A Preliminary Study on the Ecological Structure of Drosophilid Community in the Quelpart Island, Korea, with a Supplementary Note on the Drosophilid Assemblage on Tree Trunks

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Summary

A total of 59 drosophilid species were reported from the Quelpart Is., including 17 secies new to the Island.

The drosophilid fauna of the Island is not much endemic, closely related both to those of the Korean and Japan.

The community of a secondary broad-leaved forest is essentially composed of two guilds, Canopy-Fruit Feeder Guild and Floor-Fungus Feeder Guild.

D. triauraria occupies a high percentage of the *auraria* complex not only in the Quelpart Is. but also in some adjacent islands such as the Tsushima, but decreases in proportion toward northern mountainous regions of the Korean Peninsula.

Collections on tree trunks brought particular samples characterized by subgenus *Hirtodrosophila*, especially *hirticornis* group, and steganine genera.

The location of the Quelpart Is. is important to consider the faunistic relationship between Japan and the East Asian Continent. Up to the present, several collection records of drosophilid flies from the Island have been reported by Korean researchers(Chung 1955, 1958, Paik & Kim 1957, Kang, Chung & Lee 1959, Lee 1964). However, no studies have been done on its drosophilid community from the standpoint of geographical ecology, which has been recently advaneed by Mac-Arthur and his co-werkers (cf. MacArthur 1972) and is a fruitful field to study the evolution of community structure.

We had an opportunity to make a brief ecological survey on drosophilid community in the Island, and report here some preliminary information on faunistics and ecological structure of the community.

Before going further, we wish to express our sincere thanks to Prof. Sh. F. Sakagami, the Institute of Low Temperature Science, Hokkaido University, for his reading of the manuscript, and also to president Dr. S. M. Pyun and Prof. C. C. Choung of Cheju National University, and Nagasaki Biological Society in supporting our survey in the Island.

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Area Surveyed and Collection Methods

The collections were made in a secondary deciduous broad-leaved forest with admixture of laurels and *Cryptomeria japonica* at Mt. Booriak, Quelpart Is. , for two days on August 12 and 13, 1979.

It has been known that individual drosophilid species inhabit more or less specific environment. In the present study, to survey vertical distribution within forest and characteristic preference for streamside environment, collections were made by using seven "retainer" type I traps (Toda 1977a) baited with grapes and peaches fermented by Baker's yeast. Four traps were set at four different heights, 0.1, 1.5, 4.4 and 8.2*m*, from the ground to the canopy. The highest two were lifted up by a rope hung from a bough of the canopy. The tree tops of the forest were about 10*m* high. Three traps were set at shelters of small cliffs or large rocks along a small rocky stream, which had been dried up on collection. The collections were made only for about 24 hrs. Considering the very short collecting period and the ineffectiveness of "retainer" traps, two open bait traps of cylindrical cans were set on forest floor and at streamside to obtain more samples for faunistic study. These were visited several times during the survey period.

Due to different feeding and breeding habits many drosophilid species are not attracted to fruit traps. Such species were collected on fleshy fungi or by sweeping on forest floor with an insect net. Besides, sweeping collections at shelters of cliffs or rocks and on tree trunks covered with moss brought good samples of many different species. Males of genus *Amiota* flying around human eyes were also captured.

Results and Discussion

In total, 745 specimens of 30 species belonging to seven genera in Drosophilidae were obtained, which are separately presented for each different collection method and habitat in Table 1.

1. Faunal make-up of Drosophilidae in the Quelpart Is.

Up to the present, 42 drosophilid species have been recorded from the Island. Among the 30 species obtained in the present study 17 are new to the Island, of which 6 are also new to Korea. A total of 59 drosophilid species are listed below, together with information of their geographical distributions, which are classified into eleven types : endemic to the Quelpart Is. (E), recorded only from Korea (K), only from Korea and China (KC), only from the Quelpart Is. and Japan (QJ), only from Korea and Japan (KJ), Eastern Asiatic (EA), Southeastern Asiatic (SA), palaearctic (P), Holoarctic (H), Cosmopolitan (C) and others (O). The species new to the Island are marked with *, and those to Korea with **.

