

# Verification of *Anopheles (Ano.) messeae* Falleroni (Culicidae, Dipt.) from southern Sweden

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Older records of the *An. (Ano.) maculipennis* complex from Sweden are discussed in the light of recent cytogenetic studies (Stegnii and Kabanova 1976) and discussions of the taxonomic status of members of the complex (Guy et al. 1976). The presence of *An. (Ano.) messeae* Faller. in Skåne (new locality) is verified by studies of living eggs. The need for verification of older records, especially of the species *An. (Ano.) maculipennis* Meig. throughout Sweden is pointed out.

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## Introduction

The taxonomic status of the palearctic *An. (Ano.) maculipennis* complex was recently revised by Guy et al. (1976). These authors, contrary to Gutsevich et al. (1974) who only recognize one polytypic species, distinguish six palearctic species belonging to the *maculipennis* complex. This view was accepted by Knight & Stone (1977) and also by me (Dahl 1977). Recently on cytogenetic evidence from Siberian material Stegnii & Kabanova (1976) separated a new species, *An. (Ano.) beklemishevi* Stegnii & Kabanova, from the *maculipennis* complex. The situation of nomenclature has, partly because of the inadequate description of the new species, become very complicated, and priority of names need further clarification (White, pers. comm.). Meanwhile in the present study the widely accepted name *messeae* Falleroni is used in accordance with the current European interpretation of this species.

Verifications of older records from Sweden are necessary for several reasons. The results of Ekblom (1938) are given without description of methods, localities and dates of catches (exception: Sticklinge, Stockholm). This makes a detailed re-evaluation of records of sympatric species difficult. The similarity of the chorion patterns of living eggs between *maculipennis* Meig. and *beklemishevi* (Stegnii & Kaba-

nova 1976) and the variability of *messeae* in this respect calls also for a revision of earlier records. Thus here is made a first attempt to verify the presence of a species important as a Malarian vector in more southerly regions of Europe.

## Distribution

The distribution of *maculipennis* s.l. in Norway was studied by Natvig (1929) before the question of the number of species involved was clarified by Hackett et al. (1932) and Buck et al. (1933). In Sweden on basis of egg differences Ekblom (1938) revised earlier studies of *maculipennis* s.l. (Ekblom & Ströman 1932). Ulmanen et al. (1971) established the presence of *messeae* Falleroni throughout Finland.

Previous records of the *maculipennis* complex in Skåne comprise three species: *messeae* Falleroni, *atroparvus* van Thiel and *maculipennis* Meigen.

*An. (Ano.) messeae* Falleroni was recorded from Simrishamn, Limhamn, Malmö, Lomma, Hålsingborg and Ringsjön (Ekblom 1938).

New record for Skåne: Sövdeborg, Saxeröd 30.7.1975 7 ♀ (coll. Dahl). During April 1976, 4 ♀ were caught at the same locality, see below.

In Sweden *messeae* was reported up to Norrbotten by Ekblom (1938). Records of *maculi-*



Fig. 1. *An. (Ano.) messeae* Falleroni. Eggs laid by females from Scania, Sövdeborg, Saxeröd 30.7.1975. Ratio of width to length 0.19. Magnification 35 $\times$ . Photo: R. Larsson.

*An. (Ano.) messeae* Falleroni. Ägg av honor från Skåne, Sövdeborg, Saxeröd 30.7.1975. Förhållandet mellan bredd och längd 0.19. Förstoring 35 $\times$ .

*pennis* s.l. from Lule Lappmark (Dahl 1977) might well be this species. Females were caught in May–June in light traps and belonged obviously to the hibernating generation. Later also males occurred in the light trap catches from the middle of July to September (Dahl 1974).

In Europe it is the most widespread species of the *maculipennis* complex (Dahl and White, in press). In connection with the separation of a new species, *An. (Ano.) beklemishevi* Steg. et Kab., 1976, Stegnii and Kabanova (1976) pointed out its less wellknown northern and eastern distributional boundaries. In Siberia *messeae* is found sympatric with *beklemishevi*.

*An. (Ano.) atroparvus* van Thiel was recorded by Ekblom (1938) from Simrishamn, Limhamn, Malmö and Lomma, and by Missiroli et al. (1933) from Lomma.

In Sweden the species was reported from along the seashores up to Västergötland and from Gotland (Ekblom 1938). Its northern limit on the Baltic coast is unknown. In western

Europe it is mainly a coastal form with preference for saline waters. In some parts of its range, however, it can also be found in inland localities (Weyer 1950).

