Toyohi Okada
Department of Biology
Faculty of Science
Tokyo Metropolitan University
Setagaya-Ku, Tokyo, JAPAN

Rev. Brasil. Biol., 14 (1) : 41-54
Abril, 1954 — Rio de Janeiro, D. F.

DISTINCTION BETWEEN FOUR SPECIES OF THE "MELANOGASTER" GROUP, "DROSOPHILA SÉGUYI", "D. MONTIUM", "D. KIKKAWAI" SP. N. AND "D. AURARIA" (Drosophilidae, Diptera) [1]

HANS BURLA
Faculdade Nacional de Filosofia, Rio de Janeiro, D.F.

(With 19 text-figures)

Among the *Drosophila* species recently collected in French West Africa, *D. séguyi* proved to be one of the commonest ones (1). The species was also reported from Tanganyika Territory (1), furthermore under the name of *D. montium* from Uganda, Durban and Barberton (5) and finally as *D. subobscura* from Kenya (29). These records suggest that the species is rather abundant in the whole Aethiopian region. Its separateness from *D. montium* remained to be proven by morphological study and by cross experiments, that will be one of the subjects of the present paper.

D. montium has acquired importance as an object suitable to cytological and other studies (6-10,12,14,23). Its geographical distribution ranges from the Oriental region across the Pacific Ocean to South America (24). The species is maintained in cultures in various laboratories, it was twice redescribed (13,26) and its genitalia studied (11,13). However, the form involved does not fit the original description (20). By the courtesy of Dr. KRUSEMAN from the Zoological Museum of Amsterdam, the type of *D. montium* was obtained for comparison. It represents, as it will be shown beyond any doubt, a species different from the one known as *D. montium* nowadays. Consequently, the latter is described as a new species, *D. kikkawai*.

D. auraria will be considered as well because of its resemblance to *D. séguyi*. In fact, both species appear closer one to the other than either to *D. kikkawai*.

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[1] Received for publication November 12, 1953.
Work supported by grants from the Conselho Nacional de Pesquisas, Rio de Janeiro. Publication No. 16 of the Centro de Pesquisas de Genética.

In females of both *D. séguyi* and *D. kikkawai,* a color type with light tergites, and another with dark tergites were reported (5,26). In *D. kikkawai,* the dark type is known only in Brazil, where it forms mixed populations with the light one. As it will be shown, the dark color pattern of *D. séguyi* is different from the one existing in *D. kikkawai*. DUDA (3) distinguished two color types in *D. montium,* called variety *xanthopyga* and *atropyga.* In these, the difference in color is restricted to the last tergite, as in *D. séguyi*.

Another Oriental species comparable with *D. séguyi* would be *D. rufa,* which has also two color types, dark and light (personal communication by Prof. KIKKAWA). However, *D. rufa* is characterized by a dark longitudinal stripe on the pleurae, which does not exist in the least in the African species. In addition, a number of other characteristics are distinctly different between these two species. Therefore *D. rufa* is safely excluded from being synonymous to *D. séguyi,* and shall not be taken into consideration in the present study.

In the present paper cross experiments between *D. séguyi, D. auraria* and *D. kikkawai* are reported and given additional information on the morphology of the four species in question, whereby the characteristics of the genital apparatus are taken into special account. For the study of the genitalia, the dissected parts were colored (16) and mounted in balsam.

TESTS OF CROSSABILITY

The following stocks were utilized: *D. séguyi,* collected at the Ivory Coast by the author; *D. kikkawai,* a polymorphous strain from Gaspar, State of Santa Catarina; *D. auraria,* from China.

The cultures were made up in the usual manner (2), ten pairs of flies being placed in each vial. Initial experiments showed that intensive egg laying takes place two days after eclosion from the pupae in *D. kikkawai,* and four days after eclosion in *D. séguyi.* Care was taken to give sufficient yeast at the aging period, for it was observed that the lack of yeast during this period inhibits formation of eggs as well as the appearance of the black color pattern of the body wall. The numbers of crossed flies and dissected females are given in Table I.

TABLE I

Numbers of crossed flies and dissected females

Crosses ♀	Crosses ♂	Number of Pairs	Number of Females dissected
D. séguyi	*D. kikkawai*	930	200
D. kikkawai	*D. séguyi*	260	100
D. séguyi	*D. auraria*	50	28
D. auraria	*D. séguyi*	43	28

The results of the crosses were wholly negative, since no single hybrid larva or imago appeared, and no one of the dissected females contained sperm. It is amply proven, therefore, that *D. séguyi* is a species distinct from the other two.

