

**Studies on the External Male Genitalia of  
Drosophilidae in Korea**

韓國産 초파리의 雄性外部生殖器에 對한 研究

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全南大學校 論文集 第七輯 別刷

(開校十周年紀念特輯)

**Reprinted from**

**Theses of Chonnam University**

**Vol. 7**

**Kwang-Ju Korea**

**1 9 6 2**

# Studies on the External Male Genitalia of Drosophilidae in Korea

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(Received 20 July, 1962)

## INTRODUCTION

The external and internal genital organs of male *Drosophila* are known to be one of the most important species specific characters, and it has been used by many taxonomists in discriminating closely related *Drosophila* species. The external male genitalia of the genus have also been studied by Hsu(1949) and Okada(1957) in terms of systematics.

The *Drosophilid* fauna of Korea have been actively surveyed since 1955 mostly by Chonnam University(Chung et al 1955, 1956; Paik and Kim 1957), and some others (Takada and Lee 1958). Kim and Paik(1957), referring to the external features, established a tentative key to 51 Korean species of the *Drosophilidae*.

Present work attempted to check the external genital structures of Korean species of *Drosophilidae* and to provide further data for the study of systematic relationships among the species.

In order to examine the intraspecific variations Korean species have been compared with those of Japan or of the other countries, and the number of variations are observed.

## MATERIAL AND METHODS

The species used in this study had been collected from May, 1955 to October, 1960 at the various localities of South Korea; Mts. Moodung, Chiri, Hanra, Sori, Taepaik; Najoo orchard areas; and Tolsan-Island(see Fig. 1).

The Korean specimens have been compared largely with the stocks sent from Genetics Laboratory of Tokyo Metropolitan University, Japan and partly with those from Genetics Laboratory of The University of Texas and from Pavia University, Italy.

Paik's improved technique(1956) was employed in examining the structures of male

genitalia.

All the drawings were made by a drawing prism at the same magnification(ca 150x).

### PRESENTATION OF DATA

The genital preparations of 43 Korean species were examined and compared with those of Japanese, Americans, or Europeans. Several specimens were unavoidably referred to the original descriptions. If the differences are recognized, they are shown in the remarks of the following descriptions:

#### Genus *Amiota*

*Amiota*(*Phortica*) *variegata*(Fallen) Fig. 2

Described and figured by Okada(1957).

Specimens examined: Mt. Moodung; Mt. Sori.

#### Genus *Leucophenga*

*Leucophenga*(*Trichiaspiphenga*) *argentosa* Okada Fig. 3

Described and figured by Okada(1957).

Specimens examined: Mt. Moodung.

Remarks: Clasper with about 7 to 8 teeth.

*Leucophenga*(*Leucophenga*) *concilia* Okada Fig. 4

Described and figured by Okada(1957).

Specimens examined: Mt. Moodung.

*Leucophenga*(*Leucophenga*) *maculata*(Dufour) Fig. 5

Described and figured by Okada(1957).

Specimens examined: Mt. Moodung.

Remarks: Genital arch with about 10 dense hairs at heel portion.

*Leucophenga*(*Leucophenga*) *magnipalpis* Duda Fig. 6

Described and figured by Okada(1957).

Specimens examined: Mt. Chiri.

Remarks: Clasper with invariably 5 long hairs.

*Leucophenga*(*Leucophenga*) *ornatipennis*(de Meijere) Fig. 7

Described and figured by Okada(1957).

Specimens examined: Mt. Moodung.

Remarks: Clasper ovoid and upper margin heavily concaved.

*Leucophenga*(*Leucophenga*) *quinquemaculipennis* Okada Fig. 8

Described and figured by Okada(1957).

Specimens examined: Mt. Chiri.

#### Genus *Microdrosophila*

*Microdrosophila* sp-1 Fig. 9

Genital arch pale yellow, narrow, and bare. Anal plate somewhat triangular, with about 10 bristles. Clasper inconspicuous.

A single incomplete specimen from Mt. Hanra.

*Microdrosophila* sp-2 Fig. 10

Genital arch narrow, pale yellow and apically with a large process which is curved forward. Anal plate large and oblong, lower margin largely chitinized. Clasper absent.

Specimens examined: Mt. Moodung; Mt. Hanra.

#### Genus *Mycodrosophila*

*Mycodrosophila* *Koreana* Lee & Takada Fig. 11

Genital arch yellowish white, narrow and truncate below, upper portion with about 4 marginal bristles and lower portion with about 11 marginal bristles, heel obtuse angle. Clasper yellowish white, narrowing proximally, and distally with about 10 primary teeth as well as 4 secondary teeth. Anal plate yellowish white, somewhat triangular, tip portion slightly chitinized and with about 3 setae, and with about 20 bristles.

Specimens examined: Mt. Moodung; Tolsan-Island.

#### Genus *Scaptomyza*

*Scaptomyza* *disticha*(Duda) Fig. 12

Described and figured by Hsu(1949).

Specimens examined; Mt. Moodung; Mt. Hanra; Mt. Taepaik.

*Scaptomyza* *graminum*(Fallen) Fig. 13

Described and figured by Okada(1957).

Specimens examined: Mt. Hanra; Mt. Chiri; Mt. Taepaik.

Remarks: Genital arch with about 10 hairs. Clasper with about 4 to 5 secondary teeth.

*Scaptomyza* *apicalis* Hardy Fig. 14

Described and figured by Okada(1957).

Specimens examined: Mt. Sori.

*Scaptomyza polygonia* Okada Fig. 15

Described and figured by Okada(1957).

A single specimen examined from Mt. Taepaik.

### Genus *Drosophila*

#### Subgenus *Hirtodrosophila*

*Drosophila alboralis* Momma & Takada Fig. 16

Described and figured by Momma & Takada(1954).

Specimens examined: Mt. Hanra; Mt. Chiri.

*Drosophila sexvittata* Okada Fig. 17

Described and figured by Okada(1957).

Specimens examined: Mt. Hanra; Mt. Sori; Mt. Taepaik.

*Drosophila nokogiri* Okada Fig. 18

Described and figured by Okada(1957).

Specimens examined: Mt. Hanra; Mt. Sori.

Remarks: Genital arch with about 5 long upper marginal bristles along anterior margin and about 3 bristles at toe. Clasper dark brown, somewhat rectangular.

*Drosophila* sp. like *histrion* Fig. 19

General features are to be described by Okada & Kurokawa(1956).

Specimens examined: Mt. Hanra; Mt. Sori; Mt. Taepaik.

#### Subgenus *Paradrosophila*

*Drosophila coracina* Kikkawa & peng Fig. 20

Described and figured by Hsu(1949).

Specimens examined: Mt. Moodung; Stock from Tokyo, Japan.

Remarks: Heel of the genital arch pointed anteriorly, Clasper one, small, and primary teeth about 10, arranged in a concave row.

#### Subgenus *Dorsilopha*

*Drosophila busckii* Coquillett Fig. 21

Described and figured by Hsu(1949).

Specimens examined: Najoc; Stock from Tokyo, Japan; Stock from The University of Texas.

**Subgenus Sophophora**

**obscura species-group**

**obscura species-subgroup**

*Drosophila bifasciata* Pomini Fig. 22

Described and figured by Hsu(1949).

Specimens examined: Mt. Moodung; Mt. Hanra; Mt. Taepaik; Stock from Tokyo, Japan.

**melanoaster species group**

**suzukii species-subgroup**

*Drosophila suzukii*(Matsumura) Fig. 23

Described and figured Hsu(1949).

