Rapid identification of female *Culex* mosquito species using Expert System in the South East Asian region

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Abstract:
Rapid identification of mosquito (vector) species is critical for vector control and disease management. Pictorial keys of mosquito species are currently used for the identification of new mosquito species. However, this approach is not very effective. Here, we describe the use of an ID3 algorithm (part of artificial intelligence) for the rapid identification of the South East Asian female *Culex* mosquito species.

Availability: http://www.envisiict.org

Keyword: Rapid; identification; *culex*; mosquito; expert system

Background:
Mosquitoes are vectors for transmitting parasites and viruses for human diseases such as malaria, filariasis, yellow fever, dengue fever and encephalitis viruses. **[1]** Vector identification is a basic preventive strategy to control mosquito borne diseases. Generally, experienced taxonomists are involved in the identification and characterization of disease causing mosquito species. **[2]** However, identification of mosquito species using visual inspection of pictorial keys is time consuming and error prone. Hence, it is desirable to have a computerized mosquito identification system for the accurate identification of unknown *Culex* species in the South East Asian region. The use of expert system in disease management has improved public health care. **[3,4]** Here, we describe the use of expert system for the identification of disease causing mosquito species in the South East Asian regions.

Methodology:
Data utilized:
A rule based expert system was developed using the pictorial keys described elsewhere for *Culex* species associated with Japanese Encephalitis in Southeast Asia (Diptera: Culicidae) in Mosquito Systematics. **[5]**

Iterative Dichotomizer (ID3):
ID3 algorithm was applied for the development of the rule-based expert system for female *Culex* mosquito species of South East Asia. The algorithm uses ''binary partitioning'', where, parent nodes are always divided (using IF-THEN rules) into two child nodes until the tree terminates.

Macromedia Dream weaver MX 2004:
Macromedia Dream weaver MX 2004 was used for creating the online web interface.

Utility:
Accurate and rapid identification of mosquito species are paramount importance for the public health planners and administrators involved in vector control operations. The online expert system described in this article finds utility in vector identification and disease management. The system produces a decision tree for the identification of common *Culex* species in the South East Asian region (Figure 1).
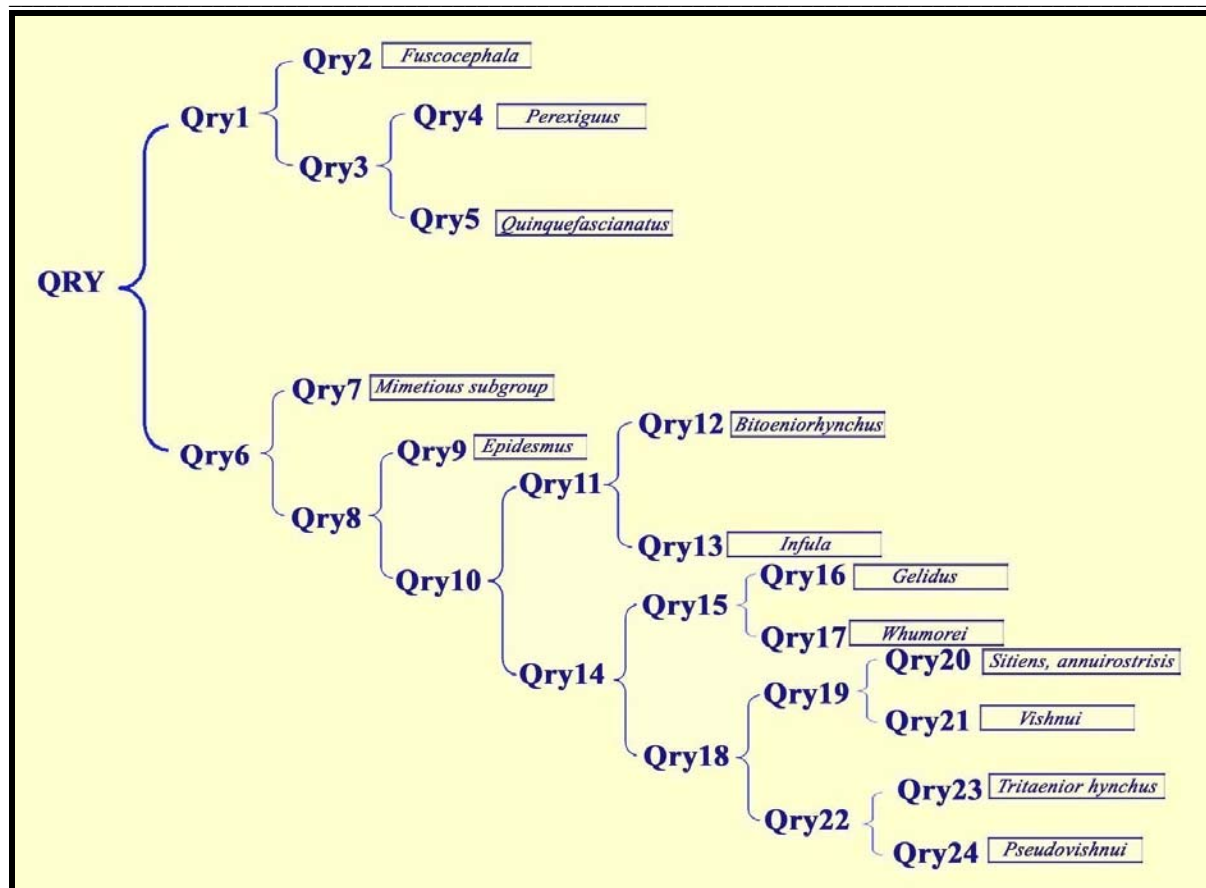
Figure 1: A decision tree for the identification of common *Culex* species in the South East Asian region is shown

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