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<tr>
<td>Citation</td>
<td>長崎大学風土病紀要 1(3), p.288-295, 1959</td>
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<tr>
<td>Issue Date</td>
<td>1959-09-23</td>
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<tr>
<td>URL</td>
<td><a href="http://hdl.handle.net/10069/3800">http://hdl.handle.net/10069/3800</a></td>
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On *Anopheles (Anopheles) omorii* n. sp. *

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INTRODUCTION

The author reported on a new unornamented dark Anopheline mosquito breeding in tree-hole, at the 9th Annual Meeting of the Japan Society of Sanitary Zoology held on April, 1957. The abstract of the lecture was printed in Japanese, on Japanese Journal of Sanitary Zoology, Vol. 8, No. 2, p. 68, 1957 in which he briefly described the specific characteristics of this mosquito and pointed out the differences between this and an allied species *A. barberi* Coq. and gave a Japanese name, "omori-anopheles" without giving a scientific name to it. In the next spring, he read a paper entitled Ecological studies on mosquitoes in Sizuoka Prefecture IV. Seasonal occurrences of *Anopheles omorii* and other mosquitoes in a tree-hole. In this lecture he used specific name "A. omorii" without touching the taxonomic-points of the species. The abstract was shown in Jap. J. Sanit. Zool. 9 (2) : 95-96, 1958.

The above descriptions about this mosquito are so informal and imperfect that the author intends to make here the detailed description of this new species.

DESCRIPTION

*Anopheles (Anopheles) omorii* n. sp. **

(Japanese name: omori-hamadaraka)

ADULTS

This mosquito is a small, dark and unspotted species and resembles *Anopheles (Anopheles) barberi* Coquillet, 1903.

*Female* (Plate I, A)

Body length : 3.6-4.8 mm

Head: Proboscis long, dark. Palpi about as long as the proboscis, dark. Occiput

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* Contributions from the Research Institute of Endemics, Nagasaki University No. 321

** The specific trivial name is dedicated to Prof. Dr. Nanzaburo OMORI, the director of the Department of Zoology, Research Institute of Endemics, Nagasaki University, with the author's heartfelt acknowledgement and respect.
clothed with numerous erect forked scales, those on the central part and vertex pale. 
Frontal tuft pale.

Thorax: Integument of scutum brown, somewhat polished, pruinose. Lateral area, 
ante"rior to mesonotal suture light brown, posterior from the suture dark brown. Scutum 
without scales, clothed with long dark setae which are 1/7-1/2 or more as long as 
the width of the scutum. Anterior promontory clothed with long curved pale scale-
like hairs. Scutellum without scales, *Anopheles*-like in shape, clothed with very 
long brown hairs.

Abdomen: Integument brown, rather densely clothed with dark-brown hairs, without 
scales.

Legs: Entirely dark.

Wing: Length 3.4-4.4mm. Scales slightly broadened, uniformly dark. Stem/cell 
ratio of vein II 1: 2.5-3.0, that of vein IV 1: 1.4. Length of cross-vein 4-5 about 
as long as the length on vein IV between cross-veins 3-4 and 4-5.

Halter: Stem yellowish, knob dark scaled.

**Male**

Coloration similar to that of the female. Body length: 3.4-4.3mm.

Wing Length: 2.7-3.9mm.

Terminalia: (Plate I, B). Ninth tergite membranous dorsally, sclerotized only la-
terally, lobes obscure. Anal bove large, triangular, finely speculate. Phallosome 
somewhat cylindrical, broad at base, rounded point at apex, without leaflet. Claspette 
broad, consisting of a dorsal cylindrical lobe bearing three closely overlapping spatulate 
filaments curved at tips and forming a kind of hood and ventral lobe bearing four 
spines, from No. 1 to No. 4 from dorsal to ventral. Spine No. 2 is apical in position, 
broad, long and pointed at tip, nearly twice as long as the ventral lobe. Other spines 
subapical in position. No. 1 and No. 4 somewhat narrower and shorter than No. 2. 
No. 3 variable in size, in some specimens seta-like spine and very much shorter than 
No. 4, in others as long as and in rare cases larger than No. 4 (in these cases No. 
4 may be very short). Basistyle a little longer than broad, clothed with long and 
short setae, without scales, two long and strong parabasal spines and one internal 
long spine. Dististyle fairly longer than the basistyle, curved, with about 10 minute 
papillated setae on the distal half. Claw short, blunt and dark brown.