Specimens examined: Mt. Moodung; Mt. Hanra; Mt. Taepaik; Stock from Tokyo, Japan,

Remarks: Anal plate oval, and with tapering tip, and about 15 stout setae at tip portion. Clasper one, primary teeth in two separate rows, upper one is arranged in a convex row.

**takahashii species-subgroup**

*Drosophila takahashii* sturtevant Fig. 24

Described and figured by Hsu(1949).

Specimens examined: Najoc; Stock from Tokyo, Japan.

*Drosophila lutea* Kikkawa & Peng Fig. 25

Figured by Kikkawa & peng(1938), described by Okada(1957).

Specimens examined: Mt. Moodung; Mt. Hanra; Tolsan-Island; Stock from Tokyo, Japan.

**melanogaster species-subgroup**

*Drosophila melanogaster* Meigen Fig. 26

Figured by Sturtevant(1921), Kikkawa and Pang(1938), Burla(1951), Shogaki(1952), Figured and described by Hsu(1949), Salles(1947).

Specimens examined: Kwangju; Stock from Tokyo, Japan.

**nipponica species-subgroup**

*Drosophila magnipectinata* Okada Fig. 27

Described and figured by Okada(1957).

Specimens examined: Mt. Hanra.

**montium species-subgroup**

*Drosophila auraria* Peng Fig. 28

Figured by Peng(1937), Kikkawa & Peng(1938), Described by Hsu(1949), Buria(1954).

Specimens examined: Mt. Hanr; Mt. Moodung; Tolsan-Island; Stock from Tokyo, Japan.

*Drosophila rufa* Kikkawa & Peng Fig. 29

Described and figured by Hsu(1949).

Specimens examined: Tolsan-Island; Stock from Tokyo, Japan.

**Subgenus *Drosophila***

**quinaria species-group**

*Drosophila brachynephros* Okada Fig. 30

Described and figured by Okada(1957).

Specimens examined: Najoo; Stock from Tokyo, Japan.

*Drosophila angularis* Okada Fig. 31

Described and figured by Okada(1957).

Specimens examined: Mt. Moodung; Tolsan-Island; Stock from Tokyo, Japan.

*Drosophila unispina* Okada Fig. 32

Described and figured by Okada(1957).

Specimens examined: Mt. Moodung; Stock from Tokyo, Japan.

*Drosophila nigromaculata* Kikkawa & Peng Fig. 33

Figured by Kikkawa & Peng(1938), Described and figured by Okada(1957).

Specimens examined: Mt. Moodung; Stock from Tokyo, Japan.

Remarks: Secondary teeth 6 on the clasper.

**testacea species-group**

*Drosophila testacea* ven Roser Fig. 34

Described and figured by Hsu(1949).

Specimens examined: Mt. Sori; Mt. Hanra.

**bizonata species-group**

*Drosophila bizonata* Kikkawa & Peng Fig. 35

Described and figured by Okada(1957).

Specimens examined: Mt. Moodung,

**melanderi species-group**

*Drosophila makinoi* Okada Fig. 36

Described and figured by Okada(1957).

Specimens examined: Mt. Taepaik; Stock from Tokyo, Japan.

**ungrouped species near histrio**

*Drosophila* sp. of *quinaria* section Fig. 37

Described and figured by Okada & Kurokawa(1956).

Specimens examined: Mt. Sori; Mt. Moodung; Mt. Hanra.

*Drosophila histrio* Meigan Fig. 38

Described figured by Hsu(1949).

Specimens examined: Mt. Chiri; Mt. Moodung; Mt. Taepaik; Stock from Tokyo, Japan.

Remarks: Genital arch long and narrow, upper portion dark brown, Lower portion with about 13 bristles arranged in a diagonal row, 3 of which are very stout and at tip portion, heel slightly pointed anteriorly, toe broad and roundish. Lower portion of anal plate with very pronounced finger like projecton which bears 3 teeth-like structures at tip. Clasper one, more or less triangula, primary teeth about 15, arranged in a slightly convex row, size of teeth gradually incresing from top to bottom.

**immigrans species-group**

*Drosophila immigrans* Sturtevant Fig. 39

Figured by Kikkawa & Peng(1938), figured and described by Hsu(1949).

Specimens examined: Mt. Moodung; Stock from Tokyo, Japan.

*Drosophila* sp. of *immigrans* group Fig. 40

Described and figured by Okada & Kurokawa(1956).



Specimens examined: Mt. Hanra.

Remarks: The original description was not available, and no comparison was made.

#### **virilis species-group**

*Drosophila virilis* Sturtevant Fig. 41

Figured and described by Hsu(1959).

Specimens examined: Najoc; Kwangju; Stock from Tokyo, Japan; Stock from The University of Texas.

Remarks: Lower portion of genital arch with about 25 bistles, undermargin in slightly convex, heel an obtuse angle.

#### **robusta species-group**

*Drosophila sordidula* Kikkawa & Peng Fig. 42

Figured by Kikkawa & Peng(1938), figured and described by Okada(1957).

Specimens examined: Mt. Moodung; Stock from Tokyo, Japan.

*Drosophila lacertosa* Okada Fig. 43

Described and figured by Okada(1957).

Specimens examined: Mt. Moodung; Mt. Hanra; Mt. Sori; Mt. Taepaik; Stock from Tokyo, Japan.

Remarks: Lower portion of genital arch short and broad, and anterior margin of lower half heavily concaved.

*Drosophila cheda* Tan. Hsu, and Sheng Fig. 44

Figured and described by Hsu(1949).

Specimens examined: Mt. Moodung; Mt. Chiri.

### **SUMMARY**

1. The external male genitalia of 43 Korean species were examined and figured, and all of which were compared with those of the stocks from other countries.

2. Intraspecific variations are recognized in the following species: *Leucophenga argentosa*, *Leucophenga maculata*, *Leucophenga magnipalpis*, *Leucophenga ornatipennis*, *Scaptomyza graminum*, *D. nokogiri*, *D. coracina*, *D. suzukii*, *D. nigromaculata*, *D. histrio*, *D. virilis*, *D. lacertosa*.

3. The lack of the teeth on the clasper may be the most important feature for the

genus *Amiota* and genus *Leucophenga* except *Leucophenga argentosa*.

4. In the genus *Drosophila*, species belonging to *takahashii*, *montium*, *quinaria*, and *robusta* species-subgroup showed the common characters of the genitalia for the group, but showed differences among themselves.

### ACKNOWLEDGEMENTS

The author wishes to extend his sincere gratitude to Dr. Y. K. Paik of Yonsei University for his great help. He also owes a great deal to members of the Department for their help in the field collections. The author's cordial thanks are also due to Dr. T. Okada of Tokyo Metropolitan University, Dr. W. S. Stone of The University of Texas, and Dr. R. E. Scossiroli of Pavia University for their kindness of sharing valuable specimens.

