

Floral developmental study in the
Spermacoceae-alliance (Rubioideae,
Rubiaceae), with focus on the tubular
corolla and epipetaly

AMPEE Meise 23/03/2018

KU LEUVEN



**Botanic Garden
Meise**

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A. Vrijdaghs: KU Leuven, Botanic Garden Meise

General Characteristics of Rubiaceae

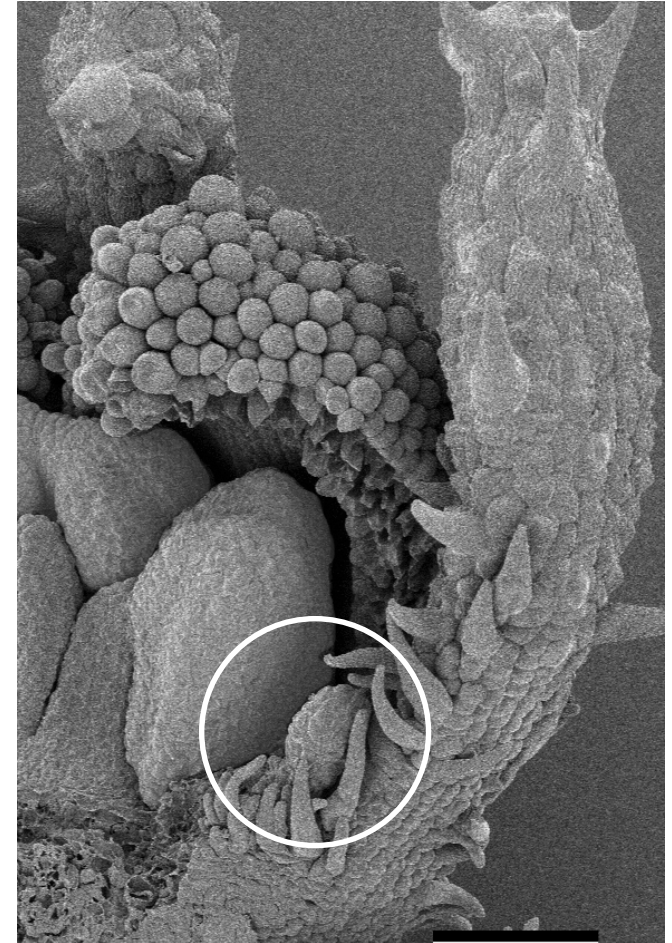
General Characteristics

- Woody or herbaceous
- Simple opposite leaves
- Interpetiolar stipules
- Colleters
- Inferior ovaries



Galium odoratum

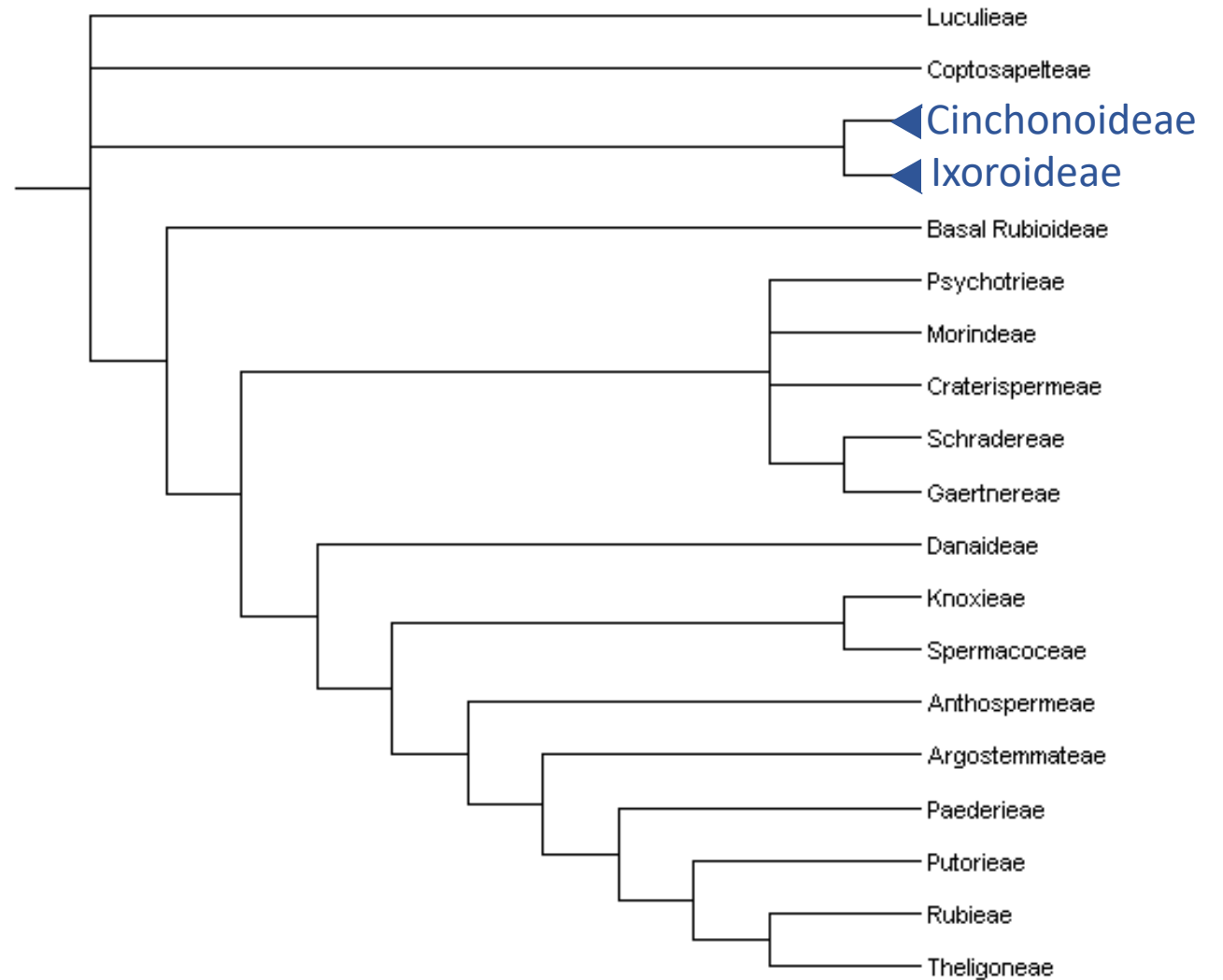
<https://goo.gl/868eHe>



Bouvardia ternifolia

Rubiaceae

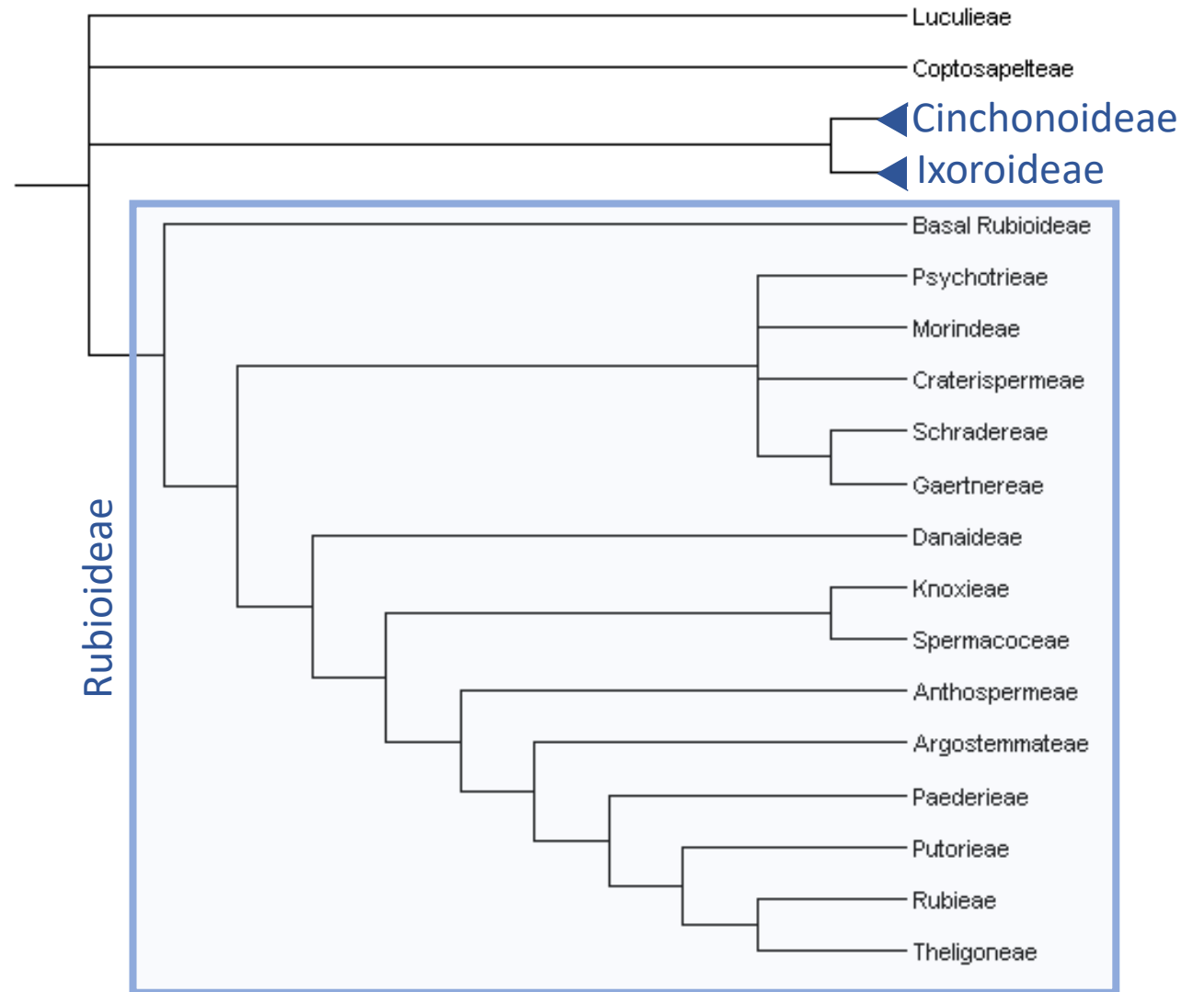
- 13000 species
- Subfamilies
 - Cinchonoideae
 - Ixoroideae
 - Rubioideae



Cladogram of Rubiaceae after Bremer & Eriksson 2009

Rubiaceae

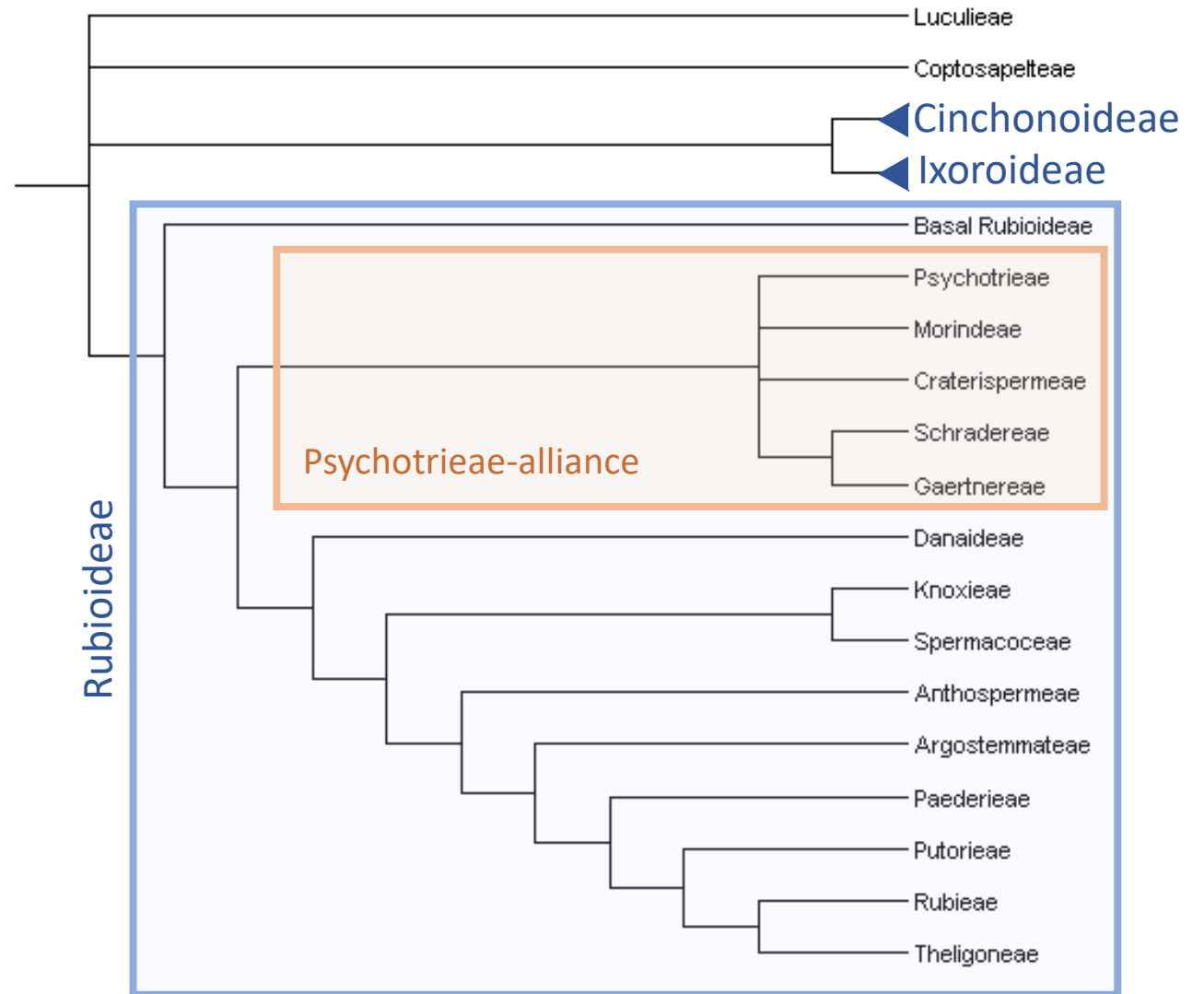
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Rubiaceae

