

s36-s37; Tomimura, Y., M. Matsuda, and Y.N. Tobari 1993, In: *Drosophila ananassae*. *Genetical and Biological Aspects*, (Tobari, Y.N., ed.), pp.139-151.

Table 2. Number of strains with impaternal females in various species of the *ananassae* complex.

Species	Locality	No. of tested strains (No. of females tested)	No. of strains with impaternal females
<i>ananassae</i>			
	Nairobi, Kenya (L)	1 (17)	0
	Kandy, Sri Lanka (C)	2 (61)	0
	Coinbatore, India (D)	2 (59)	0
	Hyderabad, India (HYD)	1 (21)	0
	Bukit Timar, Singapore (W)	2 (73)	0
	Chiang Mai, Thailand (B)	1 (27)	0
	Kuala Lumpur, Malaysia (X)	2 (23)	0
	Sandakan, Malaysia (S)	1 (10)	0
	Palawa, Philippines (R)	1 (16)	0
	Los Banos, Philippines (Q)	3 (77)	0
	Australia (AUS)	1 (25)	0
	Guam (GUM)	2 (45)	0
	Lae, Papua New Guinea (LAE)	1 (20)	0
	Port Moresby, Papua New Guinea (POM)	2 (101)	0
	Ponape, Caroline Islands (PNI)	2 (111)	0
	Tongatapu, Tonga	1 (10)	0
	Vava'u, Tonga (VAV)	1 (15)	0
	Pago Pago, Samoa (PPG)	1 (41)	0
<i>pallidosa</i> -like			
	Wau, Papua New Guinea	2 (78)	0
	Lae, Papua New Guinea	3 (94)	1
<i>pallidosa</i>			
	Lautoka, Fiji (NAN)	4 (162)	0
Taxon K			
	Kotakinabalu, Malaysia	2 (69)	0
<i>papuensis</i> -like			
	Wau, Papua New Guinea	2 (78)	0
	Lae, Papua New Guinea	2 (43)	0

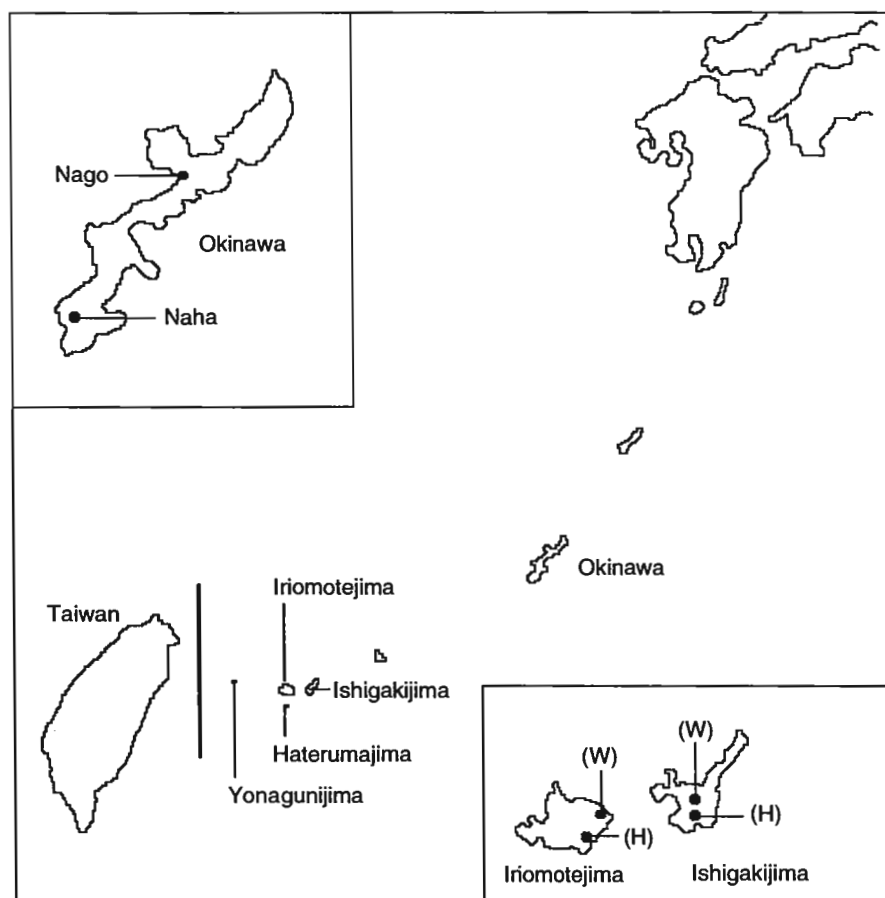
Strains, species, and symbol of locality were described in detail by Tomimura *et al.* (1993)

Distribution of *Drosophila* in Okinawa and Sakishima Islands, Japan.

