

**The ovarian polytene chromosomes  
of the taxon  
*Anopheles (Cellia) nili* Theobald**

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**Summary**

*A photomap of the ovarian polytene chromosomes of Anopheles nili Theobald, 1904 is presented as a standard reference for this taxon.*

*A comparison of the ovarian polytene chromosomes of individuals sampled from a population of An. nili at M'Poka, République Populaire du Congo, with the standard revealed no evidence of any within-taxon chromosomal variation.*

**Key words :** *An. nili* — ovarian polytene chromosomes.

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**Résumé**

LES CHROMOSOMES POLYTÈNES DES OVAIRES DANS LE TAXON ANOPHELES (CELLIA) NILI THEOBALD.

*Une carte chromosomique photographique est présentée comme une référence standard pour ce taxon.*

*Une comparaison des chromosomes polytènes d'un échantillon d'individus provenant d'une population d'An. nili de M'Poka (R.P. du Congo) avec le standard ne révèle pas de variations chromosomiques à l'intérieur du taxon.*

**Mots-clés :** *An. nili* — Chromosomes polytènes des ovaires.

**1. Introduction**

Analysis of chromosomal rearrangements visible in polytene chromosomes from ovarian nurse cells of wild-caught females assigned to specific taxa in the anopheline subgenus *Cellia* are in progress (Green, 1982a) in an exploration of the evolutionary history of this group of mosquitoes. A consequence of this work with important implications for epidemiological studies of malaria is an

answer to the question : " Do individuals assigned to the same vector species taxon represent the same field for gene recombination, or species in the genetic sense ? ". Already, this question has been answered in the negative for the taxa *An. culicifacies* (Green and Miles, 1980), *An. maculatus* (Green, 1982b), and *An. pharoensis* (Miles *et al.*, 1983). The basic approach has been to look for situations in nature where carriers of different chromosome arrangements co-exist in the absence

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of heterozygotes for those arrangements. The first requirement is a photomap designated arbitrarily as "standard" for each taxon under study.

We present a photomap of the ovarian polytene chromosomes designated as "standard" for that taxon. We also report the results of a survey of the polytene chromosome arrangements relative to the "standard" arrangement in a natural population of *An. nili*.

## 2. Materials and Methods

### 2.1. LOCALITIES AND SAMPLES

*Namibia* : four females were collected resting on bushes around a cattle kraal near Popa Falls, Okavango River (18°03' S, 21°39' E) in February, 1979.

*Congo* : 97 females were collected biting man at night in the M'Poka village area (3°55' S, 14°29' E) between 1978 and 1980. This population and locality has been described by Carnevale (1974a, b), Carnevale and Zoulani (1975), and Carnevale *et al.* (1978).

### 2.2. PRESERVATION OF OVARIES

Ovaries were placed in freshly-prepared modified Carnoy's fluid (3 volumes absolute ethanol to 1 volume glacial acetic acid) either after removal (Namibian material) from the females, or while *in situ*, when each female was judged to have reached ovarian maturation stage 2b. Attempts were made to keep the Carnoy's fluid at less than 25°C for at least 24 hours. For prolonged storage the ovaries were kept at 5-10°C with the occasional changed of Carnoy's fluid. The ovaries were then sent to London for processing.

### 2.3. CHROMOSOME PREPARATIONS

Polytene chromosomes were examined by the methods detailed in Green and Hunt (1980) and Miles *et al.* (1983). The photomap was constructed from the polytene chromosomes of the Namibian material using a montage technique so that the chromosomes can be made as straight as possible. Comparisons with the standard photomap were made using a *camera lucida* attached to a Zeiss Photomicroscope III.

## 3. Results

The standard photomap for the taxon *An. nili* is presented in photo 1. The arm designation follows that proposed by Green and Hunt (1980). The actual arm association has not yet been deter-