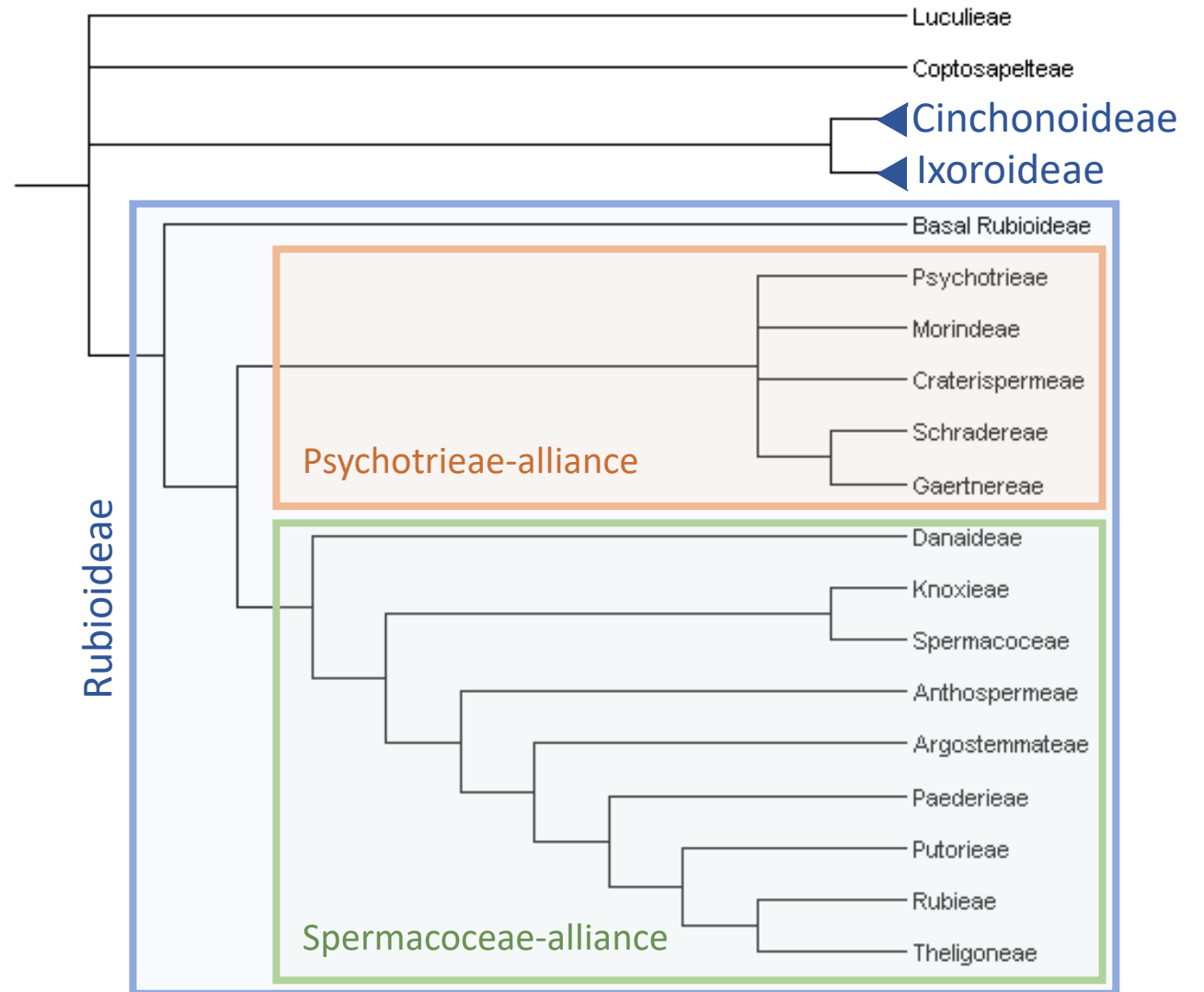
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Cladogram of Rubiaceae after Bremer & Eriksson 2009

Rubiaceae

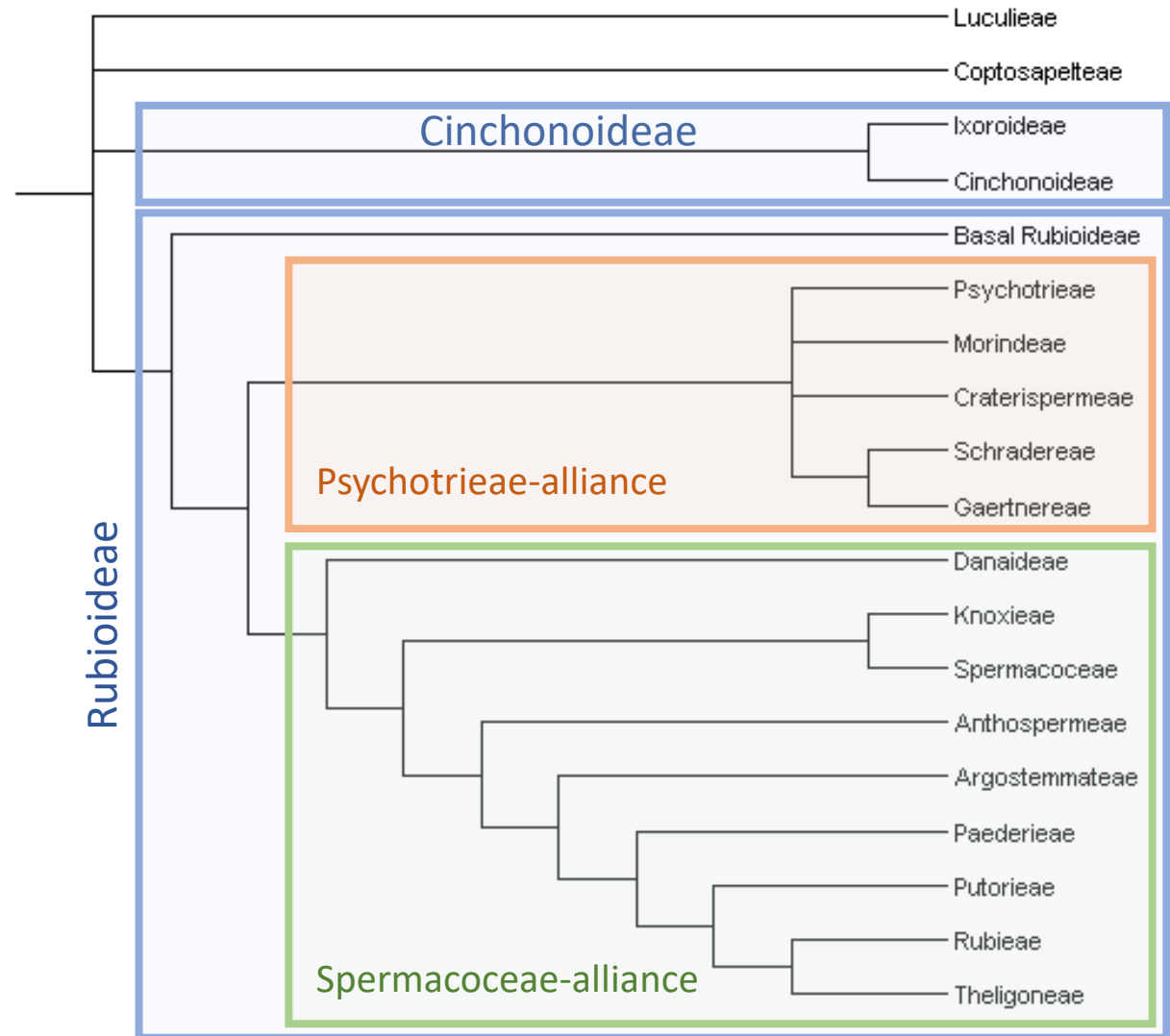
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Cladogram of Rubiaceae after Bremer & Eriksson 2009

Rubiaceae

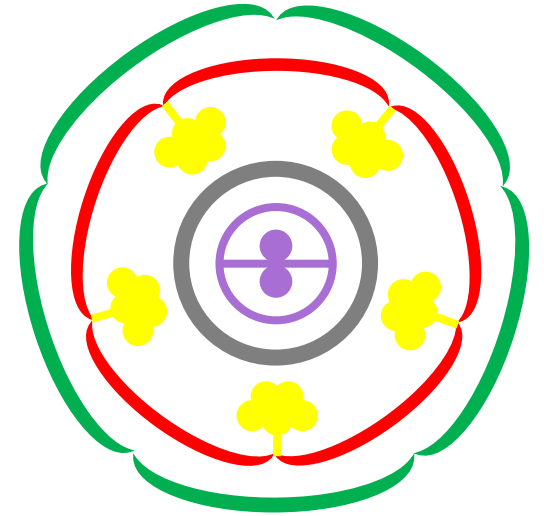
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Cladogram of Rubiaceae after Bremer & Eriksson 2009

Floral characteristics

- **Sympetalous tubular corolla** with free corolla lobes



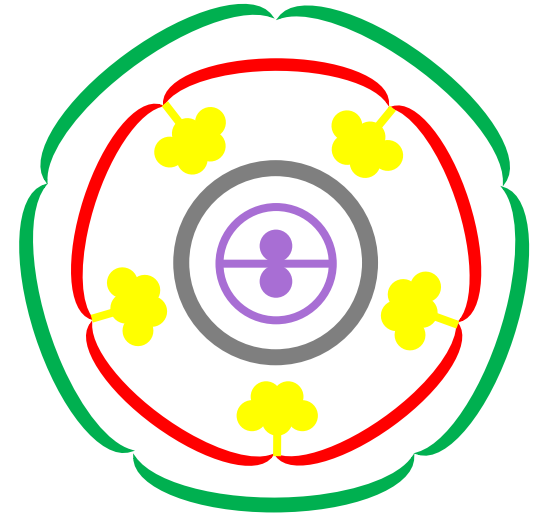
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Rothmannia longiflora

<https://goo.gl/T9xNnM>

Floral characteristics

- **Sympetalous tubular corolla** with free corolla lobes
- Often **epipetalous stamens** alternating with the corolla lobes



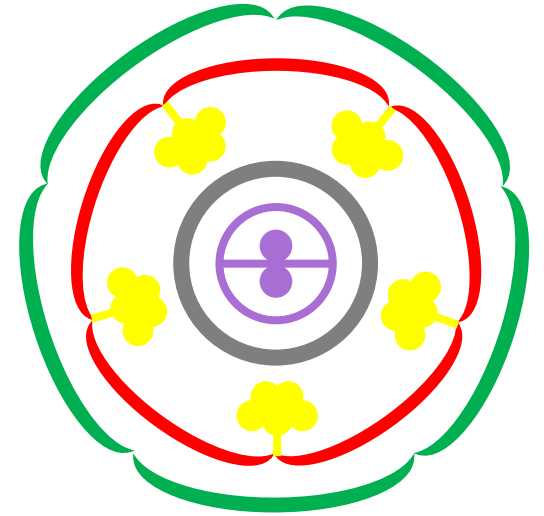
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Rothmannia longiflora