** 1. *Amiota* (*Amiota*) *albilabris* (Zetterstedt) P : Korea, Japan, Europe

2. *A.* (*A.*) *chungi* Okada (=*A. albogu-ttata* f. *koreana* Okada & Chung) K

** 3. *A.* (*Phortica*) *okadai* Máca (=*A. va-riegata* Fallèn type A) QJ

4. *Leucophenga* (*Leucophenga*) *maculata* (Dufour) P : Korea, Japan, Taiwan, Europe

* 5. *L.* (*L.*) *orientalis* Lin & Wheeler(=*L. magnipalpis* Duda) EA : Korea, Japan,

Table 1. Drosophilid species collected at various microhabitats in a secondary broad-leaved forest of Mt. Booriak, the Quelpart Is.

Environment and Method	Forest Vertical Distr. 8.2m	4.4m	1.5m	0.1m	Open Bait	Streamside Reta-iner	Open Bait	Forest Fungi Agar.	Aphyl.	F. Floor Swee-ping	Forest Tree Trunks	Strea-mside Rock Shelter	Forest Human Eyes	TOTAL	Relative Percentage L. Limit	Observed	U. Limit	Relative Abun-dance*
Drosophila bizonata	4	—	1	6	34	—	10	73	3	46	1	—	—	178	20.8	23.9	27.0	++
D. triauraria	44	9	16	5	22	9	16	1	—	4	—	—	—	126	14.2	16.9	19.6	++
D. lutescens	21	—	2	3	54	1	6	—	—	—	1	—	—	88	9.4	11.8	14.2	++
D. kangi	—	—	—	—	—	—	—	—	—	2	67	1	—	70	7.3	9.4	11.5	++
D. angularis	1	2	—	5	16	—	3	27	2	13	—	—	—	69	7.2	9.3	11.4	++
D. immigrans	19	2	2	7	23	9	3	—	—	1	—	—	—	66	6.8	8.9	11.0	++
D. unispina	—	—	—	—	—	—	—	28	10	12	—	1	—	51	4.9	6.8	8.7	++
D. sexvittata	—	—	—	—	—	—	—	9	—	6	11	1	—	27	2.2	3.6	5.0	+
Leucophenga orientalis	—	—	—	—	—	—	—	—	1	16	1	1	—	19	1.4	2.6	3.8	+
Drosophila lacertosa	8	2	—	—	5	4	—	—	—	—	—	—	—	19	1.4	2.6	3.8	+
D. sternopleuralis	1	—	—	—	1	—	—	1	—	3	—	—	—	6	0.1	0.8	1.5	±
Amiota albilabris	—	—	—	—	—	—	—	—	—	—	—	—	3	3	0.0	0.4	0.9	±
Drosophila suzukii	—	—	—	—	1	—	—	—	—	1	1	—	—	3	0.0	0.4	0.9	±
Mycodrosophila poecilogastra	—	—	—	—	—	—	—	—	2	—	—	—	—	2	0.0	0.3	0.7	±
My. gratiosa	—	—	—	—	—	—	—	1	1	—	—	—	—	2	0.0	0.3	0.7	±
Drosophila nokogiri	—	—	—	—	—	—	—	—	—	1	—	1	—	2	0.0	0.3	0.7	±
Amiota okadai	1	—	—	—	—	—	—	—	—	—	—	—	—	1	0.0	0.1	0.4	±
Leucophenga ornata	—	—	—	—	—	—	—	—	1	—	—	—	—	1	0.0	0.1	0.4	±
L. sorii	—	—	—	—	—	—	—	—	—	—	1	—	—	1	0.0	0.1	0.4	±
Liodrosophila castanea	—	—	—	—	—	—	—	—	—	1	—	—	—	1	0.0	0.1	0.4	±
Scaptomyza elmoi	—	—	—	—	—	—	—	—	—	1	—	—	—	1	0.0	0.1	0.4	±
Mycodrosophila planipalpis	—	—	—	—	—	—	—	—	1	—	—	—	—	1	0.0	0.1	0.4	±
My. shikokuana	—	—	—	—	—	—	—	—	—	1	—	—	—	1	0.0	0.1	0.4	±
My. subgratiosa	—	—	—	—	—	—	—	—	—	1	—	—	—	1	0.0	0.1	0.4	±
Drosophila auraria	—	—	—	—	—	—	—	—	—	1	—	—	—	1	0.0	0.1	0.4	±
D. collinella	—	—	—	—	—	—	—	1	—	—	—	—	—	1	0.0	0.1	0.4	±
D. macromaculata	—	—	—	—	—	—	—	—	—	—	—	1	—	1	0.0	0.1	0.4	±
D. alboralis	—	—	—	—	—	—	—	—	—	1	—	—	—	1	0.0	0.1	0.4	±
D. tenuicauda	—	—	—	—	—	—	—	—	—	1	—	—	—	1	0.0	0.1	0.4	±
Nesiodrosophila sp.	—	—	—	—	—	—	—	—	—	—	—	1	—	1	0.0	0.1	0.4	±
TOTAL	99	15	21	26	156	23	38	141	21	112	83	7	3	745				
													Mean=25		2.0	3.3	4.6	

