Original Article

Keys to the flesh flies of Sarawak, East Malaysia, with descriptions of two new genera and eight new species (Diptera: Sarcophagidae)

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Abstract: The present revisional work is based on very large collections made by the first and second authors during the course of studies. Most specimens of sarcophagid flesh flies were made by the authors during the field surveys programmed by the Sarawak Museum Department, Kuching, Malaysia from 2005 to 2019. A total of 24 genera and 59 species is recorded. Two new genera, Omarisca gen. nov. and Zulisca gen. nov. are established for two peculiar species found in mangroves. Also eight new species are described: Myorhina miyagii sp. nov., M. tomae sp. nov., Burmanomyia barioensis sp. nov., B. pseudoborneensis sp. nov., Sarcorhodendorpha kerohi sp. nov., S. okazawai sp. nov., Hosarcophaga palustris sp. nov., and H. puteri sp. nov. The following seven species are newly recorded from Malaysia: Senotainia albifrons (Rondani, 1859), Burmanomyia aureomarginata (Shinonaga & Tumrasvin, 1979), Hosarcophaga auricauda (Ho, 1938), H. serrata (Ho, 1938), Parasarcophaga idmais (Séguy, 1934), P. montiblensis (Sugiyma, 1990) and P. walshi (Ho, 1938), Revised identification keys to the Malaysian species are provided.

Key words: flesh flies, keys, new species, Sarcophagidae, Sarawak, Malaysia

INTRODUCTION

The Oriental Sarcophagidae were first reviewed by Senior-White et al. (1940) who gave keys down to four genera and 63 species which were mainly recorded from British India and including its adjacent countries. Since then, the last review of the flesh flies in the Oriental Region was by Nandi (2002), but there was no record from Sarawak in Malaysia in his revision. The flesh flies of Sarawak were recorded in very few papers such as Sugiyama et al. (1990a) (1 Gen., 3 spp.) and Kurahashi and Leh (2007) (10 Gen., 21 spp.). After these, Kurahashi and Leh (2008), Kurahashi and Tan (2012) and Kurahashi et al. (2015) described a total of 5 new species from Sarawak. A new revision is thus required since generic concepts and current systematics have changed and enough additional new species were discovered.

The present revisional study has been based on very large collections mainly made by the first (HK) and second (SHT) authors during field surveys in the project entitled “Study on taxonomy and bionomics of two-winged flies, Diptera in Sarawak, East Malaysia”. The project was conducted with the coordination and cooperation with the Sarawak Museum in Kuching. It was initiated in 2005 when the Japanese team (Representative: Dr. I. Miyagi) collected and identified mosquitoes and flies for the Sarawak Museum Reference Collection and its database. It was our sincere intention to assist the Sarawak Museum (Sarawak Government) in collecting and documenting the complete fauna and bionomics of two-winged flies in Sarawak over the years. The research was carried out in various habitats such as primary forests, farms, mangroves and beaches including some parts of National Parks from 2005 to 2012. We already published some results of surveys in 2005 and 2006 (Kurahashi and Leh, 2007). The present paper deals with a partial result of the surveys mainly made from 2007 to 2019, and presents 24 genera and 59 species of Sarcophagidae. Of these, two new genera and eight new species are described and 7 are newly recorded from Malaysia. Revised identification keys are provided.

MATERIALS AND METHODS

The collected samples were mounted with insect pins in good order. All specimens were sorted into subfamilies
and preserved in insect boxes for unidentified materials. Identified specimens are mostly preserved in the Sarawak Museum (as Natural History Reference Collection), Kuching (SM). Some were shared and deposited in several museums and institutions such as National Museum of Nature and Science, Tsukuba (NSMT); International Department of Dipterology, Tokyo (IDD); Forestry Department Sarawak (FDS); University of Malaya, Kuala Lumpur (UM); Bishop Museum, Honolulu (BPBM); Biosystematics Laboratory, Faculty of Social & Cultural Studies, Kyushu University, Fukuoka (BLKU), and Personal Collection of S. H. Tan (PCSHT). Name of museums, institutions and private collections are indicated in () in the list of species in Appendix III.

**General Morphology, Terminology and Definition**

Morphological terminology generally follows the tradition ones which previous authorities used in their works (Rohdendorf, 1937; Senior-White et al., 1940; Fan, 1965; Kano et al., 1967; Lopes, 1977; Verves, 1979 & 1980; Verves, 1980; Pape, 1987; Nandi, 2002), and some synonyms were selected for practical purpose. The adult morphology and the terminology used for descriptions are explained in Figs 1–20 in Appendix II. The modern and morphological terminology proposed is adopted from Manual of Nearctic Diptera (McAlpine, 1981) and followed by Rognes (1991), Pape (1994) and Verves (1998). The new terminology is also important in reading and understanding the description of their recent papers. These new morphological terms are shown in [ ]. For details, we referred to a text book such as Borror and DeLong's Introduction to the Studies of Insects, 7th edition where a comparison of these two terminologies is given. Other important synonyms used by different authorities are also cited in ( ). The term “frons index” is the same as Fan’s index and measurement of frons was performed in a similar manner to Fan (1965). Male and female sexual organs and terminology are illustrated and named mainly after Sugiyama and Kano (1984). All figures of general morphology in Appendix II are drawn by the second author with representatives of the most common species, Boettcherisca karnyi Hardy, 1927 of Malaysian Sarcophagidae.

**External anatomy**

The body of sarcophilagid flies consists of head, thorax and abdomen provided with their relative appendages. As observed in other Diptera, an extraordinary development of the mesothorax and its appendages “two-wings”. The metathoracic wings have been reduced to small knob-like organs called “halteres”. The mouth-parts are haustorial and the genitalia caudal.

The **Head** takes the form of a hemispherical capsule with the compound eyes laterally. Its flat side towards the thorax, and connected thereto by a narrow and extremely mobile neck.

The **Eye** (Compound eye) is the most conspicuous feature, and may occupy more than one-third of its surface in many species of the subfamily Miltogrammatinae. The eyes are widely separated by the frons or anterodorsal surface of the head capsule, a condition to which the term dichoptic is applied. In the males of some species, the eyes may be closely approximated on the frons, a condition which is termed subholoptic to distinguish it from the completely approximated or holoptic condition generally found in the male of Calliphoridae. The degree of separation of the eyes may be useful to the identification of species. The presence or absence of hairs on the surface of the eye may useful for identification.

The **Antenna** is paired, and the most noticeable appendage of the head. Its base is arisen from the middle of the anterior convex surface of the head. The antenna consists of three segments, the basal one “first antennal segment or antennal segment 1, AS1,” being smallest and terminal one “third antennal segment or antennal segment 3, AS3,” [first flagellomere] the largest. The **Arista** (style, flagellum) is a filiform appendage of the third antennal segment. The arista may be bare or haired, in which latter case the hairs bear on a dorsal and ventral surface, a condition which termed “plumose” to distinguish it from the condition hairs in a dorsal row alone “pectinate”. A leaf-like flattened arista observed in the male of Phylloteles is one of peculiar cases.

The **Ocellar triangle** is a small raised area of the dorsal surface of the head-capsule.

The **Ocellus** is a simple eye. Usually three ocelli are developed and arranged close together within the ocellar triangle. The size of anterior ocellus and the width of ocellar triangle (or a distance between posterior two ocelli) are often used for comparing the width of frons changed with the development of eyes.

The **Ptilinal suture** (frontal suture) is a suture in the form of an inverted U lying close to the base of antennae. The arms of the U are extending down on either side of antennae. This is the most important characteristic of the Muscomorpha to distinguish it from other higher taxa of Diptera. The Muscomorphous fly accomplishes this suture by evagination of a sack-like ptilinium after the fly is emerging from the puparium. After eclosion, the evagination is completely withdrawn, but the suture remains clearly visible.

The **Peristome** (epistome, epistoma, stoma) is the lower edge of the head-capsule immediately surrounding the buccal cavity, to which, incidentally, the term peristome has often been applied. The term **Epistome** best restricted to actual rim of the face in front view. The mouth-parts consist of a soft and retractile proboscis and the **Palpus**
whose shape, size and colour often offer very useful taxonomic characters.

The Occiput is the whole surface of the back of the head towards the thorax. Some authors restrict the term to that part of this surface which lies above a horizontal line drawn through the foramen of the neck, and in this case the term Succiput is applied to the lower portion.

The Frons is the anterdorsal surface of the head capsule extending from the upper margin of the occiput, around the ocellar triangle, forward and down between the compound eyes to the ptilinal suture. It may be taken to end at a line drawn horizontally through the bases of antennae although there is no morphological character to define its lower limits. The frons is subdivided into several regions for the sake of taxonomic description.

The Vertex is that part of the frons on the top of the head immediately around the ocellar triangle and in front of the occiput. Its posterior margin joins the vertical margin of the occiput. Its anterior margin is not clearly defined.

The Frontal stripe (frontal vitta, frontalia) is a clearly defined part of the frons running down from the vertex in front of the ocellar triangle to the ptilinal suture. Its shape and colouration are important to distinguished species. In some cases of males, it is reduced to a fine median line passing down at the middle of the frons. The ratio of its width to adjacent parts is sometimes noted for description.

The Parafrontal [fronto-orbital plate] (one of parafrontalia, parafrontale, orbit) constitutes the rest of frons on either side, and extend from the vertex down between the eye and the frontal stripe to an arbitrary line drawn horizontally through the bases of the antennae.

The Parafacial (one of parafacialia, parafaciale) is that areas joining the parafrontal below an arbitrary line drawn horizontally through the antennal bases which is bounded by the ptilinal suture and the anterior margin of the eye.

The Face is the region of the head-capsule which, bearing the antennae, is enclosed by the ptilinal suture and limited ventrally by the epistome or the anterior margin of the peristome. The part just above the insertion of the antennae is called the Lumen (Lunula). The antennae are sometimes separated by the Facial carina (median carina, keel). The Facial ridge (one of facialis) is lateral to the antennae and extends downwards along ptilinal suture towards the epistome.

The Gena (jowl, bucca, cheek) is that area on either side of the head-capsule lying above the peristome and below the parafacial. The Postgena (metacephalon) is the hairy narrow part at the posterior lower corner of head capsule. The Mediana is a term that has been applied to a naked part between parafacial and anterior part of gena. The Vibrissarium is a term that has been applied to a setulose part around Vibrissa.

The Postorbit is the narrow stripe of head-capsule behind the compound eyes and in front of the occiput joining up the gena below and the parafrontal and the vertex above.

The Thorax is morphologically composed of three segments. These are the Prothorax, bearing the anterior pair of legs, the Metathorax, with the middle pair of legs and the wings, and the Metathorax, bearing the hind legs and the halteres. The entire visible dorsal surface is composed of what is morphologically the mesonotergite although it is usually referred to as the Mesonotum (dorsum, disc). The mesonotum is superficially divided into three distinct parts which serve as useful information in describing the features of the thoracic dorsum.

The Scutellum is the hindmost section of the dorsal surface of the thorax. The Postscutellum (postnotum, metanotum) is a convexity of the thoracic wall beneath scutellum and above the junction of the thorax with the abdomen. The relatively undeveloped condition of postscutellum is one of the characteristics of Sarcoptagidae.

The Scutum is that portion of the thorax which is anterior to the scutellum, from which it is demarcated by a deep groove. The scutum also has a shallow groove on its surface named as the Transverse suture. The anterior portion or presutural area is sometimes named as the Prescutum to distinguish it from the post sutural one, and in this case the term scutum is applied to the posterior one. The transverse suture is very important as a reference point in describing the features of the thorax.

The Spiracle (one of stigmata, one of stomata) is the opening on the tracheal system. There are two on the lateral walls of the thorax, the Mesothoracic (prothoracic) and Metathoracic spiracles. The colouration of spiracles, actually of flaps is of taxonomical importance.

The Propleuron [proepisternum] is the area of the lateral wall of the thorax just anterior to the mesothoracic spiracle. The hairy or naked condition of this plate must be noted for classification.

The Pteropleuron (anepimeron) is a large, somewhat convex plate beneath the root of the wing. The bristles on the pteropleuron are more or less important in classification.

The Mesopleuron (anepisternum) is also a large plate in front of the pteropleuron. The arrangement of bristles and pollinosity on it are also become important in classification.

The Sternopleuron [katepisternum] is a large, triangular, slightly convex plate at the root of the mid leg. The arrangement of the Sternopleural bristles is characteristic of Sarcoptagidae.

The Hypopleuron [katepimeron+meron] is another lateral area just behind the pteropleuron. The presence of bristles on it is an important character to separate Sarcoptagidae from Scathoplagidae, Anthomyiidae and
Muscidae.

The Prealar knob (subalar knob) is a small knob that can be seen just below the wing. The prealar knob is a part of the pteropleuron, but its shape and the presence or absence of hairs on it have systematic significance.

The Postalar declivity is a kind of trough found below the edge of the scutellum, running up from the root of the wing above the line of attachment of the squama. The presence or absence of hairs on it should be noted.

The Suprasquamal ridge is a ridge that runs along the ventral side of the postalar declivity. The squama appears to attach to it

The Supraspiracular convexity [katatergite] is a convex bulge which locates just above the metathoracic spiracle. The hairiness on it is important to distinguish some groups in the Calliphoridae.

The Pleurotergite [anatergite] is another bulge below the thoracic squama and above the base of halter. The presence or absence of setulose hairs on it is sometimes useful for taxonomy.

The Wings: Only fore pair of the Wings is developed as in all winged Diptera. The hind pair is replaced by the Halteres which possess specialized sensory functions, but have no taxonomic value other than those of colour. The venation of the wing seems to be very constant within the family Sarcophagidae as shown in Appendix II (Fig. 16). However, good specific characters are often found in the rows of setulae which exist on the upper or lower sides, or both, of certain veins. Proportions of the costal sections (CS) and colourations of the Epaulet [tegula] and the Basicosta are good characters and must be examined for description. Colouration of the wing membrane into patterns is rarely found in the genus Phyloteles, Miltogrammatinae. An accessory lobe of wing, the Alar squama (upper squama), is developed near its root and joins a more broad lobe, the Thoracic squama (lower squama) at base. The thoracic squama covers the halter, and its shape and hairiness on upper surface have some systematic value.

Three pairs of Legs, Fore, Mid and Hind legs, are well developed, but show remarkably few modifications in Sarcophagidae. It is only in the chaetotaxy of the legs that useful characters are found. In describing the chaetotaxy of a dipteran leg, certain conventions are required. The leg is considered as if spread out at right angles to the longitudinal axis of the body, and as if each segment was of square, and not of round, or elliptical in cross section. There are thus anterior and posterior, dorsal (superior) and ventral (inferior) sides, and positions for bristles are simply shown as the anterodorsal bristle (ad), even in cases of intermediate positions between the four main surfaces. Individual species, moreover, show special developments, often sexual dimorphisms, in this respect. In some species of the Miltogrammatinae, the male has fine long hairs on the fore tarsus. In many species of the tribe Sarcophagini, the male has strong hair fringes on the ventral (inferior) surface of the hind femur and tibia, sometimes also on the mid femora and tibia. The hair fringes often become double and develop on both anteroventral and posteroverentral surfaces of femora and tibiae.

The Abdomen consists of four visible segments in Sarcophagidae. The dorsal part of the visible surface consists of the Tergites which pass well down the sides of the abdomen and on to the ventral surface. The median part of the ventral surface morphologically consists of smaller sclerites or the Sternites. The first visible segment consists of the combined tergite 1+2 and sternites 1 and 2 in the sarcophagids. The sternite 2 is enlarged and overlapping tergite 1+2 in Sarcophagidae, and not reduced and submerged beneath the tergite 1+2 as in Tachinidae. The shape and the vesture of bristles or spines on sternite 5 are very useful to identify the male of sarcophagids. The visible tergites bear marginal and discal bristles whose positions may be important in the sarcophagid classification. The remaining segments comprise the postabdomen which is modified to the sexual organs for copulation and larviposition. The male postabdomen shows the modification and differentiation among the subfamilies of Sarcophagidae. In the subfamily Sarcophaginae, the first large dorsal sclerite behind the tergite 5 is usually termed the First genital segment (G51) in taxonomical descriptions and has been morphologically considered the circumvented and combined sternite 7+8. The following dorsal sclerite is taxonomically called the Second genital segment (G52) and morphologically named the Epandrium. The tergite 6 is disappeared between tergite 5 and G51 in the subfamily Sarcophaginae whereas it remains developed in front of G51 in the Miltogrammatinae. The tergite 6 is amalgamated with G51 in the subfamily Paramacronychiinae. Both states of the tergite 6 are considered to be derived from that of the subfamily Miltogrammatinae in a different way of evolution. The sexual organs are called the Genitalia and often collectively called the Hypopygium (terminalia). The genitalia highly modified in both sexes, and in the male afford characters of the greatest value in separating species in the Sarcophaginae which are often inseparable by the other external ones. The female genitalia are greatly modified to lay larvae in the sarcophagids, and also afford good characters in identifying the problematic species. They will be considered below.

Male genitalia

Examination of the Male genitalia is of preeminent importance to identify the sarcophage species which have a very similar external appearance to each other. Their external structure must be referred in some details to understand the phylogenetic relationships among the species groups in the family. Fundamentally, they consist of
modifications of the tergites 6–10 and their appendages. The tip of the abdomen has a pair of processes, the Cerci (mesolobes, inner forceps, superior claspers) which are apparently identical with the anal cerci of the primitive insects. They are highly chitinized and downwardly directed in most species of Sarcophagidae, but bent posteriorly at median portion in the tribe Protodexiini. The anus opens above them. The Surstylus (paralobe, outer forceps, accessory clasper) is more or less developed exterior and slightly anterior to the cercus, but not developed at all in certain genera. The surstylus is always much less strongly chitinized than the cercus, and are morphologically considered to be outgrowth of the pleural margin of epandrium. The first genital segment (GS₃) serves as a sheath for the Aedeagus (phallosome, penis), and retracted into the body of the abdomen, appearing from outside as a small and frequently glossy, chitinous knob at apex. The tips of cerci are likewise inserted beneath the aedeagus, into the cavity of GS₃.

The Aedeagus is the general term for the copulatory and ejaculatory apparatus. The aedeagus consists of three parts, apodeme, theca and phallus.

1. The Apodeme is observed in the second genital segment (GS₂) after dissecting and removing male genitalia. The Ejaculatory apodeme attaches the end of the vas deferens. The shape of the ejaculatory apodeme is characteristic in some species, but its sclerotization changes according to age after eclosion. The Aedeagal apodeme is connected with the base of theca.

2. The Theca [basiphallus](phallophore) is a sclerotized tube uniting the aedeagal apodeme to the phallus. The theca is generally articulated with the apex of phallus, but totally amalgamated in some tribes such as Paramacronychiini, Goniophytoini and Raviniini.

