88 : 70 = 1.26 : 1	58 : 28 = 2.07 : 1	58 : 43 = 1.35 : 1	1 : 1	3.1 : 1
<i>Derbend</i>							
Mare de torrent	1088	125 : 27 = 4.63 : 1	100 : 67 = 1.49 : 1	67 : 25 = 2.68 : 1	70 : 50 = 1.40 : 1	0.96 : 1	3.1 : 1
<i>Gorgan</i>							
Mare sans végétation	1273	158 : 29 = 5.45 : 1	97 : 87 = 1.11 : 1	65 : 30 = 2.17 : 1	87 : 57 = 1.53 : 1	0.75 : 1	3.1 : 1
Autre mare sans végétation	1273	147 : 25 = 5.88 : 1	90 : 77 = 1.17 : 1	67 : 31 = 2.16 : 1	75 : 58 = 1.29 : 1	0.89 : 1	3.1 : 1
Bassin	1254	167 : 29 = 5.76 : 1	93 : 70 = 1.33 : 1	77 : 32 = 2.40 : 1	88 : 63 = 1.39 : 1	0.87 : 1	3.1 : 1
Petite mare	1102	142 : 25 = 5.68 : 1	103 : 83 = 1.24 : 1	70 : 30 = 2.33 : 1	83 : 58 = 1.43 : 1	0.84 : 1	3.6 : 1
<i>Keredj</i>							
Mare à feuilles décomposées	1188	158 : 28 = 5.64 : 1	117 : 77 = 1.52 : 1	80 : 27 = 2.96 : 1	75 : 53 = 1.42 : 1	1.07 : 1	4.1 : 1
Petite mare eutrophique	1169	120 : 25 = 4.80 : 1	103 : 75 = 1.37 : 1	73 : 25 = 2.92 : 1	72 : 52 = 1.38 : 1	1.01 : 1	3.1 : 1

Eucyclops serrulatus (Fischer) ♀—contd.

Localité.	Longueur. μ	Furca Long. : larg.	Furca Soie ap. int. : soie ap. ext.	Enp. 4. Art. term. Long. : larg.	Enp. 4. Ep. ap. int. : ép. ap. ext.	Enp. 4. Art. term. : ép. ap. int.	Cinquième patte Epine : soie méd. (larg. approx.).
Mare à végétation émergente	864	103 : 23 = 4.68	83 : 62 = 1.34 : 1	58 : 25 = 2.32 : 1	65 : 52 = 1.25 : 1	0.89 : 1	3.1 : 1
Mare de rivière	1045	133 : 27 = 4.93 : 1	100 : 65 = 1.54 : 1	73 : 25 = 2.92 : 1	73 : 50 = 1.46 : 1	1 : 1	4.1 : 1
Pahlévi	1045	125 : 25 = 5 : 1	98 : 70 = 1.40 : 1	60 : 27 = 2.22 : 1	68 : 50 = 1.36 : 1	0.88 : 1	3.1 : 1
Lagune	997	127 : 25 = 5.08 : 1	83 : 67 = 1.24 : 1	62 : 27 = 2.29 : 1	75 : 58 = 1.29 : 1	0.83 : 1	3.1 : 1
Rivière	940	113 : 23 = 4.91 : 1	83 : 67 = 1.24 : 1	58 : 27 = 2.15 : 1	72 : 52 = 1.38 : 1	0.80 : 1	2 : 1
Ramsar							
Mare	997	103 : 25 = 4.01 : 1	83 : 63 = 1.32 : 1	58 : 25 = 2.32 : 1	58 : 43 = 1.35 : 1	1 : 1	2.5 : 1
Marais	950	117 : 25 = 4.68 : 1	83 : 58 = 1.43 : 1	57 : 30 = 1.90 : 1	67 : 47 = 1.43 : 1	0.85 : 1	3.1 : 1
Mare près d'un torrent	997	123 : 23 = 5.35 : 1	90 : 77 = 1.17 : 1	63 : 28 = 2.25 : 1	67 : 52 = 1.29 : 1	0.94 : 1	3.1 : 1
Recht							
Ruisseau	1045	137 : 26 = 5.27 : 1	92 : 70 = 1.31 : 1	63 : 30 = 2.10 : 1	72 : 52 = 1.38 : 1	0.87 : 1	3.1 : 1
Sari							
Fosse près de la voie ferrée	1035	130 : 23 = 5.65 : 1	70 : 65 = 1.08 : 1	63 : 30 = 2.10 : 1	92 : 65 = 1.42 : 1	0.68 : 1	3.1 : 1
Rizière	1088	147 : 28 = 5.25 : 1	93 : 75 = 1.22 : 1	72 : 32 = 2.25 : 1	88 : 63 = 1.39 : 1	0.92 : 1	3.1 : 1

Eucyclops serrulatus (Fischer) ♂.

Localité.	Longueur. μ	Furca Long. : larg.	Furca Soie ap. int. : soie ap. ext.	Enp. 4. Art. term. Long. : larg.	Enp. 4. Ep. ap. int. : ép. ap. ext.	Enp. 4. Art. term. : ép. ap. int.	Sixième patte Epine : soie méd. : soie ext.
Ahvaz							
Bassin	788	82 : 18 = 4.55 : 1	67 : 40 = 1.67 : 1	45 : 16 = 2.81 : 1	53 : 35 = 1.51 : 1	0.85 : 1	42 : 35 : 37
Etang	855	87 : 18 = 4.83 : 1	53 : 43 = 1.23 : 1	....	....	..	38 : 32 : 37
Béhbéhan							
Réservoir souterrain	855	83 : 18 = 4.61 : 1	....	48 : 22 = 2.18 : 1	58 : 42 = 1.38 : 1	0.83 : 1	43 : 33 : 47
Petite rivière à l'eau saumâtre	874	....	....	....	....	..	42 : 40 : 50

Bassin	798	88 : 20 = 4.40 : 1	....	....	....	..	43 : 33 : 40
Mare de rivière temporaire	779	73 : 20 = 3.65 : 1	75 : 50 = 1.50 : 1	45 : 20 = 2.25 : 1	58 : 41 = 1.41 : 1	0.78 : 1	43 : 33 : 37
Puits	769	80 : 17 = 4.70 : 1	67 : 50 = 1.34 : 1	....	....	..	35 : 30 : 31
<i>Bender Chahpour</i>							
Citerne d'eau douce	798	87 : 18 = 4.83 : 1	70 : 50 = 1.40 : 1	47 : 20 = 2.35 : 1	58 : 40 = 1.45 : 1	0.81 : 1	38 : 30 : 42
Mare à l'eau saumâtre	826	....	....	....	....	..	47 : 30 : 42
<i>Bourm</i>							
Source							
Mare de rivière entre	732	....	....	....	....	..	33 : 37 : 42
Bourm et Fal	732	....	....	....	....	..	42 : x : x
<i>Chouch (Suse)</i>							
Fosse près de la gare	789	90 : 20 = 4.50 : 1	72 : 48 = 1.50 : 1	67 : 33 = 2.03 : 1	77 : 55 = 1.40 : 1	0.87 : 1	43 : 33 : 42
Marécage près du village	788	92 : 19 = 4.84 : 1	68 : 50 = 1.36 : 1	....	....	..	42 : 30 : 37
<i>Chouchter</i>							
Mare dans le lit d'une petite rivière	817	83 : 20 = 4.15 : 1	57 : 42 = 1.36 : 1	....	....	..	38 : 25 : 33
<i>Djam</i>							
Rivière entre							
Djam et Makkou	997	72 : 18 = 4 : 1	60 : 43 = 1.39 : 1	....	....	..	33 : 25 : 38
<i>Djavakan</i>							
Mare près d'un canal	817	87 : 19 = 4.58 : 1	68 : 45 = 1.51 : 1	....	....	..	42 : 28 : 33
<i>Firouzabad</i>							
Bassin	760	....	....	....	....	..	33 : 28 : 29
<i>Tang-Gaz</i>							
Rivière	732	72 : 16 = 4.50 : 1	62 : 52 = 1.19 : 1	....	....	..	33 : 30 : 40
	741	70 : 18 = 3.89 : 1	....	38 : 17 = 2.24 : 1	53 : 33 = 1.60 : 1	0.72 : 1	37 : x : x
<i>Chahrour</i>							
Bassin	902	80 : 18 = 4.44 : 1	87 : 42 = 2.07 : 1	....	....	..	50 : 33 : 37
Autre bassin	807	80 : 20 = 4 : 1	67 : 47 = 1.43 : 1	....	....	..	50 : 25 : 37
Marécage près d'un canal	931	103 : 21 = 4.90 : 1	83 : 52 = 1.59 : 1	....	....	..	47 : 33 : 42
Patite mare à feuilles décomposées	807	83 : 19 = 4.37 : 1	70 : 50 = 1.40 : 1	....	....	..	40 : 27 : 30

Eucyclops serrulatus (Fischer) ♂—contd.

Localité.	Longueur. μ	Furca Long. : larg.	Furca Soie ap. int. : so.e ap. ext.	Enp. 4. Art. term. Long. : larg.	Enp. 4. Ep. ap. int. : ép. ap. ext.	Enp. 4. Art. term. : ép. ap. int.	Sixième patte Epine : soie méd. soie ext.
<i>Gorgan</i>							
Mare sans végétation	931	100 : 20=5 : 1	70 : 50=1·40 : 1	50 : 23=2·17 : 1	66 : 44=1·50 : 1	0·76 : 1	40 : 35 : 43
Autre mare sans végétation	870	92 : 20=4·60 : 1	75 : 47=1·59 : 1	....	....	..	43 : 37 : 47
Bassin	936	107 : 20=5·35 : 1	...	....	....	..	43 : 32 : 37
Mare	627	90 : 20=4·50 : 1	62 : 48=1·29 : 1	....	....	..	42 : 27 : 37
<i>Keredj</i>							
Mare à feuilles décomposées	884	82 : 20=4·10 : 1	....	52 : 20=2·60 : 1	53 : 40=1·32 : 1	0·98 : 1	45 : 35 : 43
Petite mare eutrophique	912	75 : 18=4·17 : 1	....	40 : X=X : 1	42 : X=X : 1	0·95 : 1	43 : 33 : 50
Mare de rivière	931	83 : 22=3·77 : 1	....	....	....	..	42 : 33 : 33
<i>Pahlévi</i>							
Lagune	760	85 : 20=4·25 : 1	67 : 45=1·49 : 1	....	....	..	42 : 33 : 38
<i>Ramsar</i>							
Mare	807	....	....	....	....	..	40 : 33 : 42
Marais	813	...	....	....	....	..	40 : 33 : 42
Mare près d'un torrent	798	83 : 18=4·61 : 1	67 : 37=1·81 : 1	47 : 23=2·04 : 1	58 : 42=1·38 : 1	0·81 : 1	42 : 33 : 33
Petite étang	884	97 : 22=4·41 : 1	75 : 50=1·50 : 1	50 : 20=2·50 : 1	65 : 43=1·51 : 1	0·77 : 1	38 : 38 : 50
<i>Recht</i>							
Ruisseau	789	88 : 20=4·40 : 1	....	....	....	..	37 : 35 : ×
<i>Sari</i>							
Fosse près de la voie ferrée	855	....	....	....	....	..	40 : 33 : 40
Rizière	760	....	....	....	....	..	40 : 27 : ×

Eucyclops agiloides (Sars).

Longueur. μ	Furca. Long. : larg.	Furca. Soie ap. int. : soie ap. ext.	Enp. 4 Art. term. Long. : larg.	Enp. 4 Ep. ap. int. : ép. ap. ext.	Enp. 4 Art. term. : ép. ap. int.	Cinquième patte Epine : soie méd. (larg. approx.).	Sixième patte Epine.
♀ 988	113 : 23=4.91 : 1	77 : 58=1.33 : 1	60 : 27=2.22 : 1	61 : 44=1.39 : 1	0.98 : 1	1.6 : 1	..
♀ 855	100 : 22=4.55 : 1	83 : 50=1.66 : 1	55 : 27=2.04 : 1	60 : 42=1.43 : 1	0.92 : 1	1.6 : 1	..
♀ 1045	113 : 24=4.70 : 1	83 : 55=1.50 : 1	57 : 27=2.11 : 1	65 : 50=1.30 : 1	0.88 : 1	2.2 : 1	..
♂ 684	58 : 18=3.22 : 1	....	....	....	....	..	25
♂ 732	....	....	....	....	....	..	23
♂ 732	55 : 18=3.06 : 1	58 : 37=1.57 : 1	42 : 19=2.21 : 1	47 : 33=1.42 : 1	....	..	22

Eucyclops serrulatus (Fischer) ?

Localité.	Longueur. μ	Furca Long. : larg.	Furca Soie ap. int. : soie. ap. ext.	Enp. 4 Art. term. Long. : larg.	Enp. 4. Ep. ap. int. : ép. ap. ext.	Enp. 4. Art. term. : ép. ap. int.	Cinquième patte Epine : soie méd. (larg. approx.).	Sixième patte Epine : soie med : soie ext.
Isfahan	♀ 1330	184 : 32=5.75 : 1	100 : 93=1.08 : 1	75 : 30=2.50 : 1	87 : 65=1.34 : 1	0.86 : 1	3.4 : 1	..
	♀ 1178	167 : 25=6.68 : 1	100 : 95=1.05 : 1	75 : 32=2.34 : 1	83 : 70=1.19 : 1	0.90 : 1	3.1 : 1	..
	♂ 984	105 : 22=4.77 : 1	67 : 52=1.29 : 1	52 : 24=2.17 : 1	62 : 41=1.51 : 1	0.84 : 1	..	47 : 37 : 43
	♂ 969	103 : 22=4.68 : 1	70 : 53=1.32 : 1	....	....	..	..	47 : 33 : 42
	♂ 965	103 : 20=5.01 : 1	70 : 47=1.49 : 1	52 : 25=2.08 : 1	63 : 47=1.24 : 1	0.83 : 1	..	44 : 37 : 43

Eucyclops speratus (Lilljeborg).

N Lovön	♀ 1349	190 : 30=6.33 : 1	92 : 85=1.08 : 1	82 : 33=2.43 : 1	98 : 63=1.56 : 1	0.84 : 1	..	..
Lac Maelaren (Suède)	♀ 1368	200 : 27=7.40 : 1	107 : 83=1.29 : 1	92 : 33=2.73 : 1	93 : 65=1.43 : 1	0.99 : 1	..	..

Eucyclops euacanthus (Sars).

Localité.	Longueur. μ	Furca Long. : larg.	Furca Soie ap. int. : soie ap. ext.	Enp. 4. Art. term. Long. : larg.	Enp. 4. Ep. ap. int. : ép. ap. ext.	Enp. 4. Art. term. : ép. ap. int.	Cinquième patte Epine : soie méd. (larg. approx.).	Sixième patte Epine : soie méd. soie ext.
Baba Hadji	♀ 1108	142 : 27 = 5·26 : 1	138 : 75 = 1·84 : 1	72 : 26 = 2·77 : 1	85 : 58 = 1·46 : 1	0·85 : 1	1·6 : 1	..
Khorab	♂ 712	67 : 17 = 3·94 : 1	53 : 30 = 1·77 : 1	..	..	..	..	25 : 27 : 33
	♂ 684	67 : 16 = 4·19 : 1	..	..	..	..	..	23 : 25 : 33
	♂ ..	67 : 18 = 3·72 : 1	..	..	..	..	..	27 : 27 : 42

Eucyclops macruroides (Lilljeborg).

