

A REVISION OF THE SUB-FAMILY CALLIPHORINAE IN THE ORIENTAL REGION.

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The present paper forms Part IV of the general revision of the old family Muscidae in the Oriental Region, of which three parts have already appeared.¹ The Group now dealt with is rather a heterogeneous one, a fact which has always been recognized, Robineau-Desvoidy having separated off the non-metallic coloured genera as *Muscidae Testaceae* so long ago as 1830, a division which has persisted right up to the present day. Though Villeneuve (1920) has attempted to justify this separation on the number of pre-sutural acrostichals, the division, which is primarily based on colour, is not good, and the Group is morphologically a single unit. Biologically, however, it is not homogenous. The metallic coloured genera are saprophages, the early stages of many of which have long been known, and the life histories of some of the rarer species of which have been elucidated in recent years by Major Patton, who has shown that they include certain predatory species, and even one biontophage, though the latter is probably not truly within that class, but only secondarily so, following on septic conditions. Of the testaceous-coloured genera, the life-histories of a few of the Ethiopian species have been made out, and such have proved to be true biontophages of parasitic habit on various mammals, these including the 'Congo Floor-Maggot,' *Auchmeromyia luteola* F. and the 'Tumbu-Fly,' *Cordylobia anthropophaga* Blanch., parasites of Man. Of the Oriental species of Testaceae, only a single species has its life-history known, revealing the same mammalian-parasitic habit. In both regions, the life-histories of the large genus *Bengalia* rest in complete obscurity.

Phylogenetically, the group probably connects with the *Muscinae* by way of *Lucilia* and *Orthellia*, placed with the latter, and with the *Sarcophaginae* through *Cynomyia*. As stated in Part III of this revision there is probably a phylogenetic connection through to the Rhiniinae by way of *Anastellorhina* and *Pollenia*.

Once again, the history of the systematics of the sub-family follows along the lines given in Parts I and III of this series of papers for *Sarcophaginae* and *Rhiniinae* respectively. There is a period of profuse and

¹ *Sarcophaginae*, by R. Senior-White, *Rec. Ind. Mus.*, xxvi, 197-283, May, 1924. *Musca*, by W. S. Patton and R. Senior-White, *Rec. Ind. Mus.*, xxvi, 553-577, November, 1924. *Rhiniinae*, by R. Senior-White, *Rec. Ind. Mus.*, xxvii, 81-96, March, 1925. It was originally intended that the present part of the Revision should be the joint work of Major Patton and the author. The former's departure to China with the Kala Azar Commission of the Royal Society threw the burden of writing up the notes and material onto myself, but it must be understood that the synonymy, especially of the metallic genera, is to be entirely credited to Major Patton, whose descriptions in this section form the ground-work for that part of the paper dealing with them.

confused description, again terminating with Bigot in 1887, and, thereafter, a gap of twenty-six years, until Bezzi in 1913 first attempted to revise the Oriental species of the genus *Bengalia*. The first general revision of the Testaceae of the World, by de Surcouf, seems to have been nearly ready for press in the following year, but the outbreak of the World War deferred its publication until 1920. From 1921 to date a series of preparatory papers by Major Patton and the author have appeared, of which the present publication is the logical outcome. In the course of their studies the author believes that Major Patton and himself have had access to all the material available in at least the British collections in the East, and to older material, including many of the types, in the museums of Europe. None the less, many old names of Walker and Bigot still require synonymizing, and the completion of the synonymy will have to wait for the catalogue which will form the final part of the revision.

As nearly every species has been treated of by Major Patton or myself during recent years, in easily accessible journals, all in one language, it has not been considered necessary to repeat descriptions in full here, only a few species which have been inaccessibly or poorly described are now re-described in full. For the remainder, references to good descriptions and figures are given, but most of the noticeable characters have been made use of in drawing up the specific keys.

Location of a species in the sub-family can be accomplished with the aid of the composite table on page 219 of Part I of this series.

1. ♂ Sub-holoptic, or frons distinctly narrowed	2
♂ Broadly dichoptic, as in ♀	<i>Bengalia</i> R.-D.
2. Sterno-pleurals 2:1	3
Sterno-pleurals 1:1	7
3. Vein III above bristly on node only	4
Vein III above bristly half-way to anterior cross-vein	6
4. Eyes bare	5
Eyes hairy	<i>Paradichosia</i> S.-W.
5. Facial ridges bristly for two-thirds distance to lunule	<i>Calliphora</i> R.-D.
Facial ridges with only a few hairs above vibrissae	<i>Paratricyclea</i> Vill.
6. Posterior acrostichals 2 or 3	<i>Lucilia</i> R.-D.
Posterior acrostichals one only	<i>Phumosa</i> R.-D.
7. Pre-sutural acrostichals present	8
Pre-sutural acrostichals merged in general pubescence	<i>Chrysomyia</i> R.-D.
8. Two weak presutural acrostichals. Arista strongly biplumose	<i>Caiusa</i> Surc.
Always two and often three stronger presutural acrosti- chals. Arista bare on lower side	<i>Booponus</i> Aldr.

