STUDIES ON CALYPTERATE MUSCOID FLIES IN THE PHILIPPINES

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II. Report of species belonging to the Tribe Muscini (excluding *Musca)* (Diptera: Muscidae)

The genus *Orthellia* is composed of brightly coloured, metallic green to blue, medium-sized to moderately large flies. They are usually found in pasturelands and mountainous areas. The adults are mainly attracted to animal excrements including human ordure upon which the eggs are laid. They are also attracted to decaying animal matters such as putrifying fish baits. It is doubtful, though, whether the eggs are also laid on such materials.

Members of the genus *Morellia* are greyish to more or less subshining blackish flies which are on or about animals and their vicinities. The adults are partly haematophagous and some members have been incriminated in the transmission of certain bovine diseases (Greenberg, 1973). Though normally without domestic habits, some members have actually been reported to enter homes and, therefore, must be regarded with caution from the point of view of hygiene.

Pyrellia species are metallic green, blue to blackish, small to medium-sized flies which feed and breed on animal dung and carrion, and visit flowers. The adults are rarely found in large numbers, although, there has been a report of them occuring as such in high mountain areas.

The genus *Rypellia* is a relatively small group which formerly was a subgenus under *Dasyphora*. It is likewise closely related to the genus *Pyrellia*. In contrast to their close allies, *Rypellia* species are generally smaller and the body coloration is largely testaceous instead of metallic. Species belonging to this genus are relatively rare. In fact, this paper records the first species so far found in the Philippines.

The main thrust of this study is to identify the species found in the Philippines and be able to point out localities where they could be possibly found. Some notes on the bionomics of the individual species whenever possible are included and a key to their identification is constructed. Being the first local study on the genera, this paper is aimed to provide the baseline data for further studies along the same line.

This report is the second of a partial result of a taxonomic survey made on the muscoid fly fauna of the Philippines. Previous to this, a report on *Musca* species was made and had already been submitted for documentation elsewhere.

The specimens used in this study were those of the Tokyo Medical and Dental University, Japan; BISHOP Museum, Hawaii, and Ateneo de Davao University, Philippines.

Key to the Philippine genera of Tribe Muscini

1. — Thorax and abdomen with distinct bands or vittae; usually black, brown, or partly orange, non-metallic species — 2
   —Thorax and abdomen without distinct bands or vittae; metallic green, blue to black species — 3
2. —Thorax with two broad vittae; arista forming a sharp angle; prostigmals weak or absent; *m* broadly rounded — *Morellia*
   —Thorax with four vittae; at least before suture; arista convex; prostigmals well-developed; bend of *m* sub-angular — *Musca*
3. —Suprasquamal ridge with strong tufts of hairs anteriorly and posteriorly — *Orthellia*
   —Suprasquamal ridge bare — 4
4. —one intra-alar setae; subcostal sclerite with a single black setula; glossy, dark species — *Pyrellia (purpureonitens)*
   —two intra-alar setae; subcostal sclerite with several black setulae; less glossy, partly testaceous species — *Rypellia (nr. flavipennis)*

Key to the Philippine species of *Orthellia*

1. —Pre-sutural dorso-central setae indistinct or absent — 2
   —Pre-sutural dorso-central setae strong — 5
2. —Sternopleurals 1+2 — *Orthellia lauta*
   —Sternopleurals 0+1 — 3
3. —Post-sutural intra-alar setae indistinct or absent — *Orthellia claripennis*
   —Post-sutural intra-alar setae strong — 4
4. —Area between dorso-central and acrostichal with a pre-scutellar seta; scutellum pointed — *Orthellia diffidens*
   —Area between dorso-central and acrostichal bare; scutellum rounded — *Orthellia gavisa*
5. —Midtibia with an antero-dorsal seta — *Orthellia indica*
   —Midtibia without an antero-dorsal seta — 6
6. —Bend of *m* gradually angular; wings without bare areas — *Orthellia timorensis*
   —Bend of *m* angular; wing with a thin bare strip close to fifth — *Orthellia coerulifrons*