<https://goo.gl/T9xNnM>

Floral characteristics

- **Sympetalous tubular corolla** with free corolla lobes
- Often **epipetalous stamens** alternating with the corolla lobes
- Inferior gynoecium with a single style, usually bilocular



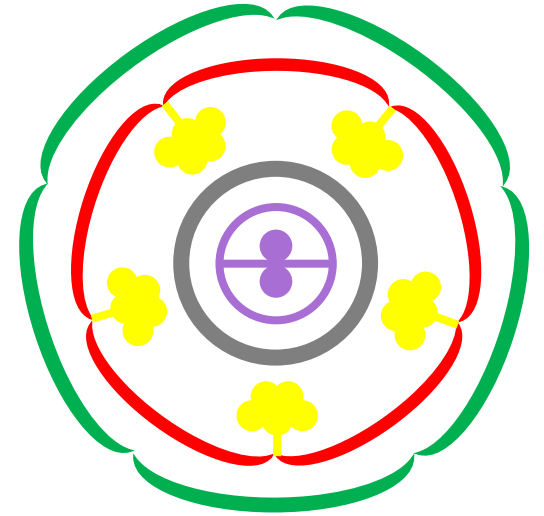
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Rothmannia longiflora

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Floral characteristics

- **Sympetalous tubular corolla** with free corolla lobes
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- Inferior gynoecium with a single style, usually bilocular
- Annular nectary on top of the gynoecium surrounding the base of the style



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Rothmannia longiflora

<https://goo.gl/T9xNnM>

Corolla splits

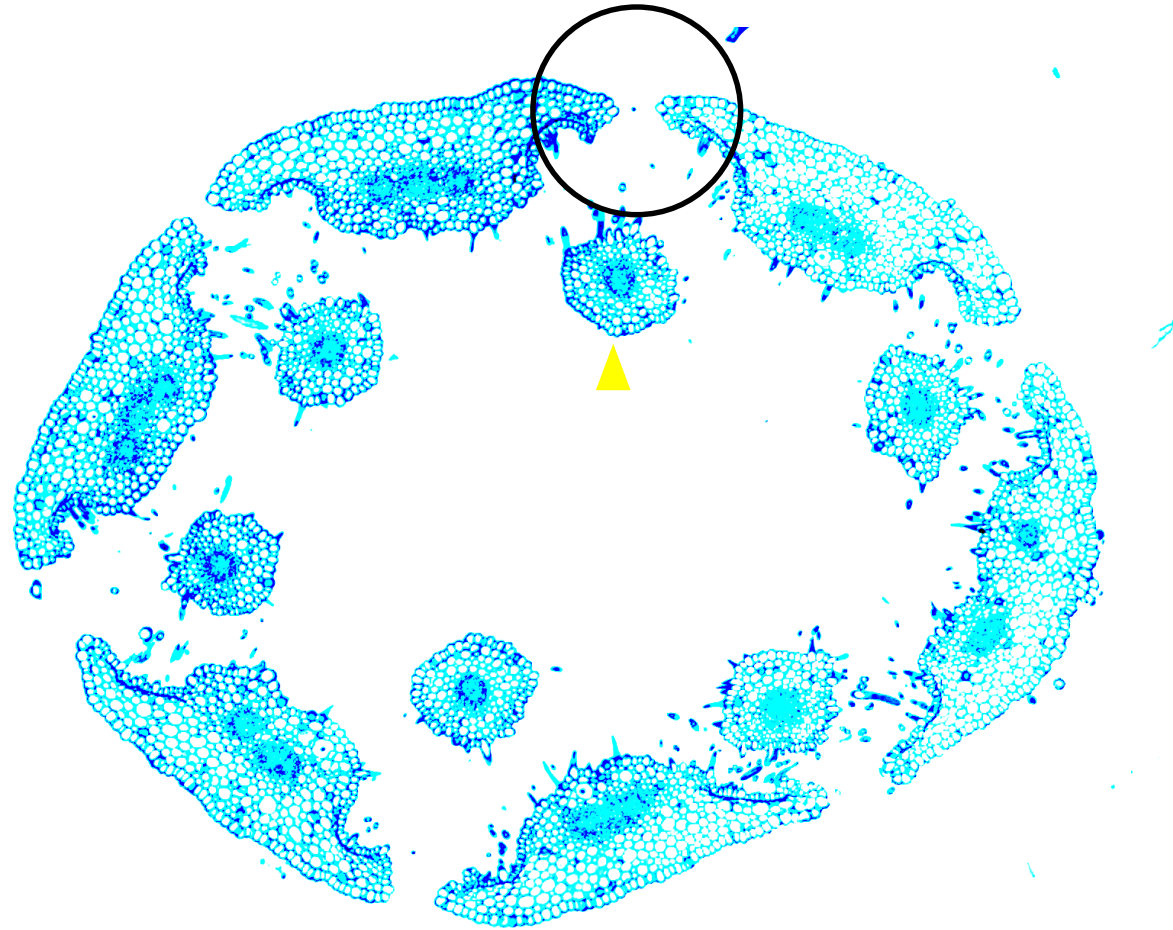
- Present in some species of the Rubiaceae
- Opposite to the filament



Paederia sp.

image received from Dr. Petra De Block

Corolla splits



Pentas hindsii

Material and Methods

- Species: *Batopedina pulvinellata*, *Bouvardia ternifolia*, *Galianthe brassiliensis*, *Galium glaucum*, *Hedyotis biflora*, *Mycetia malayana*, *Ophiorrhiza mungos*, *Pentas hindsiioides*, *Pentas lanceolata*, *Psychotria punctata*, *Richardia grandiflora*, *Serissa japonica*

Collected by Petra De Block of the Botanic Garden Meise

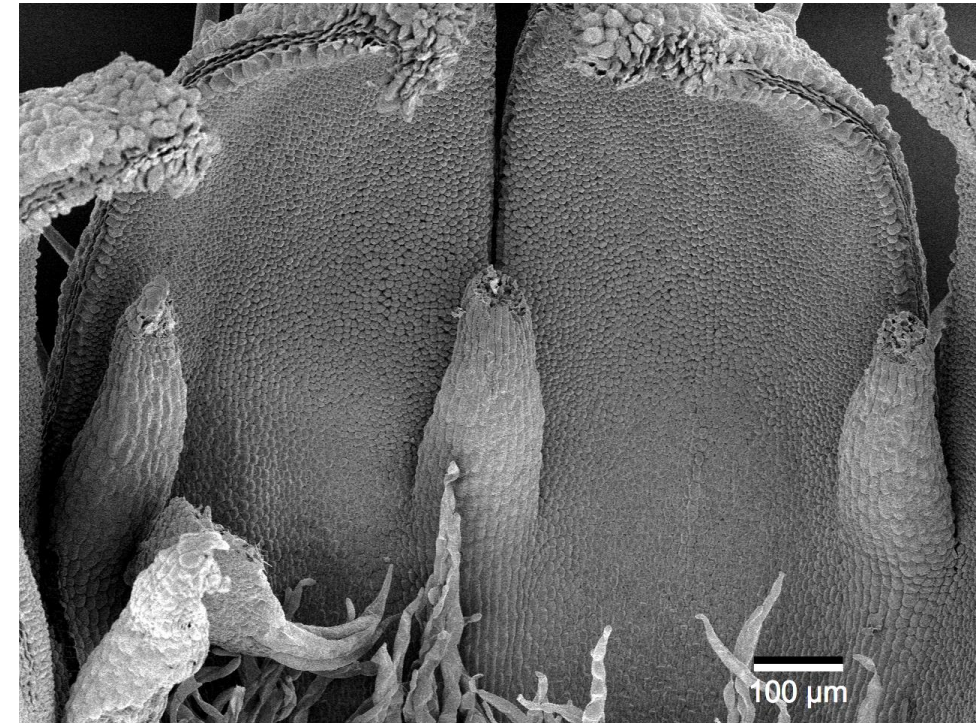
- Light microscopy & scanning electron microscopy

Aims

To test our hypothesis on the development of the corolla and androecium

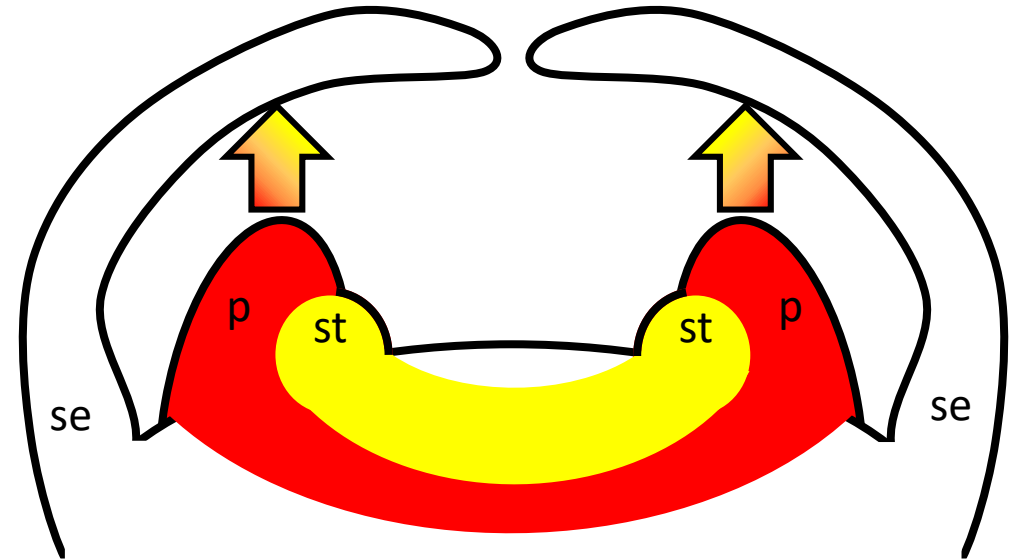
We hypothesize that the tubular corolla develops through three simultaneous developmental processes, in different proportions:

- Formation of a stamen-corolla tube
- Formation of a corolla tube *sensu stricto*
- Epidermal (postgenital) fusion of petals



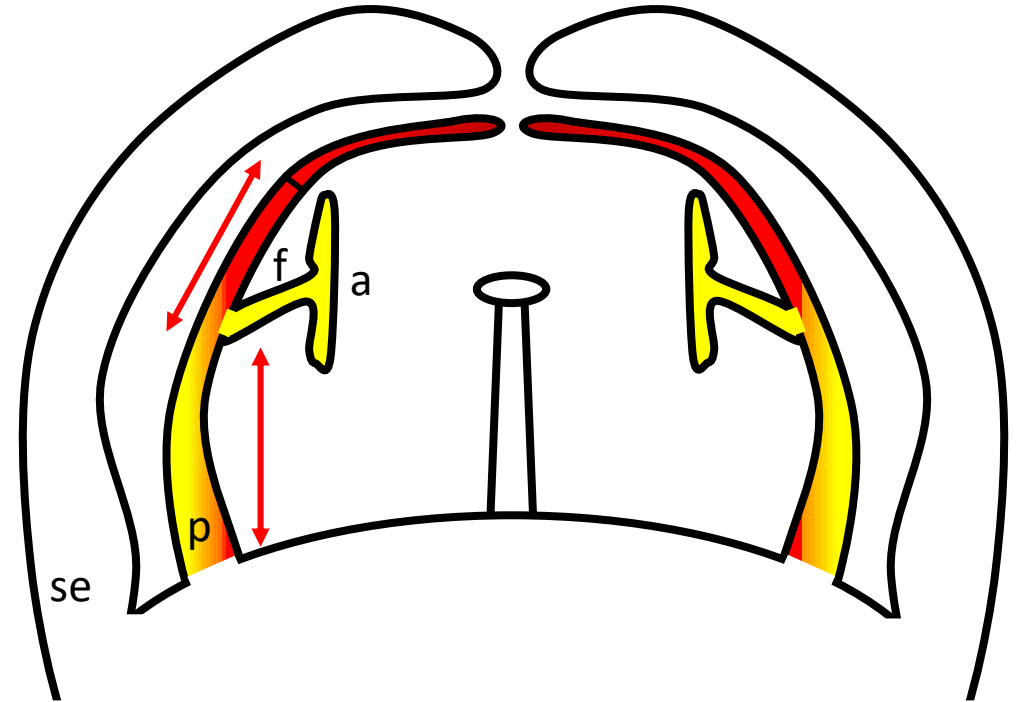
Formation of a stamen-corolla tube

- A stamen-corolla tube is formed from a common underlying annular intercalary meristem