Calliphora Robineau-Desvoidy.

? *Mufetia* R.-D. ; *Myia* Rond. ; *Mya* Rond. ; *Somomyia* Rond. ; *Somomya* Rond.

♂ Frons greatly narrowed, ♀ frons broad. Verticals strong, crossed, no outer pair in ♂, a strong pair in ♀, also a weak post-vertical. ♀ with 2 fronto-orbitals. Arista long plumose. Acrostichals 2-3. Dorsocentrals 3:3. Humeralis 4. Posthumeralis 2. Notopleurals 2. Supra-alars 4. Post-alars 2. Sternopleurals 2:1. Scutellars 10 marginal, 2 discal. Vein I bare basally. Vein III bristly on node only.

Key to the Oriental species of CALLIPHORA.

- | | | | | | |
|----------------------------|----|----|----|----|-----------------------------|
| 1. Cheeks black | .. | .. | .. | .. | 2 |
| Cheeks yellowish-red | .. | .. | .. | .. | <i>erythrocephala</i> Meig. |
| 2. Hairs on cheeks reddish | .. | .. | .. | .. | <i>vomitorea</i> Linn. |
| Hairs on cheeks black | .. | .. | .. | .. | <i>aucta</i> Wlk. |

***Calliphora vomitoria* Linnacus.**

Musca affinis Macq. ; *Calliphora antarctica* Schin. ; *Calliphora brunnicornis* R.-D. ; *Calliphora capensis* B. & Bg. ; *Musca carnaria* Scop. ; *Musca carnaria ccerulea* deGeer ; *Musca carnivora* Fb. ; *Calliphora croceipalpis* Jaenn. ; *Calliphora erythrocephala* Macq. nec Meig. ; *Calliphora ? fulvibarbis* R.-D. ; *Calliphora loewi* Enderl. ; *Musca obscura* Esch. ; *Calliphora vicaria* Schin.

Head: face blackish, white shimmering, with pale yellowish-red reflections on the jowls, often reaching to the epistome. Cheeks black, thickly covered below with foxy-red hairs. Antennae blackish-brown, third segment basally reddish-yellow, white shimmering above. Palpi reddish-yellow. ♀ frons very broad, as is also the black or brownish-red frontal stripe. Parafrons grey shimmering. *Thorax* blackish blue, with slaty-blue reflections and four black, not very distinct stripes. *Abdomen* with white and slaty-blue reflections, first segment with a narrow, blackish, posterior band and a median stripe. *Legs* black. *Wings* very pale greyish. Squamae blackish, white margined. Long. 10 mm.

Only recorded within the Oriental Region from the Simla District.

***Calliphora erythrocephala* Meigen.**

Calliphora insidiosa R.-D. ; *Musca lilaea* Wlk. ; *Calliphora littoralis* R.-D. ; *Calliphora monspeliaca* R.-D. ; *Calliphora musca* R.-D. ; *Calliphora nana* R.-D. ; *Calliphora scutellata* Macq. ; *Calliphora spitzbergensis* R.-D. ; *Calliphora vicina* R.-D. ; *Musca vomitoria minimus* Harr. ; *Volucella vomitoria* Fb. ; *Musca vomitoria auctl., nec* Linn.

Very like *vomitorea*, from which it separates only on the wholly yellowish-red face, and the broader frons in the ♂. Generally, it is more pollinose, and has a lighter appearance. Every other detail, including size, as in the preceding species.

Apparently enters the Oriental Region rather further than the preceding species. Though only recorded from the Simla District, I have seen numerous specimens from Cherat, N.-W. F. P. (Casling).

***Calliphora aucta* Walker.**

Head: frons and face black, the latter with some greyish pollen. Parafrons and parafacials black, with a few shining, whitish flecks at intervals, against the eye margins. Antennae black, base of third segment brown. Epistomal margin yellowish. Palpi orange. Genae black, with black hairs. *Thorax* very dark blue, almost black, with some greyish-white pollen, mainly anteriorly, but only visible in certain lights. *Abdomen* very dark, shining, metallic blue, more distinctly so than the thorax. No distinct darker bands to segments. *Legs* black throughout. *Wings* grey, slightly infuscated in costal cell. Long. 10 mm.

Found throughout the Himalaya from Kashmir eastwards, and at high elevations (over 5,000 ft.), in the Khasia Hills.

It will thus be seen that this genus hardly enters the Oriental Region proper, being confined to high elevations on its northern boundary with the Palaearctic.

Lucilia Robineau-Desvoidy.

Phaenicia R.-D. ; *Paralucilia* (p. p.) B. & Bg. ; *Somomyia* Rond.

♂ Frons more or less narrowed. ♀ frons more or less wide, with inner and outer verticals and three fronto-orbitals. Arista long plumose. Acrostichals 2:2-3. Dorso-centrals 3:3. Humerals 3-4. Post-humerals 1. Presutural 1. Notopleurals 2. Intra-alars 2. Supra-alars 3, (large). Post-alars 3, (one small). Scutellars 10 marginal and 2 discal. Sternopleurals 2:1. Radius basally not ciliate above. First section of vein III bristly for half its length above and below.