* ++ abundant, + common, ± rare

Taiwan

* 6. *L.* (*L.*) *ornata* Wheeler SA : Korea, Japan, Taiwan, philippine, Java, Nepal

* 7. *L.* (*L.*) *sorii* Kang, Lee & Bahng KJ

8. *Microdrosophila* (*Microdrosophila*) *urashimae* Okada KJ

9. *Liodrosophila castanea* Okada & Chung K

10. *Scaptomyza* (*Scaptomyza*) *choi* Kang, Lee & Bahng E

11. *Sc.* (*Sc.*) *graminum* Fallèn H : Korea, Japan, S. Asia, Siberia, Europe, N. America, Africa

12. *Sc.* (*parascaptomyza*) *pallida* (Zetterstedt) C

** 13. *Sc.* (*P.*) *elmoi* Takada O : Korea, Japan, Taiwan, Hawaii

14. *Nesiodrosophila quelpartiensis* (Kang, Lee & Bahng) (=*Drosophila* (*Dichaetophora*) *quelpartiensis*) E

** 15. *Nesiodrosophila* sp. E

16. *Mycodrosophila basalis* Okada KJ

* 17. *My. gratiosa* (de Meijere) (=*My. splendida* Okada) O : Korea, Japan, Taiwan, Micronesia, S. Asia, Polynesia, Seychelles, Africa

* 18. *My. planipalpis* Kang, Lee & Bahng K

* 19. *My. poecilogastra* (Loew) P : Korea, Japan, China, Europe

* 20. *My. shikokuana* Okada KJ

** 21. *My. subgratiosa* Okada QJ

22. *Drosophila* (*Scaptodrosophila*) *coracina* Kikkawa & Peng SA : Korea, Japan, China, Borneo

23. *D.* (*Sc.*) *puncticeps* Okada KJ

24. *D.* (*Sopphohora*) *bifasciata* Pomini P : Korea, Japan, Taiwan, Europe, India

25. *D.* (*So.*) *suzukii* (Matsumura) SA : Korea, Japan, China, India

26. *D.* (*So.*) *lutescens* Okada (=*D. lutea* Kikkawa & Peng) KJ

27. *D.* (*So.*) *melanogaster* Meigen C

28. *D.* (*So.*) *magnipectinata* Okada KJ

29. (*So.*) *auraria* Peng EA : Korea, Japan China

* 30. *D.* (*So.*) *triauraria* Bock & Wheeler (=*D. auraria* Peng C type) KJ

** 31. *D.* (*Lordiphosa*) *collinella* Okada EA : Korea, Japan, Mongolia

32. *D.* (*Hirtodrosophila*) *alboralis* Momma & Takada KJ

33. *D.* (*H.*) *confusa* Staegar (=*D. histrioides* Okada & Kurokawa) P : Korea, Japan, Europe