3. The Phallus [distiphallus](phallosome) is placed at the apex of the theca and usually articulated with it. Several important structures are developed for copulation and modified in different species. The detailed illustration of the following components is very useful for identification of species and understanding the phylogenetic relationships.

   a) The Corpus [paraphallus] is the posterior part of outer wall of the phallus. It is symmetrically sclerotized but the median portion is usually membranous or less sclerotized. The degree of sclerotization varies in species.

   b) The Juxta [acrophallus] (apical plate) is a shovel-like sclerotization at apicoposterior part of the phallus. The juxta is usually distinguished from the corpus by the membranous zone, but sometimes both are amalgamated to become one piece of sclerite. The aedeagus of the subfamily Miltogrammatinae lacks the juxta.

   c) The Juxtal process (process of apical plate) is a paired prolongations projected anteriorly from the base of the juxta, but sometimes not developed in groups and species.

   d) The Ventralia [hypophallic lobe](vesica of some authors) is the antero-proximal flap-like appendage of the phallus projecting forward from basal membranous portion of the phallus. The size, degree of sclerotization and number of lobes is varied by groups and species. The ventralia is usually a single paired structure, but rarely bifid at its base.

   e) The Vesica [ventral plate](harpe of some authors) is an anterior- to anteroventral extension of sclerous corpus. It usually arises at anterior extension of corpus.

   f) The Harpe [paraphallus] is a posteroverentral extension of sclerous corpus.

   g) The Median process is an internal structure between the base of the right and left styli, and attached to the median portion of inner surface of the juxta as generally observed in the tribe Sarcophagini. The tribes Raviniini and Protodexiini lack this structure. The median process is important to understand the phylogeny of the subfamily Sarcophaginae. The apical prolongation of median process is sometimes specified and called as Capitis (Roback, 1954).

   h) The Cap is a paired symmetrical sclerotization curved into the phallus from the base of ventralia. The cap is developed in some species of the tribe Sarcophagini.

   i) The Stylus (lateral filament) is a paired ejaculatory apparatus observed beside median process in the phallus. The base of stylus is usually coil-like in appearance and its body is often slender sclerous tube in the tribe Sarcophagini. This tube is made of two thin rounded sclerous stripes. The Raviniini lack stylus. In the Protodexiini, it is a paired small process projecting from the base of juxta. The stylus is also important to consider the phylogeny of the subfamily Sarcophaginae.

   j) The Dorsal rod is a paired sclerotized rods arising from lateral sides of the phallic tube to the base of ventralia. This sclerotization is observed only in the tribe Raviniini. The dorsal rod is considered to be an advanced form of ventral sclerotization.

   k) The Phallic tube is a prolongation of membranous phallus and located between dorsal rods and its orifice is sclerotized. It is observed in the primitive sarcophageine flies such as the tribe Raviniini.

   l) The Ventral sclerotization is a paired sclerotized plate observed in the hypothetical phallus of the family Sarcophagidae. The basal end is attached to the apex of corpus. Each arm runs medially and anteriorly. The ventral sclerotization seems to be modified in differentiation of each tribe.
Female genitalia

The female postabdomen, which is modified to form the so-called Ovipositor or Larvipositor, almost without exception appears to have the four visible segments. The first segment has the well sclerotized tergite 6 (T₆) and sternite 6 (S₆/ST₆), accompanying two pairs of spiracles (sp 6 & sp. 7). The second, third and fourth segments usually have more or less developed tergites 7–8 (T₇–T₈) and sternites 7–8 (S₇–S₈/ST₇–ST₈), but tergite 9 and sternite 9 are disappeared. The last sternite, probably sternite 10 has been named the Subanal plate (SBAP). In most species of sarcophagid flies, the subanal plate has no Lingula which surrounds the genital pore and may be derived from the sternite 9. The last tergite is named supraanal plate (SPAP), which seems to be derived from tergite 10 or tergite 9+10. Exterior to the supraanal plate are the Cerci. The anus opens between SPAP and cerci. The genital pore opens apparently between ST₈ and SBAP in most species of Sarcophagidae while it is found between ligulæ of SBAP in the oviparous flies of Calliphoridae.

Abbreviations of morphological terms used in text and/or figures

General morphology:
AS₁, AS₂, AS₃ = first, second, third antennal segment
CS₁, CS₂, CS₃ = first, second, third costal section
C = costa
ce = cercus
GS₁, GS₂ = first, second genital segment
hy = hypandrium
ep = epandrium (= GS₂)
S₁–S₁₀/ ST₁–ST₁₀ = abdominal sternites 1–10
ss = surstylus
T₁–T₁₀ = abdominal tergites 1–10

Wing venation:
R₁ = first longitudinal vein
R₂₃+ = second longitudinal vein
R₄₅+ = third longitudinal vein
r-m = anterior cross vein
M or M₁₂+ = fourth longitudinal vein
CuA₁ = fifth longitudinal vein
A₁+CuA₂ = sixth longitudinal vein
A₂ = axillary vein
dm – cu = posterior cross vein

Male terminalia:
a = aedeagus
dr = dorsal rod
aa = aedeagal apodeme
h = harpe(s)
ea = ejaculatory apodeme
mp = median process
p = phallus
cap = cap
c = corpus
s = stylus
j = juxta
pt = phallic tube
jp = juxtal process(es)
t = theca
v = vesica
vs = ventral sclerotization
vn = ventralia

Abbreviations for chaetotaxy:
Head:
acoc = accessory ocellar bristle(s)
iv = inner vertical bristle(s)
oc = ocellar bristle(s)
occ = occipital hair-like seta(e)
ori = frontal bristle(s)
ors = fronto-orbital bristle(s)
ov = outer vertical bristle(s)
poc = postoccipital bristle(s)
pooc = postocellar/ postvertical bristle(s)
poor = postorbital/ postocular bristle(s)

Thorax:
ac = acrostichal bristle(s)
dc = dorsocentral bristle(s)
h = humeral bristle(s)
ia = intra-alar bristle(s)
n = notopleural bristle(s)
pa = postalar bristle(s)
ph = posthumeral bristle(s)
pp = propleural bristle(s)
prs = presutural bristle(s)
pst = prostigmatic bristle(s)
sa = supra-alar bristle(s)
sc = scutellar bristle(s)
st = sternopleural bristle(s)
hp = hypopleural bristle(s)
dsc = discal scutellar bristle(s)
msc = marginal scutellar bristle(s)

Legs:
a = anterior/anterolateral bristle(s)
ad = anterodorsal bristle(s)
av = anteroventral bristle(s)
d = dorsal bristle(s)
p = posterior/ posterolateral bristle(s)
pd = posterodorsal bristle(s)
prv = posteroventral bristle(s)
v = ventral bristle(s)

Abdomen:
db = discal bristle(s)
mb = marginal bristle(s)

Width, height, length and angle:
WF = width of frons
WH = width of head/ head width
WE = width of eye/ eye width
WP = width of parafacial
WAS3 = width of 3rd antennal segment
HE = height of eye/ eye height
HG = height of gena
HH = height of head/ head height
LE = length of eye/ eye length
LH = length of head/ head length
AF = frontal angle
AV = vibrissal angle
Ratio and index:
frons index = WF/WH
ratio of WAP = ratio of width of anterior to posterior part of frontal stripe

Definition of Armature and Ornament (mainly followed after Fan, 1992)
The Hair: Generally smaller and thinner than the bristle, however it can be bent.
The Bristle: Straight and thick hair. Hair socket is found at the base, usually the base is thicker than the tip.
Position, number, length and tendency are fixed and clear; however, there are variations. If the bristle is broken,
tendency can be determined by the edge of hair socket; the edge where hair socket grow higher is the bristle
growth direction.
The Seta: Hard and straight hair, the big one can be as big as bristle, while the small one can be as small as the
hair at the vein of wing; smaller seta called setula. Some of the researchers used “seta” as bristle.
The Macrochaeta: Huge hair, is a combination of bristle and big seta.
The Microchaeta: Tiny hair, usually only able to be observed under the dissecting microscope with enlargement
of high magnification.
The Fringe: Thin and long hair, curl at the tip, usually grow in high density and in row; for example the hair of
tibia, hind leg of Sarcophagidae. Sometimes “fringe” is used as hair at edge of certain body part and this named as
“marginal fringe”.
The Soft hair: Soft hair with high density, for example, body hairs in “Hypoderma”.
The Villi: High density, short and soft hair.
The Cilia: Very thin and small hair, however, able to be observed under the dissecting microscope with lower
magnification.
The Pubescence: Unclear thin, soft with high density hair when observe under the dissecting microscope with
enlargement of low magnification.
The Tomentum: Two meanings. First, independent curly hair like soft hair of sheep. Second, modified scales,
short and flat hair, usually small and overlap to each other, however, independent hair structure can be observed
after enlargement, this named “scaled hair”.
The Pollen/ Pollinosity/ Pruinosity/ Tessellation: Very tiny with high density small scales, forming a piece of
outer surface powdered patch. These patches will reflect differently under different light intensity, for example the
greyish pollinosity on abdomen usually produces a checked/tessellate pattern/tessellation in the Sarcophagidae.
The Pile/ Pilosity: Hair which grow to become pieces at the outer surface of the body.
The Piliferous spots/ Setigerous spots: When hair which grow on the pollen, pollinosity or pruinosity, spot
surrounding of the hair socket which lack of pollen, pollinosity or pruinosity.
The Spine: Very big, thick, hard and straight structure; smaller one called spinula.
The Ctenidium: Very big, thick, hard and straight structure; smaller one called spinula.
The Teeth: Structure of teeth-shape or calcareous projection on the body wall; for example this structure often
observed on ventral surface of fore femur in Hydrotaea (Diptera: Muscidae).
The Patch: Pieces of regular or irregular markings. Formation of marking is because the surface of the body
having different colour based, and also due to lack of or having high or low density; thick or thin of various
structures (e.g. pile, scaled hair, pollen) on the body surface. The colour of pollen, stripe and band, especially
at the dorsal of thorax and abdomen, will change with different light intensity, therefore, for the description of
marking colour, the light source must be directed to the fly at 90 degrees. So that, both sides (left and right) of fly
receive equal light intensity and the observant must look from top of the fly at 90 degrees (same direction with
light source). The black and white checkerboard-like pattern on the abdomen of Sarcophagidae is an example of
marking of pollen. The marking formed by the dense villi is called “marking of villi”. The marking formed by dense
cilia is called “marking of cilia” while the marking formed by the dense seta is called “marking of setae/bristles”.
Lastly, the marking formed by dense spine is called “marking of spines”.
The Stripe/ Vitta: The marking formed parallel (elongated) with the body.
The Band/ Fascia: The marking formed across (90 degrees) the body.

Diagnosis of Sarcophagidae
The family Sarcophagidae can be recognized by the combination of following characteristics:
Head: dichoptic in both sexes, but frons of male usually more or less narrower than that of female; eyes never
closely approximated at narrowest point of frons, consist of almost uniform facets in θ2; ptilinal or frontal suture
distinct; antennae consist of 3 segments, 2nd segment (AS2) with longitudinal cleft on outer surface; 3rd segment
(AS3) largest and bearing arista as terminal style.
Thorax: black, not metallic, more or less greyish pollinose, with more or less distinct dark longitudinal stripes, usually 3 broad black ones, with complete transverse suture; postscutellum not developed, not convexed; outer posthumeral bristle (ph) located even with or mesad of presutural bristle (prs); notopleural bristles (n) generally 4, rarely 2; hypopleuron with row of bristles (hp) along posterior margin.

Wings: well developed, longer than thorax; sixth longitudinal vein (A1 + CuA1) extending more than 1/2 way to wing margin, but not reaching margin; fourth longitudinal vein (M, M1) and third longitudinal vein (R4) bend forward with an angle and meet third longitudinal vein (R5); 1st posterior cell (r4+5, r5) narrowed or closed apically; thoracic or lower squama well developed, lobulate, concealing halter.

Legs: tip of tarsus with two pulvilli and claws, without pulvilliform empodium.

Abdomen: black, not metallic, more or less covered with greyish pollinose which usually produces a tessellate pattern; sternite 2 (ST2) enlarged and overlapping tergites.

Female—Larviparous.

These characters are important criteria to distinguish the Sarcophagidae from other two-winged flies or Diptera.

TAXONOMIC KEYS

Key to the subfamilies of East Malaysian Sarcophagidae

1. Hind coxa hairy on posterior surface; n 4, two strong primary bristles, two smaller subprimary bristles; sternites 3 to 4 fully exposed and overlapping ventral margins of corresponding tergite ........................................................................ 2

— Hind coxa bare on posterior surface; n 2; sternites 3 to 4, more or less concealed by ventral margin of corresponding tergite ........................................................................ 2

2. Arista plumose or pubescent; hypopygium large; GS1 amalgamated with tergite 6 with row of erect marginal bristles [No record from Malaysia and Singapore] ........................................................................ 2

— Arista bare or pubescent; hypopygium small; tergite 6 free, not amalgamated with GS1 ........................................................................ 2



Key to the tribes and genera

1. Fore tibia with 3–4 p, rarely 2; metathoracic spiracle open, without operculum; legs long, bristly, with elongated claws in ♂; parafacial and gena broad, hairy; oral margin in profile not projecting forward; body covered with pale dusting, sometimes having long ovipositor extruded; length 5–10 mm ............................

— Fore tibia with 1–2 p; metathoracic spiracle covered with operculum; legs short, usually with short claws, sometimes with elongated ones in ♂ of Senotainia; but in this case epistomal margin in profile angulate, and body length not more than 6 mm; colouration variable, often with pale spots in contrast with black bands and spots. ............................ 2

2. Head hemi-spherical; eyes very large; numerous fine proclineate 1–2 strong reclinate fronto-orbital bristles (ors) present (Kurahashi, 1970: 95, Fig. 1C) ............................

— Head subquadrate or conical; eyes usually normal or very large in size; 0–4 (proclineate)+1–3 (reclineate) ors (Kurahashi, 1970: 95, Fig. 1A & B). ............................ 3

3. Head conical; eyes very large; ors 2+3 (Kurahashi, 1970: 95, Fig. 1D) Tribe Metopiini, Metopia Meigen (3 spp.)

— Head subquadrate; eyes usually normal in size; ors 0–4+1–2 (Kurahashi, 1970: 95, Fig. 1A, B) ............................ 4

4. Fore tibia with 2 p; claws and pulvilli long in both sexes (Kurahashi, 1970: 97, Fig. 2A), sometimes normal in ♂; abdominal tergites with three spots on dorsum ............................ Tribe Senotainiini, Senotainia Macquart (2 spp.)

— Fore tibia with 1 p; claws and pulvilli normal in both sexes (Kurahashi, 1970: 97, Fig. 2B); abdominal tergites either with three spots or dark marginal band, or with three spots and dark marginal bands forming mountain-shaped marks, or tessellate, sometimes with three dark spots ............................ 5

5. Eye bare; arista not flattened, usually elongate or rod-like; abdominal tergites with dark marginal band or tessellation ............................ Tribe Phyllotelini. . .6

— Eye hairy, if bare, then arista flattened, leaf-like in ♂; abdominal tergites with three dark spots ............................ Tribe Phyllotelini. . .7

6. Arista not flattened in ♂; abdominal tergites with three black elongated, round or triangular spots [No record from Malaysia and Singapore] ............................ Phylloteles Loew ............................ HOPACEPHALE Macquart

— Arista flattened, leaf-like in ♂; abdominal tergites with three dark spots [No record from Malaysia and Singapore] ............................ Phylloteles Loew

7. Facial ridge with row of black bristles on more than 1/2 way from vibrissa to antennal base ............................

— Facial ridge with row of black bristles on more than 1/2 way from vibrissa to antennal base ............................
Key to the species of Amobia
1. Basicosta black; thoracic dorsum without three longitudinal black stripes; presutural ac developed. .................................................. A. quatei Kurahashi
— Basicosta yellow; thoracic dorsum with three longitudinal black stripes; presutural ac absent [Sabah, No record from Sarawak] ............................ A. auriceps (Baranov)

Key to the species of Protomiltogramma
1. Paraproct and parafacial silver-white pollinose; thoracic dorsum greyish pollinose, with three broad black longitudinal stripes which become more distinct when viewed behind; tergite 5 with tuft of bristles on posteroventral corner in ☐ .......................... P. puteri Kurahashi & Leh
— Paraproct and parafacial golden pollinose; thoracic dorsum blackish, dark brown pollinose entirely, without distinct black longitudinal stripes; posteroventral corner of tergite 5 without tuft of bristles in ☐ ............................ P. parafacialis Kurahashi & Leh

Key to the species of Miltogramma
1. Third antennal segment (AS,) largely orange yellow [Sabah, No record from Sarawak] .......................... M. angustifrons (Townsend)
— AS, entirely or largely fuscous brown to black, especially on outer surface .......................... M. iberica Villeneuve

Key to the species of Senotainia
1. Propleuron hairy .......................................................... S. navigatrix (Meijere)
— Propleuron bare .......................................................... *S. albifrons (Rondani)

Key to the species of Metopia
1. Basicosta black .......................................................... 2
— Basicosta yellow .......................................................... 3
2. Vein R₁ bare [Sabah, No record from Sarawak] .................. M. sauteri (Townsend)
— Vein R₁, setulose [Sabah, No record from Sarawak] .................. M. nudibasis (Malloch)
3. Tergite 1 + 2 with erect, sometimes decumbent median mb; alar and thoracic squamae whitish; paraproct and parafacial silver-dusted in ☐; body silver-grey pollinose .......................... M. argyrocephala (Meigen)
— Tergite 1 + 2 without median mb; alar and thoracic squamae yellowish; paraproct and parafacial yellowish-silver pollinose in ☐; body yellowish-pollinose .......................... M. sufenoensis Fan

Subfamily SARCOPHAGINAE

Key to tribes and genera
1. Arista pubescent, hairs not exceed width of arista; st 1 + 1; body densely silver-grey dusted; abdomen weakly tessellated ........................................ Leucomyia Brauer & Bergenstamm
— Arista long plumose, plumose hairs longer than width of arista; st 1 + 1 + 1, rarely median one weakly developed or absent in Shinonagaella urceola; body more or less darkened, grey pollinose, abdominal pollinosity produce irregular checkered patterns or tessellation, but sometimes dark spots and median stripe in ☐ of Blaesoxipha spp. .......................................................... 2
2. Row of ori nearly straight in dorsal view [No record from Malaysia] .......................................................... Tribe Raviniini, Ravinia Robineau-Desvoidy
— Row of ori distinctly diverging at lunule .................................................. Tribe Protodexiini, Blaesoxipha Loew, B.rufipes (Macquart)
3. Presutural ac absent, at most relatively weakly developed; ac present on anterior and / or posterior prescutellar areas; ☐ sternite 5 usually with spine-like bristles along inner margins of lateral lobes .......................... Tribe Sarcophagini. 4
4. Gena entirely clothed with yellowish white hairs. 

— Gena clothed with black hairs at least in part, often largely on anterior part, or sometimes entirely.  

5. Propleuron clothed with yellowish white hairs; sternites 1–2 clothed with yellowish hairs in \( \varphi \) and \( \varphi_2 \); GS\(_1\) black in \( \varphi_1 \); tergites 6–7 and sternites 6–7 black in \( \varphi_5 \); AS\(_s\) black; st 1 + 1, sometimes 1 + 1 (fine) + 1. 

— Propleuron bare; sternites 1–2 clothed with black hairs in \( \varphi \) and \( \varphi_2 \); GS\(_1\) red in \( \varphi_2 \); tergites 6–7 & sternites 6–7 red in \( \varphi_5 \); AS\(_s\) orange; st 1 + 1 + 1. 

— \textit{Omarisca} gen. nov., \textit{O. longi/filia} (Salem) comb. n. 

6. Poststatural dc 3 or 4, each bristle subequal in length (Figs. b, c in Appendix I). 

— Poststatural dc 5, sometimes 3–7, anterior 3–5 bristles fine, less developed than posterior two and gradually decreased in length toward transverse suture; number without counting the subprimary fine interstitials and additionalis (Figs. a1, a2 in Appendix I). 

— \textit{Liopygia} Enderlein, \textit{L. ruficornis} (Fabricius) 

7. Poststatural dc 3. 

— \textit{Myorrhina} Robineau-Desvoidy 

!Number without counting the subprimary fine interstitials x and additionalis y (Fig. b in Appendix I) 

— Poststatural dc 4 (Fig. c in Appendix I). 

8. Propleuron bare. 

— Propleuron hairy. 

9. Tergite 3 with strong, erect \( mb \); Tergite 6 in \( \varphi \) with small lateral sclerites with \( mb \) [No record from Sarawak]. 

— Tergite 3 without \( mb \); Tergite 6 in \( \varphi \) divided into broad lateral sclerites with \( mb \). 

10. Yellowish white hairs on gena not extending forward to line drawn from posterior margin of eye; male sternite 4 usually with posterior pad of dense shorter clothing setae or adjacent upstanding long hairs; aedeagus with slender styulus; peregone bifurcated. 

