Taxonomy of black scavenger flies (Diptera: Sepsidae) from Luzon, Philippines

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Fourteen species of black scavenger flies in four genera are treated taxonomically in this paper. Five species belonging to the subfamily Sepsinae are recorded for the first time in the Philippines, namely: *Sepsis* sepsi Ozerov, *Dicranosepsis dudai* Ozerov, *Dicranosepsis transita* Ozerov, *Dicranosepsis sauteri* Ozerov, and *Dicranosepsis pseudotibialis* Ozerov. A new Philippine island distribution record of *Australosepsis niveipennis* (Becker) is also noted. Taxonomic keys for the genera and species are presented.

**INTRODUCTION**

In the most recent world catalogue of Sepsidae (Ozerov 2005), there are about 37 genera with 312 described species of black scavenger flies worldwide. Twelve genera are distributed in the Oriental region and six of these are from the Philippines. Previously, Baltazar (1990) listed 12 species in five genera of sepsid flies from the Philippines. In his catalogue, Ozerov (2005) accounted for 14 species in six genera, adding *Toxopoda viduata* and three more species of *Dicranosepsis*. Iwasa (2008) described and added *Toxopoda angulata* as a Philippine endemic. The Sepsidae of the Philippines have been poorly investigated and records are scattered. This study includes 14 species, five of which are reported for the first time.


The taxonomic literature and knowledge regarding the Philippine black scavenger flies are very limited. The early works of Duda (1926a,b) and Zuska (1977b) included Philippine materials. Later, Baltazar’s inventory of Philippine insects (Baltazar 1990) paved the way for gathering pertinent information about this group and there are four species added since then in the world catalogue (Ozerov 2005). Taxonomic keys in the generic and species levels, literature citation, general description, distribution and illustrations are included in this study.

This work is limited to the collections made in Luzon, Philippines (Camarines Norte: Daet; Laguna: Mt. Makiling, University of the Philippines (UP) Los Banos (UPLB), International Rice Research Institute (IRRI), UP Land Grant; Pangasinan: Sison; Quezon: Alabat island; and Zambales) covering a variety of ecosystems, such as ricefields, pasture and grazing land, residential area, coastal area, dipterocarp forest, and bordering mossy forest.

**KEYWORDS**

Philippine Sepsidae, black scavenger flies, ant-mimicking flies, *Dicranosepsis, Sepsis, Australosepsis, Meroplius*
The Sepsidae had received little attention due to their minute size and association with filth and disgusting habitat. Larvae and adults of this group are exclusively saprophagous with most species associated with mammal feces (Meier 1996, Pont and Meier 2002).

The black scavenger flies are considered an important group of flies in the decomposition of pasture dung. There are species associated with both cow and human excrements (Meier 1996). This group of flies is believed to be of some public health concern due to potential harm as vectors of pathogens and their synanthropic association (Pont and Meier 2002). They are even reported to be attracted to perishable foods, or foods prepared for storage, which may induce the growth of bacteria and fungi (Gagné 1987).

This group of flies has been a subject of studies in mating behaviors, e.g., courtship involving leg displays, female receptivity as related to ovariatus status, precopulatory guarding, and copulation posture in understanding male foreleg morphology (Eberhard 2001, Eberhard 2002, Ingram et al. 2008, Puniamorthy et al. 2008). Breeding substrates of Sepsidae are very varied, ranging from bird and mammal droppings, vertebrate carrion, decaying vegetation, slime molds, dead insects or snails, to decaying brown algae. There are reports of swarming of this group of flies as a hibernation phenomenon (Pont 1987) that may have been the result of mass emergence (Meier 1996).

The minute black scavenger flies (or ant-mimicking flies or ensign flies) have been used in forensic investigations and crime scene interpretations such as determining the time of death or the season wherein other groups of flies could not have been present (Benecke 2001).

**METHODOLOGY**

**Collection and Preservation**

Adult black scavenger flies were collected by sweeping and hand-netting over substrates where adults are gathering for feeding, mating or oviposition. Dung baits from cow, carabao, goats, horse and pig were used in collecting the specimens placed in various habitats such as ricefields, pasture and grazing land, forested area, coastal and along rivers or natural water sources. Previous or relatively old excrements in the different localities were also used in collecting the sepsids. Cow dung was used in rearing some collected female sepsids from the field. Newly collected adults were killed in 70-95% ethyl alcohol in separate vials with screw caps. They were sorted and stored in smaller vials and/or tubes with 95% ethyl alcohol for future molecular work and slide preparation. Specimens were provided with labels and codes using lead pencils.

Specimens were kept in 90-95% ethyl alcohol in vials. The ornamentation of the male forelegs and genitalia are highly species-specific and are easily seen in alcohol materials. The collected live female specimens were kept alive and fed sugarwater solutions for rearing. As for the armature of specimens with clustered legs, the femoro-tibial joint was temporarily softened with a drop of xylene and the tibia gently teased away from the femur with a fine pin. All specimens are currently in the author’s collection.

**Method of Identification**

The adults were identified using a light stereomicroscope up to 40x magnification and good light quality to detect some of the subtleties of bristling and pruinosity against the black background of the sepsid integument.

