Morphology of immature stages of *Sphaerophoria rueppellii* (Wiedemann,1820) (Diptera, Syrphidae) a predator of aphids pest

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Introduction

- The hoverfly *Sphaerophoria rueppellii* is widely distributed in the Palearctic, and their larvae prey on soft insect pests that cause significant agricultural losses.
- The correct morphological diagnosis of the immature stages of this predator, is especially important in biological control management.
- Little is known about the morphology of the immature stages of this predator, being only known the L3 stage using a light microscope, but lacking a complete and detailed study of their chaetotaxy made at SEM.

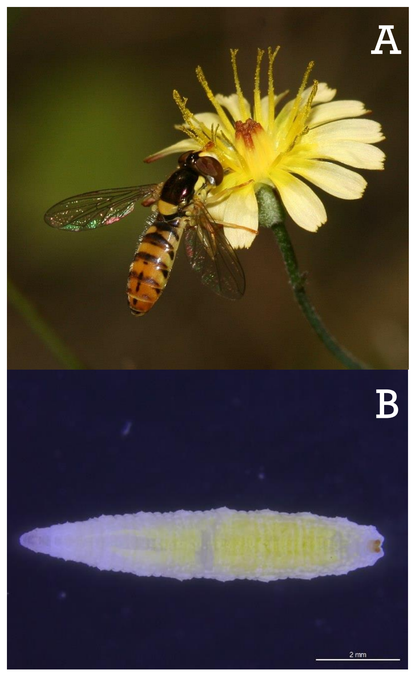


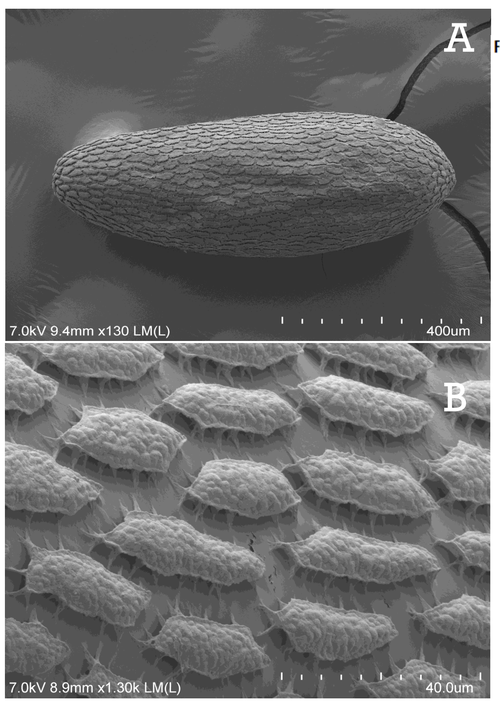
Fig 1. *S. rueppellii* A: Female (Photo by S. Rae); B: Larva L3

Materials and Methods

Material provided by BioNostrum Pest Company → Material fixed on KAAD → Cleaning at KOH 10% during 7 hours → Material mounted on aluminum stubs → Drying with Critical Point Dryer → Dehydration in series of alcohol → Sputter coated with 30 nm of gold → Observed under Hitachi SU8010-SEM

Results: Egg

- Length: (658-835 um); Width: (279-323 um); Chorion thickness: (1.54-4.25 um) n=10
- Chorionic sculpturing: hexagon form with 14-16 branches.
- EDS analysis shows C, N and O as the mayor atomic components of the surface.