**Comparison of some morphological characteristics of adults of this 
species with those of A. barberi Coq.**

This species closely resembles *A. barberi* in adults but the frontal tuft of this species 
is pale, in stead of dark in *A. barberi* according to the description of Carpenter and 
LaCasse 1955. This species bears long curved scale-like pale hairs on the anterior 
pronotory of the scutum, while *A. barberi* is described to bear dark hairs on scutum 
by Coquillett, 1903 and the above authors, 1955.

The shape of the filaments of the dorsal lobe of claspsette of this species is spatulate, 
curved and pointed at tip forming a kind of hood. This is usually seen with all three
filaments in mounted specimens but, when they are observed in the genital sac of the male pupa just before the emergence, the tips are round, not curved and pointed. As to the shape of the filaments of *A. barberi* Matheson (1950) states that the tips of the dorsal two are sharply curved forming a kind of hood, while Carpenter and LaCasse (1955) give a figure of round tips with all the three filaments.

In view of these facts, in the present, the author can not decide whether this species is different in this character from *A. barberi* or not, until he makes sure of the character with the specimens of American species.

**PUPA (Plate II)**

The chaetotaxy is as show in Plate II, A and is near to *A. barberi*.

*Cephalothorax*: chaetotaxy and shape of respiratory trumpets are similar to *A. barberi*.

*Abdomen*: chaetotaxy, paddle index are similar to *A. barberi* excepting the following points shown in Table 1.

As seen from the table, the hairs No. 5 on abdominal segment VI in 3♂ out of all

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Comparison on some characters of the pupae of <em>A. barberi</em> and <em>A. omorii</em></th>
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<tbody>
<tr>
<td>Species</td>
<td><em>A. barberi</em> Coq., 1903 after Darsie, 1949, based on 2♂ and 6♂</td>
</tr>
<tr>
<td>Hair No. 5</td>
<td></td>
</tr>
<tr>
<td>Seg. VI</td>
<td>Rather stout, Single. About 1/3 as long as the following seg.</td>
</tr>
<tr>
<td>Seg. VII</td>
<td>Rather stout, usually single, rarely with a branch. About 1/3 as long as the following seg.</td>
</tr>
<tr>
<td>Hair No. 8</td>
<td></td>
</tr>
<tr>
<td>Seg. VI</td>
<td>Single, spine-like. Av. ratio of length to width : 13.0</td>
</tr>
<tr>
<td>Seg. VII</td>
<td>Single, spine-like. Av. ratio of length to width : 16.2</td>
</tr>
<tr>
<td>Seg. VIII</td>
<td>Usually single, spine-like with as many as 5 short coarse branches near apex. Av. ratio of length to width : 21.0</td>
</tr>
<tr>
<td>Hair No. 8</td>
<td>Single, rather stout. About 84 micron long</td>
</tr>
<tr>
<td>Hair No. 7</td>
<td>Dorsal in position, small, single. About 64 micron long</td>
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* The designation of the hairs of the pupae follows that of Knight and Chamberlain (1948). Hair No. 5 is seta B, No. 8 is seta A, Paddle hair No. 8 is terminal seta x, No. 7 is accessory seta z of Darsie, 1943.
10 (3 ♀ and 7 ♂) pupae of *A. omorii* examined were slender, ordinary hairs with 6-8 rather long branches, while those in the remaining 7 pupae were rather stout spines. The average length of the hair No. 5 was about 1/2.6 and that of spines only was about 1/2.2 as long as the following segment. Accordingly with only spines, those of this species are longer than those of *A. barberi*. The branching of hair No. 5 on abdominal seg. VI and VII is as shown in the Table. As above, the hair No. 5 of *A. omorii* on these segments differ from *A. barberi* in that in the former the branching is more numerous and the hair is considerably longer than in the latter.

Hair No. 8 of *A. omorii* is nearly similar to that of *A. barberi* but the former bears more branches and a little longer than the latter.

No. 7 or accessory paddle hair of *A. omorii* is obviously ventral in position and fairly longer in stead of dorsal in position and shorter in *A. barberi*.

On the plicated anal lobe of *A. omorii* which lies between paddles and genital sac, a pair of slender, 1-3 branched hairs are present (Plate II, C & D). The hairs arise on the membranous surface, at the dorso-lateral and about the middle of the lobe. The length of the hairs are about two-thirds or nearly the same as long as the lobe. No description on such hairs have been made with *A. barberi* by the other authors.