A single-female rearing technique was employed in associating collected live female sepsid flies. Males are more easily identified because of their strong dimorphic characters especially in their forelegs: tubercles, number of setae, setulae, spines, siphuncles, and osmeterium, and their shape. Head and thoracic chaetotaxy and wing venation are important characters in sorting to genera and species. Female sepsids are difficult to pin down to species since outstanding leg characters and genital features are very rare and difficult as most taxonomic keys and descriptions deal with male specimens. Some illustrations were used along with photographs of observed specimens in identifying the collection.

The species treated in this work were identified with the aid of pertinent taxonomic literature.

The terminology follows that used by McAlpine (1981). Abbreviations used in the descriptions are as follows: Head: oc, ocellar setae; or, upper fronto-orbital setae; vti, inner vertical setae. Thorax: dc, dorso-central setae; m, mesopleural setae; npl, notopleural setae; sa, supra-alar setae; pa, postalar setae; ppm, postpronotal setae; sc, scutellar setae. Wings: bm, basal medial cell. Length of body and length of wing were measured.

**RESULTS AND DISCUSSION**

**Family SEPSIDAE Walker, 1883**


**Taxonomy**

The Sepsidae constitute a small family of acalyprate flies in the Sciomyzoidea. They are distributed in all known zoogeographic regions. Melander and Spuler (1917) separated Sepsidae and Piophilidae and recognized them as different families along with misplaced genera. The early classification scheme of the Sepsidae was summarized by Duda (1926a,b), but Hennig (1937), according to Meier (1996), completed the taxonomic task by including *Orygma lactucom* in Sepsidae; it was previously classified in the Coelopidae by using the female genitalic
features. Steyskal (1987) modified Duda’s (1926a,b) and Zuska’s (1977b) systems probably only to reflect loosely phylogenetic relationships, unlike the strict and explicitly phylogenetic intention of Hennig (1949) (see, also, Meier 1996).

Two subfamilies, Orygmatinae and Sepsinae, are recognized in this study. The subfamily Orygmatinae contains only one Holartic species; only Orygma lactuosum Meigen of Sepsinae is recorded in this region.

**Diagnostic Character**

Adult Sepsidae are relatively small, elongate, myrmecomorphic or ant-like in appearance. The abdomen is constricted basally. Vibrissa is absent but several strong peristomal hairs are present; palp is vestigial. It can be distinguished from other families of acalyptate Diptera by the presence of one or more setae on the hind margin of the posterior spiracle. 

**Taxonomic Keys**

**Subfamilies**

Key to the Subfamilies of Sepsidae [adapted from Steyskal (1987) and Pont and Meier (2002)]

1. Eye small and gena very deep, the face strongly receding; 1 orbital and 2 frontal setae; anepisternum, anepimeron, katepisternum and disc of scutellum densely setulose; 3 strong dorsocentral and 2 postalar setae; large bristly species with robust legs and short tarsi.................................................................

2. Eye large and gena narrow, the face not receding; 0-1 orbital and 0 frontal setae; anepisternum and katepisternum with only a few setae, anepimeron and disc of scutellum bare; 1-2 dorsocentral setae, or if with 4-5 (Susanomira, Zuskamira) then 1 postalar seta; smaller species with more delicate legs and longer tarsi..............................

**Genera**

Key to the Philippine Genera of Sepsidae (Diptera) [modified from several authors]

1. First and second basal cells of wing united; orbital bristles lacking; abdomen constricted behind second tergite; abdominal macrochaetae present...................Australosepsis Malloch

2. Thorax and abdomen dull black; abdomen with silvery pruinose bands; abdominal tergites lacking bristles and setae; humeral bristle minute; outer verticals (postoculars) lacking; one pair of dorsocentral; lower margin of face projecting; middle femora of male bent in middle....Toxopoda Macquart

3. A pair of strong orbital bristles present; abdomen lacking macrochaetae except at tip, not or but slightly constricted behind second tergite; always only one dorsocentral; wings not spotted; postvertical bristles present; no strong acrostichals; humeral bristle present; only one well-developed vibrissa; wings hyaline or scarcely gray; genal bristle indistinct or lacking; male hypopygal processes simple, cruciately, with anteroventrally with four bristles or without bristles...........................................................

4. Humeral and postoculars lacking; no wing spots; one dorsocentral; abdomen without macrochaetae; male with peculiar lateral processes (sternite brush) on fourth sternite..............................................Perochaeta Duda

5. Abdomen of male always with distinct macrochaetae and sternite 4 absent; wing spot, if present, only in vicinity of vein 2..............................................................Sepsis Fallon

Abdomen of both sexes without distinct macrochaetae, although sometimes with somewhat stronger housing on tergal margins and with strong anal bristles; wing darkened along costa basally and sometimes with apical spot; sternopleura shining anteroventrally..............................Dicranosepsis Duda

Genus **Australosepsis** Malloch, 1925

Australosepsis Malloch, 1925: 314. Type-species: Australosepsis fulvescens Malloch, 1925 [=Sepsis niveipennis Becker, 1903], by original designation.