— Yellowish white hairs on gena extending forward to line drawn from posterior margin of eye; male sternite 4 without pad or upstanding long hairs posteriorly; aedeagus with stout styulus; peregone not branched. 

— \textit{Shinonagaella} Verves stat. n. 

11. Fronto-orbital bristles (\( ors \)) \( 0+2 \) in \( \varphi_1 \), \( 2+2 \) in \( \varphi \), posterior two \( ors \) reclinate and not cruciate, \( ori \) inclinate and cruciate, anterior 2 proclinate in \( \varphi \) (Kurahashi and Samerjai, 2018, fig. 1a); medium sized flies, 8.5–10.0 mm in length; body slender; hind tibia without fringe; female \( T_s \) of two separated vestigial sclerites; female \( ST_s \), membranous, with setulose hairs; presutural \( ac \) developed, usually arranged in distinct row anteriorly and posteriorly in \( \varphi \), only single prescutellar \( ac \) distinctly developed in \( \varphi \). 

— Fronto-orbital bristles (\( ors \)) \( 0+1 \) in \( \varphi_1 \), \( 2+1 \) in \( \varphi \), posterior one reclinate, anterior 2 in \( \varphi \) proclinate (Kurahashi and Samerjai, 2018, fig. 1b); large sized flies; body rather stout, more than 11 mm; male hind tibia with fringe well developed on both antero- and postero-ventral surfaces; presutural \( ac \) not developed, if there are some, they are never arranged in distinct row in \( \varphi \), at most only with single pair of distinct prescutellar \( ac \). 

— \textit{Sarcosolomonia} Rohdendorf 

12. Distance between first and third poststatural dc subequal to that between third and fourth. 

— Distance between first and third poststatural dc more than that between third and fourth. 

13. Male sternite 5 with small chitinous protuberance on middle part of ventral surface; gena clothed with black hairs, but intermixed with yellow hairs posteriorly (Tumrasvin and Kano, 1979: fig. 44). 

— Male sternite 5 without such small chitinous protuberance on middle of ventral surface; gena clothed with black hairs only. 

— \textit{Phallosphaera} Rohdendorf 

14. Propleuron bare. 

— Propleuron hairy. 

15. Vein \( R_5 \) setulose. 

— Vein \( R_5 \) bare. 

16. Poststatural \( ac \) absent or rarely present, but fine or weak; mid tibia usually fringed in \( \varphi_3 \), sometimes not fringed in less nutritious males. 

— Poststatural \( ac \) present; mid tibia fringed or not fringed in \( \varphi_3 \). 

17. Scutellum without discal scutellar bristle (\( dsc \)); male sternite 4 without remarkable hairs on median part of posterior margin; ventralia not globose, without serration; hind tibia with well developed fringe on posteroventral surface in \( \varphi \). 

— Scutellum with one pair of \( dsc \); male S4 with rather long hairs on median part of posterior margin; ventralia large, globose, with serration and numerous minute spines; hind tibia without developed fringe on posteroventral surface in \( \varphi \), rarely with poorly developed fringe in part. 

— \textit{Boettcherisca} Rohdendorf/\textit{Rosellea} Rohdendorf
18. Mid tibia without fringe in \( \varphi \) .......................... Parasarcophaga Johnston & Tieg
— Mid tibia with fringe more or less developed in \( \varphi \); female tergite 6 developed, of complete plate, with row of strong marginal bristles .................................................. 19
19. Gena largely clothed with black hairs anteriorly; sternite 4 with or without mat of hairs in \( \varphi \) .............. 20
— Gena largely clothed with yellowish white hairs; sternite 4 without mat of hairs, but entirely with fine long hairs in \( \varphi \) [Peninsular Malaysia, No record from Sarawak] ....................... Iranihindia Rohdendorf
20. Sternite 4 with mat of hairs in \( \varphi \); mid tibia with 2 \( \varphi \) .......................... Seniorwhitea Rohdendorf
— Sternite 4 without mat of hairs in \( \varphi \); hind tibia with weakly developed fringe on apical 2/3 in \( \varphi \) ............. Harpagophala Rohdendorf, H. kemp (Senior-White)

The postsutural dc 3 group

Key to the species of Myorhina

1. Thoracic squama partly fuscous on disc. .......................................................... 2
— Thoracic squama entirely whitish ................................................................. 3
2. Mid tibia with \( v \) at apical 1/4 .......................... M. (Belleriromima) globovesica (Ye)
— Mid tibia without \( v \) ............. M. tomae sp. nov.
3. Presutural ac present, at least pair in front of transverse suture developed; hind tibia more or less fringed on anteroventral and posterovertral surfaces, rarely not fringed in case of less nutritious individuals .................................................. M. (Pseudothyrsocnema) borneensis Shinonaga & Lopes
— Presutural ac absent or weak; hind tibia usually not fringed at all, with 1–2 strong av in \( \varphi \), 3 av in \( \varphi \) ............ 4
4. Tergite 3 without erect median \( mb \); CS5 setulose along anterior margin on basal 1/2. M. miyagii sp. nov.
— Tergite 3 with erect median \( mb \); CS5 setulose along anterior margin almost entirely ............. 5
5. Upper and lower lobes of ventralia projecting forward in parallel direction in lateral view; male ST3 with small setulose protuberance on middle part of ventral surface [No record from Malaysia] .......................... M. (Pseudothyrsocnema) caudagalli (Böttcher)
— Upper and lower lobes of ventralia projecting to different direction, directed at right angle in lateral view .......................... M. (Pseudothyrsocnema) crinitula (Quo)

The postsutural dc 4 group

Key to the species of Sarcosolomonia

1. Vein R1 setulose .......................................................... S. rohdendorf Nandi
— Vein R1 bare .......................................................... S. crinita (Parker)

Key to the species of Burmanomyia

1. Hind tibia in \( \varphi \) fringed on anteroventral and posterovertral surfaces, with 1 av ....................... 2
— Hind tibia in \( \varphi \) not fringed, with 2 av on apical 1/2 .......................... B. baroensis sp. nov.
2. Mid tibia with fringe of short hairs on apical 1/2 of posterovertral surface, hairs exceeding tibial diameter; mid femur with 3 pd-d apically .......................................................... B. pseudoborneensis sp. nov.
— Mid tibia without fringe; mid femur with 2 pd-d apically ............ *B. aureomarginata (Shinonaga & Tumrasvin)

Key to the species of Phallosphaera

1. Parafacial densely golden pollinose; alar squama with tuft of fuscous hairs on lower inner margin .................................................. P. amicoides Kurahashi & Tan
2. Parafacial densely grey pollinose, rarely with yellow tinge; alar squama with pale hairs on lower inner margin .................................................. P. barioensis Kurahashi & Tan

Key to the species of Lioproctia

1. Abdomen with yellowish golden pollinose on tergites 4–5 .......................... L. saprianovae Pape & Bänziger
— Abdomen with ordinary greyish pollinose on tergites 4–5 .......................... L. patoni (Senior-White)

Key to the species of Sarcrohendendorfia

1. Male sternite 4 with posterior pad of dense shorter clothing setae .......................... 2
— Male sternite 4 without such pad or tuft of setae or hairs, at most with tuft of long hairs .......................................................... S. curvicercus (Sugiyama)
2. Wing largely yellowish tinged at base; alar and thoracic squamae both yellowish-orange . . . S. seniorwhitei (Ho)
— Wing hyaline, more or less dark brown tinged at base; alar and thoracic squamae both whitish ............. 3
3. Supraspiracular convexity clothed with long, upstanding, fine hairs anteriorly. .......................... 4
   — Supraspiracular convexity bare ................................................................. S. okazawai sp. nov.
4. Thoracic squama entirely whitish including disc; tergites 3–5 with ordinary greyish pollinosity; postgonite sharp pointed at apex; stylus shorter than juxta. ................................................... S. inextricata (Walker)
   — Thoracic squama partly fuscous on disc; tergites 3–5 with golden yellow pollinosity; postgonite with broad flange near apex; stylus longer than juxta. ................................................................. S. kerohi sp. nov.

The postsutural dc 5 group

Key to the species of Boettcherisca / Rosellea
1. Abdomen golden-yellow pollinose at least on tergites 4–5 in ♂, on tergite 5 in ♀ ....................................................... 2
   — Abdomen not golden-yellow pollinose, with usual grey pollinosity in ♂ and ♀ ......................................................... 4
2. Abdomen golden-yellow dusted on tergites 3–4 in ♂ and ♀; GS2 blackish in ♂; hind tibia without fringe. .................. 4
   — Abdomen golden-yellow dusted on tergites 4–5 in ♂, on tergite 5 in ♀; GS2 reddish in ♂; hind tibia with short fringe on posteroventral surface of apical 2/3 ........................................... 3
3. Sternite 4 in ♂ with long hairs on lateral sides posteriorly; cercus broad, flat, with tubercle basally in ♂; body somewhat elongate in ♂. .............................................. Boettcherisca zuli Kurahashi, Tan & Leh
   — Sternite 4 in ♂ clothed with hairs normal sized; cercus narrow, rod-like, without tubercle in ♂; body a little bit stout in ♂. ................................................................. B. krathonmai Pape & Bänziger
4. Gena largely clothed with black hairs, but with some yellowish white ones on posterior part; spines on apical part of cercus not extending to dorsal surface in ♂; pregonite slender, longer than postgonite. .......................... 5
   — Gena entirely clothed with black hairs, without yellowish white hairs; spines on apical part of cercus extending to dorsal side in ♂; pregonite and postgonite stout, subequal to each other in length ......................................... 6
5. Hind tibia not fringed, with a few long hairs on posteroventral surface, usually with 1 av; occipital dilatation yellowish pollinose; pregonite with broad flange near apex. .............................................. B. karnyi (Hardy)
   — Hind tibia poorly fringed, with more than 8 long fine hairs, with 2 av, sometimes 1 av; occipital dilatation grey pollinose; pregonite long, curved apically, with pointed, sometimes rounded apices. ...................................................... B. peregrina (Robineau-Desvoidy)
6. GS2 reddish in ♂; ventralia reduced to small rounded lobe ......................................................... B. javanica Lopes
   — GS2 blackish in ♂; ventralia largely lobulated, with small dorsal expansion [No record from Malaysia] .......... 5

Key to the species of Hosarcophaga (♂)
1. Sterno pleural bristles (st) 1+1; ors 0+1, reclinate ors (preverticals); tergite 3 with decumbent median mb. .......... H. puteri sp. nov.
   — St 1+1+1; ors 0+2; tergite 3 without median mb ................................................................. H. auricauda (Ho)
2. Hind tibia with fringe well developed on anteroventral and posteroventral surfaces, posteroventral hairs longer than those on anteroventral surface ........................................... *H. serrata (Ho)
   — Hind tibia without fringe, at most with several fine rather long hairs medially on anteroventral surface ........ 3
3. Male genitalia as shown in Fig. 9. ................................................................. H. palustris sp. nov.
   — Male genitalia as shown in Ho, 1938: 121, fig. 7. ................................................................. *H. serrata (Ho)

Key to the species of Parasarcophaga (♂ ♂)
1. Gena clothed with black hairs .................................................................. The group 1 entirely black haired on gena
   — Gena largely black haired, but partly with yellowish white hairs, usually along posterior margin ................... 2
2. Genal black hairs limited to anterior extremity; palpus reddish or brownish on apical 1/3; hind femur with fringe on posterior surface, but longest hairs subequal to width of femur; body medium in size, less than 14.0 mm, 9.5–13.5 mm in length ................................................................. The group 2 largely yellow haired on gena
   — Genal black hairs more or less extended to posterior 1/2 of upper part; palpus entirely blackish; hind femur with developed fringe on posterior surface, longest hairs longer than width of femur; body large, usually more than 14.0 mm in length. ...................................................... The group 3 largely black haired on gena

Key to the species of “the species-group 1” entirely black haired on gena
1. Parafacial, parafacial and mediana golden yellow pollinose; tergites 4–5 with golden yellow pollinosity; thoracic squama largely fuscous on dorsal surface, but pale brown along posterior margin [Sabah, No record from Sarawak] ................................................................. P. javana (Macquart)
   — Parafacial, parafacial and mediana silver grey to grey pollinose; tergites 4–5 with silver grey to grey pollinosity; thoracic squama largely fuscous on dorsal surface, but pale brown along posterior margin [Kurahashi, Tan & Leh]
ventralia of simply structured lobe, small, less sclerotized and not spinosed; stylus elongate, longer than length of
to form arc; apical part of processes curved like hook; vesica (lateral plate) strongly sclerotized and pigmented;
shape; membranous region between theca and harpe; juxta well differentiated, lateral processes elongated and bend
1. Black genal hairs located only in anterior 1/2 of upper part; cercus with distinct beak-shaped apex
— Black genal hairs extending beyond anterior 1/2 of gena; cercus slender, pointed at apex 2
2. Male genitalia as shown in Nandi, 2002: 265, figs. 467–468. ........... *P. (Liosarcophaga) idmais (Séguy)
— Male genitalia as shown in Nandi, 2002: 272, fgs. 475–478. ........... P. (Liosarcophaga) dux (Thomson)
— Male genitalia as shown in Nandi, 2002: 342, fgs. 580–585. ........... P. (Parasarcophaga) albiceps (Meigen)
— Male genitalia as shown in Nandi, 2002: 331, fgs. 561–566. ........... P. (Parasarcophaga) hirtipes (Wiedemann)
— Male genitalia as shown in Sugiyama et al., 1990a: 86, figs. 13–15. .......... P. mimobrevicornis (Sugiyama)

Key to the species of “the species-group 3” largely yellow haired on gena
1. ov not developed, rarely weakly developed in male; alar and thoracic squamae with yellowish-white hairs on
— ov well developed in male; alar and thoracic squamae with fuscos sc hair on lower inner and outer margins;
— pregonite with broad flanged from base; ventralia membranous, highly globulose and formed a big bulge... ... ...
— S. princeps (Wiedemann)
— S. orientalis (Parker)

New taxa
Omarisca gen. nov.
(Fig. 1)

Type species: Sarcophaga longifilia Salem, 1946

Etymology
The name (gender: feminine) is composed of the word “Omar”, the name of Professor Baharudin Omar,
Department of Biomedical Sciences, Faculty of Health Sciences, National University of Malaysia, and suffix “isca”
derives from Latin word “Musca”, meaning “fly”. It means “Omar’s fly”.

Diagnosis
Flies having body elongate in ♂; but stout in ♀; genae and propleura clothed with yellowish white hairs.
♂: Head dichoptic in both sexes; frons index 0.19–0.21 (M=0.21, n=4) in O. longifilia; antenna long, but not
reaching to vibrissa; arista long-plumose; body mostly clothed with yellowish white hairs, especially pleura and
sternites; propleuron and pro sternum hairy; ac 0+0; only 1 hindmost post sutural dc strongly developed, but
anterior ones not developed, hardly distinguished from ground hairs; st 1+1+1, median st fine and shorter than
anterior and posterior ones, located closer to anterior one; vein R1 bare; mid tibia not fringed; hind tibia fringed
on apical 2/3 of antero- and posteroventral surfaces; tergite 3 (T3) without median mb; sternite 5 (ST5) of Y-shaped;
T6 vestigial, of two left and right narrow sclerites with row of mb and some hairs. Male genitalia: theca of normal
shape; membranous region between theca and harpe; juxta well differentiated, lateral processes elongated and bend
to form arc; apical part of processes curved like hook; vesica (lateral plate) strongly sclerotized and pigmented;
ventralia of simply structured lobe, small, less sclerotized and not spinosed; stylus elongate, longer than length of
juxta, coiled at base; shape of aedeagus very characteristic, well represented as good criteria of the present genus.

♀: Frons index 0.30 in *O. longifilia*; abdomen broad, oval (habitus photograph in Appendix V); terminalia (larvipositor) characteristic as shown in Fig. 1; T₆ intermediate between single complete sclerite and two separate ones, with large incision posteriorly; T₈ (probably 7+8+9 combined tergite) disappeared; ST₆ and ST₇ of single sclerite; ST₈ disappeared, with several setulose hairs; ST₉ of two sclerites (Fig. 1).

**Affinity**

The type species clearly represents a new genus of the tribe Sarcophagini (Subfamily Sarcophaginae). It seems to have a relationship with *Sarcorhodendorfia* and *Sarcosolomonia*, but male and female genitalia are characteristic and it is easily distinguished from these two genera.

**Zulisca** gen. nov.

(Fig. 2)

Type species: *Sarcophaga aquila* Sugiyama, 1990

**Etymology**

The name (gender: feminine) is composed of the word “Zul”, a nickname for Professor Zulqarnain M., Genetics and Molecular Biology, Institute of Biological Sciences, Faculty of Science, University of Malaya, and suffix “isca” derives from Latin word “Musca”, meaning “fly”. It means “Zulqarnain’s fly”.

**Diagnosis**

Flies having body elongate in ♂, but stout in ♀; genae clothed with balck, brown and yellow hairs; propleura clothed with fuscous black hairs.

♂: Head dichoptic in both sexes; frons index 0.18–0.20 (M=0.18, n=9) in *Z. aquila*; antenna long, but not reaching to vibrissa; arista long-plumose; propleuron clothed with blackish hairs; prosternum hairy; ac 0+0–1 (very fine); only 1 hindmost postsutural dc strong, but anterior ones not developed, hardly distinguished from ground hairs; st 1+1+1, median st fine and shorter than anterior and posterior ones, located close to anterior one; vein R₁ bare; mid tibia fringed more than apical 1/2; hind tibia fringed on entire length of anteroventral and

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Fig. 1. *Omarisca longifilia* (Salem, 1946) comb. nov., female genitalia.—a, larvipositor, caudal view; b, spermatheca, one of three illustrated.

Fig. 2. *Zulisca aquila* (Sugiyama, 1990) comb. nov., female genitalia.—a, larvipositor, caudal view; b, spermatheca, one of three illustrated.
posteroventral surfaces; tergite 3 (T₃) without median mb; sternite 5 (ST₅) of Y-shaped; T₆, vestigial, with two left and right narrow sclerites with row of several mb. Male genitalia: theca of normal shape; membranous region present between theca and harpe; juxta well differentiated, with two lateral processes lobulated; apical part of processes round; vesica (lateral plate) of narrow sclerotized projection, somewhat pigmented; ventralia of simply structured membranous lobe, small, less sclerotized and not spinosed; stylus elongate, longer than length of juxta, with coiled base; vesica (lateral plate) very simple, curved; aedeagus simply structured, but well represented as good criteria of the present genus.

♂. Frons index 0.26–0.28 (M=0.26, n=3); abdomen broad, oval; terminalia (larvipositor) characteristic as shown in Fig. 2; T₄ intermediate between single complete sclerite and two separate ones, with large incision posteriorly, with two rows of lateral mb; T₅ of two narrow sclerite; T₆ of single narrow sclerite, without mb; ST₇ single sclerite, with 3 strong lateral mb; ST₈ single sclerite, with 2 mb; ST₉ single sclerite, vestigial, bare, without mb, amalgamated with ST₆; ST₇ single plate-like sclerite; spermatheca elongate, scutellate, with smooth, round head.

Affinity

The type species clearly represents a new genus of the tribe Sarcophagini (Subfamily Sarcophaginae). It seems to be close to Papesarcophaga Kurahashi & Kakinuma, but the new Zulisca has a hairy propleuron.

Myorhina miyagii sp. nov.
(Fig. 3)

♂.—Head: dichoptic; eye large, bare; frons broad; frons index 0.16–0.18 (M=0.17, n=3) just in front of anterior ocellus; frontal stripe parallel sided, narrowed toward vertex, black, slightly more than 2.0× width of parafrontal at level of in front of anterior ocellus; parafrontal and parafacial black, densely silver-grey pollinoise, clothed with fine black hairs along eye margin; parafrontal provided with ca. 10 ori; 1 reclinate ors developed; mediana narrow, not distinguishable; gena narrow, black, densely grey pollinoise, entirely clothed with black hairs; postgena black, densely grey pollinoise, clothed with yellowish brown hairs; antenna black; 3rd antennal segment (AS₃) about 2.5× as long as 2nd (AS₂); arista long plumose, black. Palpus normal sized, slender, black, with short and bristy black hairs.

