

# Ommatidial Number of Females of European *Culex pipiens pipiens*

Kenji KUROKAWA<sup>1</sup>, Tsutomu ODA<sup>2</sup>, Masakatsu UEDA<sup>1</sup>,  
Akio MORI<sup>1</sup>, Makoto ZAITSU<sup>1</sup> and Osamu SUENAGA<sup>3</sup>

**Abstract** The number of ommatidia in the 4th to the 6th rows in compound eyes were examined with females of European *Culex pipiens pipiens* and those of Egyptian strain of *Cx. p. molestus*. Generally, females of European *Cx. p. pipiens* had 9 ommatidia, but some females had 8 ommatidia. Most females of *Cx. p. molestus* had 8 ommatidia, but some of them had 9 ommatidia. Thus, it will be possible to distinguish the females of European *Cx. p. pipiens* and those of *Cx. p. molestus* in level of population based on the difference of the ommatidial number. Bull. Sch. Allied Med Sci., Nagasaki Univ. 2 : 167-171, 1988

**Key words :** *Culex pipiens pipiens*, ommatidial number, compound eyes

## Introduction

In Europe, the mosquito of *Culex pipiens* complex is composed of 2 members of *Culex pipiens pipiens* and *Cx. p. molestus*. The former exhibits anautogeny, eunogamy, and diapause, but the latter shows autogeny, stenogamy, and the lack of diapause.<sup>1)</sup> There is little difference in external morphology between *Cx. p. pipiens* and *Cx. p. molestus* of either sex. On the other hand, non-autogenous *Cx. p. pallens* and autogenous *Cx. p. molestus*, which are members of the *Culex pipiens* complex, are found in Japan. The males of the two member can be morphological distinguished by their external genitalia,<sup>4)</sup> and also the females can be generally discriminated by number of ommatidia in compound eyes ; the females of *Cx. p. molestus* have about 8 ommatidia in the 4th to 6th rows, whereas *Cx. p. pallens* ommatidia have about 9.<sup>2)3)</sup> In this study, we compared the females of the European strain of

---

1 Department of Medical Zoology, Nagasaki University School of Medicine

2 Department of General Education, the School of Allied Medical Sciences, Nagasaki University

3 Institute of Tropical Medicine, Nagasaki University

Table 1. Ommatidial numbers of females of *Cx. p. pipiens* and *Cx. p. molestus*

Strain	Row of compound eyes	No females dissected	Ommatidial numbers		
			8	9	10
<i>Cx. p. pipiens</i> (Bromarv)	4	30		30 (100.0)	
	5	30		30 (100.0)	
	6	30		30 (100.0)	
<i>Cx. p. pipiens</i> (Leningrad)	4	9	3 (33.3)	6 (66.7)	
	5	9	2 (22.2)	7 (77.8)	
	6	9	2 (22.2)	7 (77.8)	
<i>Cx. p. pipiens</i> (Hamburg)	4	47	10 (21.3)	37 (78.7)	
	5	47		45 (95.8)	2 (4.3)
	6	47	3 (6.4)	41 (87.2)	3 (6.4)
<i>Cx. p. molestus</i> (Egypt)	4	35	34 (97.1)	1 (2.9)	
	5	35	25 (71.4)	10 (28.6)	
	6	35	32 (91.4)	3 (8.6)	

( ) : % of females

*Cx. p. pipiens* and those of *Cx. p. molestus* with respect to the number of ommatidia.

### Materials and methods

Three strains of *Cx. p. pipiens* and 1 strain of *Cx. p. molestus* were used. *Cx. p. pipiens* females were reared as adults from the 4th instar larvae and pupae, which were collected from waste tires in autumn, 1984 in Bromarv, Finland or at ground pools with organic matter in autumn, 1987 in Leningrad, in the USSR. In addition, the females were collected in the cellar in winter, 1985 in Hamburg, West-Germany and then reactivated at 25°C. The females used were reared from the eggs produced by such gonoactive females that fed on mouse. The females of the Egyptian strain of *Cx. p. molestus* which were a gift from the Department of Entomology, Institute of Tropical Medicine in Hamburg had been reared for 37 generations at 25°C in the Department of Medical Zoology, Nagasaki University School of Medicine. The head of the females was boiled in a glass tube (1cm in diameter and 5cm in depth) containing 10% KOH solution for 3 minutes, when the black compound eyes in the head became transparent. The head without color was fixed in a 70% alcohol solution, and washed in water. Then the head was transferred into a drop of glycerin on a slide glass. The number of ommatidia in the 4th to 6th rows on the right side of the dorsal part in compound eyes were counted under a stereomicroscope (Fig. 1).