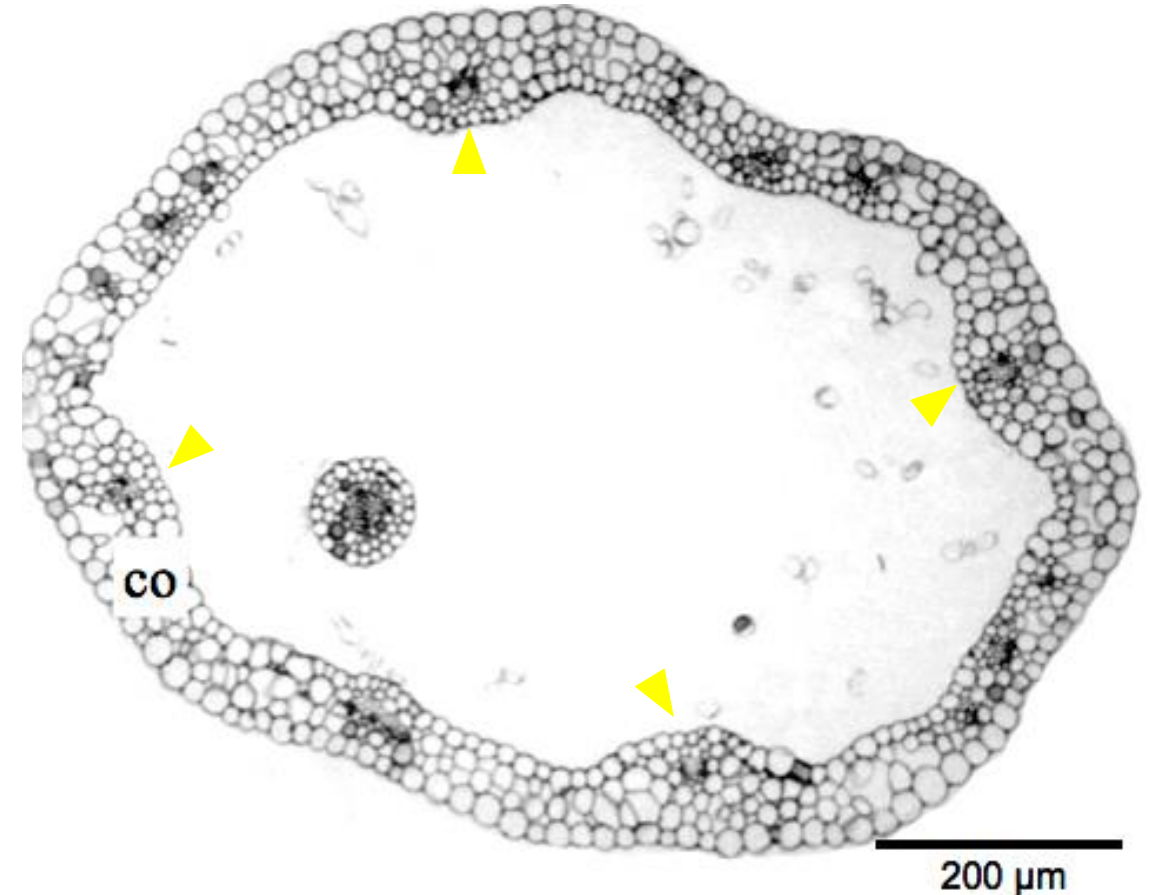
Formation of a stamen-corolla tube

- A stamen-corolla tube is formed from a common underlying annular intercalary meristem
- Above the insertion point of the filament on the stamen-corolla tube, a corolla tube *sensu stricto* can be present

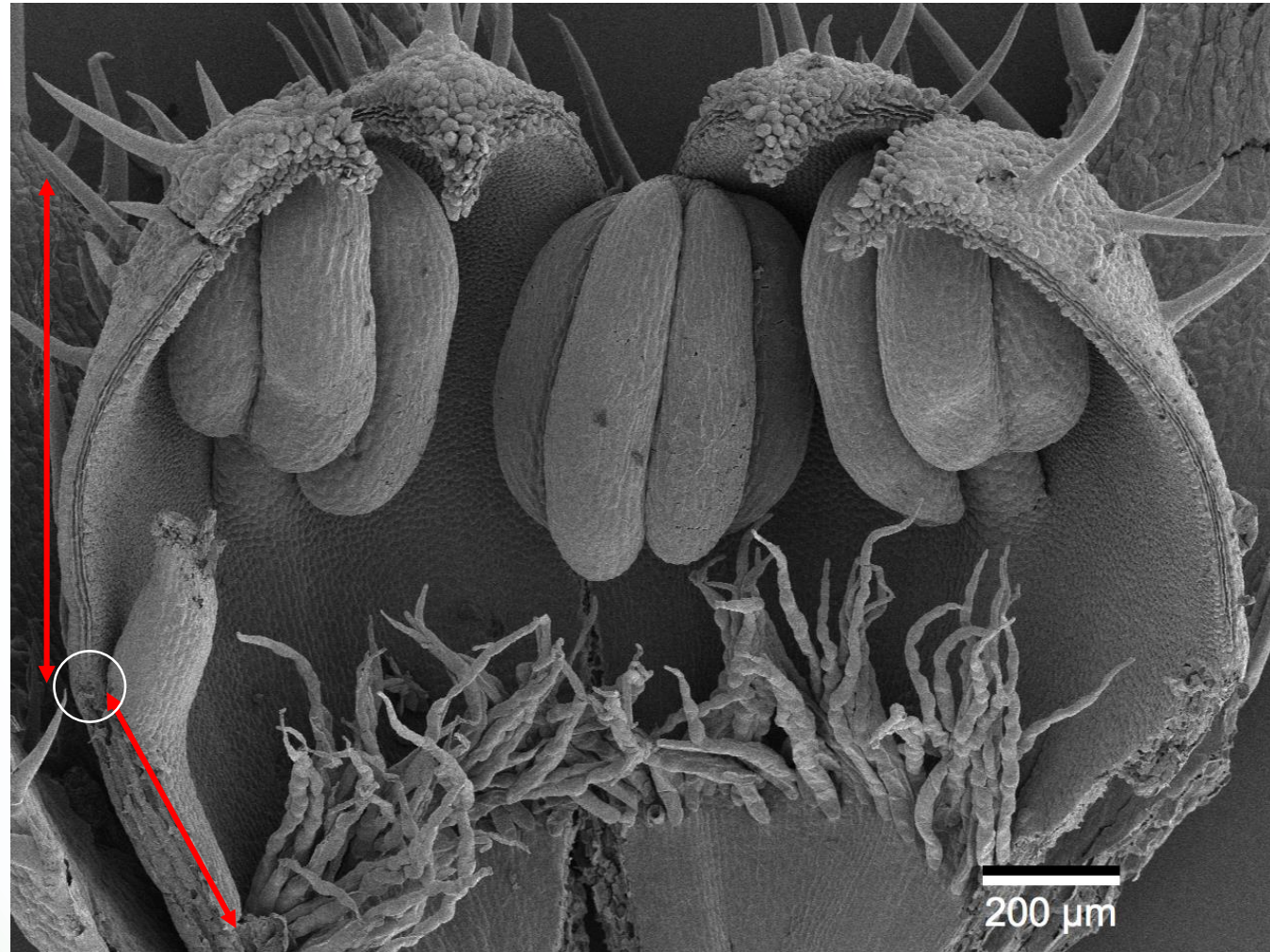


Formation of a stamen-corolla tube

- A stamen-corolla tube is formed from a common underlying annular intercalary meristem
- Above the insertion point of the filament on the stamen-corolla tube, a corolla tube *sensu stricto* can be present
- There is no distinction between the filament and the corolla below the insertion point

