

DETERMINATION OF SPECIES COMPOSITION OF MOSQUITOES FOUND IN PALOSAI STREAM, PESHAWAR.

Naheed Ali and Syed Basit Rasheed

Department of Zoology, University of Peshawar, Peshawar.

ABSTRACT

Survey for immature stages of mosquitoes was carried out in polluted water of Palosai stream passing near Peshawar University campus. Collection of immature stages were done from April to June 2006 and then in October to January 2007 and were reared to adult, for identification which was done by using taxonomic keys of Christopher and Baurad. Collection was done from four different localities viz. Hayatabad, Lalazar Colony, Malakander and Ittehad Colony in Peshawar. A total of 15083 individuals were collected which included 7382 males, 7700 females and one gynandromorph, belonging to two genera *Culex* and *Anopheles*. More than 99% of the collected larvae and pupae belonged to the genus *Culex* with three species, viz. *Cx. pipiens quinquefasciatus*: the most abundant species, *Cx. tritaeniorhynchus* and *Cx. vishnui* occupying the same habitat and occurring in May, June and October while the genus *Anopheles* was found to contain six species viz. *An. nigerimus* (collected in April), *An. subpictus*, *An. culicifacies*, *An. fluviatilis*, *An. maculatus* (collected in October) and *An. stephensi* (found both in April and October).

Key Words: Peshawar, Palosai stream, mosquitoes larvae and pupae, species composition.

INTRODUCTION

Mosquitoes belong to the order Diptera sub order Nematocera and family Culicidae. Culicinae and Anophelinae are the two important sub-families of Culicidae. 8 genera and 440 species of culicinae occur in oriental region only, while a total of 45 species of *Anopheles* are found in this region (Knight and Stone, 1977; 1978). Sixty four species of sub family culicinae and 23 species of *Anopheles* occur in Pakistan. Among sixty four species of culicine, one each belongs to the genera *Tripteroides*, *Ficalbia*, *Coquilletidia*, *Uranotaenia* and *Armigere*, 2 species to *Mansonia*, 3 species to *Culiseta*, 24 species to *Culex* and 30 species to *Aedes* (Aslamkhan, 1971). Suleman *et al.* (1993) studied the mosquito fauna of Peshawar and found 31 species belonging to 6 genera. Genus *Anopheles* was represented by 10 species, *Aedes* by 8, *Culex* by 9, *Culiseta* by 2, and *Armigeres* and *Mansonia* each by a single species.

Mosquitoes are important to mankind because of their ability to transmit many diseases. They act as vectors of many deadliest diseases including West Nile Virus, Yellow Fever, Filariasis, Dengue and Malaria. Malaria can be considered as the most common disease in many parts of the world. Mosquitoes of genus *Anopheles* are the vectors of four species of malarial parasites belonging to the

genus *Plasmodium*. Among 3.3 billion people at risk of malaria, about 247 million malaria cases causing approximately a million deaths, mostly of children under 5 years were reported in 2006. In 2008 the number of malaria endemic countries were 109 among which 45 were within the WHO African region (WHO, 2008). Out of 23 anopheline species reported from Pakistan, two species, *Anopheles culicifacies* and *Anopheles stephensi* are considered as primary malaria vectors in Pakistan. *Anopheles culicifacies* has been reported to be the most important vector in the rural areas (Covell, 1931; Hick and Majid, 1937; Reisen and Boreham, 1982; Mahmood *et al.*, 1984; Pervez and Shah, 1989), and *Anopheles stephensi* in the urban areas (Rehman and Mutalib, 1967). Apart from the above two species, *Anopheles pulcherrimus* and *Anopheles fluviatilis* are suspected to be acting as vectors, especially in the mountains and foot hill areas of northern districts of NWFP and Punjab (Suleman *et al.*, 1993).

Contrary to popular opinion, mosquitoes do not breed in the heavy undergrowth of weeds, bushes, or shrubs. Although these places provide excellent refuge for adults, they do not provide a suitable habitat for mosquito larvae. Mosquitoes of different species lay their eggs in a variety of water sources that range from small containers to vast expanses of marshland. The eggs may be laid singly or in rafts,

deposited in water, on the sides of containers where water will soon cover, or on damp soil where they can hatch when flooded by rainwater or high tides. Common breeding sites for mosquitoes are drainage ditches, ponds, tin cans, old tires and tree holes. The eggs of some floodwater mosquitoes may dry out for more than a year and still hatch when flooded (Koehler, 1999).