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Distribution of *Drosophila* flies in six islands of Okinawa prefecture of Japan had been surveyed in 1980's and 1990's from ecological and biogeographical viewpoints. Flies were collected using banana bait traps, within seven days after trap setting. At an exceptional site in Nago, Okinawa, flies were collected by sweeping over the garbages around pineapple yard. Figure 1 shows the collection sites of Okinawa and Sakishima islands (Miyakojima, Ishigakijima, Iriomotejima, Haterumajima and Yonagunijima). Flies were classified into one *Phorticella* and 21 *Drosophila* species according to Okada (1987). In his paper,

Figure 1. Collection sites of *Drosophila* in Okinawa and Sakishima islands (Miyakojima, Ishigakijima, Iriomotejima, Haterumajima and Yonagunijima). (H) and (W) show the sites of human habitation and wild forest, respectively.



Scaptodrosophila is categorized as the subgenus of *Drosophila*. But now it is in an independent genus (Grimardi, 1990). Two *Scaptodrosophila* species from Iriomotejima are not described in Okada (1987).

Table 1 shows the results of fly collection near human habitation of Okinawa and Miyakojima in 1982 and 1983. In a total of 1928 flies, 11 species were found in the Okinawa and Miyakojima. The most abundant species was *D. bipectinata*, followed by *D. melanogaster*, *D. takahashii* and *D. ananassae*. The collection of *D. simulans* and *D. triauraria* is a new record of distribution in Okinawa prefecture, although the colonization of *D. simulans* in Miyakojima had already reported in Watada *et al.* (1986). The new distributional record of *D. triauraria* is biogeographically important, since the closely related species, *D. quadraria* is reported from Taiwan. They have neither significant genetic divergence at the protein level nor reproductive isolation (Ohnishi *et al.*, 1983; Kimura, 1987). The new record of *D. triauraria* in Okinawa island supports the idea that *D. quadraria* may be a geographical race of *D. triauraria* (Kimura, 1987). Additionally, *D. quadraria* might be a founder of *D. triauraria*, because *D. quadraria* had never been collected after a single female collection in Taiwan.

A further survey of *Drosophila* had been made in Okinawa and five Sakishima islands from 1996 to 1999. In Ishigakijima, Iriomotejima and Haterumajima, flies were collected in human habitation (H) and natural forest (W). Table 2 shows collection sites, date and the results of fly number in Okinawa and five Sakishima islands. A total of 11252 flies were classified as one *Phorticella flavipennis* and 20 *Drosophila* species. The most abundant species was *D. takahashii* and followed by *D. bipectinata*, *D. albomicans*, *D. dorsocentralis*, *D. ananassae*, *D. melanogaster* and *D. daruma*. In spring, *D. takahashii* was the most abundant in human habitation of Ishigakijima and Iriomotejima. This species was also dominant in the wild forests of the islands. A similar distribution pattern was found in *D. albomicans*, *D. dorsocentralis*, and *D. ananassae*. However they were abundant in fall rather than in spring. *D. bipectinata* and *D. melanogaster* were

Table 2. Number of *Drosophila* flies collected in six islands of Okinawa prefecture.

	Naha		Miyako*		Ishigakijima			Iriomotejima			Haterumajima		Yonagunijima		
	(H)	(P)	(H)	(H)	(H)	(W)	(H)	(H)	(H)	(W)	(H)	(W)	(H)	(H)	
	96/11	96/11	99/3	98/3	96/11	98/3	98/11	96/11	98/3	98/11	96/11	98/3	98/11	98/11	98/12
<i>P. flavipennis</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>bryani</i>	1	-	-	-	97	-	-	21	-	-	-	-	-	71	11
<i>coracina</i>	-	-	-	-	4	36	15	2	1	6	-	-	-	-	8
<i>dorsocentralis</i>	9	5	2	48	10	59	61	98	1	244	-	-	-	81	27
<i>Scept. sp.A</i>	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
<i>Scept. sp.B</i>	-	-	-	-	-	-	-	2	-	2	-	-	-	-	-
<i>takahashii</i>	34	6	160	1461	1	1444	6	43	5	37	-	-	-	2	-
<i>melanogaster</i>	-	71	61	20	7	104	-	94	-	-	-	-	-	174	199
<i>simulans</i>	-	73	8	-	-	-	-	-	-	-	-	-	-	-	-
<i>fusciphila</i>	-	-	6	4	3	7	-	1	-	-	-	-	-	7	1
<i>ananassae</i>	1	-	5	25	-	-	12	174	-	382	-	-	-	122	2
<i>bipunctinata</i>	492	-	120	166	12	23	13	714	16	20	16	-	198	70	70
<i>bocki</i>	-	-	-	-	5	-	32	-	6	20	6	-	2	2	1
<i>kikkawai</i>	-	-	273	13	-	-	-	-	-	-	-	-	-	-	-
<i>lactecomis</i>	-	-	-	-	-	-	-	-	17	2	-	-	-	-	-
<i>daruma</i>	-	-	-	-	-	-	10	-	338	43	-	-	-	-	-
<i>bizonata</i>	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-
<i>albomicans</i>	146	5	243	55	10	95	350	22	130	115	-	-	5	10	10
<i>formosana</i>	-	-	-	26	-	-	10	-	27	10	-	-	-	-	-
<i>immigrans</i>	-	-	106	-	-	-	-	-	-	-	-	-	-	-	-
<i>quadrilineata</i>	-	-	-	4	-	-	1	1	4	23	-	-	-	-	1
Total	683	681	986	1822	149	1768	517	1290	646	904	662	404	904	148	330

Naha and Nago are collection site of Okinawa island, and Miyako* means Miyakojima. (H), (P) and (W) show collection sites of human habitation, pineapple yard and wild forest, respectively.

mainly collected in human habitation. On the other hand, *D. daruma* was found only in the wild forest of Iriomotejima. This species is usually rare and collected in riversides of southern Japan. *D. lacteicornis* and *D. formosana* were collected only in wild forests of Ishigakijima and Iriomotejima although they were not dominant in the islands.