*An. (Ano.) maculipennis* Meigen was recorded from Hälsingborg and Ringsjön (Ekblom 1938).

The same author gives localities from most areas up to Central Sweden and also from several places along the Baltic shores. It can be found together with *messeae*. But generally the larvae are reported to prefer waters with less vegetation and artificial containers. The adults occur in lower humidity than *messeae* (Weyer 1950) and in Sweden the species was characterized as an inland form (Ekblom 1938).

In the light of recent findings (Stegnii & Kabanova 1976) these records need verification by cytogenetic studies and comparison with eggs of *beklemishevi*.

#### Taxonomy of *messeae*

The species can be separated from all other species of the *maculipennis* complex in the egg stage. All eggs from the different batches from females caught at Saxeröd, Skåne (Figs. 1, 2) fitted well into the pattern of *messeae*: irregular patches of black and white with two indistinct transverse bands of black enclosing the float chamber area (Ekblom 1935, Weyer 1939, Russell et al. 1943). The less well defined black bands and the stouter shape of the egg, which gives a high ratio of width to length of the egg, separates *messeae* from *beklemishevi* (Stegnii and Kabanova 1976).

#### Observations on biology of *messeae*

The females caught indoors at the end of July attacked from about 22 hrs and only in semi- or darkness. They behaved very "nervously" compared to the straight forward landing behaviour of *Aedes* spec. The slightest movement or direct light on the arm prevented them from settling down. Probably in the field they feed on sleeping animals.

The females were aspirated in semidarkness on my arm, when they tried to bite. About 12 hrs later they were fed, and did so readily, on human blood. Four females laid eggs once, between two and three days after that blood-meal. None could be induced to take a second



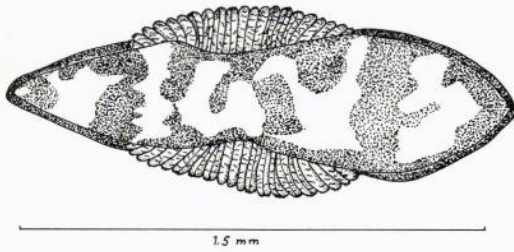


Fig. 2. *An. (Ano.) messeae* Falleroni. An egg from a different batch (same locality as Fig. 1). The number of the float chambers abt. 26. Ratio of width to length 0.17. These features together with the pattern of the chorion all classify the eggs as *messeae* and distinguish them well from *beklemishevi* (Stegnii & Kabanova 1976).

*An. (Ano.) messeae* Falleroni. Ägg från en annan hona (samma lokal som Fig. 1). Antal flytsektioner ca. 26. Förhållandet mellan bredd och längd 0,17. Dessa karaktärer samt mönstret av chorion är speciella för *messeae* och skiljer dem väl från *beklemishevi* (Stegnii & Kabanova 1976).

meal under the given circumstances. Each batch had about 60 eggs. These hatched in tap water of 22°C after two to four days. Within a week most larvae had reached the end of the second instar.

In April 1976 females were found indoors for about a week and four were caught. They had not attacked man. Only one could be induced to take a small amount of blood and all females died without having laid eggs. Most probably they were also *messeae*.

A comparison of the behaviour of the two catches with results from other areas indicates that the spring catch (?*messeae*) actually were females coming out early of hibernation (Ekblom and Ströman 1932) and were attracted by the light and warmth of the house. They may have hibernated in the unheated attic or the empty barn of the old farm, one of the places where inseminated females in more southern areas hibernate (Wesenberg-Lund 1920–21, Weyer 1935, Köhlhorn 1972). The summer females (*messeae*) came into the house attracted by light at dusk. They readily attacked man, thus displaying a great need for a blood meal. These females either belonged to or produced the hibernating generation. The number of generations in Fennoscandia is not

known. Presumably there might be two in the southernmost parts and only one generation towards the North.

### Sammanfattning

Äldre fynduppgifter från Sverige av arter tillhörande *An. (Ano.) maculipennis*-komplexet diskuteras med hänsyn till nyligen genomförda cytogenetiska studier (Stegnii & Kabanova 1976) och diskussioner av den taxonomiska status av komplexets arter (Guy et al. 1976). Förekomsten av *An. (Ano.) messeae* Fall. i Skåne har belagts (ny fyndort) genom studier av levande ägg. Nödvändigheten påpekas att verifiera äldre fynduppgifter från Sverige av i synnerhet *An. (Ano.) maculipennis* Meig.

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