FAILURE OF ANOPHELES STEPHENSI LISTON TO TRANSMIT HUMAN PLASMODIA MECHANICALLY

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ABSTRACT. Malaria patients with high asexual Plasmodium vivax or P. falciparum parasitemias each gave partial blood meals to 30 normal Anopheles stephensi Liston. These mosquitoes were then allowed to complete their meals on two uninfected volunteers. These volunteers did not contract malaria.

INTRODUCTION

The possibility of mechanical transmission of human plasmodia by mosquitoes has been investigated by several workers. Mayne (1928) reported on 4 unsuccessful attempts using Anopheles quadrimaculatus Say and Plasmodium vivax. P. G. Shute (personal communication) mentioned the failure of additional attempts by B. Mayne, S. P. James and himself using Anopheles atroparvus Van Thiel and P. vivax. No other mechanical transmission studies employing mosquitoes and other human plasmodia appear to have been reported. In view of the potential importance of this mode of transmission for malaria eradication schemes, it was decided to repeat the above work with P. vivax using Anopheles stephensi Liston and to initiate a similar study using Plasmodium falciparum.

MATERIALS AND METHODS

Informed volunteers, adult male inmates of the Maryland House of Correction, Jessup, Maryland were selected for the study after detailed examinations for mental and physical fitness that included chest radiography, electrocardiogram, and laboratory tests. A particular prerequisite was normality of the baseline blood picture and hepatic and renal function tests. Infec-

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MALARIA PARASITES. The Chesson strain of P. vivax has served as a standard laboratory strain since its isolation in New Guinea over 30 years ago. In 1974 a new isolate of P. falciparum transmitted in East Africa was sent to us. This strain has been found to be chloroquine sensitive
and is designated the Tanzania (Mor.) strain.

PROCEDURE. When malarial parasite donors were shown by blood smear examination to have a high level of young ring-stage trophozoites, normal *A. stephensi* were placed in individual containers and allowed to take a partial meal on the potential malarial donor. After partial engorgement the mosquito was removed and immediately placed upon the uninfected volunteer.

RESULTS

EXPERIMENT I: *P. falciparum*. When the donor volunteer demonstrated an asexual parasitemia of 6,120 per mm$^3$, 30 normal *A. stephensi* were placed in individual cages and split-fed on the donor (blood group O) and an uninfected volunteer. The second volunteer's blood slides remained negative thereafter.

EXPERIMENT II: *P. vivax*. When the donor volunteer demonstrated an asexual parasitemia of 16,920 per mm$^3$, 30 normal *A. stephensi* were placed in individual cages and split-fed on the donor (blood group O) and an uninfected volunteer. The second volunteer's blood slides remained negative thereafter.

DISCUSSION

Under the optimal conditions described above *A. stephensi* failed to transmit either *P. vivax* or *P. falciparum*, therefore it appears unlikely that this species does in fact transmit human malaria either by contamination of the mouth-parts or by fecal ejection of part of the blood meal during feeding. The possibility that other species of mosquitoes might transmit in this way is being investigated.

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Literature Cited