First Report of *MEGASELIA SCALARIS* in Evora Region, Portugal

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Introduction

Megaselia scalaris or scuttle fly, originally described as *Phora scalaris* by Loew in 1866, is a cosmopolitan species of the *Phoridae* family with broad relevance in forensic science, public health, microbiology, and food safety (Pallavi et al., 2023; Pennington et al., 2017). The objective of this study is to report the presence of the *M. scalaris* in Alentejo, Portugal.

Materials and Methods

In October 2025, as part of an ongoing study in southern Portugal, several samples of distinct swine muscles and arthritic fluid were inoculated into different culture media: Plate Count Agar (PCA), Violet Red Bile Glucose Agar (VRBG), Mannitol Salt Agar (MSA), and MacConkey Enterococcus Agar (M. Entero).

The plates incubated at 30 °C (PCA and VRBG) and at 37°C (MSA and M. Entero), after 72 hours they were examined, and revealing unusual markings in the PCA and VRBG cultures. Several larvae were first observed with the naked eye, followed by microscopic analysis, and subsequently by macroscopic examination using a dissecting microscope.

The plates with the larvae were maintained, allowing observation and later identification of various developmental stages: eggs, larvae, pupae, and adult. Later a morphological identification of adult flies was performed, and molecular confirmation via PCR targeting the mitochondrial cytochrome oxidase subunit I (COI) gene is currently underway.

Results and Discussion

Under conventional light microscopy, the larvae exhibited an elongated, translucent body approximately 6 mm in length, with visible mouth hooks. Then an examination using a dissecting microscope was conducted to observe additional morphological details.

The plates with the larvae were maintained under observation, allowing the identification of successive developmental of all stages. Morphological identification of the adult flies led to their classification as *M. scalaris*, based on key morpho-anatomical features.

M. scalaris is noteworthy, because of its importance in food contamination and myiases (intestinal, urogenital, ocular, vaginal, and cutaneous) (Koller et al., 2002; Ghavami & Djalilvand, 2015; Diyes et al., 2015; Chen et al., 2022; Solgi et al., 2017). It is also a concern in apiculture, as it can act as vector for Apis mellifera pathogens (Abou-Shaara & Darwish, 2021; Arafat et al., 2024; Disney & Aguiar, 2008; Rossi et al., 2024). In forensic entomology, plays a significant role in estimating the post-mortem interval (PMI), especially in indoor due to its ability to access confined environments and its predictable developmental cycle (Pallavi et al., 2023; Al-Zahrani et al., 2023; Yan et al., 2023).

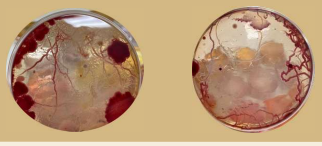
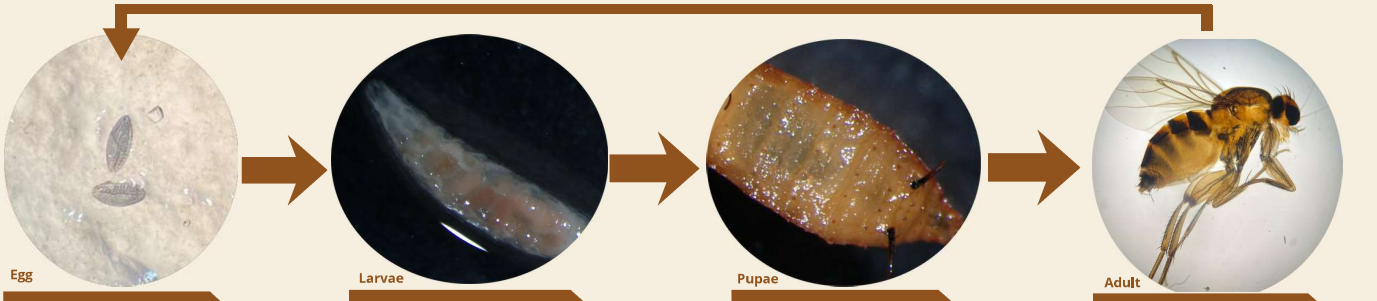


Fig. 1 Plates with larvae trails

Life Cycle of *M. scalaris*

PMI estimation tool in forensic entomology
Full cycle: 10–21.7 days (varies with environment)
Optimal temp.: 22–24 °C
Development influenced by temperature & humidity