ADDITIONAL NOTES TO THE SPECIES

Drosophila séguyi Smart (30)
(Figs. 1-8)

D. séguyi: a new name for *D. subobscura* Séguy (29), which is a homonym.
D. montium de Meijere as re-described by DUDA (5).
D. séguyi Burla (1) : additional notes to the description.

D. séguyi resembles *D. kikkawai* in many characteristics, for instance in the long sex combs on the two proximal tarsal joints of the foreleg, in males, and in the thick black bristles along the posterior margin of the tergites, in females. On the other hand, *D. séguyi* differs from *D. kikkawai* in the following characteristics: the body color is of a darker, reddish yellow, vivid hue, and

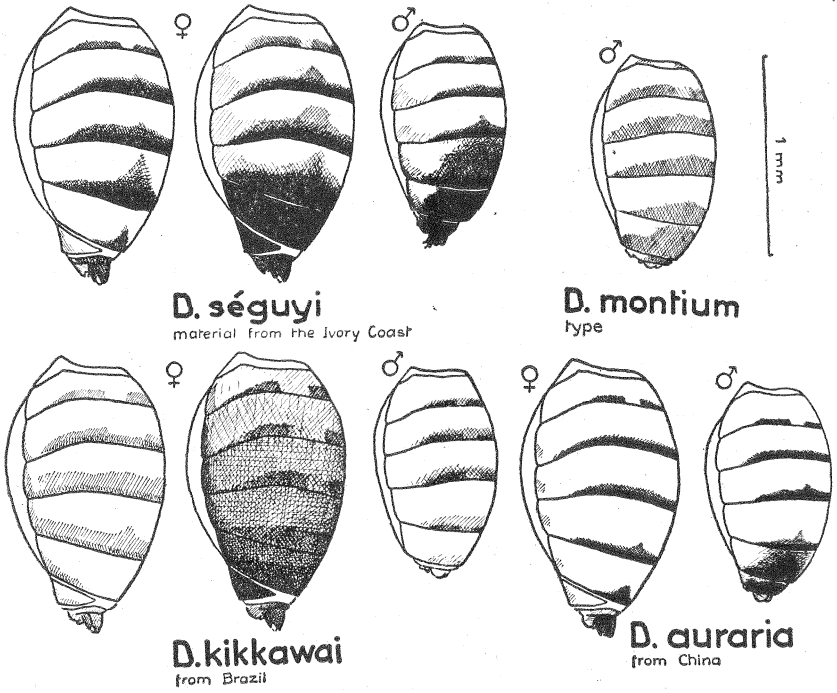


Fig. 1 — Abdominal pattern in the four species studied.

the dark pattern is of a deeper black; the eyes are of a brighter red color; in females of the dark type (fig. 1), only the 6th and 7th tergites are black, while in dark females of the Brazilian *D. kikkawai,* a brownish or grayish black shade runs from the tip of the abdomen towards its base, diminishing gradually in intensity but reaching, as a rule, the second tergite; in males, the

6th tergite is black, with the lateral zones generally light, while in *D. kikkawai* this tergite is yellow with the posterior border rarely slightly darkened; the antennal joint is darker, grayish brown; the lower portion of the face is snow white in males (fig. 2); the sex combs have fewer teeth (Table II).

