Watabe, H. Hokkaido University of Education, Sapporo, Japan. A preliminary note on the drosophilid flies collected at timberyards in northern Japan.

A number of drosophilids have been hitherto known to utilize tree sap fluxes and rotting barks as their feeding and breeding substrates. As often as I have opportunity, I have collected drosophilid flies at timberyards in northern Japan since 1979. Here, I preliminarily report the drosophilid fauna of five different timberyards. Flies were collected at a timberyard in Sakata (SK; 39°N, 140°E) and Kiyokawa (KY; 39°N, 140°E) in the Tohoku district, and Jyozankei (JY; 43°N, 141°E), Hobetsu (HB; 43°N, 142°E) and Ashoro (AS; 43°N, 143°E) in the Hokkaido district. Collections were made by net-sweeping and direct aspirating on logs and fallen barks. Fruit-traps were also used at SK and AS. Except for Sakata facing the Sea of Japan, all timberyards are in the mountainous region.

The common kind of logs accumulated at timberyards of Hokkaido are coniferous tree **Picea jezoensis, Abis sahalinensis,** larch **Larix leptolepsis, Kalopanax pictus,** linden tree **Tilia japonica,** oak **Quercus mongolia** var. **grosseserrata,** white birch **Betula platyphylla** and **Cercidiphyllum japonicum,** and those at KY are Japanese cedar **Cryptomeria japonica** and beech **Fagus crenata.** Although I could not identify the tree species at SK, most logs are coniferous trees, some of which have been transported from foreign countries, e.g., USSR.

A total of 1683 specimens were collected, belonging to 5 genera and 32 species. Table 1 shows the common species in each collection locality. The remaining species are as follows: **D.nigromaculata** at AS (1♂, 4♀♀), **D.brachynephros** at HB (1♂), **D.curvispina** at AS (1♀), **D.testacea** at JY (3♂♂, 3♀♀), HB (1♀) and AS (3♀♀), **D.hydei** at SK (1♀), **D.melanogaster** at SK (1♂), **D.subauraria** at AS (2♂♂, 1♀), **D.lutescens** at KY (1♀), **D.clarofinis** at AS (1♀), **D.makinoi** at JY (1♀), **D.alboralis** at JY (1♂), **D.busckii** at SK (1♀), KY (1♀) and HB (1♂), **D.collinella** at AS (1♀), **Scaptomyza pallida** at JY (2♂♂, 2♀♀), **Sc.consimilis** at JY (8♂♂, 7♀♀) and AS (1♀), **Amiota okadai** at JY (1♀), and **Leucophenga** sp. at SK (1♀). As breeding sites for drosophilid flies, four types of substrates, slime fluxes, fleshy fungi, fermenting fruits and decayed leaves, have been known in northern Japan (Kimura et al. 1977). Most species shown in Table 1, all members of the **virilis** and **robusta** groups, **D.bifasciata** and four species of **Chymomyza,** utilized decayed barks as their feeding and/or breeding sites. During the survey, the breedings were confirmed in **D.virilis** (SK), **D.kanekoi** (HB, AS), **D.lacertosa** (KY, JY), **D.moriwakii** (JY, AS) and **D.busckii** (KY). Many larvae, probably of **Chy. caudatula,** were also found in barks of relatively new logs at KY.

Table 1. Drosophilid flies collected at timberyards in northern Japan.
(* = numbers in parentheses represent number of males and females, respectively.)

Locality Date:	Sakata Jun 24-26	Kiyokawa Jun 27-29	Jyozankei May 5-Nov 3	Hobetsu Jul 27-29	Ashoro May 21-24 Jul 9-11
Genus **Drosophila**:					
the **virilis** sp.-group					
D.virilis	58(34,24)*	--	--	--	--
D.lummei	3(1,2)	--	--	--	--
D.kanekoi	2(1,1)	3(2,1)	--	6(3,3)	79(27,52)
D.ezoana	--	--	14(11,3)	10(4,6)	133(93,40)
the **robusta** sp.-group					
D.lacertosa	--	19(10,9)	2(2,0)	6(3,3)	40(24,16)
D.moriwakii	--	--	151(111,40)	--	163(79,84)
D.sordidula	--	--	2(2,0)	--	--
D.okadai	--	--	28(23,5)	--	7(4,3)
D.neokadai	--	--	7(3,4)	--	--
the **melanogaster** sp.-group					
D.auraria	10(3,7)	4(3,1)	--	10(6,4)	6(2,4)
the **obscura** sp.-group					
D.bifasciata	--	--	4(3,1)	--	14(5,9)
Genus **Chymomyza**:					
Chy. caudatula	--	60(30,30)	113(103,10)	251(205,46)	22(14,8)
Chy. costata	--	--	11(6,5)	31(23,8)	21(13,8)
Chy. fuscimana	--	--	110(95,15)	84(73,11)	81(71,10)
Chy. distincta	--	--	46(41,5)	17(16,1)	3(3,0)

It is difficult to compare quantitatively the samples between the timberyards, because the same sample unit has not been used for every collection. However, a few characterisitcs for the distribution of several species were noticeable. **D.virilis,** the well-known domestic species, has not been collected at any timberyards of Hokkaido, although its large populations have been found at breweries of Hokkaido.

