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Drosophila Survey of Hokkaido, XVIII. Drosophilidae From Four Localities of Hokkaido

By

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(With 3 Text-figures and 1 Table)

A distributional survey of *Drosophila* has attracted current interest of geneticists and ecologists from the standpoint of population genetics. Since 1949, knowledge on the distribution and ecology of *Drosophila* in Hokkaido has been considerably increased, consequent to the accumulation of available data gathered by several workers in the Makino Laboratory.

Results of extensive collections of drosophilid flies made from 1951 to 1958 have been published by Momma (1957), Takada (1958), and some others, with particular regard to habitats and distribution. In the present paper, the authors wish to report additional data from some ecological surveys of the Drosophilidae made in the following four localities of Hokkaido: (1) Okoppe in the east-northern part of Hokkaido, from the 19th to the 23rd, August, 1959, (2) Okushiri Island in the southern part, from the 4th to the 9th, August, 1960, (3) Utoro in the Shiretoko peninsula, and (4) Habomai in the Nosappu peninsula, from the 16th to the 19th, August, 1961 (Fig. 1).

The authors record special thanks to Professor Sajiro Makino, for reading through this manuscript. They are grateful to Dr. Eizi Momma for his helpful guidance with many important advices, to Dr. Haruo Takada for his valuable aid in identification of the species, to Dr. Yasuko Toyofuku for her kind advice with friendly assistance, and to Messrs. S. Nemoto, Okoppe-Town, T. Matsudaira and A. Katsurada, Utoro Village and T. Goto, for their kind aid in the collection of specimens.

Method of collection: Collections were mostly made by the use of small containers which were baited with fermenting banana and bound with strings to branches of bushes and trees. As the containers, use was made of either dry-milk cans about 660cc in capacity, or paper beer cups about 180 cc in capacity. Flies obtained were readily drawn from the containers by covering them with a vinyl sack. Supplementarily a few species of flies were collected by means of net sweeping in various sorts of vegetation and by being sucked up into a glass pipe from many kinds of grasses and fungi.

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Results with Remarks

A total of 2809 drosophilid flies were obtained in the present collection. They comprised 33 species belonging to 5 genera. The collection records are summarized in Table 1. Most flies of the genus *Drosophila* were attracted to the fermenting fruits.

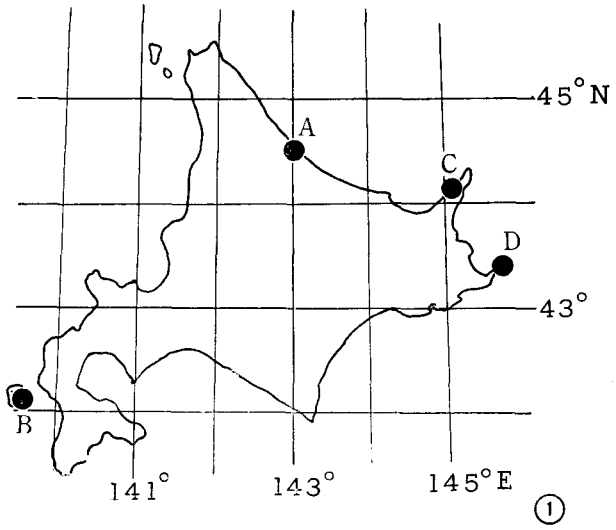

Fig. 1. Map of Hokkaido showing the localities where collections were made. A, Okoppe. B, Okushiri. C, Utoro in the Shiretoko peninsula. D, Habomai in the Nosappu peninusla.

Okoppe: A total of 684 specimens belonging to 21 species and 4 genera were collected. Most of them were *Drosophila bifasciata* (181 specimens, 26.4 per cent), *D. testacea* (158 specimens, 23.5 per cent) and *D. lacertosa* (102 specimens, 15.7 per cent). It is interesting to see that *D. auraria* and *D. nigromaculata* common in Hokkaido occurred at comparatively low frequency in this locality. *Drosophila tenuicauda, D. pengi, Scaptomyza polygonia* and *S. unipunctum*, were rather rare in occurrence, only 6, 11, 1 and 2 specimens, respectively being obtained. *Drosophila ezoana* belonging to the *virilis* group numbered 21 specimens in this collection.