TABLE II

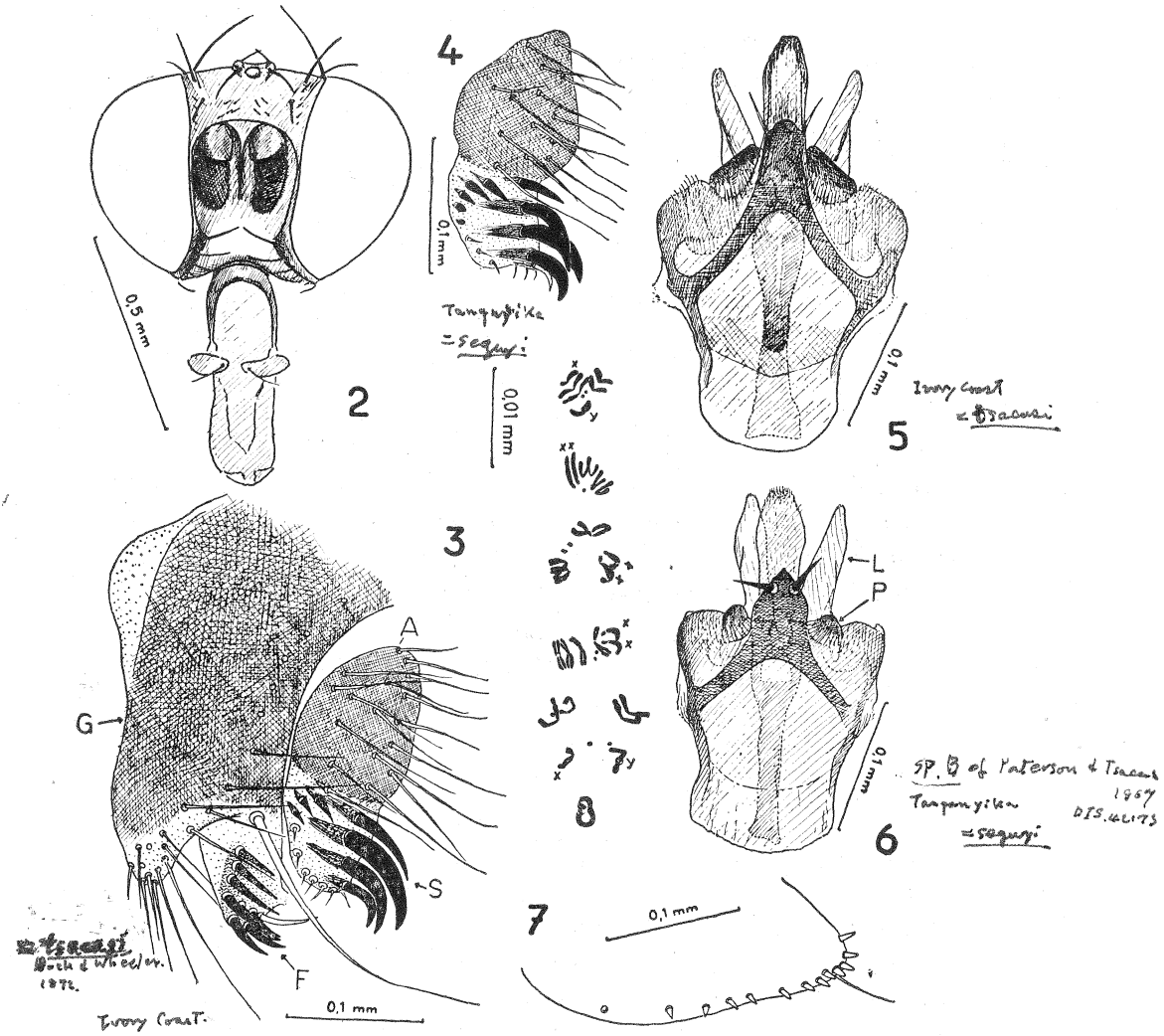
Number of teeth in the sex combs, in 20 legs per species

SPECIES	Sex comb on first tarsal joint		Sex comb on second tarsal joint	
	range	mean	range	mean
D. seguyi	14 — 23	19,2	12 — 21	16.7
D. kikkawai, Brasil (9)	17 — 33	21 — 28	13 — 23	16 — 20
D. kikkawai, Japan (13)		about 25		about 18
D. auraria, Japan	21 — 28	24.6	15 — 22	18.0
D. auraria, China	25 — 30	27.3	17 — 23	19.8
D. montium	18 and 19		14 and 17	

Genital apparatus (fig. 3) — The genital arch is deeply darkened, only the paramedian anterior processi and the toes being light. The secondary clasper (11) is fused with the anal plate, though it is different in chitin structure and pigmentation. In these characteristics, the species resembles *D. auraria,* and is different from *D. montium* and *D. kikkawai.* Especially distinctive are the long roots of the teeth on the secondary clasper. There are 3-5, mostly 4 strong curved teeth on the secondary clasper (5 males from the Ivory Coast examined). In two males from Tanganyika Territory (fig. 4), these teeth are smaller, more irregular, and the lowermost tooth is especially small and lighter than the other ones. Lateral of the curved teeth there are, in the material from West Africa, 2-3 smaller teeth, also with distinct root, while in the material from East Africa there are about 5 such teeth. The tip of the forceps is characteristically lower than the toe of the genital arch. On the base of the forceps there is one (most rarely two) very long bristle. The hypandrium (fig. 5) resembles the one of *D. kikkawai,* both in shape and in possessing ventrally a median horn headed by a pair of bristles. The two lancets accompanying the penis (manto-do-penis following SALLES) are rather long, again like in *D. kikkawai.* The two geographical races of the species studied differ also in some characteristics of the hypandrium: in the eastern race, the distal border is straighter, the apex of the ventral horn is acuminate, its two bristles being stronger, and the two bulbs beside the ventral horn (lobo interno sub-apical do ramo curto exterior da pinça, following MALOGOLOWKIN) are smaller and evenly rounded (fig. 6).