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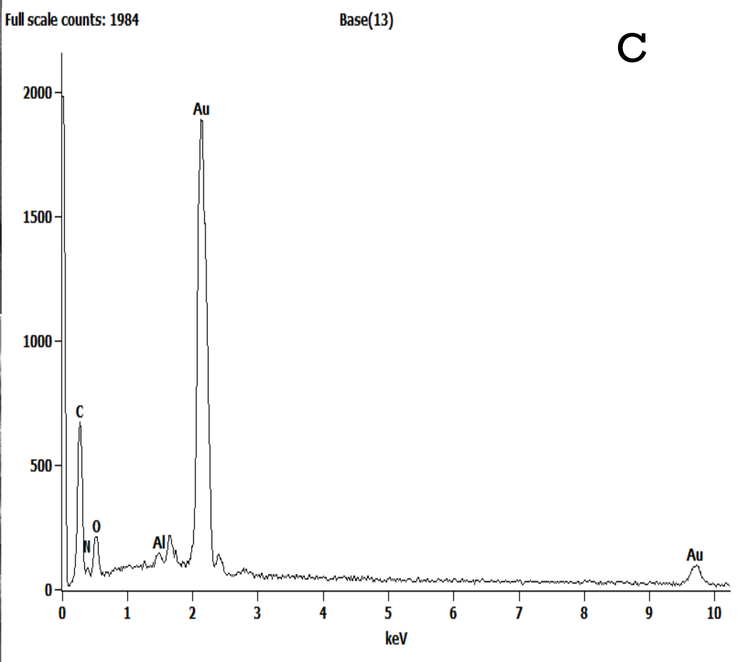

Fig 2. A: Lateral view of the *S. rueppellii* egg; B: Chorionic sculpture; C: EDS Analysis

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- The studied material was provided by BioNostrum Pest Control .

Results: Larva

- Alive L1 and L2 color is yellowish, the L3 stage is green with one white line on either side
- In the abdominal segments the number of sensilla varies depending on the larval stage. L1: 15 sensilla; L2: 16 sensilla and L3: 18 sensilla
- In all three larval stages, the sensilla position on the first abdominal segment is different from the rest of the abdominal segments.
- The number and position of the sensilla on the eight abdominal segments in all three larval stages differ from the rest of abdominal segments.

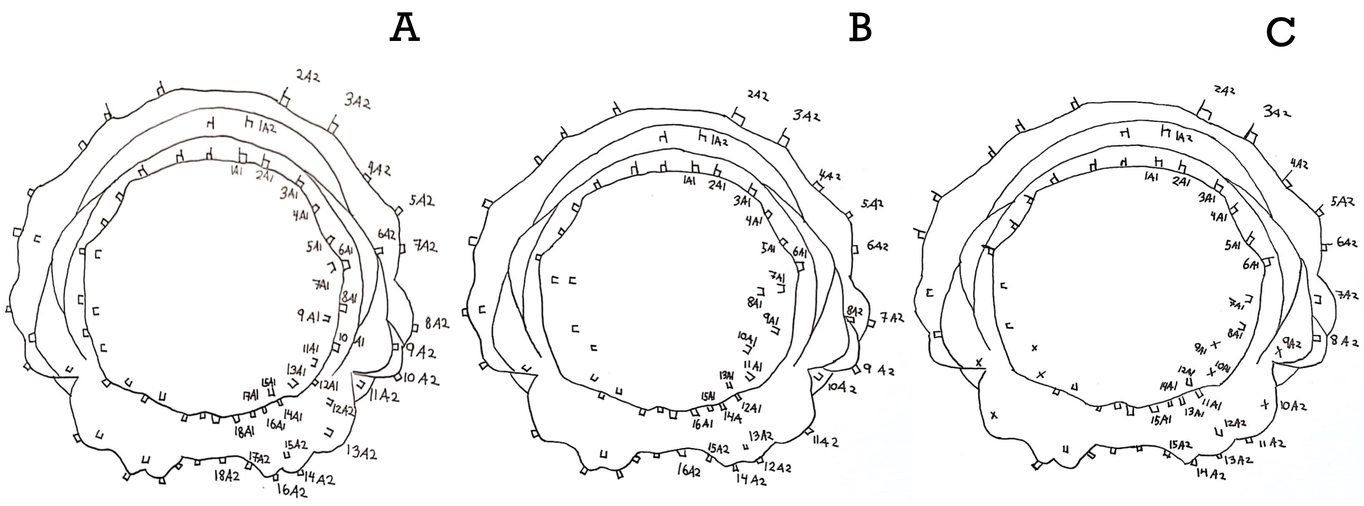

Fig 3. A: L3 abdominal segment chaetotaxy; B: L2 abdominal segment chaetotaxy; C: L1 abdominal segment chaetotaxy

Results: Puparium

- Length: (4.09-5.09 mm); height: (1.61-1.84 mm); width: (1.69-1.95 mm) n =20
- Integumental dorsal thickness: range 11.2-16.2 um; lateral thickness: range 5.39-8.28 um.
- Color green and tear shaped.

