Estimation of the Routes of Synhospitalic Distribution of
the Genus Drosophilella DUDA (Diptera, Drosophilidae),
with Descriptions of Three New Species from
Malaysia and Indonesia

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Synopsis

OKADA, T. 1986—Estimation of the routes of synhospitalic distribution of
the genus Drosophilella DUDA (Diptera, Drosophilidae), with descriptions of

The routes of synhospitalic distribution of the Drosophilella species are
estimated with special regard to the host plants. A couple of new syn-
hospitalic species, baechlii and bogneri, obtained from the flowers of Homalo-
mena lancifolia Hook. f. (Araceae) in Malaysia and another new species,
iskanduri, found synhospitalic with D. colocasiae DUDA on the flowers of
Colocasia esculenta SCHOTT (Araceae) in Indonesia are described.

Closely related species of the genus Drosophilella DUDA have been
frequently found in couple on a host plant flower of Araceae (OKADA,
1975; CARSON & OKADA, 1980; TODA & OKADA, 1983; HONDA-YAFUSO,
1983). The present report deals with further instances found in couple
of two new species from Malaysia and also of D. colocasiae DUDA and
its allied new species from Indonesia. Furthermore, the routes of syn-
hospitalic distribution of Drosophilella species are estimated in relation
to their host plants.

Drosophilella baechlii sp. nov.
(Fig. 1A-D)

♂, ♀. Body about 1.5 mm in length. Eye dark brownish red, bare.
Antenna dark brown, 3rd joint large and rounded. Arista plumose, as
long as antenna, with 4 upper and 2 lower branches. Palpus broad,
orange brown. Periorbit pruinose black. Frons flat, mat black, anteriorly
narrowing and yellowish brown, narrower than median length. Face
gray. Carina narrow, high, broad below. Clypeus grayish brown. Cheek
narrow, gray. Ocellars outside triangle made by ocelli. Postverticals
small, upright. Anterior reclinable orbital minute. Mesoscutum and
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scutellum mat brownish black. Thoracic pleura mat gray, with faint dark patches. Acrostichal hairs in 2 rows. Humerals 2. Scutellars divergent, apicals longer than laterals and nearer to each other than to laterals. Sterno-index 0.8. Legs yellowish gray; femora and tibiae darker; 2nd tarsal joint of fore leg (Fig. 1B) distally narrowing, with 10 stout black teeth in 2 rows inferiorly, ultimate tooth twice as long as others. Wing (Fig. 1A) hyaline, slightly fuscous especially anteriorly. C-index 1.5; 4V-index 2.5; 4C-index 1.7; 5x-index 3.0; Ac-index 3.0. C3-fringe absent. Halter yellow, knob large and black. Abdominal tergites mat black, ventrolaterally with large elliptical stigma. Periphallic organs (Fig. 1C) black; cercus caudally elongate; surstylus absent. Phallic organs (Fig. 1C) black; aedeagus very long and slender, laterally bilobed; paramere absent. Ovipositor (Fig. 1D) oblong, apically with 3 long and a few fine setae.

Holotype ♂, allotype ♀, 3♂ paratypes, Pahang, S of Kuala Medang, Malaysia, 6.VIII.1985 (Bogner leg.), ex flowers of *Homalomena lancifolia* (Araceae). Types are deposited in the Bavarian State Museum, Munich, paratypes in the National Science Museum, Tokyo.

*Distribution.* Malaysia.

*Relationships.* This species resembles *D. toshikai* OKADA in having plumose arista, weak costal fringe, and in the periphallic organs, but it differs from the latter in having more numerous teeth of fore tarsus, very slender aedeagus, and in the absence of surstylus.

*Remarks.* The specific name is dedicated to Dr. Gerhard Bächli of Zoologisches Museum der Universität Zürich, from whom the specimens have been sent to me for investigation.

*Drosophila bogneri* sp. nov. *(Fig. 1E-H)*

♂, ♀. Body about 1.5 mm in length. Eye dark red, bare. Antenna brown. Arista missing (probably plumose). Palpus grayish brown. Frons flat, quadrate, mat black, anteriorly orange brown. Face dark brown. Carina high, narrow. Clypeus grayish brown. Cheek very narrow, grayish yellow. Postverticals minute. Orbitals before middle of frons, anterior replete fine. Mesoscutum and scutellum mat brownish black. Thoracic pleura yellowish gray, with a black patch below notopleural region. Acrostichal hairs in 2 rows. Humerals 2. Anterior dorsocentals much shorter than posteriors, far before middle of mesoscutum. Scutellars parallel; apicals longer than laterals, equally apart from each other and from laterals. Sterno-index about 1.0. Legs yellowish gray; 2nd tarsal joint of fore leg (Fig. 1F) with 10 black
stout teeth in 2 rows, ultimate tooth twice as long as others. Wing (Fig. 1E) hyaline, somewhat fuscous. C-index 1.5; 4V-index 2.5; 4C-index 1.6; 5x-index 3.0; Ac-index 3.0. C3-fringe absent. Halter yellowish orange, knob large and black. Abdominal tergites mat black, 6T caudally and 7T in ♀ orange brown. Each tergite laterally with a large elliptical stigma. Periphalic organs (Fig. 1G) black; epandrium smaller than cercus, which has a long process caudally. Surstylus large, long, fused with cercus. Phallic organs (Fig. 1G) black; aedeagus not very slender, without prominent subbasal process. Ovipositor (Fig. 1H) rod-shaped, apically with 3 long setae.