Key to the Oriental species of LUCILIA.

- | | |
|--|----------------------------|
| 1. Two posterior acrostichals | 2 |
| Three posterior acrostichals | 5 |
| 2. Antennae black or very dark orange | 3 |
| Antennae bright orange | <i>pulchra</i> Wied. |
| 3. ♂ frons sub-holoptic | 4 |
| ♂ frons $\frac{1}{4}$ or more of head-width. Abdomen unbanded, first segment black | <i>coerulea</i> Wied. |
| 4. Purplish-blue species. Abdomen unbanded | <i>inducta</i> Wlk. |
| Green species with much white pollen. Abdomen distinctly banded | <i>albopilosa</i> sp. nov. |
| 5. Third antennal segment 2-2 $\frac{1}{2}$ times length of second | <i>cuprina</i> Wied. |
| Third antennal segment at least 3 times length of second | <i>sericata</i> Meig. |

Lucilia coerulea Wiedemann.

Lucilia ballardi Patt. ; *Lucilia flavipennis* Macq. ; *Musca metilia* Wlk.

For description see Patton (1922D) and (1922E, tab. lxiii, fig. 10), as *ballardi*. Known from Nepal, South India, Ceylon and Java.

Lucilia pulchra Wiedemann.

Somomyia coeruleolimbata Big. ; *Somomyia pagodina* Big. ; *Lucilia phellia* Wlk. ; *Lucilia ruficornis* Macq.

For description see Patton (1922D) and (1922E, tab. lxiii, fig. 9). Known from Bihar and Southern India, and from Java.

Lucilia inducta Walker.

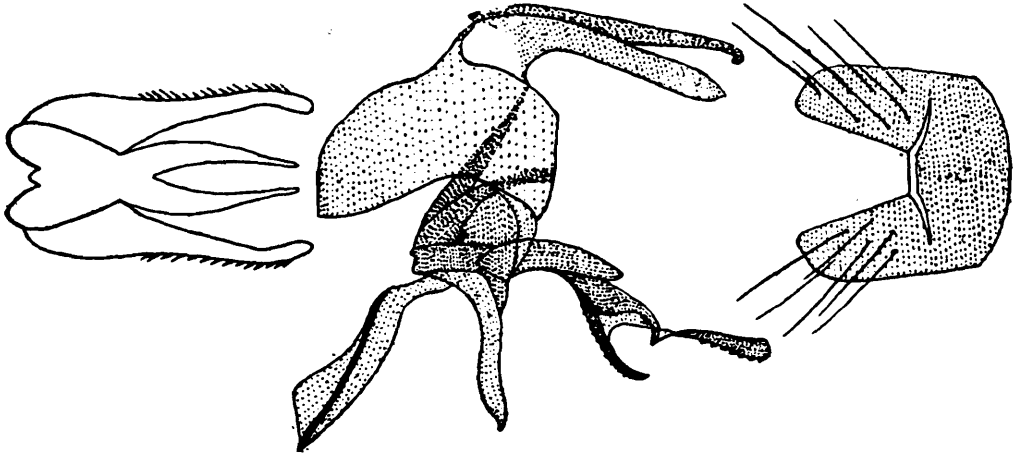
Lucilia craggi Patt. ; *Somomyia obesa* Big. ; *Somomyia pachysoma* Big. ; *Lucilia porphyryna* Wlk.

For description see Patton (1922A) and (1922E, tab. lxiii, fig. 8), as *craggi*. Known from the Himalaya, the Khasia Hills, Nilgiri Hills, Ceylon, Malaya and Java.

Lucilia albopilosa sp. nov.

Head : ♂ sub-holoptic, ♀ frons about $\frac{1}{4}$ head-width. Front black, face greyish. Parafrons and parafacia broad, silvery. Epistomal

margins dull luteous. Antennae brown. Palpi orange. Occipital margin broad, silvery. *Thorax* green, thickly covered with white pile. *Abdomen* greenish-coppery, occasionally with a bluish tinge. First segment black. Margins of other segments distinctly, though not broadly blue-



Lucilia albopilosa, sp. nov. ♂ genitalia.

black banded. *Legs* black. *Wings* grey, costal margin slightly infuscated. Long. 6-9 mm. Type ♂ and ♀ from Suduganga, Matale, Ceylon, 15-vi-20 and 28-vi-18, in Author's collection. Co-types in Major Patton's collection.

Known from Gauhati, North Bihar, Kallar (foot of Nilgiris), and Ceylon submontane zone.

It is improbable that this common species has escaped prior description, but neither I nor Major Patton have so far been able to identify it with any of the earlier descriptions or types.

***Lucilia sericata* Meigen.**

Lucilia brunnicornis Macq.; *Lucilia caeruleiviridis* Macq.; *Musca caerulescens* Meig.; *Lucilia sayi* Jænn.