The collection of *D. bocki* in Ishigakijima, Iriomotejima, Haterumajima and Yonagunijima is a new record of the distribution in Japan. *D. bocki* is a closely related species to *D. kikkawai* which is a domestic and world wide species. The first collection of Japanese *D. bocki* was in Iriomotejima in 1979 by the one of the authors (M.W.). Since morphological classification of the species was actually difficult at that time, it was identified as *D. bocki* by mating experiments, two-dimensional electrophoresis and allozyme electrophoresis (Ohnishi *et al.*, 1983). The present study shows that *D. bocki* dwells in the four Sakishima islands and prefers the wild environment rather than human habitation. *D. bocki* may not be a recent colonizer in Japan. A difficult identification might have missed the species as in the case in Taiwan (Baimai, 1979; Baimai *et al.*, 1980).

D. simulans was a colonizing species in mainlands of Japan (Honsyu, Kyusyu, Shikoku and Hokkaido), and had never been found in Okinawa and Sakishima islands (Watanabe and Kawanishi, 1978).

Table 1. Number of *Drosophila* collected in human habitation of Okinawa (Naha and Nago) and Miyakojima in 1982 and 1983.

	Naha (H)	Nago (P)	Miyakojima (H)	
	82/10	82/10	82/10	83/8
<i>bryani</i>	0	6	18	79
<i>dorsocentralis</i>	1	3	31	10
<i>takahashii</i>	119	6	69	19
<i>melanogaster</i>	1	341	7	5
<i>simulans</i>	0	0	137	5
<i>ficuspila</i>	3	0	22	11
<i>ananassae</i>	2	168	2	21
<i>biplectinata</i>	3	0	508	199
<i>kikkawai</i>	23	32	6	8
<i>triantaria</i>	2	0	0	0
<i>albomicans</i>	7	6	7	0
Total	161	562	807	356

(H) and (P) show collection sites of human habitation and pineapple yard, respectively.

Many *D. simulans* were once collected in Miyakojima in 1982. However, this species seems to be suffering from settlement there. Only 8 flies are *D. simulans* in a total of 986 *Drosophila* flies in spring of 1999. New colonization of *D. simulans* was found in Nago (Okinawa island) by sweeping. But the species was not collected in Naha. A further and precise survey is needed for the study of colonization of *D. simulans* in Okinawa and Sakishima islands.

References: Baimai, V., 1979, Pacif. Ins. 21: 235-240; Baimai, V., S. Kitthawee, and C. Chumchong 1980, Jpn J. Genet. 55: 177-187; Grimaldi, D.A., 1990, Bull. Am. Mus. nat. Hist. 197: 1-139; Kimura, M.T., 1987, Kontyu 55: 429-436; Ohnishi, S., K.W. Kim, and T.K. Watanabe

1983, Jpn J. Genet. 58: 141-151; Okada, T., 1988, Taxonomic outline of the family *Drosophilidae*. in: *Selected papers by Dr. Toyohi OKADA (1936-1988)*, (Suzuki, K., ed.): 1-87. The association of the Memorial Issue of Dr. Toyohi OKADA, Toyama, Japan; Watada, M., Y. Inoue, and T.K. Watanabe 1986, Zool. Sci. 3: 873-883; Watanabe, T.K., and M. Kawanishi 1978, Zool. Mag., 87: 109-116.

Why is *mama* not *adipose*?

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I reported earlier (Doane, 1996) that *fs(2)lto5DF6*, a recessive mutation in the gene *female sterile (2) late oogenesis5*, does not complement *adp^{fs}*, a female sterility mutation previously believed to be an allele of *adipose (adp)*, the first obesity gene of *Drosophila melanogaster* to be described. The former was isolated in a second chromosome saturation screen for EMS-induced female-steriles (Schupbach and Wieschaus, 1989, 1991; T. Schupbach in Lindsley and Zimm, 1992, page 237). The latter was described nearly 40 years ago as a spontaneous mutation derived from a natural population in Kaduna, Nigeria (Doane, 1960a, b).¹ It became apparent that *fs(2)lto5DF6* and *adp^{fs}* are recessive alleles of the same gene based on genetic location, failure to complement one another, and similarities in their female sterility phenotypes (Doane, 1996). I have named this gene *maternal metaphase arrest* (genetic symbol, *mama*). Its name reflects the maternal effect lethality of eggs laid by females homozygous for either of these female sterility mutations and the meiotic or mitotic arrest