EFFECT OF GAMMA RADIATION ON THE ACTIVITY OF MOSQUITO *CULEX PIPIENS*

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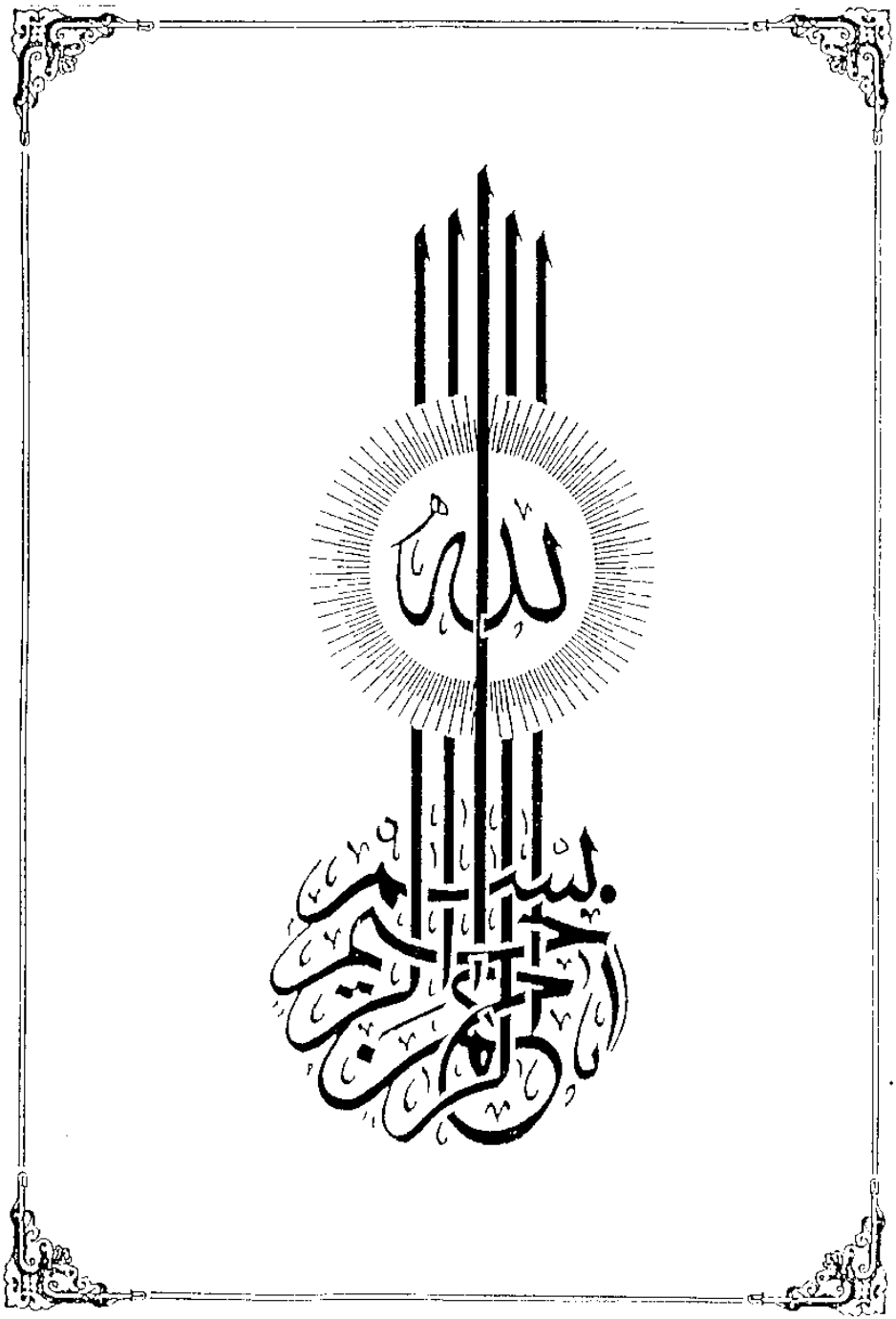

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INTRODUCTION

I. INTRODUCTION

Among the numerous species of bloodsucking arthropods that annoy man and other warm-blooded animals, mosquitoes stand out most prominently. Generally, they stand as insect vectors of diseases. They are the sole vectors of the malarias, yellow fever, and dengue, and they participate very importantly in the transmission of filariasis and the encephalitides.

Economic losses due to mosquitoes would done, amply justify the great sums now spent on mosquito abatement, yet these losses are minor compared with the prodigious damage done to the public health by mosquitoes as vector of diseases.

Culex pipiens L. is one of the most widespread culicid mosquito and the research on its control has recently been increased because of its importance as a transmitter of Wuchereria bancrofti and Rift Valley fever (Hoogstraal et al., 1979 Meegan et al. 1980).

The importance of filariasis transmitted by Culex sp. in Egypt has been growing steadily in recent years and considerable attention has been focussed on its control.