Thorax: blackish, more or less covered with grey or silver-grey pollinoise; 3 broad, dark longitudinal stripes distinct on dorsum; humerus and postalar callus concolorous with dorsum; scutellum concolorous with dorsum; prothorax hairy, usually with 2–3 fine hairs; propleuron bare; notopleuron sparsely haired around n; hypopleuron hairy; sternopleuron clothed with black hairs; supraspiracular convexity bare; mesothoracic spiracle with pors 1, h 3; n 4; sa 3; pa 2; st 1 +1+1; sc 3+1(fine), with fine apical marginal sc.

Wing: hyaline, vein fuscous brown; epaulet blackish; basicosta yellow; vein R₁, bare; node of R₂+₃ and R₄+₅ with a few black setulose above and below; vein R₄+₅, setulose 1/2 from node to cross vein r-m above; vein M bent with sharp angle; cross vein dm-cu sigmoid, slightly curved posteriorly. Alar squama with tuft of pale white hairs on inner lower margin. Thoracic squama large, bare on dorsal surface, pale brownish white on disc. Halter brown with fuscous knobby.

Legs: blackish, more or less grey pollinoise on coxae and femora; fore femur with 2 regular rows of long bristles on dorsal and posterdorsal surfaces, with row of long and strong pv on apical 2/3; fore tibia with 1 p at apical 1/3 and 2–3 ad basally; mid femur with 2–3 strong av and 3 strong pv medially; some hairy bristles on posteroventral and anteroventral surfaces entirely, with row of several short av and pv apically, with 2–3 a medially, with 2 pd preapically; mid tibia with 1–2 submedian ad, 1 pd, 2 p, 1 v; hind femur with 1 regular and 1 short rows of ad, with 3–4 av medially, with 2 av preapically, with 2 fine and 1 strong pv medially, and clothed with fine short and long hairy bristles on anteroventral and posteroventral surfaces, with 2–pd preapically; hind tibia not fringed, with 2 ad and 2 pd, 1 adp, 2 av, 1 apical av.

Abdomen: black, tessellate, more or less grey to silver-grey pollinoise on tergites 1+2, tessellated on T₅, more or less covered with grey to silver pollinoise; T₄+₅, with row of strong mb, fine bristles on posteroventral margin of T₅. Hypopygium less prominent, black; GS₁ not prominent, with brownish-grey pollinoise; GS₂, black subshining.

Male genitalia as shown in Fig. 3a–f.

♀. Unknown.

Length: 9.0–12.0 mm.

Type material. Holotype ♂, ♂ holotype [laser-printed on red card] // MALAYSIA: BORNEO/ Sarawak State// Miri Division, Pa Lungan // Tudal Hill, 1,271 m, hill top, 4.ix.2009/ Coll. H. Kurahashi // Myorhina miyagii sp. nov./ Det. H. Kurahashi [laser-printed on white card with red perimeter], with a small tube containing dissected genitalia. Paratypes: 2♂, with "Paratype [laser-printed on yellow card]" and identification label “Myorhina miyagii sp. nov./ Det. H. Kurahashi [laser-printed on white card with blue perimeter]” // MALAYSIA: BORNEO: 2♂, same data as holotype.
Type depository. Holotype ♂ (NSMT-I-DIP22743) and 1 paratype ♂ (NSMT-I-DIP22744) are deposited in National Museum of Nature and Science, Tsukuba (NSMT); 1 paratype ♂ in Sarawak Museum Department, Kuching (SM).

Etymology. The specific epithet is named after Dr. I. Miyagi, Leader of the project, Professor emeritus, University of the Ryukyu, Japan for offering an opportunity to study the fly fauna of Sarawak, Malaysia.

Remarks. The present new species is similar to M. tomae sp. nov., but easily distinguished by having no fringe on hind tibia in ♂. Male genitalia is also characteristic in the shape of aedeagus and cercus. Forest species.

Distribution. Malaysia (Borneo, Sarawak)

Bionomics. Male flies were found at hill top of montane forests.

Myorhina tomae sp. nov.
(Fig. 4)

♂.—Head: dichoptic; eye large, bare; frons broad; frons index 0.17–0.19 (M = 0.18, n=9) just in front of anterior ocellus; frontal stripe parallel sided, narrowed toward vertex, black, slightly more than 2.0x width of parafrontal at level of in front of anterior ocellus; parafrontal and parafacial black, densely silvery-grey pollinose, clothed with black hairs along eye margin; parafrontal provided with ca. 13 ors; 1 reclinate ors developed; mediana narrow, not distinguishable; gena narrow, black, densely grey pollinose, entirely clothed with black hairs; postgena black, densely grey pollinose, clothed with yellowish brown hairs; antenna black; 3rd antennal segment (AS₃) about 3.0× as long as 2nd (AS₂); arista long plumose, black except for median part brownish. Palpus normal sized, slender, black, with short and long bristly black hairs.

Thorax: blackish, more or less covered with grey or silver-grey pollinosity; 3 broad, dark longitudinal stripes
distinct on dorsum; humerus and postalar callus concolorous with dorsum; scutellum concolorous with dorsum; prosternum hairy; propleuron bare; notopleuron sparsely haired around n; hypopleuron hairy; sternopleuron clothed with black hairs; supraspiracular convexity bare; mesothoracic spiracle fuscous black; metathoracic spiracle medium in size, fuscous black. Chaetotaxy: ac 0 + 1; dc 3 – 4 + 3; ia 1 (fine) + 2 – 3; ph 2; prs 1; h 3; n 4; sa 3, pa 2; st 1 + 1; sc 3 + 1, with apical marginal sc.

Wing: hyaline, vein fuscous brown; epaulet blackish; basicosta yellowish brown; vein R, bare; node of R 2 + 3 and R 4 + 5 with a few black setulae above and below; vein R 4 + 5 setulose more than 4/5 from node to cross vein r–m above; vein M bent with sharp angle; cross vein dm-cu sigmoid, slightly curved anteriorly and posteriorly. Alar squama with tuft of pale white hairs on inner lower margin. Thoracic squama large, bare on dorsal surface, dark brownish spot on disc. Halter brown.

Legs: blackish, more or less grey pollinose on coxae and femora; fore femur with 2 complete regular rows of long bristles on dorsal and posterodorsal surfaces, with row of fine, long and strong pv on entire length; fore tibia with 1 p at apical 1/3 and 2 ad basally; mid femur without strong av and pv medially, short hairy bristles on posteroventral and anteroventral surfaces entirely, with row of several short av and pv apically, with row of 4–5 strong a medially, with 2 p–pd preapically; mid tibia with 1 submedian ad, 1 pd and 2 p, without v; hind femur with irregular rows of ad, with 1 strong av preapically, clothed with fine long hairy bristles on anteroventral and posteroventral surfaces, with 3–4 p–pd preapically; hind tibia fringed, with 2 ad and 2 pd, 1 preapical av.

Abdomen: black, tessellate, more or less grey to silver-grey pollinose on tergites 1 + 2, silver-grey pollinose, tessellate on T 3–5; T 4 with median strong and 3 strong lateral mb; T 5 with row of mb. Hypopygium prominent,
black; GSs retracted in T₅, with brownish-grey pollinosity, without mb; GS₂ black, subshining. Male genitalia as shown in Fig. 4a–f.
♀. Unknown.

Length: 8.0–11.0 mm.

Type material. Holotype ♂, ‘Holotype [laser-printed on red card]’ // MALAYSIA: BORNEO/ Sarawak State ./Miri Division, Bario/ Prayer Mountain, 1,428 m./ hill top, 9.ix.2009/ Coll. H. Kurahashi/ Myorhina ♂/ tomae sp. nov./ Det. H. Kurahashi [laser-printed on white card with red perimeter]’ with a small tube containing dissected genitalia. Paratypes: 8 ♂, with “Paratype [laser-printed on yellow card]” and identification label “Myorhina ♂/ tomae sp. nov./ Det. H. Kurahashi [laser-printed on white card with blue perimeter]” // MALAYSIA: BORNEO: 3 ♂, same data as holotype; 5 ♂, same locality as holotype, 11–12.ix.2009, H. Kurahashi.

Type depository. Holotype ♂ (NSMT-I-DIP22745); 5 male paratypes (NSMT type series NSMT-I-DIP22746–22750) are deposited in National Museum of Science and Nature, Tsukuba (NSMT); 3 ♂ paratypes in Sarawak Museum Department, Kuching (SM).

Etymology. The specific epithet is named after Dr. T. Toma, a member of the project, Professor, University of the Ryuku, Japan for her kind help to study the fly fauna of Sarawak, Malaysia.

Remarks. The present new species is similar to Myorhina miyagii sp. nov., but easily distinguished by having mid femur without strong av and pv medially, hind femur without av medially and hind tibia not fringed in ♂. Male genitalia is also characteristic in the shape of aedeagus and cercus. Forest species.

Distribution. Malaysia (Borneo, Sarawak)

Bionomics. Male flies were found at hill top of montane forests.

_Burmanomyia barioensis_ sp. nov.
(Fig. 5)

♂.—Head: dichoptic; eye large, bare; frons narrow; frons index 0.12–0.13 (M = 0.12, n = 3) just in front of anterior ocellus; frontal stripe parallel sided, somewhat narrowed toward vertex, fuscous black, less than 2.0x width of parafrenal at level of in front of anterior ocellus; parafrenal and parafacial narrow, black, densely silver-grey pollinose, clothed with black hairs along eye margin; parafrenal provided with ca. 13 ori; 1 reclinate ors developed; mediana narrow, not distinguishable; gena narrow, black, densely grey pollinose, entirely clothed with black hairs; postgena black, densely grey pollinose, clothed with black hairs except for several yellowish-white ones on posterior extremity; antenna black; 3rd antennal segment (AS₃) about 2.0× as long as 2nd (AS₂); arista long plumose, black. Palpus normal sized, slender, black, with short and bristly black hairs.

Thorax: blackish, more or less covered with grey or silver-grey pollinosity; 3 broad, dark longitudinal stripes distinct on dorsum; humerus and postalar callus concolorous with dorsum; scutellum concolorous with dorsum; prosternum hairy; propleuron bare; notopleuron sparsely haired around; hypopleuron hairy; sternopleuron clothed with black hairs; supraspiracular convexity bare; mesothoracic spiracle fuscous black; metathoracic prosternum hairy; propleuron bare; notopleuron sparsely haired around; hypopleuron hairy; sternopleuron clothed with black hairs; supraorbital stripe parallel sided, somewhat narrowed toward vertex, fuscous black. Chaetotaxy: R₅ without strong av and pv medially, hind femur without av medially and hind tibia not fringed in ♂. Male genitalia is also characteristic in the shape of aedeagus and cercus. Forest species.

Wing: hyaline, vein fuscous brown; epaulae blackish; basicosta yellowish white; vein R₁ bare; node of R₂, a row of short pd, apical 1/3 of 1 av, medially and hind tibia not fringed in ♂. Male genitalia is also characteristic in the shape of aedeagus and cercus. Forest species.

Bionomics. Male flies were found at hill top of montane forests.

“Holotype [laser-printed on red card]’ // MALAYSIA: BORNEO/ Sarawak State./Miri Division, Bario/ Prayer Mountain, 1,428 m./ hill top, 9.ix.2009/ Coll. H. Kurahashi/ Myorhina ♂/ tomae sp. nov./ Det. H. Kurahashi [laser-printed on white card with red perimeter]’ with a small tube containing dissected genitalia. Paratypes: 8 ♂, with “Paratype [laser-printed on yellow card]” and identification label “Myorhina ♂/ tomae sp. nov./ Det. H. Kurahashi [laser-printed on white card with blue perimeter]” // MALAYSIA: BORNEO: 3 ♂, same data as holotype; 5 ♂, same locality as holotype, 11–12.ix.2009, H. Kurahashi.

Type depository. Holotype ♂ (NSMT-I-DIP22745); 5 male paratypes (NSMT type series NSMT-I-DIP22746–22750) are deposited in National Museum of Science and Nature, Tsukuba (NSMT); 3 ♂ paratypes in Sarawak Museum Department, Kuching (SM).

Etymology. The specific epithet is named after Dr. T. Toma, a member of the project, Professor, University of the Ryuku, Japan for her kind help to study the fly fauna of Sarawak, Malaysia.

Remarks. The present new species is similar to Myorhina miyagii sp. nov., but easily distinguished by having mid femur without strong av and pv medially, hind femur without av medially and hind tibia not fringed in ♂. Male genitalia is also characteristic in the shape of aedeagus and cercus. Forest species.

Distribution. Malaysia (Borneo, Sarawak)

Bionomics. Male flies were found at hill top of montane forests.
Length: 10.5 mm.

Type material. Holotype ♂, 'Holotype [laser-printed on red card]//MALAYSIA: BORNEO/ Sarawak State,/Miri Division, Bario,/ Prayer Mountain, 1,428 m./ hill top, 11–12.ix.2009/ Coll. H. Kurahashi// Burmanomyia ♂/ barioensis sp. nov./ Det. H. Kurahashi [laser-printed on white card with red perimeter], with a small tube containing dissected genitalia. Paratypes: 1 ♂, with "Paratype [laser-printed on yellow card]" and identification label "Burmanomyia ♂/barioensis sp. nov./ Det. H. Kurahashi [laser-printed on white card with blue perimeter]" // same locality as holotype, 9.ix.2009/ Coll. H. Kurahashi//; 1 ♂, [Malaysia/Sabah]/ Crocker Range// Inobong/ 2.v.2004/ T. Tachi//.

Type depository. Holotype ♂ (NSMT-I-DIP22751), 1 ♂ paratype (NSMT-I-DIP22752) in National Museum of Nature and Science, Tsukuba (NSMT); 1 ♂ paratype in Biosystematics Laboratory, Faculty of Social & Cultural Studies, Kyushu University, Fukuoka (BLKU).

Etymology. The specific epithet "barioensis" is derived from the locality name "Bario" where holotype specimen was collected.

Remarks. The present new species is similar to Burmanomyia aureomarginata (Shinonaga & Tumrasvin, 1979), but easily distinguished by having no fringe on hind tibia in ♂. Male genitalia is also characteristic in the shape of aedeagus and cercus. Montane forest species.

Distribution. Malaysia (Borneo, Sarawak and Sabah)

Bionomics. Male flies were found around sunny spots of montane forest more than 1,400 m, especially at hill top area.
Burmanomyia pseudoborneensis sp. nov.
(Fig. 6)

♂.—Head: dichoptic; eye large, bare; frons broad; frons index 0.18 (M=0.18, n=2) just in front of anterior ocellus; frontal stripe parallel sided, somewhat narrowed toward vertex, fuscous black, less than 2.0x width of parafrontal at level of in front of anterior ocellus; parafrontal and parafacial black, densely silver-grey pollinose, clothed with black hairs along eye margin; parafrontal provided with ca. 15 ors developed; mediana narrow, not distinguishable; gena narrow, black, densely grey pollinose, entirely clothed with black hairs; postgena black, densely grey pollinose, clothed with black hairs except for several yellowish white ones on posterior extremity; antenna black; 3rd antennal segment (AS3) about 2.0× as long as 2nd (AS2); arista long plumose, black. Palpus normal sized, slender, black, with short and bristly black hairs.

Thorax: blackish, more or less covered with grey or silver-grey pollinosity; 3 broad, dark longitudinal stripes distinct on dorsum; humerus and postalar callus concolorous with dorsum; scutellum concolorous with dorsum; prosternum hairy; propleuron bare; notopleuron sparsely haired around; hypopleuron hairy; sternopleuron clothed with black hairs; supraspiracular convexity bare; mesothoracic spiracle fuscous black; metathoracic fuscous black. Chaetotaxy: ac 4–6 (strong) + 1; dc 3–4+4; ia 1+2–3; ph 2–3; prs 1; h 3; n 4; sa 4–5, 1st one (pra) almost same length with 4th; pa 2; st 1+1+1; sc 3–4 (2 strong) + 1, with fine apical marginal sc.

Wing: hyaline, vein fuscous brown; epaulet blackish; basicosta yellowish white; vein R1 bare; node of R2+3 and

Fig. 6. Burmanomyia pseudoborneensis sp. nov., male genitalia.—a, fifth sternite, ventral view; b, hypopygium, lateral view; c, cerci and surstyli, caudal view; d, pregonite and postgonite, lateral view; e, aedeagus, lateral view; f, surstylus and cercus, lateral view.
R$_{4+5}$ with a few black setulae above and below; vein R$_{4+5}$ setulose more than 1/2 way from node to cross vein r-m above; vein M bent with right angle; dm-cu sigmoid, slightly curved. Alar squama opaque white at basal part and with tuft of brown hairs on inner lower margin. Thoracic squama large, bare on dorsal surface. Halter brown with black knob.

Legs: blackish, more or less grey pollinose on coxae and fore femora; fore femur with 2 regular rows of strong bristles on dorsal and posterodorsal surfaces, many fine long setulae on whole posterior surface, with row of long and strong v on entire length; fore tibia with 3 ad basally, 1 p at apical 1/3, 1 pv apically and 1 d at apical; mid femur with row of fine, long hairy bristles on posteroventral and anteroventral surfaces entirely, with row of 3–4 short av medially and row of short pv apically, with 2–3 a medially and 3 p–pd preapically; mid tibia with 1 submedian ad, a row of short pd, apical 1/3 with 1p, short fringe on anteroventral and posteroventral surfaces, with 1 strong pv and av at apically; hind femur with 1 regular and 1 irregular and incomplete rows of ad, with 3–4 d at apical 1/3, 1 p preapically, and clothed with fine long hairy bristles on anteroventral and posteroventral surfaces, with row of strong av and pv; hind tibia fringed on anteroventral and posteroventral surfaces, with sparse row of long and short ad, 2 pd submedially, 1 preapical d, 1 av at apical 1/3, 1 apical av.

Abdomen: black, tessellate, more or less grey to silver-grey pollinose on tergites 1+2–3, tessellated on T$_{4+5}$ more or less covered with yellowish-brown pollinosity; T$_1$ without median mb; T$_4$ with erect median and 3–4 strong lateral mb; T$_5$ with row of strong mb, fine bristles on posteroventral margin; ventral surface of tergites and sternites clothed with long hairs (the length as along as sternite). Hypopygium prominent, fuscous black; GS$_1$ prominent, with brownish-grey pollinosity; GS$_2$ black, shining. Male genitalia as shown in Fig. 6a–f.

♀. Unknown.

Length: 13.0–13.5 mm.

Type material. Holotype ♂, ’Holotype [laser-printed on red card]’ // MALAYSIA: BORNEO/ Sarawak State// Miri Division, Bario// Arur Dalan, 1,235 m./ forest, 7.ix.2009// Coll. H. Kurahashi// Burmanomyia sp. nov./ pseudoborneensis sp. nov./ Det. H. Kurahashi// Burmanomyia sp. nov./ pseudoborneensis sp. nov./ Det. H. Kurahashi [laser-printed on white card with red perimeter],’ with a small tube // MALAYSIA: MALAYA: 1 ♂, Cameron Highland/ 16 mL from Tapah/ 400 m, 28.X.1991// Col. R. Kano & K. Inder Singh//.

Type depository. Holotype ♂ (NSMT-I-DIP22753), 1 ♂ paratype (NSMT-I-DIP22754) are deposited in Natural Museum of Nature and Science, Tsukuba (NSMT).

Etymology. The specific epithet “pseudoborneensis” is derived from this form having a similar appearance of Myorhina borneensis (Shinonaga & Lopes).