Longueur. μ	Furca. Long. : larg.	Furca. Soie ap. int. soie ap. ext.	Enp. 4. Art. term. Long. : larg.	Enp. 4. Ep. ap. int. : ép. ap. ext.	Enp. 4. Art. term. : ép. ap. int.	Cinquième patte Epine : soie méd. (larg. approx.).	Sixième patte Epine : soie méd. : soie ext.
♀ 1140	184 : 27 = 6·81 : 1	92 : 76 = 1·21 : 1	73 : 35 = 2·09 : 1	84 : 59 = 1·40 : 1	0·87 : 1	1·9 : 1	..
1092	170 : 23 = 7·39 : 1	90 : 69 = 1·30 : 1	77 : 30 = 2·57 : 1	83 : 58 = 1·43 : 1	0·93 : 1	1·3 : 1	..
♀ 1055	170 : 22 = 7·73 : 1	100 : 70 = 1·43 : 1	....	....	..	..	..
♀ 1074	173 : 25 = 6·92 : 1	102 : 77 = 1·32 : 1	75 : 28 = 2·68 : 1	83 : 60 = 1·38 : 1	0·90 : 1	1·2 : 1	..
♂ 789	120 : 16 = 7·50 : 1	70 : 50 = 1·40 : 1	50 : 22 = 2·27 : 1	58 : 40 = 1·45 : 1	0·86 : 1	..	27 : 30 : 42

NEMATODES PARASITIC IN *GRYLLOTALPA*.

By M. A. BASIR.

(Department of Zoology, Muslim University, Aligarh, U. P., India.)

During recent years nematodes of insects have received renewed interest because of the possibility of their use in the biological control of insect pests. In this connection several successful experiments have already been performed, but most of them are still in the experimental stage. In India little work has been done on insect nematodes and unless a thorough survey is made of the various nematodes which infest the insects of the land, the possibilities of their biological importance in the control of insects cannot be assessed. With this end in view the author has started making a general survey of nematode parasites of insects of this country.

A very large number of *Gryllotalpae* were dissected from the Aligarh district. Nearly all of them were found to be infected with one or more species of nematodes. All the nematodes found are Oxyurid worms belonging to the subfamily Thelastomatinae. The material was found to consist of five different kinds of worms. Four of them were found to represent four new genera for which the following names have been proposed :—

Gryllocola gryllocola, gen. et sp. nov.

Gryllophila gryllophila, gen. et sp. nov.

Talpicola talpicola, gen. et sp. nov.

Mirzaiella asiatica, gen. et sp. nov.

One worm closely resembles *Periplaneticola mirzaia*, a genus described by the author in an earlier paper (1940), but it differs from that species in certain characters. The name *Periplaneticola periplaneticola*, sp. nov. is proposed for it.

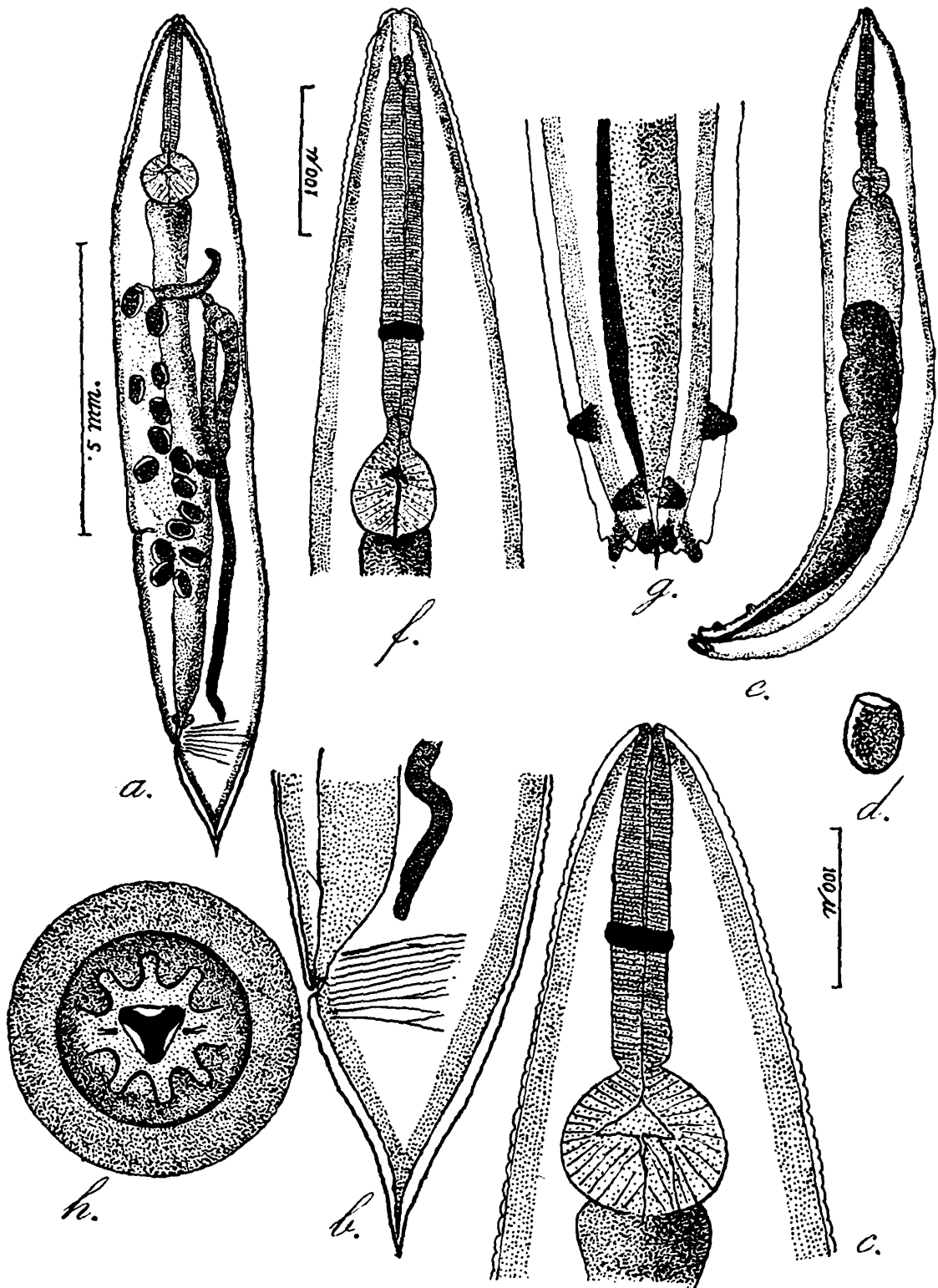
***Gryllocola*, gen. nov.**

Generic diagnosis.—Thelastomatinae: mouth opening prismoidal, surrounded by eight submedian labiopapillae. Cervical and caudal alae present. Oesophagus consisting of an anterior club-shaped part set off from the posterior valvular bulb by a narrow isthmus. Intestine dilated anteriorly to form a slight cardia. Vulva two-third of the body length from the anterior end. Tail of female conical. Tail of male truncated, bearing four pairs of caudal papillae; one pair of large sub-ventral preanal papillae, one pair of medioventral preanal papillae, one pair of adanal papillae, and one pair of postanal subdorsal papillae, Ovaries two; uteri divergent. Eggs oval with a conspicuous polar cap. Spicule single.

Type species.—*Gryllocola gryllocola*, sp. nov.

Specific description.—*Gryllocola*.

Male (Text-fig. 1 e-g).—1.08 mm. long by 150 μ wide. Cervical and caudal alae present. Cuticular striations present only in the cervical region, anterior to the nerve ring. First two annules very large,



TEXT-FIG. 1.—*Gryllocola gryllocola*, gen. et sp. nov.

a. Adult female entire. b. Female, tail, lateral view. c. Female, oesophageal region. d. Eggs. e. Male, entire, lateral view. f. Male, oesophageal region. g. Male, caudal region, ventral view. h. Female, head, en face view.

each about 18 μ wide, remaining annules 6 μ apart. Buccal cavity long and cylindrical, 30 μ deep by 15 μ wide. Oesophagus 310 μ long, consisting of a corpus 245 μ long by 25 μ wide, an isthmus 16 μ long by 10 μ wide and a posterior valvular bulb 65 μ long by 55 μ wide. Nerve ring 150 μ from the anterior end of body. Excretory pore not

observed. Anus near the posterior extremity, ventrally situated. Tail completely truncated. Caudal papillae consisting of one pair of large subventral preanal, one pair of medioventral preanal, one pair of adanal and one pair of subdorsal postanal papillae. Subventral alae present. Testis single. One spicule with a broad and blunt head, $18\ \mu$ long.

Female : (Text-fig. 1 *a-d, h*).— 1.35 mm. long by $180\ \mu$ wide. Cuticle inconspicuously striated ; striations $6\ \mu$ apart. Cervical and caudal alae present. Oral opening prismoidal with three inner cuticular projections, surrounded by eight submedian labiopapillae. Amphids or lateral organs appear as small circular openings. Buccal cavity not conspicuous. Oesophagus $310\ \mu$ long, consisting of a corpus $220\ \mu$ long by $27\ \mu$ wide, an isthmus represented by a narrow constriction $20\ \mu$ wide, and a posterior valvular bulb $90\ \mu$ long by $80\ \mu$ broad. Nerve ring $150\ \mu$ from the anterior end of body. Excretory pore not observed. Intestine enlarged anteriorly to form a slight cardia. Anus $170\ \mu$ from the posterior end of body. Tail conical. Vulva $850\ \mu$ from the anterior end of body. Ovaries two ; uteri divergent. Eggs approximately oval, $45\ \mu$ to $50\ \mu$ long by $27\ \mu$ wide, with a conspicuous polar cap.

Host.—*Gryllotalpa*, sp.

Location.—Intestine (rectum).

Type locality.—Aligarh (Northern India).

Type specimen.—(Reg. No. W3456/1) is deposited in the Zoological Survey of India (*Ind. Mus.*), Calcutta.

Gryllophila, gen. nov.

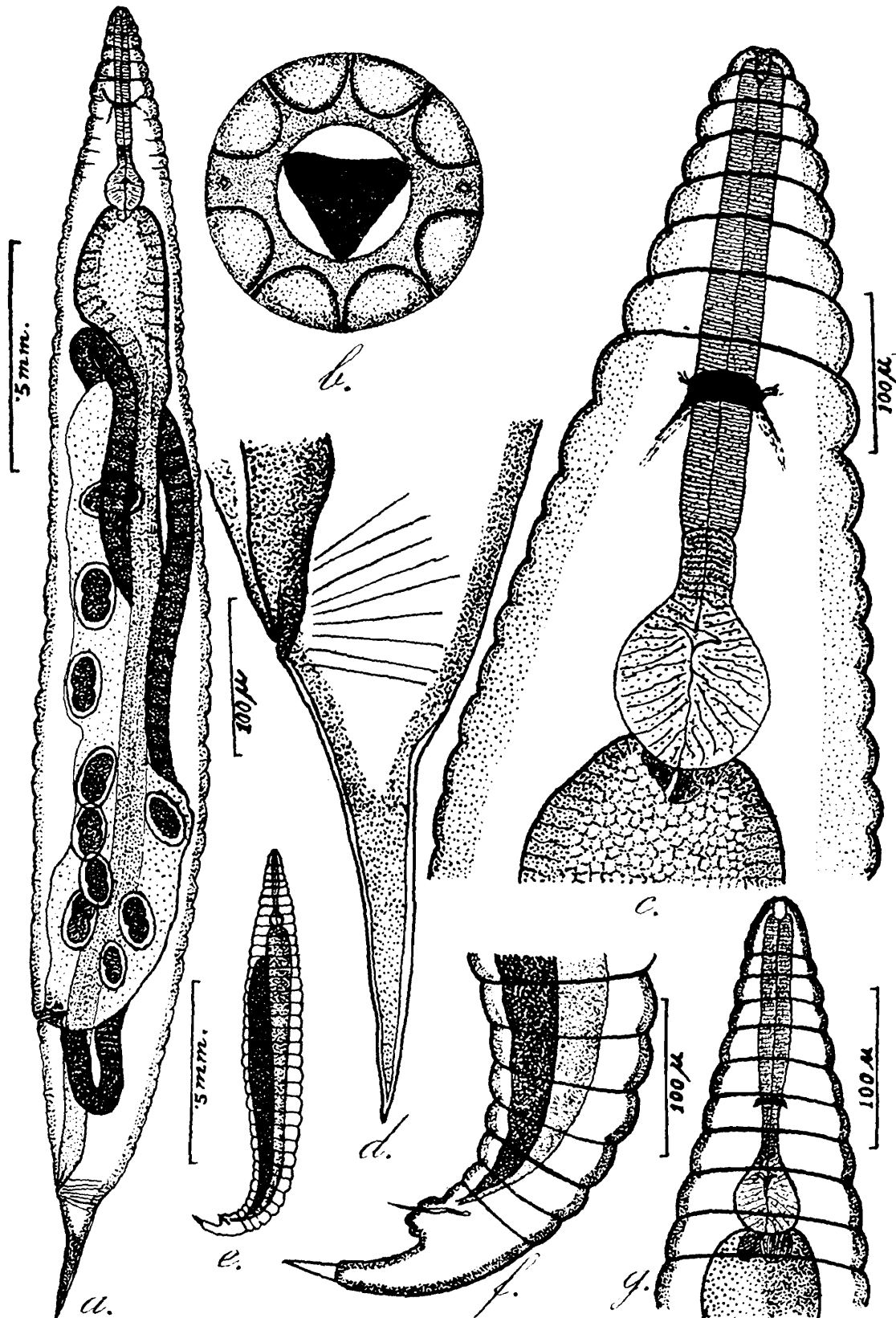
Generic diagnosis.—Thelastomatinae : Mouth opening triangular, surrounded by a circumoral elevation and eight labiopapillae. Oesophagus consisting of an anterior corpus, an isthmus distinctly set off from the corpus and a posterior valvular bulb. Intestine dilated anteriorly to form a big cardia. Vulva 77 per cent of the body length from the anterior end. Ovaries two ; uteri parallel. Eggs ellipsoidal ; segmentation begins at the time of deposition. Tail of female conically attenuated. Tail of male attenuated, ending in a short pointed appendage which is abruptly set off from the body. Spicule single.

Type species.—*Gryllophila gryllophila*, sp. nov.

Specific description.—*Gryllophila* :

Male : (Text-fig. 2 *e-g*).— 1.17 mm. long by $170\ \mu$ wide. Body annulated throughout its whole length. First annule very big, $40\ \mu$ wide, second $15\ \mu$ wide and the third $18\ \mu$ wide. The following annules continually and regularly increase in width till about the middle of the body some of them reach the width of $40\ \mu$. Posteriorly they regularly decrease in size, the posterior most annule being only $22\ \mu$ wide. Buccal cavity cylindrical, $12\ \mu$ deep by $8\ \mu$ wide. Oesophagus $200\ \mu$ long, consisting of a corpus $115\ \mu$ long by $20\ \mu$ in maximum width, an isthmus $40\ \mu$ long by $10\ \mu$ wide and a posterior valvular bulb $45\ \mu$ long by $40\ \mu$ wide. Nerve ring $125\ \mu$ from the anterior end of body. Excretory pore not observed. Anus $115\ \mu$ from the posterior end of body. Tail attenuated, ending in a short pointed appendage which is abruptly set off from the body. One spicule, $50\ \mu$ long.

