Lab session: Morphometry and ImageJ

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Aim:

1. Quantification of within species and between species variation in morphological traits using ImageJ
2. Test whether there is inter-group reliability in measurements

You are provided with 45 image plates containing images of 65 individuals belonging to five species of wasps that depend on the *Ficus racemosa* L. to complete their life-cycle.

- **Image 1_wasp-annotated:** Has parts of the wasp labelled and this image is for your reference.
- **Images 1–10:** *Apocrypta* Sp. (Ap) is a parasitoid, and exploiter
- **Images 11–20:** *Platyneura* sp1 (P1) is a galler, and exploiter
- **Images 21–30:** *Platyneura* sp2 (P2) is a galler, and exploiter
- **Images 31–41:** *Platyneura* sp3 (P3) is a parasitoid or an inquiline, and exploiter
- **Images 42–65:** *Ceratosolen fusciceps* (Pol) is a galler and pollinator

For this practical **each group** will measure the parts of the body for all the individuals **except** Image 1_wasp-annotated, and image 31. For images 1–41, you have to take three measurements: head+thorax, abdomen, ovipositor (see Figures 1 and 2 for reference). For images 42–65, you have to take two measurements owing to poor image quality (see Figure 3 for reference).

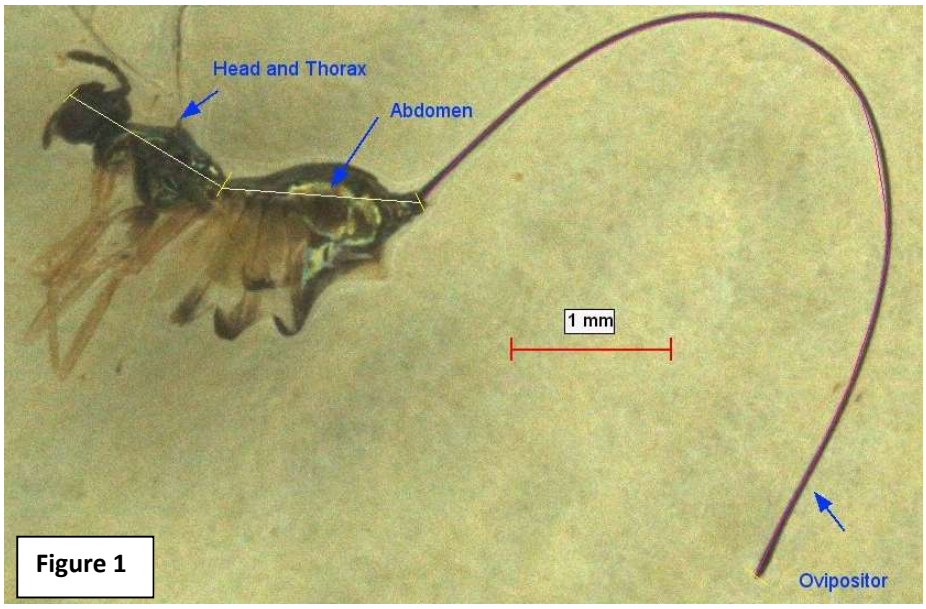

Figure 1

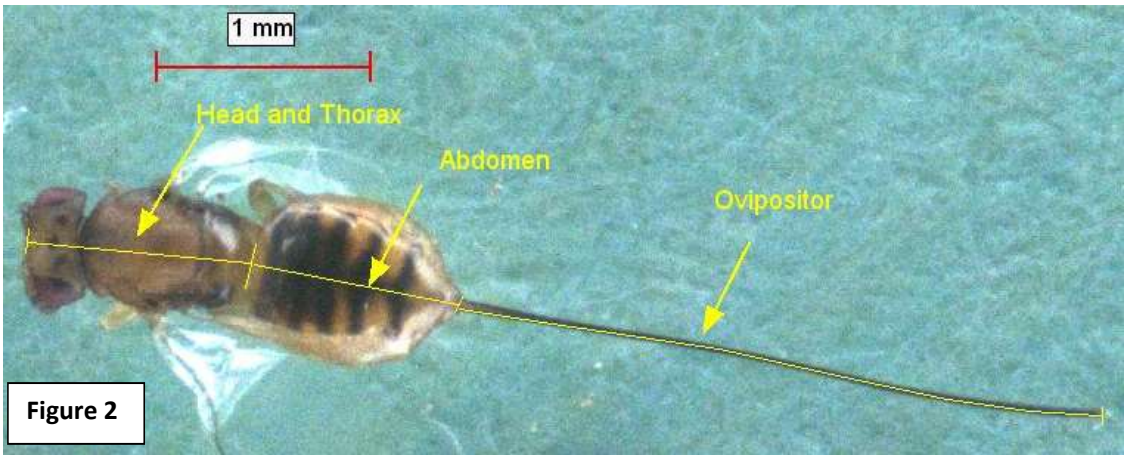

Figure 2

Figure 3

In the report please write briefly about the following (minimum 300 words):

1. Morphometry
2. ImageJ
3. Variation in population
4. Fig-fig wasp interaction, ovipositor

Result:

1. Report the min, max, mean, and SD of all the organs measured for each species. **Comment on the within species and across species variation.**
2. Plot the ovipositor lengths for all species (in a single graph). **Comment on the plot.**
3. Plot the body length (head+thorax+abdomen) for all species (in a single graph). **Comment on the plot.**

4. Obtain data from any group in your class for ovipositor lengths (for example, take from group 1 measurements for P1 and P2 ovipositor). Compare your data on the ovipositor measurement for the same species statistically. **Did you find a significant difference in ovipositor length measurement for P1 between group 1 and your group**? **What does a significant difference or a lack of significance difference indicate for the measurements?**
5. Answer the questions:
    - Would you measure image 31? Yes/no. Give justification for your answer in one–two lines.
    - Which tool do you use to measure straight line in Image J?
    - Which species has the longest ovipositor length, and which species has the shortest ovipositor length. Provide a biologically relevant answer (in one–two lines) for why one species has short ovipositor whereas another species has a long ovipositor.
    - What else could you have tested with your data? (one example)

Answer to queries raised during the practical class:

- Change the colour of the line used for measurement from yellow to any other colour: **Edit – option – point tool – change colour**