

**Gynandromorphism and intersexualism in Culicidae
(Diptera: Culicomorpha: Culicoidea):
description of five individual cases and a literature review**

[Gynandromorphismus und Intersexualismus bei den Culicidae
(Diptera: Culicomorpha: Culicoidea):
Beschreibung von fünf Einzelfällen und eine Literaturübersicht]

by

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Abstract

Although very rare under natural conditions, anomalies of phenotypic sexual expression have been described for individuals of numerous families of the Diptera, including mosquitoes (Culicidae). Gynandromorphism and intersexualism are sexual aberrations generating individuals either with both male and female or with intermediate sexual characteristics. Here we describe five cases of gynandromorphism in three mosquito species. In addition, a list of species of the family Culicidae for which gynandromorphs and intersexes have been described in the literature is compiled.

Key words

Culicidae, Aedes, Culex, Palaearctic Region, France, Germany, Switzerland, gynandromorphism, intersexualism, sexual differentiation, sexual aberration

Zusammenfassung

Anomalien der phänotypischen Geschlechtsausprägung sind bei einer Vielzahl von Dipterenfamilien, einschließlich Stechmücken (Culicidae), beschrieben, kommen jedoch unter natürlichen Bedingungen sehr selten vor. Gynandromorphismus und Intersexualismus sind sexuelle Fehlentwicklungen, aus denen entweder Individuen mit männlichen und weiblichen oder Individuen mit intermediären sexuellen Merkmalen hervorgehen. Fünf Fälle von Gynandromorphie bei drei Stechmückenarten werden präsentiert. Zusätzlich wird eine Liste der Arten der Familie Culicidae, bei welchen Gynander und Intersexe in der Fachliteratur beschrieben wurden, zusammengestellt.

Stichwörter

Culicidae, Aedes, Culex, paläarktische Region, Frankreich, Deutschland, Schweiz, Gynandromorphismus, Intersexualismus, sexuelle Differenzierung, sexuelle Anomalie

Introduction

An essential moment in life of any higher organism is that point in time when an individual is destined to become either male or female. Arthropods form the most diverse phylum of organisms, and it is not surprising that they have developed various mechanisms of sex-determination (SÁNCHEZ 2008). These mechanisms are highly complex, and developmental defects may occur. Thus, sexual aberrations have been observed in both natural and laboratory populations of almost all orders of arthropods (NARITA et al. 2010). Gynandromorphism and intersexualism are the most frequent aberrations, leading to morphologically anomalous individuals with either both male and female characteristics or with sexually intermediate traits.

In the majority of insects, sex is determined genetically and causes a distinct phenotypic dimorphism. Most insects have heterogametic sex chromosomes, X and Y, which are different in shape and size and can be distinguished cytologically (HAKE & O'CONNOR 2008). Mosquitoes (Culicidae) have six diploid chromosomes,