Key to the Philippine species of *Morellia*

1. Post-sutural dorso-central satae four, all strong; squamae dark brown; abdomen largely glossy black and usually without any distinct vitta except on fifth tergite; hindtibia in male with five or more anteroventral setae

Morrellia nigrisquama

Post-sutural dorso-central setae five but anterior two weak; squamae whitish; abdomen with three apparently shifting vittae; hindtibia in male with two to five anteroventral setae

Morellia hortensia

Records

1. *Orthellia claripennis* Malloch

Orthellia claripennis Malloch, 1923, Ann. Mag. nat. Hist., 12 (9):515.
Remarks: No Philippine material available in authors' collections.
Bionomics: According to Emden (1965) the species is attached to human ordure.
Distribution: Oriental. Philippines: (Palawan) (Pont, 1977).

2. *Orthellia coerulifrons* (Macquart)

Lucilia coerulifrons Macquart, 1851, Dipt. Exot. Suppl., 4:248.
Ortellia coerulifrons: Emden, 1965, Fauna of India, Diptera, 7(1):127.
Specimens examined: LUZON: Sorsogon: 12M, 12F, Sablayan, Juban, 1-8 II 1972, B.D. Cabrera (TMDU); PALAWAN: 19M, 21F, Dicala, Caruray, 12-14 II 1972, B.D. Cabrera (TMDU); 2F, Puerto Princesa, 2 II 1972, B.D. Cabrera (TMDU); MINDANAO: 1M, 1F, horse manure, Mt. Talomo, 1000 m, 14 VI 1983, 9 IV 1985, F.R. Magpayo (ADDU).
Bionomics: Shinonaga and Kano (1971) associated this species with dung of cattle and water buffaloes in the main island of Okinawa. We do not have information on the habits of specimens collected from Palawan and Luzon, but those of Mindanao were known to occur on horse dung, presumably to feed and breed. Emden (1965), however, identified cow dung as a breeding media.
Distribution; Oriental and S. Palearctic. Philippines (Luzon, Palawan-Balabac Is., Sulu Archipelago: Tawi-Tawi, Mindanao)

3. *Orthellia diffidens* (Walker)

Musca diffidens Walker, 1957, J. Proc. Linn, Soc. Lond., Zool., 1:26.
Orthellia diffidens: Emden, 1965, Fauna of India, Diptera, 7 (1):132.
Specimens examined: PALAWAN: 1M, Antipolo Beach, 1 XI 1975, H. Kurahashi (TMDU).
Bionomics: Unknown to the present authors.
Distribution: Oriental. Philippines (Mindoro, Palawan-Balabac, Sulu Archipelago: Tawi-Tawi) (Pont, 1977).

4. *Orthellia gavisa* (Walker)

Musca (Neomyia) *gavisa,* Walker, 1859, J. Proc. Linn. Soc., Lond., Zool., 4:138.

Orthellia gavisa: Pont, 1977, Cat. Dipt. Or. Reg., 3:464.
Specimens examined: MINDANAO: Davao: 4M, 4F, horse and chicken manure, Mt. Talomo, 1000 m, 3 IV 1983, 22 V 1983, 14 VI 1983, 14 X 1983, F. R. Magpayo (ADDU, TMDU).
Bionomics: Adults are found in high mountain areas. They have been observed to feed on horse and chicken manure and are suspected to breed on these materials.
Distribution: The species has already been reported in several localities in the Oriental region but this is the first record of this species from the Philippines.

