

Residual anofelism in the Northern Adriatic Sea littoral 50 years after malaria eradication

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The Northern Adriatic Sea littoral was heavily malarious; intensive land drainages, agricultural development and socioeconomic improvement were the key factors which led to malaria eradication, sped up by indoor insecticide spraying, achieved soon after the World War II. Periodic regular observations on anophelism were carried out by the Istituto per la Lotta Antimalarica delle Venezie from middle 20's until early 60's. The main vector was *Anopheles sacharovi*, a species which typically bred in coastal brackish swamps; other species were *An. atroparvus* (which was a probable secondary vector) and the usually strictly zoophilic *An. maculipennis*, *An. melanoon*, *An. messeae* and *An. subalpinus*.

From 1995 to 1997 surveys were carried out in order to review the genus *Anopheles* in the coastal area of Friuli-Venezia Giulia and Veneto regions. A total of 11,346 females were collected from animal shelters (cowshed, pigsties, horsestables) of 52 sites along 180 km of coast crossing 5 provinces (from North: Gorizia, Udine, Venezia, Padova and Rovigo). All specimens belonging to the *An. maculipennis* complex were scored for the presence of the differential characters of *An. sacharovi*, the only species of the complex morphologically characterized at the adult stage. The examination of morphological characters of single egg batches obtained from field collected females was the main diagnostic tool for the other species. Species identification was subjected to confirmation by larval chetotaxy analysis (n. of branches of antepalpmate hairs of IV and V abdominal segments) in representative samples of laboratory-reared mature larvae, while biochemical analysis (enzyme electrophoresis) on some samples of identified females were performed in the laboratory of Prof. L. Bullini and Dr. R. Cianchi of the University of Rome "La Sapienza" and partly in our laboratory.

No *An. sacharovi* female was recorded. The examination of 6,352 single ovipositions obtained from 9,619 females led to the identification of three species of the *An. maculipennis* complex: *An. atroparvus*, *An. maculipennis* and *An. messeae*, and one of the *An. claviger* complex: *An. claviger s.s.* (tab. 1). Larval chetotaxy examination carried out on 1,626 larvae and the biochemical identification of 457 females confirmed the previous diagnosis based on egg characters.

The relative frequency of the species varied depending on the site: *An. maculipennis* was the most abundant species north of Venice; south of Venice, and particularly in the Po river delta, the most abundant species were *An. atroparvus* and, in some sites, *An. messeae*.

In view of the high density recorded for *An. atroparvus* in some sites (corresponding to various thousands females in a single animal shelter), the vectorial capacity values may be significant and should be assessed.

Tab. 1. Results of the identifications based on egg morphology; *atrop.* = *An. atroparvus*, *macul.* = *An. maculipennis*, *mess.* = *An. messeae*, *clav.* = *An. claviger s.s.*

Province (No. sites)	No. collected females	No. ovipositing females	No. ovipositions obtained	% <i>atrop.</i>	% <i>macul.</i>	% <i>mess.</i>	% <i>clav.</i>
Gorizia (2)	206	153	87	1	91	2	6
Udine (6)	1,398	1,380	759	2	93	0.1	4
Venezia(27)	6,009	5,398	3,514	20	75	3	2
Padova (1)	79	79	52	42	29	29	-
Rovigo (16)	3,654	2,609	1,940	59	1	40	0.2
TOTAL	11,346	9,619	6,352	29	55	14	2