



## Development status of *Wuchereria bancrofti* in experimentally infected *Culex quinquefasciatus* with seasonal fluctuations: A study in slums of Burdwan

Indranil Bhattacharjee<sup>1</sup>, Biplab Mandal<sup>2</sup>, Partha Pratim Chakravorty<sup>3\*</sup>

<sup>1,3</sup> P.G. Department of Zoology, Raja Narendra Lal Khan Women's College (Autonomous) (Natural and Applied Science Research Centre), Paschim Medinipur, West Bengal, India

<sup>1</sup> Department of Zoology, Dr. Bhupendranath Dutta Smriti Mahavidyalaya, Hatgobindapur, West Bengal, India

<sup>2</sup> Department of Zoology, Vidyasagar University, Paschim Medinipur, West Bengal, India

### Abstract

Changing seasons have effect on development of *Wuchereria* larvae. The effect of seasonal fluctuations on the development were assessed by experimental infection to *Culex quinquefasciatus* from a human volunteer (microfilaria (*mf*) carrier). Study indicates that the rainy season provides optimal conditions for transmission of *Wuchereria* in terms of minimum time span for the development of *mf* into infective L<sub>3</sub> larvae without any apparent loss of parasitic load during the process of development. There exists a robust relationship between ingestion of *mf*, production of L<sub>3</sub> and *mf* density in human blood which is a crucial determinant within the transmission dynamics of filaria.

**Keywords:** *Wuchereria*, development, fluctuation, season

### 1. Introduction

Lymphatic filariasis (LF) generally attacks lymphatic system and results in chronic illness. 856 million in 52 countries remain threatened by this diseases. DEC in conjunction with albendazole is recommended as treatment against LF [1]. Stability of transmission of *Wuchereria* depends upon many factors [2, 6] as well as variation within the density of *mf* within the blood and parasite [7, 8]. *Culex quinquefasciatus* is taken under consideration as primary vector of *Wuchereria bancrofti* [9, 10]. High humidity and optimum temperature plays important role in survivality of vector mosquito also as development of *Wuchereria* [11]. Microfilariae (*mf*) required a minimum of 16-17 days within the mosquito to succeed within the infective stage [12]. When the temperature was above 37°C and humidity below 65% no transmission was recorded in Khurda district of Orissa [13]. Many existing literatures are there which aren't sufficient to elucidate the effect of seasonal variation on parasitic development inside the vector species [12, 14, 15, 16].

The present study was designed to assess the effect of differences due to the season on the development of *Wuchereria bancrofti* from *mf* to infective stage (L<sub>3</sub> stage) in *Culex quinquefasciatus* in order that proper strategy even be adopted to manage vector population especially season and it's getting to produce cost-effective results around the year on the highest of things operations.

### 2. Materials and Methods

#### 2.1 Source, maintenance and Identification of experimental mosquito

Adult blood fed mosquitoes were collected from slum (Hatgobindapur (23.25°C N, 87.97°C E), Pandaveswar (23.70°C N, 87.27°C E), Jamuria (23.70°C N, 87.07°C E) and Memari (23.17°C N, 88.10°C E) of Burdwan during the year March 2019 to February 2020. Adult mosquitoes were then introduced in mosquito cage together with a clear

polyesterene 250 ml cup partially filled with distilled water overnight. Female lay egg one by one arranging them into head down array that sticks together to form the egg raft. Larvae were reared in plastic trays (30 cm × 25 cm × 5 cm) and were fed with Brewer yeast, dog biscuits and algae in a ratio of 3:1:1 respectively [17]. The water was changed on alternate day. The last instars larvae on transforming to pupae were manually collected, transferred to a beaker containing tap water and kept inside a mosquito cage for adult emergence. The emerged adults were put in adult-holding cages and fed with 5% sucrose solution. Key provided by Christophers [18], Barraud [19] and Chandra [20] were used to identify mosquito.

### 2.2 The Experiment

#### 2.1.1 Volunteers selection

Microfilariae carrier volunteer (sex-male, age- above 18, health status- no clinical signs of filariasis, medicines/treatment taken before- no treatment) from slums of Burdwan were selected at random as hosts for blood meal. Written consent was taken from them after describing them the nature of study. Densities of microfilariae in the blood done by the protocol of Chularerk and Desowitz [21]. At the end of the study they were treated by recommended dose of DEC by WHO [22].

#### 2.2.2 Infection of mosquito

Laboratory reared adult female mosquito (nearly 100) of day 4 age were kept separately in mosquito cage and subjected to starvation for one full day. One hand of human volunteer carrier of *mf* (*Wuchereria bancrofti*) was inserted into the mosquito cage at 1900 hour and allowed the mosquito to imbibe blood. Within one hour interval, nearly about 70% mosquitoes were found to be blood fed. Then the hand of volunteer was withdrawn and glucose solution (5%) was supplied in soaked cotton in the cage.