Remarks. The present new species is similar to Myorhina borneensis (Shinonaga & Lopes, 1975), but easily distinguished by having 4 poststatural dc on thorax. Male genitalia is also characteristic in the shape of aedeagus and cercus. Montane forest species.

Distribution. Malaysia (Malaysia, Malaya and Borneo)

Bionomics. Male flies were found in montane forests of more than 400 m.

Sarcorhodendorfia kerohi sp. nov.

(Fig. 7)

♂.—Head: dichoptic; eye large, bare; frons broad; frons index 0.20–0.21 (M=0.20, n=9) just in front of anterior ocellus; frontal stripe parallel sided, slightly narrowed toward vertex, fuscous brown, slightly more than 3× width of parafacial at level of in front of anterior ocellus; parafrontal and parafacial black, densely silvery-brown pollinose, clothed with black hairs along eye margin; parafacial provided with ca. 12 or; 1 prevertical bristle developed; mediana narrow, not distinguishable; gena narrow, black, densely silvery-grey pollinose, largely clothed with black hairs except for several yellowish hairs posteriorly; postgena black, densely silvery-grey pollinose, clothed with yellowish white hairs; antenna black except for median part brownish; 3rd antennal segment (AS$_3$) slightly more than 2.5× as long as 2nd (AS$_2$); arista long plumose, blackish. Palpus normal sized, slender, blackish, with short and bristly black hairs.

Thorax: blackish, more or less covered with yellowish-brown pollinosity, sometimes with yellowish brown tinge; 3 broad, dark longitudinal stripes distinct on dorsum; humerus and postalar callos concolorous with dorsum; scutellum concolorous with dorsum; prosternum and propleuron hairy; notopleuron clothed with a few small black hairs; hypopleuron hairy; sternopleuron largely clothed in black hairs; supraspiracular convexity hairy anteriorly; mesothoracic spiracle fuscous black; metathoracic spiracle fuscous black. Chaetotaxy: ac 6–7(fine) +1; dc 4–5+4; ia 1(fine)+2; ph 2; prs 1; h 3; n 4; sa 3–4; pa 2; st 1+1+1; sc 4–5+1(fine).

Wing: hyaline, sometimes slightly yellow tinged; vein fuscous brown; epaulet blackish; basicosta yellowish brown; vein R, bare; node of R$_{2+3}$ and R$_{4+5}$ with a few black setulae above and below; vein R$_{4+5}$ setulose more than
1/2 way from node to cross vein r-m above; vein M bent with right angle; dm-cu sigmoid, slightly curved. Alar squama with tuft of pale white hairs on inner lower margin. Thoracic squama large, bare on dorsal surface, pale white. Halter brown.

Legs: blackish, more or less grey pollinose on coxae and femora; fore femur with 2 rows of long bristles on dorsal and posterodorsal surfaces, with row of strong pv on apical 1/2; fore tibia with 1 p and 3 ad basally; mid femur with row of several pv on apical 1/3, with row of av on apical 1/2, with 2–3 p–pd preapically; mid tibia with 1–2 submedian ad, 1 pd, 1 p, 1v; hind femur with 2 rows of strong av, 1 row from basal to preapical, 1 from submedian to apical, with a few strong av apically, with many fine long setulae on anteroventral and posteroventral surfaces, with 1–2 strong av preapically, 2–3 pd and 1 p–pd preapically, no characteristic bristle on posterior surface; hind tibia fringed on anteroventral and posteroventral surfaces, with row of short ad, with 2–3 strong submedian ad, 1 apical d, 2 pd, 1 av, 1 apical av.

Abdomen: blackish on tergites 1+2–3, more or less reddish on tergites 4–5 and GS1–2; T4–5 more or less covered with yellowish-grey to golden pollinosity; T1 with erect median and 3–4 strong lateral mb; T3 with row of strong mb, fine bristles on posteroventral margin; ST4 with conspicuous tuft of condensed black hairs at posterior margin. Hypopygium prominent, reddish; GS1 with yellowish-grey pollinosity; GS2 reddish brown, shining. Male genitalia as shown in Fig. 7a–f.

♀.—Similar to male in general appearance except for broader frons and more stout abdomen; frons index 0.27–0.30 (M=0.29, n=4), presence of two procinate and one reclinate fronto-orbital bristles (ors 2+1); ov developed; abdomen more robust and yellowish-grey to gold pollinosity on tergites. Ovipositor short, similar to that of S.
antilope: tergite 6 of dome-like, divided into two parts by median narrow membranous portion, left and right sclerites, with row of mb; hair along posterior margin on more than 1/2 of total length; tergites 7–9 disappear; no secondary pigmented area; sternite 6 of single plate, without incision, with complete row of mb, largely haired on posterior margin; sternite 7 of single plate, without distinct incision, with complete row of mb, hair more than 1/2 posteriorly; sternite 8 disappeared at site, without mb; sternite 9 disappeared.

Length: 8.0–14.5 mm.

Type material. Holotype ♂, Holotype [laser-printed on red card] //MALAYSIA: BORNEO/ Sarawak, Lanjak-/ Entimau Wildlife/ Sanctuary, Engkari R./ forest, 29.vi-3.vii.2012/ Coll. H. Kurahashi //, Sarcorohdendorfia / kerohi sp. nov./ Det. H. Kurahashi [laser-printed on white card with red perimeter], *with a small tube containing dissected genitalia. Paratypes: 2♂, with “Paratype [laser-printed on yellow card]” and, identification label “Sarcorohdendorfia kerohi sp. nov./ Det. H. Kurahashi [laser-printed on white card with blue perimeter]” // same data as holotype; 1♂, “MALAYSIA: BORNEO/ Sarawak State,/ Sibu Division,/ Katingib River, Batu Gong/ forest, 9.ix.2011/ Coll. H. Kurahashi//; 2♂, MALAYSIA: BORNEO/ Sarawak State,/ Sibu Division,/ Katibas River,/ Batu Gong, forest, 9.ix.11/ Coll. S. H. Tan//; 1♂, MALAYSIA: BORNEO/ Sarawak State/ Sibu Division,/ Lanjak Entimau Wildlife/ Sanctuary, Helipod,/ hilltop, 161 m, 7–8.ix.2011/ Coll. H. Kurahashi//; 1♂, MALAYSIA: BORNEO/ Sarawak State,/ Miri Division, Bario,/ Prayer Mountain, 1,428 m,/ hill top, 9.ix.2009/ Coll. H. Kurahashi//; 1♂, MALAYSIA: BORNEO/ Sarawak State,/ M3 division, Bario,/ Arur Dala, 1,235 m./ forest, 10.ix.2009/ Coll. H. Kurahashi//1♂, MALAYSIA: BORNEO/ Sarawak State,/ Miri Division, Bario,/ Mt. Prayer,/ hill top, 1428 m, 11.ix.09/ Coll. S. H. Tan// 1♀, same locality, 11.ix.09/ Coll. S. H. Tan//; 1♀, MALAYSIA: BORNEO/ Sarawak State, M3 Division, Bario,/ Prayer Mountain, 1,428 m,/ hill top, 11–12.ix.2009/ Coll. H. Kurahashi/ 1♀, MALAYSIA: BORNEO, Sarawak State,/ Miri Divbision, Bario, Pa Ukat, 1,020 m,/ forest, 7.ix.2007/ Coll. Hiromu Kurahashi//.

Type depository. Holotype ♂ (NSMT-I-DIP22755), and 3♂1♀ paratypes (NSMT-I-DIP22756–22758) are deposited in National Museum of nature and Science, Tsukuba (NSMT); 3♂1♀ paratypes in Sarawak Museum Department, Kuching (SM); 3♂1♀ in Bishop Museum, Honolulu (BPBM).

Etymology. The specific epithet is named after the late Mr. Keroh Anak Janting, a staff of Forestry Department Sarawak, who assisted us in our field survey in Lanjak Entimau Wildlife Sanctuary and to commemorate him for his support and assistant during the collections.

Remarks. The present new species is similar to Sarcorohdendorfia multivillosa Shinonaga & Tumrasvin, 1975 from Thailand, but its abdominal tip is reddish and usually covered with yellowish golden pollinosity on tergites 4–5. Male genitalia also characteristic in the shape of stylus long. Forest species. The female specimen examined is a mother fly which deposited one larva. This larva was successfully raised to adulthood of one male fly after pupal stage of 17 days. Therefore, female identity was confirmed by its male progeny and DNA analysis.

Distribution. Malaysia (Borneo, Sarawak)

Bionomics. Male flies were collected in sunny spots often on the top of hill and lowland forests.

Sarcorohdendorfia okazawai sp. nov. (Fig. 8)

♂.—Head: dichoptic; eye large, bare; frons broad; frons index 0.19–0.21 (M=0.20, n=8) just in front of anterior ocellus; frontal stripe parallel sided, narrowed toward vertex, black, slightly more than 2× width of parafacial at level of in front of anterior ocellus; parafacial and parafacial black, densely golden-yellow pollinose, clothed with black hairs; parafacial provided with ca. 14 or 1 prevetrical ors developed; mediana narrow, not distinguishable; gena narrow, black, densely grey pollinose with yellow tinge anteriorly, largely clothed with black hairs except for several yellowish hairs posteriorly; postgena black, densely grey pollinose, clothed with yellowish white hairs; antenna blackish; 3rd antennal segment (AS3) slightly more than 3× as long as 2nd (AS2); arista long plumose, blackish. Palp normal sized, slender, blackish, with short and bristly black hairs.

Thorax: blackish, more or less covered with yellowish or brownish-grey pollinosity; 3 broad, dark longitudinal stripes distinct on dorsum; humerus and postalar callus concolorous with dorsum; scutellum concolorous with dorsum; prothorax and propleuron hairy; notopleuron largely clothed with black hairs; hypopleuron hairy; sternopleuron clothed in black hairs; supraspiracular convexity bare; mesothoracic spiracle fuscous black; metathoracic spiracle fuscous black. Chaetotaxy: ac 6–7+1; dc 4–5+4; ia 1(fin) + 2–3; ph 2; prs 1; h 3; n 4; sa 5, 1st and 3rd ones fine; pa 2; st 1+1+1; sc 4+1(fin).

Wing: hyaline; vein fuscous brown; epaupe blackish; basicosta yellowish brown; vein R, bare; node of R 3, and R 4+5 with a few black setulae above and below; vein R 4+5 setulose more than 1/2 way from node to cross vein m-r above, 1–2 hairs along line below; vein M bent with right angle; dm-cu sigmoid, slightly curved. Alar squama with tuft of dark brown hairs on lower lower margin. Thoracic squama large, bare on dorsal surface, dark brown on disc. Halter brown.
Legs: blackish, more or less grey pollinose on coxae and femora; fore femur with 2 rows of long bristles on dorsal and posterodorsal surfaces, with row of long and strong pv on entire length, clothed with fine long hairs on entire posterior surface; fore tibia with 1 p and 2–3 ad basally; mid femur with row of 2–3 av medially, with 2 rows of short and strong av and pv on apical 1/3, with 3–5 a medially, with 3 p–pd preapically; mid tibia with 1 submedian ad, 1 pd, 1 p, 1v; hind femur with irregular row of strong ad on entire length, with a few strong long av on apical 1/3, clothed with fine and long hairs on ventral surfaces, with 3–4 p–pd preapically; hind tibia fringed on anteroventral to posteroventral surfaces, with row of short ad, with 2 strong submedian ad, 1 apical d, 2 pd (strong), 1 av, 1 apical av.

Abdomen: black, tessellate, more or less grey to yellowish-grey pollinose on tergites 1+2+3, tessellated on T 4–5 more or less covered with yellowish-grey to golden pollinosity; T 4 with erect median and 3–4 strong lateral mb; T 5 with row of strong mb, fine bristles on posteroventral margin; ST 4 with conspicuous tuft of condensed black hairs at posterior margin. Hypopygium prominent, black; GS 1 with yellowish- or brownish-grey pollinosity. Male genitalia as shown in Fig. 8a–f.

♀. Unknown.

Length: 11.0–15.0 mm.

Type material. Holotype ♂, `Holotype [laser-printed on red card]//MALAYSIA: BORNEO/ Sarawak State,/ Miri Division, Bario,/ Prayer Mountain, 1,428 m, hill top, 9.ix.2009/ Coll. H. Kurahashi// Sarcorohdendorfia ♂/ okazawai sp. nov./ Det. H. Kurahashi [laser-printed on white card with red perimeter], with a small tube containing dissected genitalia. Paratypes: 7 ♂, with "Paratype [laser-printed on yellow card]" and identification label "Sarcorohdendorfia okazawai/ sp. nov./ Det. H. Kurahashi [laser-printed on white card with blue perimeter]" // MALAYSIA: BORNEO: 4 ♀ same data as holotype; 3 ♀, Sarawak State, Miri Division, Bario, Arur Dalan, 1,235 m, forest, 10.ix.2009, Coll. H. Kurahashi.
Type depository. Holotype ♂ (NSMT-I-DIPT22759), and 4 ♀ paratypes (NSMT-I-DIPT22760–22763) are deposited in National Museum of Nature and Science, Tsukuba (NSMT); 3 ♀ paratypes in Sarawak Museum Department, Kuching (SM).

Etymology. The specific epithet is named after Professor Dr. Takao Okazawa, Kanazawa University, a member of the Miyagi’s project for his kind guidance and encouragement.

Remarks. The present new species is similar to Sarcorhodendorphia kerohi sp. nov., but easily distinguished by the bare supraspiracular convexity and black male hypopygium. Male genitalia is also characteristic in the shape of stylus long. Montane forest species.

Distribution. Malaysia (Borneo, Sarawak)

Bionomics. Male flies were found around sunny spots in montane forests and often on the top of hill.

Hosarcophaga palustris sp. nov.

(Fig. 9a–f)

♂.—Head: dichoptic; eye large, bare; frons index 0.15–0.16 (n = 2) just in front of anterior ocellus; frontal stripe parallel sided, narrowed toward vertex, black, slightly more than width of parafrontal at level of in front of anterior ocellus; parafrontal and parafacial black, densely silver-grey pollinose, clothed with black hairs; parafrontal provided with ca. 9 oris; 2 reclinate oris developed; mediana narrow, not distinguishable; gena narrow, black, densely grey pollinose, entirely clothed with black hairs; postgena black, densely grey pollinose, clothed with yellowish white hairs; antenna blackish; 3rd antennal segment (AS3) slightly more than 2.5× as long as 2nd (AS2); arista long plumose, largely blackish except for some yellowish brown in part. Palpus normal sized, slender, blackish, with short and briskly black hairs.

Thorax: blackish, more or less covered with yellowish or brownish-grey pollinosity; 3 broad, dark longitudinal stripes distinct on dorsum; humerus and postalar callus concolorous with dorsum; scutellum concolorous with dorsum; prosternum and propleuron hairy; notopleuron with several black hairs around sternopleuron clothed in black hairs; supraspiracular convexity bare; mesothoracic spiracle fuscous black; metathoracic spiracle brown to fuscous black. Chaetotaxy: ac + 0; pv + 1; and + 2; mb + 3; 2 reclinate; ors + 4; sa + 5, 1st one (pra) shorter than 4th; m + 2; s + 1 + 1; c + 3 + 1(fine).

Wing: hyaline, largely brownish tinged; vein fuscous brown; epaulet blackish; basicosta yellowish brown; vein R1 bare; node of R2 + 3 and R4 + 5 with a few black setulae above and below; vein R4 + 5 setulose more than 1/2 way from node to cross vein r-m above; vein M bent right angle; dm-cu sigmoid, slightly curved. Alar squama with tuft of pale brown hairs on inner lower margin. Thoracic squama large, bare on dorsal surface, dark brown on disc. Halter brown.

Legs: blackish, more or less grey pollinose on coxae and femora; fore femur with 2 rows of long bristles on dorsal and posterodorsal surfaces, with row of long and strong pv on entire length; fore tibia with 1 p at apical 1/3 and 2 ad submedially; mid femur with row of fine, long hairy bristles on posterovelar surface medially, with row of several short pv on apical 1/3, with 2–3 a medially, with 3 p-pd preapically; mid tibia with 1 submedian a, 1 pd, 1 p, 1v at apical1/3 and with 2 pd basally; hind femur with two rows of strong ad on entire length, with 2 av medially, 1–2 av preapically; and clothed with fine hairs on ventral surfaces, with 2 p-pd preapically; hind tibia not fringed, with row of short ad, with 2 strong submedian ad, 1 apical d, 2 strong submedian pd, 1 submedian and 1 apical av.

Abdomen: black, tessellate, more or less grey pollinose on tergites 1+2–3, tessellated on T4–5 more or less covered with grey to silver pollinosity; T1 with fine median mb; T2 with erect median and 3 strong lateral mb; T3 with row of strong mb; fine bristles on posterovelar margin. Hypopygium prominent, fuscous black; GS1 with brownish-grey pollinosis; GS2 black, shining. Male genitalia as shown in Fig. 9a–f.

♀. Unknown.

Length. 8.5–10.0 mm.

Type material. Holotype ♂, Holotype [laser-printed on red card]//MALAYSIA: BORNEO/ Sarawak State, Jabatan Perhutang/, swampt, <1m, 18.ix.2007/ Coll. Hiromu Kurahashi// Hosarcophaga palustris sp. nov.// Det. H. Kurahashi [laser-printed on white card with red perimeter]; with a small tube containing dissected genitalia. Paratype: 1 ♀, with "Paratype [laser-printed on yellow card]" and identification label "Hosarcophaga palustris sp. nov.// Det. H. Kurahashi [laser-printed on white card with blue perimeter]" // MALAYSIA: BORNEO: 1 ♀, Sarawak State Kuching Dist., Regional Forestry / Office Kuching, swampt, 18.ix.2007/ Coll. S. H. Tan// [S-SWK-176, unknown, DNA analyzed by S. H. Tan, 2008].

Type depository. Holotype ♂ (NSMT-I-DIPT22764) and 1 ♀ paratype (NSMT-I-DIPT22765) are deposited in National Museum of Nature and Science, Tsukuba (NSMT); 1 paratype in Sarawak Museum, Kuching (SM).

Etymology. The specific epithet is derived from a swampy place "palustris" in Latin.

Remarks. The present new species is similar to Hosarcophaga auricauda (Ho), but easily distinguished by having
no fringe on hind tibia in ♂. Male genitalia is also characteristic in the shape of aedeagus and cercus. Swamp species.  

**Distribution.** Malaysia (Borneo, Sarawak)  

**Bionomics.** Male flies were found in a swampy place of mangrove forests around river mouths.

**Hosarcophaga puteri** sp. nov.  
(Fig. 10a–f)

♂.—Head: dichoptic; eye large, bare; frons broad; frons index 0.22–0.23 (n=2) just in front of anterior ocellus; frontal stripe parallel sided, somewhat narrowed toward vertex, black, less than 2.0x width of parafrontal at level of in front of anterior ocellus; parafrontal and parafacial, black, densely silver-grey pollinose, clothed with black hairs; parafrontal provided with ca. 8 ors; 1 reclinate ors developed; ov developed; mediana narrow, not distinguishable; gena narrow, black, densely grey pollinose, entirely clothed with black hairs; postgena black, densely grey pollinose, clothed with black hairs except for several yellowish white ones on posterior extremity; antenna black; 3rd antennal segment (AS₃) about 2.0× as long as 2nd (AS₂); arista long plumose, black. Palpus normal sized, slender, black, with short and bristly black hairs.

Thorax: blackish, more or less covered with grey or silver-grey pollinosity; 3 broad, dark longitudinal stripes distinct on dorsum; humerus and postalar callus concolorous with dorsum; scutellum concolorous with dorsum;
prosternum and propleuron hairy; notopleuron bare; hypopleuron bare except for row of strong hp posteriorly; sternopleuron hairy; supraspiracular convexity bare; mesothoracic spiracle fuscous black; metathoracic spiracle small in size, yellowish-brown. Chaetotaxy: ac 3–4+3–4 in irregular rows short; dc 2–4+4–5; ia 1(fine)+2–3; ph 2; prs 1; h 3; n 4; sa 3, 1st one (pra) subequal to 4th n; pa 2; st 1+1; sc 2–3(2 strong)+1(fine), without or with apical marginal sc.