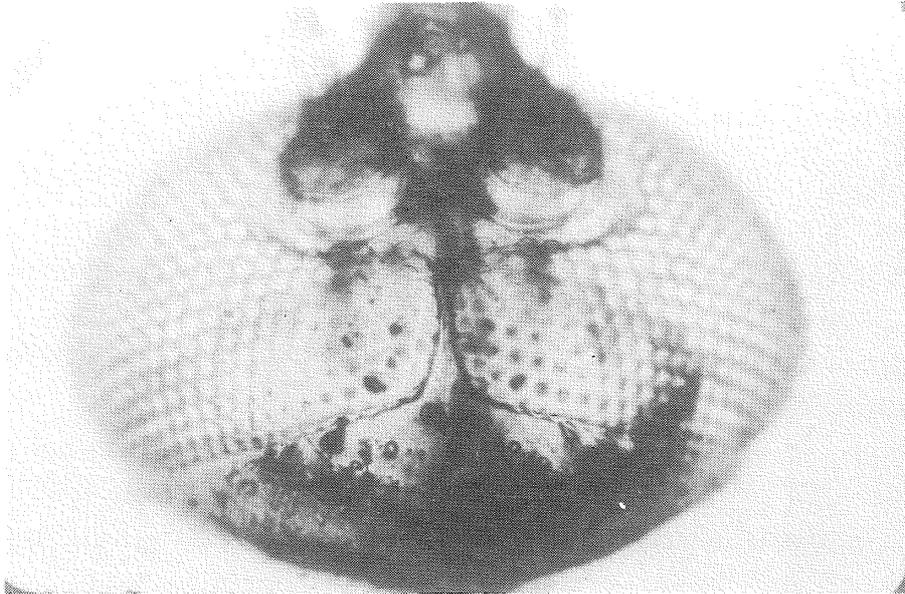


Fig. 1. Compound eyes of *Cx. p. pipiens* females, dorsal view.

## Results and Discussion

Table 1, shows the frequency distribution of *Cx. p. pipiens* and *Cx. p. molestus* females with the number of ommatidia in the 4th to 6th rows in compound eyes. In the Bromarv strain there were 9 ommatidia in all rows. Most females of the Leningrad strain had 9 ommatidia in all rows, but some females had 8 ommatidia. This was similar to the number of ommatidia in the Hamburg strain females, some of which had 10 ommatidia. Therefore, the *Cx. p. pipiens* generally has 9 ommatidia and the number will vary with the strain. On the other hand *Cx. p. molestus* generally has 8 ommatidia, but some females with 9 ommatidia also appeared.

The present observation shows that the *Cx. p. pipiens* females generally has 9 ommatidia, but some females had 8 or 10 ommatidia. Such findings are similar to those obtained on *Cx. p. pallens* in Japan.<sup>3)</sup> Mori *et al.*<sup>2)</sup> (1982) reported that the ommatidial number varies with the temperature in *Cx. p. pallens*. The variation of ommatidia in our experiment also may be related with the temperature and strain. Also the ommatidial number of *Cx. p. molestus*, varied in this experiment. This agrees with the findings obtained by Mori *et al.*<sup>2)</sup> (1982). As mentioned above, the number of ommatidia overlaps in females between *Cx. p. pipiens* and *Cx. p. molestus*. Thus, it is difficult to distinguish the female of *Cx. p. pipiens* from that of *Cx. p. molestus* based on the difference of ommatidial number, but it will be possible in level of population. There remains the possibility to distinguish females of both strains, by

improving the present methods, for example, by order or combination of ommatidial number in the 4th to 6th rows.

### References

1. Clements AN : The physiology of mosquitoes, Pergamon Press LTD., Oxford, 1963, pp 169-175.
2. Mori A, Oda T, Fujita K, Ueda M, Kurokawa K : On number of ommatidia of females in *Culex pipiens pallens* and *Culex pipiens molestus* under various temperatures. Trop Med 24 : 151-153 (in Japanese with English summary), 1982.
3. Noguchi K, Asahina S : Ommatidial number as a diagnostic character for Japanese autogenous *Culex molestus*. J Med Ent 3 : 146-148, 1966.
4. Tanaka K, Mizusawa K, Saugotad ES : A revision of the adult and larval mosquitoes of Japan (including the Ryukyu archipelago and the Ogasawara Islands and Korea (Diptera ; Culicidae) ). Contr Amer Ent Instit 16, 1979.

(1988年12月24日受理)

## ヨーロッパ産トビロイエカの小眼数

黒川 憲次<sup>1</sup> 小田 力<sup>2</sup> 上田 正勝<sup>1</sup> 森 章夫<sup>1</sup>  
在津 誠<sup>1</sup> 末永 敏<sup>3</sup>

- 1 長崎大学医学部医動物学教室
- 2 長崎大学医療技術短期大学部
- 3 長崎大学熱帯医学研究所

**要 旨** ヨーロッパ産のトビロイエカの雌とチカイエカの雌を区別するため西ドイツ、フィンランド及びソ連で採集されたトビロイエカ雌とエジプト産チカイエカ雌の複眼の第4例から第6列目の小眼数を数えた。ソ連のトビロイエカの小眼数はどの例でも9個であった。西ドイツとフィンランドのトビロイエカの多くは9個の小眼を持ち、少数のものは8個のそれを持っていた。エジプト系のチカイエカの小眼数は一般に8個であったが、9個もった雌もあった。したがって、ヨーロッパ産トビロイエカ雌とチカイエカのそれとは小眼数によって集団としては区別可能であろう。

長大医短紀要 2 : 167-171, 1988