Identification of mosquitoes: new simplified keys for morphological analysis

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INTRODUCTION.

In medical and veterinary entomology, the morphological identification is an important tool to recognize vectors of pathogens as mosquitoes, sand flies and ticks. Analysis is based on dichotomous keys (on paper or digital support), that follow a single pathway of character choices up to an end point, i.e. the identification of taxon. When personnel with expertise in entomology are not available, it is necessary to implement simplified tools suitable for achieving targeted objectives. Aim of this study is to create a simplified identification keys of mosquitoes at genus level, for personnel working in areas with potential circulation of vector-borne diseases. This work is a part of the ISS project "Collection, Characterization, and Control of vector arthropods and related pathogens – C3-Lab" carried out in collaboration with Ministry of Defence and University of Rome "Sapienza".

MATERIALS AND METHODS.

To create this new taxonomic support, all the morphological keys available for Italian and African species were analyzed. Simplified identification technology was developed in digital form using PowerPoint software – Microsoft® in a step-by-step dichotomic procedure. First key section consists of schematic character description and related species information (Fig.1). Practically, the operator pushes the button to choose the characteristics relating to the genera analysed in a simple scheduling system, including figures and description of morphological details with taxonomic value (Fig.2). Additionally, the main information on the vector and invasive species is reported in the summary sheets. All the selected characters will easily and uniquely guide operator towards a mosquito genus.