Head: frons and face more or less yellowish, with silvery pruinescence. ♂ front not extremely narrowed. ♀ front as broad as long, frons more than twice the width of the parafrons, which is distinctly narrower than the parafacials. Antennae black. Palpi yellow. Genal hairs black. *Thorax* green with silvery pollen. Three posterior acrostichals. *Abdomen* coppery to greenish, with silvery pruinescence. First segment darker than the others. *Legs* black. *Wings* clear, base of costa light yellowish. Long. 8-10 mm.

This Palaearctic species only enters the Oriental Region in the Kurram Valley on the North-West Frontier of India.

***Lucilia cuprina* Wiedemann.**

*Lucilia argyricephal*a Macq.; *Musca fuscina* Wlk.; *Lucilia indica* R.-D.; *Lucilia leucodes* Frahd.; *Musca serenissima* Wlk.; *Musca temperata* Wlk.

For description see Patton (1922A) and (1922E, tab. lxiii, fig. 7), as *argyricephal*a.

Known from India (general), Singapore, China, Seychelles, and throughout Africa.

Chrysomyia Robineau-Desvoidy.

Paracompsomyia Hough ; *Paralucilia* (p. p.) B. & Bg. ; *Pycnosoma* B. & Bg. ; *Psilosoma* Surc.

♂ Frons greatly narrowed. ♀ frons wide. ♂ with inner verticals only, ♀ with both pairs. Only 2 very weak fronto-orbitals in ♀, outwardly directed, not proclinate. Arista long plumose. Acrostichals 0-1. Dorso-centrals 1: 2-3, the anterior posterior one very weak. Humeralis 3. Post-humeralis 1. Notopleurals 2. Supra-alars 3. Post-alars 2. Sternopleurals 1:1. Scutellars 8 marginal, 2 discal. Vein I basally strongly bristled above. Vein III below bristly to cross-vein.

Key to the Oriental species of CHRYSOMYIA.

- | | |
|---|-------------------------|
| 1. Wings hyaline | 2 |
| Base and costa of wing infuscated | <i>marginalis</i> Wied. |
| 2. Cheeks orange | 3 |
| Cheeks black | 4 |
| Cheeks silvery white | <i>albiceps</i> Wied. |
| 3. ♂ eye facets all same size. ♀ frontal stripe grey-brown | <i>bezziana</i> Villen. |
| ♂ eye with upper facets enlarged. ♀ frontal stripe red-brown | <i>megacephala</i> Fb. |
| 4. ♂ eyes approximated, upper facets enlarged. ♀ frons $\frac{2}{3}$ of head width. Legs black, femora normal | <i>combrea</i> Wlk. |
| ♂ eyes separated, all facets equal. ♀ frons $\frac{1}{2}$ head-width. Femora blue, dilated. ♂ abdomen black fringed | <i>villeneuvi</i> Patt. |

Chrysomyia megacephala Fabricius.

Musca batz Wlk. ; *Somomyia cyaneocincta* Big. ; *Lucilia cyanescens* Lw. ; *Somomyia dives* Big. ; *Chrysomyia duvaucellii* R.-D. ; *Musca dux* Esch. ; *Lucilia flaviceps* Macq. ; *Somomyia pfeifferi* Big. ; *Musca remuria* Wlk. ; *Somomyia saffrana* Big.

For description see Patton (1922B) and (1922E, tab. lxiii, fig. 2). Distributed generally throughout India and the Dutch East Indies. Ceylon. Chagos Archipelago. Guam. Australia. Does not occur in Africa.

Chrysomyia bezziana Villeneuve.

Pycnosoma dux, auctt. nec Esch.

For description see Patton (1920) and (1922E, tab. lxiii, figs. 1 and 12). Distributed generally throughout India and Africa. Ceylon. Philippines. This species has only once been captured in nature adult, a ♂, Calcutta, in kitchen, (Strickland), —all other specimens known have been bred from larvae.

Chrysomyia albiceps Wiedemann.

Lucilia bengalensis R.-D. ; *Musca bibula* Wied. ; *Musca elara* Wlk. ; *Musca emoda* Wlk. ; *Musca himella* Wlk. ; *Somomyia nubiana* Big. ; *Lucilia orientalis* Macq. ; *Lucilia pavonia* Schin. ; *Musca putoria* Wied. ; *Calliphora rufifacies* Frogg.

For description see Patton (1922C) and (1922E, tab. lxiii, fig. 4). In the Oriental Region it is recorded from India (general), Ceylon and Sumatra. There are some slight differences between the species in this

Region and in Africa, which might justify the separation of the Oriental form as var. *putoria* Wied., but such distinction seems hardly necessary. It occurs generally throughout Africa, and in Australia and New Zealand.

***Chrysomya marginalis* Wiedemann.**

Compsomyia nigripennis Hough; *Chrysomya regalis* R.-D.

I am indebted to Major E. E. Austen for the following redescription of this species.