**LARVA (Plate III)**

Length: 3.8-5.5mm (Chaetotaxy follows that of Belkin, 1950)

**Head.**

Antenna short, dark and glabrous; antennal hair simple, very short and arise on rather outer surface near middle of shaft, about 1/3-1/4 as long as the width of shaft; terminal hair rather long usually 3-4, rarely 2 or 5 branched, never simple. Inner clypeal hairs long and simple, placed close together; basal tubercles may or rarely may not be separated by more than the diameter of a single tubercle. Outer clypeals about 2/3 as long as the inner ones, simple or bifid, occasionally trifid at about 1/3 distance from the base. The outer clypeal placed so close to inner that the distance between outer and inner clypeals of one side only slightly larger than the distance between inner clypeals. Postclypeal simple, slightly shorter than the outer clypeal, arising posterior and outer to the latter. Frontal hairs short, simple; inner frontal as long as outer clypeal; middle frontal arise close to inner, very short, about 1/4 as long as the inner; outer frontal as long as inner one. Sutural and transsural small, simple. Subantennal usually split into 2-4 branches near base, as long as outer clypeal. Supraorbital small, simple or bifid. Mentum with 9 teeth.

**Thorax.**

Integument of thorax spiculate partially.

Prothorax: Prothoracic sub-median group arise on respective roots; No. 1 not so long, usually 2-4 (range 0-7) side branches; No. 2 long plumose; No. 3 short, simple. Prothoracic pleural group; No. 9 long, rather stout, simple rarely with 1-2 minute side branches; No. 10 and 12 slender, simple, a little shorter than No. 9; No. 11 minute, simple.
Mesothorax: No. 1 stout, plumose; No. 2 short, simple; No. 3 slender, simple, a little longer than No. 1; No. 4 slender, simple, one and a half as long as No. 1; No. 5, No. 6, No. 7 a little shorter than No. 1; No. 5 4-6 branched; No. 6 and No. 7 2-3 branched near tip. Pleural group: No. 9 long, rather stout, very sparsely barbed; No. 10 slender, simple, a little shorter than No. 9; No. 11 very minute; No. 12 short, simple or bifid near tip.

Metathorax: No. 3 undeveloped, small, usually 3-5 branched (range 3-7); Pleural group similar to that in mesothorax.

Abdomen

Integument of abdomen spiculate partially.

Palmate hair: No. 1 on segment I undeveloped, small, simple or bifid; No. 1 on segments II-VII well developed with 12-28 leaflets with serrations on apical half.

Lateral hair: No. 6 long, plumose on segments I-VI.

Pecten: with 16-20 rarely 14 or 15 spines of nearly equal length, admixing 2-5 of a little shorter ones.

**Differences in larval characters of this species from A. barberi**

The original description of *A. barberi* made by Coquillett, 1903 is only with adults and very brief. The comparison of larval characters of this species with those of *A. barberi* were made accordingly with the descriptions and figures given by Carpenter and LaCasse, 1955.

(1) The most remarkable difference is the position of inner and outer clypeal hairs. Inner clypeal hairs of this species are placed close together and the distance between them is nearly the same as or a little more or rarely less than a diameter of a single tubercle. Outer clypeal arises so close to inner one that the distance between inner and outer of one side is only a little more than the distance between two inner ones. On the contrary to the above, in *A. barberi*, inner clypeal hairs is placed wide apart.

(2) Middle frontal hair of this species is very short and about 1/4 as long as the inner frontal, instead of a little shorter than the inner in *A. barberi*.

(3) Terminal hair of antenna of this species is usually 3-4 branched (range 2-5), instead of simple in *A. barberi*.

(4) In this species, integument of thorax and abdomen spiculate partially, while, in *A. barberi* thorax sparsely but uniformly spiculate, abdomen not spiculate.

(5) Mesothoracic No. 4, in this species, is long, simple and No. 5 is present, while in *A. barberi*, No. 4 is rather short and branched and No. 5 is absent in figure given by the above authors.

(6) Pecten spines of this species are 16-20, rarely 14 or 15 in number and about equal in length admixing only 2-5 a little shorter ones, while, those of *A. barberi* are 12 in number and the length of teeth becomes increasingly shorter on outer sides in the figure given by the above authors.
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EGGS

Length 0.37-0.44mm, width about 0.09mm. Float is absent. The egg is completely encircled by a semitransparent membranous and striped frill. The frill arises near the upper edge of hull extending its free end upwards above the deck. This frill appears to act as a float.