Female: (Text-fig. 2 a-d).—2.8 mm. long by 350 μ in maximum width. Cuticle conspicuously striated. First annule 17 μ wide; width



TEXT-FIG. 2.—*Gryllophila gryllophila*, gen. et sp. nov.

a. Adult female, entire, lateral view. b. Female, head, en face view. c. Female oesophageal region. d. Female, tail, lateral view. e. Male, entire, lateral view. f. Male, caudal region, lateral view. g. Male, oesophageal region.

of the following annules increasing till it reaches its maximum in the ninth annule which is 50 μ wide. Posterior to the ninth annule a width of 30 μ is regularly maintained till we reach the position of the vulva.

behind which the width of the annules again decreases to $10\ \mu$. Oral opening triangular, surrounded by a circumoral elevation and eight submedian labiopapillae. Amphids present in the form of small circular openings. Buccal cavity cylindrical, $20\ \mu$ deep by $10\ \mu$ wide. Oesophagus $453\ \mu$ long, consisting of a corpus $300\ \mu$ long by $40\ \mu$ wide, an isthmus $43\ \mu$ long by $35\ \mu$ wide, and a posterior valvular bulb $110\ \mu$ long, by $100\ \mu$ wide. Nerve ring $210\ \mu$ from the anterior end of body. Excretory pore not observed. Intestine dilated anteriorly to form a big cardia. Anus $320\ \mu$ from the posterior end of body. Tail conically attenuated. Vulva in the posterior third of the body, $2.17\ \text{mm}$. from the anterior end. Ovaries two; uteri parallel. Eggs ellipsoidal, $150\ \mu$ long by $80\ \mu$ wide; segmentation begins before deposition.

Host.—*Gryllotalpa*, sp.

Location.—Intestine (rectum).

Type locality.—Aligarh (Northern India).

Type specimen.—(Reg. No. W3457/1) is deposited in the Zoological Survey of India (*Ind. Mus.*), Calcutta.

Talpicola, gen. nov.

Generic diagnosis.—Thelastomatinae: *Male* unknown.

Female with mouth opening sub-triangular, surrounded by eight labiopapillae. Lateral alae present. Oesophagus consisting of a cylindrical corpus followed by a very short isthmus not distinctly separated either from the corpus or from the following posterior valvular bulb. Buccal cavity broad and cylindrical. Excretory pore much behind the base of oesophagus. Tail conical. Vulva near middle of body. Vagina directed anteriorly. Ovaries two; uteri divergent. Eggs oval, with a conspicuous polar cap.

Type species.—*Talpicola talpicola*, sp. nov.

Specific description.—*Male* unknown.

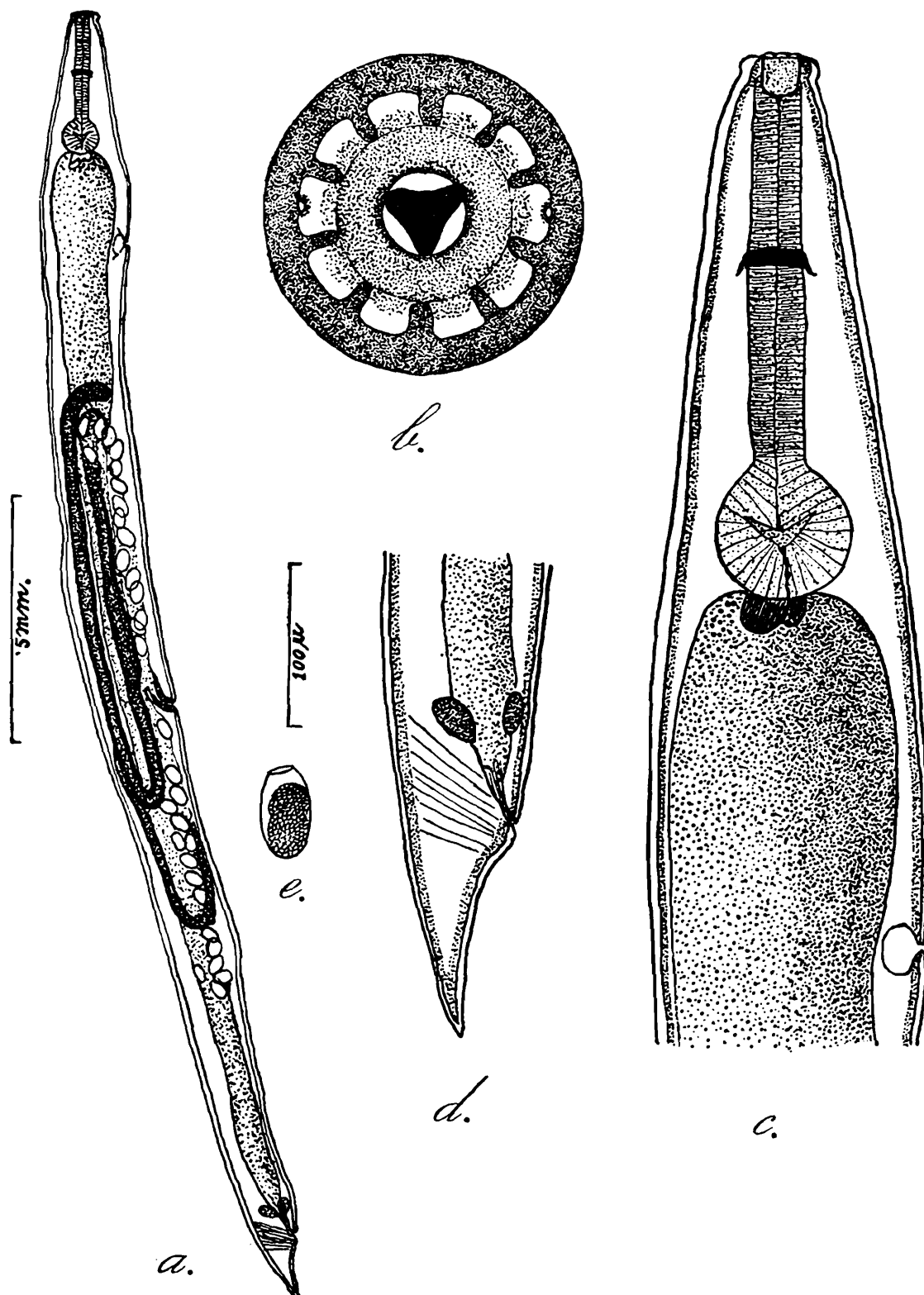
Female: (Text-fig. 3 a-e).— $2.7\ \text{mm}$. long by $170\ \mu$ wide. Lateral alae present. Body not striated. Oral opening sub-triangular, surrounded by eight submedian labiopapillae. Amphids appear as small circular openings. Buccal cavity $25\ \mu$ deep by $22\ \mu$ wide. Oesophagus $325\ \mu$ long, consisting of a cylindrical corpus $235\ \mu$ long by $35\ \mu$ wide, an isthmus $10\ \mu$ long by $30\ \mu$ wide not distinctly set off, and a posterior valvular bulb $80\ \mu$ long by $85\ \mu$ wide. Nerve ring $120\ \mu$ from the anterior end of body, situated near the middle of corpus. Excretory pore posterior to base of oesophagus, $550\ \mu$ from the anterior end of body. Intestine enlarged anteriorly to form a cardia. Anus $135\ \mu$ from the posterior end of body. Tail conical. Vulva near middle of body, $1.42\ \text{mm}$. from the anterior end. Vagina directed anteriorly. Ovaries two; uteri divergent. Eggs oval, $55\ \mu$ long by $30\ \mu$ wide, with a conspicuous polar cap; segmentation begins before deposition.

Host.—*Gryllotalpa*, sp.

Location.—Intestine (rectum).

Type locality.—Aligarh (Northern India).

Type specimen.—(Reg. No. W3458/1) is deposited in the Zoological Survey of India (*Ind. Mus.*), Calcutta.



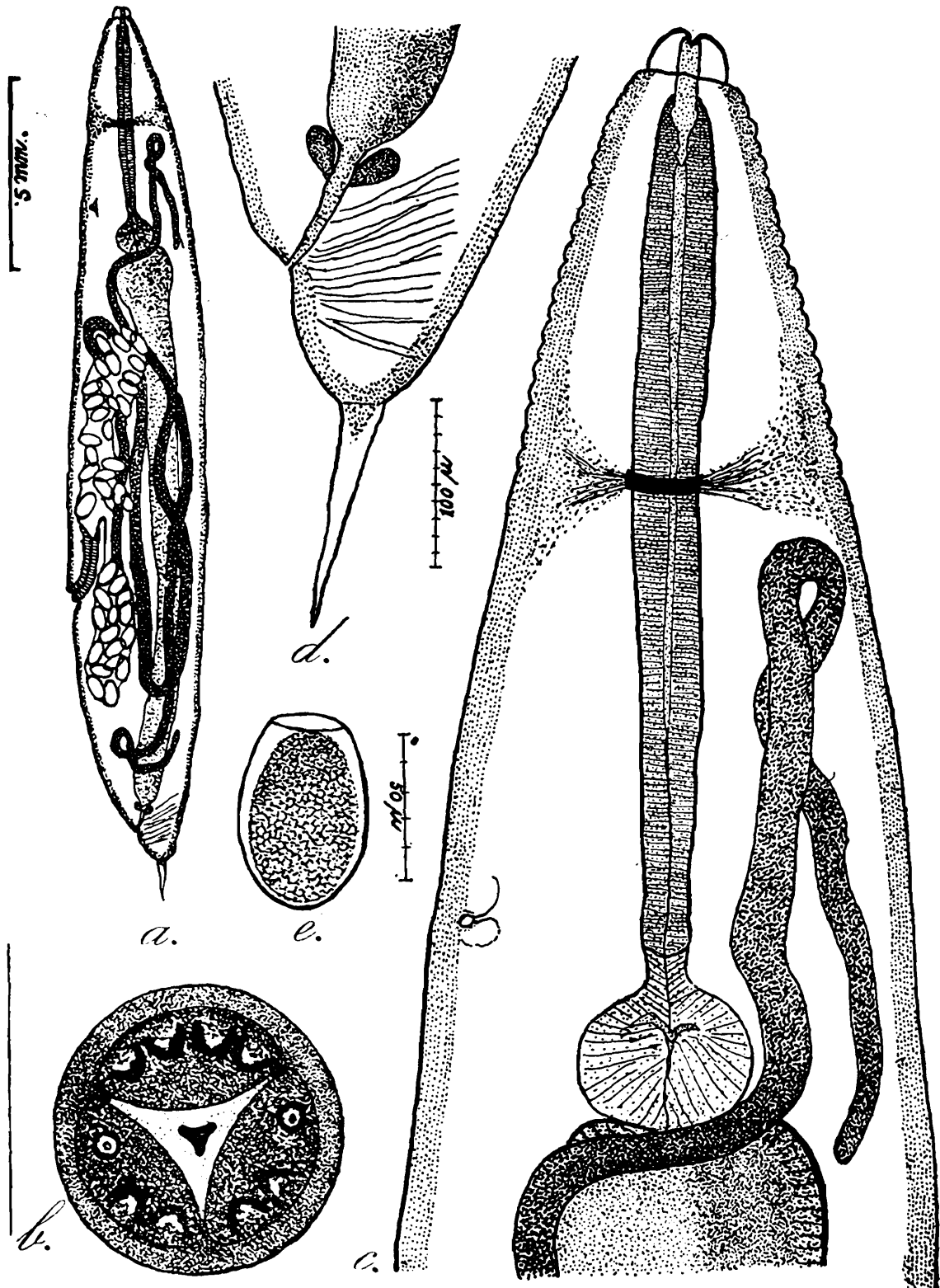
TEXT-FIG. 3.—*Talpicola talpicola*, gen. et sp. nov.

a. Adult female, entire, lateral view. *b.* Female, head, en face view. *c.* Female, anterior region. *d.* Female, tail, lateral view. *e.* Egg.

Mirzaiella, gen. nov.

Generic diagnosis.—Thelastomatinae: Oral opening small and sub-triangular, surrounded by three well developed lips; the dorsal lip bears four papillae on its external surface and the ventro-lateral lips bear two papillae each. Amphids are present, opening externally near

the dorsal part of the ventro-lateral lips. Cuticle striated only anterior to the nerve ring. Buccal cavity long, partly covered by the oesophagus. Oesophagus very long, occupying more than 25 per-cent of the body length, consisting of an anterior corpus, an isthmus and a posterior valvular bulb. Excretory pore anterior to base of oesophagus. Intestine dilated anteriorly to form a big cardia. Tail short and rounded,



TEXT-FIG. 4.—*Mirzaiella asiatica*, gen. et sp. nov.

a. Adult female, entire, lateral view. b. Female, head, en face view. c. Female, oesophageal region. d. Female, tail, lateral view. e. Egg.

bearing a caudal appendage which is distinctly set off from the body. Vulva two-third of the body length from the anterior end. Vagina

long and muscular, directed anteriorly. Ovaries two; uteri divergent. Eggs oval, with a conspicuous polar cap.

Type species.—*Mirzaiella asiatica*, sp. nov.

Specific description.—*Mirzaiella*: *Male* unknown.

Female: (Text-fig. 4 *a-e*).—2.2 mm. long by 360 μ wide. Cuticle transversely striated only anterior to the nerve ring. Anterior annules 11 μ wide and posterior ones up to 15 μ wide. Mouth small and sub-triangular, surrounded by three well developed lips; the dorsal lip bears four papillae on its external surface and the ventro-lateral lips bear two papillae each. Amphids open externally towards the dorsal part of the ventro-lateral lips. Buccal cavity 75 μ long by 11 μ wide. Oesophagus 620 μ long, consisting of a corpus 510 μ long by 40 μ in maximum width, an isthmus 22 μ long by 22 μ wide and a posterior valvular bulb 85 μ long by 108 μ wide. Nerve ring 270 μ from the anterior end of body. Excretory pore anterior to base of oesophagus, 550 μ from the anterior end of body. Intestine dilated anteriorly to form a big cardia. Anus 215 μ from the posterior end of body. Tail short and rounded, bearing a caudal appendage 130 μ long, the latter being longer in younger females. Vulva 1.55 mm. from the anterior end of body. Vagina long and muscular, directed anteriorly, Ovaries two; uteri divergent. Eggs oval, 70 μ long by 45 μ wide, with a conspicuous polar cap.

Host.—*Gryllotalpa*, sp.

Location.—Intestine (rectum).

Type locality.—Aligarh (Northern India).

Type specimen.—(Reg. No. W3459/1) is deposited in the Zoological Survey of India (*Ind. Mus.*), Calcutta.

Genus **Periplaneticola** Basir, 1940.

Generic diagnosis.—*Thelastomatinae*: *Male* unknown.