Okushiri Island: A total of 846 flies representing 15 species and 3 genera were obtained. Most specimens among them were *D. auraria* (333 specimens, 39.4 per cent in frequency), *D. lacertosa* (270 specimens, 31.8 per cent) and *D. nigromaculata* (150 specimens, 17.7 per cent). Twenty-six specimens of *Parascaptomyza pallida* were collected by means of net sweeping. One male of *D. okadai*, a rare species, was caught by trap. Six females and four males of *D. auraria* type C were gotten. Supplementary information as to the distribution of *D.*

Table 1. Numerical data of *Drosophila* species in trap collection and net sweeping

Species	Okoppe	Okushiri	Utoro	Habomai	Total
Amiota alboguttata f. furcata	1	1	—	—	2
A. variegata	—	—	7(6)	—	7(6)
Liodrosophila aerea	—	—	12(12)	—	12(12)
Parascaptomyza pallida	9(3)	26(26)	*72*(72)	*92*(*63*)	*199*(164)
Scaptomyza apicalis	4(2)	—	4(3)	—	8(5)
S. graminum	—	—	—	35(32)	35(32)
S. polygonia	1	—	4(3)	15(15)	20(18)
S. unipunctum	2	—	2(2)	—	4(2)
Drosophila sexvittata	—	—	27(26)	—	27(26)
D. trivittata	—	—	*177*(176)	—	*177*(176)
D. histrioides	5(1)	—	1	21	27(1)
D. busckii	1	—	—	—	1
D. coracina	—	3	12	—	15
D. bifasciata	*181*	—	1	5	*187*
D. suzukii	20	18	3	10	51
D. nipponica	—	—	13(13)	—	13(13)
D. magnipectinata	—	—	1(1)	—	1(1)
D. auraria type A	39	*271*(1)	*67*	7(1)	*384*(2)
D. auraria type B	16	52	*65*	10(1)	*143*(*1*)
D. auraria type C	—	10	—	—	10
D. brachynephros	13	2	2	9	26
D. unispina	6	—	—	—	6
D. nigromaculata	24(2)	*150*	*96*(3)	*207*(13)	*477*(18)
D. testacea	*158*(1)	1	*25*	—	*184*(1)
D. histrio	14	—	—	—	14
D. tenuicauda	6(1)	1	1	—	8(1)
D. funebris	12	28	4(2)	—	44(2)
D. immigrans	37	2	—	—	39
D. pengi	11	—	—	—	11
D. virilis	—	8	—	—	8
D. ezoana	21	—	5	3	29
D. sordidula	—	—	8	—	8
D. lacertosa	*103*	*270*	*159*(2)	7	*539*(2)
D. moriwakii	—	2	1	—	3
D. okadai	—	1	*89*	—	90
Total flies	684(10)	846(27)	858(321)	421(125)	2809(483)

Drosophilidae from Okoppe (Aug., 1959), Okushiri (Aug., 1960), Utoro and Habomai (Aug., 1961)

* The numerals in the parentheses denote the number of specimens collected with the use of net sweeping.

auraria type C in Hokkaido was added to its first description by Takada (1960) and Kaneko (1960).

Utoro in the Shiretoko Peninsula: The collection provided 558 specimens in total which represented by 25 species, covering 5 genera. Common species noted were *D. trivittata* (177 specimens, 20.6 per cent), *D. lacertosa* (159 specimens, 18.5

per cent), *D. auraria* (132 specimens, 15.4 per cent), *D. nigromaculata* (96 specimens, 11.2 per cent), *D. okadai* (89 specimens, 10.4 per cent) and *P. pallida* (72 specimens, 8.4 per cent). All of *P. pallida* and the majority of *D. trivittata* were captured by net sweeping from various kinds of grasses and fungi. *Scaptomyza apicalis* (4 specimens), *S. polygonia* (4), *S. unipunctum* (2), *D. magnipectinata* (1) and *D. tenuicauda* (1) were rare species, in this locality. It was noticeable that forty-one females and forty-eight males of *D. okadai* belonging to the *robusta* group were secured. Also, this collection record gave the first occurrence of the genus *Liodrosophila in* Hokkaido. *Drosophila nigromaculata* exhibited an extreme sex-ratio of 0.1.

Habomai in the Nosappu Peninsula: Total 421 specimens were obtained in this locality: they were classified into 11 species and 3 genera. *Drosophila nigromaculata* was the dominant species, showing 207 flies (49.2 per cent), while *P. pallida* ranked next, showing 92 specimens (21.8 per cent). Most specimens of *P. pallida* and *S. graminum* were collected by net sweeping.

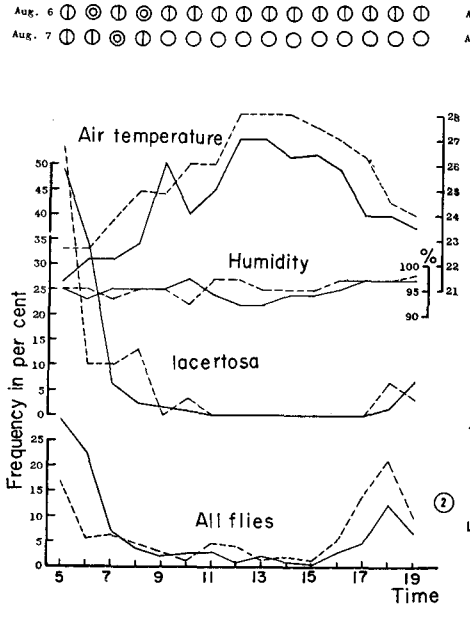

Fig. 2.