The vaginal plate is slightly pointed unlike any of the other species compared, and the species is easily distinguishable by this character in mixed material (fig. 7).

Chromosomes (fig. 8) – In three larvae from the West African strain, the metaphase configuration proved to consist of two pairs of V-shaped autosomes, a pair of dot-like autosomes and a pair of rod-like sex chromosomes. The



Drosophila séguyi Smart – Fig. 2: Head of male; fig. 3: parts of the male genital apparatus, genital arch (G), forceps (F), anal plate (A), and secondary clasper (S), of material from the Ivory Coast; fig. 4: anal plate and secondary clasper of males from Tanganyika Territory; fig. 5: hypandrium and penis of material from the Ivory Coast; fig. 6: the same of material from Tanganyika Territoy (L=lancets, P= pincers); fig. 7: vaginal plate; fig. 8: metaphase chromosome plates in cells of the larval brains.

X chromosome shows a conspicuous secondary constriction as in *D. rufa* (24), while the Y chromosome is probably J-shaped. The salivary chromosomes show five long elements and a dot.

Drosophila auraria Peng (27)
(Figs. 9-12)

KIKKAWA & PENG (13): description; figure of the male hypopygium.
HSU (11) : description of the male genital apparatus.
WHEELER (34) : species listed as a member of the sub-group C of the *melanogaster* group.
PATTERSON & WHEELER (25) : species mentioned in the catalogue.
TAN, HSU & SHENG (32) : records from China.
PATTERSON & STONE (24) : distribution.
MAKINO, MOMMA & TAKADA (17) : records from Hokkaido in relation to altitude.
MAKINO, MOMMA, TAKADA & ISHIHARA (18) : records from Hokkaido.
TAKADA & MAKINO (31) : two types, A and B, distinguished.
MORIWAKI, OKADA & KUROKAWA (21) : also two types, A and B, distinguished.

The following notes are based on a study of dried material from Japan, sent by Prof. KIKKAWA, and of a stock of Chinese origin, sent by Prof. FREIRE-MAIA.

D. auraria has, like *D. séguyi,* the snow-white face in males, but almost without carina, and with the white area reaching the upper half of the face. Unlike *D. séguyi,* the cheeks are of a very light color, and the third antennal joint is grayish yellow. The proximal sex comb has more teeth than in *D. séguyi* (Table II). The costal index is about as high as in *D. montium,* and much higher than in *D. séguyi* and *D. kikkawai* (Table III).

TABLE III

Costal index and 4th vein index in the species compared. Each mean number refers to ten wings measured.

SPECIES		Costal index		4th vein index	
		mean	range	mean	range
D. *séguyi*	♀ ♀	2.19±0.05	2.0 — 2.3	2.41±0.04	2.3 — 2.6
	♂ ♂	2.08±0.01	2.0 — 2.1	2.55±0.04	2.4 — 2.8
D. kikkawai	♀ ♀	1.99±0.03	1.8 — 2.1	2.52±0.04	2.3 — 2.7
	♂ ♂	1.82±0.03	1.7 — 2.0	2.49±0.05	2.3 — 2.7
D. auraria	♀ ♀	2.82±0.03	2.7 — 3.0	2.58±0.06	2.4 — 2.8
	♂ ♂	2.65±0.03	2.5 — 2.9	2.64±0.03	2.5 — 2.8
D. montium	♀		2.8 & 2.9		2.1 & 2.2
	♂		2.7 & 2.7		2.5 & 2.6
D. montium following DUDA (3)			1.5 — 2.5		almost 3
D. montium following DE MEIJERE (20)			—		2.2

Both species have almost the same abdominal pattern (fig. 1). As it has been recently reported (21, 31), *D. auraria* has also two types differing in morphological and ecological characteristics, but it is not mentioned whether the polymorphism involves also the color pattern of the tergites.

Genital apparatus (figs. 9-11) — Compared with *D. séguyi,* the toe of the genital arch is larger and bears a strong triangular process on the posterior margin. The secondary clasper is fused to the anal plate. In ten males of the Chinese stock, there were 2 or 3 curved teeth on the secondary clasper, and 1-2 shorter teeth on the limit between the two fused sclerites. In six males of the Japanese material, there was only one tooth of the latter type. In the Chinese flies, there were found 1-2, mostly one long bristles at the base of the forceps, while in the Japanese material the corresponding number was almost invariably two. The shape and other features of the hypandrium resemble more the condition in *D. montium* than in *D. séguyi* or *D. kikkawai;* there are larger pincers, relatively short lancets, and the lateral horns are protruding. A median horn is weakly suggested in the Chinese material, and reduced to a narrow clasp in the other material. There are several more differences in the hypandiaum between the two geographical races, regarding size, direction and shape of lancets, pincers and penis, and it would be worth testing the crossability of the two forms.