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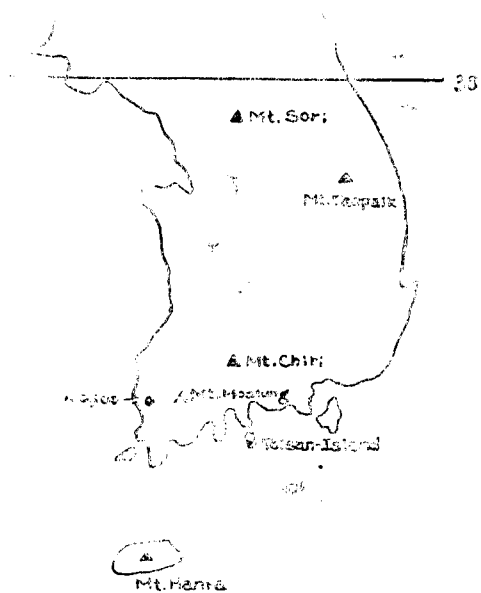


Fig. 1. The localities of collection

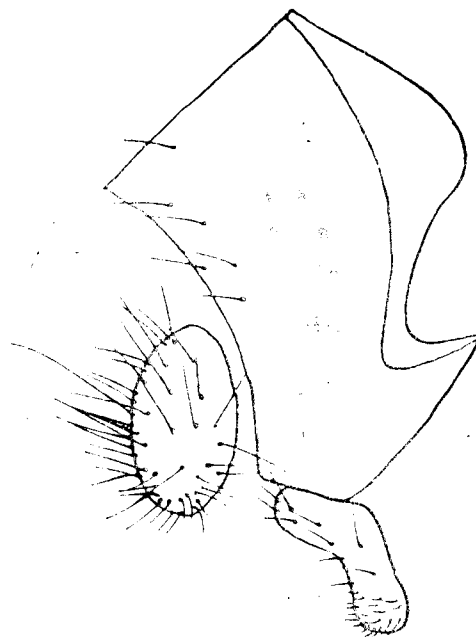


Fig. 2. *Amiota variegata* (Fallén)

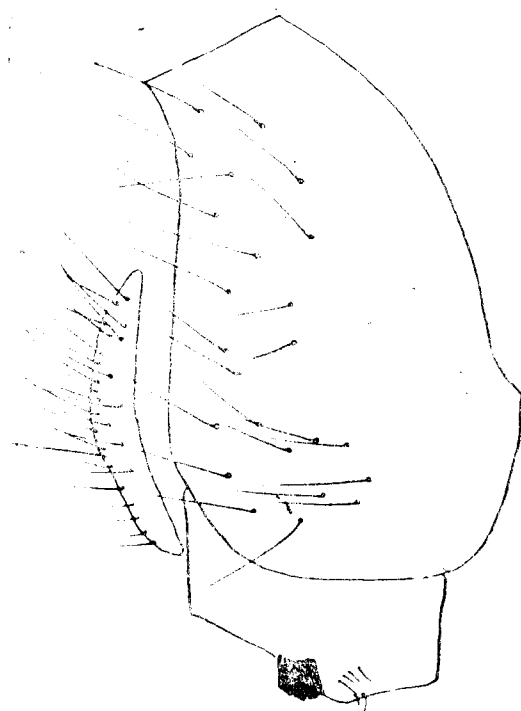


Fig. 3. *Leucophenga argentosa* Okada

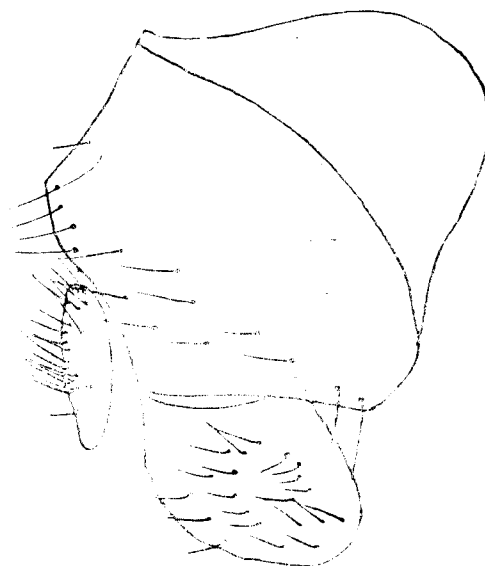


Fig. 4. *Leucophenga concilia* Okada

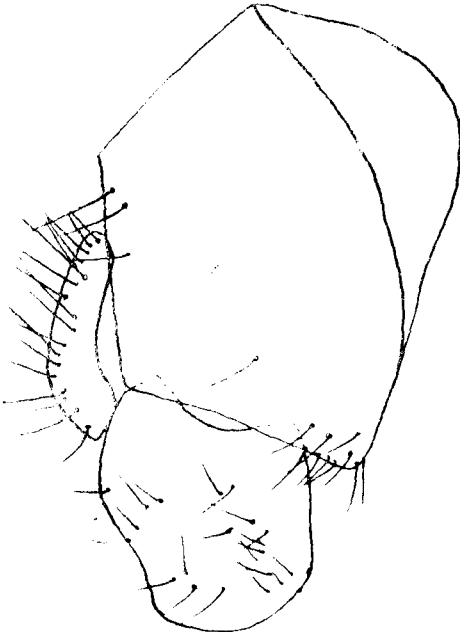


Fig. 5. *Leucophenga maculata*(Dufour)

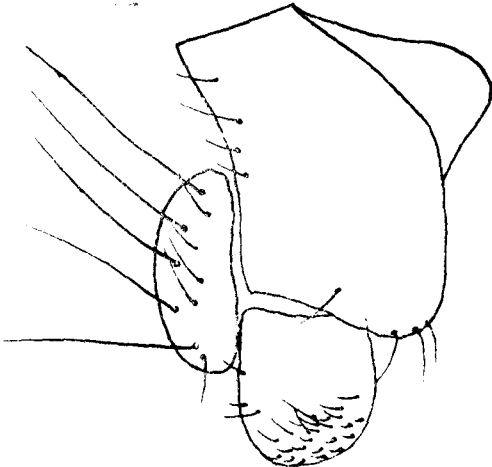


Fig. 6. *Leucophenga magnipalpis* Duda

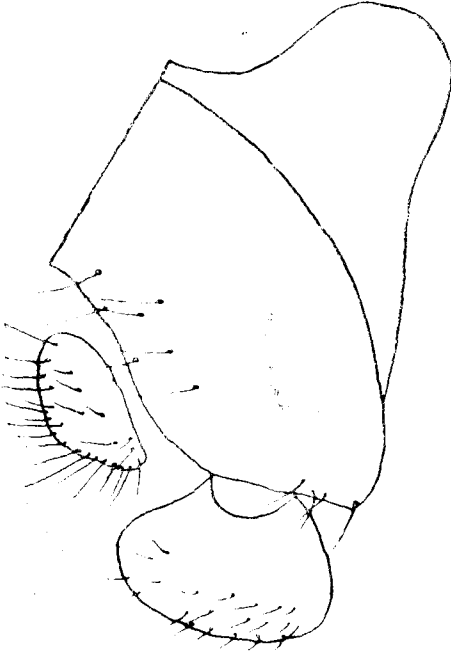


Fig. 7. *Leucophenga ornatipennis*  
(de Meijere)