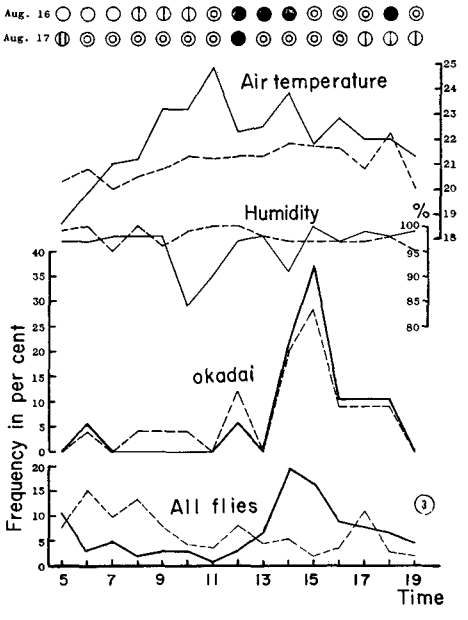

Fig. 3.

Figs. 2–3. Graphs showing the diurnal activity of drosophilid flies, and temperature, humidity and weather. ○; Fine. ◔; Clear. ◍: Hazy. ◎; Cloudy. ●; Rainy.

Fig. 2. The diurnal activity of *D. lacertosa* and all flies collected on fine days at Oku-shiri. Solid lines deal with the data obtained on 6th and dotted lines on 7th of August, 1960.

Fig. 3. The diurnal activity of *D. okadai* and all flies collected on cloudy days at Utoro. Solid lines deal with the data obtained on 16th and dotted lines on 17th of August, 1961.

Notes on diurnal activity: Diurnal behavior of *Drosophila* was preliminarily observed in Okushiri, Utoro and Habomai. It was found that: *Drosophila nigromaculata* showed a bimodal curve with peaks in the morning and evening,with a general similarity to the feature observed on Mt. Daisetsu (Ishihara 1955) and in the City of Sapporo (Wakahama 1957). In Okushiri, however, a unimodal activity was observed with a peak about one hour before sunset. *Drosophila auraria*, in Utoro and Okushiri, displayed a bimodal activity with peaks in the morning and in the evening. *Drosophila lacertosa* showed an activity of bimodal type with a high peak at sunrise and a low one at sunset (Fig. 2). The activity seems to be assigned into type A, according to the classification of diurnal activity of *Drosophila* by Nozawa (1956). *Drosophila okadai* showed a unimodal curve, having a peak at three o'clock in the afternoon (Fig. 3), so far as observations on cloudy days were concerned.

The diurnal activity of all flies in Okushiri and Utoro showed a bimodal curve with two peaks, one in the morning and the other in the eveing (Figs. 2 and 3). A similar behavior was reported by Ishihara (1955) and Shima (1960) in observations in the cities of Sapporo and Iwamizawa, respectively. It seems apparent that the above activity may be controlled by temperature to some extent. The diurnal activity shown in Utoro was rather irregular, but showed somewhat similarity to that in Okushiri. However, the humidity should be considered as a factor which exerts some control over the diurnal activity of flies.

Summary

Collections of drosophilid flies were made in the following four localities of Hokkaido: Okoppe (Aug., 1959), Okushiri (Aug., 1960), Utoro and Habomai (Aug., 1961). A total of 2809 specimens were obtained, by means of traps baited with fermenting fruits or by net sweeping. They were assigned into 33 species belonging to 5 genera. Among them, common species were: *Drosophila bifasciata*, *D. testacea* and *D. lacertosa* in Okoppe, *D. auraria*, *D. nigromaculata* and *D. lacertosa* in Okushiri, *D. sexvittata*, *D. lacertosa*, *D. auraria*, *D. nigromaculata*, *D. okadai* and *Parascaptomyza pallida* in Utoro and *D. nigromaculata* and *P. pallida* in Habomai, respectively. The first record of *Liodrosophila aerea* in Hokkaido was made from Utoro.

The diurnal activity was observed in some common species. Most species were of bimodal type in diurnal behavior, with two peaks, one in the morning and the other in the evening. *Drosophila okadai* exhibited a unimodal activity with a peak at about four hours before sunset.

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