THE TYPES

*Holotype* Male, with mounted genitalia, reared from a larva collected in a tree hole of *Zelkova serrate* at Mt. Tochu, Misakubo city, Iwatagun, Sizuoka prefecture, Japan on June 29, 1957, emerged on July 7, 1957.

*Allotype* Female, reared from a larva collected in the same hole on August 27, 1956, emerged on September 2, 1956.

*Paratypes* Four males (from No. 1 to No. 4), six females (from No. 5 to No. 10), five mounted male genitalia (from No. 11 to No. 15), three mounted pupae (from No. 16 to No. 18), two mounted pupal skin (No. 19, No. 20), seven mounted 4th instar larvae (from No. 21 to No. 27). No. 5 was collected as a adult, while all other specimens were did as larvae and killed or reared to pupae or adults. No. 5, 6, 7 collected on August 27, 1956; No. 8 on Aug. 9, 1956; No. 1, 9, 10, from 11 to 15, from 21 to 27 on June 29, 1957; No. 2, 3, 4 on July 31, 1957; from No. 16 to 21 on Aug. 20, 1958.

All type specimens were collected by the author at the same locality as that of Holotype.

Paratypes No. 3, 4, 9, 10, 11, 12, 16, 17, 21, 22 are deposited in the Sasa's Laboratory, Institute for Infectious Diseases, Tokyo University; Holotype, allotype and the remaining Paratypes are deposited in Department of Medical Zoology, Research Institute of Endemics, Nagasaki University.

ECOLOGICAL NOTES

The larvae of this mosquito have been found only in a hole of cut down trunk of *Zelkova serrate* under the dense shade in jungle at the slope of Mt. Tochu at about 900 meters above sea level. The hole is 50cm in diameter and 250cm in depth. The water collected in the hole was red brownish in color and 7.0 in PH. This mosquito appears to hibernate in younger larval stage. The adults may emerge on from late May to early June and seems to repeat its life cycles 3 or 5 times by the end of late October. Thereafter only younger larvae were found. In the tree hole, the larvae of *Aedes kobayashii*, *Culex kyotoensis* and *Megarhinus towadensis* were also found.

TAXONOMIC DISCUSSION

*A. omorii* belongs *Anopheles* series in group of A or *Anopheles* group of Subgenus *Anopheles* Meigen. This is proved by the following facts: Wings without pale as well as dark spot; s basistyle with 2 strong parabasal spines set on tubercles;
abdomen of adults without scales dorsally or laterally; front femora of adult slender at the base; scales of female palpi appressed towards the base; wings and legs completely dark.

Among the Anopheles series, mosquito species which have such characteristics as below are only A. barberi and A. omorii. That is:

Wings without pale or dark spot; legs entirely dark; phallosome of genitalia entirely without leaflets, spines or hairs; Inner clypeal hairs simple; Eggs without float.

The differences between the two species were described in each paragraph.

**SUMMARY**

The author made the description of a new Anopheline mosquito which was found in a tree hole in jungle at Mt. Tochu (about 900 meters above sea level), Sizuoka prefecture. This mosquito having unspotted wing is closely allied to Anopheles (A.) barberi recorded in United States of America but clearly different from the latter species in many points as pointed out in each paragraph. To this new mosquito the author gave a scientific name, Anopheles (Anopheles) omorii.

**ACKNOWLEDGMENT**

The author wishes to express his sincere appreciation to Prof. Dr. N. Omori for valuable advice and criticism throughout the work and for reading the manuscript. Thanks are also due to officers of Misakubo Forestry Office. He is also indebted to Mr. T. Konuma for his assistance in collection of this mosquito.

**LITERATURES**


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**EXPLANATION OF PLATES**

Plate I A: Adult female of *Anopheles omorii*.

B: Male terminalia.

Plate II A: Pupa. B: Respiratory trumpet.

C: Anal lobe of male pupa, showing a pair of hairs.

P: Paddle, a: Anal lobe, g: Genital sac.

D: Anal lobe of female pupa, showing a pair of hairs.

Plate III A: Head of larva.

B: Thorax and a part of abdomen.

C: Pecten.

Received for publication August 17, 1959.