**DIAGNOSIS.** Head roundish or slightly flattened dorsoventrally. Distance between eyes at level of vibrissae significantly larger than the width of postpedicel. Occipital sclerite with several setae. Arista bare. Chaetotaxy: or absent, but if present (1), then very short, hair-like; 1 oc, 1 poc, 1 ovt and 1 ivt. 2-3 vibrissae, always striking from genal setulae.
Sepsis


Wing normal, longer than abdomen, with darkened spot near apex $R_2$, usually almost unclear from yellowish–colored specimens. Anal lobe well-developed. Cells bm and br fused. Alula well-developed, bare. Margin of upper calypter with hair, margin of lower calypter without hairs.

Abdomen constricted after syntergite 1+2. Sternite 4 of male simple. Surstylus symmetrical, fused to epandrium. Epandrial process absent.

Key to the species of Australosepsis

1. Wing clear, without white apex; Male: fore tibia ventrally with short row of stout setulae on basal third, apical half curved............. *Australosepsis frontalis* (Walker)

Wing with diffuse dark subapical spot; wing apex milk-white; Male: fore tibia ventrally with longer row of setulae on basal half, followed distally by 2 bare tubercles....................... *Australosepsis niveipennis* (Becker)

*AUSTRALOSEPSIS FRONTALIS* (Walker, 1860)


*tenella* de Meijere, 1906: 183 (*Sepsis*). Type-locality: Singapore; Lectotype ♂, by Zuska (1968): 472, in MTMB.

*brevis* Brunetti, 1910: 361 (*Sepsis*). Type-locality: Baroda (India); Holotype ♂, not in NHML and presumed in ZSIC or destroyed.

*jieveni* Frey, 1917: 25 (*Sepsis*). Type-locality: Anuradhapura (Sri Lanka); Holotype ♂, in ZMUH.

*Head*: Ocellar, postvertical, inner and outer vertical bristles present and well-developed. 1 to 3 dorsocentral setae. Humeral bristles developed.

*Thorax*: Wings clear with microtrichia, without apical spot. Anterior femora without tubercles bearing spinules; anterior tibiae in proximal half with flat tubercles bearing black spines, distal part curved, clearly concave ventrally.

*Abdomen*: Constricted between second and third tergum, last segments with long and strong marginal macrosetae. Hypopygium small, simple in structure.

*Length*: body: 2.8 to 3.9 mm; wing: 1.6 to 2.8 mm.

*Specimens examined*: CAMARINES NORTE: 4 ♂. Daet, Camarines Norte, cow dung, May 2011, S. D. Letana (Coll. #44b); LAGUNA: 15 ♂. UPLB Cattle Farm, cow dung, 30 May 2006, S. D. Letana (Coll. #17); PANAGASINAN: 3 ♂, Sison, Pangasinan, unknown dung, May 2011, Ian Marca (Coll. #46); ZAMBALES: 8 ♂, Cabangan, ricefield, carabao dung, 24 June 2006, S. D. Letana (#Z).

*Distribution*: Australasian/Oceanian. — Australia (Northern Territory, Western Australia), New Caledonia (New Caledonia). Oriental. — Bangladesh, China (Guangdong, Taiwan), India (Andhra Pradesh, Karnataka, Kerala, Orissa, Tamil Nadu), Indonesia (Lombok I., Sulawesi I., Sumbawa I., Timor I.), Japan (Okinawa I.), Malaysia (Borneo I.) Nepal, Philippines (Balabac I., Busuanga I., Culion I., Luzon I., Mindanao I., Palawan I.), Singapore, Sri Lanka, Thailand, Vietnam. Palaearctic. — Asia: Pakistan.

*AUSTRALOSEPSIS NIVEIPENNIS* (Becker, 1903) (Figures 1 and 2)

*Sepsis niveipennis* Becker, 1903: 143. Type-locality: Asyût (EGYPT); Lectotype ♂, by designation of Zuska (1968): 474, in ZMHUB.

*Sepsis flava* Brunetti, 1910: 351. Type-locality: Calcutta (INDIA); Lectotype ♂, by designation of Zuska (1968): 474, in NHML.

*Sepsis tincta* Brunetti, 1910: 353. Type-locality: Allahabad (INDIA); Lectotype ♂ by designation of Zuska (1968): 474, in NHML.

*Australosepsis fulvescens* Malloch, 1925: 314. Type-locality: Sydney (AUSTRALIA: New South Wales); Holotype ♂, in AMS.

*Head*: Frontal plate mostly shining. Outer vertical $\frac{1}{2}$ and postocular $2/3$ length of inner vertical. Gena $\frac{1}{2}$ to $2/3$ width of antennal flagellum. Subvibrissal setae numerous and short.

*Thorax*: Scutum, postpronotal lobes and scutellum dull, only around postocular callus. Anterior notopleural much shorter than posterior; 1-2 dorsocentral setae; acrostichal and dorsocentral ground-setulae minute. Wing apex including veins and microtrichia whitish with a diffused dark spot at the end of $R_{2+3}$ vein. Fore tibia ventrally with longer row of setulae on basal half, followed distally by 2 bare tubercles; distal parts of tibiae...
not strongly curved.

Abdomen: Subshining. Strongly constricted between syntergite 1+2 and base of tergite 3.

Length: body: 3.2 mm; wing: 2.0 mm.

Specimens examined: PANGASINAN: Sison, Pangasinan, 2 ♂, 11 May 2011, Ian Marca (Coll #46a).