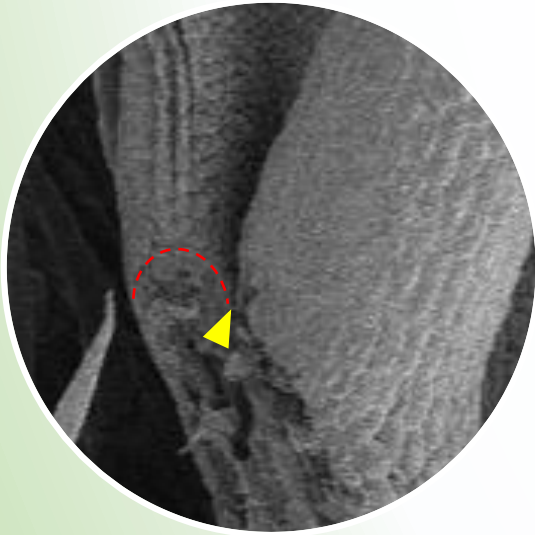


Preliminary results

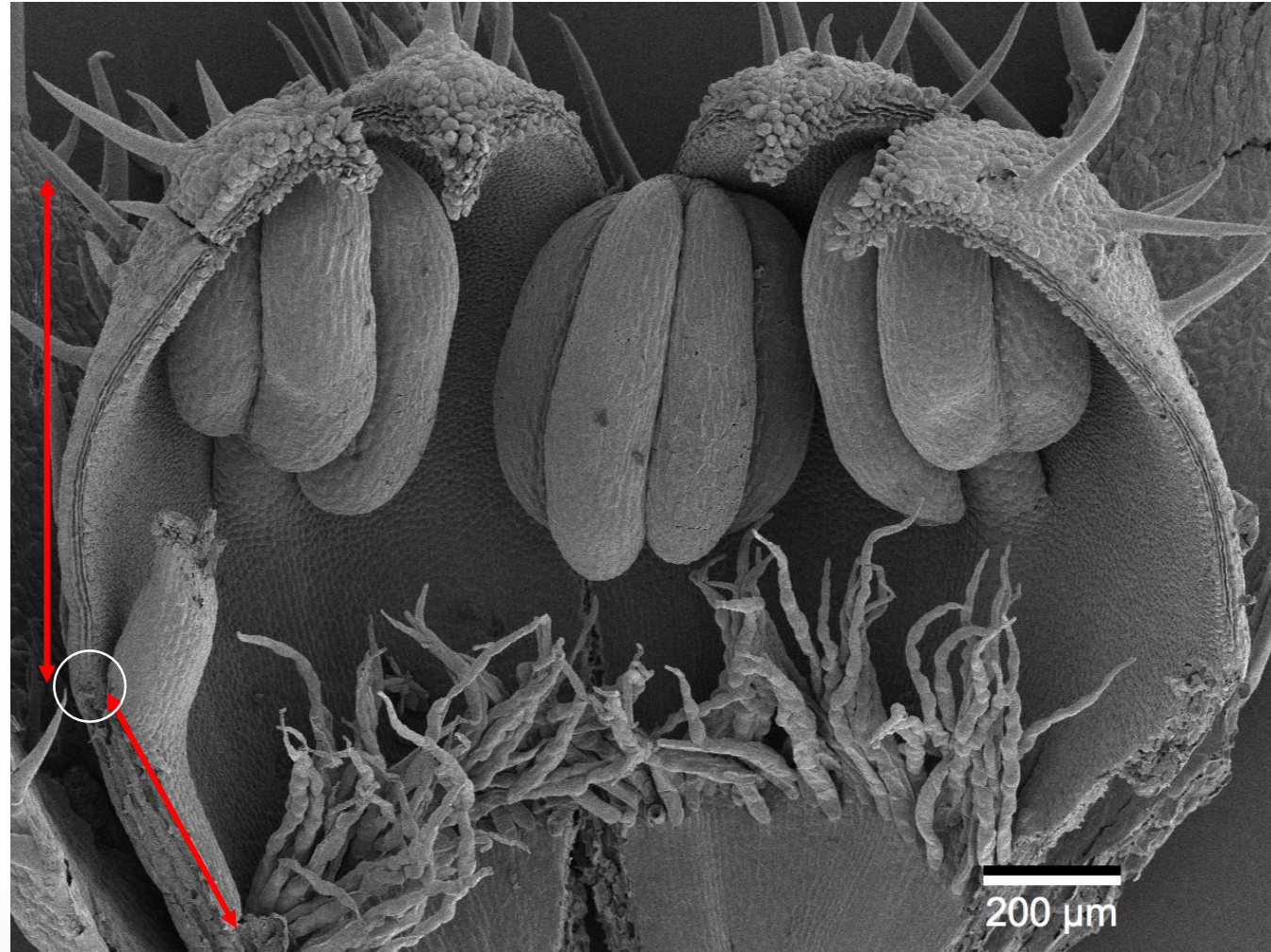


Richardia grandiflora

Preliminary results

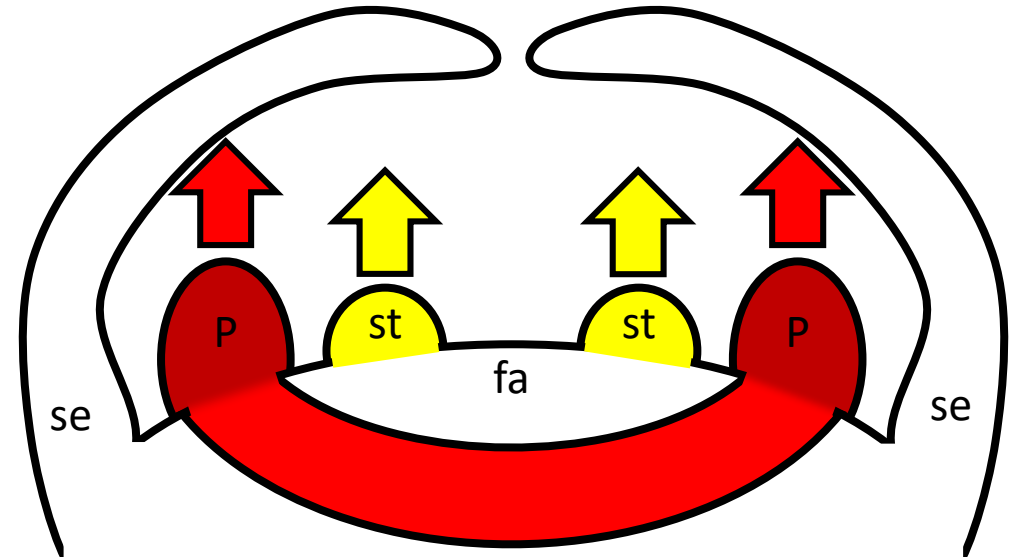


Richardia grandiflora



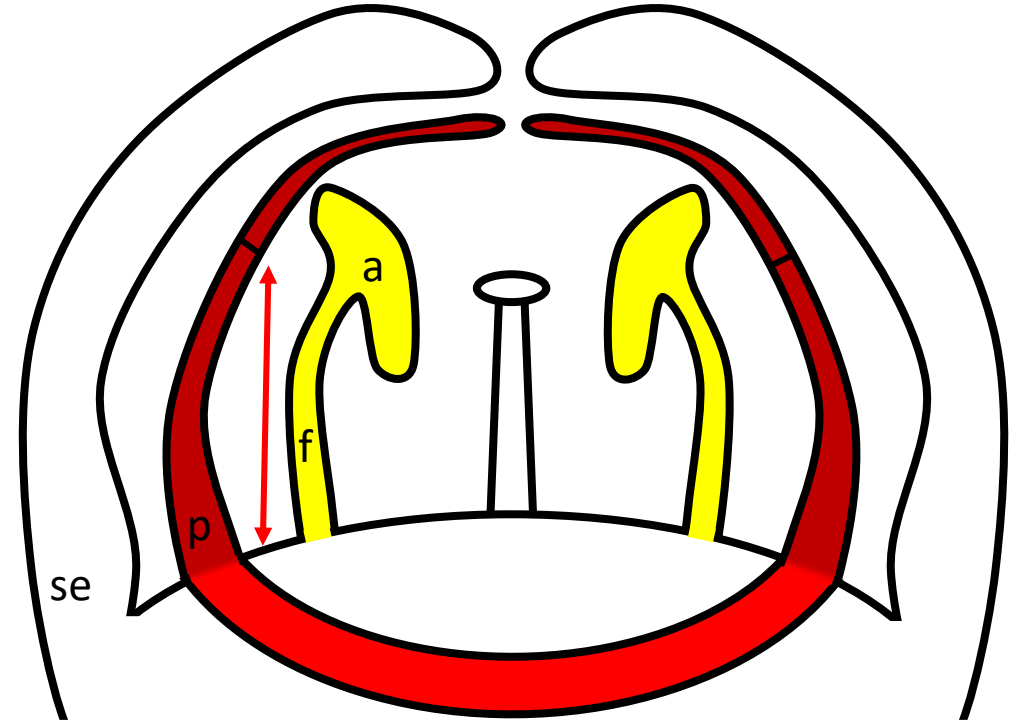
Formation of a corolla tube *sensu stricto*

- A corolla tube *sensu stricto* is formed from an underlying annular intercalary meristem
- Stamen primordia originate individually on the floral apex



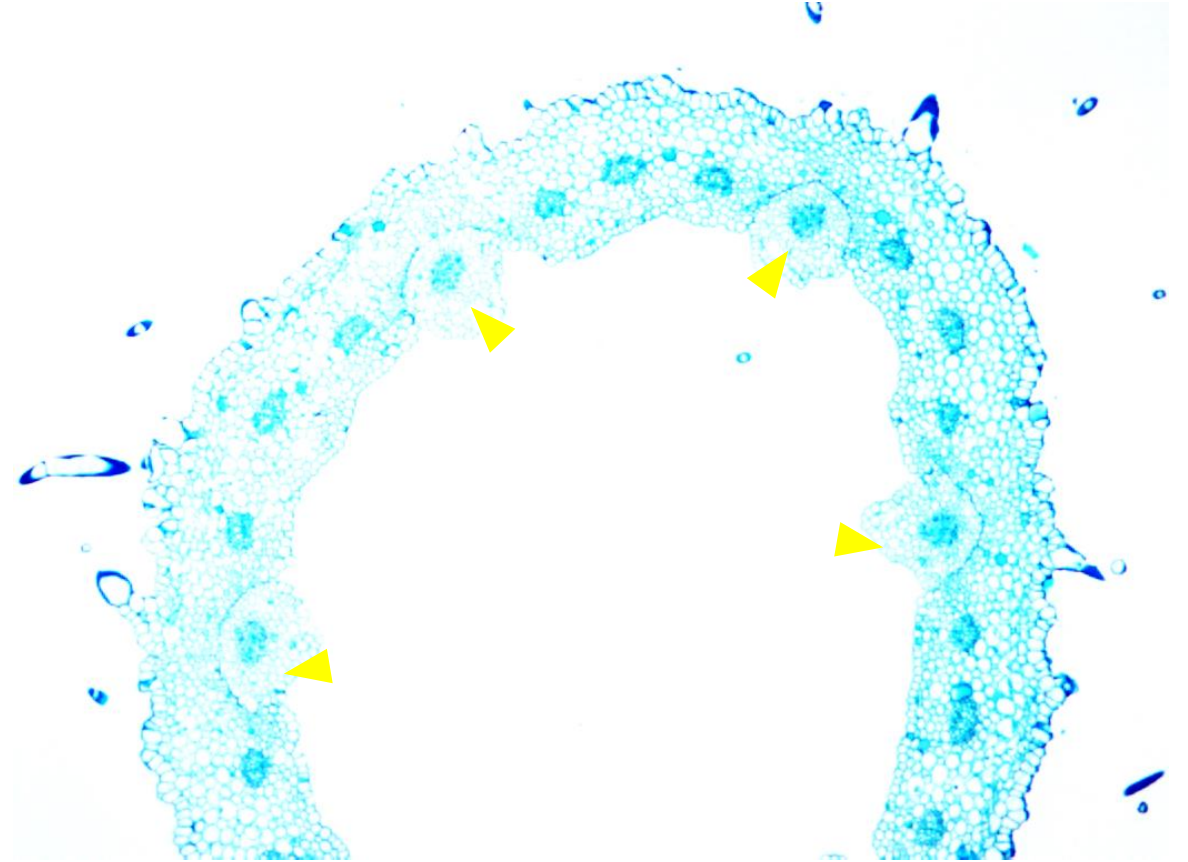
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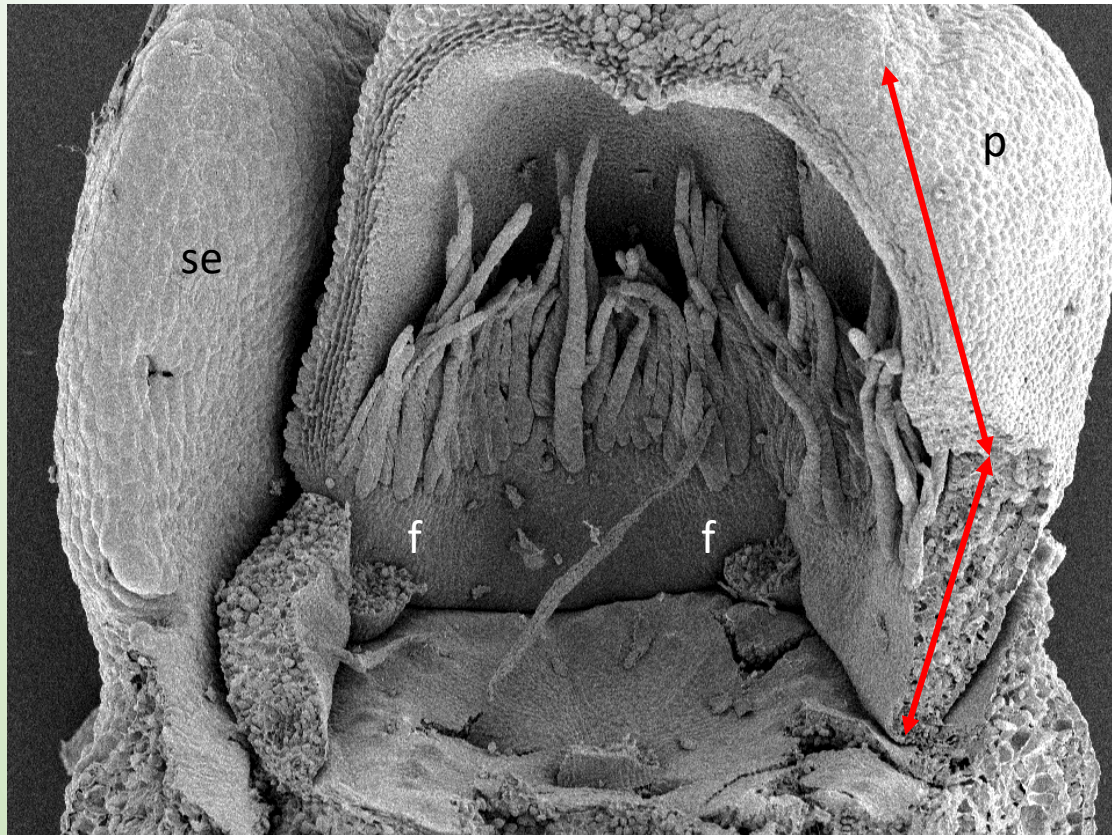


Formation of a corolla tube *sensu stricto*

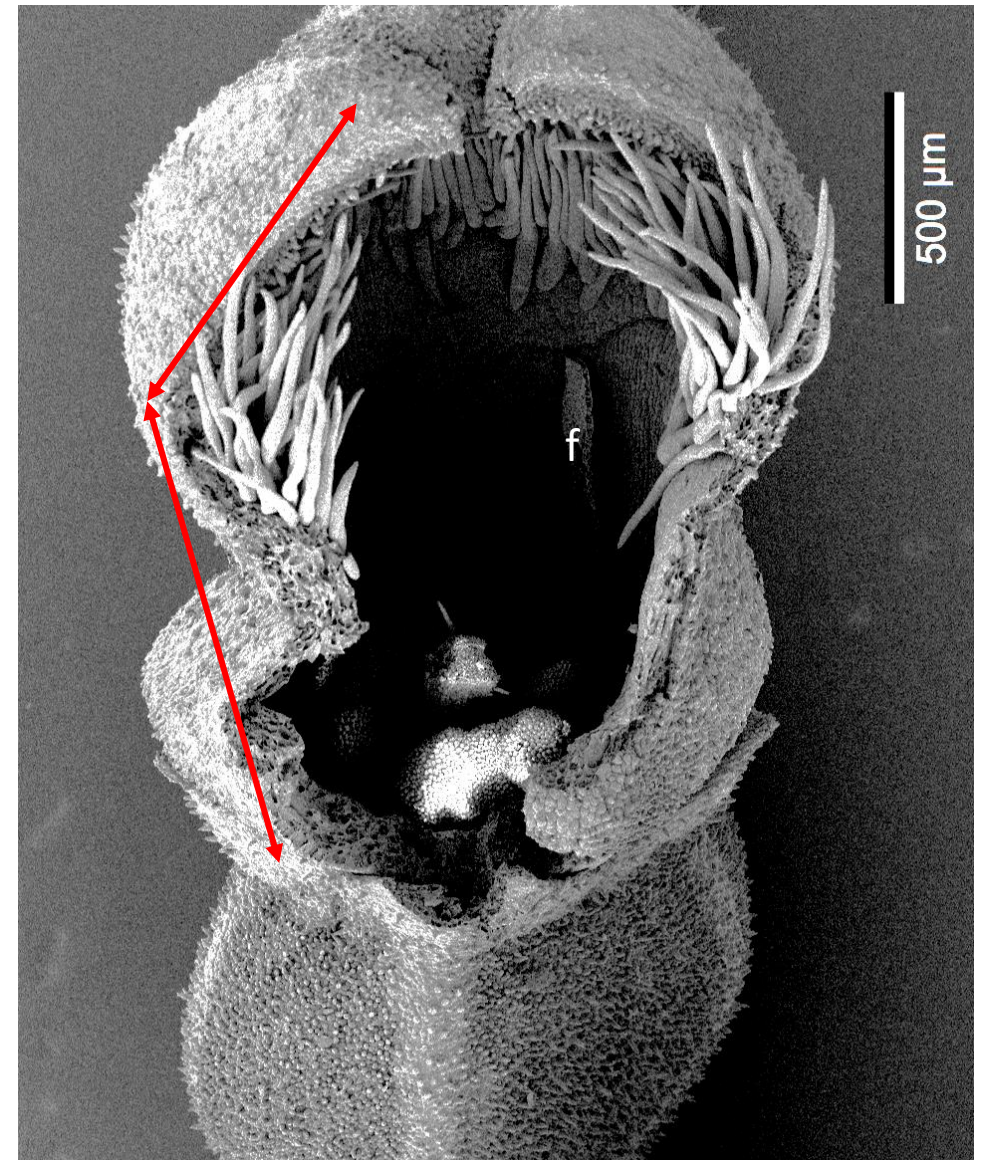
- A corolla tube *sensu stricto* is formed from an underlying annular intercalary meristem
- Stamen primordia originate individually on the floral apex
- Stamens and corolla are clearly distinguishable



