



ID der Kurzfassung : 434

Automated wing shape analysis for accessible identification of mosquitoes and other pathogen-transmitting Diptera

Inhalt

Accurate species identification of Diptera, including vectors of pathogens, remains a persistent bottleneck in surveillance. Knowing which species are present is the basis for risk assessment and control. Reliable identification, however, depends on scarce taxonomic specialists or expensive alternatives. Analysing the shape of insect wings is a faster and cheaper, but measuring wings manually is slow and subjective.

We developed ITHILDIN, a free, open-access system that automatically places anatomical reference points (landmarks), on Diptera wings using deep learning and identifies species from their geometric arrangement rather than an opaque AI algorithms.

ITHILDIN distinguish 34 mosquito taxa with 91% accuracy, matching conventional “black-box” neural networks while remaining fully interpretable. It reliably flags images it cannot process, providing built-in quality control.

The underlying reference database now exceeds 50,000 wing images of over 100 taxa, and the pipeline has already been transferred to two further Diptera families, i.e. Drosophilidae and Glossinidae, demonstrating that it is not limited to mosquitoes.

By removing the need for specialist expertise and costly equipment, ITHILDIN makes species identification for insect vectors accessible to a far wider range of users. Its transparent results and expanding species coverage make it a practical tool for vector monitoring and control, including in regions where identification capacity is currently limited.

Keywords

entomology, vector identification, AI

Registration ID

OHS26-131

Professional Status of the Speaker

Senior Scientist

Junior Scientist Status

No, I am not a Junior Scientist.

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Vortragende(r): LÜHKEN, Renke

Track Klassifizierung: Novel Methods, Technologies & AI

Typ des Beitrags: Oral presentation

Eingereicht von **LÜHKEN, Renke** <luehken@bnitm.de> am **Montag, 22. Juni 2026**