

Dipteran internal feeders in underground parts of *Viola*

In early June 2024, M. Zappa made the original observation of an unknown insect tunneling in a *Viola* petiole: <https://www.inaturalist.org/observations/220815991> to which iNaturalist post C. Eiseman alerted me.

Subsequent investigations of *Viola* plants* in my yard in summer 2024 revealed two different species of fly larvae feeding in the underground parts of the plants. Affected plants showed dark, shallow minelike tunnels just under the outermost layers of the plant tissue, with many of the tunnels moving from petioles of leaves into the underground parts. Larvae found in these tunnels mostly appeared to belong to the same type ("sp. A") with posterior spiracles black and knoblike and anterior spiracles in an elongate fan shape. This first species of larva eventually established deeper, wider tunnels in the underground parts in which they completed their feeding. The second type of larva, "sp. B," was mostly found in deeper, externally obscure tunnels in the underground parts, but it was unclear to what extent they had manufactured the tunnels, although it seemed certain they were feeding on healthy plant tissue like sp. A. Larvae of sp. B had less conspicuous posterior spiracles undifferentiated in color and sclerotization from the surrounding body tissue, and less elaborate anterior spiracles in a compact fan shape.

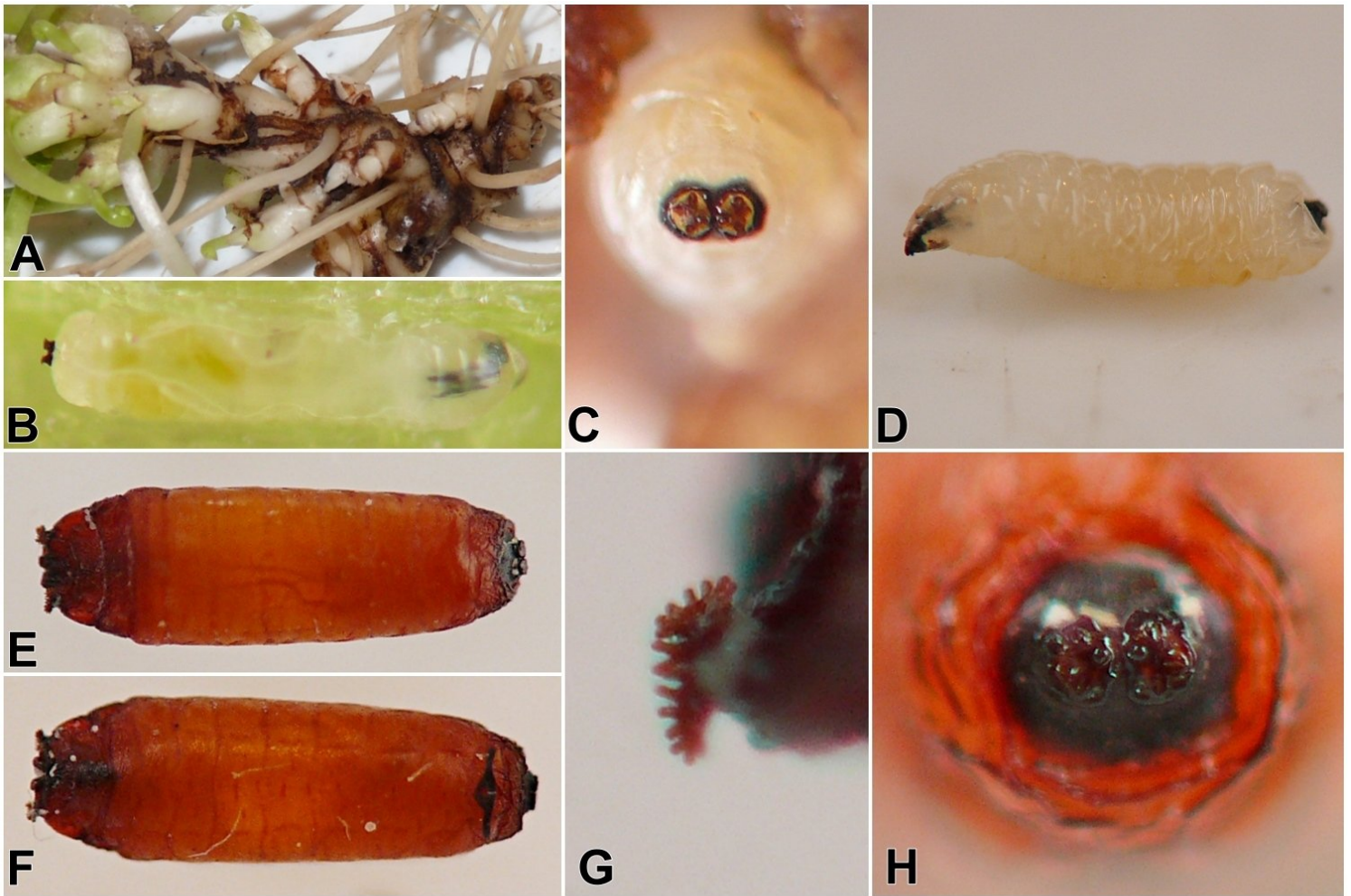
Puparia of both species were obtained via rearing, and one of the sp. B puparia produced an adult chloropid fly. The adult fly (<https://bugguide.net/node/view/2389775>) emerged in early August, about two and a half weeks after it was collected as a nearly mature larva in mid-July. The puparium of this chloropid appears to be typically formed inside the plant material.