The high hopes for mosquito eradication placed on residual insecticides were soon belied by the discovery of resistance in

victor mosquitoes. This discovery has once again emphasized the value of the use of other biological methods for control or eradication. It is well known that Culex pipiens had developed a high degree of resistance to insecticides used for mosquito control.

The successful experiment carried out by Knipling (1955), and his co-workers which led to the eradication of the screw worm fly Cochliomyia haminivorax from the South Eastern of America, by the sterile male technique, made the use of ionizing radiation as one of the approaches in insect control.

Many records have been obtained on the bad effects of gamma radiation on the vitality and consequently competability of the insects in the normal populations. The effect on the overall performance of the insect arises from a number of individual performance traits. Aspects of the function quality of the sterilized mosquitoes used in an eradication on control program can be evaluated by measuring their overall performance or by measuring their individual performance traits viz: orientation to habitat , sexual activity, sexual physiology... etc.

In the present study, different individual traits thought to be affected by radiation at different doses were investigated

in a hope that results obtained from this study may contribute to a proper understanding and offering help to the mosquito control program using the sterile insect technique.

Moreover, the effect of gamma radiation on the capability of the female mosquito to transmit the filaria larva (micro-filaria) from a diseased-man to a healthy one through its usual route in the adult mosquito body, was studied.

REVIEW OF LITERATURE

II. REVIEW OF LITERATURE

A. General Biology of Culex pipiens Complex:

Culex pipiens complex is considered as one of the most widely distributed mosquito species all over the world and it has been recognized as the major vector of filariasis throughout the world. The following riview aims to stating some references on the general biology of C. pipiens.

Rees (1901) found that when mosquitoes were bred in captivity, the males emerge earlier and in greater number than females.

Boyce and Lewis (1910) showed that the mucous formed in larval cultures served as a food for bacteria which was an important food requirement for mosquito culture.

Howard et al. (1912) mentioned that both fertilized and virgin females can be induced to suck blood.

Kirkpatrick (1925), stated that C. pipiens was a common domestic mosquito species forming about 95% of mosquitoes in houses, and it is very active at night, however, it could bite by daytime especially in a somewhat dark room as well as in cool days, possibly owing to their restricted activity by night.

Buxton and Hopkins (1927) have shown that the length of the larval life is longer for females than for males.

Wigglesworth (1929) found that the rate of larval growth rises with increase in temperature over a wide temperature range but rapid growth is also dependent upon an adequate food supply and in conditions of starvation, the larval stage may be prolonged for several months.

Boissezon (1929) reported that a portion of C. pipiens could breed without blood meal.

Huff (1929) observed that C. pipiens could lay autogenous eggs.

Roubaud (1929 & 1930) found examples of C. pipiens which could breed without blood meals.

Mayne (1930) found that females of the Culex pipiens kept in cages rarely fed at humidities below 60% R.H.

Roubaud and Toumanoff (1930) stated that adult females of Culex pipiens could produce fertile eggs without taking blood meals thus depending on material accumulated during its larval period.

Putman and Shannon (1934) stated that life is naturally

prolonged by feeding but females which are allowed to reproduce live less long than females fed on sugar solution only

Tate and Vincent (1936) considered the stenogamous character to be due to the fact that C. pipiens males copulated with resting females.

Marshall (1938) reported that C. pipiens pipiens males had swarmed before the mating process took place in the air.

Roy and Majunder (1939) found that one insemination is sufficient for the life of a female.

Fisk (1941), Callat(1943)and Romingtor (1945) found that blood is nearly always taken from mammals and birds but a few species fed regularly on amphibia and reptiles.

Knight et al. (1951) stated that "very little information was available about the exact larval dietary requirements for autogenous mosquitoes". They added that "it seems logic to believe that the larval food must be sufficiently rich in proteins and minerals to compensate for amount of these compounds that are normally obtained via the adult blood meal".

Tischner and Schief (1955) reported that an increase in wing-beat frequency occurs in Aedes aegypti reaching a maximum 3 days after emergence being some 200 c/s higher than in adults a few hours older.

Sasa et al. (1966) reported that C. pipiens complex could be further classified into several geographical or physiological subspecies as follows:

1- Culex pipiens pipiens linnaeus:

This subspecies is found in Europe and northern parts of North America which is physiologically not autogenous, not stenogamous and difficult to be bred in cages.

2- Culex pipiens fatigans Wiedemann:

Which is found in the tropical and subtropical zones of the world and is neither autogenous nor stenogamous, but is easily bred in cages.

3- Culex pipiens pallens Coquillette:

Which show intermediate characters between the two extreme populations; C. pipiens pipiens and C. pipiens fatigans and in neither autogenous nor stenogamous.

4- Culex pipiens molestus Forskal

Which has been attributed to the autogenous and stenogamous race and found in Egypt, Middle East-Japan and