The vaginal plate (fig. 12) is rounded, differing from the similar plate of *D. kikkawai* in that a secondary edge is running behind the teeth, and the uppermost tooth is isolated from the other ones.

Drosophila kikkawai sp.n.

(Figs. 13-16)

D. montium De Meijere. KIKKAWA (12) : two chromosomal races described.
- KIKKAWA & PENG (13) : description; figure of the male hypopygium.
- OSIMA (23) : genetical and cytological data.
- PAVAN & DA CUNHA (26) : full re-description using Brazilian material; two color types distinguished.
- FREIRE-MAIA: chromosome configuration in Brazilian strains (6) : number of teeth in the sex combs (8, 9); frequency of inversions (10).
- WARD (33) : three karyotypes distinguished.
- HSU (11) : description of the male genital apparatus.
- WHEELER (34) : species listed as a member of the sub-group C of the *melanogaster* group.
- PATTERSON & WHEELER (25) : species mentioned in the catalogue; part of the information concerns *D. kikkawai.*
- TAN, HSU & SHENG (32) : records from China.
- PATTERSON & STONE (24) : distribution, karyotypes.

? *D. montium* de Meijere. DUDA (3) : two color types, var. *atropyga* and *xanthopyga,* described. (4) : additional notes to the description; figure of the male hypopygium in side view.

? *D. montium* de Meijere. MALLOCH (19) : short note; record from Samoa.

non *D. montium* de Meijere from Java.

non *D. montium* de Meijere in DUDA (5) : description on after African material.

The species was fully described by KIKKAWA & PENG, and by PAVAN & DA CUNHA. It becomes now a new species because it is far from being identical to the type male of *D. montium* de Meijere.

The following additional notes to the species are based on a study of dried material from Japan, sent by Prof. KIKKAWA, and of several Brazilian strains, sent by Prof. FREIRE-MAIA.

The body color is light brownish yellow, with a grayish hue. The dark color pattern is dull grayish brown, never bright black. The eyes are of a dull light wine red. The third antennal joint is very light grayish brown. In males, the shape of the carina is similar to that in *D. séguyi* (fig. 2), but the face lacks the white area. Checks, proboscis and palpi are light yellowish. The abdominal color pattern of the Brazilian material is shown in fig. 1. The females from Japan are all of the light type. Although the posterior bands are quite broad in some Japanese specimens, the sixth tergite is without exception lighter than the proximal ones. The number of teeth in the sex combs is given in Table II.

Genital apparatus (figs. 14-16) — The genital arch is of a light color, only the anal plate is slightly darkened. The most distinctive feature is the complete separation between the anal plate and the secondary clasper. The latter sclerite is, contrary to the condition in the other species, low and broad, and bears two strong curved teeth (8 males from Brazil and 8 from Japan examined). The forceps is well armed with strong teeth and bristles, unlike *D. montium*. As in *D. séguyi*, the tip of the forceps is lower than the toe of the genital arch. The two samples are almost alike in these characteristics, as well as in the number of bristles and teeth on each sclerite. The hypandrium is trapezoidal and shows ventrally a median horn that bears on its apex two long bristles. The pincers are twofold: ventrally a pair of pointed elements (ramo interno da pinça, following MALOGOLOWIN), and dorsally a pair of rounded bulbs (lobo interno sub-apical do ramo externo da pinça). The pointed elements occur also in the former two species, where they are shorter and not visible in ventral view. The lancets (manto-do-pênis) surpass the hypandrium body as much as the penis. The two samples differ slightly but constantly in all these parts of the hypandrium.

The vaginal plate is rounded (fig. 13).

Differential diagnosis — *D. kikkawai* differs from *D. montium* De Meijere, with which it has been mixed up until now, in the lighter color of face, third antennal joint, sixth tergite and genital arch, in the larger size of the genital arch, the smaller size of the hypandrium and penis, as well as in the following characteristics of the male genital apparatus: anal plate and secondary clasper separated from each other, the latter with two strong curved teeth on the inner margin, and without dark teeth on the surface; forceps conspicuous, with long teeth and bristles; hypandrium as broad as it is long, with a median horn that bears apically two bristles; penis narrower, without long hairs.

Drosophila montium De Meijere (20)
(Figs. 17-19)

The original description is the following:

"Tjibodas, 5000-6000 Fuss, Koningsberger leg.