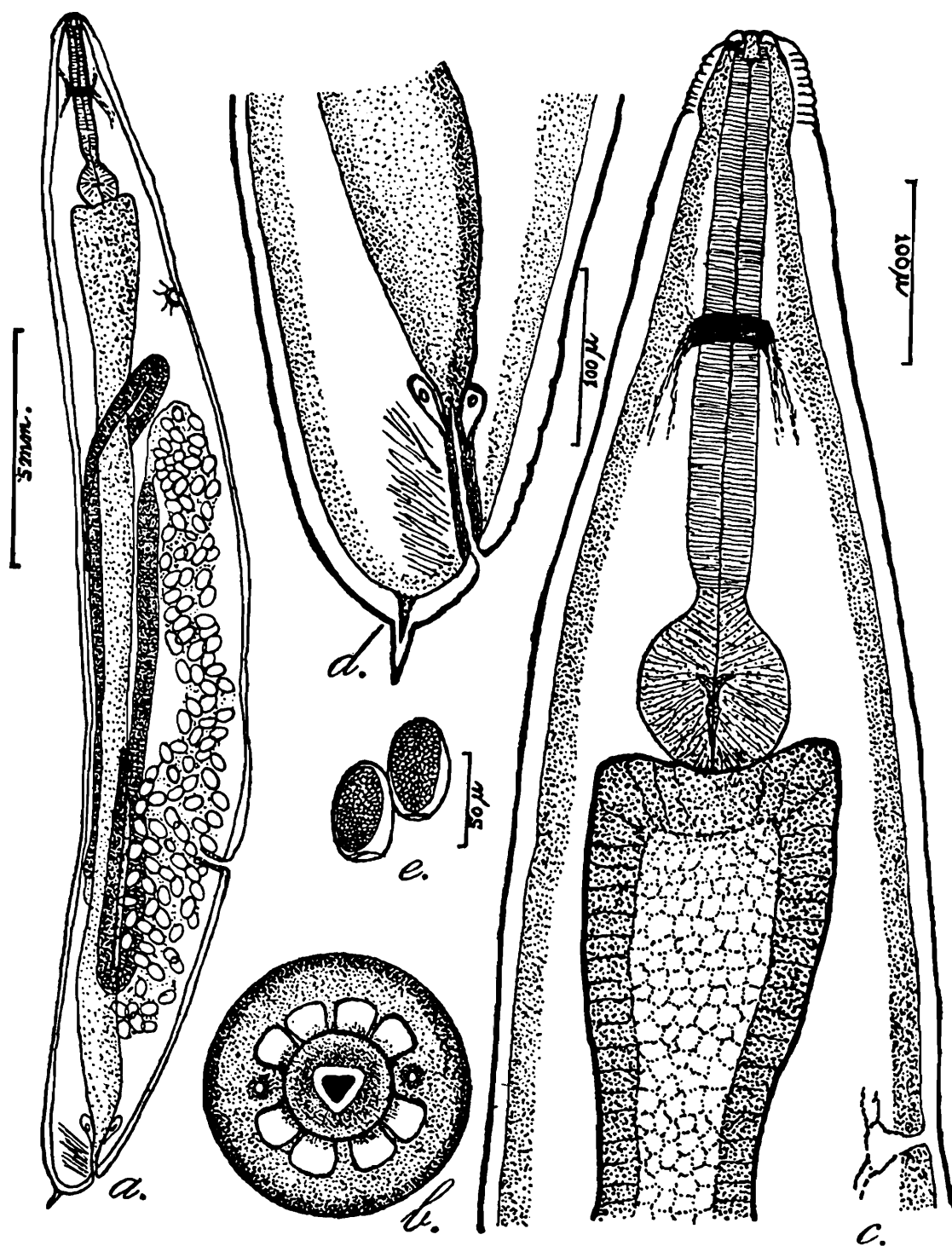
Female with mouth opening sub-triangular, surrounded by a circumoral elevation and eight labiopapillae. Amphids appear as small circular openings. Oesophagus consisting of an anterior corpus followed by a distinct isthmus and a posterior valvular bulb. Nerve ring about two-third of the length of corpus from its anterior end. Tail of female very characteristic; short and blunt, with a very small caudal appendage distinctly set off from the body. Vulva two-third or more of the body length from the anterior end. Ovaries two; uteri divergent. Eggs oval, with a conspicuous polar cap.

Periplaneticola periplaneticola, sp. nov.

Specific description.—*Periplaneticola*: *Male* unknown.

Female: (Text-fig. 5 *a-e*).—2.6 mm. long by 350 μ in maximum width. Cuticle striated only in the cervical region; in all only nine annules present. First annule 15 μ wide, remaining annules 8.5 μ wide each. Lateral alae, present. Oral opening sub-triangular, surrounded by a circumoral elevation and eight labiopapillae. Amphids appear as small circular openings. Buccal cavity cylindrical, partly enveloped by the oesophagus, 18 μ deep by 10 μ wide. Oesophagus 400 μ long, consisting of a

corpus 295 μ long by 35 μ wide, an isthmus 15 μ long by 28 μ wide and a posterior valvular bulb, 90 μ long by 85 μ wide. Nerve ring 140 μ .



TEXT-FIG. 5.—*Periplaneticola periplaneticola*, sp. nov.

a. Adult female, entire, lateral view. b. Female, head, en face view. c. Female, anterior region. d. Female, tail, lateral view. e. Egg.

from the anterior end of body. Excretory pore much behind the base of oesophagus, 610 μ from the anterior end of body. Intestine enlarged anteriorly to form a slight cardia. Anus 90 μ from the posterior end of body. Tail short and blunt with a very small pointed caudal appendage, 35 μ long, distinctly set off from the body. Vulva 1.85 mm. from the anterior end of body, 71 per cent of the body length from the anterior end. Ovaries two; uteri divergent. Eggs oval, 55 μ long by 35 μ wide, with a conspicuous polar cap.

Periplaneticola was described as a new genus by the writer in the paper cited and one species *Periplaneticola mirzaia*, was described from the intestine of *Periplaneta americana*. Since that description was based on a single non-gravid female, it could not be complete. No eggs were seen and the form of oral opening and head papillae could not be described. The present specimens were obtained from *Gryllotalpa* and resemble *Periplaneticola mirzaia* to a great extent; but there are certain characters which do not allow the two to be put together under the same species. The absence of alae, the extent of cuticular striations on the body, and the position of vulva in *Periplaneticola mirzaia*, are characters sufficient enough to separate the two as distinct species.

Host.—*Gryllotalpa* sp.

Location.—Intestine (rectum).

Type locality.—Aligarh (Northern India).

Type specimen.—(Reg. No. W3460/1) is deposited in the Zoological Survey of India (*Ind. Mus.*), Calcutta.

Key to the species of the genus Periplaneticola.

1. Lateral alae absent. Cuticle striated throughout the whole length of the body. Vulva 66 per cent of the body length from the anterior end *P. mirzaia*.
2. Lateral alae present. Cuticle striated only in the cephalic region. Vulva 71 per cent of the body length from the anterior end .. *P. periplaneticola*.

Key to the genera of the sub-family Thelastomatinae.

1. Corpus of oesophagus terminated posteriorly by a pronounced swelling at least in female 2
Corpus of oesophagus not terminated by a pronounced swelling .. 6
2. Anterior and posterior parts of corpus not distinctly set off .. *Aorurus*.
Anterior and posterior parts of corpus distinctly set off 3
3. Corpus terminated by a subcylindrical swelling *Leidynema*.
Corpus terminated by an ovoid or subspherical swelling 4
4. Corpus terminated by a subspherical swelling .. *Leidynemella*.
Corpus terminated by an ovoid swelling .. 5
5. Tail of female filiform *Hammerschmidtella*.
Tail of female conical *Galebiella*.
6. Eggs encapsulated or covered with spiral threads (often in two's or three's) 7
Eggs not covered as above .. 8
7. Eggs covered by spiral threads .. *Pseudonymus*.
Eggs encapsulated, not covered by spiral threads *Binema*.
8. Corpus of oesophagus of female very short 9
Corpus of oesophagus of female not very short 11
9. Vulva near middle of body *Talpicola*.
Vulva much posterior to middle of body .. 10
10. Tail of female conical *Blatticola*.
Tail of female attenuated *Blattelicola*.

- | | |
|---|--------------------------|
| 11. Corpus distinctly enlarged in form of a sub-spherical swelling at base of buccal cavity .. | <i>Blattophila</i> . |
| Corpus subcylindrical, without any form of enlargement | 12 |
| 12. Tail conical or nearly conical in both sexes .. | 13 |
| Tail filiform, attenuated then delicately filiform, or very sharply set off in both sexes | 14 |
| 13. Head of female with dorsodorsal and ventro-ventral simple papillae and laterodorsal and lateroventral labiopapillae | <i>Sevirianoia</i> . |
| Head of female with all eight cephalic papillae in form of labiopapillae | <i>Cephalobellus</i> . |
| 14. Female with one ovary | <i>Galebia</i> . |
| Female with two ovaries | 15 |
| 15. Oral opening surrounded by three lips | 16 |
| Oral opening not surrounded by three lips | 17 |
| 16. Tail of female filiform or very delicately attenuated | <i>Fontonema</i> . |
| Tail of female short and round bearing a caudal appendage | <i>Mirzaiella</i> . |
| 17. Tail of male extremely short, degenerate .. | <i>Eurycoma</i> . |
| Tail of male delicately attenuated or filiform .. | <i>Thelastoma</i> . |
| 18. Vulva anterior to middle of body ... | <i>Suifunema</i> . |
| Vulva much posterior to middle of body .. | 19 |
| 19. Uteri divergent | 20 |
| Uteri parallel | <i>Gryllophila</i> . |
| 20. Tail conical .. | <i>Gryllocola</i> . |
| Tail short and blunt with a very small caudal appendage attached to it .. | <i>Periplaneticola</i> . |

SUMMARY.

Four new genera and one new species of nematodes have been described from the intestine of *Gryllotalpa* (Gryllidae). All of these are Oxyurid worms belonging to the subfamily Thelastomatinae. The key to the genera at present included in the subfamily Thelastomatinae is given above.

LITERATURE CITED.

- Basir, M. A., 1940.—Nematodes parasitic in Indian cockroaches. *Proc. Ind. Acad. Sci.* XII, pp. 8-16.
- Basir, M. A., 1941.—Two new nematodes from an aquatic beetle. *Proc. Ind. Acad. Sci.* XIII, pp. 163-167
- Basir, M. A., 1941.—A new species of the nematode genus *Blattophila* Cobb, 1920, from a cockroach. *Current Science* X, pp. 443-445.
- Baylis, M. A. and Daubney, R., 1926.—A synopsis of the families and genera of Nematoda. *Brit. Mus. (Nat. Hist.)*, pp. 1-277
- Chitwood, B. G., 1932.—A synopsis of nematodes parasitic in insects of the Family Blattidae. *Zeit. Parasitenk.*, V, pp. 14-50.
- Chitwood, B. G. and Chitwood, M. B., 1934.—Nematodes parasitic in Philippine cockroaches. *Philip. Journ. Sci.* LII, pp. 381-393.

- Christie, J. R., 1931.—Some nemic parasites (Oxyuridae) of Coleopterous larvae. *Jour. Agr. Res.* XLII, pp. 463-482.
- Hammerschmidt, K. E., 1846-47.—Beschreibung einigen Oxyuris-Arten. *Naturwiss, Abhand. Wien* I, pp. 279-288.
- Travassos, L., 1929.—Contribucao preliminar a systematica dos nematodes dos arthropodos *Int. Oswaldo Cruz. Suppl.* V, pp. 15-25.
- Walton, A. C., 1927.—A revision of the nematodes of the Leidy collections. *Proc. Acad Nat. Sci., Philadelphia* LXXIX, pp. 49-163.

ON A COLLECTION OF BIRDS FROM THE HOSHANGABAD DISTRICT (CENTRAL PROVINCES, INDIA).

By M. L. ROONWAL, *M.Sc., Ph.D.(Cantab.), Zoological Survey of India, Calcutta.*

CONTENTS.

	PAGE.
I. Introduction	107
II. Weights	109
III. Systematic Account	111

I. INTRODUCTION.

In February-March 1941, a party of the Zoological Survey of India under Dr. B. N. Chopra, and consisting, in addition, of the writer, Mr. K. N. Das and a taxidermist, made a brief zoological survey of the Hoshangabad District in the Central Provinces. Dr. B. Prashad, the Director, was also with the party for a few days. Some 88 bird skins were collected and field-notes taken. The following is a report on this collection. Two skins, one of a warbler, *Phylloscopus*, and the other of a dove, *Streptopelia*, which could not be satisfactorily identified, are not included.

The Hoshangabad District.—This district, which is one of the western districts of the Central Provinces, lies between latitudes 21° 53' and 22° 59' N. and longitudes 76° 47' and 78° 44' E. It stretches along the left bank of the Narbada, between the Vindhya Mts. and the Satpura Range of which the Mahadeo Hills may be regarded as a part; it includes a portion of the Satpura Range within its borders. It is a narrow strip of country about 120 miles broad from east to west and roughly 25 miles wide from north to south, and covers an area of 3,676 square miles.

The southern half of the district is occupied by the Satpura Range (highest point about 4,500 feet above sea level) with its moderately dense forests. The northern half consists of open plains which are irrigated by the Narbada and grow largely wheat.

The average temperature varies from about 52° to 108°F. in the plains, while the hills are colder. The average annual rainfall is about 47 inches, being mainly received during five monsoon months, June to October. In the Mahadeo Hills, *e.g.*, Pachmarhi, the rainfall is heavier, averaging 77 inches annually. [For further details and map of the district, see Hora and Nair¹.]

The collection was made partly in the Mahadeo Hills (Pachmarhi Plateau) and partly in the plains. Ecologically, the two areas are different, and many species found at Pachmarhi are either rare or absent in the plains. Both the areas are treated here together for sake of the convenience.

¹ Hora, S. L. and Nair, K. K., *Rec. Ind. Mus.* XLIII, pp. 361-373 (1941).

The itinerary.—The following is the itinerary of the tour :—

1. MAHADEO HILLS.

Pachmarhi.—Feb. 8th to 17th. The Pachmarhi Plateau is 3,500 ft., the surrounding hills about 1,000 ft. higher. We collected on the Pachmarhi Plateau and in the surrounding hills and jungles, especially in the vicinity of hill streams.

Singanama.—Feb. 18th to 20th. This is a village on the Pachmarhi-Pipariya Road, about 14 miles from Pachmarhi and lying at the foot of the hills. We collected in the forest near R. Denwa. The area is excellent, and very rich in bird life.

2. PLAINS.

Sandia on R. Narbada.—Feb. 21st. This is a village on the bank of the Narbada, about 12 miles from Pipariya (*infra*). We collected on the river bank.

Pipariya.—Feb. 22nd to 23rd. We collected in the fields in the neighbourhood and also around the town.

Itarsi.—Feb. 24th to 26th. We collected on the meadows and along the stream not far from the town.

Handia on R. Narbada.—Feb. 27th. This is a village on the bank of the Narbada, about 13 miles from Harda (*infra*). We collected on the river bank.

Harda.—Feb. 28th to Mar. 5th. We collected around the town, especially along the railway line.

Ornithology of the District.—Besides Osmaston's¹ (1922 ; 1936) comprehensive lists of the birds of the Pachmarhi Plateau, there is no noteworthy published account of the birds of the Hoshangabad District. Ali and Whistler² (1939 ; 1940) have recently published an account of the birds of the western half of Central India lying just north of the Hoshangabad District, and the present report, though incomplete, may be regarded as complimentary to that account.