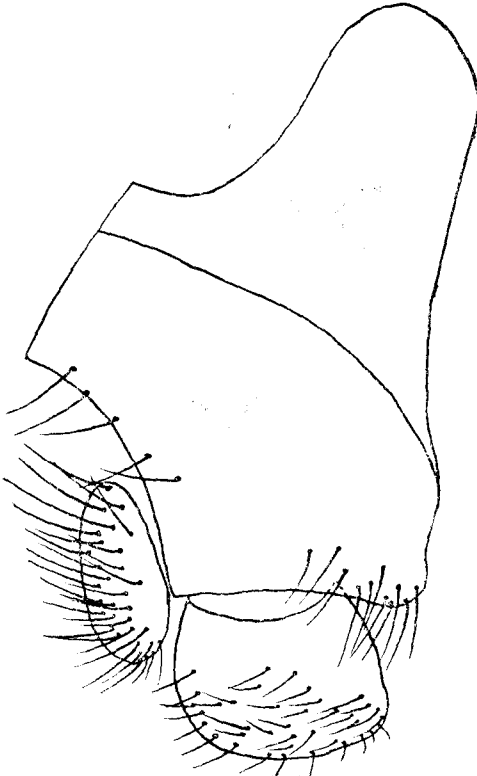


Fig. 8. *Leucophenga quinque maculipennis*  
Okada

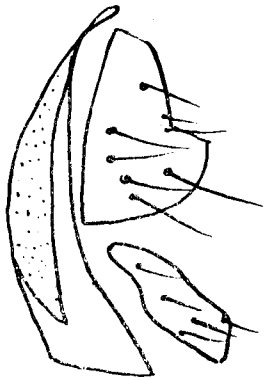


Fig. 9. *Microdrosophila* SP.-1

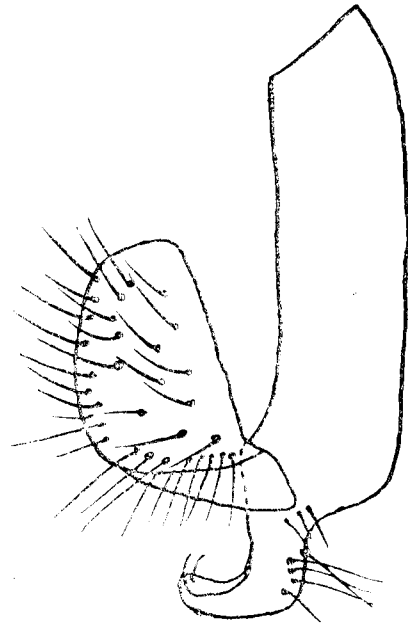


Fig. 10. *Microdrosophila* SP.-2

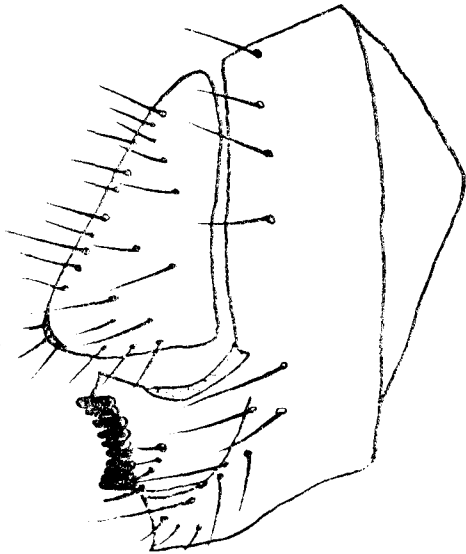


Fig. 11. *Mycodrosophila* *Koreana*  
Lee & Takada

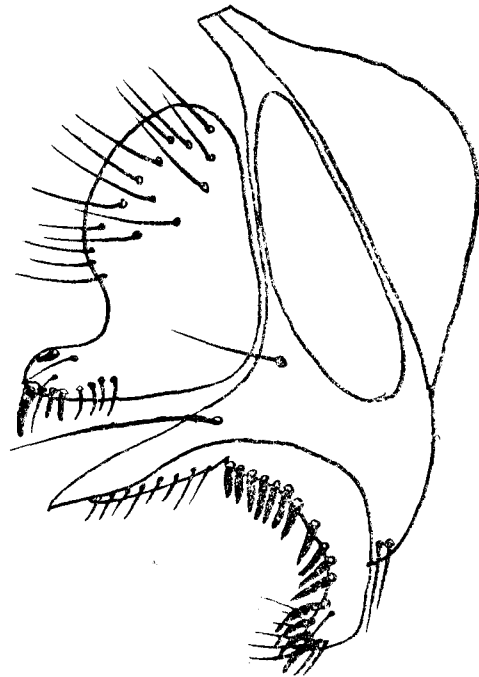


Fig. 12. *Scapeomyza* *disticha* (Duda)

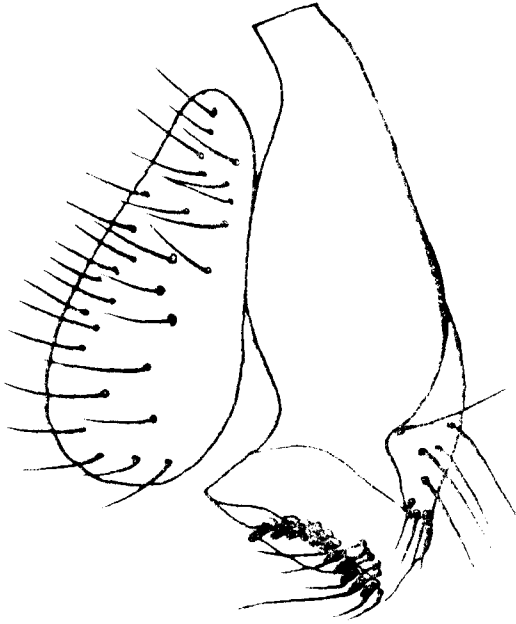


Fig. 13. *Scaptomyza graminum*(Fallen)