Stirne matt gelbrot; Scheiteldreieck und Periorbiten braun, schwach glänzend. Fühler an der Wurzel gelbrot, das dritte Glied dunkelbraun, oben mit 6, unten mit 4 Kammstrahlen. Untergesicht braun, deutlich gekielt. Die sehr schmalen Backen un die Taster bräunlich weiss.

Thorax und Schildchen glänzend rotgelb, Brustseiten gelb, oben ins Braune ziehend. Hinterleib rotgelb, mit sehr breiten glänzend schwarzen Querbinden, welche in der Mittellinie nicht unterbrochen sind, vielmehr einander bisweilen berühren; gelbe und schwarze Binden gehen beide auf die Bauchseite über. Flügel etwas gebräunt, die Queradern genähert, der letzte Abschnitt der vierten Längsader 2,2 mal so lang wie der vorletzte; zweite Längsader mässig lang. Schwinger und Beine gelb.

Körper-und Flügellange 2 mm.

Diese Art sieht der folgenden (*D. silvata*) ähnlich, unterscheidet sich durch die nicht unterbrochenen Hinterleibsbinden, durch die nicht gesäumte hintere Querader und die mehr genäherten Queradern. Durch letzteres Merkmal ist sie auch von *latifascia* zu unterscheiden, welche überdies z.T. schwarze Schenkel hat."

The references about ocellar triangle, third antennal joint, lower face and marginal bands of the tergites indicated that the species might not be the same form as the today's *D. montium*. Through the kindness of Dr. KRUSEMAN, two specimens from de MEIJERE's material were obtained. One of the specimens was a male labelled: Tjibodas/5000-6000/Koninsgsberger 1913/Drosophila montium/ det. de Meijere/Type/all with the exception of the last but one line in handwriting. The other specimen was a female, labelled: Tjibodas. / 5000-6000 / Koninsgsberger 1913.

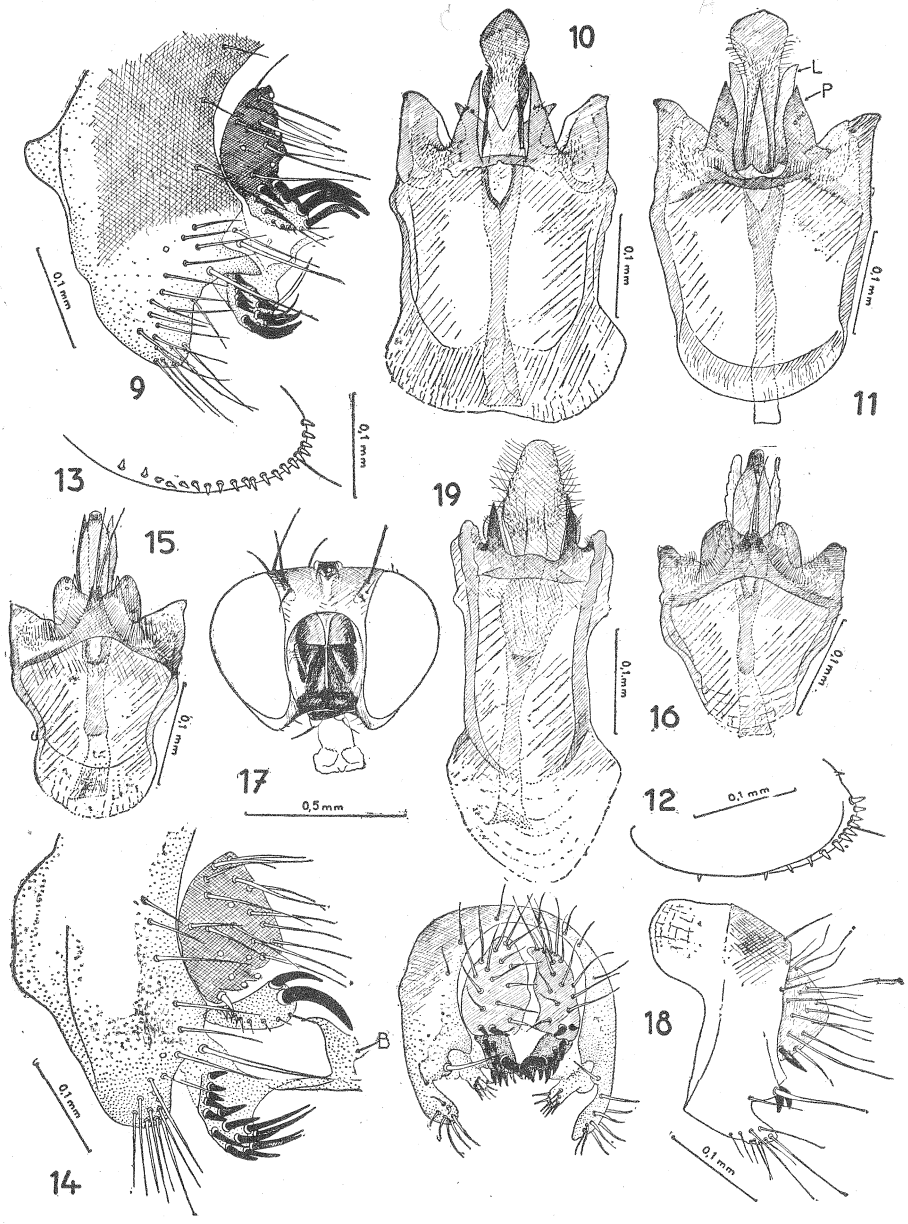
DE MEIJERE did not mention the number of specimens he studied, and whether he based the description upon one single type specimen. This information lacking, it is supposed that the male obtained for comparison is the legitimate type. With the written permission of Dr. KRUSEMAN, the two specimens were dissected and some parts mounted. The remainder, together with two permanent mounts, was sent back to the Zoological Museum of Amsterdam.