Measurements and sex.—Measurements were taken as follows :—*Wing* : Chord from the bend of the wing to the tip of the longest primary, with the quills flattened out. *Tail* : From the insertion of the central rectrices in the uropygium to the tip. *Tarsus* : From the tarso-metatarsal joint to the metatarso-digital joint. *Bill* : From the junction of the bill with the skull to the tip—this is as a rule longer than the “exposed culmen”

The sex was determined in each case by an examination of the gonads. When this was not done, the sex is indicated within brackets.

Local names.—These were ascertained for a few birds at Pachmarhi by carefully questioning the local bird-catchers, and are given under the species concerned. The names are in the local Hindi.

¹ Osmaston, B. B., *Journ. Bombay Nat. Hist. Soc.* XXVIII, pp. 453-459 (1922); and Birds, in *Guide to Pachmarhi*, pp. 62-71 (1936).

² Ali, S. and Whistler, H., *Journ. Bombay Nat. Hist. Soc.* XLI, pp. 82-106 (1939); *Journ. Bombay Nat. Hist. Soc.* XLI, pp. 470-488 (1940).

II. WEIGHTS.

The weights of Indian birds, though recorded in older writings, are seldom recorded in recent reports of collections. The following are the weights of some of the birds in the present collection. The birds were weighed within about 5 hours of being shot. Loss of blood and some feathers constitute a source of error. Nevertheless, it is hoped that the data will provide interesting information which is generally lacking for Indian birds. The systematic value of these weights is, however, not clear. Generally, the weights are in grammes, but those of some of the larger birds are in pounds.

Ord. PASSERES.

Fam. CORVIDAE.

Dendrocitta vagabunda vagabunda (Lath.)—1 ♀ (near breeding) : 106.6 gms.

Fam. PARIDAE.

Parus major maharattarum Hart.—1 ♂ (non-breeding) : 11.7 gms.

Machlolophus xanthogenys aplonotus (Bly.)—2 ♂♂ (non-breeding) : 14.1-15.2 gms.

Fam. SITTIDAE.

Sitta castanea castanea Less.—1 ♂ : 12.0 gms.

Fam. TIMALIIDAE.

Turdoides somervillei (subsp. ?)—1 ♀ : 70.8 gms.

Argya caudata caudata (Dumont)—2 ♂♂ (near breeding) : 40.4-40.5 gms.

Chloropsis jerdoni (Bly.)—1 ♂ (non-breeding) : 24.5 gms.

Fam. PYCNONOTIDAE.

Molpastes cafer pallidus Stuart Baker—1 ♀ (non-breeding) : 30.0 gms.

Fam. TURDIDAE.

Saxicola caprata ?bicolor Sykes—1 (♂) : 13.3 gms.

1 (♀) : 12.5 gms.

Saxicola torquata indica (Bly.)—1 ♂ (non-breeding) : 13.0 gms.

Phoenicurus ochruros rufiventris (Vieil.)—1 (♂) : 16.8 gms.

Copsychus saularis saularis (Linn.)—1 ♀ (non-breeding) : 32.1 gms.

Monticola solitaria pandoo (Sykes)—2 ♂♂ (non-breeding) : 43.4-46.7 gms.

1 ♀ (non-breeding) : 42.5 gms.

Myophonus coeruleus horsfieldii Vig.—1 (sex?) : 120.5 gms.

Fam. MUSCICAPIDAE.

Culicicapa ceylonensis ceylonensis (Swain.)—1 (sex?) : 7.2 gms.

Leucocirca aureola aureola (Less.)—1 ♀ : 10.0 gms.

Fam. LANIIDAE.

Lanius schach erythronotus (Vig.)—3 ♂♂ (non-breeding) : 34.8-37.2 gms.

Fam. CAMPEPHAGIDAE.

Pericrocotus peregrinus peregrinus (Linn.)—2 ad. ♂♂ (non-breeding) : 8.2-8.6 gms.

1 imm. ♂ : 8.5 gms.

Graucalus macei macei Less.—2 ♂♂ (non-breeding) : 85.0-89.0 gms.

1 ♀ (non-breeding) : 80.0 gms.

Fam. DICRURIDAE.

Dicrurus macrocercus peninsularis Ticeh.—1 ad. ♀ : 44.1 gms.

1 imm. ♂ : 46.0 gms.

Dicrurus caerulescens caerulescens (Linn.)—1 ♂ : 37.4 gms.

Fam. FRINGILLIDAE.

Carpodacus erythrinus roseatus (Bly.)—1 ♂ (non-breeding) : 20.5 gms.

Gymnoris xanthocollis xanthocollis (Burt.)—3 ♂♂ (non-breeding) : 17.0-18.7 gms.
1 (sex?) : 19.1 gms.

Fam. MOTACILLIDAE.

Motacilla maderaspatensis J. F. Gm.—1 (sex?) : 35.7 gms.

Motacilla cinerea caspica (S. G. Gm.)—1 (sex?) : 17.0 gms.

Anthus hodgsoni hodgsoni (Richm.)—1 ♀ : 19.8 gms.

Fam. ALAUDIDAE.

Ammomanes phoenicura phoenicura (Frank.)—2 ♂♂ (near breeding) : 25.7-27.4 gms.
1 ♀ (near breeding) : 25.7 gms.

Fam. NECTARINIDAE.

Leptocoma asiatica asiatica (Lath.)—1 ♂ (near breeding) : 8.0 gms.

Ord. CORACIIFORMES.

Fam. PICIDAE.

Dryobates maharattensis (subsp. ?)—1 (sex?) : 34.2 gms.

Fam. CAPITONIDAE.

Thereiceryx zeylanicus (subsp. ?)—1 ♂ (near breeding) : 115.5 gms.

Fam. PSITTACIDAE.

Psittacula cyanocephala cyanocephala (Linn.)—1 (♂) : 64.0 gms.
1 ♀ : (near breeding ?) : 71.4 gms.

Fam. CORACIIDAE.

Coracias benghalensis benghalensis Linn.—1 ♂ (non-breeding) : 121.5 gms.

Fam. MEROPIDAE.

Merops orientalis orientalis Lath.—2 ♂♂ (non-breeding) : 15.5-17.4 gms.
1 ♀ (non-breeding) : 16.3 gms.

Fam. ALCEDINIDAE.

Ceryle rudis leucomelanura Reichen.—1 ♂ (breeding) : 76.6 gms.
1 ♀ (breeding) : 90.0 gms.

Alcedo atthis taprobana Kleinsch.—1 ♂ (near breeding) : 22.7 gms.

Halcyon smyrnensis ?smyrnensis (Linn.)—1 ♂ (non-breeding) : 74.0 gms.

Fam. UPUPIDAE.

Upupa epos ceylonensis Reichenb.—2 ♂♂ (breeding) : 52.7-55.2 gms.

Fam. ASIONIDAE.

Athene brama indica (Frank.)—1 ♂ (near breeding) : 111.0 gms.

Glaucidium radiatum radiatum (Tick.)—2 ♂♂ (near breeding ?) : 96.5-111.7 gms.
1 ♀ (near breeding ?) : 112.0 gms.

Ord. ACCIPETRES.

Fam. AEGYPTIDAE.

Pseudogyps bengalensis (J. F. Gm.)—1 ♂ (non-breeding) : 10½ lbs.

Neophron percnopterus ginginianus (Lath.)—1 (sex?) : 3 lbs.

Ord. COLUMBAE.

Fam. COLUMBIDAE.

Streptopelia orientalis meena (Sykes)—1 ♂ (non-breeding) : 190.7 gms.*Streptopelia chinensis suratensis* (J. F. Gm.)—1 ♀ : 120.4 gms.*Streptopelia senegalensis cambayensis* (J. F. Gm.)—1 ♂ (non-breeding) : 81.0 gms.*Streptopelia decaocto decaocto* (Frivald.)—1 ♂ (non-breeding) : 82.7 gms.

Ord. CHARADRIIFORMES.

Fam. CHARADRIIDAE.

Lobivanellus indicus indicus (Bodd.)—1 ♀ (near breeding) : 117.0 gms.

Fam. SCOLOPACIDAE.

Tringa hypoleucos Linn.—1 ♂ : 43.3 gms.

III. SYSTEMATIC ACCOUNT.

Order PASSERES.

Family CORVIDAE.

***Dendrocitta vagabunda vagabunda* (Latham).**

(The Indian Tree-Pie.)

Specimen obtained—

Pachmarhi.—1 ♀, 10.2.41.

Measurements (mm.)—

		Wing.	Tail.	Tarsus.	Bill.
1 ♀	..	155	255	32	30

Colour of bare parts.—Iris dark brown. Bill ashy black. Legs, feet and claws horny black.*Field notes.*—Very common on trees at Pachmarhi, going about either singly or in twos and threes. Not seen elsewhere.

The ovary of the ♀ (Feb. 10th) was enlarged and measured 11×7 mm.; the largest egg follicle measured 2×2 mm., suggesting breeding in the near future.

Osmaston (1922, p. 453) says it is very common on the Pachmarhi Plateau and breeds in April-May.

Ali and Whistler (1939, p. 85) recorded it as common in western Central India.

Family PARIDAE.

***Parus major mahrattarum* Hartert.**

(The Southern Grey Tit.)

Specimen obtained—

Around Pachmarhi.—1 ♂, 17.2.41.

Measurements (mm.)—

		Wing.	Tail.	Tarsus.	Bill.
1 ♂	.. ..	63	54	28	

Colour of bare parts.—Iris dark chocolate. Bill black. Legs, feet and claws slaty. Pads dirty pale grey.

Field notes.—A few seen singly at Pachmarhi.

The testes of the ♂ (Feb. 17th) were in the non-breeding condition and measured 1×1 mm.

Osmaston (1922, p. 453) says it is fairly common at Pachmarhi and is resident; the breeding season is not given.

In western Central India, Ali and Whistler (1939, p. 85) found it common; family parties were noted in August and September.

***Machlolophus xanthogenys aplonotus* (Blyth).**

(The Southern Yellow-cheeked Tit.)

Specimens obtained—

Pachmarhi.—1♂, 12.2.41; 1♂, 2nd week Feb. 1941.

Measurements (mm.)—

		Wing.	Tail.	Tarsus.	Bill.
2 ♂♂	..	69-72	54-59	18-20	13 (1 ♂)

Field notes.—Not uncommon at Pachmarhi.

The testes of the two males, were in the non-breeding condition and measured 1×1 mm.

Osmaston (1922, p. 453) says it is fairly common in Pachmarhi and breeds in April-May.

In western Central India, Ali and Whistler (1939, p. 86) found it at several places including Chanderi in the Gwalior State which is the most northerly place where *aplnotus* has hitherto been recorded. Courting couples were noted at the end of March and family parties with young in August and September.

Family SITTIDAE.

***Sitta castanea castanea* Lesson.**

(The Chestnut-bellied Nuthatch.)

Specimen obtained—

Pachmarhi.—1♂, 10.2.41.

Measurements (mm.)—

	Wing.	Tail.	Tarsus.	Bill.
1 ♂	72	39	18	19.5

Colour of bare parts.—Upper bill horny black, darker at tip; lower bill pale ashy at base, dark horny at tip. Legs, feet and claws horny. Pads pale yellow.

Field notes.—One seen at Pachmarhi.

Osmaston (1922, p. 454) says it is common at Pachmarhi and breeds in April-May.

Ali and Whistler (1939, p. 86) found it occurring in pairs or family parties of 3 or 4 in the Indore and Dhar States in western Central India.

NOTE.—On Feb. 12th on the Pachmarhi-Pipariya road about two miles from Pachmarhi I noticed a pair of *Sitta frontalis* sitting on a nest on a tree and evidently feeding the young ones. Unfortunately I could not secure the specimens, but I am certain they were not *S. c. castanea*. However, the fact that Osmaston (1922, p. 454) does not include *S. frontalis* in his Pachmarhi list makes me somewhat uncertain of my identification.

Family TIMALIIDAE.

Turdoides somervillei (subsp.?).

(The Jungle Babbler.)

Specimen obtained—

Pachmarhi.—1♀, 10.2.41.

Elsewhere noted at : Harda.

Measurements (mm.)—

	Wing.	Tail.	Tarsus.	Bill.
1 ♀	107	112	37	25.5

Colour of bare parts.—Iris very pale straw-yellow with a central very thin dark brown ring. (Osmaston, 1936, p. 17, gives the iris as white.) Bill pale straw-yellow with a faint fleshy tinge ; tip pale horny. Legs, feet and pads, as bill. Claws fleshy horny.

Local name.—"Gayangā."

Field notes.—Extremely common at Pachmarhi, usually abounding near habitations and in thin jungle and keeping to bushes and low trees ; occurs in small or big (up to 30 or 40) parties ; feeds on the ground. Fairly common at Harda.

Osmaston (1922, p. 453) too found it common on the Pachmarhi Plateau.

In western Central India, Ali and Whistler (1939, p. 86) found *T. s. orientalis* common in the forests.

Argya caudata caudata (Dumont).

(The Common Babbler.)

Specimens obtained—

Itarsi.—2♂♂, 25.2.41.

Measurements (mm.)—

	Wing.	Tail.	Tarsus.	Bill.
2 ♂♂	79-80	109-112	29-30	19-20

Colour of bare parts.—Iris brown. Bill earthy brown, tip smoky. Legs, feet and pads dull pink. Claws pale smoky.

Field notes.—Fairly common at Itarsi. Seen in groups of 4 or 5 on bushes and low trees.

The testes of two males (Feb. 25th) were enlarged and measured 6×4 and 7×5 mm., suggesting breeding.

This babbler evidently does not occur on the Pachmarhi Plateau where I did not see it ; nor does Osmaston (1922) record it.

Ali and Whistler (1939, p. 87) found it common in western Central India where birds with mature gonads were found in March, April, August and September, from which these authors suggest that it apparently breeds throughout the year.

Chloropsis jerdoni (Blyth).

(Jerdon's Chloropsis.)

Specimen obtained—

Around Pachmarhi.—1♂, 14.2.41.

Measurements (mm.)—

		Wing.	Tail.	Tarsus.	Bill.
1 ♂	..	89	81	21.5	23

Colour of bare parts.—Iris dark brown. Bill waxy dark brown. Legs, feet and claws slaty. Pads dirty fleshy white.

Field notes.—A few seen singly in forest around Pachmarhi. The testes of the ♂ (Feb. 14th) measured 1.5×1.5 mm.

Osmaston (1922, p. 454) says it is common in Pachmarhi where it is specially noticeable from May to June.

In western Central India, Ali and Whistler (1939, p. 88) found it at several places; they noted that the April specimens had testes enlarged up to 5×4 mm., while August ones were undergoing the post-nuptial moult.

Family PYCNONOTIDAE.

Molpastes cafer pallidus Stuart Baker.

(The Central Indian Red-vented Bulbul.)

Specimen obtained—

Singanama.—1♀, 19.2.41.

Elsewhere noted at : Pachmarhi.

Measurements (mm.)—

		Wing.	Tail.	Tarsus.	Bill.
1 ♀	..	91.5	84	22	18

Colour of bare parts.—Iris dark brown. Bill black. Legs, feet and claws horny black. Pads dirty white.

Field notes.—Common in the scrub jungle north-west of Pachmarhi, but rare in the station itself. Common at Singanama.

The ovary of the ♀ (Feb. 19th) measured 4×3 mm.