Head: Eyes in ♂ meeting above, in ♀ separated by the orange frons, which is practically one-third of head in width; ♂ upper eye facets enlarged. Antennae orange, arista brown. *Thorax* plum purple to metallic green, with pollinose pearl-grey transverse band on anterior and posterior borders, appearing in certain lights as a dark transverse band. *Abdomen* ground colour as thorax, basal portion of second segment and lateral patches on third and fourth segments with shimmering pollinosity; first segment, and hind borders of second and third segments usually darker than remainder of abdomen. *Legs* metallic purplish brown or black. *Wings* hyaline, with a dark brown basal patch, which is continued as a stripe along the fore border to the end of the second vein. Long. 9-13 mm.

See also Patton (1922E, tab. lxiii, fig. 6).

A widely distributed African species which has been taken at Quetta (Baluchistan), just within the boundaries of the Oriental Region. Major Austen has also taken it at St. Vincent, Cape Verde Islands.

***Chrysomya combrea* Walker.**

Musca defixa Wlk.; *Chrysomya nigriceps* Patt.; *Lucilia pinguis* Wlk.

For description see Patton (1922B) and (1922E, tab. lxiii, fig. 3), as *nigriceps*. Found in hill districts throughout India. Also in Malaya.

***Chrysomya villeneuvi* Patton.**

For description see Patton (1922C) and (1922E, tab. lxiii, fig. 5). Only so far recorded from Coonoor, Nilgiri Hills.

***Phumosia* Robineau-Desvoidy.**

Ochromyia B. & Bg. nec Macq.; *Plinthomyia* Rond.

♂ sub-holoptic, ♀ frons with 2 exterior fronto-orbitals. Sternopleurals 2 : 1 : Vein III bristly half way to anterior cross-vein. A pair of small bristles on the face just below the tips of the antennae.

Key to the Oriental species of PHUMOSIA.

1. Second abdominal segment with a median, triangular, blue patch. Third segment all blue dorsally .. *abdominalis* R.-D.
2. Second and third abdominal segments with posterior borders only blue *analis* Macq.

The difference between the two species is one of abdominal colour only, and it is probable that further material will show that they represent only forms of a single species.

Phumosia abdominalis R.-D.

Head: eyes bare. ♀ frons $\frac{3}{4}$ of an eye-width. Frontal stripe brown. Parafrontals yellowish. Antennae yellow, third segment thrice the length of second. Arista biplumose to tip. Palpi yellow, lightly clavi-form. *Thorax* yellow, with brown lines very slightly distinct from general coloration, and some black pile. Scutellum similar to mesonotum. *Abdomen* short-cordiform. First segment all yellow. Second segment yellow anteriorly, with a median triangular patch over posterior two-thirds metallic blue, which extends laterally towards the margins. Third segment blue dorsally, yellow laterally. Fourth segment blue anteriorly, sides and tip yellow. *Legs* yellow, tarsal segments darkened apically. *Wings* clear, base yellowish. Long. 9 mm.

I have not seen any specimens of this species. It is recorded from the Dutch East Indies, Philippines and Borneo.

Phumosia anulis Macq.

Head and *thorax* similar to the preceding species. *Abdomen* yellow, the first and second segments indistinctly bordered with violet, the third with a narrow posterior, fourth with a narrow anterior violet border. *Legs* yellow, apical segments of tarsi brown. *Wings* yellow, costal margin brownish, especially apically. Long. 9 mm.

Described from New Holland, but not since recorded from Australia. Known from the Philippines, the Molluccas, and Buru Island.

Caiusa de Surcouf.

Very close to *Phumosia*, differing by the sternopleurals 1:1, and the peristomal hairs being finer and more numerous than in the former genus. The small pair of sub-antennal facial bristles is absent.

Key to the Oriental species of CAIUSA.

Disc of mesonotum dark, with broad testaceous lateral margins	..	..	..	..	<i>indica</i> Suro.
Disc of mesonotum all testaceous	..	..	..	..	<i>testacea</i> S.-W.
Disc of mesonotum shining black, tinged bluish posteriorly					<i>nigronitens</i> S.-W.

Caiusa indica de Surcouf.

For description see Senior-White (1923A).

Known from South India and Ceylon.

Caiusa testacea Senior-White.

For description see Senior-White (1923A).

Known from Ceylon and Malaya. Probably occurs in South India.

Caiusa nigronitens Senior-White.

For description see Senior-White (1923B).

Known only from Singapore.

Paratricyclea Villeneuve.

♀ with two external fronto-orbitals. Internal frontals commencing below the lower external fronto-orbital. One or more small, irregular, internal frontals. Arista plumose to tip. Acrostichals 1: 1-3, the posterior may be feeble or wanting. Sternopleurals 2:1. The genotype has the third vein bristly to at least half-way to cross-vein, (in ♂ right to it), but in the Oriental species this vein is bristly on the node only. The latter have also a second weak posterior acrostichal.

Key to the Oriental species of PARATRICYCLEA.

1. Legs yellow. Third antennal segment not more than
thrice second *asiatica* S.-W.
2. Legs black. Third antennal segment five times second *toxopei* sp. nov.