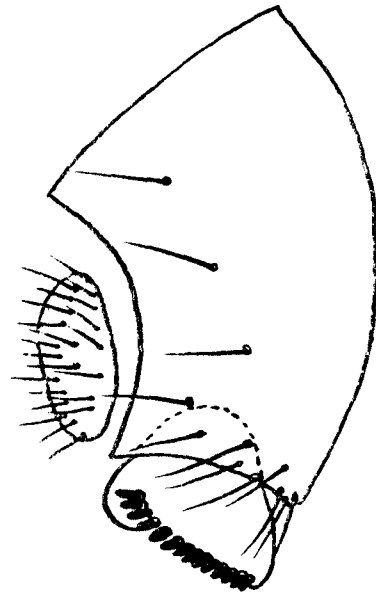


Fig. 14. *Scaptomyza apicalis* Hardy

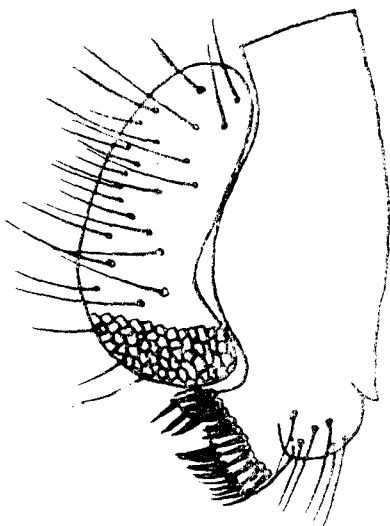


Fig. 15. *Scaptomyza polygonia* Okada

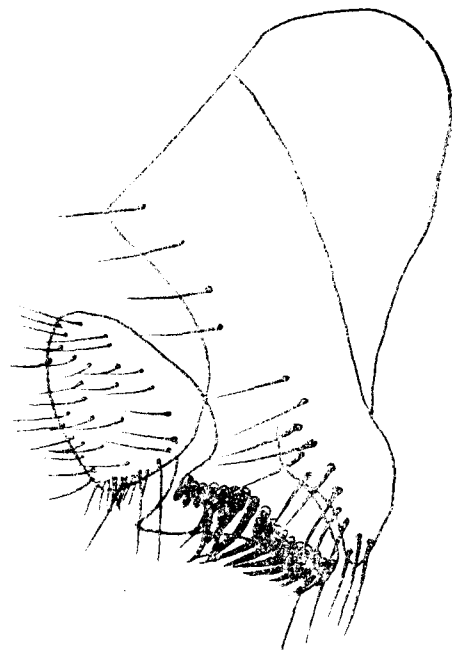
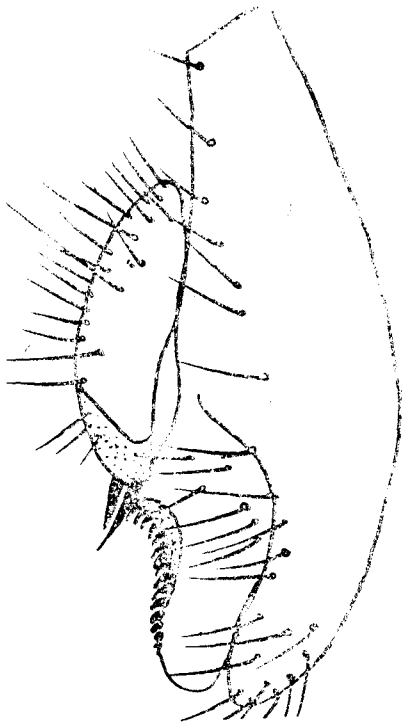
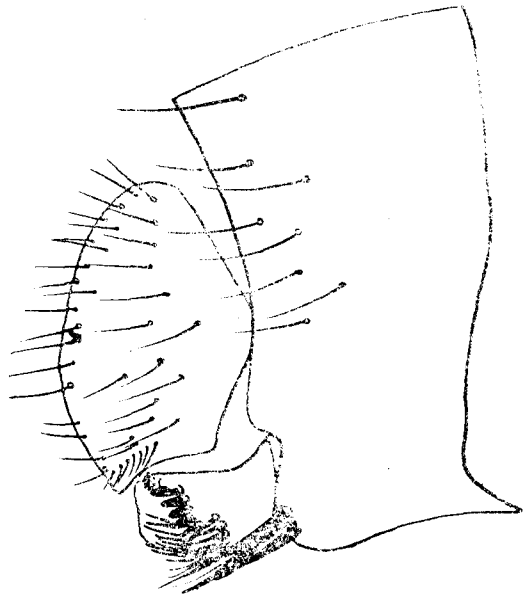
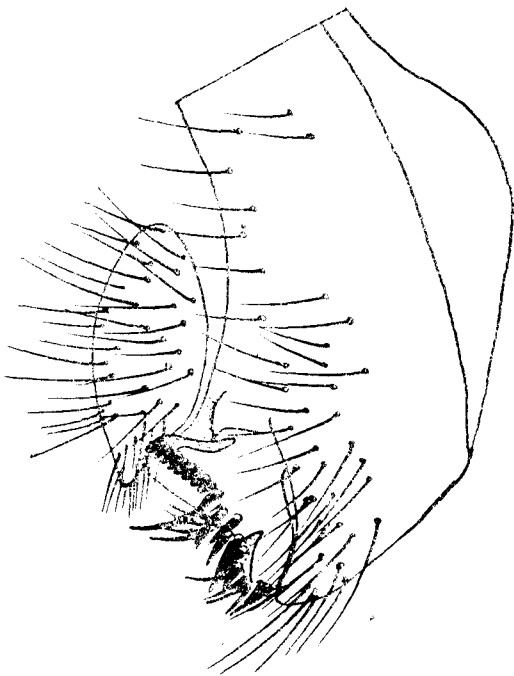
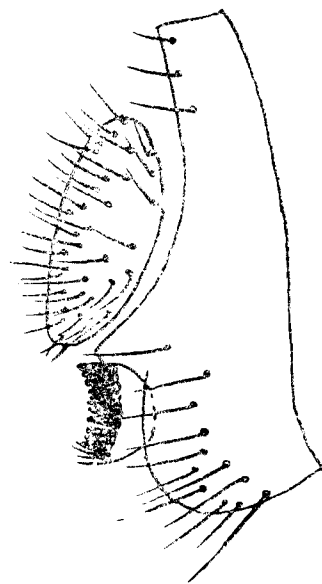


Fig. 16. *P. alboralis* Momma & Takada

Fig. 17. *D. Sexvittata* OkadaFig. 18. *D. nokogiri* OkadaFig. 19. *D. SP. like histrio*Fig. 20. *D. coracina* Kikkawa & Peng

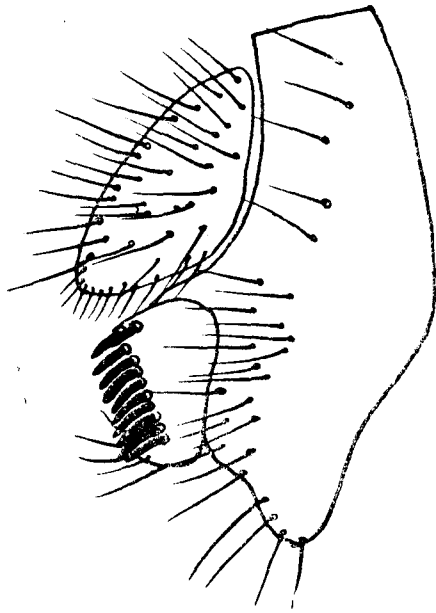


Fig. 21. *D. busckii* Coquillett

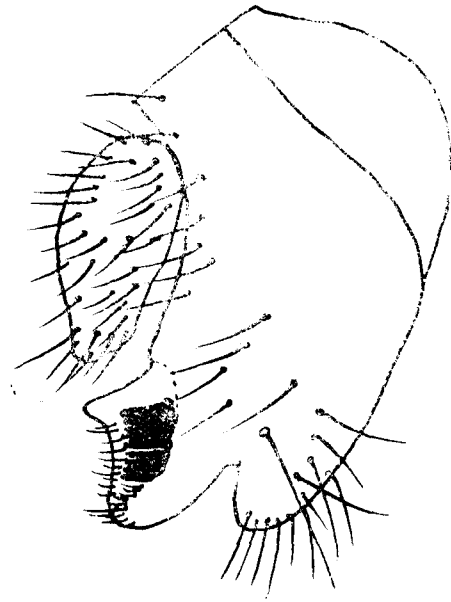


Fig. 22. *D. bifasciata* Pomini

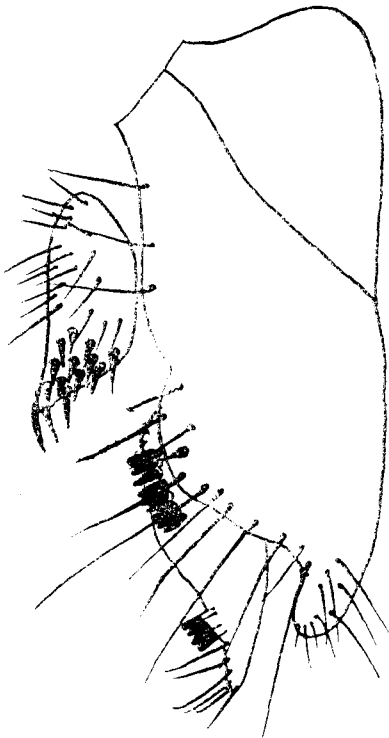


Fig. 23. *D. Suzukii*(Matsumura)