The type male fits perfectly the description by DE MEIJERE. The following additional information may be given:

Arista with 5 upper and 3-4 lower branches in addition to the terminal fork. Anterior and posterior orbital of equal length, middle orbital 0.3-0.4 other two. Postvertical as long as the anterior orbital. Anterior width of the front 0.9 length. Face and carina as in fig. 17.

The acrostichal hairs were shaved off, and one of the anterior scutellars as well as the sternopleurals were lacking. Two humerals. Apical bristle on second tibia, preapicals on all three tibiae. Proximal sex comb with 18-19

teeth, distal combs with 14-17 teeth. Costal index 2.7; 4th vein index 2.5; 5x index 3.2; heavy bristle index about 0.45.



Drosophila auraria Peng — Fig. 9: Genital arch, forceps, anal plate and secondary clasper of material from China; fig. 10: hypandrium and penis of material from China; fig. 11: the same of material from Japan (L=lancets, P=pincers); fig. 12: vaginal plate. *Drosophila kikkawai* sp.n. — Fig. 13: Vaginal plate; fig. 14: genital arch, forceps, anal plate, secondary clasper, and bridge (B) connecting the two forcipes, of material from Brazil; fig. 15: hypandrium and penis of material from Brazil; fig. 16: the same, of material from Japan. *Drosophila montium* De Meijere — Fig. 17: [illegible] of male; fig. 18: male hypopygium; fig. 19: hypandrium and penis.

Marginal bands of tergites as in fig. 1, dark brown, obviously faded. Length of body 2.4 mm, length of wing 2.3 mm.

Genital apparatus (figs. 18, 19) – Genital arch relatively small, darkened dorsally, the toe slender and much lower than the lower tip of the forceps. The posterior border of the genital arch forms two processes, the lower bearing a bristle. Forceps very weak and small, with fine short bristles, revealing a condition uncommon to the complex of the subgroup. Secondary clasper strong, of rhomboid shape, fused to the anal plate though there is a distinct limit between the two sclerites. On the lower tip of the secondary clasper, there is a strong curved tooth; along the lower margin there is a regular row of 5 teeth; 6 similar teeth are arranged in two rows on the surface and two teeth arise from the lower border of the anal plate. Hypandrium unproportionally long, with large, shell-like proximal growth zone and lateral edges protruding distally. Lancets small, broad; pincers pointed, without ventral bulb. Penis conspicuous, scrubby with long pile in preapical region.

The female specimen differed from the male in the following: Arista with 4-5 upper and 3 lower branches in addition to the terminal fork. Anterior orbital 0.8 of posterior, middle orbital 0.6 of anterior. Ocellar triangle hardly darker than the other parts of the front. Anterior width of the front 1.1 length. Eye index 1.1. Costal index 2.9; 4th vein index 2.1; 5x index 2.4. Posterior bands of the tergites as in the male, the 6th tergite with the pattern of the preceding ones.

The female specimen was somewhat better preserved than the male, and showed 7 rows of acrostichal hairs, convergent anterior scutellars and sterno index 0.6. While removing the abdomen for preparation of the genitalia, it was lost by unfortunate manipulation. Before, it had been noticed that the vaginal plate is apparently rounded as in *D. kikkawai*. Considering the differences existing between the two specimens, it is not sure whether they belong to the same species.

