Research Note

***Culicoides* biting midges (Diptera: Ceratopogonidae) collected at Iriomote Island, Ryukyu Archipelago, Japan, and their blood source**

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Abstract: A total of 1,825 individuals belonging to 22 species *Culicoides* biting midges were captured at Iriomote Is., Japan, on May 3–6, 2003 by light traps. *C. albifascia* was the most predominant species followed by *C. verbosus*, *C. sumatrae* and *C. okinawensis*. *C. arnaudi* was recorded from Iriomote Is. for the first time. The blood engorgement was observed in 72 individuals of 7 species. As the result of ELISA analysis of the blood meals, *C. albifascia* was determined to be an ornithophilic species for the first time.

Key words: *Culicoides* biting midges, Iriomote Island, blood source, ELISA

MATERIALS AND METHODS

INTRODUCTION

Culicoides biting midges (Diptera: Ceratopogonidae) have blood-sucking habits and they may transmit various pathogenic organisms to their hosts. Therefore, they are considered as one of the most important groups in medical and veterinary entomology (Kitaoka, 1983).

Accordingly, many faunal studies on the midges have been carried out at many localities including the Ryukyu Archipelago, Japan (e.g. Arnaud, 1956; McDonald et al., 1973; Kitaoka, 1977, 1980, 1984a,b; Hoshino, 1985; Wada et al., 1996).

Iriomote Is. is the largest island among the Yaeyama Islands of the Ryukyu Archipelago and has extensive tropical rain forests and characteristic mammalian fauna. We had an opportunity to collect *Culicoides* biting midges at Iriomote Is. May 3 to 6, 2003.

We report a list of the 22 *Culicoides* species captured and their blood meal sources in this paper.

Collections were carried out during the nights of May 3 to 6, 2003 at the eaves of Iriomote Wildlife Research Centre in Komi by the use of the modified FHK-type light trap, which has a 30W fluorescent BLB lamp as the attractant.

Culicoides biting midges captured were kept in the icebox and transported to the laboratory, and identified into species using the key (Kitaoka, 1984a; 1984b; Wada, 1990) and the number of individuals of each species and sex were recorded. The blood meals of the engorged midges were examined by ELISA (Sasaki, 1986) using anti sera against human, cat and chicken to determine their blood source animals.

RESULTS

A total of 1,825 individuals of *Culicoides* biting midges belonging to 22 species were captured by the 3 nights collections (Table 1). Among them, *C. albifascia* was

Table 1. Number of biting midges captured at Komi, Iriomote Is. on May 3-5, 2003.

Species	Female	Male	Total	(%)
<i>C. albifascia</i>	1283	5	1288	(70.58)
<i>C. verbosus</i>	181	14	195	(10.68)
<i>C. sumatrae</i>	113	1	114	(6.25)
<i>C. okinawensis</i>	60	8	68	(3.73)
<i>C. brevitarsis</i>	34	2	36	(1.97)
<i>C. matsuzawai</i>	36	0	36	(1.97)
<i>C. anophelis</i>	19	1	20	(1.10)
<i>C. peregrinus</i>	9	7	16	(0.88)
<i>C. arakawae</i>	8	1	9	(0.49)
<i>C. jacobsoni</i>	6	1	7	(0.38)
<i>C. komiensis</i>	6	1	7	(0.38)
<i>C. arnaudi</i>	7	0	7	(0.38)
<i>C. paraflavescens</i>	5	0	5	(0.27)
<i>C. dryadeus</i>	4	0	4	(0.22)
<i>C. longidens</i>	3	0	3	(0.16)
<i>C. nipponensis</i>	1	2	3	(0.16)
<i>C. brevipalpis</i>	2	0	2	(0.11)
<i>C. clavipalpis</i>	1	0	1	(0.05)
<i>C. iriomotensis</i>	1	0	1	(0.05)
<i>C. oxystoma</i>	1	0	1	(0.05)
<i>C. toshiokai</i>	1	0	1	(0.05)
<i>C. wadai</i>	1	0	1	(0.05)
Total	1782	43	1825	(100.00)

Table 2. Number of biting midges engorged and reacted against anti-sera.

Species	Captured No. of female	Engorged	(%)	Reacted against		
				anti-human	anti-cat	anti-chicken
<i>C. albifascia</i>	1283	33	(2.57)	0	0	12
<i>C. verbosus</i>	181	25	(13.81)	0	0	0
<i>C. okinawensis</i>	60	9	(15.00)	0	0	0
<i>C. matsuzawai</i>	36	1	(2.78)	0	0	0
<i>C. anophelis</i>	19	1	(5.26)	0	0	0
<i>C. komiensis</i>	6	2	(33.33)	0	0	0
<i>C. brevipalpis</i>	2	1	(50.00)	0	0	0
Total	1587	72	(4.04)	0	0	12

the most predominant species captured (1,288 individuals, 70.58%) followed by *C. verbosus* (195 midges, 10.68%), *C. sumatrae* (114 midges, 6.25%) and *C. okinawensis* (68 midges, 3.73%). The number of other 18 species captured was small (only 160 midges, 8.77%, in total). *C. arnaudi* was recorded from Iriomote Is. for the first time.

Among the captured midges, 72 individuals of 7 species were engorged. The engorgement rates were very low in every species (mean=4.04%). As the result of

ELISA analysis, only 12 blood meals obtained from *C. albifascia* reacted against anti-chicken serum and no blood meal reacted against anti-human and anti-cat sera (Table 2).

DISCUSSION

So far, 31 species of *Culicoides* biting midges have been recorded from Iriomote Is. (Wada et al., 1996), and we added *C. arnaudi* as a newly recorded species in this paper. However, the species reported as *C.*

kibunensis by Henna et al. (1991) from Ishigaki Is. and Iriomote Is. has apparently been recorded to be *C. arnaudi* by Wada et al. (1996).

We considered that the number of species obtained is large for the results of 3 nights collections and these results may be due to the good environmental condition of the collecting site that is surrounded by broad mud flats and semi-tropical rain forests. Therefore, other species including the species that are already recorded from other islands of the Yaeyama Islands may be captured by following surveys if performed at other collecting points in the island.

Although Wada et al. (1996) mentioned that *C. albifascia* of Iriomote Is. might be different from true *C. albifascia*, we use the name *C. albifascia* for our predominant species in this paper after the description of Tokunaga (1962) and the key of Kitaoka (1985a).

Because the Iriomote wildcat (*Felis iri-omotensis*) inhabits the island, we examined the blood meals of the engorged midges against anti-cat serum together with anti-human and anti-chicken sera in order to determine whether the midges bite cat or not. As the results of ELISA analysis, none of the blood meals examined reacted against the anti-cat serum. More blood meals should be collected and examined against anti-cat serum. It is noteworthy that *C. albifascia* was determined to be the ornithophilic species for the first time.

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