Wing: hyaline, vein fuscous brown; epaulet blackish; basicosta yellowish brown; vein R₁ bare; node of R₁+₂ and R₄+₅ with a few black setulae above and below; vein R₁+₂ setulose more than 1/2 way from node to cross vein r-m above; suberect and long costal spine present; vein M bent with right angle; dm-cu sigmoid, almost straight and slightly curved at middle. Alar squama with tuft of pale white hairs on inner lower margin. Thoracic squama large, bare on dorsal surface, pale brownish white on disc. Halter brown.

Legs: blackish, more or less grey pollinose on coxae and femora; fore femur with 1 regular and 1 irregular rows of long bristles on dorsal and posterodorsal surfaces, with row of long and strong pv on entire length; fore tibia with 1 p at apical 1/3 and 2 ad basally; mid femur with row of fine hairy bristles on posteroventral (long) and anteroventral (short) surfaces entirely, with row of several short av and pv apically, with 2–3 a medially, with 2 p–pd preapically; mid tibia with 2 submedian ad, 1 pd, 1 p, 1 v; hind femur with 1 regular and 1 irregular and incomplete rows of ad, with 2 av medially, 1–2 av preapically, and clothed with fine long hairy bristles on anteroventral and posteroventral surfaces, with 2–3 p–pd preapically; hind tibia not fringed, with sparse row of

Fig. 10. *Hosarcophaga puteri* sp. nov., male genitalia.—a, fourth and fifth sternites, ventral view; b, hypopygium, lateral view; c, cerci and surstyli, caudal view; d, pregonite and postgonite, lateral view; e, aedeagus, lateral view; f, surstylus and cercus, lateral view.
long and short ad, 2 strong submedian pd, 2 submedian av, 1 apical d, 1 apical av.

Abdomen: black, tessellate, more or less grey to silver-grey pollinose on tergites 1+2–3, tessellated on T4–5 more or less covered with grey to silver pollinose; T1 with fine median mb; T4–5 with row of strong mb, fine bristles on posteroventral margin. Hypopygium less prominent, fuscous black; GS not prominent, with brownish-grey pollinose; GS black, shining, with silvery-grey pollinose laterally. Male genitalia as shown in Fig. 10a-f.

Kuching Division, Santubong, mangrove, Forestry Department Sarawak to conduct research on Diptera (two-winged flies) for taxonomic studies. cooperation and assistance during the survey. The researchers obtained the necessary permits from the Director of.

B. Zakaria; and Japanese members of the project, Drs. T. Okazawa, T. Toma, H. Takaoka, Y. Higa, for their kind assistance, Mr. Affinid Muhidden, Mr. Mahmud Muhidden; General Office Assistants, Mr. Richard Lim, Mr. Yahya permission to carry out our field works. We would like to thank Assistant Curator, Mr. Yakup Mawi; Museum assistants.

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APPENDIX I

Row and number of postsutural dc found in thoracic chaetotaxy, dorsolateral view.—x, and y showing subprimary additionals and interstitials, respectively.

*Parasarcophaga unguitigris* Rohdendorf, a representative of postsutural dc 5.

*Liopygia ruficornis* (Fabricius), an aberrant of postsutural dc 5.

*Myorrhina kanekoi* (Kano & Field), an aberrant of postsutural dc 3.

*Sarcorhodendorfia antilope* (Böttcher), a representative of postsutural dc 4.
APPENDIX II

General morphology, terminology and abbreviation of sarcophagid flies. One of common Malaysian species, Boettcherisca karnyi Lopes, was examined and illustrated for studies.

Fig. 1. Head, lateral view.
Fig. 2. Head, anterior view.
Fig. 3. Male head, dorsal view.
Fig. 4. Female head, dorsal view.
Fig. 5. Measurement of the head, anterior view (adopted from Fan, 1992).
Fig. 6. Measurement of the head, lateral view (adopted from Fan, 1992).
Fig. 7. Thorax, dorsal view.
Fig. 8. Thorax, lateral view.
Fig. 9. Female abdomen, dorsal view.
Fig. 10. Male abdomen, dorsal view.
Fig. 11. Female abdomen, ventral view.
Fig. 12. Male abdomen, ventral view.
Fig. 13. Fore leg, dorsal view.
Fig. 14. Mid leg, dorsal view.
Fig. 15. Hind leg, dorsal view.
Fig. 16. Wing, dorsal view.
Fig. 17. Male genitalia, lateral view.
Fig. 18. Female genitalia, caudal/ posterior view, with an inset of spermatheca, one of three illustrated.
Fig. 19. Aedeagus, lateral view.
Fig. 20. Schematic arrangement of parts of sarcophagine aedeagus in general, lateral view.
Figs. 1–4. *Boettcherisca karnyi*, head.
Figs. 5-7. Boettcherisca karnyi, measurements of head and thorax, dorsal view
Fig. 8

Boettcherisca karnyi, thorax, lateral view
Figs. 9–12. *Boettcherisca karnyi*, abdomen.
Figs. 13–15. *Boettcherisca karnyi*, legs.
Fig. 16

Fig. 16. Boettcherisca karnyi, wing.
Figs. 17–20. *Boettcherisca karnyi*, male and female genitalia.
APPENDIX III

East Malaysian (Borneo: Sarawak) sarcophagid species and specimens examined (Diptera) are listed. New country records are marked with an asterisk (*). All materials available were identified by HK and SHT. In the cases of no available material, the previous records were cited in the list below the scientific name.

Subfamily MILTOGRAMMATINAE

Tribe Macronychiini

Macronychia malayana Kurahashi & Pape, 1996, n. rec. to Sarawak

BORNEO: 1 ♀, Sarawak State, Lanjāk-Entimau Wildlife Sanctuary, Engkari R., forest, 29.vi.–3.vii.2012, H. Kurahashi (IDD); 2 ♀, Sarawak State, Sibu Division, Katibas River, Batu Gong, forest, 9.ix.2011, H. Kurahashi (SM); 1 ♂, Sarawak State, Sibu Division, Katibas River, Batu Gong, forest, 9.ix.2011, S. H. Tan (UM).

Tribe Amobiini

Amobia quatei Kurahashi, 1974

BORNEO: 2♂, 1 ♀, Sarawak State, Lanjāk-Entimau Wildlife Sanctuary, Engkari R., forest, 29.vi.–3.vii.2012, H. Kurahashi (IDD); 2 ♀, Sarawak State, Sibu Division, Katibas River, Dujaun River, forest, 10.ix.2011, H. Kurahashi (SM); 1♂, Sarawak State, Sibu Division, Katibas River, Makut River, 23 m, rocky shore, 5.ix.2011, S. H. Tan (UM); 1 ♀, Sarawak State, Sibu Division, Katibas River, Menyarin River, forest, 9.ix.2011, H. Kurahashi (SM).

Tribe Miltogrammatini

Craticulina tabaniformis (Fabricius, 1805)

BORNEO: 1♂, Sarawak State, Kuching District, Santubong, <10 m, beach, 13.xi.2019, H. Kurahashi (IDD); 1♂, Sarawak State, Kuching District, Santubong, <1 m, beach, 19.ix.2011, H. Kurahashi (SM); 1 ♀, Sarawak State, MRI Division, Barito to Pa Lungan, 1,020 m, forest, 9.ix.2007, H. Kurahashi (IDD); 1♂, Sarawak State, Sibu Division, Katibas River, Batu Gong, forest, 9.ix.2011, H. Kurahashi (SM); 7♂, Sarawak State, Sibu Division, Katibas River, Menyarin River, forest, 9.ix.2011, H. Kurahashi (SM); 11♂, Sarawak State, Sibu Division, Katibas River, Tupang River, forest, 11.ix.2011, H. Kurahashi (SM); 5♂, Sarawak State, Sibu Division, Lanjāk Entimau Wildlife Sanctuary, Helipad, 12.ix.2011, H. Kurahashi (SM); 3♂, Sarawak State, Sibu Division, Lanjāk Entimau Wildlife Sanctuary, Helipad, 161 m, hill top, 7–8.ix.2011, S. H. Tan (UM); 29♂, Sarawak State, Sibu Division, Lanjāk Entimau Wildlife Sanctuary, Helipad, 161 m, hill top, 7–8.ix.2011 (24♂), 12.ix.2011 (5♂), H. Kurahashi (SM); 5♂, Sarawak State, Sri Aman Division, Ulu Engkari, Nanga Talong, forest, 4.vii.2012, H. Kurahashi (IDD).

Miltogramma iberica Villeneuve, 1912

BORNEO: 54♂, Sarawak State, Lanjāk-Entimau Wildlife Sanctuary, Engkari R., forest, 29.vi.–3.vii.2012, H. Kurahashi (IDD); 2♂, Sarawak State, Lanjāk-Entimau Wildlife Sanctuary, Engkari R., forest, 29.vi.–3.vii.2012, Lily Sir (FDS); 11♂, Sarawak State, MRI Division, Barito to Pa Lungan, 1,020 m, forest, 31.viii.–1.ix.2008, H. Kurahashi (SM); 12♂, Sarawak State, Sibu Division, Katibas River, Batu Gong, forest, 9.ix.2011, H. Kurahashi (SM); 7♂, Sarawak State, Sibu Division, Katibas River, Menyarin River, forest, 9.ix.2011, H. Kurahashi (SM); 11♂, Sarawak State, Sibu Division, Katibas River, Tupang River, forest, 11.ix.2011, H. Kurahashi (SM); 5♂, Sarawak State, Sibu Division, Lanjāk Entimau Wildlife Sanctuary, Helipad, 12.ix.2011, H. Kurahashi (SM); 3♂, Sarawak State, Sibu Division, Lanjāk Entimau Wildlife Sanctuary, Helipad, 161 m, hill top, 7–8.ix.2011, S. H. Tan (UM); 29♂, Sarawak State, Sibu Division, Lanjāk Entimau Wildlife Sanctuary, Helipad, 161 m, hill top, 7–8.ix.2011 (24♂), 12.ix.2011 (5♂), H. Kurahashi (SM); 5♂, Sarawak State, Sri Aman Division, Ulu Engkari, Nanga Talong, forest, 4.vii.2012, H. Kurahashi (IDD).

Protomiltogramma parafacialis Kurahashi & Leh, 2008

BORNEO: 1 ♂, Sarawak State, Kuching Division, Borneo Highlands, 1,034 m, forest, 16–18.ix.2011, H. Kurahashi (SW); 1♂, Sarawak State, Kuching Division, Borneo Highlands, 1,034 m, forest, 16–18.ix.2011, S. H. Tan (UM); 2♂, Sarawak State, Kuching Division, Matang National Park, <500 m, forest, 28.vii.2007, H. Kurahashi (SM); 4♂, Sarawak State, Lanjāk-Entimau Wildlife Sanctuary, Engkari R., forest, 29.vi.–3.vii.2012, H. Kurahashi (IDD); 2♂, Sarawak State, Limbang Division, Bakelandang, 900 m, forest, 21–26.vii.2008, H. Kurahashi (SM); 3♂, Sarawak State, Limbang Division, Lawas Dist., Ba’ Kelalan to Pa Rabata, 1,215 m, forest, 10.vi.2013, H. Kurahashi (SM); 1♂, Sarawak State, Limbang Division, Lawas Dist., Ba’ Kelalan to Pa Rabata, 1,215 m, forest, 10.vi.2013, S. H. Tan (IDD); 1♂, Sarawak State, MRI Division, Barito to Pa Lungan, 1,151 m, forest, 31.viii.2009, H. Kurahashi (SM); 12♂, Sarawak State, MRI Division, Barito to Pa Lungan, 1,020 m, forest, 31.viii.–1.ix.2008, H. Kurahashi (SM); 19♂, Sarawak State, MRI Division, Barito, Pa Lungan, 1,029 m, forest, 4.ix.2007(8♂), 9.ix.2007(11♂), H. Kurahashi (SM); 1♂, Sarawak State, MRI Division, Barito, Pa Lungan, 1,029 m, forest, 4.ix.2007(8♂), 9.ix.2007(11♂), H. Kurahashi (SM); 1♂, Sarawak State, MRI Division, Barito, Stone cutting site, 1,020 m, forest, 11.ix.2007, H. Kurahashi (SM); BORNEO: 9♂, Sarawak State, MRI Division, Barito, Stone-cutting site, 1,103 m, forest, 28.viii.2009, H. Kurahashi (SM); 2♂, Sarawak State, MRI Division, Barito, Stone-cutting site, 1,121 m, forest, 8.ix.2009, H. Kurahashi (SM); 3♂, Sarawak State, MRI Division, Barito, Stone-cutting site, 1,020 m, forest, 28.viii.–1.ix.2008, H. Kurahashi (SM); 7♂, Sarawak State, MRI Division, Pa Lungan to Barito, 1,151 m, forest, 5.ix.2009, H. Kurahashi (SM); 1♂, Sarawak State, MRI Division, Pa Lungan to Pa Terutun, 1,140 m, forest, 3.ix.2009, H. Kurahashi (SM); 1♂, Sarawak State, Sibu Division, Katibas River, Batu Gong, forest, 9.ix.2011, H. Kurahashi (SM).

Protomiltogramma puteri Kurahashi & Leh, 2008

BORNEO: 2♂, Sarawak State, Kuching Division, Sampadi, <1 m, sandy beach, 8.ix.2008, H. Kurahashi (SM); 5 ♀, Sarawak State, Kuching Division, Santubong, <1 m, mangrove, 27.vii.2018, H. Kurahashi (IDD); 11♂, Sarawak State, Kuching Division, Santubong, <1 m, beach, 19.ix.2011, H. Kurahashi (SM).

*Senotainia albifrons* (Rondani, 1859)

BORNEO: 1♂, Sarawak State, Lanjāk-Entimau Wildlife Sanctuary, Engkari R., forest, 29.vi.–3.vii.2012, H. Kurahashi (IDD).
**Metopia argyrocephala** (Meigen, 1824)

**Metopia souteri** (Townsend, 1932)

**Metopia suifenhoensis** Fan, 1965

**Subfamily SARCOPHAGINAE**

**Tribe Protodexiini**

**Blaesoxipha rufipes** (Macquart, 1839), n. rec. to Sarawak

**Subfamily SARCOPHAGINAE**

**Tribe Protodexiini**

**Blaesoxipha rufipes** (Macquart, 1839), n. rec. to Sarawak
Tribe Sarcophagini

*Omarisca longifilia* (Salem, 1946) comb. nov.

BORNEO: 3♂ 1 ♀, Sarawak State, Kuching Division, Santubong, mangrove, <1 m, 27.vii.2018, S. Kakinuma and H. Kurahashi (IDD); 3♂, Sarawak State, Kuching Division, Santubong, swamp, 70 m, 27.vii.2018, S. H. Tan (SM).

The post sutural *dc* 3 group

**Myorhina borneensis** (Shinonaga & Lopes, 1975)

BORNEO: 7♂ 4♀, Sarawak State, Kuching Division, Borneo Highlands, 1,034 m, forest, 16–18.iix.2011, S. H. Tan (UM); 2♂, Sarawak State, Kuching Division, Borneo Highlands, 1,034 m, forest, 16–18.iix.2011, H. Kurahashi (SM); 2♂, Sarawak State, Kuching Division, Borneo Highlands, 1,200 m, forest, 25–29.vii.2018, H. Kurahashi (IDD); 1♂, Sarawak State, Limbang Division, Bakelalan, 900 m, forest, 21–26.vii.2008, H. Kurahashi (SM); 1♂, Sarawak State, Miri Division, Bario to Pa Lungan, 1,151 m, forest, 31.viii.2009, H. Kurahashi (SM); 2♂, Sarawak State, Miri Division, Bario, Arur Dalan, 1,235 m, forest, 10.iix.2009, H. Kurahashi (SM); 1♂, Sarawak State, Miri Division, Bario, Arur Dalan, 1,235 m, forest, 7.iix.2009, H. Kurahashi (IDD); 2♂, Sarawak State, Miri Division, Bario, Arur Dalan, 1,140 m, forest, 3.ix.2009, H. Kurahashi (SM); 1♀, Sarawak State, Miri Division, Bario, Arur Dalan, 1,235 m, forest, 10.iix.2009, H. Kurahashi (IDD); 1♀, Sarawak State, Miri Division, Bario, Arur Dalan, 1,020 m, forest, 30.viii.2009, H. Kurahashi (SM); 2♂, Sarawak State, Miri Division, Bario, Pa Ukat., 1,020 m, forest, 3.iix.2007, H. Kurahashi (SM); 3♂, Sarawak State, Miri Division, Bario, Power St., 1,020 m, forest, 2.i.x.2007(2♂); 5.i.x.2007(1♂), H. Kurahashi (SM); 1♂, Sarawak State, Miri Division, Bario, Prayer Mountain, 1,428 m, hill top, 11–12.iix.2009, H. Kurahashi (SM); 1♂, Sarawak State, Miri Division, Bario, Prayer Mountain, 1,428 m, hill top, 11–12.iix.2009, H. Kurahashi (IDD); 11♂, Sarawak State, Miri Division, Bario, Stone-cutting site, 1,121 m, forest, 8.iix.2009, H. Kurahashi (SM); 3♂, Sarawak State, Miri Division, Bario, Pa Lungan to Pa Terutun, 1,140 m, forest, 3.iix.2009, H. Kurahashi (SM); 1♂, Sarawak State, Sri Aman Division, Ulu Engkari, Nanga Talong, forest, 4.vii.2012, H. Kurahashi (IDD).

**Myorhina globovesica** (Ye, 1980)

BORNEO: 6♂, Sarawak State, Miri Division, Bario, Prayer Mountain, 1,428 m, hill top, 11–12.iix.2009, H. Kurahashi (SM).

The post sutural *dc* 4 group

*Burmanomyia aureomarginata* (Shinonaga & Tumrasvin, 1979)

BORNEO: 1♂, Sarawak State, Miri Division, Bario, Pa Ukat, 1,020 m, forest, 7.iix.2007, H. Kurahashi (IDD); 1♂, Sarawak State, Miri Division, Bario, Stone-cutting site, 1,121 m, forest, 8.iix.2009, H. Kurahashi (IDD); 1♂ 1 ♂, Sarawak State, Sibu Division, Katibas River, Dujau River, forest, DNA analyzed by S. H. tan, 2011, 10.iix.2011, S. H. Tan (IDD).

**Lioproctia pattoni** (Senior-White, 1924)

BORNEO: 2♂, Sarawak State, Kuching Division, Borneo Highlands, ca. 150 m, forest, 7.vii.2012, H. Kurahashi (IDD); 1♂, Sarawak State, Limbang Division, Bakelalan, 900 m, forest, 21–26.vii.2008, H. Kurahashi (SM); 27♂ 14♀, Sarawak State, Miri Division, Bario, Pa Ukat, 1,020 m, forest, 8.iix.2007, H. Kurahashi (SM); 1♂, Sarawak State, Miri Division, Bario, Pa Ukat, 1,072 m, forest, 29–30.vii.2009, H. Kurahashi (SM); 3♂, Sarawak State, Miri Division, Bario, Pa Ukat, 1,072 m, forest, 29–30.vii.2009(1♀), 6.i.xi.2009(2♂); H. Kurahashi (IDD); 5♂, Sarawak State, Miri Division, Bario, Prayer Mountain, 1,428 m, hill top, 9.i.ix.2009(1♂), 11–12.iix.2009(4♂), H. Kurahashi (SM); 1♂, Sarawak State, Miri Division, Pa Lungan to Arur Kiran, 1,105 m, nr swamp, 1–2.i.ix.2009, H. Kurahashi (SM).