Adults of sp. A have not yet been reared as of early 2025. The puparia show similarities with certain muscoid families (e.g., Anthomyiidae, Scathophagidae) and it seems likely the fly belongs to this superfamily. No adults emerged from reared puparia of this species in the growing season during which they were formed, suggesting that the puparium may at least sometimes be the overwintering stage. In one case, a nearly mature larva was removed from its tunnel in the underground parts for photography, and then reintroduced into a new tunnel poked into fresh plant material with the end of a thick wire. Shortly thereafter, this larva formed its puparium inside the new tunnel. It is unclear if the puparium is typically formed inside the plant material, but the first batch of *Viola* underground parts collected from the author's yard in early summer contained spent puparia of the chloropid along with tunnels apparently formed by sp. A, but no sp. A puparia (either intact or spent) were present, suggesting its typical pupation location could be in the soil.

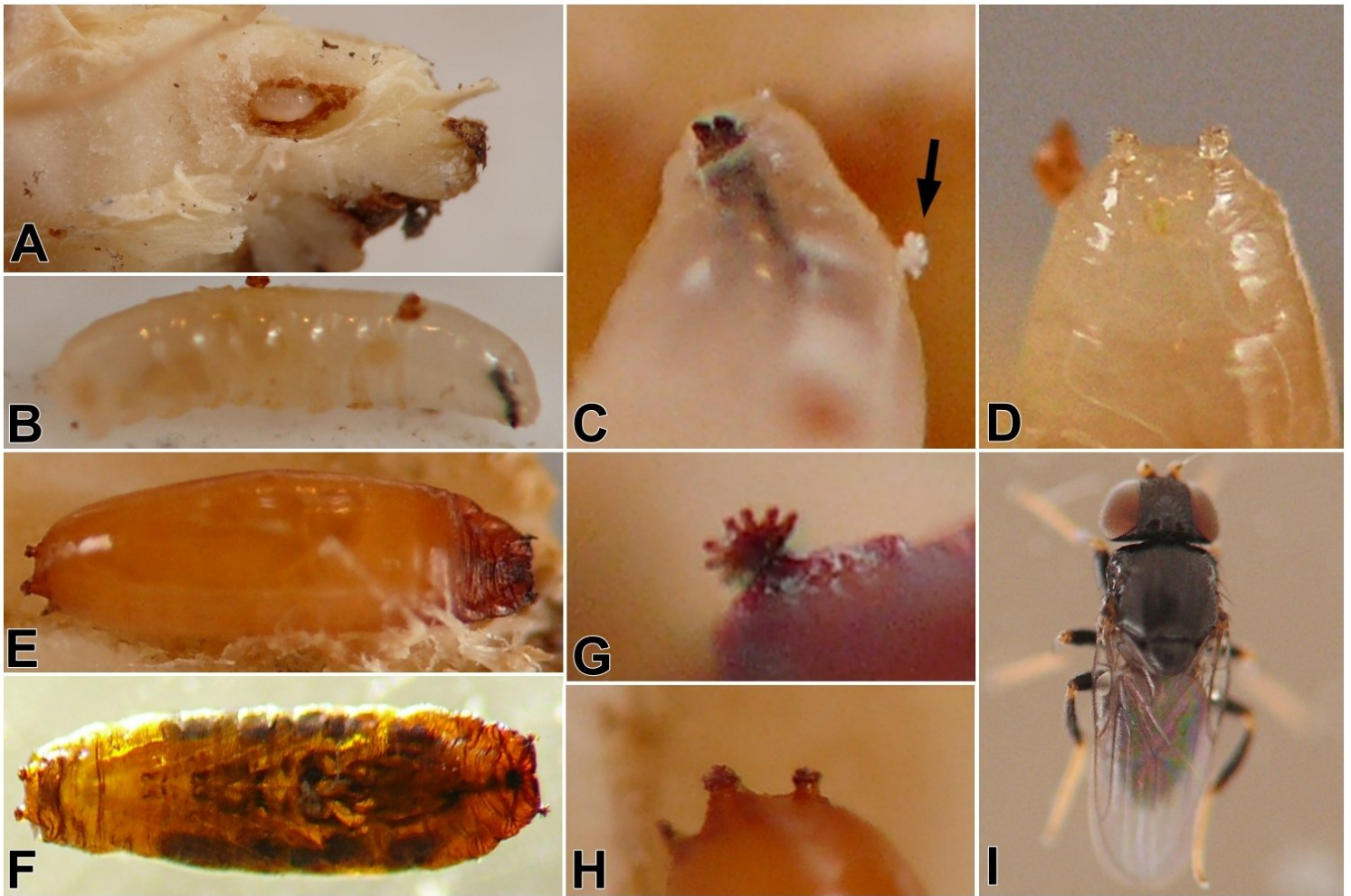
Thank you to M. Zappa for posting his original observation that led to these investigations, and to C. Eiseman for passing along Mathew's observation to me.

J. van der Linden
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* The *Viola* sp. involved a large one, with basal leaf petioles reaching up to 12" or so, and leaf blades up to ~4"-5" across.



Unidentified dipteran miner/borer in underground parts of *Viola*. A: Tunnels in ?rhizome; B: Young larva, extracted from tunnel in petiole; C: posterior spiracles of middle-aged larva; D: mature larva. E: Puparium, dorsal; F: puparium, ventral; G: anterior spiracle of puparium; H: posterior spiracles of puparium.



Chloropidae ex underground parts of *Viola*. A: Larva in plant material; B: larva; C: anterior end of larva, showing mouthhooks and anterior spiracle (arrow); D: posterior spiracles of larva; E: puparium; F: aging puparium with pupa visible; G: anterior spiracle of puparium; H: posterior spiracles of puparium; I: adult.