M.Phil. in Zoology

Bionomic aspects of members of the *Anopheles subpictus* complex from selected localities in Sri Lanka

Pavilupillai Justin Jude

Abstract

Anopheles subpictus sensu lato **is a proven vector of malaria in Sri Lanka. This taxon exists as a species complex comprising four sibling species namely A-D in the Indian subcontinent. A limited study carried out in Sri Lanka revealed the presence of all four sibling species in the country. The present study was carried out with objective of establishing the bionomics such as prevalence, feeding and breeding preference, resting behavior and susceptibility to common insecticides by members of the Subpictus complex. Adult mosquito samples and larval forms were collected between July, 2008 and May, 2011 in different locations and using different techniques. Iso-female progenies were obtained from collected blood-fed *An. Subpictus* females and their sibling species status was confirmed based on diagnostic morphological characteristics. Collected blood-fed samples were screened for blood- meal analysis and parasite detection. Larvae of iso-female progenies were used to prepare mitotic chromosomes. Salinity tolerance test, with salinity level from 1 ppt - 35 ppt, were performed to determine differential salinity tolerance of sibling species in the laboratory. Insecticide susceptibility tests to common insecticides were carried out using standard bioassays and biochemical assays. A total of 9584 *An. Subpictus s.l.* adults and 2909 larvae were collected. All four sibling species were indentified in all four districts. Species C (63.7%) was predominant in inland areas followed by species B (20.8%), species D (15%) and species A (0.5%), whereas species B (49%) was predominant in coastal areas followed by species C (41%) and species D (10%). Species B tends to feed outdoors and species A, C and D prefer to feed indoors. Blood-meal analysis revealed that species A, species B, species C and species D with 21%, 38%, 30% and 14% of human blood index (HBI) respectively. *Anopheles subpictus B/An. sundaicus* were collected from both inland and coastal sites where salinity levels varied from 0 to30 ppt. *An. Subpictus* sibling species A, C and D were also collected from inland and coastal localities in water with salinity between 0 and 4 ppt. *An. Subpictus* C, D and *An. Subpictus* B/ *An. Sundaicus* larvae showed differential salinity tolerance in laboratory tests. All sibling species were highly resistant to DDT. However there were significant differences among the sibling species in their susceptibility to tested insecticides. Species B was more susceptible to all the tested insecticides than the other sibling species. Malathion resistance in both species C and D may be caused by elevated GST activity and an altered insensitive target site in AchE. Elevated esterase levels in species C and D might have contributed to the low levels of pyrethroid resistance. However an absence of elevated activity of monooxygenases in species B, C and D indicates that monooxygenases are unlikely to be the cause of this partial resistance to pyrethroids. The study demonstrates that the presence of all four sibling species is wide spread and they show differential feeding preference, salinity and susceptibility to insecticides. These established differential bio–ecological traits are important in devising appropriate vector control measures in the country to sustain the low prevalence of malaria.**