5. *Orthellia indica* (Robineau-Deavoidy)

Lucilia indica Robineau-Deavoidy, 1830, Mem. pres. div. Sav. Acad. Sci. Inst. Fr., 2:453.
Orthellia indica: Emden, 1965, Fauna of India, Diptera, 7(1):126
Specimens examined: LUZON: Laguna: 3M, 4F, Mt. Makiling, Los Baños (TMDU); 1F, nr. Lumbang, Laguna de Bay, 24 x 1975, R. Kano (TMDU); Rizal: 3F, Seashore, Manila, 12 VII 1975, S.B.D. Cabrera (TMDU); 6M, 16F, Montible, 100 m, 24-27 I 1975, S. Shinonaga (TMDU); 1F, Puerto Princesa, 29 I 1975, S. Shinonaga (TMDU); SAMAR: 2M, 1F, Maluio, Tarlac, 14 III 1972, B.D. Cabrera (TMDU); 1F, Basey, 17-18 II 1975, S. Shinonaga (TMDU); LEYTE: 1F, Bo. Pitogo, Jardo, IV 1972, B.D. Cabrera (TMDU), 10F, Tacloban, 19 II 1975, S. Shinonaga (TMDU); MINDANAO: 3M, 4F, water buff. dung, Mt. Talomo, 1000 m. 23 V 1983, 25 IX 1983, 24 VI 1984, F.R. Magpayo (ADDU, TMDU).
Bionomics: Emden (1965) reported this species from horse and cow dung but we found this also on water buffalo dung. Together with *O. timorensis,* they are the most common *Orthellia* species found associated with animal excrements in lowland pasture areas. Occasionally, the species is seen in the vicinity of households.
Distribution: Oriental, Philippines (Luzon, Palawan, Samar, Leyte, Mindanao)

6. *Orthellia lauta* (Wiedemann)

Musca lauta Wiedemann, 1830, Aussereurop, zweifl. Insekt., 2:410.
Orthellia lauta: Emden, 1965, Fauna of India, Diptera, 7(1):28.
Specimens examined: LUZON: Laguna: 1M, 7F, Mt. Makiling, 500 m. Los Baños, 28 II 1975, S. Shinonaga (TMDU); 1F, nr Lumbang, Laguna de Bay, 24 x 1975, H Kurahashi (TMDU); Sorsogon: 11M, 26F, Sablayan, 1-8 II 1972, B.D. Cabrera (TMDU); PALAWAN: 1F, Dicala, Caruray, 12 II 1972, B.D. Cabrera (TMDU); 2M, 1F, Montible, 24-27 I 1975, S. Shinonaga (TMDU); 2F, Puerto Princesa, 29 I 1975, S. Shinonaga (TMDU); SAMAR: 1M, 1F, Basey, 17-18 II 1975, S. Shinonaga (TMDU); MINDANAO: Davao: 1M, 1F, Marfori, Davao City, 7n II 1983, F.R. Magpayo (ADDU); 1F, water buff. dung, Mt. Talomo, 1000 m, 29 V 1983, F. R. Magpayo (TMDU); : 1M, Basbas Is., 3 IV 1967, M.D. Delfinado (BISHOP).

Bionomics: Adults are usually found along mountainside pasturelands. They have been collected from water buffalo dung, but have also been reported on cow dung, dead animals, and even on human ordure on which, according to Emden, the larvae live.

Distribution: Widely distributed in Oriental region.
Philippines (Luzon, Palawan, Mindanao, Basbas Is.)

7. *Orthellia timorensis* (Robineau-Desvoidy)

Lucilia timorensis Robineau-Desvoidy, 1830, Mem. pres. Sav. Acad, Sci. Inst. Fr., 2:460.

Lucilia philippensis Macquart, 1843, Mem. Soc. Sci. Agric. Lille, 1843: 303. N. Syn.

Orthellia timorensis: Pont, 1977, Cat. Dipt. Or. Reg., 3:466.