* 34. *D.* (*H.*) *macromaculata* Kang & Lee KJ

35. *D.* (*H*) *quadrivittata* Okada KJ

36. *D.* (*H.*) *sexvittata* Okada KJ

37. *D.* (*H.*) *trilineata* Chung K

38. *D.* (*H.*) *trivittata* Strobl P : Korea, Japan, Taiwan, Europe

* 39. *D.* (*H.*) *kangi* Okada KJ

40. *D.* (*H*) *nokogiri* Okada KJ

41. *D.* (*Dorsilopha*) *buschii* Coquillett C

42. *D.* (*Drosophila*) *repleta* Wollaston C

43. D. (D.) *Cheda* Tan, Hsu & Sheng *KC*

44. *D.* (*D.*) *lacertosa* Okada SA : Korea, Japan, Taiwan, India, Nepal

45. *D.* (*D.*) *virilis* Sturtevant C

46. *D.* (*D.*) *subtilis*, Kikkawa & Peng EA : Korea, Japan, China

47. *D.* (*D.*) *curviceps* Okada & Kurokawa SA : Korea, Japan, India

48. *D.* (*D.*) *immigrans* Sturtevant C

49. *D.* (*D.*) *testacea* Van Roser H : Korea, Japan, Europe, N. America

50. *D.* (*D.*) *angularis* Okada KJ

51. *D.* (*D.*) *brachynephros* Okada SA : Korea, Japan, India

52. *D.* (*D.*) *unispina* Okada KJ

53. *D.* (*D.*) *kuntzei* Duda P : Korea, Japan, Europe

54. *D.* (*D*) *nigromaculata* Kikkawa & Peng

KJ

55. *D.* (*D.*) ***bizonata*** Kikkawa & Peng O : Korea, Japan, Hawaii
56. *D.* (*D.*) ***histrio*** Meigen P : Korea, Japan, China, Europe
57. *D.* (*D.*) ***sternopleuralis*** Okada & Kurokawa KJ
58. *D.* (*D.*) ***grandis Kikkawa*** & Peng KJ
" 59. *D.* (*D.*) ***tenuicauda Okada*** KJ

Judging from the relatively high percentage (28.8%, 17/59) of the species newly recorded in the present study, the above list is supposed to be still rather incomplete. More species are expected to be recorded from the Island by further surveys. Despite of such a limitation, the drosophilid fauna of the Island is hypothetically characterized as follows. The KJ species occupy a large part of the fauna (20 spp. 33.9%), followed by P (8 spp. 13.6%), SA (6 spp. 10.2%), C (6 spp. 10.2%), K (4 spp. 6.8%), EA (4 spp. 6.8%), E (3 spp. 5.1%), O (3 spp. 5.1%), QJ (2 spp. 3.4%), H (2 spp. 3.4%) and KC (1 spp. 1.7%). Considering the location of the Island between the Korean peninsula and Japan, the fauna is divided into five elements. The first is the continental element (K+KC, 5 spp. 8.5%). The second is of Japan and Pacific islands, composed of three species (5.1%), two QJ and SC, elmoi (O), all of which were newly recorded from the Island in the present study. Of the three, however, *A. okadai* may be possibly distributed also in the Korean Peninsula, because in Japan it had been cited as *A. variegata* (Fallèn 1823), the name of which has been also seen in the lists of Korean drosophilid species, but was described as a good species of the *variegata* complex by Máca in 1977. Therefore, the percentage of this element may be somewhat reduced. The third is the element common to both areas, composing the majority of the fauna (KJ+EA+SA+P+H+two O, 42 spp. 71.2%). In addition to these three elements, the other two, endemics (E) and cosmopolitans (C), contribute to the fauna. In conclusion, the drosophilid fauna of the Island is not much endemic and related so closely both to those of the Korean Peninsula and of Japan, though a little more to the former, that the majority is composed of the species common to both areas.

2. Ecological structure of drosophilid community

In principle it is impossible to evaluate reliably the relative abundance of each component species in natural drosophilid community from the samples obtained by different methods, because the efficien-cies to extract samples from natural populations are incomparable among different kinds of methods. In spite of such a limitation, it is not absolutely meaningless to assume that the relative precentages expressed in the total sample represent natural conditions to some extent. Therefore, the relative abundances of component species are evaluated into three classes, abundant, common and rare, in the following way. The 95% confidence limits of relative percentage are given by the Sakuma's (1964) formula.

$$\{n/N \pm 2\sqrt{n(N-n)/N^3}\} \times 100,$$

where N=total individual number and n= individual number of a species. Next, the limits of the mean percentage can be calculated in the same way by using the mean individual number (n=N/S, where S=total species number) instead of n. In comparison between the percentage range of each species and that of the mean, the species is regarded to be abundant when the lower limit of the former exceeds the higher one

of the latter, common when the two ranges overlap, and rare when opposite to the case of "abundant". As shown in Table 1, seven species are regarded to be abundant, corresponding to 23.3% of the total species number and occupying 87.0% of the total individual number, three species are common (10.0% in species number and 8.7% in individual number), and the remaining twenty species rare (66.7% and 4.3%).