Preliminary results

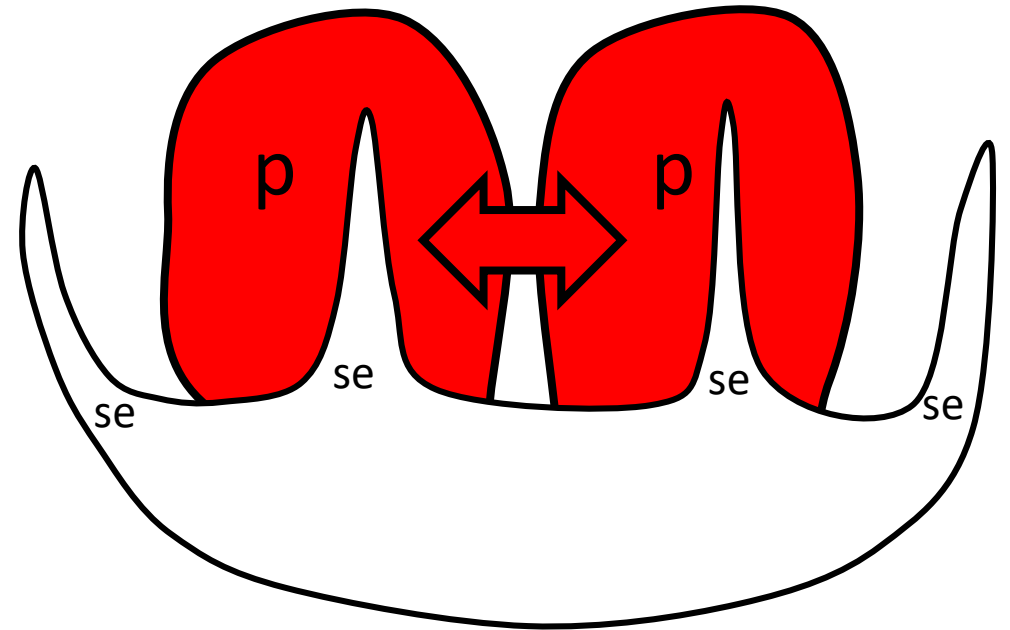


Hedyotis biflora



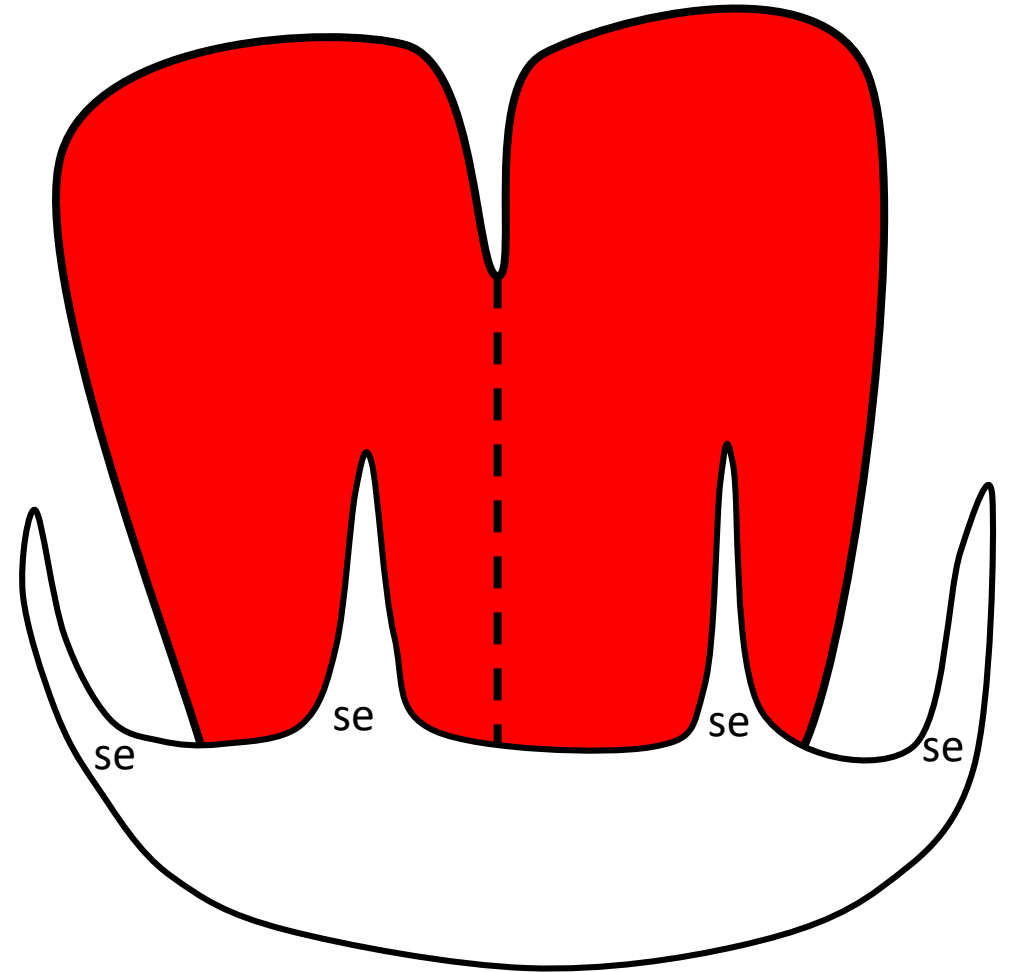
Epidermal (postgenital) fusion of petals

- A tubular corolla is formed via epidermal (postgenital) fusion of petals

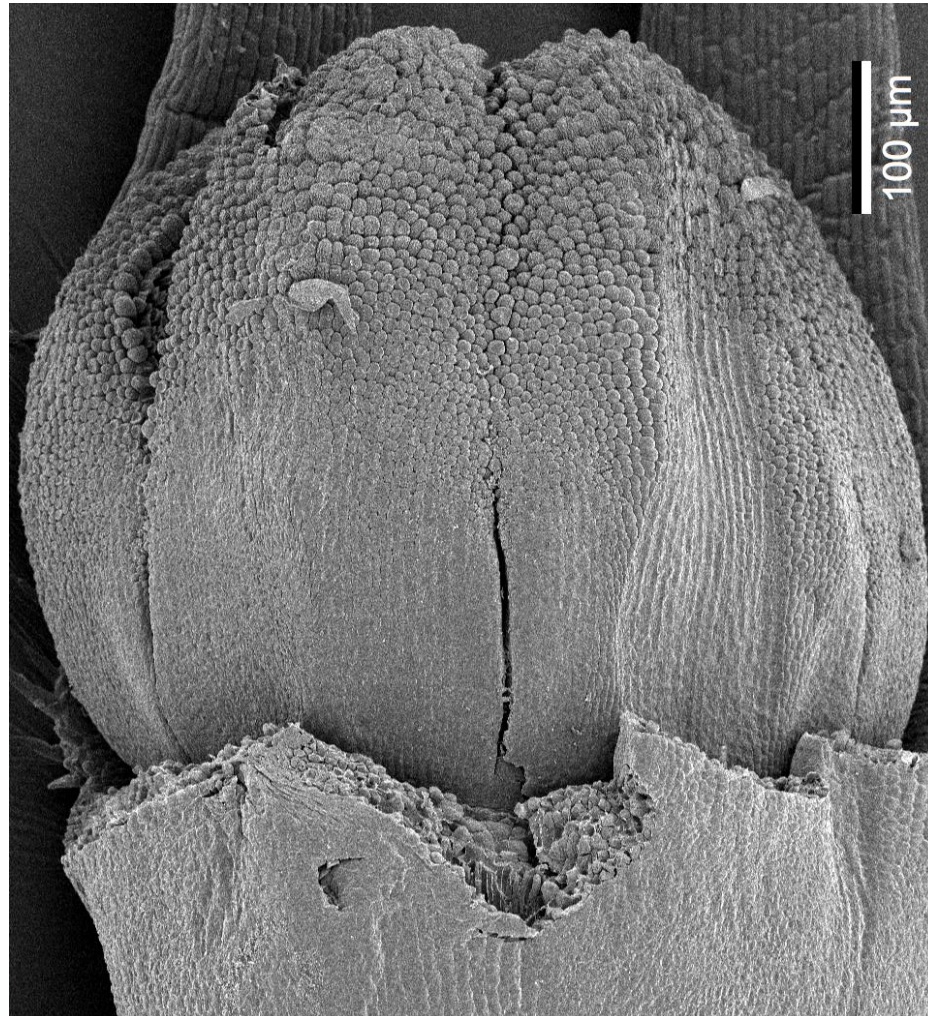


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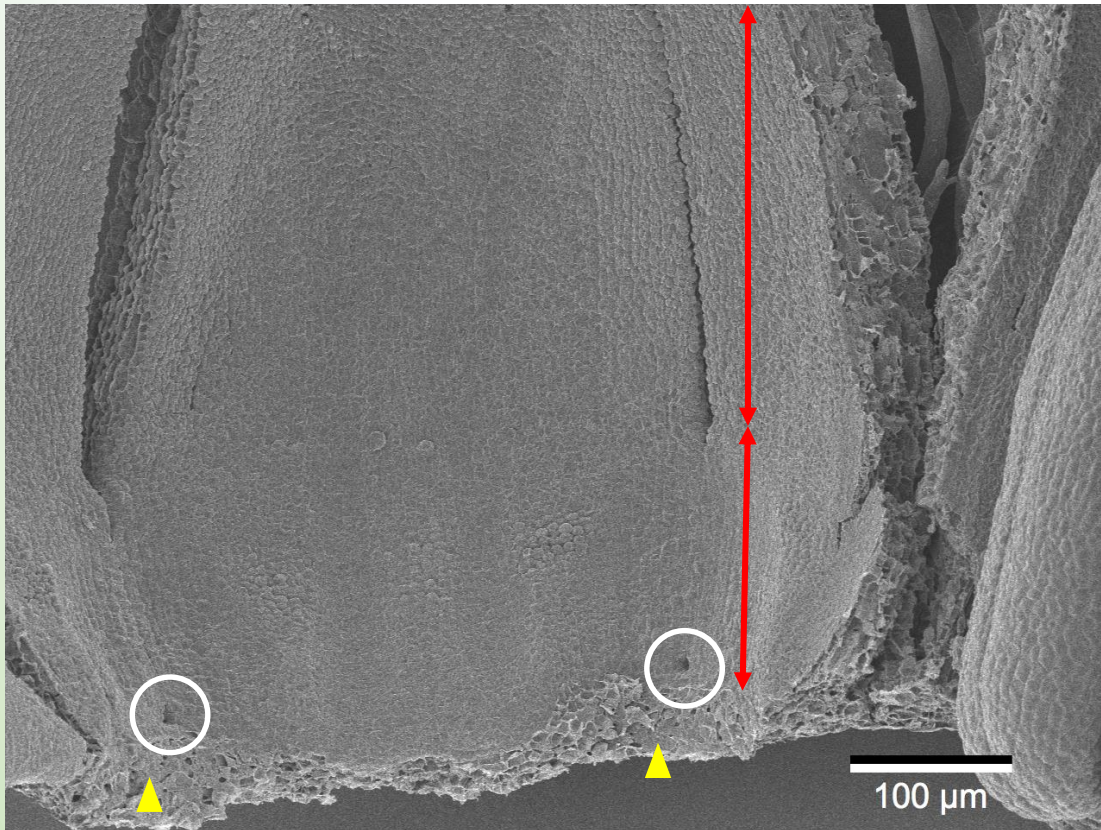