DISCUSSION

The African material of *D. séguyi* upon which DUDA based the re-description of *D. montium* has not been examined by myself. However, the description by DUDA fits perfectly *D. séguyi*, so the identity of DUDA's species with *D. séguyi* can be taken for granted. It remains to be studied whether the widely distributed *D. kikkawai* occurs also in Africa, possibly in ports as a domestic species .

D. montium is likely to be endemical to Java or that part of the Oriental region. Its genitalia seem to be highly specialized as compared with the other species of the subgroup. It will be worth looking for still other species of the kind in the Oriental region, where more endemical species of the subgroup may be assumed to occur.

The present information on the geographical distribution of the species considered is now the following:

D. montium: Java
D. kikkawai: Japan, China, Brazil; Haway ?, Samoa ?
D. séguyi: Africa
D. auraria: Japan, China.

At present it seems impossible to decide which of the species the other reports of *D. montium* by DUDA might be assigned to. In 1924 (3), he wrote in the key:

> 25. Zweiter Costalabschnitt 1,5 — 2,5 mal länger als der dritte; Endabschnitt der 4. Längsader fast 3 mal länger als der Queraderabstand ..... Gesichtskiel schmal, doch nasenförmig, tief reichend. 2. Orale fast so stark wie die Knebelborste. Hinterleib gelb mit schwarzen, in der Mitte nicht unterbrochenen Hinterrandbinden
>
> *montium* de Meijere (Java, Formosa, Mittel-Annam).
> (die letzten Hinterleibsringe ganz gelb var. *xanthopyga* n. var.
> — die letzten Ringe schwarz var. *atropyga* n. var.).

The impression is that he dealt with *D. kikkawai*. If that be true, the dark variety of the Oriental populations would be quite different from the fark variety of the Brazilian populations, a rather unlikely condition. As he mentioned the carina as distinct and low reaching, *D. auraria* can be excluded. There remains to postulate that *D. séguyi* might range as far as that region, or else that DUDA's species be another one the subgroup, or a mixture of species. In 1926 (4) he mentioned the vaginal plate as rounded, what excludes *D. séguyi*, and he gave a figure of the male genitalia, that excludes *D. montium*. The figure points to *D. auraria*, while there is nothing mentioned of a white face in males, so that an identification with *D. auraria* again becomes suspect.

The present study borders upon questions of intraspecific divergence. *D. séguyi* from Tanganyika differs from the West African one so much that they would probably be called different species, provided they lived at the same locality. As the two forms are allopatric, the entire width of the African continent lying between the localities where they were collected, they are judged to represent merely two geographical races of the same species.

In the case of *D. kikkawai*, the strains from Brazil differ from the Japanese sample in the genitalia and in its possessing a dark color variety that is not met with in the Japanese records, but occurs also, following Prof. FREIRE-MAIA (personal communication), in material from Honolulu. However, both forms are known to possess the same two types of metaphase configuration (6), and the morphological differences are not of such an extent that would not be expected from two populations so widely separated one from the other. Therefore, the same criteria applies, as in the case of *D. séguyi*, and both are considered to be geographical races of the same species, as long as results from cross experiments will not contradict this opinion.

The taxonomical position of *D. séguyi* is interesting as far as the species appears transitional between *D. auraria* and *D. kikkawai*. In general, it is

closer to *D. auraria,* but has the hypandrium similar to *D. kikkawai,* while the shape of the vaginal plate is different from either of the other species.

Acknowledgements — My special thanks go to Dr. KRUSEMAN of the Zoological Museum of Amsterdam, who most kindly made available the type specimen of *D. montium* for comparison and even for dissection. To Dr. LEVER, Amsterdam, I am grateful for submitting my respective request to Dr. KRUSEMAN. I am very indebted to Prof. KIKKAWA for his interest in the matter and for sending Japanese material of *D. kikkawai, D. auraria* and *D. rufa,* to Dr. F. ERNST for collecting *D. séguyi* in Tanganyika Territory, and to Prof. FREIRE-MAIA for sending stocks of *D. kikkawai* and *D. auraria.*

SUMMARY

By means of cross experiments and morphological comparison, *D. séguyi* from Africa was shown not to be synonymous to *D. kikkawai, D. auraria* or *D. montium. D. séguyi* is supposed to be abundant in Africa and to replace *D. montium* in that region.

The type specimen of *D. montium* is shown not to be identical with the well-known *D. montium* of today. The latter is given the name of *D. kikkawai.*

The reports of DUDA's on Oriental *D. montium* fail to be assigned to either of the species in question.

Additional notes on the morphology of the four species considered are given. In each of the three species *D. séguyi, D. auraria* and *D. kikkawai,* two samples from geographically different localities were studied, and in each case the two samples were observed to differ slightly one from the other.

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