Egg
Oviposition spans 3–5 days
Fecundity: over 350 eggs, up to 650 per female in 16 days
Hatching: ~20.8 hours at 25 °C
Low humidity negatively affects hatching success

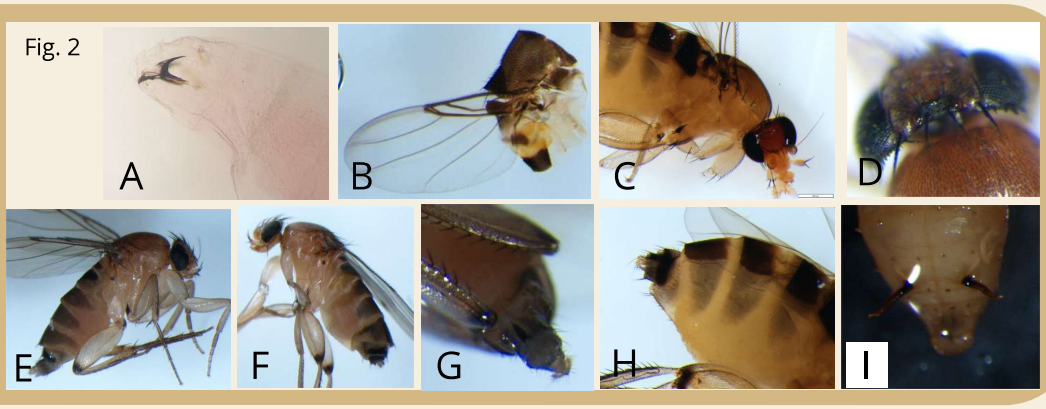
Larvae
L1-L2-L3
Duration: ~6.9 days at 25 °C
Faster at 27–28 °C
165 h → 63 h (from 18 °C to 27 °C)
Critical weight needed for pupariation
Delayed by toxins, antibiotics, hormones

Pupae
Duration: 11.7 days (♂) | 13.6 days (♀) at 25 °C
Reduced to ~9.9 days at 27 °C
Males pupate ~2 days earlier
Sensitive to heat; high temps cause sterility or death

Adult
Emerge: 17–29 days post - egg, average 22 days
Males emerge ~4 days before females
Copulation: ~32 seconds
Suboptimal diet shortens lifespan
Known for "scuttle" movement

Morphology

Fig. 2 - Morphology of *Megaselia Scalaris*.
A- Larval mandibles and cephalopharyngeal skeleton.
B- The costal vein is notably thick and extends only to the middle of the anterior wing margin; vein R3 is distinctly forked, a diagnostic feature of the genus scale bar 1mm.
C- suctorial mouthparts; markedly developed femur, with prominent coxa and trochanter, scale bar 0.5 mm.
D- Three well-developed ocelli arranged in a typical triangular formation on the vertex of the head, scale bar 0,2 mm.
E- Male scale bar 1 mm.
F- Female scale bar 1 mm.
G- Male hypopygium, genital structures, scale bar 0.5 mm.
H- Female abdominal tergites e genital structures, scale bar 0.5 mm.
I- Two respiratory horns on the second abdominal segment of pupae, scale bar 1 mm.



Conclusions and Future Perspectives

This finding is noteworthy due to the species' relevance is a several forms of human myiasis, because its larvae are capable of infesting live human hosts (Koller et al., 2002; Ghavami & Djalilvand, 2015; Diyes et al., 2015; Chen et al., 2022; Solgi et al., 2017). Regarding future prevalence, a study modeled the future distribution of *M. scalaris* for the potential prevalence of M. scalaris under future climatic conditions (SSP126 and SSP585 scenarios) in Southern Europe indicates that the threats to apiculture from this pest are likely to continue over a long period through 2050 and 2070 (Abou-Shaara & Darwish, 2021). The highest infestation in Europe is expected to occur in Portugal, Spain, France, and Italy (Abou-Shaara & Darwish, 2021; Disney & Aguiar, 2008; Rossi et al., 2024). A study concluded that beekeeping in these regions, is expected to suffer from M. scalaris parasitism, and these threats reflect the danger posed by this pest to apiculture (Abou-Shaara & Darwish, 2021; Disney & Aguiar, 2008; Rossi et al., 2024).

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