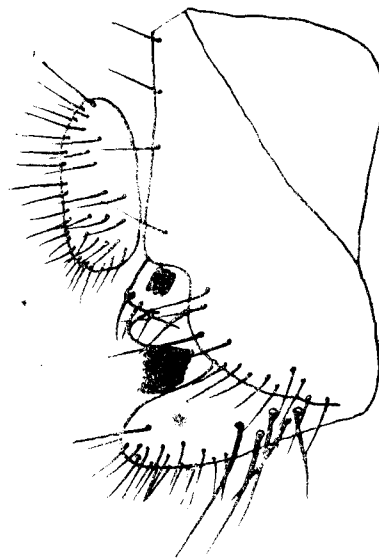
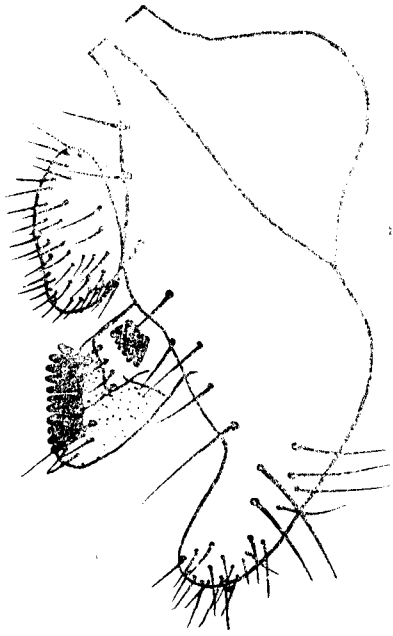
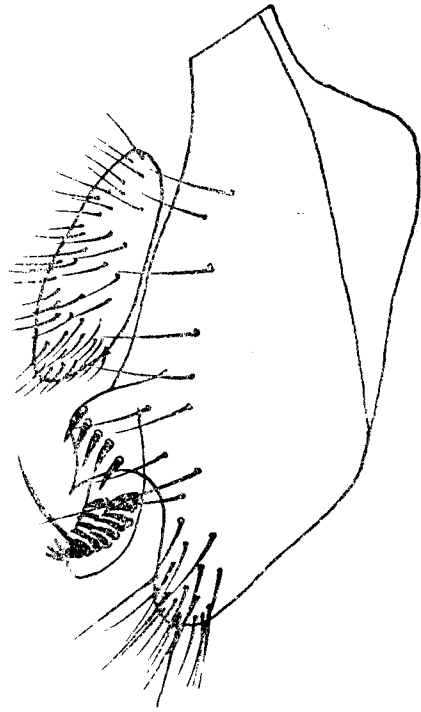
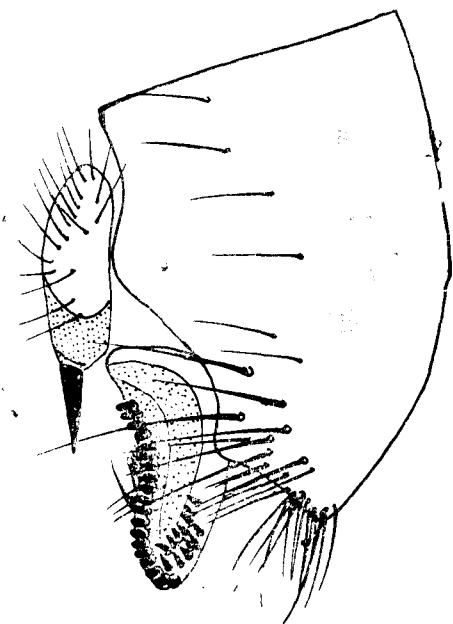
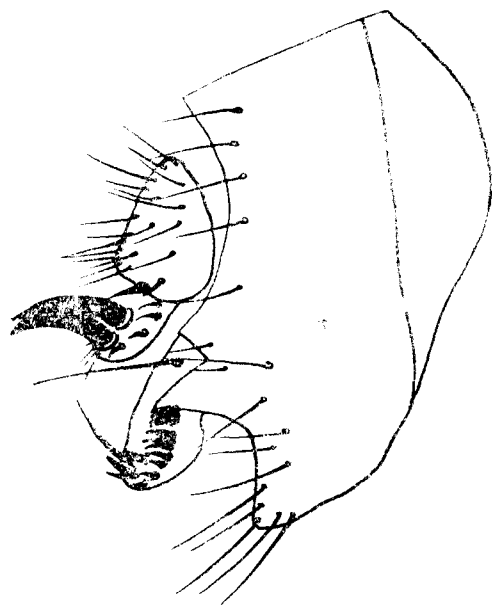


Fig. 24. *D. Takahashii* Sturtevant



Fig. 25. *D. Intea* Kikkawa & PengFig. 26. *D. melanogaster* MeigenFig. 27. *D. magnipectinata* OkadaFig. 28. *D. auratia* Peng