**Lioproctia saprianovae** (Pape & Bänziger, 2000)

BORNEO: 1♂, Sarawak State, Miri Division, Borneo Highlands, ca. 150 m, forest, 7.vii.2012, H. Kurahashi (IDD); 2♂, Sarawak State, Kuching Division, Borneo Highlands, 650 m, forest, 29.viii.2007, H. Kurahashi (SM); 31♂ 20♀, Sarawak State, Kuching Division, Borneo Highlands, 1,034 m, forest, 16–18.iix.2011, H. Kurahashi (IDD); 1♂, Sarawak State, Kuching Division, Matang National Park, <50 m, forest, 28.vii.2007, H. Kurahashi (SM); 1♂ 2♂, Sarawak State, Lanjak-Entimau Wildlife Sanctuary, Engkari R., forest, 29.vi.–3.vii.2012, Lily Sir (FDS); 19♂ 7♀, Sarawak State, Lanjak-Entimau Wildlife Sanctuary, Engkari R., forest, 29.vi.–3.vii.2012, H. Kurahashi (IDD); 1♂, Sarawak State, Miri Division, Bario to Pa Lungan, 1,020 m, forest, 31.viii.–1.x.2008, H. Kurahashi (SM); 1♂ 3♀, Sarawak State, Miri Division, Bario to Pa Lungan, 1,020 m, forest, 9.x.2007, H. Kurahashi (SM); 2♂, Sarawak State, Miri Division, Bario to Pa Lungan, 1,020 m, forest, 4.x.2007(1♂); 9.x.2007(2♂); H. Kurahashi (SM); 1♂, Sarawak State, Miri Division, Bario, Prayer Mountain, 1,428 m, hill top, 9.x.2009, H. Kurahashi (SM); 6♂ 12♀, Sarawak State, Miri Division, Bario, Power St., 1,020 m, forest, 2,.ix.2007(1♂); 5.i.x.2007(4♂), H. Kurahashi (SM); 2♂, Sarawak State, Miri Division, Bario, Prayer Mountain, 1,428 m, hill top, 9.x.2009, H. Kurahashi (SM); 1♂ 12♂ 13♀, Sarawak State, Miri Division, Bario, Power St., 1,020 m, forest, 2,.ix.2007(1♂); 5.i.x.2007(4♂), H. Kurahashi (SM); 1♂, Sarawak State, Miri Division, Pa Lungan to Arur Kiran, 1,105 m, nr swamp, 1–2.i.ix.2009, H. Kurahashi (SM).

**Phallosphaera amicoides** Kurahashi & Tan, 2012

*Phallosphaera amicoides* Kurahashi & Tan, 2012: 323. BORNEO: Sarawak State, HT was examined.

**Phallosphaera baroensis** Kurahashi & Tan, 2012

*Phallosphaera baroensis* Kurahashi & Tan, 2012: 320. BORNEO: Sarawak State, HT and 6 paratypes were examined.
**Sarcorhondorfia curvicercus** (Sugiyama, 1990)

BORNEO: 1♂; Sarawak State, Limbang District, Lawas Dist., Lepo Bunga, 1,709 m, forest, 11.vi.2013, H. Kurahashi (SM); 1♂, Sarawak State, Limbang District, Lawas Dist., Mt. Murud, JoyBridge, 2,089 m, forest, 14.vi.2013, H. Kurahashi (SM); 1♂, Sarawak State, Miri Division, Bario, Power St., 1,020 m, forest, 2.ix.2007, H. Kurahashi (IDD); 1♂, Sarawak State, Miri Division, Baro, Prayer Mountain, 1,428 m, hill top, 9.ix.2009, H. Kurahashi (SM); 1♂, Sarawak State, Miri Division, Baro, Prayer Mountain, 1,428 m, hill top, 9.ix.2009, H. Kurahashi (IDD); 1♂, Sarawak State, Miri Division, Pa Lungan, Tudeal Hill, 1,271 m, hill top, 4.ix.2009, H. Kurahashi (SM).

**Sarcorhondorfia inextricata** (Walker, 1859)

BORNEO: 1♂; Sarawak State, Sibu Division, Ju River, 90 m, forest, 12.iii.2014, S. H. Tan (PCSHT); 1♂, Sarawak State, Sibu Division, Katibas River, Tupang River, forest, 11.ix.2011, H. Kurahashi (SM); 1♂, Sarawak State, Sibu Division, Lanjak Entimau Wildlife Sanctuary, Helipad, 161 m, hill top, 7.viii.2011, H. Kurahashi (SM); 1♂, Sarawak State, Sibu Division, Lanjak Entimau Wildlife Sanctuary, Ju Station, Helipad, 142 m, hill top, 6.iii.2014, S. H. Tan (PCSHT).

**Sarcosolomonia crinita** (Ho, 1938)

BORNEO: 1♂; Sarawak State, Lanjak Entimau Wildlife Sanctuary, Engkari R., forest, 29.vi.-3.vii.2012, H. Kurahashi (IDD); 3♂, Sarawak State, Miri Division, Baro Highlands, Mt. Prayer, 1,428 m, hill top, 12.ix.2009, S. H. Tan (IDD); 1♂, Sarawak State, Miri Division, Baro Highlands, Pa Lungan, Tupang Hill, 1,271 m, hill top, 4.ix.2009, S. H. Tan (PCSHT); 2♂, Sarawak State, Miri Division, Baro to Pa Lungan., 1,020 m, forest, 4.ix.2007(1♂); 9.ix.2007(1♂), H. Kurahashi (SM); 10♂; Sarawak State, Miri Division, Baro, Arur Dalan, 1,235 m, forest, 7.ix.2009, H. Kurahashi (SM); 4♂; Sarawak State, Miri Division, Baro, Arur Dalan, 1,235 m, forest, 10.ix.2009, H. Kurahashi (SM); 1♂; Sarawak State, Miri Division, Baro, Arur Dalan, 1,020 m, forest, 6.ix.2007, H. Kurahashi (SM); 1♂; Sarawak State, Miri Division, Baro, Pa Ukat., 1,020 m, forest, 3.ix.2007(1♂); 7.ix.2007(1♂), H. Kurahashi (SM); 1♂; Sarawak State, Miri Division, Baro, Pa Ukat., 1,020 m, forest, 3.ix.2007(1♂); 7.ix.2007(1♂), H. Kurahashi (SM); 1♂; Sarawak State, Miri Division, Baro, Pa Ukat., 1,020 m, forest, 3.ix.2007(1♂); 7.ix.2007(1♂), H. Kurahashi (SM); 1♂; Sarawak State, Miri Division, Pa Lungan, Tupang Hill, 1,271 m, hill top, 4.ix.2009, H. Kurahashi (IDD); 1♂; Sarawak State, Sibu Division, Katibas River, Dujau River, forest, 10.ii.2011, H. Kurahashi (SM).

**Sarcosolomonia crinita** (Parker, 1917)

BORNEO: 1♂; Sarawak State, Kota Samarahan Division, Sadong Jaya, coconut plan., 8.viii.2012, H. Kurahashi (IDD); 1♂, Sarawak State, Kuching District, Matang Natang National Park, <50 m, forest, 26.vii.2018, H. Kurahashi (IDD); 1♂, Sarawak State, Kuching District, Santubong, <1 m, mangrove, 27.vii.2018, H. Kurahashi (IDD); 2♂, Sarawak State, Kuching Division, Bako N. P., mangrove, 26.vi.2005, H. Kurahashi (SM); 1♂, Sarawak State, Kuching Division, Borneo Highlands, ca. 150 m, forest, 7.vii.2012, H. Kurahashi (IDD); 1♂; Sarawak State, Kuching Division, Borneo Highlands, 650 m, forest, 9.vii.2008, H. Kurahashi (SM); 10♂; Sarawak State, Kuching Division, Kampung Tarat, <200 m, forest, 15 ix.2007, H. Kurahashi (SM); 1♂, Sarawak State, Kuching Village, Kuching City, Sarawak Museum, <5 m, garden, 31.viii.2007, H. Kurahashi (SM); 7♂; Sarawak State, Kuching Division, Matang National Park, <1 m, forest, 21-22.ix.2007, H. Kurahashi (SM); 2♂, Sarawak State, Kuching Division, nr Serian, Kampung Tarat, <200 m, forest, 25.vii.2018, H. Kurahashi (IDD); 1♂, Sarawak State, Kuching Division, Rambungan, <1 m, swamp, 9 ix.2008, H. Kurahashi (SM); 1♂, Sarawak State, Kuching Division, Sampadi, <1 m, sandy beach, 8 ix.2008, H. Kurahashi (SM); 1♂, Sarawak State, Kuching Division, Santubong, <1 m, beach, 19.ix.2011, H. Kurahashi (SM); 1♂; Sarawak State, Kuching Division, Santubong, <1 m, swamp, 14.ix.2007, H. Kurahashi (SM); 1♂, Sarawak State, Limbang Division, Bakelalan, 900 m, forest, 21-26.viii.2008, H. Kurahashi (SM); 1♂, Sarawak State, Miri Division, Baro Town, 1,020 m, garden, 10.ix.2007, H. Kurahashi (SM); 1♂, Sarawak State, Miri Division, Baro, Prayer Mountain, 1,428 m, hill top, 11-12.ix.2009, H. Kurahashi (SM); 1♂, Sarawak State, Miri Division, Baro, Stone-cutting site, 1,121 m, forest, 8.ix.2009, H. Kurahashi (SM); 2♂, Sarawak State, Miri Division, Pa Lungan to Pa Terutun, 1,140 m, forest, 3 ix.2009, H. Kurahashi (SM); 2♂, Sarawak State, Miri Division, Pa Lungan, Tudeal Hill, 1,271 m, hill top, 4.ix.2009, H. Kurahashi (SM); 3♂; Sarawak State, Miri Division, Sungai Liku, S47, S55, S47, S56, 9 v.2016(2♂); 10 v.2016(1♂), T. Tachi (PCTT); 4♂, Sarawak State, Sibu Division, Lanjak Entimau Wildlife Sanctuary, Helipad, 161 m, hill top, 12.ix.2011, H. Kurahashi (SM); 1♂, Sarawak State, Sri Aman Division, Ulu Engkari, Nanga Talong, forest, 4.vii.2012, H. Kurahashi (IDD).

**Sinonippion hainanensis** (Ho, 1936)

BORNEO: 2♂; Sarawak State, Sarawak State, Kuching Division, Jabatan Perhutangan, <1 m, swamp, 18.ix.2007, H. Kurahashi (SM); 1♂, Sarawak State, Kuching Division, Jabatan Perhutangan, <1 m, swamp, 18.ix.2007, H. Kurahashi (IDD).

The poststructural dc 5 group

**Alisarcophaga grossiti** (Hall & Bohart, 1948)

BORNEO: 8♂; Sarawak State, Kuching Division, Kampung Sampadi, <1 m, beach, 17.ix.2007, H. Kurahashi (SM); 2♂, Sarawak State, Kuching Division, Sampadi, <1 m, sandy beach, 8 ix.2008, H. Kurahashi (SM); 2♂, Sarawak State, Kuching Division, Santubong, <1 m, mangrove, 27.viii.2018, H. Kurahashi (IDD); 3♂; Sarawak State, Kuching Division, Santubong, <1 m, beach, 19.ix.2011, H. Kurahashi (SM); 1♂; Sarawak State, Kuching Division, Santubong, <1 m, swamp, 14.ix.2007, H. Kurahashi (SM).

**Boettcherisca javanica** Lopes, 1961

BORNEO: 4♂; Sarawak State, Kuching Division, Borneo Highlands, ca. 150 m, forest, 7.viii.2012, H. Kurahashi (IDD); 1♂, Sarawak State, Kuching Division, Borneo Highlands, 650 m, forest, 29.viii.2007, H. Kurahashi (SM); 2♂, Sarawak State, Kuching Division, Jabatan Perhutangan, <1 m, swamp, 18.ix.2007, H. Kurahashi (SM); 1♂, Sarawak State, Kuching Division, Kampung Tarat, <200 m, forest, 15.ix.2007, H. Kurahashi (IDD); 1♂, Sarawak State, Kuching Division, Sibu Division, Katibas River, forest, 10.ii.2011, H. Kurahashi (SM).
Boettcherisca karneyi (Hardy, 1927)

**BORNEO:** 4♂, Sarawak State, Kota Samarahan Division, Sadong Jaya, coconut plant., 8.vii.2012, H. Kurahashi (IDD); 1♂, Sarawak State, Kuching Division, Borneo Highlands, ca. 150 m, forest, 7.vii.2012, H. Kurahashi (IDD); 42♂ 4♀, Sarawak State, Kuching Division, Jabatan Perhutang, <1 m, swamp, 18.ix.2007, H. Kurahashi (SM); 12♂ 1♀, Sarawak State, Kuching Division, Kampung Rambung, <1 m, swamp, 16.ix.2007, H. Kurahashi (SM); 1♂, Sarawak State, Kuching Division, Kampung Rambung, <1 m, swamp, 16.ix.2007, H. Kurahashi (SM); 1♂, Sarawak State, Kuching Division, Kampung Rambung, <1 m, swamp, 16.ix.2007, H. Kurahashi (SM);<1 m, swamp, 16.ix.2007, H. Kurahashi (SM);<1 m, swamp, 16.ix.2007, H. Kurahashi (SM);<1 m, swamp, 16.ix.2007, H. Kurahashi (SM);<1 m, swamp, 16.ix.2007, H. Kurahashi (SM);<1 m, swamp, 16.ix.2007, H. Kurahashi (SM);<1 m, swamp, 16.ix.2007, H. Kurahashi (SM);<1 m, swamp, 16.ix.2007, H. Kurahashi (SM);<1 m, swamp, 16.ix.2007, H. Kurahashi (SM);<1 m, swamp, 16.ix.2007, H. Kurahashi (SM);<1 m, swamp, 16.ix.2007, H. Kurahashi (SM);<1 m, swamp, 16.ix.2007, H. Kurahashi (SM);<1 m, swamp, 16.ix.2007, H. Kurahashi (SM);<1 m, swamp, 16.ix.2007, H. Kurahashi (SM);<1 m, swamp, 16.ix.2007, H. Kurahashi (SM);<1 m, swamp, 16.ix.2007, H. Kurahashi (SM);<1 m, swamp, 16.ix.2007, H. Kurahashi (SM);<1 m, swamp, 16.ix.2007, H. Kurahashi (SM);<1 m, swamp, 16.ix.2007, H. Kurahashi (SM);<1 m, swamp, 16.ix.2007, H. Kurahashi (SM);<1 m, swamp, 16.ix.2007, H. Kurahashi (SM);<1 m, swamp, 16.ix.2007, H. Kurahashi (SM);<1 m, swamp, 16.ix.2007, H. Kurahashi (SM);<1 m, swamp, 16.ix.2007, H. Kurahashi (SM);<1 m, swamp, 16.ix.2007, H. Kurahashi (SM);<1 m, swamp, 16.ix.2007, H. Kurahashi (SM);<1 m, swamp, 16.ix.2007, H. Kurahashi (SM);<1 m, swamp, 16.ix.2007, H. Kurahashi (SM);<1 m, swamp, 16.ix.2007, H. Kurahashi (SM);<1 m, swamp, 16.ix.2007, H. Kurahashi (SM);<1 m, swamp, 16.ix.2007, H. Kurahashi (SM);<1 m, swamp, 16.ix.2007, H. Kurahashi (SM);<1 m, swamp, 16.ix.2007, H. Kurahashi (SM);<1 m, swamp, 16.i...
Boettcherisca peregina (Robineau-Desvoidy, 1830)

BORNEO: 1 ♀, Sarawak State, Borneo Highlands, 4.ix.2006, H. Kurahashi (SM); 1♂, Sarawak State, Kuching Division, Kuching City, Sarawak Museum, ca.<500 m, forest, 28.viii.2007, H. Kurahashi (SM); 2♂, Sarawak State, Limbang Division, Bakelalan, 900 m, forest, 21–26.viii.2008, H. Kurahashi (SM); 1♂, Sarawak State, Miri Division, Bario, Pa Umor.,1,020 m, forest, 29.viii.2008, H. Kurahashi (SM); 2♀, Sarawak State, Miri Division, Bario, Pa Umor., 1,020 m, forest, 8.ix.2007, H. Kurahashi (SM); 1♂, Sarawak State, Miri Division, Bario, Power St., 1,020 m, forest, 5.ix.2007, H. Kurahashi (SM); 2♂, Sarawak State, Miri Division, Bario, Town, 1,020 m, garden, 10.ix.2007, H. Kurahashi (SM); 1♂, Sarawak State, Miri Division, Pa Lungan to Arur Kiran, 1,105 m, nr swamp, 1–2.ix.2009, H. Kurahashi (SM); 1♂, Sarawak State, Miri Division, Pa Lungan to Pa Terutun, 1,140 m, forest, 3.ix.2009, H. Kurahashi (SM); 1♀, Sarawak State, Miri Division, Sungai Luku, S25, 9.v.2016, T. Tachi (PCTT); 2♂, Sarawak State, nr Serian, Mt. Sedong, Kampung Tarat, 9.ix.2006, H. Kurahashi (SM).

Boettcherisca zuli Kurahashi, Tan & Leh, 2015

Boettcherisca zuli Kurahashi, Tan & Leh, 2015: 277. BORNEO: Sarawak State, 1 paratype was examined.

*Hosarcophaga auricauda* (Ho, 1938), comb. nov.

BORNEO: 1♂, Sarawak State, Kuching, Matang Wildlife Centre, 28.ix.2005, H. Kurahashi (IDD); 1♂1♀, Sarawak State, Kuching Dist., Regional Forestry Office Kuching, swamp, 18.ix.2007, S. H. Tan (IDD);

*Hosarcophaga serrata* (Ho, 1938)

BORNEO: 1♂, Sarawak State, Kuching, Kubah N. P.,<50 m, 28.viii.2006, H. Kurahashi (IDD); 1♂, Sarawak State, Borneo Highlands, 30.ix.2006, H. Kurahashi (SM); 2♂, Sarawak State, Kuching Division, Matang Wildlife Centre, 12.m, forest, 4–5.ix.2008, H. Kurahashi (SM); 2♂, Sarawak State, Kuching, Matang, Wildlife Centre, 28.ix.2005, H. Kurahashi (SM).

*Liopygia ruficornis* (Fabricius, 1794)

BORNEO: 3♂ 3♀, Sarawak State, Kuching Division, Kuching City, Sarawak Museum, <5 m, garden, 31.viii.2007, H. Kurahashi (SM)

*Parasarcophaga albiceps* (Meigen, 1826)

BORNEO: 2♂, Sarawak State, Kota Samarahan Division, Sadong Jaya, coconut plan., 8.vii.2012, H. Kurahashi (IDD); 1♂, Sarawak State, Kuching Division, Borneo Highlands, ca. 150 m, forest, 7.vii.2012, H. Kurahashi (IDD); 1♂, Sarawak State, Kuching Division, Matang National Park, <50 m, forest, 26.viii.2018, H. Kurahashi (IDD); 2♂, Sarawak State, Kuching Division, Kuching City, Sarawak Museum, 150 m, forest, 21–26.viii.2008, H. Kurahashi (SM); 1♀, Sarawak State, Miri Division, Bario, Pa Umor., 1,020 m, forest, 29.viii.2008, H. Kurahashi (SM); 2♂, Sarawak State, Miri Division, Bario, Pa Umor., 1,020 m, forest, 8.ix.2007, H. Kurahashi (SM); 1♂, Sarawak State, Miri Division, Bario, Power St., 1,020 m, forest, 5.ix.2007, H. Kurahashi (SM); 2♂, Sarawak State, Miri Division, Bario, Town, 1,020 m, garden, 10.ix.2007, H. Kurahashi (SM); 1♂, Sarawak State, Miri Division, Pa Lungan to Arur Kiran, 1,105 m, nr swamp, 1–2.ix.2009, H. Kurahashi (SM); 1♀, Sarawak State, Miri Division, Pa Lungan to Pa Terutun, 1,140 m, forest, 3.ix.2009, H. Kurahashi (SM); 1♀, Sarawak State, Miri Division, Sungai Luku, S25, 9.v.2016, T. Tachi (PCTT); 2♂, Sarawak State, nr Serian, Mt. Sedong, Kampung Tarat, 9.ix.2006, H. Kurahashi (SM).