Osmaston (1922, p. 454) says it is very common in Pachmarhi but rare in the surrounding jungles, which is contrary to my observations made in the middle of February, 1941. He further says it breeds in gardens, etc. from May to August.

In western Central India, Ali and Whistler (1939, p. 88) recorded it as common.

Family TURDIDAE.

***Saxicola caprata ?bicolor* Sykes.**

(The Northern Indian Stone-chat.)

Specimens obtained—

Around Pachmarhi.—1(♂), 12.2.41 ; 1(♀), 14.2.41.

Measurements (mm.)—

	Wing.	Tail.	Tarsus.	Bill.
1 ♂	66	49	21	11
1 ♀ ..	70	49	22	15

Colour of bare parts.—♂ : Bill black. Legs and feet horny. Claws horny black. Pads dirty horny brown. ♀ : Iris dark brown. Bill dark brownish black. Legs, feet and claws horny black. Pads dusky.

Field notes.—A few seen singly at Pachmarhi.

Osmaston (1922, p. 456) says it is common on the Pachmarhi Plateau.

In western Central India, Ali and Whistler (1939, p. 89) recorded it as uncommon.

***Saxicola torquata indica* (Blyth).**

(The Indian Bush-chat.)

Specimens obtained—

Singanama.—1♂, 18.2.41.

Itarsi.—1(♂), 24.2.41.

Measurements (mm.)—

	Wing.	Tail.	Tarsus.	Bill.
2 ♂♂	66-67	52-54	20-22	13-14

Colour of bare parts.—Iris brown. Bill black. Legs, feet and claws black. Pads smoky.

Field notes.—A few seen singly at Singanama and Itarsi on low trees and bushes ; uncommon.

The testes of the Singanama male (Feb. 18th) were in the non-breeding condition and measured 1×1 mm.

Osmaston (1922, p. 456) says it is a winter visitor to Pachmarhi.

In western Central India, Ali and Whistler (1939, p. 89) recorded it as fairly common—earliest date 17th September, latest 17th April.

***Phoenicurus ochruros rufiventris* (Vieillot).**

(The Eastern Indian Redstart.)

Specimen obtained—

Singanama.—1(♂), 18.2.41.

Measurements (mm.)—

	Wing.	Tail.	Tarsus.	Bill.
1 ♂	88	65	25.5	17

Colour of bare parts.—Iris dark chocolate brown. Bill horny brown. Legs, feet and claws horny brown. Pads dirty white.

Field notes.—One or two seen at Singanama.

Osmaston (1922, p. 456) says it is a common winter visitor to Pachmarhi.

In western Central India, Ali and Whistler (1939, p. 89) noted it at several places—last date of departure April 16th, by which most had departed; earliest date of arrival September 10th, becoming appreciably commoner by September 19th.

Systematic note.—I have followed Whistler and Kinnear¹ in determining the subspecies. The black feathers show a few dark grey edgings, but, with the large wing, the specimen would appear to be *rufiventris*.

Copsychus saularis saularis (Linnaeus).

(The Indian Magpie-Robin.)

Specimen obtained—

Pachmarhi.—1♀, 14.2.41.

Measurements (mm.)—

	Wing.	Tail.	Tarsus.	Bill.
1 ♀	90	78	28	22

Colour of bare parts.—Bill horny black. Legs and feet horny. Claws black. Pads waxy pale yellow.

Local name.—"Kāli sooi chiriā."

Field notes.—Fairly common at Pachmarhi.

The ovary of the ♀ was in the non-breeding condition and measured about 4×4 mm.

Osmaston (1922, p. 456) says it is very common in and around Pachmarhi.

In western Central India, Ali and Whistler (1939, p. 89) found it common in song towards the end of February and in March, and moulting the rectrices in September.

Monticola solitaria pandoo (Sykes).

(The Indian Blue Rock-Thrush.)

Specimens obtained—

Pachmarhi.—1♂, 16.2.41.

Harda.—1♂, 1.3.41; 1♀, 3.3.41.

NOTE.—The ♀ here recorded is sooty brown with a faint bluish tinge.

Measurements (mm.)—

	Wing.	Tail.	Tarsus.	Bill.
2 ♂♂	125-127	93-95	28-30	25.5-28
1 ♀	117	84	29	28

¹ Whistler, H. and Kinnear, N. B., *Journ. Bombay Nat. Hist. Soc.* XXXVI, p. 70 (1932).

Colour of bare parts.—♂ : Iris dark brown. Bill dark horny brown. Legs, feet and claws black. Pads dirty white. ♀ : Iris dark brown. Bill dark smoky brown. Legs, feet and claws dark smoky brown. Pads dirty white.

Field notes.—Uncommon at Pachmarhi and Harda.

The testes of the Pachmarhi (Feb. 16th) and Harda (Mar. 1st) specimens were in the non-breeding condition, measuring about 2×1 mm. The ovary of the Harda ♀ (Mar. 3rd) was also in the non-breeding condition and measured 6×4 mm.

Osmaston (1922, p. 456) says it is occasionally seen in winter at Pachmarhi.

In western Central India, Ali and Whistler (1939, p. 90) found it not uncommon—latest date April 4th, earliest September 11th.

***Myophonus coeruleus horsfieldii* Vigors.**

(The Malabar Whistling Thrush.)

Specimen obtained—

Around Pachmarhi.—1 (sex ?), 13.2.41.

Measurements (mm.)—

	Wing.	Tail.	Tarsus.	Bill.
1 (sex?)	152	(110)	43	30

Colour of bare parts.—Iris dirty olive green (not brown). Bill black. Legs, feet and claws horny black. Pads dirty white.

Local name.—"Bhangrāj."

Field notes.—Three or four solitary specimens were seen near streams and shady gorges around Pachmarhi. The call consists of a most melodious drawn-out whistle uttered as the bird shoots along the gorges. Not seen elsewhere.

Osmaston (1922) says it is common at Pachmarhi and breeds from 15th June.

Ali and Whistler (1939) did not come across it in western Central India.

Family MUSCICAPIDAE.

***Culicicapa ceylonensis ceylonensis* (Swainson).**

(The Grey-headed Flycatcher.)

Specimen obtained—

Forest around Pachmarhi.—1 (sex?), 16.2.41.

Measurements (mm.)—

	Wing.	Tail.	Tarsus.	Bill.
1 (sex?)	62	59	14	13

Field notes.—Fairly common in the forests around Pachmarhi.

Osmaston (1922, p. 455) says it is common at Pachmarhi in ravines and by streams, and breeds in June-July.

In western Central India, Ali and Whistler (1939, p. 92) recorded "*C. c. pallidor*" which they found uncommon.

As I have shown earlier ¹, I am unable to separate *pallidor* Ticehurst from the typical *ceylonensis*.

Leucocirca aureola aureola (Lesson).

(The White-browed Fantail-Flycatcher.)

Specimen obtained—

Pachmarhi.—1♀, 14.2.41.

Measurements (mm.)—

	Wing.	Tail.	Tarsus.	Bill.
1 ♀	80	89	18	14

Colour of bare parts.—Iris dark chocolate brown. Bill black. Legs, feet and claws horny black. Pads dirty white.

Field notes.—Saw a flock of about 10 on the golf links at Pachmarhi.

Osmaston (1922, p. 453) says it is fairly common at Pachmarhi in the cold weather but does not breed there.

In western Central India, Ali and Whistler (1939, p. 92) found it common.

Family LANIIDAE.

Lanius schach perythronotus (Vigors).

(The Rufous-backed Shrike.)

Specimens obtained—

Singanama.—1♂, 18.2.41.

Pipariya.—2♂♂, 23.2.41.

Measurements (mm.)—

	Wing.	Tail.	Tarsus.	Bill.
3 ♂♂	86.5-90	109-116	30	17-21.5

Colour of bare parts.—Iris dark brown or chocolate brown. Bill black—in one ♂ the lower bill pale fleshy horny. Legs, feet and claws dull horny grey to black. Pads dirty white.

Field notes.—Two or three seen at Singanama near cultivated fields. Fairly common at Pipariya where several were seen sitting singly on hedges near cultivated fields.

The testes of the three males (Feb. 18th-23rd) were small and measured 2×1 mm.

Osmaston (1922, p. 455) says it is not common on the Pachmarhi Plateau but is seen there occasionally in winter.

¹ Roonwal, M. L., *Rec. Ind. Mus.* XLI, p. 292 (1939).

North of the Hoshangabad District, Ali and Whistler (1939, p. 93) found it in western Central India, where some were seen carrying nest material on August 25th.

Systematic note.—I have followed Whistler and Kinnear¹ who have cleared up the question of the races of this shrike. In the skins from the Hoshangabad District the rufous extends to all the scapulars. I consider these skins *erythronotus*. The wings are much smaller (86.5-90 mm.) than the measurements given by Whistler and Kinnear.

Family CAMPEPHAGIDAE.

Pericrocotus peregrinus peregrinus (Linnaeus).

(The Small Minivet.)

Specimens obtained—

Around Pachmarhi.—1♂, 9.2.41 ; 1♂ (first winter), 11.2.41 ; 1♂, 12.2.41.

Measurements (mm.)—

	Wing.	Tail.	Tarsus.	Bill.
2 ad. ♂♂	69-70	78.5-80.5	17-18	12.5-14.5
1 imm. ♂	68	78	16.5	

Colour of bare parts.—Adult ♂ : Iris dark brown. Bill black. Legs, feet and claws horny black. Pads pale horny. First winter ♂ : Upper bill horny black ; lower bill dull fleshy plumbeous at base and darker at tip. Rest as in adult ♂.

Field notes.—Common at Pachmarhi. The testes of one of the males (Feb. 12th) were small, measuring 1×1 mm.

Osmaston (1922, p. 455) says it is very common on the Pachmarhi Plateau and breeds in April and May.

In western Central India, Ali and Whistler (1939, p. 94) found it common ; family parties were noted in August-September.

Systematic note.—Following the able exposition of the races by Whistler and Kinnear², I have rejected the confusing account of this minivet by Stuart Baker³, the name *cinnamomeus* has not been accepted.

Graucalus macei macei Lesson.

(The Large Indian Cuckoo-Shrike.)

Specimens obtained—

Pachmarhi.—1♂, 13.2.41.

Singanama.—1♂, 20.2.41 ; 1♀, 20.2.41.

Measurements (mm.)—

	Wing.	Tail.	Tarsus.	Bill.
2 ♂♂	167-175	132-138	25-26	28-29
1 ♀	160	133	27	28

¹ Whistler, H. and Kinnear, N. B., *Journ. Bombay Nat. Hist. Soc.* XXXVI, p. 336 (1933).

² Whistler, H. and Kinnear, N. B., *Journ. Bombay Nat. Hist. Soc.* XXXVI, p. 342 (1933).

³ Stuart Baker, E. C., *Faun. Brit. Ind., Birds* (2nd ed.) II, p. 329 (1924).

Colour of bare parts.—Iris dark brown in male, dark rufous brown in female. Bill, legs, feet and claws black. Pads dirty white.

Field notes.—Only one seen at Pachmarhi on the top of a tree. At Singanama also seen on tops of trees. Evidently rare.

The gonads of the three specimens (Feb. 13th and 20th) were in the non-breeding condition, and measured thus : testes about 2×2 mm. ; ovary 4×3 mm.

Osmaston (1922) says it is common at Pachmarhi and breeds in April.

Ali and Whistler (1939, p. 94) recorded it from several places in western Central India.

Family DICRURIDAE.

Dicrurus macrocercus peninsularis Ticehurst.

(The Black Drongo.)

Specimens obtained—

Pipariya.—1♀ (first winter), 23.2.41.

Harda.—1♀, 3.3.41 ; 1♂ (first winter), 3.3.41.

Elsewhere noted at : Itarsi.

Measurements (mm.)—

	Wing.	Tail.	Tarsus.	Bill.
1 ad. ♀	140	154	21	23
1 imm. ♀	134	138	22	24
1 imm. ♂	135	134	24	23

Colour of bare parts.—Adult ♀ : Iris chocolate brown. Bill glossy black. Legs, feet and claws black. Pads smoky.

Field notes.—Common at Pipariya and Harda where they were met with usually singly and sitting on telegraph wires. At Itarsi they were seen in association with grazing cattle, often hopping on to their backs.

Systematic note.—I have followed Ticehurst's¹ revision of *D. macrocercus*. Birds from western Central India and from southern Central Provinces are also said to be *peninsularis*.

Osmaston (1922, p. 454) says it was only once seen at Pachmarhi.

In western Central India, just north of the Hoshangabad District, Ali and Whistler (1939, p. 95) recorded *D. m. peninsularis* as common.

Dicrurus caerulescens caerulescens (Linnaeus).

(The White-bellied Drongo.)

Specimen obtained—

Around Pachmarhi.—1♂, 10.2.41.

Measurements (mm.)—

	Wing.	Tail.	Tarsus.	Bill.
1 ♂	131	129	20	23

¹ Ticehurst, C. B., *Journ. Bombay Nat. Hist. Soc.* XXXVI, pp. 927-929 (1933).

Colour of bare parts.—Bill, legs, feet and claws horny black.

Field notes.—Only one or two seen at Pachmarhi.

Osmaston (1922, p. 454) says it is the common King Crow of the Pachmarhi Plateau and breeds in March-April.

In western Central India, Ali and Whistler (1939, p. 95) found it common ; they recorded it as breeding in April.

Family ORIOLIDAE.

Oriolus xanthornus maderaspatanus Franklin.

(The Central Indian Black-headed Oriole.)

Specimen obtained—

Pachmarhi.—1 (sex?), 15.2.41.

Measurements (mm.)—

	Wing.	Tail.	Tarsus.	Bill.
1 (sex?)	142	95		29

Field notes.—Fairly common at Pachmarhi ; seen singly on tall trees. Not noted elsewhere.

Osmaston (1922, p. 455) says it is common on the Pachmarhi Plateau and breeds in May.

In western Central India, Ali and Whistler (1939, p. 99) found it rare, having noted it only at Guna in the Gwalior State.

Systematic note.—I have followed Whistler and Kinnear's ¹ exposition of the races of this bird. The Pachmarhi specimen is *maderaspatanus*.

Family FRINGILLIDAE.

Carpodacus erythrinus roseatus (Blyth).

(The Common Indian Rose-Finch.)

Specimen obtained—

Around Pachmarhi.—1 ♂, 15.2.41.

Measurements (mm.)—

	Wing.	Tail.	Tarsus.	Bill.
1 ♂	84	61	19	14

Colour of bare parts.—Iris dark brown. Upper bill horny ; lower bill silvery grey. Legs and feet dark horny brown. Claws horny. Pads dirty white.

Field notes.—A pair seen on a tree about 2 miles from Pachmarhi.

The testes of the ♂ (Feb. 15th) were small and measured 1×1 mm.

Osmaston (1922) does not include this Rose-Finch in his list of Pachmarhi birds.

¹ Whistler, H. and Kinnear, N. B., *Journ. Bombay Nat. Hist. Soc.* XXXVI, p. 584 (1933).

Ali and Whistler (1939, p. 101) recorded *C. e. erythrinus* as being a common winter visitor (Sept. 15th to April 7th) to western Central India, just north of the Hoshangabad District; they did not find *C. e. roseatus*.

***Gymnoris xanthocollis xanthocollis* (Burton).**

(The Yellow-throated Sparrow.)

Specimens obtained—

Around Pachmarhi.—2 ♂♂, 14.2.41; 1 (sex ?), 14.2.41.