Specimens examined: LUZON: Laguna: 1F, UP Campus, 150 m, Los Baños, 21 x 1975, H. Kurahashi (TMDU); 1F, Mt. Makiling, 300 m, Los Baños, 22 x 1975, H. Kurahashi (TMDU) 1M, 4F, Mt. Makiling, 500 m, Los Baños, 23 x 1975, 6-7 I 1976, N. Kurahashi and S. Shinonaga (TMDU); 1M, nr. Lumbang, Laguna de Bay, 24 x 1975, R. Kano (TMDU); Albay: 1F, Mt. Mayon, 1200-1800 m, 16 km NW Legaspi, 12 V 1962, H. M. Torrevillas (BISHOP); Sorsogon: 6M, 13F, Sablayan, Juban, 1-8 III 1972, B.D. Cabrera (TMDU); PALAWAN: 2F, Dicala, Caruray, 13 II 1972, B.D. Cabrera (TMDU); 1F, Swamp, 10 Km SW Puerto Princesa, 29 x 1975, H. Kurahashi (TMDU); 7M, 12F, Hill c, 40 km SW Puerto Princesa, 31 x 1975, H. Kurahashi (TMDU); SAMAR: 53M, 79F, Bo. Sta. Cruz, Salcedo, 27 III 1972, B.D. Cabrera (TMDU); 2F, Basey, 17-18 II 1975, S. Shinonaga (TMDU); LEYTE: 19M, 17F, Bo. Pitogo, Jardo, 1 IV 1972 B.D. Cabrera (TMDU); 3M, 4F, Tacloban, 19 II 1975, S. Shinonaga (TMDU); NEGROS: 1M, Camp Lookout, Valencia, 15 I 1961, H. M. Torrevillas (BISHOP); MINDANAO: 2M, 13F, Mt. Talomo, 1000 m, 29 I 1983, 21-22 V 1983, 17 VII 1983, 15-28 VIII 1983, 11-25 IX 1983 (M on fish baits, F on fish, Chicken dung, and horse manure), D. Tadena and F. R. Magpayo (TDMU, ADDU); 1F, Mt. Apo, 1100 m, 5 VIII 1985, K. Ishikawa (TMDU); Cotabato: 1F, Little Mt. Apo, 1 VIII 1978, A. Nakahishi and O. Yata (TMDU); Misamis Or,; 2F, Jungle, Trib. Clarin R., 14 VII 1958, H.E. Milliron (BISHOP); Zamboanga del Norte: 11F, Summit Mt. Malindang, 1290 m, 14-15 VII 1958, H.E. Milliron (BISHOP); 1F, Masawan, 1250-1400 m, 15 VII 1958, H.E. Milliron (BISHOP)

Bionomics: The species was reported by Shinonaga and Kano (1971) to occur on cattle dung is pasturelands and on deer dung and other animal excreta in mountainous areas. The same authors mentioned its occurence on human ordure. In the Philippines, adults of *O. timorensis* are common in mountain areas and lowland pastures. They are attracted to fish baits and have been observed on water buffalo, horse, and chicken dung.

Distribution: Widely distributed in Oriental region, S. Palearctic and Papuan Subregion. Philippines (Luzon, Palawan and Balabac, Is., Samar, Leyte, and Mindanao).

8. *Morellia hortensia* (Wiedemann)

Musca hortensia Weidemann, 1824, Anal. Ent., 49.

Musca hortulana Weidemann, 1830, Aussereurop, zweifl, Insekt., 2:417.
Morellia hortensia (Weidemann), Stein, Tijdschr. Ent., III, 209; Emden, 1965, Fauna of India, Diptera, 7 (1):108.