Distribution: Afrotropical. — Angola, Botswana, Cameroon, Ethiopia, Ghana, Kenya, Madagascar, Malawi, Namibia, Nigeria, Republic of the Congo, Republic of South Africa, Sierra Leone, Sudan, Swaziland, Tanzania, Togo, Uganda, Yemen, Zimbabwe. Australasian/Oceanian. — Australia (Australian Capital Territory, New South Wales, Northern Territory, Queensland, Western Australia), Fiji, New Caledonia (New Caledonia), Papua New Guinea (Bismarck Arch., New Guinea I.), Solomon Islands, Vanuatu. Oriental. — Afghanistan, Bangladesh, China (Taiwan), India (Andhra Pradesh, Karnataka, Orissa, Rajasthan, Tamil Nadu, Uttar Pradesh, West Bengal), Indonesia (Java I., Lesser Sunda Is, Sulawesi I.), Japan (Okinawa I.), Malaysia (East Malaysia), Nepal, Philippines (Jolo I.). Palaearctic. — Asia: Iraq, Israel, Pakistan, Turkmenistan; Europe: Cyprus; North Africa: Egypt, Morocco.

Genus MEROPLIUS Rondani, 1874

Meroplius Rondani, 1874: 175. Gender: masculine. Type-species: Nemopoda stercoraria Robineau-Desvoidy, 1830 [=Sepsis minuta Wiedemann, 1830], by original designation.

Parameroplius Duda, 1926a: 37 [described as a subgenus of Meroplius]. Gender: masculine. Type-species: Sepsis fasciculata Brunetti, 1910, by monotypy.

**DIAGNOSIS.** Head roundish or slightly flattened dorsoventrally. Distance between eyes at level of vibrissae significantly larger than the width of postpedicel. Occipital sclerite with several setae. Arista bare. Chaetotaxy: 1 or, 1 oc, 1 poc, 1 ivt, and 1 ovt. 1 vibrissa.

Scutum with the following paired setae: 1 pprn, 2 npl, 1 spal, 1 pal, 0+(1-2) dc; often present rows of short setae between lines ac (unpaired row) and along lines dc. Proepisternum without setae. Metepimeral bridge absent. Mediotergite with shining (without pollen) spot under scutellum. Scutellum dorsally convex, without hairs, with well-developed apical setae; basal setae short, hair-like.

Coxa of male foreleg without osmeterium. Male femur and tibia of foreleg modified, usually posteriorly with two black spines; female fore femur usually with a deta in apical third ventrally. C Luxa of midleg in upper half bare. Femur of midleg straight. Male tibia of hindleg with an osmeterium-like area or with a conspicuous osmeterium.

Wing normal, longer than abdomen, with anal lobe well-developed. Cells bm and br separate. Alula well-developed or moderate, entirely covered with microtrichiae. Margin of upper calypter with hairs, margin of lower calypter without hairs.

Abdomen not constricted after syntergite 1+2. Sternite 4 of male modified. Surstyli symmetrical, fused to epandrium. Epandrial process absent or present.
**MEROPLIUS FASCICULATUS** (Brunetti, 1910)  
(Figure 3)

*fasciculata* Brunetti, 1910: 365 (*Sepsis*). Type-locality: ‘Ceylon’ [=Sri Lanka]; Holotype ♀, not in NHML and presumed in ZSIC or destroyed.

*plumata* de Meijere, 1913b: 363 (*Sepsis*). Type-locality: “rivier Kamp” (Irian Jaya: New Guinea I.); Lectotype ♀, by designation of Ozerov (1999): 51, in ZMUA.

**Head:** Roundish, facial carina small, face receding, gena linear. Orbital bristle strong and distinct, inner vertical and outer vertical setae present.

**Thorax:** Wings with a distinct gray tinge. Distal modified bristle on ventral side of fore femur small, club-like, anterior bristle in basal fourth of femur long and strong, row of posteroverental setulae in basal half not differentiated from normal pilosity; osmeterium about two-third as long as hind tibia.

**Abdomen:** Hypopygium with a long, slender, apically widened surstylus, and with a sharp anteroveretal process. 

*Specimens examined:* METRO MANILA: 1 ♂, Quezon Ave., Quezon City, 4 March 2007, S. D. Letana; QUEZON: 1 ♂, Del Pilar, Quezon, Alabat Island, goat dung, 12 Dec. 2006, S. D. Letana (Coll. #40).

**Length:** body: 4 to 4.3 mm; wing: 2.6 to 3 mm.

**Distribution:** Australasian/Oceanian. — Papua New Guinea (New Guinea I.). **Oriental.** — Bangladesh, China (Guangdong, Taiwan), India (Karnataka, Kerala, Madhya Pradesh, West Bengal), Indonesia (Java I., Sulawesi I.), Kalimantan I., Malaysia (East Malaysia), Nepal, Philippines (Luzon I., Jolo I.), Sri Lanka, Thailand. **Palaearctic.** — Asia: China (Sichuan), Japan (Honshu I., Kyushu I., Shikoku I.).