Preliminary results



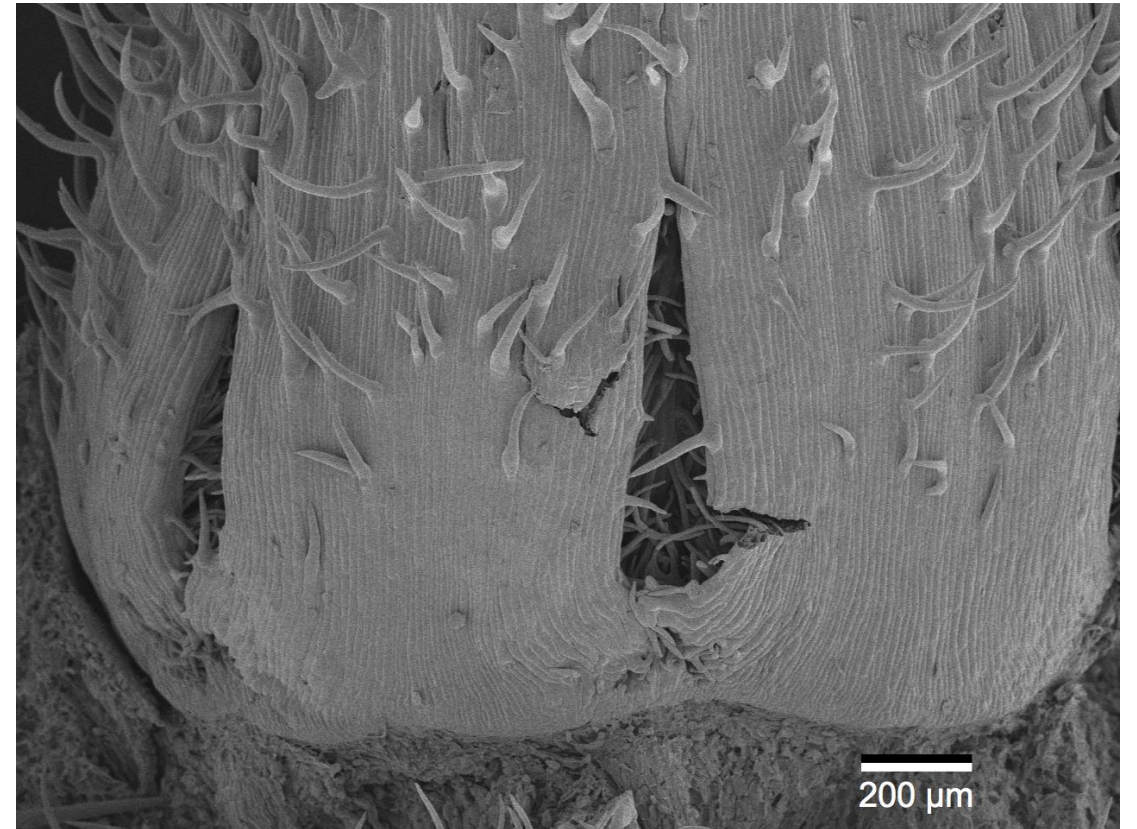
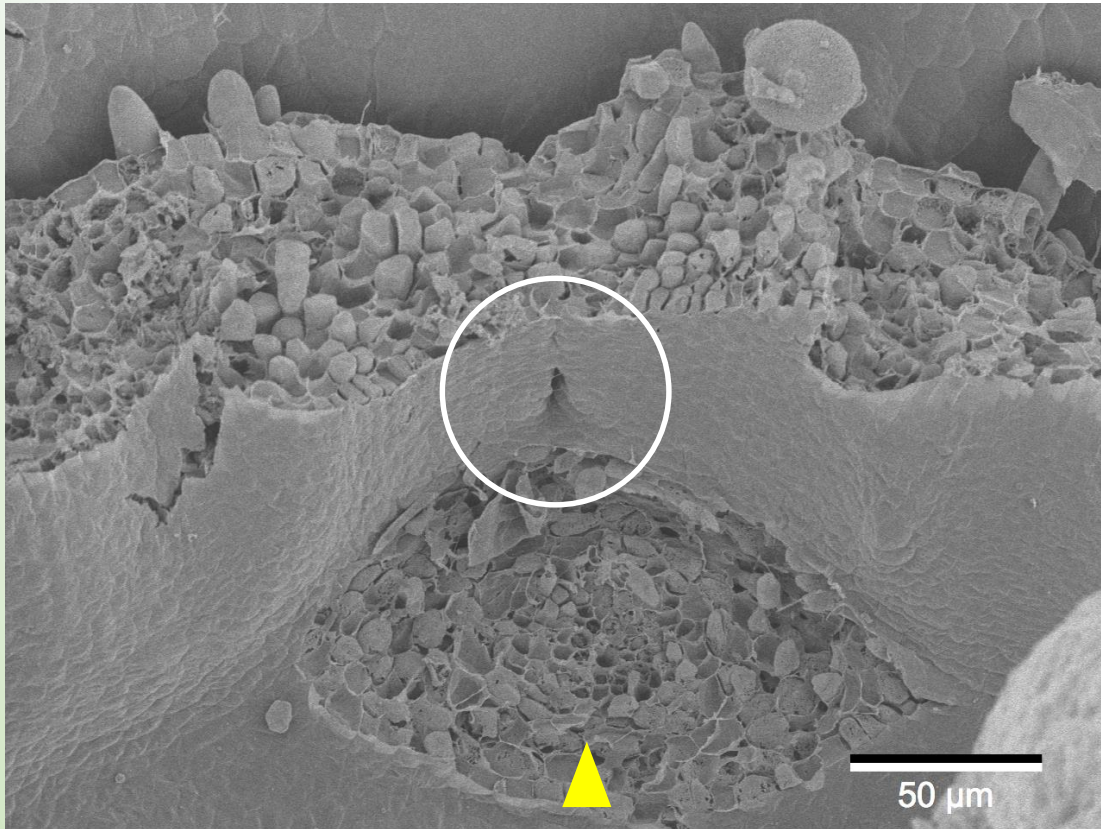
Serissa japonica

Some more complex cases



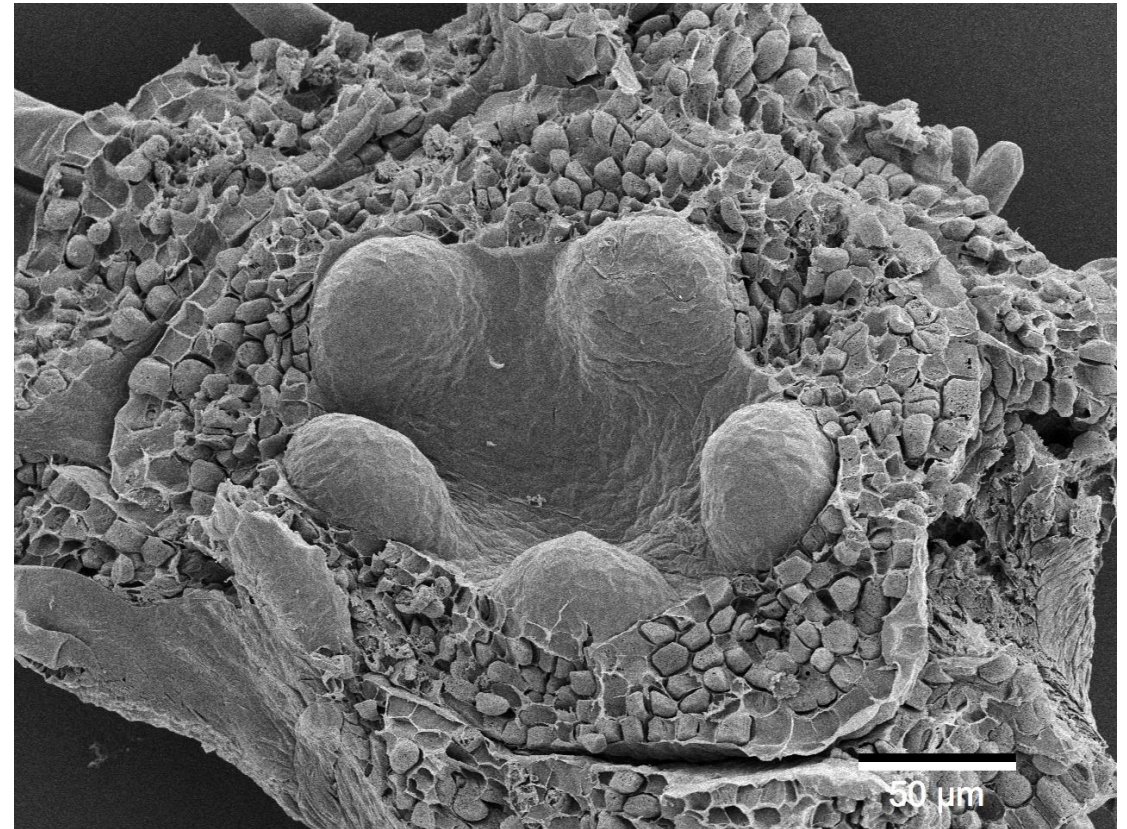
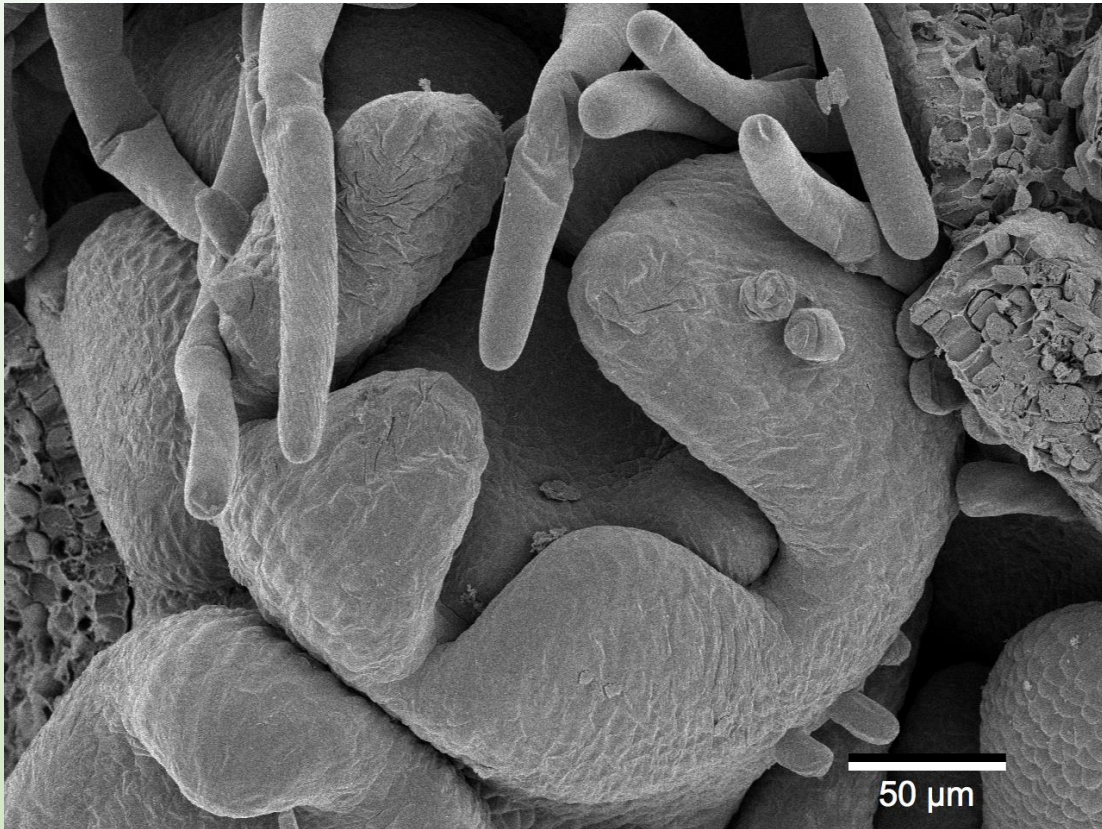
Pentas lanceolata