As mentioned in the descriptions of methods, the different results obtained by various methods represent the species-specific ecology of drosophilid flies. From the results of collections by retainer traps set vertically from the ground to the canopy, the species are classified for their vertical habitat preferences within the forest into two types, the canopy and floor dwellers. The former includes *D. triauraria*, *D. lutescens*, *D. immigrans* and *D. lacretosa*, while the latter does *D. angularis* and probably *D. bizonata*. Although the trap collections along a rocky stream, which had, however, been dried up on collection, were not so fruitful, *D. triauraria*, *D. immigrans*, *D. bizonata*, *D. lutescens* and *D. lacertosa* were collected in moderate numbers. The results of collections on fleshy fungi at forest floor are separately shown for Agaricales and Aphyllophorales fungi in Table 1. The two afore mentioned floor dwellers were frequently collected on Agaricales, together with two other fungivorous species, *D. unispina* and *D. sexvittata*, which were never collected by fruit traps. The collections on Aphyllophorales brought the results somewhat different from those on Agaricales. The samples included the species of two genera other than genus *Drosophila*, *Leucophenga orientalis*, *L. ornata*, *Mycodrosophila poecilogastra*, *My. gratiosa* and *My. planipalpis*. The collections by sweeping on forest floor were the most fruitful in number of species (18 spp.), presumably reflecting the variety of microhabitats. But, the majority of the sample was composed of fungivorous species referred to above. We obtained a quite particular sample on tree trunks covered with moss, which consisted mainly of *D. kangi* together with *D. sexvittata*. This particular microhabitat is referred to later in comparison with the results of other localities. The collections at shelters among huge rocks beside a dried-up stream brought *D. macromaculata* and *Nesiodrosophila* sp., together with some fungivorous species, though only one specimen for each species. Three male specimens of *A. albilabris* were caught when flying around human eyes.

Based upon the results obtained, though incomplete in sample size and by restriction not only to a part of the whole habitat spectrum in the Island but also to a very short period of a particular season in the drosophilid annual life cycle, the ecological structure of the community in a secondary broad-leaved forest of the Island is hypothetically sketched out in Table 2 by arranging each component species within a bi-dimensional ecological niche space with regard to habitat and food habit. As for information on the latter, only the fungus feeding habit was directly confirmed in the present study, as shown with *. Therefore, the food habits of other species were assumed to be similar with those observed in other localities, though the local variation is obviously possible. The community is essentially composed of two guilds, Canopy-Fruit Feeder Guild and Floor-Fungus Feeder Guild. The latter involves many species not only of genus *Drosophila* but also of *Mycodrosophila*. But the tendency of resource partitioning among them was in part observed for fungus species between Agaricales and Aphyllophorales, as mentioned above. The assemblage at a dried-up streamside does not involve characteristic inhabitants but

is just of a mixture between the two guilds. Two other minor microhabitats, mossy tree trunks and rock shelter, are respectively characterized by their own particular species compositions.

Tabel 2. Ecological structure of drosophilid community in secondary broad-leaved forest

Microhabitat / Food Habit	Canopy	Streamside (dried up)	Floor	Mossy Tree Trunks	Rock Shelter
Fruit Feeder	*D. triauraria*	*D. triauraria*	(*D. suzukii*)		
	D. lutescens	*D. lutescens*	(*D. auraria*)		
	D. immigrans	*D. immigrans*			
Tree Sap Feeder	*D. lacertosa*	*D. lacertosa*			
	(*A. okadai*)				
Fungus Feeder		*D. bizonata**	*D. bizonata**	*D. kangi*	(*D. macromaculata*)
			*D. angularis**		
			*D. unispina**		
			*D. sexvittata**	*D. sexvittata**	
			*L. orientalis**	(*L. sorii*)	
			(*D. sternopleuralis**)		
			(*My. poecilogastra**)		
			(*My. gratiosa**)		
			(*D. nokogiri*)		
			(*L. ornata**)		
			(*My. planipalpis**)		
			(*My. shikokuana*)		
			(*My. subgratiosa*)		
			(*D. collinella**)		
			(*D. alboralis*)		
Herbage Feeder			(*Sc. elmoi*)		
			(*D. tenuicauda*)		
Unkown	(*A. albilabris*) ?		(*Li. castanea*)		(*Nesiodrosophila sp.*)

* confirmed directly for its food habit. Relative abundance : **abundant**, common, (rare).