**Figure 3. Meroplus fasciculatus** (Brunetti). Male habitus. Scale bar: 1 mm.

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**Genus SEPSIS** Fallén, 1810


*Sepsidimorpha* Frey, 1908: 578, 584. Gender: feminine. Type-species: *Sepsis loewi* Hendel, 1902 [= *Sepsis duplicata* Haliday, 1838], by monotypy.


**DIAGNOSIS.** Head roundish or slightly flattened dorsoventrally. Distance between eyes at level of vibrissae larger than width of postpedicel. Occipital sclerite with several setae. Arista bare. Chaetotaxy: absent or present, 1 very short hair-like; 1 oc, 1 pos, 1ovt and 1 ivt. 2-3 vibrissae, always striking from genal setulae.

Scutum with the following paired setae: 1 ppm, 1-2 npl, 1 pal (usually short, hair-like), 0+ (1-2) dc; sometimes with a row of thin and short setulae along each ac, dc, and ial line. Proepisternum without setae. Metepimeral bridge absent. Mediotergite shining under scutellum. Scutellum dorsally without hairs. With a pair of well-developed apical setae; basal setae absent or shot, hair-like.


Wing normal, longer than abdomen, with dark spot near apex. R2+3 or without spot, with well-developed anal lobe. Cells bm and br separate. Alula well-developed to narrow, entirely covered with microtrichiae. Margin of upper calypter with hairs, margin of lower calypter without hairs.

Abdomen constricted after syntergite 1+2. Sternite 4 of male simple. Surstyl symmetrical, fused to epandrium. Epandrial process absent.
SEPSIS COPROPHILA de Meijere, 1906


Body color of males generally reddish; sternopleura wholly pruinose; wing without a dark spot at the end of R2-3vein; Surstylus (hypopygal process) long and stout; male fore femur without such distinct median tubercle. Postalar bristles strong.

Wing apex never whitish. Fore metatarsus ventrally, near base, with 2 strong, black, sinuous bristles, clearly differentiated from other ventral hairs. Male: Fore femur ventrally without tubercle. But with a row of spines; fore tibia with a posteroventral tubercle; surstylus longer, wider. flatter. with long, ventrally directed, basal bristle posteriorly.

Specimens examined: LAGUNA: 1 ♂, UP Land Grant, pasture, carabao dung, 23 March 2010, SD Letana (Coll. #38c); QUE-ZON: 5 ♂, Del Pilar, Alabat Island, horse dung, 29 December 2006, SD Letana (Coll. #35b).

Length: body: 3.6 to 3.8 mm; wing: 2.5 mm.

Distribution: Oriental. — Bangladesh, China (Guangdong, Taiwan), India (Assam, Karnataka, Kerala, Maharashtra, Tamil Nadu, West Bengal), Indonesia (Java I., Sulawesi I., Sumatra I.), Japan (Okinawa I.), Malaysia (East Malaysia), Nepal, Philippines (Luzon I., Mindanao I., Palawan I.), Singapore, Sri Lanka, Thailand, Vietnam. Palaearctic. — Asia: Japan (Kyushu I.).
etnam. Palaearctic. — Asia: Japan (Honshu I., Kyushu I.).

**SEPSIS INDICA** Wiedemann, 1824

*indica* Wiedemann, 1824: 57 (*Sepsis*). Type-locality: “India orient”; Lectotype♂, by designation of Ozerov (2004): 00, in ZMUC.

*decipiens* de Meijere, 1906: 177 (*Sepsis*). Type-locality: Stephansort, Astrolabe-Bai (Papua New Guinea: New Guinea I.); Holotype ♂, in MNMNB.

*fusciventris* Brunetti, 1910: 357 (*Nemopoda*). Unavailable name; citation of a Bigot MS name, as nomen nudum is synonymy with *Sepsis indica* Wiedemann.

The males generally reddish or reddish-brown. Sternopleura dorsally and posteriorly pruinose; postalar setae strong; wing without a dark spot at the end of R_{2+3}. The males have strongly modified forelegs with large femoral protrusions and spines. Hypopygial process with long bristles.

**Specimens examined:** LAGUNA: 3 ♂, UPCO, UPLB, cow dung, 14-18 March 2008, S. D. Letana (Coll. #29a, 30a and 31a); QUEZON: 1 ♂, Del Pilar, Quezon, Alabat Island, horse dung, 29 Dec. 2006, S. D. Letana (Coll. #35a); 1 ♂, Del Pilar, Quezon, Alabat Island, pig dung, 30 Dec. 2006, S. D. Letana (Coll. #36a).

**Length:** body: 5.6 to 6.2 mm; wing: 4 to 4.8 mm.

**Distribution:** Australasian/Oceanian. — Papua New Guinea (New Guinea I.). Oriental. — Bangladesh, China (Taiwan), India (Karnataka, Orissa, Tamil Nadu), Japan (Okinawa I.), Nepal, Philippines (Luzon I.), Thailand, Vietnam. Palaearctic. — Asia: Japan (Hokkaido I., Honshu I., Kyushu I.), Korea, Russia (Khabarovskiy Kray, Primorskiy Kray).

**SEPSIS LATERALIS** Wiedemann, 1830

*lateralis* Wiedemann, 1830: 468 (*Sepsis*). Type-locality: China; Lectotype ♂, by designation of Pont and Meier (2002): 167, in ZMUC.