Parasarcophaga brevicornis* (Ho, 1934)

BORNEO: 2♂, Sarawak State, Kuching Division, Jabatan Perhutang, <1 m, swamp, 18.ix.2007, H. Kurahashi (SM); 1♂, Sarawak State, Kuching Division, Kuching City, Sarawak Museum, <5 m, garden, 31.viii.2007, H. Kurahashi (SM); 1♂, Sarawak State, Kuching Division, Matang National Park, <50 m, forest, 21–22.ix.2007, H. Kurahashi (SM); 1♂, Sarawak State, Kuching Division, Kuching City, Sarawak Museum, <5 m, garden, 31.viii.2007, H. Kurahashi (SM); 1♂, Sarawak State, Kuching, Matang Wildlife Centre, 28.ix.2005, H. Kurahashi (IDD); 1♂1♀, Sarawak State, Kuching Dist., Regional Forestry Office Kuching, swamp, 18.ix.2007, S. H. Tan (IDD); 1♂, Sarawak State, Kuching, Matang Wildlife Centre, 28.ix.2005, H. Kurahashi (SM).

BORNEO: 1♂, Sarawak State, Kuching, Matang Wildlife Centre, 28.ix.2005, H. Kurahashi (IDD); 1♂1♀, Sarawak State, Kuching Dist., Regional Forestry Office Kuching, swamp, 18.ix.2007, S. H. Tan (IDD); 1♂1♀, Sarawak State, Kuching Dist., Regional Forestry Office Kuching, swamp, 18.ix.2007, S. H. Tan (IDD).
Kuching Division, nr Serian, Kampung Tarat, <200 m, forest, 25.vii.2018, H. Kurahashi (IDD); 3♂, Sarawak State, Kuching Division, Santubong, <1 m, swamp, 14.ix.2007, H. Kurahashi (SM); 1♂, Sarawak State, Lanjak-Entimau Wildlife Sanctuary, Engkari R., forest, 29.vi.–3.vii.2012, H. Kurahashi (IDD); 1♂, Sarawak State, Miri Division, Bario Town, 1,020 m, garden, 1.ix.2007, H. Kurahashi (SM); 1♂, Sarawak State, Miri Division, Bario, Power St., 1,020 m, forest, 5.ix.2007, H. Kurahashi (SM); 1♂, Sarawak State, Miri Division, Bario, Stone-cutting site, 1,103 m, forest, 28.viii.2009, H. Kurahashi (SM); 1♂, Sarawak State, Miri Division, Pa Lungan to Barito, 1,151 m, forest, 5.ix.2009, H. Kurahashi (SM); 1♂, Sarawak State, Sibu Division, Katibas River, Tupang River, forest, 11.ix.2011, H. Kurahashi (SM); 2♂, Sarawak State, Sibu Division, Lanjak Entimau Wildlife Sanctuary, Ju Station, Helipad, 142 m, hill top, 6.i.2014, S. H. Tan (PCSHT); 3♂, Sarawak State, Sibu Division, Lanjak Entimau Wildlife Sanctuary, Helipad, 1,034 m, hill top, 7–8.ix.2011(2♂), 12.ix.2011(1♂), H. Kurahashi (SM).

Parasarcophaga dux (Thomson, 1869)

BORNEO: 1♂, Sarawak State, Kuching Division, Jabatan Perhutang, <1 m, swamp, 18.ix.2007, H. Kurahashi (SM); 7♂ 3♀♀, Sarawak State, Kuching Division, Kampung Rambungan, <1 m, swamp, 16.ix.2007, H. Kurahashi (SM); 6♂ 4♀♀, Sarawak State, Kuching Division, Kampung Sampadi, <1 m, beach, 17.ix.2007, H. Kurahashi (SM); 6♂, Sarawak State, Kuching Division, Kuching City, Sarawak Museum, <5 m, garden, 31.viii.2007, H. Kurahashi (SM); 1♂, Sarawak State, Kuching Division, Matang National Park, <50 m, forest, 21–22.ix.2007, H. Kurahashi (SM); 16♂, Sarawak State, Kuching Division, Rambungan, <1 m, dry swamp, 8–9.ix.2008, H. Kurahashi (SM); 5♂, Sarawak State, Kuching Division, Sampadi, <1 m, sandy beach, 8.ix.2008, H. Kurahashi (SM); 4♂ 3♀♀, Sarawak State, Kuching Division, Santubong, <1 m, mangrove, 27.vii.2018, H. Kurahashi (IDD); 7♂ 2♀♀, Sarawak State, Kuching Division, Santubong, <1 m, swamp, 14.ix.2007, H. Kurahashi (SM); 1♂, Sarawak State, Kuching Division, Telega Air, <1 m, swamp, 9.ix.2008, H. Kurahashi (SM); 1♂, Sarawak State, Lanjak-Entimau Wildlife Sanctuary, Engkari R., forest, 29.vi.–3.vii.2012, H. Kurahashi (IDD); 1♂, Sarawak State, Limbang Division, Lawas Dist., Ba’ Kelalan View Point, 1,099 m, forest, 16.vi.2013, H. Kurahashi (SM); 1♂, Sarawak State, Miri Division, Barito, Town, 1,020 m, garden, 10.ix.2007, H. Kurahashi (SM).

Parasarcophaga hirtipes (Wiedemann, 1830)

BORNEO: 1♂, Sarawak State, Miri Division, Pa Lungan to Barito, 1,151 m, forest, 5.ix.2009, H. Kurahashi (SM).

*Parasarcophaga idmatais* (Séguy, 1934)

BORNEO: 1♂, Sarawak State, Kuching Division, Mt. Pueh, 33 m, forest, 3.ix.2008, H. Kurahashi (SM).

Parasarcophaga lopesi Verves, 1980

BORNEO: 3♂, Sarawak State, Kuching Division, Rambungan, <1 m, dry swamp, 8–9.ix.2008, H. Kurahashi (SM); 3♂, Sarawak State, Kuching Division, Santubong, <1 m, swamp, 14.ix.2007, H. Kurahashi (SM); 1♂, Sarawak State, Kuching Division, Santubong, <1 m, swamp, 14.ix.2007, H. Kurahashi (SM).

Parasarcophaga mimobrevicornis (Sugiyama, 1990) n. rec. to Sarawak

BORNEO: 1♂, Sarawak State, Kuching Division, Santubong, <1 m, mangrove, 26.vii.2018, H. Kurahashi (IDD).

Parasarcophaga misera (Walker, 1849)

BORNEO: 1♂, Sarawak State, Kota Samarahan Division, Sadong Jaya, coconut plan., 8.vii.2012, H. Kurahashi (IDD); 11♂ 8♀♀, Sarawak State, Kuching Division, Jabatan Perhutang, <1 m, swamp, 18.ix.2007, H. Kurahashi (SM); 1♂, Sarawak State, Kuching Division, Kampung Sampadi, <1 m, beach, 17.ix.2007, H. Kurahashi (SM); 3♂ 3♀♀, Sarawak State, Kuching Division, Kuching City, Sarawak Museum, <5 m, garden, 31.viii.2007, H. Kurahashi (SM); 2♂, Sarawak State, Kuching Division, Matang National Park, <50 m, forest, 21–22.ix.2007, H. Kurahashi (SM); 3♂ 1♀♀, Sarawak State, Kuching Division, Rambungan, <1 m, dry swamp, 8–9.ix.2008, H. Kurahashi (SM); 1♂, Sarawak State, Kuching Division, Sampadi, <1 m, sandy beach, 8.ix.2008, H. Kurahashi (SM); 2♂ 2♀♀, Sarawak State, Kuching Division, Santubong, <1 m, mangrove, 27.vii.2018, H. Kurahashi (IDD); 1♂, Sarawak State, Kuching Division, Santubong, <1 m, beach, 19.ix.2011, H. Kurahashi (SM); 1♂ 1♀♀, Sarawak State, Kuching Division, Santubong, <1 m, swamp, 14.ix.2007, H. Kurahashi (SM); 1♂, Sarawak State, Kuching Division, Telega Air, <1 m, swamp, 9.ix.2008, H. Kurahashi (SM); 1♂, Sarawak State, Miri Division, Bario, Pa Ukat, 1,020 m, forest, 3.ix.2007, H. Kurahashi (SM); 1♂ 1♀♀, Sarawak State, Miri Division, Bario, Pa Umor, 1,020 m, forest, 8.ix.2007, H. Kurahashi (SM); 1♂ 2♀♀, Sarawak State, Miri Division, Bario, Pa Umur, 1,072 m, forest, 29–30.viii.2009, H. Kurahashi (SM); 2♂, Sarawak State, Miri Division, Bario, Stone-cutting site, 1,020 m, forest, 11.ix.2007, H. Kurahashi (SM); 1♂, Sarawak State, Miri Division, Bario, Stone-cutting site, 1,121 m, forest, 8.ix.2009, H. Kurahashi (SM); 1♂, Sarawak State, Miri Division, Bario, Town, 1,020 m, garden, 10.ix.2007, H. Kurahashi (SM); 1♂, Sarawak State, Miri Division, Bario, Town, 1,020 m, garden, 1.ix.2007, H. Kurahashi (SM); 1♂, Sarawak State, Miri Division, Pa Lungan to Terutun, 1,140 m, forest, 3.ix.2009, H. Kurahashi (SM); 1♂ 1♀♀, Sarawak State, Miri Division, Sungai Liku, S23, S26, 9.v.2016, T. Tachi (PCTT); 1♂, Sarawak State, Sibu Division, Katibas River, Ngaranau River, forest, 10.ix.2011, H. Kurahashi (SM); 10♂, Sarawak State, Sibu Division, Katibas River, Tupang River, forest, 11.ix.2011, H. Kurahashi (SM); 1♂, Sarawak State, Sibu Division, Lanjak Entimau Wildlife Sanctuary, Ju Station, Helipad, 161 m, hill top, 12.ix.2011, S. H. Tan (IDD); 5♂, Sarawak State, Sibu Division, Lanjak Entimau Wildlife Sanctuary, Helipad, 161 m, hill top, 7–8.ix.2011(3♂), 12.ix.2011(2♂), H. Kurahashi (SM); 1♂, Sarawak State, Sri Aman Division, Ulu Engkari, Nanga Talong, forest, 4.vii.2012, H. Kurahashi (IDD).

*Parasarcophaga montiblensis* (Sugiyama, 1990), comb. nov.

BORNEO: 2♂, Sarawak State, Kuching Division, nr Serian, Kampung Tarat, <200 m, forest, 25.vii.2018, H. Kurahashi (IDD); 1♂, Sarawak State, nr Serian, Mt. Kampung Tarat, 1.ix.2006, H. Kurahashi (SM).

Parasarcophaga omari Kurahashi & Leh, 2007

BORNEO: 2♂, Sarawak State, Kuching Division, Borneo Highlands, 1,034 m, forest, 16–18.ix.2011, H. Kurahashi (SM); 1♂, Sarawak State,
Kuching Division, Kampung Tarat, <200 m, forest, 15.ix.2007, H. Kurahashi (IDD); 2♂, Sarawak State, Kuching Division, Mt. Pueh, 33 m, forest, 3.ix.2008, H. Kurahashi (SM); 1♂, Sarawak State, Lanjak-Entimau Wildlife Sanctuary, Engkari R., forest, 29.vi.–3.vii.2012, H. Kurahashi (IDD); 1♂, Sarawak State, Sibu Division, Tapi River, Tupang River, forest, 11.ix.2011, H. Kurahashi (SM).

**Parasarcophaga quinquersamosa** (Sugiyama, 1990), comb. nov.

BORNEO: 24♂ 22 ♀, Sarawak State, Kuching Division, Jaban Perhutang, <1 m, swamp, 18.ix.2007, H. Kurahashi (SM); 22♂ 9 ♀, Sarawak State, Kuching Division, Kampung Rambungan, <1 m, swamp, 16.ix.2007, H. Kurahashi (SM); 1♂, Sarawak State, Kuching Division, Rambungan, <1 m, swamp, 15.ix.2007, H. Kurahashi (IDD); 8♂ 6 ♀, Sarawak State, Kuching Division, Rambungan, <1 m, dry swamp, 8–9.ix.2008, H. Kurahashi (SM); 1♂, Sarawak State, Kuching Division, Santubong, <1 m, swamp, 14.ix.2007, H. Kurahashi (IDD); 1♂, Sarawak State, Kuching Division, Telega Air, <1 m, swamp, 9 ix.2008, H. Kurahashi (SM); 10♂ P 2 ♀ P, Sarawak State, Santubong 30 k N of Kuching, 19–10.xi.1975, S. Shionaga and H. Shima (NSMT).

**Parasarcophaga taenionota** (Wiedemann, 1819)

BORNEO: 2♂, Sarawak State, Kuching Division, Jaban Perhutang, <1 m, swamp, 18.ix.2007, H. Kurahashi (SM); 4♂, Sarawak State, Kuching Division, Rambungan, <1 m, dry swamp, 8–9.ix.2008, H. Kurahashi (SM); 2♂, Sarawak State, Kuching Division, Santubong, <1 m, mangrove, 27.vii.2018, H. Kurahashi (IDD); 1♂, Sarawak State, Lanjak-Entimau Wildlife Sanctuary, Engkari R., forest, 29.vi.–3.vii.2012, Lily Sir (FDS); 1♂ 1 ♀, Sarawak State, Sri Aman Division, Ulu Engkari, Nanga Talong, forest, 4.vii.2012, Lily Sir (FDS).

*Parasarcophaga walshi* (Ho, 1938), comb. nov.

BORNEO: 1♂, Sarawak State, Kuching Division, Santubong, <1 m, beach, 19.ix.2011, S. H. Tan (PCSHT); 3♂, Sarawak State, Kuching Division, Santubong, swamp, 14.ix.2007, S. H. Tan (PCSHT).

**Rosellea notabilis** (Kano & Lopes, 1969), comb. nov.

BORNEO: 2♂ 3 ♀, Sarawak State, Kuching Division, Borneo Highlands, 1,200 m, forest, 28–29.vii.2018, H. Kurahashi (IDD); 1 ♀, Sarawak State, Kuching Division, Matang National Park, <50 m, forest, 26.vii.2018, H. Kurahashi (IDD); 1♂ 1 ♀, Sarawak State, Lanjak-Entimau Wildlife Sanctuary, Engkari R., forest, 29.vi.–3.vii.2012, H. Kurahashi (IDD); 1♂, Sarawak State, Limbang Division, Bakelalan, 900 m, forest, 21–26.viii.2008, H. Kurahashi (SM); 1♂, Sarawak State, Kuching Division, Bario to Pa Lungan, 1,020 m, forest, 31.viii.–1.ix.2008, H. Kurahashi (SM); 1♂, Sarawak State, Sibu Division, Bario to Pa Lungan, 1,020 m, forest, 4.ix.2007(1♂1 ♀), 9.ix.2007(2♂3 ♀), 1♂, Sarawak State, Sibu Division, Bario, Pa Umor, Pa Lungan, 1,020 m, forest, 7–9.ix.2007, H. Kurahashi (SM); 1♂, Sarawak State, Sibu Division, Bario, Prayer Mountain, 1,235 m, forest, 10.ix.2009, H. Kurahashi (SM); 6♂ 4 ♀, Sarawak State, Serian, Mt. Sedong, Kampung Tarat, 1–3.x.2005, H. Kurahashi (SM); 1♂, Sarawak State, Sibu Division, Lanjak-Entimau Wildlife Sanctuary, Helipad, 161 m, hill top, 7–8.ix.2011, H. Kurahashi (SM).

**Seniorwhitea orientalis** (Parker, 1917)

BORNEO: 1♂ 1 ♀, Sarawak State, Kuching Division, Matang National Park, <50 m, forest, 21–22.ix.2007, H. Kurahashi (SM); 2♂, Sarawak State, Miri Division, Bario to Pa Lungan, 1,151 m, forest, 31.viii.2009, H. Kurahashi (SM); 1♂ 1 ♀, Sarawak State, Miri Division, Bario, Pa Umor, 1,062 m, forest, 6.ix.2009, H. Kurahashi (SM); 2♂ 2 ♀, Sarawak State, Miri Division, Bario, Stone-cutting site, 1,103 m, forest, 28.viii.2009, H. Kurahashi (SM); 2♂, Sarawak State, Miri Division, Pa Lungan to Bario, 1,151 m, forest, 5.ix.2009, H. Kurahashi (SM); 1♂, Sarawak State, Miri Division, Pa Lungan, 1,020 m, forest, 8.ix.2007, H. Kurahashi (SM); 1♂, Sarawak State, Sri Aman Division, Ulu Engkari, Nanga Talong, forest, 4.vii.2012, H. Kurahashi (IDD); 3♂, Sarawak State, Kuching Division, Regional Forestry Office Kuching, swamp, 18.ix.2007, S. H. Tan (PCSHT); 1♂, Sarawak State, Miri Division, Bario Town, Quarry, 1,103 m, forest, 8.ix.2009, S. H. Tan (PCSHT).

**Seniorwhitea princeps** (Wiedemann, 1830)

BORNEO: 4♂, Sarawak State, Sibu Division, Lanjak-Entimau Wildlife Sanctuary, Helipad, 1,034 m, hill top, 7–8.ix.2011, H. Kurahashi (SM).

**Zulissa aquila** (Sugiyama, 1990), comb. nov.

BORNEO: 1♂, Sarawak State, Kuching Division, Bako N. P., mangrove, 5.ix.2006, H. Kurahashi (SM); 1♂, Sarawak State, Kuching Division, Rambungan, <1 m, swamp, 15.ix.2009, H. Kurahashi (IDD); 3♂ 2 ♀, Sarawak State, Kuching Division, Rambungan, <1 m, swamp, 8–9.ix.2008, H. Kurahashi (SM); 11♂ 4 ♀, Sarawak State, Kuching Division, Kampung Rambungan, <1 m, swamp, 16.ix.2007, H. Kurahashi (SM); 2♂ 1 ♀, Sarawak State, Kuching Division, Santubong, <1 m, swamp, 14.ix.2007, H. Kurahashi (IDD); 1♂, Sarawak State, Kuching Division, Telega Air, <1 m, swamp, 9.ix.2008, H. Kurahashi (SM); 3♂, Sarawak State, Santubong, <1 m, mangrove, 27.vii.2018, H. Kurahashi (IDD).
APPENDIX IV
Habitus photographs of eight new species described in dorsal and lateral views, with labels. 
HT♂ = Holotype male.

*Myorhina miyagii* sp. nov., HT♂

*Myorhina tomae* sp. nov., HT♂
*Burmanomyia pseudoborneensis* sp. nov., HT♂

*Burmanomyia barioensis* sp. nov., HT♂
Hosarcophaga palustris sp. nov., HT♂

Hosarcophaga puteri sp. nov., HT♀
Sarcorhendorfia kerohi sp. nov., HT♂

Sarcorhendorfia okazawai sp. nov., HT♂


APPENDIX V

Habitus photographs of 11 previously known and newly recorded species from Sarawak, with collection labels.

Alisarcophaga gressitti ♂

Boettcherisca javanica ♂
Boettchedrisa krathonmai ♂

Burmanomyia aureomarginata ♂
Hosarcophaga serrata ♂

Myorhina borneensis ♂
Omarisca longifilia ♂ comb. n.

Omarisca longifilia ♀ comb. n.
Parasarcophaga mimobrevicornis ♂

Parasarcophaga montibensis ♂
Parasarcophaga quinqueramosa ♂