Paratricyclea asiatica Senior-White.

For description see Senior-White (1923B).

Only recorded from Matheran (Western Ghats, India).

Paratricyclea toxopei sp. nov.

♀. *Head*: Frontal stripe black, deeply incised above by greyish-yellow ocellar area. Parafrons and parafacia greyish. Facial bristles reaching to half length of third antennal segment, but very weak in upper part of row. Antennae dark grey, third segment very elongate. Vibrissae very strong, crossed. Palpi yellow, narrow throughout. *Thorax* dark grey with paler whitish-grey areas. A pair of well-defined pre-sutural black stripes between the acrostichals and dorso-centrals. Scutellum concolorous. Acrostichals 1: 3. Dorso-centrals 2:3. *Abdomen* black and grey tessellate. Third segment with a row of very strong marginals. *Legs* black. *Wings* grey, base of costa slightly more infuscate. Third vein bristly on node only. Long. 8 mm.

Described from Buru Island, Dutch East Indies, station 9, 17.v.21, (Toxopeus). Type in author's collection.

It is possible that the two species placed in this genus may ultimately separate off as a separate genus, or that this and the next genus, *Paradichosia*, may both sink in a slightly more broadly defined *Tricyclea* Wulp, but until the World genera are far better known in this group than they are at present it seems best neither to erect more nor yet suppress any of the genera already existing.

Paradichosia Senior-White.

Head: Eyes sparsely but distinctly pubescent, ♂ eyes closely approximated. Arista plumose nearly to tip. Cheeks about one-third the height of an eye. Facial ridges bristly to level of middle of third antennal joint. Vibrissae well above mouth margin. Genal row of many bristles. Postocular row distinct on upper half of head. Palpi elongate claviform. Proboscis somewhat elongate, haustellum twice as long as rostrum, strongly chitinized, labella small,

Thorax: chaetotaxy—acrostichals 2:3; dorso-centrals 2:3; post-humerals 3; humerals 3, notopleurals 2; supra-alars 2:2; (the posterior weak); intra-alars 2; post-alars 3 (the interior weak); propleural 1, with a decumbent tuft of bristles below it; mesopleuron with hinder marginal fan of about 8, and some hairs along upper margin and upper half of anterior margin; pteropleuron with some weak bristly hairs; sternopleurals 2:1; hypopleuron with an angled row of about 8; scutellars, a lightly crossed apical, 3 marginals and a pre-apical pair. *Abdomen*: strong marginals to second apparent segment laterally, and on all of third and fourth segments, the last with irregular discals.

Wings: costal spine weak. Vein I bare. Vein III bristly on node only above and below. Squamae bare.

Paradichosia scutellata Senior-White.

For description see Senior-White (1923A).

Only known from the Darjiling District.

Booponus Aldrich.

♀ only. Eye small, genae below half its height. Frons one-third of head-width, the median stripe occupying two-thirds of this. Ocellars strong. Verticals two pairs, the inner convergent. Two small orbitals placed high up, opposite the second and third frontals. Parafrons and paraface covered with small, black hairs which extend over the genae, except in a small clear space near the vibrissae. Vibrissae hardly more than half as far apart as facial ridges at their middle. Face much depressed, receding, parafrons-paraface junction at root of antennae one-third its width in front of eye. Facial ridges hairy and sharp. Antennae small, arista bare below, pectinate above with short hairs which at longest are barely twice the thickness of the shaft, the basal half of which is very thick. Palpi normal. Proboscis short. *Thorax*: acrostichals 2-3:3. Doso-centrals 2:3. Humerals 3. Interhumeral 1. Posthumeral 2. Presutural 2. Notopleurals 2. Intra-alars 3. Supra-alars 2. Post-alars 2. Sternopleurals 1:1. *Abdomen* without macrochaetae. Hind edge of all four segments with a row of longer hairs, not conspicuous. Sternal plates uncovered. *Legs*: mid tibia on last fourth with one small bristle on inner side and one on outer front. Hind tibia with two small bristles exteriorly. *Wings*: fourth vein nearly closing first posterior cell. Third vein with 9-10 bristles from node. No costal spine. Halteres yellow. Squama and supra-squamal ridge both bare.

Booponus intonsus Aldrich.

♀. Wholly light yellow, including tarsi, except a trace of brownish on anterior part of thoracic dorsum. Wings sub-hyaline with yellow veins. Front, face, genae, mesonotum, scutellum, abdomen and femora with numerous, evenly placed black hairs. Long. 6½ mm.

Only known from the Philippines, where it has been bred from the foot of the water buffalo.

Bengalia Robineau-Desvoidy.*Anisomyia* Wlk.; *Ochromyia* Macq.