*complicata* Wiedemann, 1830: 468 (*Sepsis*). Type-locality: China; Holotype ♂, in ZMUC.

*inpunctata* Macquart, 1839: 118 (*Sepsis*). Type-locality: not stated [from title: Canary Is.]; Holotype ♂, in MNHNP.

*algira* Macquart, 1843: 389 (*Nemopoda*). Type-locality: Algiers (ALGERIA); Holotype ♂, probably in MNHNP.

*lateralis* Macquart, 1843: 390 (*Nemopoda*). Junior secondary homonym, preoccupied by *Sepsis lateralis* Wiedemann, 1830. Type-locality: “Du Brésil ou du Chili” [probably from Africa, not South America]; Holotype ♂, in MNHNP.

definita Duda” , error for definita Brunetti [Vanschuytbroeck (1962): 459].

Head: dark, with only genal area brown to yellow; to mostly yellow, with only fronto-orbital plates and median occipital sclerite brown. Antenna brown to almost wholly reddish-yellow.

Thorax: wholly dark with brown postpronotal lobes and proepisternal area; to entirely yellow and a median line on postnotum. Scutellum black to reddish-yellow. Legs wholly yellow; to mid and hind coxae basally; fore femur mid and hind femora except at base, mid tibia except on apical quarter, hind tibia wholly, and tarsomeres 4-5 dark.

Abdomen: wholly dark; to mainly dark with basal part and apical part reddish to yellow.

Specimens examined: 1♂ LAGUNA: Los Banos, Umali Subdivision, attracted to TV, 28 May 2011, S. D. Letana (Coll. #47); 2 ♂, UP Land Grant trail, carabao dung, 23 March 2010, SD Letana (Coll. #42).

Length: body: 3.6 mm; wing: 2.5 mm.

Distribution: Afrotropical. — Angola, Botswana, Cameroon, Democratic Republic of the Congo, Ethiopia, Ghana, Kenya, Madagascar, Malawi, Mauritius, Namibia, Nigeria, Republic of South Africa, Republic of the Congo, Réunion, Seychelles, Sierra Leone, Swaziland, Tanzania, Uganda, Zambia, Zimbabwe; Asia: Yemen. Australasian/Oceanian. — USA (Hawaiian Is.), Papua New Guinea (New Guinea I.). Palaearctic. — Asia: Afghanistan, China (Hebei), Iraq, Israel, Japan (Kyushu I.), Syria; Europe: Cyprus, Greece, Italy, Malta, Spain (incl. Balearic Is), Turkey; North Africa: Algeria, Azores, Canary Is, Egypt, Libya, Madeira Is, Morocco, Tunisia. Oriental. — Bangladesh, China (Guangdong, Taiwan), India (Andhra Pradesh, Assam, Bihar, Himachal Pradesh, Karnataka, Kerala, Meghalaya, North Bengal, Tamil Nadu, Uttar Pradesh, West Bengal), Japan (Okinawa I.), Malaysia (East Malaysia), Myanmar, Nepal, Pakistan, Philippines (Luzon I., Negros I.), Sri Lanka, Thailand.

SEPSIS SEPSI Ozerov, 2003 (Figures 4 and 5)

Sepsis sepsi, Ozerov 2003: 1276. Type-locality: Wawó, 450m (INDONESIA: Sumbawa I.); Holotype ♂, in DEI.

Sepsis sepsi can be distinguished from other Sepsis by the row of four large spines on a large rounded ventromedial bump of the fore femur (Fig.16a). The fore tibia (Fig.16b) lacks a rounded lobe, and the surstylus differs in structure.

Specimens examined: ZAMBALES: 3 ♂, Cabangan, ricefield, carabao dung, 24 June 2006, SD Letana (# Zb).

Length: body: 3.8 mm; wing: 2.5 mm.


Figure 4. Sepsis sepsi Ozerov. (After Ang and Meier 2010) Male: A, fore femur, posterior; B, fore tibia, posterior view; and C, hypopygium, dorsal view. Scale bar: 0.5 mm

Figure 5. Sepsis sepsi Ozerov. (After Sepsidnet: sepsidnet-rmbn.rmbr.nus.edu.sg) Male habitus. Scale bar: 1 mm
Genus **DICRANOSEPSIS** Duda, 1926

**Dicranosepsis** Duda, 1926a: 43 [described as a subgenus of *Sepsis*]. Gender: feminine. Type-species: *Sepsis bicolor* Wiedemann, 1830, by original designation.

**DIAGNOSIS.** Head round or slightly flattened dorsoventrally. Distance between eyes at level of vibrissae significantly larger than the width of postpedicel. Occipital sclerite with several setae. Arista bare. Chaetotaxy: or absent, 1 oc, 1 poc, 1 ovt, and 1 ivt. 2-3 vibrissae, always striking from genal setulae.

Scutum with the following paired setae: 1 pprn, 2 nol, 0-1 pal, 0+2 dc. Proepisternum without setae. Metepimeral bridge present. Mediotergite shining under scutellum. Scutellum dorsally without hairs, with a pair of well-developed apical setae; basal setae absent or short, hair-like.

Coxa of male foreleg without osmeterium. Male femur and tibia of foreleg modified. Coxa of midleg in upper half bare. Femur of midleg straight. Tibia of male hindleg with a hardly visible osmeterium-like are.