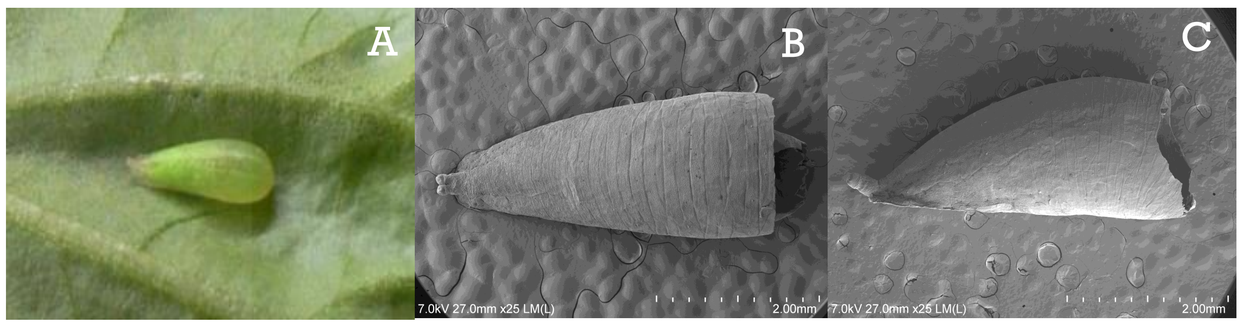

Fig 4.Puparium; A: Photo R. Amorós;; B:Dorsal view; C: Lateral view

Posterior Respiratory Process (PRP) of the puparium

- Higher than wide and situated on a tubular prominence in the anal segment.
- Two circular shapes surface divided by a close median groove (mg).
- Each circular shape surface contain: 1 ecdysial scar (es); 3 equidistant spiracular opening (so I-III); 4 short inter-spiracular setae (is); 1 perispiracular glands (pg)

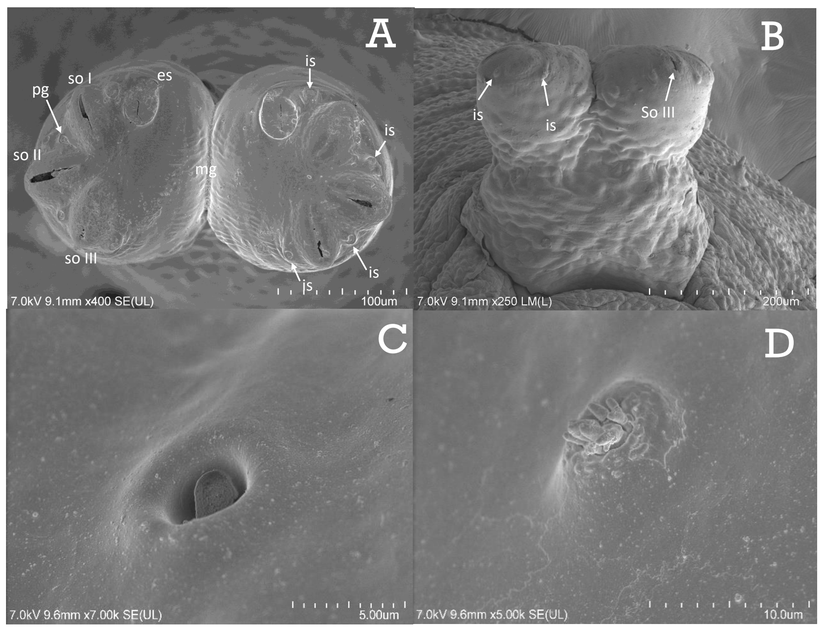

Fig 5. A: dorsal view of the PRP; B: lateral view; C: perispiracular gland; D: inter-spiracular setae

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