Specimens examined: Luzon: Mt. Province: 5M, 5F, Abatan Buguias, 60 km, S. Bontoc, 1800-2000 m, 4 VI 1964, H. M. Torrevillas (BISHOP); Laguna: 3F, Mt. Makiling, Los Baños, 500 m, 28 II 1975, S. Shinonaga (TMDU); 1M, nr. cows, Mt. Makiling, 500 m, Los Baños, 16-17 IV 1985, F. R. Magpayo (TMDU); Cavite: 1F, forest c, 600 m, Tagaytay, 6 VI 1975, R. Kano (TMDU); Camarines Sur: 1M, 1F, Mt. Iriga, 500-600 m, 31 III 1962, 22 IV 1962, H. M. Torrevillas (BISHOP); 1F, Mt. Isarog, 750-850 m, 8-9 V 1963, H. M. Torrevillas (BISHOP); Sorsogon: 3F, Sablayan, Juban, 1-8 II 1972, B.D. Cabrera (TMDU); PALAWAN: 1F, Eran Pt., 8 km SW Tarumpitao Pt., 31 XII 1959 – 4 I 1960, L. W. Quate (BISHOP); 6F, malaise trap, 3 km NE Tinabog, 8-14 V 1962, H. Holtman (BISHOP), 2F, malaise trap, 4 km N San Nicolas, 22 V. 1962, H. Holtman (BISHOP); 1F, malaise trap, 6 km W Culion, Culion Is., 15 VI 1962, H. Holtman (BISHOP), 4M, 9F, Dicala, Caruray, 12-14 II 1972, B.D. Cabrera (TMDU), 1M, 19F, Montible, 24-27 I 1975, S. Shinonaga (TMDU); 4F, Puerto Princesa, 29 I 1975, S. Shinonaga (TMDU); NEGROS: 1F, Dumaguete: 4 I 1961, H. M. Torrevillas (BISHOP); SAMAR: 7F, Basey, 17-18 II 1975, S. Shinonaga (TMDU); MINDANAO: Agusan: 2F, nr. water buffalo, Hubang, San Francisco 23 V 1984, F.R. Magpayo (TMDU); Davao: 1F, Tagum, 4 II 1975, S. Shinonaga (TMDU); 1M, 1F, water buffalo, Marfori, Davao City, 7 II 1983, 16 V 1983, F.R. Magpayo (TMDU, ADDU); 1M, 1F, hatched on cow dung, 12-23 VI 1983, Chua (ADDU); 4F, 22 V 1984 – water buff. dung, 23 V 1984 – nr. water buffalo, 1-4 IV 1985 – fish bait, Marfori, Davao City, F.R. Magpayo (TMDU); Zamboanga del Sur: 1F, in clearing, Zamboanga, 30 VII 1958, H.E. Milliron (BISHOP); 1M, 5-8 km W Zamboanga, 1 VIII 1958, H. E. Milliron (BISHOP); Zamboanga del Norte: 1F, 11 km E Sindangan, 20 VIII 1958, H.E. Milliron (BISHOP)

Bionomics: Adults are on or about animals in pasturelands. They feed on sweat but are also able to suck blood by re-opening healing wounds using their strong prestomal teeth. The eggs are normally laid on dung. In a study done in Davao, Philippines, cow and water buffalo dung were found as the favored breeding media. The study likewise, showed dominance of *M. hortensia* in both media — accounting for 64% to 68% of the total number of flies. Poultry manure has also been identified as a breeding material (Skidmore, 1985).

Distribution: Oriental and Papuan sub-regions. Philippines (Luzon, Palawan, Negros, Mindanao).

9. *Morellia nigrisquama* Mulloch

Morellia nigrisquama Malloch, 1928, Ent. Mitt. 17:329.

Specimens examined: LUZON: Camarines Sur: 1M, Mt. Iriga, 900 m, 2 V 1962, H. M. Torrevillas (BISHOP); MINDANAO: DAVAO: 2M, 1F, water buffalo nose, Mt. Talomo, 1000 m, 27 II 1983, 13 III 1983, D. Tadena (ADDU); 2F, nr. horse dung, Mt. Talomo, 1000 m, 15 V 1983, 21 V 1983, F.R. Magpayo (ADDU).

Bionomics: Adults are about animals in high mountain areas. It is doubtful whether they are haematophagous, though it is likely that they feed on animal exudates and breed on dung.