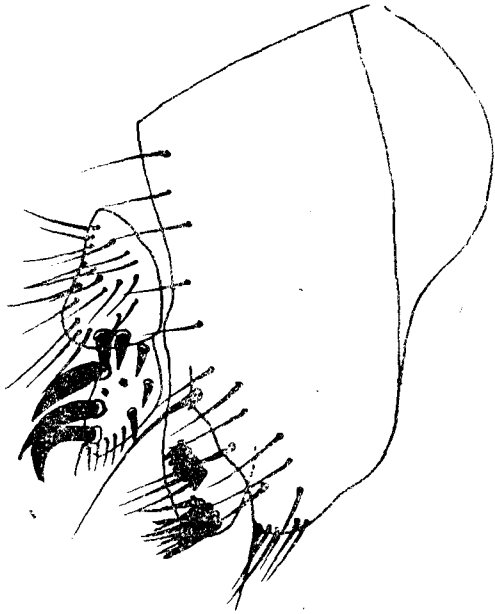


Fig. 29. *D. rufa* Kikkawa & Peng

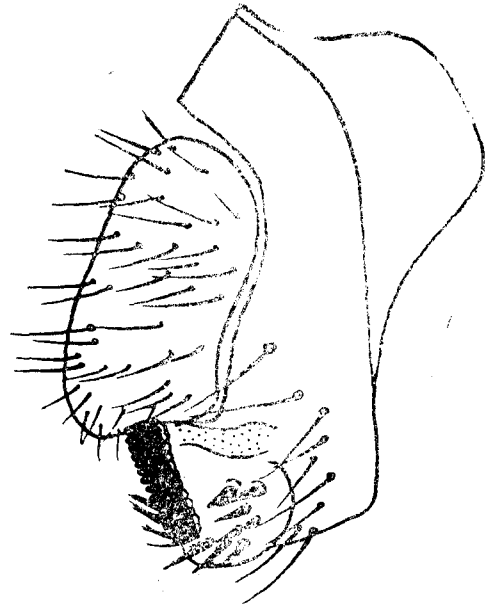


Fig. 30. *D. brachynephros* Okada

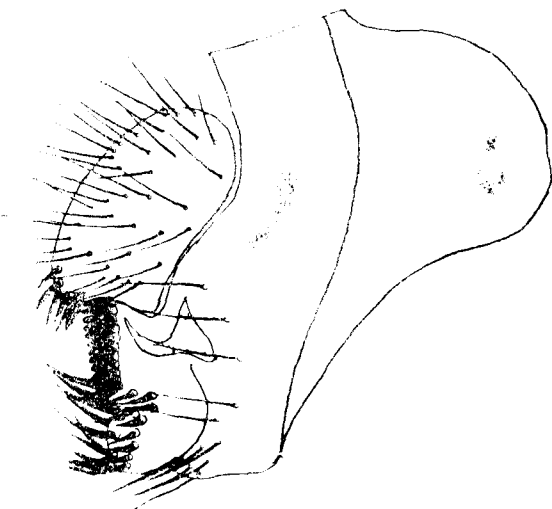


Fig. 31. *D. angularis* Okada

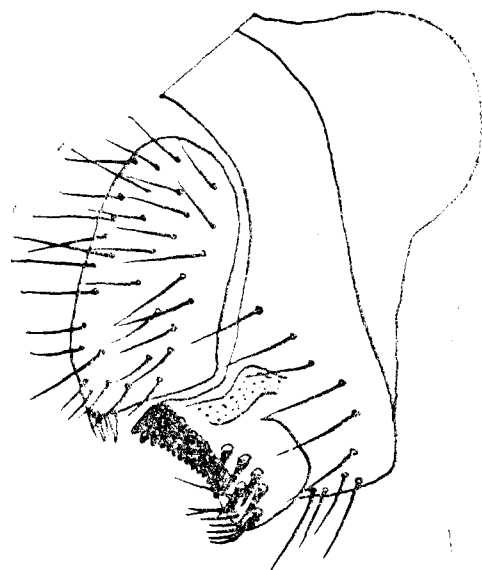
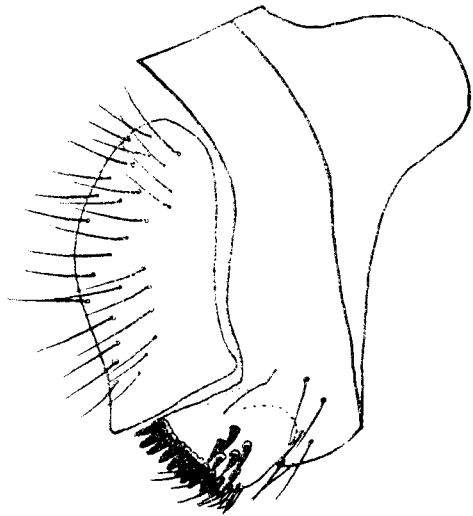
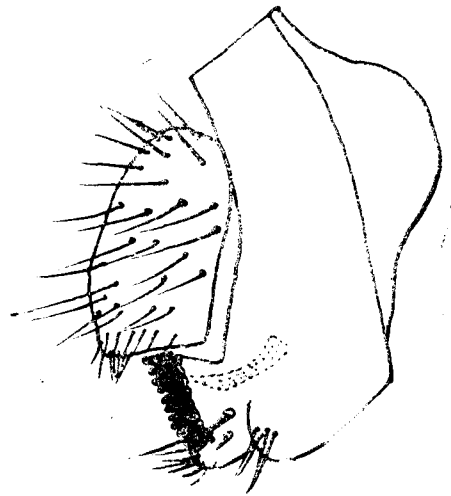
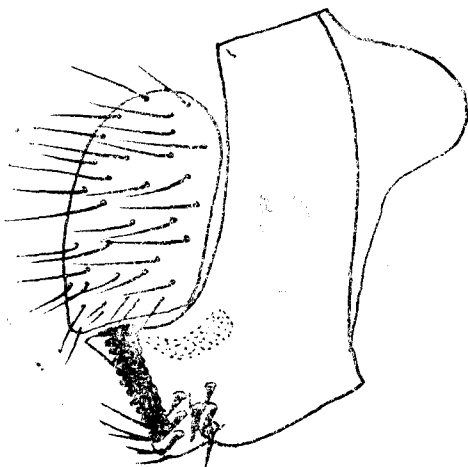
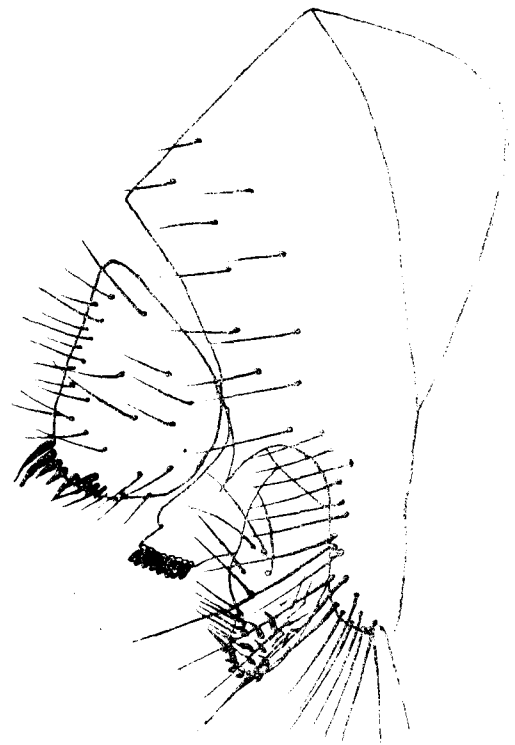


Fig. 32. *D. unispina* Okada

Fig. 33. *D. nigromaculata* Kikkawa & PengFig. 34. *D. testacea* van RoserFig. 35. *D. bizonata* Kikkawa & PengFig. 36. *D. makinoi* Okada