Main objective of the present study was to determine the species composition of mosquito fauna of Palosai stream at few places in Hayatabad, Peshawar University campus and adjoining area. The emphasis was on the collection of immature stages of mosquitoes found in the part of the stream polluted by different sources. The larvae were reared to adult hood for identification through taxonomic keys provided in "The fauna of British India, including Ceylon and Burma" by Christopher (1933) and Barraud (1934).

MATERIALS AND METHODS

Peshawar University campus and adjoining area including Hayatabad were collection sites from where regular collection was made from Palosai stream, which passes through Lalazar colony. Palosai stream originates from Khyber agency and flows up to Peer Bala from where it joins with other such streams. It enters Peshawar District from the South. The stream consists of rainy water and small drains arising from different areas of Hayatabad. This stream used to have flowing water only in rainy seasons but now it flows round the year and gets even flooded in Monsoon. Its water, before it enters Peshawar, is quite clean but it gets polluted in Hayatabad by drain system of residential area and industrial waste that join the stream. The areas of Palosai stream selected for study purpose comprised of polluted water at Hayatabad, Malakandher, Ittehad Colony and Lalazar Colony. Collection was made from these focal points on monthly basis depending on the availability of larvae. Only immature stages were collected. Collection was done from April to June and then in October to January. Along with these areas of Palosai stream, the immature mosquitoes were also collected from temporary ponds in its vicinity, which were formed due to overflow.

Larvae and pupae were collected with the help of a 500 ml plastic cup and transferred to a plastic jar. The

jar openings were closed with net cloth. No artificial food was given as the small quantity of stream water (300-500 ml) collected along with the larvae contained sufficient amount of food material. The larvae in the jar were kept at room temperature in the laboratory and were reared to adulthood. The adult mosquitoes were collected with the aspirator from the jars and were killed with a cotton swab of chloroform in an airtight container. Specimens were segregated sex wise and were placed in test tubes containing silica gel before identification. Binocular microscope was used for taxonomic study and identification was made up to species level with the help of taxonomic keys provided in "The fauna of British India, including Ceylon and Burma" by Christopher (1933) and Barraud (1934). Relevant information right from the time of collection of samples was recorded with great care and precision for final analysis and conclusion.

RESULTS AND DISCUSSION

This survey was conducted to know the species composition of mosquitoes that breed in Palosai stream. *Culex* and *Anopheles* are the two genera collected in this study. Nine species belonging to these two genera were found, viz., *Culex pipiens quinquefasciatus*, *Cx. tritaeniorhynchus*, *Cx. vishnui*, *Anopheles culicifacies*, *An. fluviatilis*, *An. maculatus*, *An. nigerrimus*, *An. subpictus*, and *An. stephensi*. *Culex* was predominated by representing the maximum number of larvae and pupae while *Anopheles* by a few individuals.

A total of 15083 immature stages of mosquitoes were collected including 7382 male, 7700 female and one gynandromorph (Ali and Rashid, 2008). Among these immature stages, 99.9% belongs to the genus *Culex* while 0.1% to the genus *Anopheles*. *Cx. pipiens quinquefasciatus* was the most abundant species represented by 6867 male and 6978 female individuals. Next abundant species was *Cx. tritaeniorhynchus* represented by 89 male and 96 female individuals followed by *Cx. vishnui* represented by 68 male and 72 female mosquitoes. *Anopheles* comprised of five individuals each of *An. subpictus* and *An. stephensi* while one individual each of *An. culicifacies*, *An. fluviatilis*, *An. maculatus* and *An. nigerimus* were collected (Table 1).

Armigeres in sewerage main holes and *Mansonia uniformis* remains attached to submerged plants for respiratory requirements. In this study only those species that breed in running polluted water were collected.

Some characters like colour and size of mosquitoes observed in the present study were different from those given in the key used for identification, like the color of thorax, which depends on the food taken at the larval stage. In this study no artificial food was provided to the immature stages and they were dependent on the naturally available food in the water collected at the time of sampling. The available food varies not only in type but also in quantity; which has resulted in variation of colour and size. Overall the variation did not prevent exact identification of species. Most of the species found in this survey were recorded by different workers, in other parts of the Province, like from Kohat Hangu Valley (Qutubuddin, 1960); a rural village of Swabi District (Khan, 1994); Bajuar agency and Shahipayan village of Peshawar (Shah, 1997).

The number of species found in the present work is relatively less as compared to the earlier studies and this is apparently because of the collection methods and difference in the ecology of different areas surveyed. Suleman *et al.* (1993) used six collection methods for sampling of mosquitoes from variety of habitats: larval/pupal survey, indoor resting collection, animal nets, bird baited traps, man biting and light traps, while in present work, the collection was focused only on immature stages. Another possible reason may be that the survey was restricted to sewerage water and temporary/permanent ponds/ditches present in the vicinity of Palosai stream.

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