Holotype ♀, allotype ♀, Pahang, S of Kuala Medang, Malaysia, 6.VIII.1985 (BOGNER leg.), ex flowers of Homalomena lancifolia (Araceae) together with the foregoing species. Types are deposited in the Bavarian State Museum, Munich.

Distribution. Malaysia.

Relationships. This species resembles the foregoing species in the structure of tarsal teeth of fore leg and caudally elongate male cercus, but it differs from the latter in the palar thoracic pleura and shorter and stouter aedeagus.

Remarks. The specific name is dedicated to Mr. Josef BOGNER of
Bavarian State Museum, Munich, for collecting material.

*Drosophilella colocasiae* DUDA

(Fig. 2A-G)


♀, ♂. Body 1.5–2.0 mm in length. Arista slightly longer than antenna. Wing (Fig. 2A) with costal fringe composed of short setae sparsely intermittent with longer setae. Second tarsal joint of fore leg (Fig. 2B) with 3–5 stout black teeth. Sterno-index about 0.5. Male 6th abdominal sternite with a black conical process (Fig. 2C). Abdominal tergites black or grayish yellow. Periphallic organs (Fig. 2F) black; epandrium tapering above and anteriorly, with a conical process sub-basally above, caudoventral corner obtuse angular; male cercus large, oval; surstylus small, triangular. Phallic organs (Fig. 2F) black; aedeagus oblong, with a prominent subbasal process. Ejaculatory apodeme (Fig. 2E) with stalk broad, elliptical and flat. Ovipositor (Fig. 2G)

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**Fig. 2.** A-G, *Drosophilella colocasiae*; H-N, *D. iskandari*. A, H, Male wing; B, I, fore tarsi; C, J, conical process of male 6th abdominal sternite; D, K, periphallic organs; E, L, ejaculatory apodeme; F, M, phallic organs; G, N, ovipositor. Scales and signs as in Fig. 1.
brown, slender, distally tapering, with a few long setae. Other features as described by DUDA (1924) and WHEELER (1969).

*S*pecimens examined. 10♂, 10♀, Bogor, Java, 250 m (ISKANDAR leg.), ex flowers of *Colocasia esculenta* SCHOTT (Araceae).

*Distribution.* Indonesia.

*Remarks.* Through courtesy of Mr. B. BRUGGE of Zoological Museum, University of Amsterdam, I could examine ♀ lectotype and a ♂ specimen of this species preserved in that museum. The lectotype was designated by WHEELER (1969). DUDA’s record (1924:253) of ♀ seems to be an error. KRAMADIBRATA & HAMBALI (1983) recorded this species from Java, Thailand and Sulawesi, collected from the flowers of *Colocasia gigantea* Hook as well as of *C. esculenta*. The records outside Indonesia should better be reconfirmed.

*Drosophilella iskandari* sp. nov.

(Fig. 2H-N)

♂, ♀. Body about 1.5 mm in length. Antenna with 2nd joint grayish brown, 3rd black. Arista pubescent, nearly as long as antenna. Frans mat black, anteriorly slightly paler. Face grayish black. Carina broad. Clypeus gray. Cheek brownish black, half as broad as the greatest diameter of eye. Mesoscutum and scutellum mat brownish black. Thoracic pleura somewhat paler than mesoscutum. Humerals 2, upper longer. Acrostichal hairs in 4 sparse rows. Anterior dorsocentrals 2/3 as long as posteriors, far before the latters. Lateral scutellars 3/4 as long as apicals, which are nearer to each other than to laterals. Sterno-index 0.6. Legs grayish black, femora and tibiae darker. Second tarsal joint of fore leg (Fig. 2I) distally elongate, with 3–4 stout black teeth. Wing (Fig. 2H) hyaline; C reaching M, costal fringe composed of short setae sparsely intermittent with longer setae. C-index 1.8–2.0; 4V-index 2.2; 4C-index 1.2; 5x-index 1.7; Ac-index 2.6–3.2. C3-fringe absent. Halter grayish yellow. Abdominal tergites yellowish brown with more or less developed black caudal bands. Male 6th abdominal sternite with a pale conical process (Fig. 2J). Periphallic organs (Fig. 2K) black; cercus large, oval; surstylus absent; epandrium rectangular at caudoventral corner. Phallic organs (Fig. 2M) black; aedeagus without prominent subbasal process. Ejaculatory apodeme (Fig. 2L) with stalk longer than broad. Ovipositor (Fig. 2N) rather broad, slightly tapering distally.