In comparison with that detected in Hokkaido northern Japan (Toda 1977b, Minami et al. 1979), the ecological structure of drosophilid community in the Island is characterized by the prosperity of Forest Floor-Fungus Feeder Guild. In Hokkaido the Guild includes somewhat less species, particularly in *Mycodrosophila*, though not so minor in comparison with other guilds, but basically similar to that of the Quelpart Is. with common components such as *D. unispina* and ecological counterparts such as *D. testacea* to *D. bizonata* and *D. brachynephros* to *D. angularis*. A marked difference is seen in the forest canopy dwellers. In the Island those are

mainly composed of fruit feeders, while in Hokkaido of tree sap feeders. But also in Hokkaido, together with wild species feeding on tree saps *D. lutescens* and *D. immigrans* are found in the canopy of natural forests at least in autumn, when they increase their population sizes and invade natural environments from human habitations. The case of *D. triauraria* occupying forest canopy in the Island is quite peculiar, because the habitat of this species has been reported to be open grassland (Kimura & Toda 1976, Minami 1979) and never recored from the forest canopy in Hokkaido. Although it is uncertain whether this species inhabits not only forest canopy but also open grassland in the Island, the present result at least indicates the habitat preference of its population in the Island quite different from that in Hokkaido. Another peculiarity of the habitat preference is the case of *D. lacertosa*. Being a member of typical streamside dwellers, it seldom invades forests remote from streams in Hokkaido (Beppu 1979). Even if it does rarely, it attains the subarboreal layer but never the canopy (Toda 1977b). The cace observed in the Island could be considered to be a kind of ecological niche shift or expansion, which may or may not be cauesd by the paucity of other tree sap feeders in forest canopy. It has been reported that the species of genus *Amiota* are exclusively confined to the forest canopy in northern temperate regions (Basden 1953, Toda 1977b). In the present study only one specimen of *A. okadai* was collected from the canopy. It can not be concluded whether the present result represetns the real paucity of this genus in the forest canopy or attributes only to the insufficient sampling restricted to a very short period.

Remarks

1. Local variation of relative abundances among three species of the *auraria* complex

Three species, *D. auraria*, *D. biauraria* and *D. triauraria*, which had previously been treated as three races, A, B and C respectively, of *D. auraria*, compose a group of sibling species, the *auraria* complex, together with the other species, *D. quadraria*, in Taiwan. In relation to their evolution, they have been well studied cytogenetically (Kurokawa 1960, etc., Lee 1972, etc.). Further, their ecological differentiation was reported for the habitat segregation by Kurokawa (1967), that is, *auraria* inhabits near human habitations, *biauraria* mountain forests remote from human habitations, and *triauraria* areas intermediate between the two with its population size smaller than those of the other two. Recently, several cases discordant with the Kurokawa's result have been found for habitat preference and relative abundance of *triauraria* (Kimura & Toda 1976, Toda 1981). Although the present result must be biased from natural conditions because the area surveyed includes neither human habitations nor grassland, *triauraria* occupied an unusually high percentage of the complex (99.2%), whereas only one specimen (0.8%) of *auraria* and none of *biauraria* were collected. Such an excessive percentage of *triauraria* was also reported from the Tsushima Is. (Toda 1981) located in the similar biogeographical situation between the Korean Peninsula and Kyushu. Therefore, in order to investigate whether such a high percentage of *triauraria* is biogeographically significant or not, previous data obtained at several islands