Singanama.—1 ♂, 19.2.41.

Pipariya.—1 ♀, 22.2.41; 1 (sex ?), 22.2.41.

Elsewhere noted at : Itarsi.

Measurements (mm.)—

	Wing.	Tail.	Tarsus.	Bill.
3 ♂♂	79-86	55-61	16.5-19	14-15
1 ♀	78	56	18	13
2 (sex ?)	80.5-85	51-56	17-18	13.5-14.

Colour of bare parts.—♂ : Iris olive brown to chocolate brown. Bill waxy dark brown. Legs, feet and claws dull slaty. ♀ : Not noted.

Field notes.—Extremely common at Pachmarhi, especially near the cultivated fields where they congregate in the mornings in flocks of 30 or more, making a chirping din characteristic of sparrows. Also common at Singanama near cultivated fields, and at Pipariya. At Itarsi they were seen picking grain on meadows in large flocks of over 100 birds.

The gonads of the four birds examined at Pachmarhi and Pipariya were all in the quiescent state. The testes measured about 1×1 to 2×1 mm.; the ovary (Pipariya, Feb. 22nd), 4×4 mm.

Osmaston (1922, p. 456) says it is extremely common at Pachmarhi.

In western Central India, Ali and Whistler (1939, p. 101) found it common in the dry season but absent in August and early September, appearing again in late September; they considered it a "decidedly local migrant"

Family MOTACILLIDAE.

***Motacilla maderaspatensis* J. F. Gmelin.**

(The Large Pied Wagtail.)

Specimens obtained—

Itarsi.—1 (sex ?), 24.2.41.

Bank of R. Narbada at Handia.—1 ♂, 27.2.41.

Measurements (mm.)—

	Wing.	Tail.	Tarsus.	Bill.
1 ♂	96	107	28	19
1 (sex ?)	101	109	29	21

Colour of bare parts.—Iris dark brown. Bill black. Legs, feet and claws horny black. Pads smoky white.

Field notes.—A few seen near a stream at Itarsi, and on the banks of the Narbada at Handia.

The testes of the Handia ♂ (Feb. 27th) were enlarged and measured 4×4 mm., suggesting breeding in March.

Osmaston (1922) does not include this bird in his Pachmarhi list.

In western Central India, Ali and Whistler (1939, p. 103) found it fairly common and evidently breeding in April.

Motacilla cinerea caspica (S. G. Gmelin).

(The Eastern Grey Wagtail.)

Specimen obtained—

Pachmarhi (at “ Small Waterfall ”).—1 (sex ?), 16.2.41.

Measurements (mm.)—

		Wing.	Tail.	Tarsus.	Bill.
1 (sex ?)	..	83	96	20	17.5

Field notes.—Only one seen at the “ Small Waterfall ” near Pachmarhi.

Osmaston (1922, p. 456) says it is a common winter visitor to the Pachmarhi Plateau, arriving about 1st September.

In western Central India, Ali and Whistler (1939, p. 103) found it at several Places in winter (earliest date Sept. 5th, latest Apr. 8th); some were in the breeding dress.

Anthus hodgsoni hodgsoni (Richmond).

(The Indian Tree-Pipit.)

Specimen obtained—

Around Pachmarhi.—1 ♀, 12.2.41.

Measurements (mm.)—

			Wing.	Tail.	Tarsus.	Bill.
1 ♀	..	..	87.5	62	22	14

Field notes.—One seen at Pachmarhi.

Osmaston (1922, p. 456) says it is very common at Pachmarhi in winter, leaving that place in April.

Ali and Whistler (1939, p. 104) did not come across it in western Central India.

Family ALAUDIDAE.

Ammomanes phoenicura phoenicura (Franklin).

(The Indian Rufous-tailed Finch-lark.)

Specimens obtained—

Singanama.—1 ♂, 20.2.41.

Bank of R. Narbada at Sandia.—1 ♂, 21.2.41 ; 1 ♀, 21.2.41.

Measurements (mm.)—

	Wing.	Tail.	Tarsus.	Bill.
2 ♂♂	104-109	67-79	24	17
1 ♀	100	67	23	14

Colour of bare parts.—Iris dark brown. Upper bill horny ; lower bill pale horny with dark tip. Legs and feet pale rufous. Claws pale horny.

Field notes.—A pair seen in a stubble field at Singanama. Common singly or in twos and threes on the banks of the Narbada at Sandia, probably coming from the adjoining fields to drink. This habit of frequenting banks of rivers does not appear to have been recorded before.

The gonads of the three specimens (Feb. 20th, 21st) were in the breeding condition. The testes measured about 5×4 mm. ; the ovary about 8×8 mm., with the largest egg-follicles about 1×1 mm.

I did not see it at Pachmarhi, nor does Osmaston (1922) record it from there.

In western Central India, Ali and Whistler (1939, p. 106) found it fairly common in open cultivated country but make no mention of having seen it on river banks ; specimens taken on 16th February had maturing gonads ; they were found in flocks of 50 or more in September.

Family NECTARINIIDAE.

Leptocoma asiatica asiatica (Latham).

(The Indian Purple Sunbird.)

Specimen obtained—

Around Pachmarhi.—1 ♂ (metallic plumage), 10.2.41.

Measurements (mm.)—

	Wing.	Tail.	Tarsus.	Bill.
1 ♂	56	37	15	21

Colour of bare parts.—Iris dark brown. Bill, legs, feet and claws black.

Field notes.—Only one or two seen in the jungle around Pachmarhi.

The testes of the ♂ (Feb. 10th) were moderately enlarged and measured 1.5×1.5 mm.

Osmaston (1922, p. 456) says it is common in Pachmarhi and breeds during April to June.

In western Central India, Ali and Whistler (1939, p. 106) found it common ; they record it as breeding in March-April.

Order CORACIIFORMES.

Family PICIDAE.

Dryobates mahrattensis (subsp. ?).

(The Yellow-fronted Pied Woodpecker.)

Specimen obtained—

Singanama.—1 (sex ?), 19.2.41.

Measurements (mm.)—

	Wing.	Tail.	Tarsus.	Bill.
1 (sex ?)	104	69	20	25

Colour of bare parts.—Iris dark red. Bill waxy grey, darker at tip. Legs and feet waxy grey. Claws horny.

Field notes.—Only one seen at Singanama, tapping persistently on the bark of a tree.

Osmaston (1922, p. 456) says it is not uncommon on the Pachmarhi Plateau.

In western Central India, Ali and Whistler (1940, p. 470) found it common ; a nest with parents feeding the half-grown chicks was found on April 16th.

Family CAPITONIDAE.

Thereiceryx zeylanicus (subsp. ?).

(The Green Barbet.)

Specimen obtained—

Pachmarhi.—1 ♂, 15.2.41.

Measurements (mm.)—

	Wing.	Tail.	Tarsus.	Bill.
1 ♂ ..	120	80	28	31.5

Colour of bare parts.—Iris brown. Bill pink. Legs and feet fleshy yellow. Claws horny. Bare skin around the eyes yellowish.

Local name.—"Gummā"

Field notes.—Only one seen at Pachmarhi ; evidently rare at this time.

The testes of the ♂ (Feb. 15th) were fairly enlarged and measured 5×3 mm.

Osmaston (1922, p. 456) says it is very common at Pachmarhi, and breeds in April-May.

In western Central India, Ali and Whistler (1940, p. 471) found it only at two places in the Bhopal and Gwalior States ; the Bhopal skins were *T. z. caniceps* (Frankl.), while the one from further north, i.e., Gwalior, was intermediate between the subspecies *caniceps* and *kangrae*,

Family PSITTACIDAE.

Psittacula cyanocephala cyanocephala (Linnaeus).

(The Western Blossam-headed Paroquet.)

Specimens obtained—

Pachmarhi.—1 ♂, 15.2.41 ; 1 ♀, 15.2.41.

Measurements (mm.)—

			Wing.	Tail.	Tarsus.	Bill.
1 ♂	..	..	139	(197)	15.5	19
1 ♀	..	..	142	187	14	22.5

Colour of bare parts.—♂ : Iris straw yellow. Upper bill pale orange ; lower bill black. Legs, feet and claws mottled horny. Pads dirty white. ♀ : Iris very pale yellow. Upper bill yellow ; lower bill horny. Rest as in ♂.

Field notes.—Common at Pachmarhi in flocks of 8 or 10.

The ovary of the ♀ measured 6×4 mm. and was evidently in the semi-quiescent stage.

Osmaston (1922, p. 457) says it is common in and around Pachmarhi.

In western Central India, just north of the Hoshangabad District, Ali and Whistler (1940, p. 472) found *P. c. bengalensis* ; these were common and were breeding or about to breed in January.

Family CORACIIDAE.

Coracias benghalensis benghalensis Linnaeus.

(The Indian Roller or Blue Jay.)

Specimen obtained—

Pachmarhi.—1 ♂, 14.2.41.

Elsewhere noted at : Pipariya ; Itarsi.

Measurements (mm.)—

			Wing.	Tail.	Tarsus.	Bill.
1 ♂	..	..	186	129	20.5	41

Colour of bare parts.—Iris dark brown. Naked orbital skin pinkish ochreous (not yellow). Bill horny black. Legs and feet dirty yellow. Claws black.

Local name.—" Leelkant "

Field notes.—Fairly common at Pachmarhi, moving about singly. Common at Pipariya and Itarsi where they were often noticed sitting singly on telegraph wires and trees.

The testes of the ♂ (Feb. 14th) were in the non-breeding condition, and measured about 3×2 mm.

Osmaston (1922, p. 457) says it is common on the Pachmarhi Plateau and breeds in April-May.

In western Central India, Ali and Whistler (1940, p. 472) found it sparingly.

Family MEROPIDAE.

Merops orientalis orientalis Latham.

(The Common Indian Bee-eater.)

Specimens obtained—

Around Pachmarhi.—1 ♂, 14.2.41 ; 1 ♀, 14.2.41.

Singanama.—1 ♂, 20.2.41.

Measurements (mm.)—

			Wing.	Tail.	Tarsus.	Bill.
2 ♂♂	..	..	90-97	115-129	9.5-11.5	33.5-35
1 ♀			94	120	12	34

Colour of bare parts.—Iris : Crimson with an outer white ring in ♂; bright crimson in ♀. Bill black. Legs and feet fleshy horny. Claws horny. Pads dirty white.

Local name.—"Hari sooi chiriā"

Field notes.—Common at Pachmarhi ; found singly or in small flocks of 10 or 15 on trees. Very common at Singanama.

The gonads of the specimens collected were small. The testes of two Pachmarhi and Singanama males (Feb. 14th-20th) measured 1×1 mm. ; the ovary of a Pachmarhi ♀ (Feb. 14th) measured 4×3 mm.

Osmaston (1922, p. 457) curiously, and I think due to oversight, does not include the Common Indian Bee-eater in his earlier Pachmarhi list, although I found it common enough. In a subsequent Pachmarhi list (1936, p. 66), however, he says it is very common.

In western Central India, Ali and Whistler (1940, p. 473) found it "not uncommon, but curiously sparse and local" In the last week of March they met with individuals with granular ovaries and also individuals digging nests.

Family ALCEDINIDAE.

Ceryle rudis leucomelanura Reichenbach.

(The North Indian Pied Kingfisher.)

Specimens obtained—

Harda.—1 ♂, 1.3.41 ; 1 ♀, 1.3.41 ; 1 ♀, 4.3.41.

Measurements (mm.)—

			Wing.	Tail.	Tarsus.	Bill.
1 ♂	..	..	142	80	12	66
2 ♀♀		..	140-143	75-88	12	61-62

Colour of bare parts.—Iris very dark brown. Bill horny black. Legs, feet and claws smoky horny to black. Pads smoky white.

Field notes.—Common at Harda on banks of streams. Not noted elsewhere.

The three specimens shot at Harda (Mar. 1st-4th) were evidently breeding, as the gonads were greatly enlarged. The testes measured 8×5 mm. The ovaries measured 8×7 to 16×9 mm. and showed fairly large egg-follicles.

Osmaston (1922, p. 457) says it is occasionally seen around the lake at Pachmarhi.

In western Central India, Ali and Whistler (1940, p. 473) recorded a bird with ripe testes on Jan. 15th, and a nest on Feb. 4th; the ovaries of a ♀ on Sept. 7th were granular.

***Alcedo atthis taprobana* Kleinschmidt.**

(The Common Ceylon Kingfisher.)

Specimen obtained—

Harda.—1 ♂, 2.3.41.

Measurements (mm.)—

	Wing.	Bill.
1 ♂	69	44

Colour of bare parts.—Iris dark brown. Bill black. Legs, feet and pads reddish orange. Claws horny orange at base, horny at tip.

Testes of the ♂ shot on Mar. 2nd were moderately large, measuring 2.5×2 mm., evidently indicating breeding in the near future.

Field notes.—Seen occasionally at Harda near streams, but not common.

Osmaston (1922, p. 457) says it is not uncommon in and around Pachmarhi, and is a resident bird; the breeding season, however, is not stated.

In western Central India, Ali and Whistler (1940, p. 473) recorded mostly *A. a. bengalensis*, but also one specimen of *A. a. taprobana*.

***Halcyon smyrnensis* ?*smyrnensis* (Linnaeus).**

(The North Indian White-breasted Kingfisher.)

Specimens obtained—

Singanama.—1 ♂, 22.2.41.

Harda.—1 ♂, 3.3.41.

Elsewhere noted at: Pachmarhi.

Measurements (mm.)—

	Wing.	Tail.	arsus.	Bill.
2 ♂♂	122-123	94-95	16	62-64

Colour of bare parts.—Iris dark chocolate brown. Bill deep red. Legs and feet deep red to deep reddish orange, with smoky tinge in front. Foot pads reddish orange. Claws smoky horny.

Field notes.—One specimen seen at Pachmarhi on Feb. 14th; evidently rare at this time of the year. Fairly common at Singanama near streams. Not common at Harda where only a few were seen near streams.

The testes of both the males (Feb. 22nd and Mar. 3rd) were in the non-breeding condition, measuring about 2×1 mm.

Osmaston (1922, p. 457) says it is common on the Pachmarhi Plateau and breeds in April-May.

Systematic note.—Whistler and Kinnear¹ have shown that there is an indication of a larger North Indian race (*smymensis*) and a smaller South Indian race (*fusca*) of this kingfisher. By their size, the Hoshangabad District specimens would seem to belong to the typical race.

Family BUCEROTIDAE.

***Tockus birostris* (Scopoli).**

(The Common Grey Hornbill.)

Specimens obtained—

Pachmarhi.—1 ♀, 10.2.41.

Singanama.—1 ♂, 19.2.41.

Elsewhere noted at : Pipariya.

Measurements (mm.)—

	Wing.	Tail.	Tarsus.	Bill.
1 ♂	216	297	50	116
1 ♀	205	288	(46)	90

Colour of bare parts.—♂ : Iris deep red-orange. Casque and base of bill black ; rest of bill waxy white. Legs, feet and claws horny. Pads dirty white. Bare area around eye black. ♀ : Iris with an outer ring of white merging into an inner brown ring. Rest as in ♂.