Head: ♂ eyes as widely separated as ♀, frons one-third of head-width. ♀ with two pairs of fronto-orbitals. Clypeus, (pre-labrum, Bezzi), usually large, distinct and outstanding. Vibrissae either at level of, or well above, the epistomal margin, in the latter case associated with a specially strong development of the clypeus. Antennae long, arista strongly plumose to tip. Palpi long, at most weakly claviform. *Thorax* quadrate, often paler at borders than on disc. A prescutellar pair of acrostichals only. Dorso-centrals usually 1-2:4. Sternopleurals 1:1. *Abdomen*: third and fourth segments with marginal macrochaetae. One group of the genus has also a pair of discal macrochaetae on fourth segment. This includes all the African species. *Legs*: front tibia in ♂ in two groups of the genus bears specifically characteristic arrangements of spines. In the third group (with discal macrochaetae on IV), these spines are practically absent, but the hind tibiae then have long fringes of hairs in the ♂ sex, *Sarcophaga*-like. The resemblance to the latter genus is accentuated by the frequent development of a comb-like set of bristles on the lower side of the mid femur on its apical half. *Wings*: third vein bristly at least half way to anterior cross vein.

Key to the Oriental species of BENGALIA.

- | | |
|--|---|
| 1. Abdomen without discal macrochaetae on fourth segment | 2 |
| Abdomen with discal macrochaetae on fourth segment .. | 7 |
| 2. Clypeus strongly projecting, vibrissae far above mouth margin | 3 |
| Clypeus less strongly projecting, vibrissae level with mouth margin | 6 |
| 3. Large species, front tibia in ♂ variously armed .. | 4 |
| Small species, front tibia with 2 pairs of bristles. ♂ abdomen with two strong spines ventrally on third segment | <i>hastativentris</i> S.-W. |
| 4. Femora and tibiae yellow | 5 |
| Femora more or less black | <i>jejuna</i> var. <i>quadrinotata</i> Big. |
| 5. Front tibia with 7 or more spines in one row, 5th longest | <i>siamensis</i> S.-W. |
| Front tibia armed 5:2 | <i>jejuna</i> Fb. |
| Front tibia armed 3:0 | <i>lateralis</i> Macq. |
| 6. Femora with black rings | <i>escheri</i> Bzi. |
| Femora all yellowish | <i>xanthopyga</i> S.-W. |
| 7. ♂ hind tibiae shaggily fringed | <i>varicolor</i> Fb. |
| ♂ hind tibiae not shaggily fringed | 8 |
| 8. Abdomen usually blackish. Accessory forceps a plain edged plate | <i>bezzi</i> S.-W. |
| Abdomen usually yellowish. Accessory forceps bilobed .. | <i>surcoufi</i> S.-W. |

Bengalia jejuna Fabricius.*Bengalia testacea* R.-D. *Musca torosa* Wied.

For description see Senior-White (1923A).

Occurs throughout the plains of India, as far as the Indus. Also in South India and Ceylon in hill localities. I have seen specimens from Siam (Bangkok). In the Madras Agricultural Department collection is

a ♂, Coimbatore, 5-vi-14, from pupa in soil (Ramakrishna). This would appear to be the first record of the breeding of any member of the genus. Unfortunately, the puparium has not been preserved.

Bengalia jejuna var. **quadrinotata** Bigot.

Bengalia quadrinota Big.

For description see Senior-White (1923A).

I have seen every intermediate stage between the type form and the extreme variety. Originally described as a separate species as from Ceylon, further specimens from that island have not come to hand. It is common on the Indo-Gangetic plain right up to the Indus. I have seen specimens from the Madras Presidency as far south as Walayar Forests in Malabar.

Bengalia lateralis Macquart.

Musca (Anisomyia) favillacea Wlk.; *Homodexia obscuripennis* Big.

For description see Senior-White (1923A).

I have seen Indian material of this species from Mussoorie and Naini Tal in the Himalayas to Cochin in S.-W. India. It is also known from Ceylon, Malaya and the Philippines. Walker's synonym is from Celebes.

Bengalia siamensis Senior-White.

For description see Senior-White (1924).

Only known from the type locality in North Siam.

Bengalia hastativentris Senior-White.

For description see Senior-White (1923A).

Only known as yet from the Matale District of Ceylon.

Bengalia escheri Bezzi.

Head: Frons dull greyish yellow, shortly and sparsely haired. Occiput blackish grey, with a yellow vertical mark. Face grey, a broad black fleck at level of base of antennae. Antennae, third segment yellow, darkened above and on outer side. Palpi yellow, slightly clavate. *Thorax* brownish black, with thick greyish-yellow tomentum, the short pubescence and the bristles all black. Dorso-centrals 1:4. Mesopleurae on lower half with a broad black fleck, broadly white-margined above, and in front and below bounded with a similar fleck above the fore coxae. Pleurae all over fairly long black haired. Scutellum paler (sub-opaque), marginally. *Abdomen* blackish brown, no discal macrochaetae on fourth segment. First segment with a yellow, transparent band, narrowed, but not interrupted, in the middle. Second segment with a similar band on the fore margin, broadly interrupted in the middle. Third segment sometimes with such a band on the fore margin, sometimes all black, like the fourth. The whole abdomen with much white shimmering pollen forming broad bands on the anterior halves of the segments. ♂ hypopygium black. *Legs* yellow, hind tibiae

whitish, with darker tips. Femora with broad black rings, least developed on the front and most on the mid pair, but sometimes not distinct on any pair of legs. ♂ front tibia with 6-7 strong bristles, mid femora with apical 'comb' of spines very strongly developed. ♂ hind femora shortly but thickly haired, hind tibiae with short, rather closely-set pubescence. *Wings* considerably darkened, base and fore margin somewhat yellowish. Long. 14-15 mm.