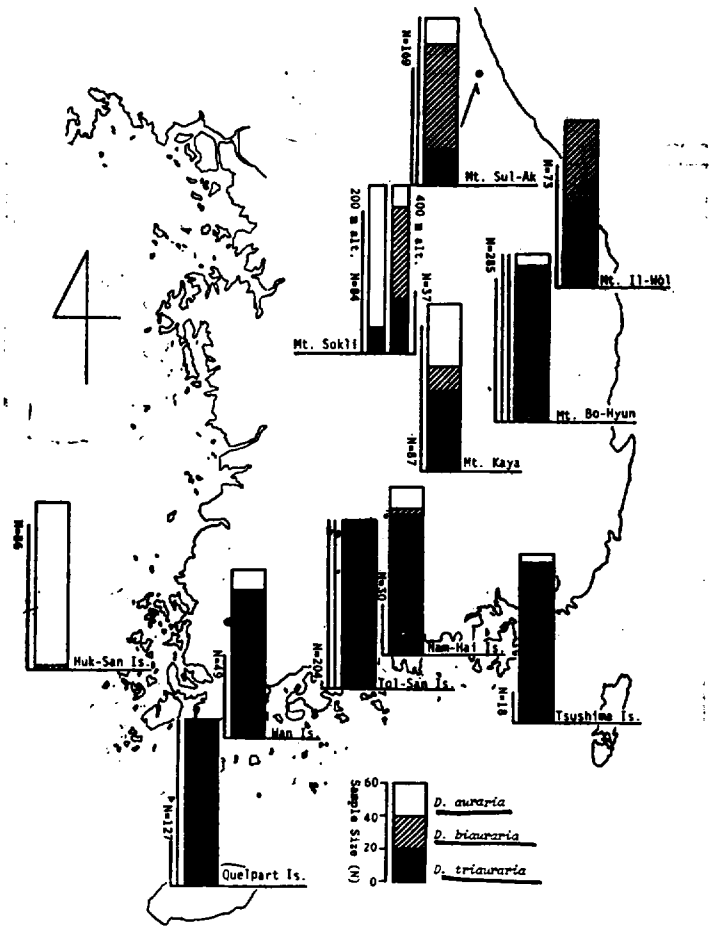

Fig. 1. Relative abundances of the *auraria*-complex species at several localities in Korea and on Tsushima Is.

just south of the Korean Peninsula are reviewed and shown in Fig. 1, together with those at the Quelpart Is., the Tsushima Is. and sevearl localities in the Peninsula. Although the sample sizes vary among localities (N=18 to 285), and further, the percentage ratios resulted from the samples must be more or less biased in the extent to which the whole habitat spectrum of the *auraria* complex was covered in collections, *triauraria* is much frequent at three islands just south of the Peninsula like as in the Quelpart Is. and the Tsushima Is. It tends to decrease with the latitude, while *biauraria* tends to behave oppositely in northern mountainous regions. *Auraria* shows the minority in the relative abundances in the complex all over the range concerned, except for the Huk-San Is. located somewhat remote west of the Peninsula and lowland of Mt. Sokli.

Table 3. Drosophilid flies collected on tree trunks at two localities, the Quelpart Island and Hokkaido

Locality Kinds of Tree Trunks	Quelpart Is. Mossy Total(♀♀/♂♂)	Hokkaido Mossy	Decayed Bark	Underside of Fallen Trees	TOTAL
D. kangi	67(31/36)	–	–	–	–
D. sexvittata	11(3/ 8)	324(131/193)	11(7/ 4)	2(1/ 1)	337(139/198)
L. sorii	1(0/ 1)	–	–	–	–
L. orientalis	1(0/ 1)	–	1(1/ 0)	–	1(1/ 0)
D. suzukii	1(1/ 0)	–	–	–	–
D. lutescens	1(1/ 0)	–	–	–	–
D. bizonata	1(0/ 1)	–	–	–	–
D. nokogiri	–	36(22/ 14)	2(0/ 2)	25(14/11)	63(36/ 27)
D. trivittata	–	57(35/ 22)	5(3/ 2)	–	62(83/ 24)
D. testacea	–	12(8/ 4)	1(1/ 0)	1(1/ 0)	14(10/ 4)
L. quinquemaculipennis	–	4(3/ 1)	6(0/ 6)	–	10(3/ 7)
D. confusa	–	7(3/ 4)	3(0/ 3)	–	10(3/ 7)
A. trifurcata	–	–	8(6/ 2)	–	8(6/ 2)
Amiota(Amiota) spp.♀	–	2(2/ -)	3(3/ -)	1(1/ -)	6(6/ -)
D. imaii	–	6(3/ 3)	–	–	6(3/ 3)
D. biauraria	–	4(2/ 2)	1(1/ 0)	1(0/ 1)	6(3/ 3)
D. brachynephros	–	1(0/ 1)	3(2/ 1)	–	4(2/ 2)
Au. leucopeza	–	3(1/ 2)	–	–	3(1/ 2)
D. unispina	–	2(1/ 1)	1(0/ 1)	–	3(1/ 2)
A. conifera takadai	–	–	2(0/ 2)	–	2(0/ 2)
A. furcata ♂	–	–	–	2(-/ 2)	2(-/ 2)
D. collinella	–	2(1/ 1)	–	–	2(1/ 1)
D. moriwakii	–	2(1/ 1)	–	–	2(1/ 1)
Diastata vagans	–	1(0/ 1)	–	–	1(0/ 1)
A. trochlea ♂	–	–	1(-/ 1)	–	1(-/ 1)
Leucophenga sp. 4	–	1(0/ 1)	–	–	1(0/ 1)
St. longifibula	–	–	1(1/ 0)	–	1(1/ 0)
St. ctenaria	–	–	1(0/ 1)	–	1(0/ 1)
Stegana sp. 1	–	1(1/ 0)	–	–	1(1/ 0)
Stegana sp. 2	–	–	–	1(1/ 0)	1(1/ 0)
Sc. consimilis	–	1(0/ 1)	–	–	1(0/ 1)
D. bifasciata	–	1(0/ 1)	–	–	1(0/ 1)
D. nigromaculata	–	1(1/ 0)	–	–	1(1/ 0)
TOTAL	83(36/47)	468(215/253)	50(25/25)	33(18/15)	551(258/293)