Field notes.—At Pachmarhi this bird was encountered on Feb. 10th in the forest close to the Chemical Warfare School, flying either singly or in groups of 8 or 10 on the tops of tall trees. Also seen a single specimen on Feb. 14th two miles north of Pachmarhi on the road to Pipariya. Common at Singanama, visiting the *Ficus* ("bar") trees close to the Rest House in the mornings between about 7 and 9 A.M., usually in pairs ; also common in the forests at Singanama towards R. Denwa. A few also seen at Pipariya on Feb. 22nd.

The call is a sharp, slightly hoarse and drawn out *Peen-n-n-n*, *Peen-n-n-n*, each lasting for about 5 seconds, with longer intervals between two successive *Peen-n-n-n*'s. It strongly recalls the call of the Common Pariah Kite.

The testes of the ♂ shot at Singanama on Feb. 19th were in the non-breeding condition and measured 4×3 mm.

Osmaston (1922, p. 457) says it is very common on the Pachmarhi Plateau, especially in the spring.

In western Central India, Ali and Whistler (1940, p. 473) found it common.

¹ Whistler, H. and Kinnear, N. B., *Journ., Bombay, Nat. Hist. Soc.* XXXVII, pp. 761, 762 (1935).

Family UPUPIDAE.

Upupa epos ceylonensis Reichenbach.

(The Ceylon Hoopoe.)

Specimens obtained—

Pachmarhi.—1 ♂, 12.2.41 ; 1 ♂, 13.2.41.

Measurements (mm.)—

			Wing.	Tail.	Tarsus.	Bill.
2 ♂♂	..	..	135-139	98-105	21-23	56-57

Colour of bare parts.—Iris dark brown.*Local name*.—"Khatōlā"*Field notes*.—Tolerably common at Pachmarhi, moving about singly. Not seen elsewhere.The testes (12th-13th Feb.) were large and measured 3×2 to 5×4 mm., indicating breeding.

Osmaston (1922, p. 457) says it is common on the Pachmarhi Plateau and breeds in April.

In western Central India, Ali and Whistler (1940, p. 474) came across specimens of both *U. e. epops* and *U. e. ceylonensis*; some of these were evidently breeding in February and April.

Family ASIONIDAE.

Athene brama indica (Franklin).

(The Northern Spotted Owlet.)

Specimen obtained—

Pipariya.—1 ♂, 23.2.41.

Measurements (mm.)—

			Wing.	Tail.	Tarsus.	Bill.
1 ♂	..	..	147	79	32	21

Colour of bare parts.—Iris lemon yellow. Bill greyish yellow. Feet and pads light buff. Claws horny.*Field notes*.—Only one seen during the day on the top of a tamarind tree.The testes (Feb. 23rd) were moderately enlarged and measured 4×3 mm., suggesting breeding in the near future.

Osmaston (1922, p. 458) says it occurs at Pachmarhi but is not common.

In western Central India, Ali and Whistler (1940, p. 475) found a bird with granular ovaries at Chanderi in the Gwalior State on April 8th.

Glaucidium radiatum radiatum (Tickell).

(The Jungle Owlet.)

Specimens obtained—

Forest around Pachmarhi.—1 ♂, 9.2.41.

Singanama.—1 ♂, 18.2.41 ; 1 ♀, 19.2.41.

Measurements (mm.)—

			Wing.	Tail.	Tarsus.	Bill.
2 ♂♂	..	..	130-132	78-80	27-28	19
1 ♀	..	..	136	84	(26)	

Colour of bare parts.—Iris bright yellow in ♂, lemon yellow in ♀. Bill ashy yellow. Feet and pads ashy ochreous. Claws horny with black tips.

Field notes.—One seen in the jungle near Pachmarhi, and two at Singanama. The testes of the ♂ (Feb. 18th) measured 3×2 mm.; the ovaries of the ♀ (Feb. 19th) measured 7×5 mm.

Osmaston (1922, p. 458) says the bird is common in the Pachmarhi forests and breeds in April-May.

Ali and Whistler (1940, p. 475) did not come across it in western Central India.

Order ACCIPETRES.

Family AEGYPTIDAE.

Pseudogyps bengalensis (J. F. Gmelin).

(The Indian White-backed Vulture.)

Specimen obtained—

Pachmarhi.—1 ♂, 12.2.41.

Measurements (mm.)—

	Wing.	Tail.	Tarsus.	Bill.
1 ♂	(580)	214	(98)	62

Field notes.—Fairly common at Pachmarhi, being often seen in groups of 10 or 12 near carcasses on rocks. Often seen in company with the Neophron.

The testes of the ♂ (Feb. 12th) were in the quiescent stage, and measured 2.5×2 mm.

Osmaston (1922, p. 458) says it occurs on the Pachmarhi Plateau but does not breed there.

In western Central India, Ali and Whistler (1940, p. 476) found it common everywhere.

Neophron percnopterus ginginianus (Latham).

(The Neophron or Smaller White Scavenger Vulture.)

Specimen obtained—

Singanama.—1 (sex ?) (first winter ?), 19.2.41.

Elsewhere noted at: Pachmarhi; Itarsi.

NOTE.—The Singanama bird was acquiring the white adult plumage, but the brown patches were still evident in several places.

Measurements (mm.)—

	Wing.	Tail.	Tarsus.	Bill.
1 (sex ?)	465	234	83	62.5

Colour of bare parts.—Iris white, with inner purple ring. (Stuart Baker, 1928, p. 23, does not give the colour of the iris; for the typical race he gives the colour as yellow or dark brown.) Bill fleshy grey (in immature bird). Bare skin on head and chin yellow. Legs and feet pinkish white. Claws dark horny.

Field notes.—Several specimens, both pure white (adults) and brown ones (immature first winter birds) were noted in small numbers at Pachmarhi on Feb. 12th and subsequently in company with the Indian White-backed Vulture, *Pseudogyps bengalensis*. All adults were yellow-beaked and, therefore, *ginginianus*. A solitary bird noted at Singanama (specimen collected). Also noted in fair numbers at Itarsi on Feb. 24th.

Osmaston (1922, p. 458) says it is common at Pachmarhi where it breeds on the cliffs; the breeding season, however, is not stated.

In western Central India, Ali and Whistler (1940, p. 476) noted two nests with brooding birds at Surwaya in the Gwalior State on the 22nd March.

Family FALCONIDAE.

Milvus migrans govinda Sykes.

(The Common Pariah Kite.)

Specimen obtained—

Pachmarhi.—1 ♀, 11.2.41.

Elsewhere noted at: All the places visited in the District.

Measurements (mm.)—

	Wing.	Tail.	Tarsus.	Bill.
1 ♀	487	320	59	39.5

Colour of bare parts.—Bill horny. Legs and feet waxy grey-white. Pads dirty waxy-white. Claws horny.

Field notes.—Common at all the places visited in the Hoshangabad District.

Osmaston (1922, p. 458) also found it common at Pachmarhi. No indication of the breeding season in the District is available.

In western Central India, Ali and Whistler (1940, p. 477) found it common, especially in and about towns.

Order COLUMBAE

Family COLUMBIDAE.

Streptopelia orientalis meena (Sykes).

(The North Indian Rufous Turtle-Dove.)

Specimen obtained—

Singanama.—1 ♂, 18.2.41.

Measurements (mm.)—

	Wing.	Tail.	Tarsus.	Bill.
1 ♂	200	136	25	23

Colour of bare parts.—Bill fleshy horny. Legs and feet dark horny. Claws waxy horny. Pads pinkish white. Naked orbital skin grey beneath eye, dark pink elsewhere.

Field notes.—Only one or two seen at Singanama ; evidently rare.

The testes of the ♂ were small and measured 3×2 mm.

Osmaston (1922, p. 459) says it occurs in Pachmarhi throughout the year but is most common in winter.

Ali and Whistler (1940, p. 477) recorded a few specimens from the Gwalior and Bhopal States in western Central India.

Systematic note.—This bird is the *meena* Sykes of Whistler and Kinnear¹, i.e., the bird which breeds in the N. W Himalayas ; it is not the *meena* Sykes of Stuart Baker². (Also see Roonwal³, 1941, p. 328.)

Streptopelia chinensis suratensis (J. F. Gmelin).

(The Indian Spotted Dove.)

Specimen obtained—

Around Pachmarhi.—1 ♀, 11.2.41.

Elsewhere noted at : Singanama.

Measurements (mm.)—

	Wing.	Tail.	Tarsus.	Bill.
1 ♀	143	141	22	22

Local name.—"Pharki"—probably a general name for all doves.

Field notes.—Very common at Pachmarhi in thin forest on rocks and plains ; usually found singly. Extremely common at Singanama. None seen at Itarsi where it appeared to be absent, although other doves were seen.

¹ Whistler, H. and Kinnear, N. B., *Journ., Bombay, Nat. Hist. Soc.* XXXVIII, pp. 677-679 (1936).

² Stuart Baker E. C., *Faun. Brit. Ind., Birds* (2nd ed.) V, p. 240 (1928).

³ Roonwal, M. L. *Rec. Ind. Mus.* XLIII, pp. 328-332 (1941).

Osmaston (1922, p. 459) says it is common in and around Pachmarhi.

In western Central India, Ali and Whistler (1940, p. 477) found it common ; a nest with eggs was met with on September 19th.

***Streptopelia senegalensis cambayensis* (J. F. Gmelin).**

(The Indian Laughing Dove or Little Brown Dove.)

Specimen obtained—

Itarsi.—1 ♂, 24.2.41.

Measurements (mm.)—

		Wing.	Tail.	Tarsus.	Bill.
1 ♂	..	122	115	19	18

Colour of bare parts.—Naked orbital skin grey. Bill and cere horny black. Legs and feet purple. Claws horny black. Pads dirty grey-brown.

Field notes.—Common at Itarsi in meadows and thin forest. Not noted elsewhere.

The testes of the ♂ (Feb. 24th) were small and measured 3×2 mm.

Osmaston (1922) does not list it as a Pachmarhi bird.

Ali and Whistler (1940, p. 478) found it common in western Central India.

***Streptopelia decaocto decaocto* (Frivaldszky).**

(The Indian Ring-Dove.)

Specimen obtained—

Itarsi.—1 ♂, 24.2.41.

Elsewhere noted at : Harda.

Measurements (mm.)—

		Wing.	Tail.	Tarsus.	Bill.
1 ♂		179	146	24	22

Colour of bare parts.—Naked orbital skin grey. Bill and cere horny black. Legs and feet purple. Claws horny black. Pads dirty pale brown.

Field notes.—Common at Itarsi where it was met with on trees in open grassland. A few seen at Harda.

The testes of the Itarsi ♂ (Feb. 24th) were small, and measured 2×2 mm.

Osmaston (1922) does not record it as a Pachmarhi bird.

In western Central India, Ali and Whistler (1940, p. 478) found it common, and obtained nests with eggs on September 18th.

Order GALLINAE.

Family PHASIANIDAE.

Galloperdix lunulata (Valenciennes).

(The Painted Spur-Fowl.)

Specimen obtained—

Forest around Pachmarhi.—1 ♂ (labelled ♀ in the field, evidently by mistake ; has ♂ plumage), 10.2.41.

NOTE.—The specimen was purchased at Pachmarhi from a local *shikari* who said he got it from the jungles near Pachmarhi.

Measurements (mm.)—

		Wing.	Tail.	Tarsus.	Bill.
1 ♂	..	159	132	38	23

Field notes.—The specimen is in moulting and new feathers are seen developing on the rump ; the tail shows only 8 feathers. Both the tarsi have two spurs each.

Osmaston (1922, p. 459) says it is common at Pachmarhi on rocky slopes.

In western Central India, Ali and Whistler (1940, p. 478) found it at several places ; specimens taken in March and April had maturing gonads.

Order CHARADRIIFORMES.

Family CHARADRIIDAE.

Lobivanellus indicus indicus (Boddaert).

(The Indian Red-Wattled Lapwing.)

Specimens obtained—

Itarsi.—1 ♀, 27.2.41.

Bank of R. Narbada at Handia.—1 ♀, 27.2.41.

Measurements (mm.)—

		Wing.	Tail.	Tarsus.	Bill.
2 ♀♀	..	210-227	111-131	73-74	36-37

Colour of bare parts.—Iris red with a narrow pink outer ring. Bill with tip smoky, rest deep pink. Wattle near eye deep pink. Tibia, tarsus and feet dirty yellow. Claws smoky. Pads pale smoky.

Field notes.—Common at Itarsi near streams where they were seen in association with grazing cows. Exhibited a semi-gregarious tendency. Also very common on the banks of the Narbada at Handia.

The ovary of the Itarsi specimen (Feb. 25th) was enlarged, measuring 12×9 mm. ; some of the egg-follicles measured 1.5×1.5 mm. The Handia specimen (Feb. 27th) had a smaller ovary, 5×5 mm.

In western Central India, Ali and Whistler (1940, p. 484) found it common.

Family SCOLOPACIDAE.

Tringa hypoleucos Linnaeus.

(The Common Sandpiper.)

Specimen obtained—

Bank of R. Narbada at Sandia.—1 ♂, 21.2.41.

Measurements (mm.)—

	Wing.	Tail.	Tarsus.	Bill.
1 ♂	107	62	23	30

Colour of bare parts.—Iris dark brown. Upper bill fleshy smoky, darker at tip ; lower bill fleshy, smoky at tip.

Field notes.—A few seen on the bank of the Narbada at Sandia.

In western Central India, Ali and Whistler (1940, p. 485) found it common, the last date being April 19th.

Order HERODIONES.

Family PLEGADIDAE.

Thereskiornis melanocephala (Latham).

(The White Ibis.)

Specimen obtained—

R. Narbada at Handia.—1 ♂ (juv.), 27.2.41.

Measurements (mm.)—

	Wing.	Tail.	Tarsus.	Bill.
1 ♂ (juv.)	322	123	92	141

Colour of bare parts.—Iris brown.

Field notes.—A few, perhaps 8 or 10, seen on the Narbada at Handia in small parties of 2 to 4.

The testes of the juv. ♂ (Feb. 27th) measured 6×4 mm.

In western Central India, Ali and Whistler (1940, p. 486) found it in small parties in the Bhopal State and the Gwalior State.

Family ARDEIDAE.

Egretta garzetta garzetta (Linnaeus).

(The Little Egret.)

Specimen obtained—

R. Narbada at Handia.—1 ♀ (breeding plumage), 27.2.41.

Measurements (mm.)—

	Wing.	Tail.	Tarsus.	Bill.
1 ♀	260	99	92	82

Colour of bare parts.—Iris brown.

Field notes.—Fairly common on the Narbada at Handia, going about singly or in pairs.

The ovary of the ♀ was fairly enlarged and measured 11×6 mm., suggesting breeding in the near future.

In western Central India, Ali and Whistler (1940, p. 487) noted it in the Bhopal State and the Gwalior State.

***Ardeola grayii* (Sykes).**

(The Indian Pond Heron or Paddy Bird.)

Specimen obtained—

R. Narbada at Handia.—1 ♀ (non-breeding plumage), 27.2.41.

Measurements (mm.)—

	Wing.	Tail.	Tarsus.	Bill.
1 ♀	202	77	59	71

Colour of bare parts.—Iris yellow-brown.

Field notes.—Fairly common on the Narbada at Handia. The ovaries were small and measured 4×3 mm.

Osmaston (1922, p. 459) says it is fairly common by the lake at Pachmarhi.

In western Central India, Ali and Whistler (1940, p. 487) found nesting birds in Sangi Tank near Mandleshwar in the Indore State on September 5th.

