**Research Methods**

**Overview of Tutorial**

Title: A Phylogenetic Exploration of parasite receptor in Anopheline Species

Research Questions

* How closely related are the pfs47 receptor found in different Anopheles Mosquito species.
* Can any relationship be observed between Pfs47 receptor of Anopheles species and other mosquito species?

**Objective:** To develop an R script to construct a phylogenetic tree using a FATSTA file containing protein sequences of mosquito species.

**A few statements about the intended approach/methods**

*Plasmodium falciparum*, a parasite transmitted by Anopheles mosquitoes, possesses the surface protein Pfs47, which aids in evading the mosquito immune system, ensuring its survival and transmission. This host-pathogen interaction is highly specific, as *P. falciparum* expresses Pfs47 haplotypes compatible with their mosquito vectors. Failure in compatibility with the host receptor can activate the mosquito immune system, leading to the parasite's death. By constructing a phylogenetic tree, this tutorial aims to elucidate the relationship between different Anopheles mosquitoes and their Pfs47 haplotypes.

The initial stage involved the collection of DNA sequence/Protein sequences of anopheles species from different geographical regions. The phylogenetic tree will be constructed using R software with established algorithms implemented in libraries such as Phangorn, ape, and seqinr to show the relations between different taxa. Statistical support for the inferred phylogenetic relationships will be evaluated using bootstrap resampling and maximum likelihood approach. The tree will be displayed with appropriate labels and annotations to facilitate interpretation.