Holotype ♂, allotype ♀, 1♂ 1♀ paratypes, Bogor, Java, 250 m, 13.III.1986 (ISKANDAR leg.), ex flowers of *Colocasia esculenta* together with the foregoing species. Types are deposited in the National Science Museum, Tokyo.
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Distribution. Indonesia.

Relationships. This species resembles the foregoing species, colocasiae, in weak costal fringe, structure of 2nd tarsal joint teeth of fore leg, and conical process of male 6th abdominal sternite, but differs from the latter in having pale conical process of 6th abdominal sternite, weak subbasal process of aedeagus, no subbasal process of epandrium, no surstylius, and broader ovipositor with shorter setae.

Remarks. The specific name is dedicated to Dr. Djoko T. Iskandar of the Department of Biology, Institute of Technology, Bandung, who has kindly collected samples of this and foregoing species. The foregoing species is more common than this species.

Routes of Synhospitalic Distribution

Three couples of Drosophilella species have been known as synhospitalic (parasitic on same host species or even same host individual): D. alocasiae OKADA & D. xenalocasiae OKADA on Alocasia odora C. KOCH; D. stamenicola CARSON et OKADA & D. pistilicola CARSON et OKADA on Colocasia esculenta SCHOTT; D. monoconica TODA et OKADA & D. diconica TODA et OKADA on Colocasia esculenta. Two other synhospitalic couples are discovered in the present study: D. baechlii & D. bogneri on Homalomena lancifolia; D. colocasiae & D. iskandari on Colocasia esculenta. Although these two couples are known only by dried specimens, the first mentioned species of each couple should be stamenicolous and second mentioned one should be pistilicolous in larval habits, same as in the three known synhospitalic couples cited above. This conclusion is resulted from morphological comparison of adult flies.

Stameniculous species: Epandrium with subbasal conical process; aedeagus with subbasal conical process; ovipositor very slender.

Pistilicolous species: Epandrium without subbasal conical process; aedeagus without subbasal conical process; ovipositor rather broad.

My previous suggestion (OKADA, 1980) that D. colocasiae is pistilicolous was erroneous. Dr. S. TOSHIOKA informed me that the host plant of D. toshioiokai OKADA in TODA and OKADA is Homalomena sp., not Colocasia esculenta as reported by me (TODA and OKADA, 1983).

Thus, three routes of synhospitalic distribution of the Drosophilella species can be estimated as below (Fig. 3).

1. Colocasia Route Hypothetical ancestors (S. China) — monoconica (mo), diconica (di) (Burma) — colocasiae (co), iskandari (is) (Indonesia) — stamenicola (st), pistilicola (pi) (New Guinea).


By the way, the term synhospitalic is applied here not in its strict sense, since the pollination role of *Drosophilella* flies for Taro flowers has been often suggested, for example, by KRAMADIRATA and HAMBALI, 1983. The pollens are found attached on the bodies of dried specimens of *D. colocasiae*, even on the lectotype which was collected 70 years ago. CARSON (in CARSON and OKADA, 1980) concluded from his experiment of bagging inflorescence in Papua New Guinea concluded that the flies were not necessary for full pollination of the flowers, although their role in possible cross fertilization mechanisms could not be discerned.

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* (On page 37) Personal informations by Mr. H.Z. CHENG and Dr. M.J. TODO.
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Nio of Institute of Technology, Bandung, Dr. S. TOSHIOKA of Dokkyō Dental College, Tochigi, Dr. M. J. TODA of Hokkaido University, and Mr. M. WATADA of Tokyo Metropolitan University, for affording me various informations.

摘要

岡田豊日（東京都）——タロイショウジョウバエ属 (*Drosophilella*) の共寄主的分布経路の推定と 3 新種の記載。

Malaysia より 2 種、Indonesia より 1 種のタロイショウジョウバエ属の新種を記載し、既知種を含めて本属の共寄主的分布経路を、寄主植物との関連において推定した。すなわち中国南部を起点として、*Colocasia*（タロイモ）、*Alocasia*（クワズイモ）、*Homalomena*（ニオイズイキ）の 3 経路が推定された。

Literature cited


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