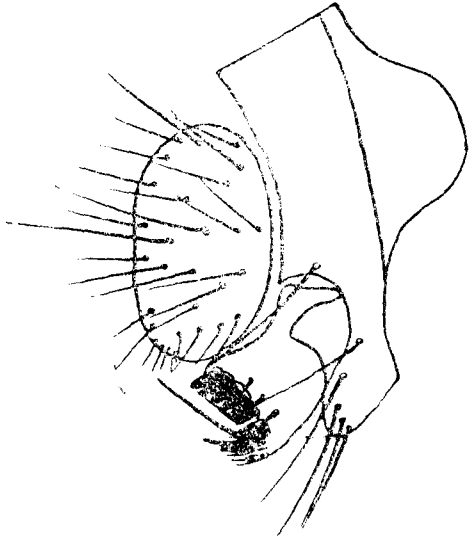


Fig. 37. *D.* SP. of *quinaria* section Okada

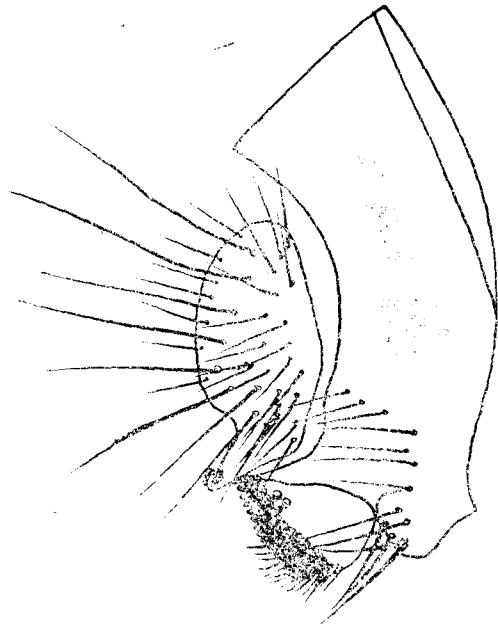


Fig. 38. *D. histrio* Meigen

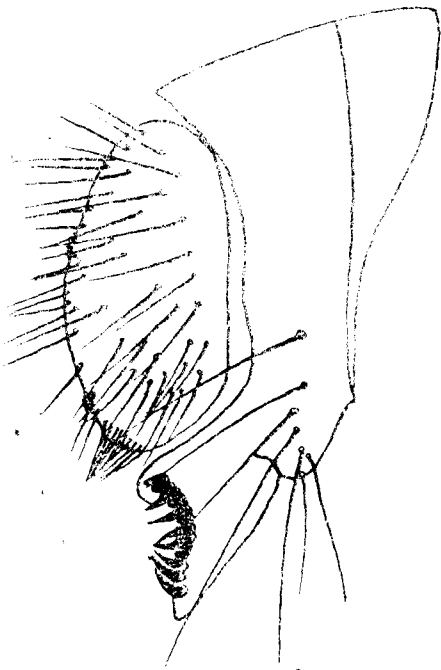


Fig. 39. *D. immigrans sturtevant*

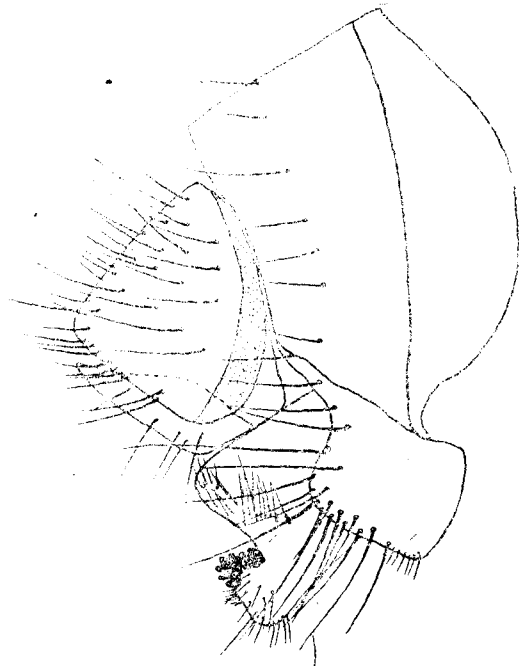


Fig. 40. *D.* sp. of *immigrans* group Okada

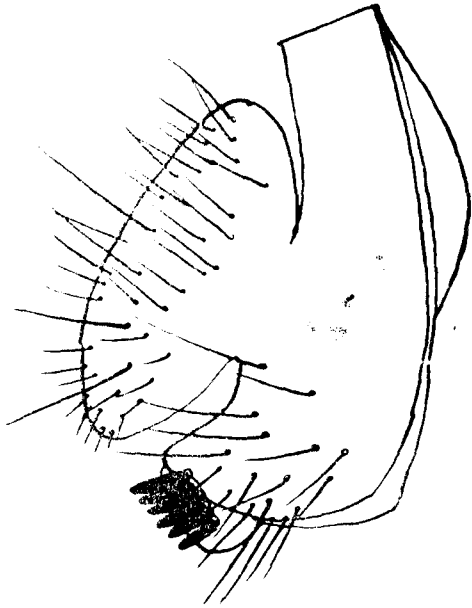


Fig. 41. *D. virilis* Sturtevant

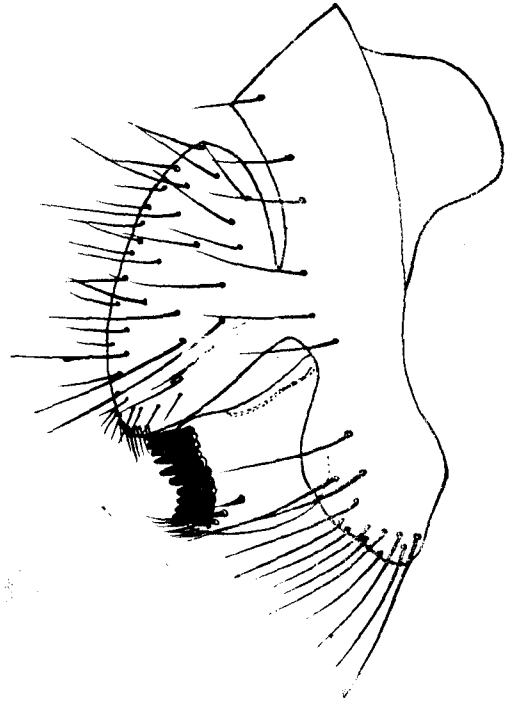


Fig. 42. *D. sordidula* Kakkawa & Peng

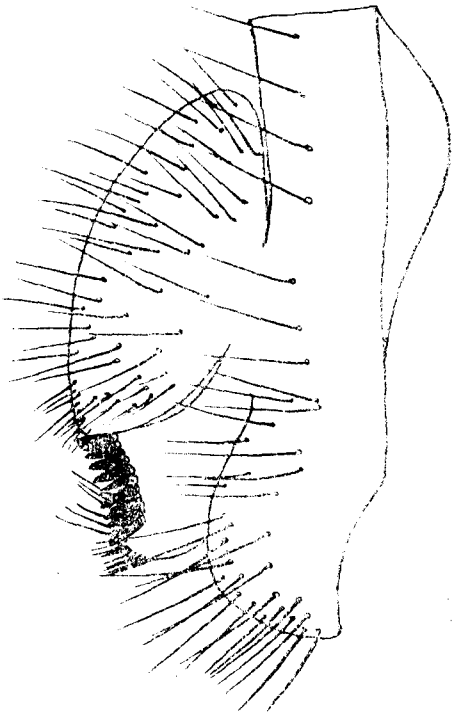


Fig. 43. *D. lacertosa* Okada

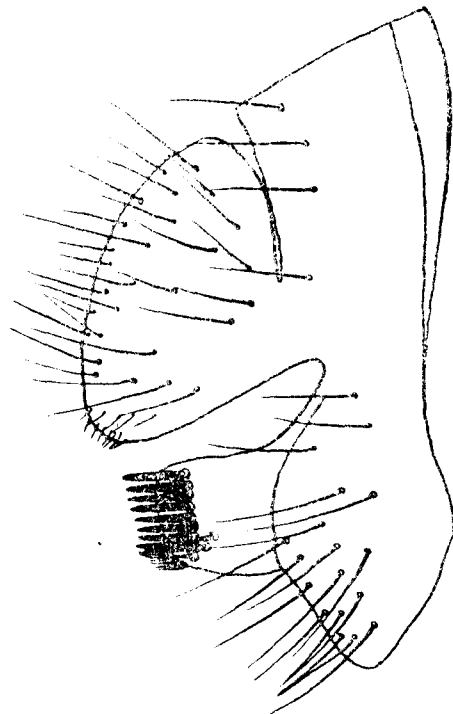


Fig. 44. *D. cheda* Tan, Hsu and Sheng

—抄 錄—

## 韓國產 초파리의 雄性外部生殖器에 對한 研究

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金 鉉 元

〔1962年 7月 20日 接受〕

1. 著者は 韓國產 초파리의 雄性外部生殖器에 依한 系統的 研究를 目的으로 1955年 5月부터 1960年 10月까지 國內 各地(無等山, 智異山, 漢拏山, 蘇利峰, 太白山, 羅州果樹園, 突山島)에서 採集한 6屬 43種에 對하여 外部生殖器 永久標本을 만들어, 系統的 類緣關係를 調查하고 또한 地理的인 變異를 調查하기 爲하여 같은 日本產 或은 歐美產과도 比較하였든바, 相當數의 變異를 發見하였다. 變異型은 "remarks"에 記載하였다.
2. *Leucophenga argentosa*, *L. maculata*, *L. magnipalpis*, *L. ornatipennis*, *Scaptomyza graminum*, *D. nokogiri*, *D. coracina*, *D. suzukii*, *D. nigromaculata*, *D. histrio*, *D. virilis*, *D. lacertosa* 等은 外國產과 뚜렷한 變異를 보여주었다.
3. *Amiota*屬과 *Leucophenga*屬(但 *L. argentosa*는 除外)에 屬한 種은 모두 把握器(clasper)에 齒(teeth)가 없는 것이 뚜렷한 特徵인 것 같다.
4. *Sophophora* 亞屬中 *takahashii*, *montium* species-subgroup에 屬한 種들과 *Drosophila* 亞屬中 *quinaria*, *robusta* species-subgroup에 屬한 種들은 各 group에 따라 共通의 特徵을 가졌음으로 系統的 分類에 좋은 特徵이 되겠다.