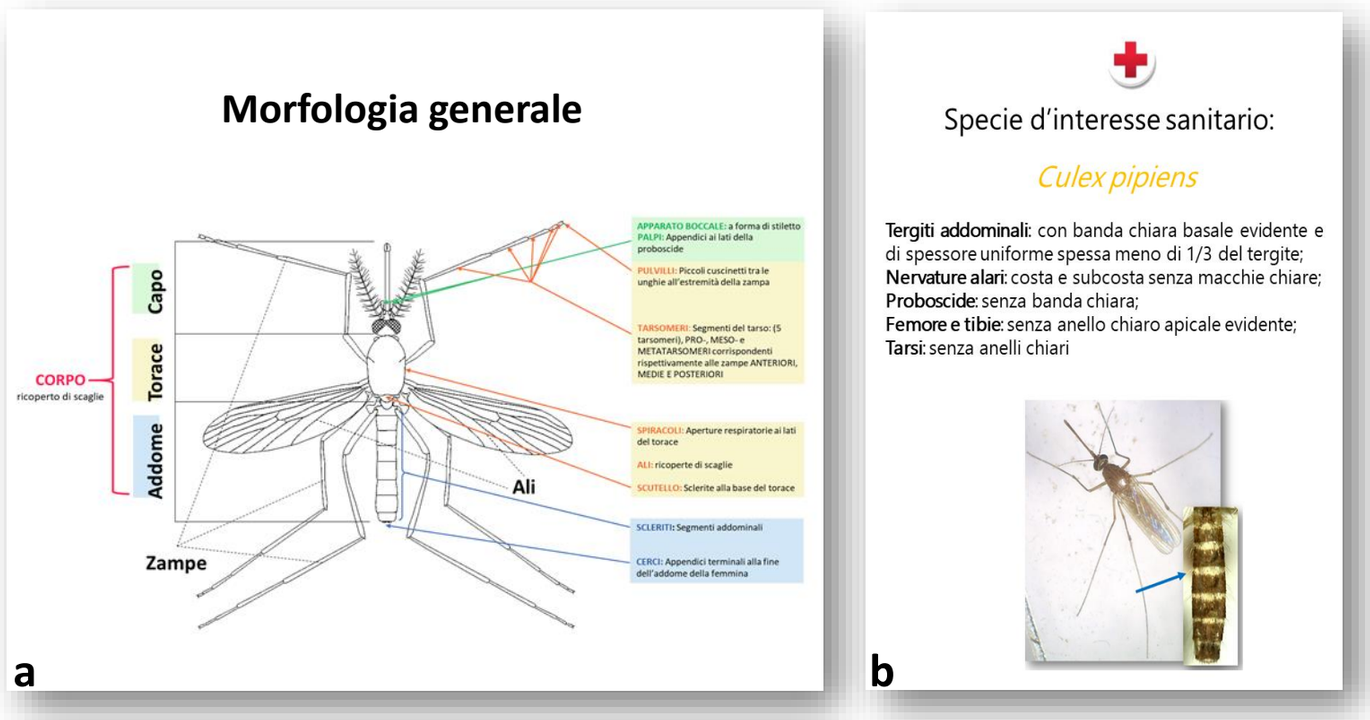

Fig. 1. General morphology scheme (a); Additional species information (b).

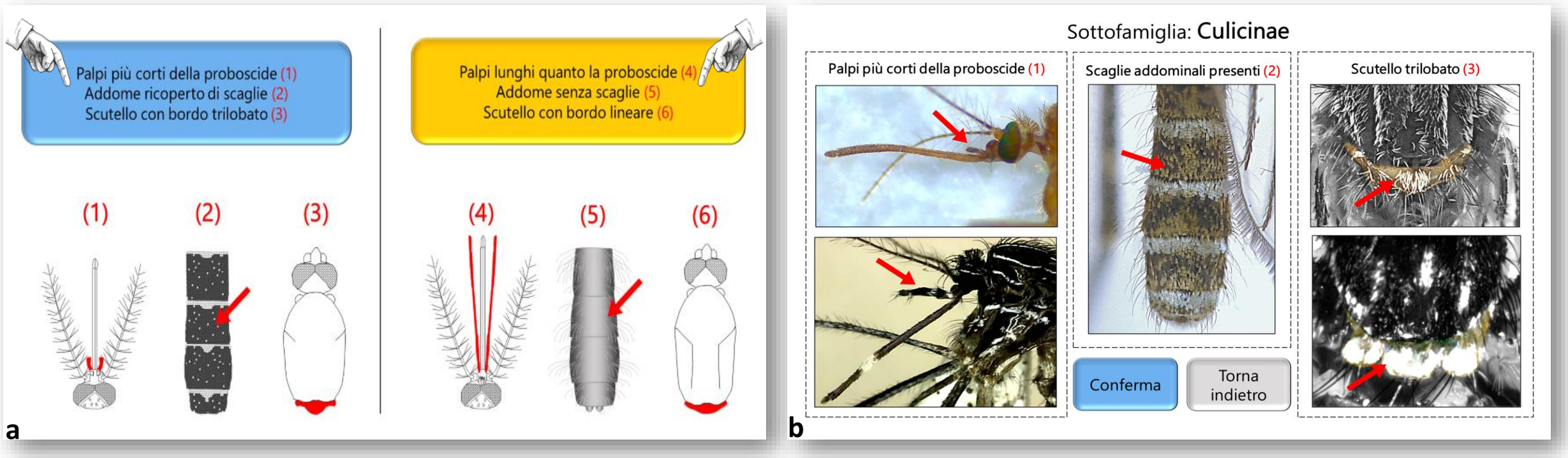

Fig. 2. Step by step dichotomic procedure: characters choise (a); photographic support to confirm the characters choise (b).

RESULTS AND CONCLUSIONS.

To have a prior knowledge of mosquitoes in an area chosen as a theatre of operations, and consequently of the potential diseases circulating, non-specialized personnel can use these digital keys that allow to quickly identify mosquito genera, using any technological support (smartphone, tablet, or computer). Moreover, during sampling procedures, specimens can be screened in real time, and all characteristics are preserved for identification and eventual molecular analysis of pathogens. This new practical support allows the identification of different subfamilies and genera using only a few diagnostic characters, currently only for Italian and African (Djibouti and Niger) mosquitoes. Future studies could be aimed at simplifying morphological keys for genera and species of any endemic area.

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