Described from Formosa, it is also found on the Khasia and Garo Hills in Assam.

***Bengalia xanthopyga* Senior-White.**

For description see Senior-White (1924).

Described from Singapore and the Philippines.

***Bengalia bezzii* Senior-White.**

For description see Senior-White (1923A).

Originally described from Ceylon, occurs throughout the plains of India from the extreme south of the Peninsula to the Indus. Sixty-five per cent of the collection of the Madras Agricultural Department in this group proved to consist of this generally not very common species. From notes by Isaac in this collection this species shares the habits of the larger ones of preying on ant pupae. The Cherat specimens I have seen are twice the normal size, and with their pale yellow abdomen are superficially quite unlike the general form of the species (*vide* Senior-White 1924), but the ♂ genitalia are identical.

***Bengalia surcoufi* Senior-White.**

For description see Senior-White (1923A).

A Himalayan species, extending at least as far west as Dehra Dun, and eastwards onto the Khasia Hills in Assam. Also found in the Western Ghats (Matheran).

***Bengalia varicolor* Fabricius.**

Bengalia latro Meij.

For description see Senior-White (1923A) as *latro* Meij.

The type form is browner and smaller than the blackish form described as a separate species by de Meijère, but the ♂ genitalia prove the conspecificness.

Known from South India, Ceylon, Java, the Philippines and Formosa.

***Zonochroa dioclea* Wlk.**

The name of this species should be deleted from the Oriental List. I am greatly indebted to Major E. E. Austen for the following information. *Musca dioclea*, Wlk. List. Dept. B. M., iv, 869. (1849), was described from an unknown locality (given by Walker, *loc. cit.*, as " ?"). What *may* be the type is now a badly damaged specimen, minus abdomen, proboscis and palpi, and devoid of all legs, except the front femur and tibia on the right hand side. The wings agree fairly well with Walker's

escription, but in certain other respects, so far as the condition of the specimen permits judgment, there are some discrepancies, but not more so than in the usual Walkerian description.

Subsequently, when describing the Diptera collected by Wallace in Borneo, [Proc. Linn. Soc., i, 128, (1857)], Walker recorded *Bengalia dioclea* Wlk., [Cat. Dipt. iv, 869, (*Musca*)], as occurring in Sarawak, and on the strength of this record the species was included by Wulp in his Catalogue, under the genus *Ochromyia* Macq. The specimen collected by Wallace in Sarawak, and identified by Walker as his "*Musca*" *dioclea*, is still in the British Museum and bears the label "Dioclea Walk." in Walker's own handwriting, but is not conspecific with the damaged specimen, (possibly the type) referred to above, neither does it agree with Walker's description of *M. dioclea*.

With respect to the possible type of *Musca dioclea*, Wlk., which certainly belongs to the genus *Zonochroa*, Major Austen informs me that he suspects that this was actually obtained in West Africa. The Museum does not appear to possess any other examples of the same species, but a comparison with allied species suggests the conclusion stated.

In regard to the Sarawak specimen, which I briefly examined when working through the Oriental material in this group for "Senior-White 1924" this specimen is now nameless, and as I stated, is quite unlike any other Oriental species known to me. There is, therefore, at least one undescribed Oriental species of Calliphorine. The Malayan fauna probably holds further novelties in this group, as in most others.

REFERENCES.

- Patton 1920). "Some Notes on Indian Calliphorinae-I." *Ind. Journ., Med. Res.*, viii, 17.
- (1922A). "Some Notes on Indian Calliphorinae-II." *Loc. cit.*, ix, 548.
- (1922B). "Some Notes on Indian Calliphorinae-III." *Loc. cit.*, ix, 555.
- (1922C). "Some Notes on Indian Calliphorinae-IV." *Loc. cit.*, ix, 561.
- (1922D). "Some Notes on Indian Calliphorinae-V." *Loc. cit.*, ix, 570.
- (1922E). "Some Notes on Indian Calliphorinae-VI." *Loc. cit.*, ix, 635.
- Senior-White (1923A). "The Muscidae Testaceae of the Oriental Region." *Spol. Zeyl.*, xii, 294.
- (1923B). "Notes on Indian Muscidae." *Mem. Dept. Agric. Ind.*, (Entom. Ser.), viii, 35.
- (1924). "New and Little-known Oriental Tachinidae." *Spol. Zeyl.*, xiii, 103.
- Surcouf (1920). "Revision des Muscidae Testaceae." *Arch. Mus. Hist. Nat. Paris* (5) vi, 27.
- Villeneuve (1920). *Bull. Soc. Ent. France*, 1920 (14), 223.