2. Drosophilid flies on tree trunks

Without giving actual data, Throckmorton (1975) pointed out tree trunks as an important microhabitat to collect some drosophilid species, especially of subfamily Steganinae. In Table 3 the result at the Quelpart Is. is presented in comparison with the data obtained at three localities, Toya, Koryukozan and Misumai, of central Hokkaido, northern Japan, in August, 1978. The data at Hokkaido are separately shown for three different kinds of tree trunks, those covered with moss, those with decayed bark, and underside of fallen rete trunks. The samples at both localities are common in the abundance of *Hirtodrosophila* species accompanied with the species of *Leucophenga*, i.e., *D. kangi*, *D. sexvittata*, *L. sorii* and *L. orientalis* for the Quelpart Is., and *D. sexvittata*, *D. nokogiri*, *D. trivittata*, *D. confusa*, *L. quinquemaculipennis*, *L. orientalis* and *Leucophenga* sp. 4 for Hokkaido. Among these species, *D. kangi* and *D. nokogiri* belong to the same species group, *hirticolnis* group, and are usually quite rare in samples by other collection methods. They could be considered the ecological equivalents between the two localities, characterizing tree trunks as a particular drosophilid microhabitat. Besides, the samples at Hokkaido include many species of steganine genera, *Amiota* and *Stegana*, as pointed out by Throckmorton (loc. cit.). It is the first record for females of subgenus *Amiota* to be collected on natural organic substance other than artificial fruit baits, indicating circumstantial evidence of their breeding on decayed bark. The same possibility might be suggested for the species of *Stegana*. As described above, the drosophilid assemblage on tree trunks is mainly composed of fungivorous *Hirtodrosophila* species, together with those of *Leucophenga* and subgenus *Drosophila*. The percentage of such fungivors attains 71.4% in spceies number and 97.6% in individual number for the sample of the Quelpart Is., and 72.1% and 91.5% respectively for that of Hokkaido. Although the actual breeding of these fungivorous species and steganine species has never been confirmed on tree trunks, they not only rest there but also are supposed to depend on microorganisms inhabiting such a particular microenvironment, especially decayed bark, as their food resource.

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〈國文抄錄〉

濟州島에 있어서 樹枠部位別에 따른 초파리群에 관한 硏究

1979年 8月 12日과 13日에 大韓民國 濟州島에서 초파리相의 豫備調査를 한 結果 短期間이기는 하나 濟州島産 초파리 59種이 採集된 中 未記錄種 17種이 採集되었기로 그 List를 報告하는 바이다.

1. 濟州島의 초파리相은 固有率은 낮으나 韓國 및 日本과 극히 가까운 關係가 있음을 나타내었다.

2. 調査를 한 廣葉樹林의 초파리 群集은 基本的으로 林冠에서 果實을 먹는 集團과 林床에서 버섯類를 먹는 集團에 依하여 構成되어 있다.

3. *auraria* complex 中 *D. triauraria*은 濟州島, 對馬島 및 隣近의 諸島에서 特히 높은 相對頻度를 나타내었으나 韓國의 山岳地帶에서는 減少되는 傾向이 나타났다.

4. 樹幹部에서 採集된 것은 subgenus *Hirtodrosophila* 特히 *hirticornis* group 및 subfamily Steganinae에 依하여 特徵지어지는 獨特한 種構成을 나타내었다.