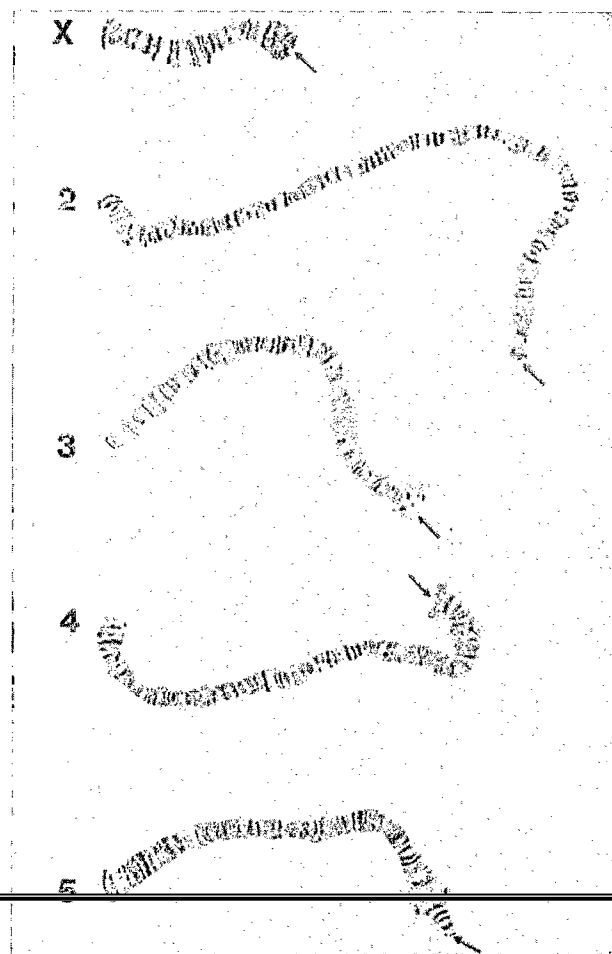


PHOTO 1. — Photomap of the ovarian polytene chromosome arrangement designated as "standard" for the taxon *Anopheles nili* (Theobald), 1904. The map was constructed from individuals representing a population of this taxon in Namibia (see text for details). The arrows indicate the centromeric ends of the chromosomes.

Readable polytene preparations were made from 68 of the 97 females collected at M'Poka. All had the same chromosomal arrangement as the "standard". No inversion polymorphisms were detected.

## 4. Discussion

The taxonomy, distribution, malaria vector status and biology of the taxon *A. nili* has been reviewed by Gillies and De Meillon (1968). These authors refer to this taxon as a complex on the basis of important differences in man-biting habit, vectorial status and morphology. The present study involved a presumably zoophilic population from southern Africa (where *An. nili* is rare) and material from an area where *nili* is known to be man-biting and a secondary vector of malaria, but unfortunately, due to the method of preserving the ovaries, it is not possible to determine whether both populations were morphologically different. Consequently the absence of chromosomal rearrangements quite often associated with species differences cannot be easily interpreted. Does the

have presented provides a reference point for further studies, where more extensive sampling of natural populations would be carried out together with the necessary formal taxonomic studies of chromosomally-identified material.

It is interesting that *An. nili* belongs to the series *Neomyzomyia*. Studies of other vector species within this series (eg. *An. balabacensis* s.l. and *An. punctulatus*) have failed to find readable ovarian polytenes chromosomes.

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were we sampling geographically-distinct populations of the same species? The photomap we

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## BIBLIOGRAPHY

- CARNEVALE (P.), 1974a. — Comparaison de trois méthodes de capture pour l'échantillonnage d'une population d'*Anopheles nili* (Theobald), 1904. *Cah. O.R.S.T.O.M., sér. Ent. méd. et Parasitol.*, 12, 2 : 135-144.
- CARNEVALE (P.), 1974b. — Variations saisonnières d'une population d'*Anopheles nili* (Theobald), 1904 en République Populaire du Congo. *Cah. O.R.S.T.O.M., sér. Ent. méd. et Parasitol.*, 12, 3 : 165-174.
- CARNEVALE (P.), BOSSÉNO (M.-F.) and ZOULANI (A.), 1978. — Étude du cycle gonotrophique d'*Anopheles nili* (Theobald), 1904. *Cah. O.R.S.T.O.M., sér. Ent. méd. et Parasitol.*, 16, 1 : 43-52.
- CARNEVALE (P.) and ZOULANI (A.) 1975. — Agressivité d'*Anopheles nili* (Theobald), 1904 à l'intérieur et à l'extérieur des maisons. *Cah. O.R.S.T.O.M., sér. Ent. méd. et Parasitol.*, 13, 2 : 69-73.
- GILLIES (M. T.) and DE MEILLON (B.), 1968. The Anophelinae of Africa South of the Sahara. S.A.I.M.R. Publication no. 68, Johannesburg, S.A.
- GREEN (C. A.), 1982a. — A cladistic analysis of mosquito chromosome data. *J. Hered.*, 73 : 2-11.
- GREEN (C. A.), 1982b. — Population studies of anophelines. Doctoral thesis, Department of Zoology, University of the Witwatersrand, Johannesburg.
- GREEN (C. A.) and HUNT (R. H.), 1980. Interpretation of variation in ovarian polytene chromosomes of *Anopheles funestus* Giles, *A. parensis* Gillies, and *A. aruni* (?), *Genetica, The Hague*, 51 : 187-195.
- GREEN (C. A.) and MILES (S. J.), 1980. — Chromosomal evidence for sibling species of the malaria vector *Anopheles* (*Cellia*) *culicifacies* Giles. *J. trop. Med. Hyg.*, 83 : 75-78.
- MILES (S. J.), GREEN (C. A.) and HUNT (R. H.), 1983. — Genetic observations on the taxon *Anopheles* (*Cellia*) *pharoensis* Theobald. *J. trop. Med. Hyg.* 86 : 153-157.