Distribution: Burma, Formosa, India, Malaya, Nepal, Sumatra, Thailand (Pont, 1977). Philippines (Luzon: Camarines, Mindanao: Mt. Talomo, Davao)

10. *Pyrellia purpureonitens* Emden

Pyrellia purpureonitens Emden, 1965, Fauna of India, Diptera, 7 (1):137.

Specimens examined: LUZON: Laguna: 1M, 1F, Mt. Makiling, 500 m, Los Baños, 16-17 IV 1985, F.R. Magpayo (TMDU)

Bionomics: Adults occur in semi-forested areas. They are attracted to fish baits and other decaying animal matters in the forest. No single information on the biology of the larvae is available, but on the generic level the larvae are known to occur in excrements and carrion upon which they feed (Emden, 1965).

Distribution: India, Malaya, Thailand, Philippines (Luzon Mindanao).

11. *Rypellia* sp. (nr. *flavipennis* Emden)

Rypellia Malloch, 1931, Ann. Mag. nat. Hist., 10(7): 190.

Dasyphora (Rypellia) Flavipennis: Emden, 1965, Fauna of India, Diptera, 7(1):147.

Specimens examined: MINDANAO: Zamboanga del Sur: 2M, light trap, Lemesahan, 600 m, 7 IX 1958, H. E. Milliron (BISHOP).

Bionomics: Nothing is known to the present authors.

Remarks: The samples we have are very close to *R. flavipennis* Emden, except for a few deviations on infuscations on the part of the thorax and abdomen. Malloch (1932) keyed further Oriental species of *Rypellia,* but in the absence of the latter, we temporarily base our identification on *flavipennis,* Emden, to which the present species is very closely allied.

Some Notes on the Medical Importance of the Species. The genus *Orthellia* has, so far, not been reported either as a causative agent or a vector of human or animal diseases. Studies on this seems to be lacking. Unlike the genus *Morellia,* the *Orthellia* species are attracted only to dung which they use for feeding and breeding purposes. The adults have never been caught from animal bodies and have very rarely, if ever, been seen inside human dwellings. Because of this, they might be thought of to be of very minor importance to public health. However, the fact that these species hop from dung to dung in the course of their feeding and breeding, there is then the possibility that some of them transfer by mechanical means certain bovine pathogens. Such is possible through contamination of grasses upon which the flies alight before ruminants feed on them. Some species may likewise play an important role in the transmission of poultry diseases by mechanical transfer of pathogens from dung to poultry feeds.

Quite different from the genus *Orthellia, Morellia* species come in direct contact with animals. They are known to be haematopagous. They also have predilection for animal exudates such as tears, sweat, and mucous discharges from body openings. Thelaziosis, an eye infection caused by a worm which affects ruminants in Europe, Asia, and Africa; dogs and cats in the United States and certain parts of Asia; and man in China is transmitted by certain species of *Musca* and *Morellia* (Greenberg, 1973). Serious infections by *Thelazia* sometimes lead to blindness due to the formation of a scar tissue on the surface of the eyeball as a result of scratching by the serrated cuticle of the parasite. Other species of *Morellia* have also been incriminated in cases of bovine mastitis. Though those species are not identified, similarity in habits among *Morellia* species including those found in Philippines makes every member of this genus potential carriers of pathogens of related infections mentioned and other important bovine infections as well.

There has not been any study, so far, emphasizing the medical importance of *Pyrellia* and *Rypellia* species, but their similarity in habits to *Orthellia* species, at least in part, may include them among potential vectors of disease-causing organisms among farm animals.

Summary

Philippine muscoid flies belonging to the Tribe Muscini in the collections of the BISHOP MUSEUM are identified and reported together with Philippine materials in the collections of the Tokyo Medical and Dental University, and representative species from the Ateneo de Davao University, Philippines. *Orthellia gavisa, Morellia nigrisquama,* and a species of *Rypellia* closely allied to *R. flavipennis* Emden are for the first time recorded from the Philippines. Keys to the genera and species based on the recent findings are given.

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