This is probably due to low temperatures during the winter of Hokkaido. Conversely, **D.ezoana** has not been collected at the timberyards of Tohoku. **D.kanekoi,** a recently found species, is most widely distributed among the members

Table 2. Seasonal changes in the number of individuals collected at the Jyozankei timberyard in northern Japan.

Month	May	Jun	Jul	Aug	Sep	Oct
D.ezoana	13	1	--	--	--	--
D.moriwakii	138	12	1	--	--	--
D.okadai	25	3	--	--	--	--
Chy.caudatula	7	--	103	3	--	--
Chy.costata	--	--	4	4	3	--
Chy.fuscimana	--	--	74	27	8	1
Chy.distincta	--	--	42	4	--	--

of this group. **D.lummei** was described from Finland (Hackman 1972), who remarks that it has an extensive eastward distribution. To date in Japan, the collection records of **D.lummei** are almost restricted to timberyards in the western part of Tohoku, although the detailed information is still poor. Furthermore, as mentioned above, some logs at the SK timberyard are imported from USSR. These facts suggest that the Tohoku district might be a marginal zone for the distribution of **D.lummei**, or that its SK individuals might have colonized with logs from the Eurasian Continent. In the **robusta** group and the genus **Chymomyza**, **D.lacertosa** and **Chy. caudatula** were the most widely distributed species, respectively.

To study seasonal fluctuations of drosophilids at a timberyard, periodical collections were made at weekly intervals from May 5 to November 3 in 1979, at Jyozankei near Sapporo. The **virilis** group, the **robusta** group and **D.bifasciata** have been collected exclusively in spring (Table 2).

This is due to the dessication of logs during the summer, so that these flies would withdraw into surrounding forests in this season. Compared to these species, the adults of **Chymomyza**, except for **Chy. caudatula**, began to appear about two months later, which would depend upon differences in the life cycles between the species. Like a majority of drosophilids distributed in the Holoarctic region, the **virilis** group and the **robusta** group spend the winter in the adult stage, while **Chy. costata** and **distincta** are known to commit larval diapause (Watabe & Beppu 1977; Enomoto 1981; Lumme & Lakovaara 1983). Therefore, the adults of **Chymomyza** appear in late June to early July in Hokkaido. Judging from the phenological data, it seems that **Chy. fuscimana** would be also a larval diapause species.

At last, an excess of **Chymomyza** males in the samples taken is remarkable. This has relation to behavior of males. The males of **Chymomyza** appeared twice in a day, morning and evening, on the cut end of logs, and exhibited complex and species-specific courtships, e.g., active walking, wing scissoring and foreleg swinging. On the other hand, most females usually remained resting near the edge of logs. Therefore, the males could be captured more effectively in the collection using the insect net or an aspirator. Such a bias of the sex ratio is not true in the natural populations of **Chymomyza**, of course.

References: Enomoto, O. 1981, Low Temp. Sci. Ser. B 39:21-29; Hackman, W. 1972, Notul. Ent. 52:89-92; Kimura, M.T., M.J. Toda, K. Beppu & H. Watabe 1977, Kontyu 45:571-582; Lumme & Lakovaara 1983, in:Genetics and Biology of Drosophila 3d (Ashburner et al., eds.) 171-220; Watabe, H. & K. Beppu 1977, J. Fac. Sci. Hokkaido Univ. Ser. IV 20:611-620.

Williamson, R.L. and A.D. Riggs. Beckman Research Institute (City of Hope), Duarte, California USNA. 5-Aza-2′-deoxycytidine does not cause recessive lethal mutations in **Drosophila melanogaster.**

In mammalian cells, 5-aza-2′-deoxycytidine (5-AzaCdR) at relatively low concentrations (less than 10 μM) will often efficiently cause somatically heritable changes in cellular phenotype (reviewed in Riggs & Jones 1983). This analog is thought to function by preventing the formation of 5-methylcytosine. Present evidence suggests that 5-AzaCdR is not a significant mutagen for mammalian cells in culture (Landolph et al. 1982; Jones 1984; Olsson & Forchhammer 1984; Kerbel et al. 1984; Delers et al. 1984), but nevertheless, may be a carcinogen (Carr et al. 1984). Drosophila has been reported not to contain detectable 5-methylcytosine (Urieli-Shoval et al. 1982), although a recent report indicates that Drosophila may contain this modified base at very low levels (Achwal et al. 1984). It is possible that only the germ cells of the adult contain 5-methylcytosine. For these reasons, we thought it would be interesting to see if 5-AzaCdR was toxic, mutagenic, or would affect fertility in Drosophila. Our test for the mutagenic effect of 5-AzaCdR was modified from the standard design of Muller (1928), but used a lethal-bearing FM6 chromosome, designated l(FM6), in place of ClB. Virgins for the cross were derived from Canton-S male and l(1)J1/l(FM6) parents.

Feeding experiments with 5-AzaCdR were unsuccessful; therefore, Canton males were injected with 0.1 μl of Drosophila Ringers solution (Ephrussi & Beadle 1936), either with or without 5 mg/ml 5-AzaCdR (Sigma). Solutions were made fresh prior to injection.

DADE 5-μl Accupettes that had been drawn to fine needles with a pipette puller were used for the injections. A graph-paper scale was glued to a short segment of fine polyethylene tubing and a lengthwise