Some more complex cases



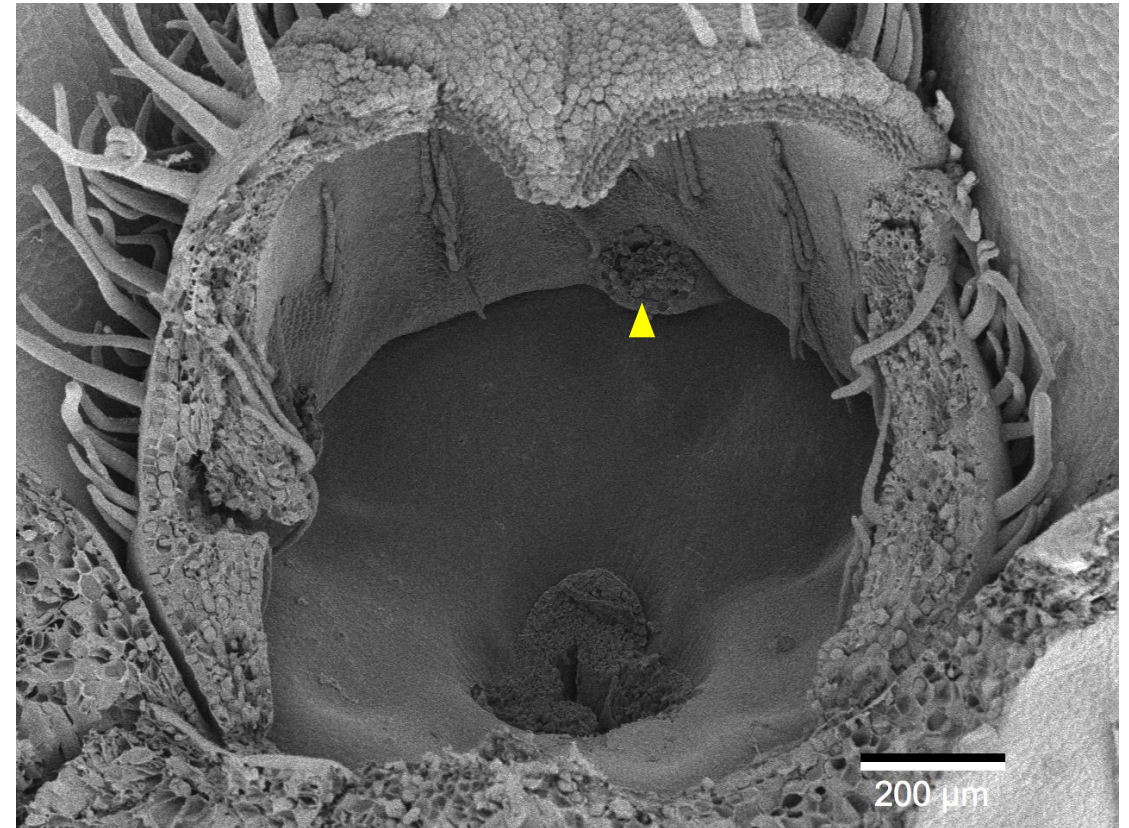
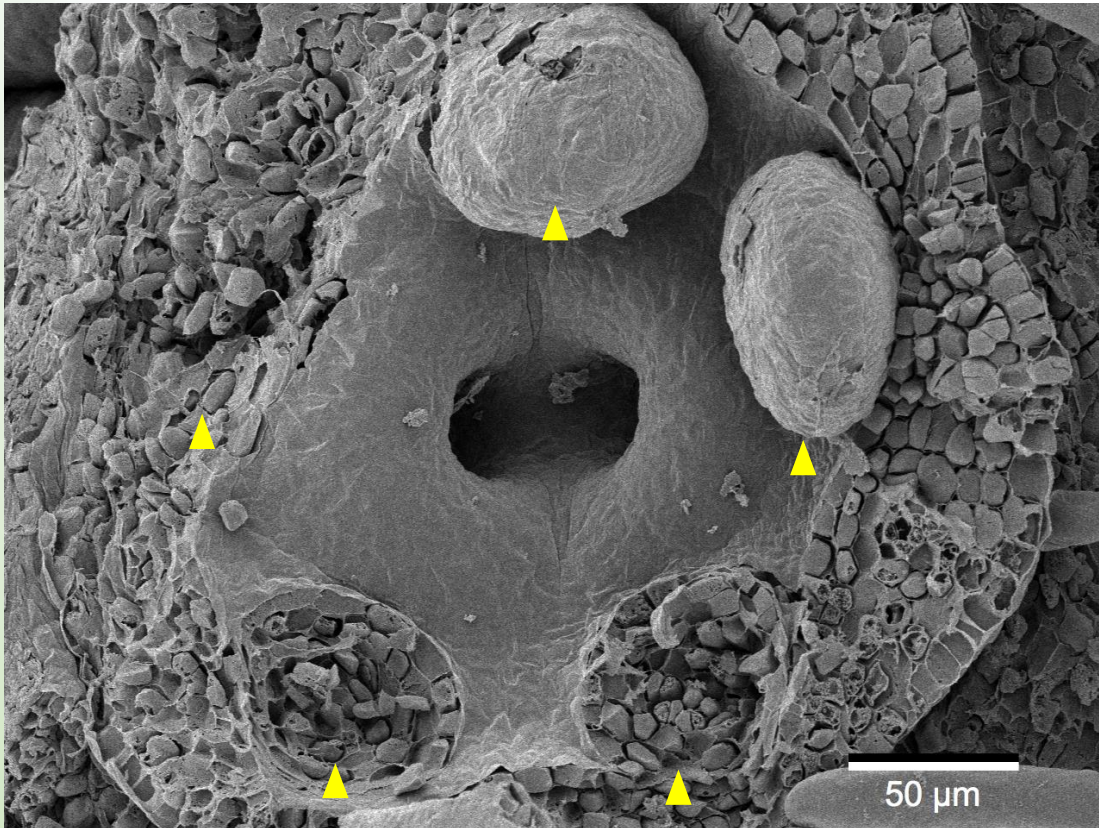
Pentas hindsoides

Some more complex cases



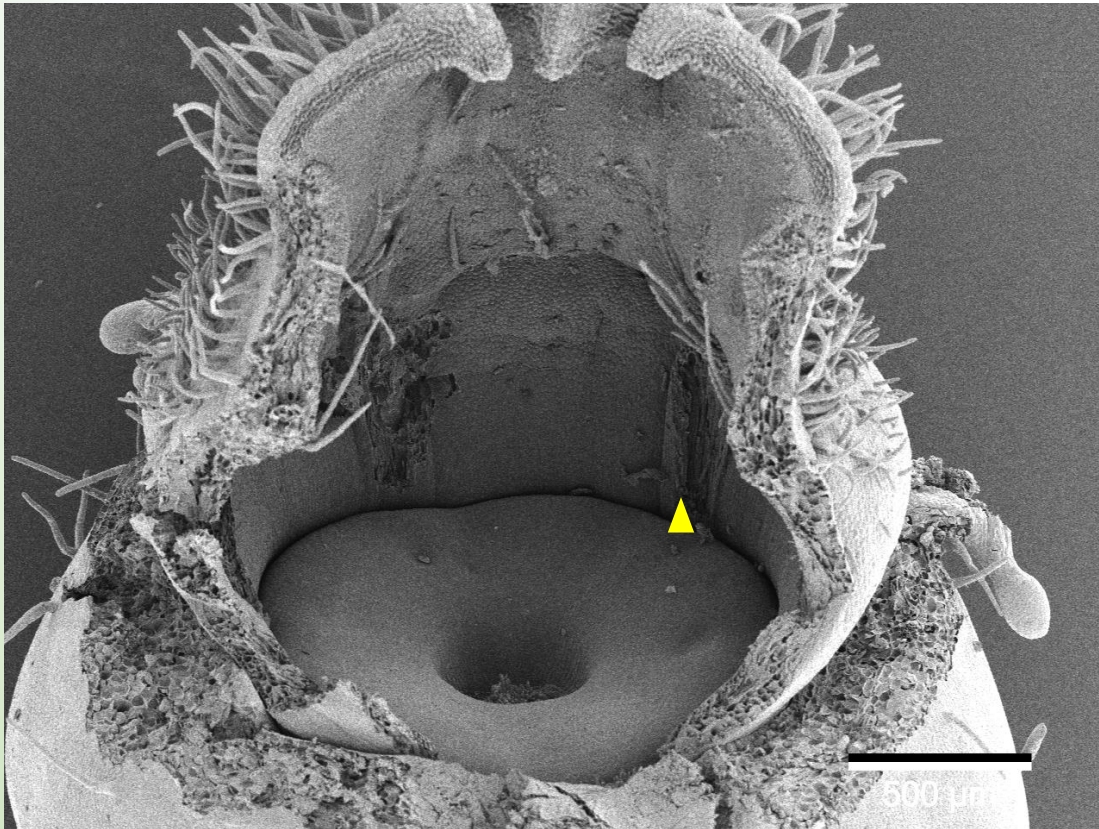
Mycetia malayana

Some more complex cases

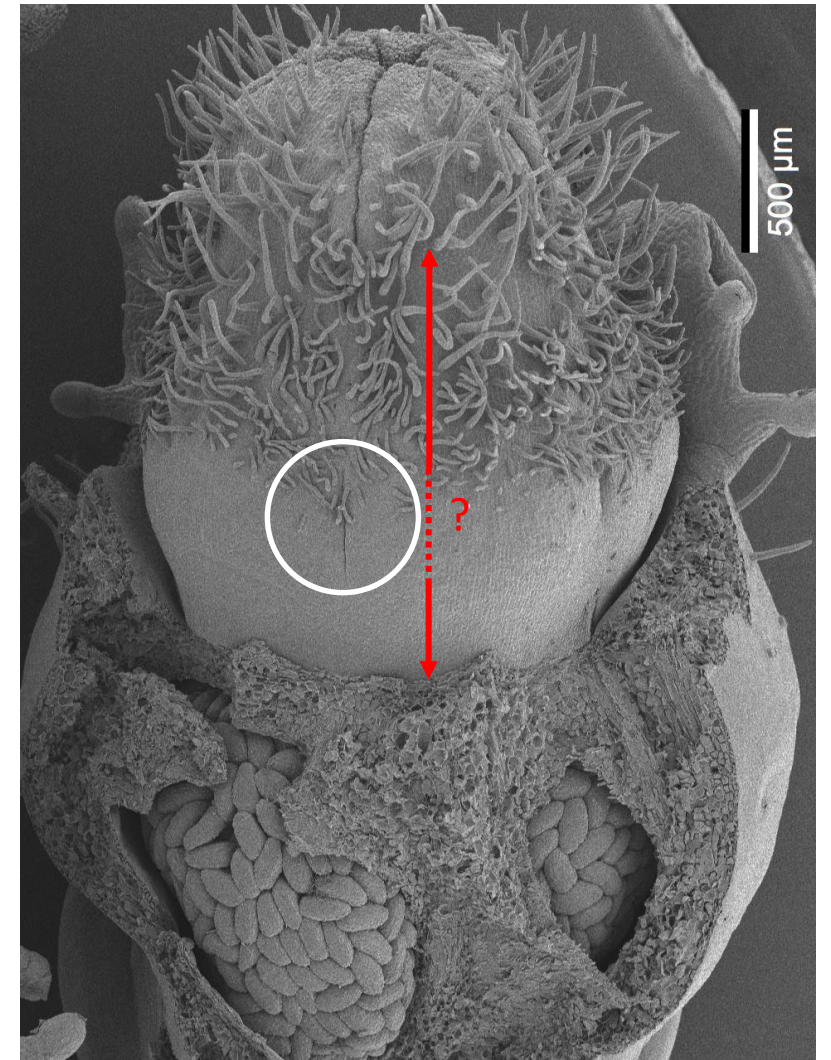


Mycetia malayana

Some more complex cases




Mycetia malayana



Conclusions

- For all observed species except *Mycetia malayana*, the development of the corolla and androecium can be explained by combination of simultaneously occurring formation of a stamen-corolla tube, a corolla tube *sensu stricto* and epidermal fusion (postgenital) of petals at different proportions depending on the species.
- Based on these preliminary results, the development of the corolla and androecium of *Mycetia malayana* still poses questions such as: How do the corolla splits develop? Are the splits lifted by the development of a corolla tube *sensu stricto* or do they originate by an active process higher on the corolla?
- The position of the stamens, corolla splits and the whorl of hairs are useful tools to assess the development of the tubular corolla.



Thank you
Merçi beaucoup
Dank u

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