Wing normal, longer than abdomen, with moderate anal lobe. Cells bm and br separate. Alula narrow, entirely covered with microtrichiae. Margin of upper calypter with hairs, margin of lower calypter without hairs.

Abdomen constricted after syntergite 1+2. Sternite 4 of male simple. Surstyli symmetrical, fused to epandrium. Epandrial process present.

**Key to the species of Dicranosepsis**

1. Anepimeron completely pruinose..............................................2
   Anepimeron shining in anterior half or with shining spot anteriorly..................................................5
2. Fore trochanter strongly or somewhat extended ventrally..................4
   Fore trochanter not extended ventrally....................................3
3. Hind trochanter posteriorly covered with hair-like setae............
   Hind trochanter without hair-like setae........**D. dudai** Ozerov
   Ventral process of fore trochanter same length as body of fore trochanter......................................**D. sauteri** Ozerov
   Ventral process of fore trochanter shorter than body of fore trochanter; fore femur with 1–2 anterobasal setae......................**D. pseudotibialis** Ozerov
4. Fore femur with 2 av setae in the basal third; distance between av setae in the basal fifth of fore femur less than length of basal seta and apical end of distal av seta does not reach the half-way point of fore femur..........................**D. revocans** (Walker)
5. Fore femur without av seta basally; mid-tibia without brown ring at the distal end..........................**D. javanica** (de Meijere)

**DICRANOSEPSIS DUDAI** Ozerov, 2003

(Figure 6)

**Dicranosepsis dudai** Ozerov, 2003: 89. Type-locality: “Batoe Doelang: (Indonesia: Sumbawa I.); Holotype ♀, in DEI.

**Head:** Frons dark or brownish near apex. Face yellow to brown, but antennal grooves usually blackish. Gena brown to black. Antenna brownish. Occipital sclerite with several setulae. Gena with a row of setulae along lower margin. Postgena with seta, 2-3 vibrissae.

**Thorax:** Black. Legs yellow but femur of midleg and hindleg in apical half and tibia of midleg and hindleg in basal half usually darkened; tibia of midleg blackish near apex. Tarsomeres 4 and 5 of all legs black. Wing clear, with brownish veins; basal-costal cell basally and basal cell completely blackish. Upper calypter and margins white, lower calypter and margins darkened. Halter yellowish.

**Abdomen:** Black. Constricted after syntergite 1+2. Syntergite 1+2 at sides with 2-4 thin setae. Tergites 3-5 each with a row of thin marginal setae. Surstyli symmetrical, fused to epandrium.

**Specimens examined:** LAGUNA: 2 ♀, Hortorium, UPLB, ex culture from cow dung, 10 March 2007, SD Letana (#10). Length: body: 4.1 mm; wing: 2.2 mm.

**Distribution:** **Oriental.** — Indonesia (Flores I., Sumbawa I.). Philippines (Luzon; New record).

**DICRANOSEPSIS JAVANICA** (de Meijere, 1904)

*Sepsis javanica* de Meijere, 1904: 107: Type-locality: Tosari (INDONESIA: Java I.); Lectotype ♀, by designation of Ozerov (1997): 147, in ZMUA.

“javanica”, incorrect subsequent spelling of *javanica* de Meijere [Hennig (1949): 61]

Color of body black. Legs yellow. Wing without dark spot near apex. Height of gena+subgena approximately 10 times shorter than vertical diameter of eye. First flagellomere approximately 1.4 times as long as wide Proepisternum completely greyish pruinose. Anepimeron shining in anterior half and pruinose in posterior half.
Fore trochanter simple. Fore femur without av in basal third. Midtibia with 1 av in apical third. Length of av and pv on first tarsomere of mid leg less than the height of tarsomere 4 of mid leg. Length of av on first tarsomere of hind leg less than the length of tarsomere 4 of hind leg.

Anal vein approximately 6 times as long as the width of bm cell. Alula approximately 1.5 times as wide as bm cell.

Specimens examined: QUEZON: 1 ♂, Del Pilar, Alabat Island, carabao dung, 30 December 2006, SD Letana (#37b).

Length: body: 3.7 mm; wing: 2.1 mm.

Distribution: Oriental. — China (Guangdong, Taiwan), India, Indonesia (Java I.), Myanmar, Nepal, Pakistan, Philippines (Luzon), Sri Lanka, Thailand, Vietnam.

DICRANOSEPSIS PSEUDOTIBIALIS Ozerov, 2003

ometown. — Indonesia (Sumbawa I.); Holotype ♂, in DEI.

Head: slightly flattened dorsoventrally in lateral view. Postpedicel in profile long-oval approximately 1.5 time longer than wide. 1 oc, 1 poc, 1 ivt, 1 ovt; or absent. Occipital sclerite with several setulae. Gena with a row of setulae along lower margin. Post gena with 1 seta. 2-3 vibrissae.

Thorax: Scutellum with well-developed apical setae; basal setae short, hair-like. Scutum: 1 pprn, 2 npl, 1 spal, 1 pal, 0+2 dc. Femur of foreleg with 1 av basally. Coxa of midleg bare in upper half. Femur of midleg with a row of short a. tibia of midleg with 1 v in apical third and with apical av and pv. Femur and tibia of hindleg without striking setae.

Abdomen: constricted after syntergite 1+2. Syntergite 1+2 at sides with 2-4 thin setae. Tergites 3-5 each with a row of thin marginal setae. Surstyli symmetrical, fused to epandrium.

Specimens examined: LAGUNA: 1 ♂, UPCO, UPLB, from cow dung, 14 March 2008, SD Letana (#29b); 3 ♂, Tayabak Camp Site, Mt. Makiling, fresh horse dung, 19 September 2008, SD Letana (#23a).

Length: body: 3 to 3.3 mm; wing: 2.1 to 2.2 mm.


DICRANOSEPSIS REVOCANS (Walker, 1869)

Sepsis revocans Walker, 1869: 163. Type-locality: “Makessar” [now=Ujung Pandang] (Indonesia: Sulawesi I.); Holotype ♀, in NHML.

Sepsis acuta de Meijere, 1913a: 118 [as forma of bicolor]. Type-locality: “Tainan” (China: Taiwan); Lectotype ♂, by designation of Ozerov (1997): 154, in ZMHUB.

Sepsis bipilosa Duda, 1926a: 48 [as variety of bicolor]. Type-locality: “Macuyam” (China: Taiwan); Lectotype ♂, by designation of Ozerov (1997): 155, in DEI.

Sepsis bipilosaformis Duda, 1926a: 48 [as a subvariety of bicolor variety of bipilosa]. Type-locality: Colombo (Sri Lanka; lectotype ♂, by designation of Ozerov (1997): 155, in MTMB.

parabipilosa Duda, 1926b: 55. Error for bipilosiformis Duda.

Head: Color of body from yellow to black. Height of gena+subgena approximately 10 times shorter than vertical diameter of eye. First flagellomere approximately 1.5 times as long as wide.

Thorax: Proepisternum completely grayish pruinose, anepimeron shining in anterior half and pruinose in posterior half. Legs yellow. Fore trochanter simple. Mid tibia with 1 av in apical third. Length of av and pv on first tarsomere of mid leg less than the length of tarsomere 4 of mid leg. Length of av on first tarsomere of hind leg less than the length of tarsomere 4 of hind leg. Wing without dark spot near apex.

Specimens examined: LAGUNA: 6 ♂, Makiling Forest Reserve Trail, approx 500m asl, Mt. Makiling Laguna, old horse dung, 15 September 2008, SD Letana (#19); 2 ♂, Makiling Forest Reserve Trail, approx 500m asl, Mt. Makiling Laguna, cow dung, 15 September 2008, SD Letana (#20a and b).

Length: body: 3 to 3.5 mm; wing: 2.1 to 2.2 mm.

Distribution: Australasian/Oceanian. — Australia (Queensland), Solomon Islands. Oriental. — China (Guangdong, Taiwan), India (Assam), Indonesia (Flores I., Sulawesi I., Sumbawa I.), Japan (Okinawa I.), Malaysia, Myanmar, Philippines (Luzon), Sri Lanka, Thailand, Vietnam.

DICRANOSEPSIS SAUTERI Ozerov, 2003

(Figure 8)

Dichranosepsis pseudotibialis Ozerov, 2003: 88. Type-locality: “Batoe Doelang” (INDONESIA: Sumbawa I.); Holotype ♂, in DEI.
2-3 vibrissae.

Thorax: Dark. Legs yellow, tibia of midleg blackish near apex. Wing clear, with brownish veins; basal-costal cell and basal cell completely blackish. Upper calypter and margin white, lower calypter and margin blackish. Halter yellowish. Scutum with the following paired setae: 1pprn, 2 np, 1 spal, 1 pal, 0+2 dc. Ane-pisternum in posterior half bearing scattered hairs and with long seta near posterior margin. Scutellum with well-developed apical setae; basal setae short, hair-like.

Abdomen: Black. Constricted after syntergite 1+2. Syntergite 1+2 at sides with 2-4 thin setae. Tergites 3-5 each with a row of thin marginal setae. Surstyli symmetrical, fused to epandrium.

Specimens examined: LAGUNA: 2 ♂, UP Land Grant trail, Laguna, carabao dung, 23 March 2010, SD Letana (#39); 1 ♂, IRRI, Laguna, cow dung pit fall trap, 11 June 2010, SD Letana (#41d).

**Length:** body: 3.6 mm; wing: 2.2 mm.

**Distribution:** Oriental — China (Taiwan), Philippines (Luzon; New record).

**DICRANOSEPSIS TRANSITA** Ozerov, 1997
(Figure 9)

*Sepsis gracilis* Duda, 1926a: 48 [as variety of *bicolor*]. Junior primary homonym, preoccupied by *Sepsis gracilis* Zetterstedt, 1847. Type-locality: “Chosokei” (China: Taiwan); Lectotype, by designation of Ozerov (1997): 157, in DEI.

Dicranosepsis transita Ozerov, 1997: 156. Substitute name for *Sepsis gracilis* Duda.

Head: Dark brown to black. Height of gena + subgena approximately 12-16 times shorter than vertical diameter of eye. First flagellomere approximately 1.4 times as long as wide.
CONFLICTS OF INTEREST

None.

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