

Are oligolectic bees always the most effective pollinators?

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a) **Oligolectic bees in Brazil**

survey

related plants and their characteristics

distribution

b) **Case studies** – narrowly oligolectic species

morphological and behavioral specializations

Cajophora (Loasaceae) and Paracolletini

Turnera (Turneraceae) and *Protomeliturga*

What is oligolecty?

Pollen specialization of a bee species.
Females collect and feed bee larvae only with pollen of related plant species or genera of the same plant family.

Which bees are oligolectic in Brazil?

with oligolectic spp.
oligolecty uncertain
no oligolectic spp.

Andrenidae

Oxaeinae
Calliopsini
Protandrenini
Protomeliturgini

Apidae

Apinae
Anthophorini
Apini
Bombini
Euglossini
Meliponini
Centridini
Emphorini
Ericrocidini
Eucerini
Exomalopsini
Isepeolini

Osirini
Protepeolini
Rhathymini
Tapinotaspidini
Tetrapediini

Nomadinae

Bachynomadini
Caenoprosopidini
Epeolini
Nomadini

Xylocopinae

Geratinini
Xylocopini

Colletidae

Colletinae
Colletini
Paracolletini

Diphaglossinae

Caupolicanini
Dissoglottini
Xeromelissinae
Chilicolini

Halictidae

Halictinae
Augochlorini
Halictini
Rophitinae

Megachilidae

Anthidini
Lithurgini
Megachilini

Which bees are oligolectic in Brazil?

Andrenidae

Calliopsini

Arhysosage (1 sp.)
Callonychium (1)

Protandrenini

Anthrenoides (1)
Cephalurgus (1)
Panurgillus (9)

Protomeliturgini

Protomeliturga (1)

Apidae

Emphorini

Ancyloscelis (5)
Diadasina (2)
Melitoma (2)
Melitomella (1)
Ptilothrix (3)

Eucerini

Florilegus (4)
Gaesischia (4)
Melissoptila (5)
Peponapis (1)
Santiago (1)

Tapinotaspidini

Lanthanomelissa (3)

Colletidae

Paracolletini

Actenosigynes (1)
Albinapis (1)
Bicolletes (2)
Cephalocolletes (2)
Hexanthes (2)
Niltonia (1)
Nomiocolletes (1)
Perditomorpha (1)
Protodiscelis (1)
Sarocolletes (1)
Tetraglossula (2)

Halictidae

Halictini

Pseudagapostemon (2)
Rophitinae
Ceblurgus (1)

Megachilidae

Anthidini

Gnathanthium (1)
Hypanthidium (1)

Lithurgini

Lithurgus (1)
Microthurge (1)

Megachilini

Megachile (3)

Oligolectic bees in Brazil are solitary species

Which plants are related to oligolectic bees in Brazil?

Onagraceae 10 bee species

Cactaceae 8

Malvaceae 8

Pontederiaceae 7

Asteraceae 7

Convolvulaceae 5

Apiaceae 5

Iridaceae 3

Loasaceae 3

Oxalidaceae 3

Solanaceae 3

Lythraceae 2

Alismataceae 1

Bignoniaceae 1

Boraginaceae 1

Calyceraceae 1

Cucurbitaceae 1

Turneraceae 1

Vochysiaceae 1

19 plant families



Food plants of oligolectic bees

no trees –
mainly herbs
& small shrubs

Food plants of oligolectic bees



Sida galheirensis



Cordia leucocephala



Oxalis sellowiana

- Therophyts
- Geophyts
- Hemicryptophyts
- Lianas
- Chamaephyts
- Nanophanerophyts

Food plants of oligolectic bees

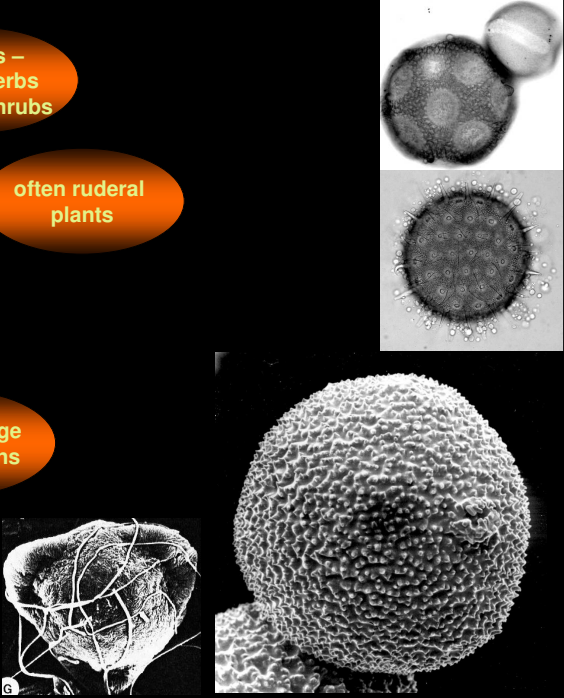
- no trees – mainly herbs & small shrubs
- often ruderal plants

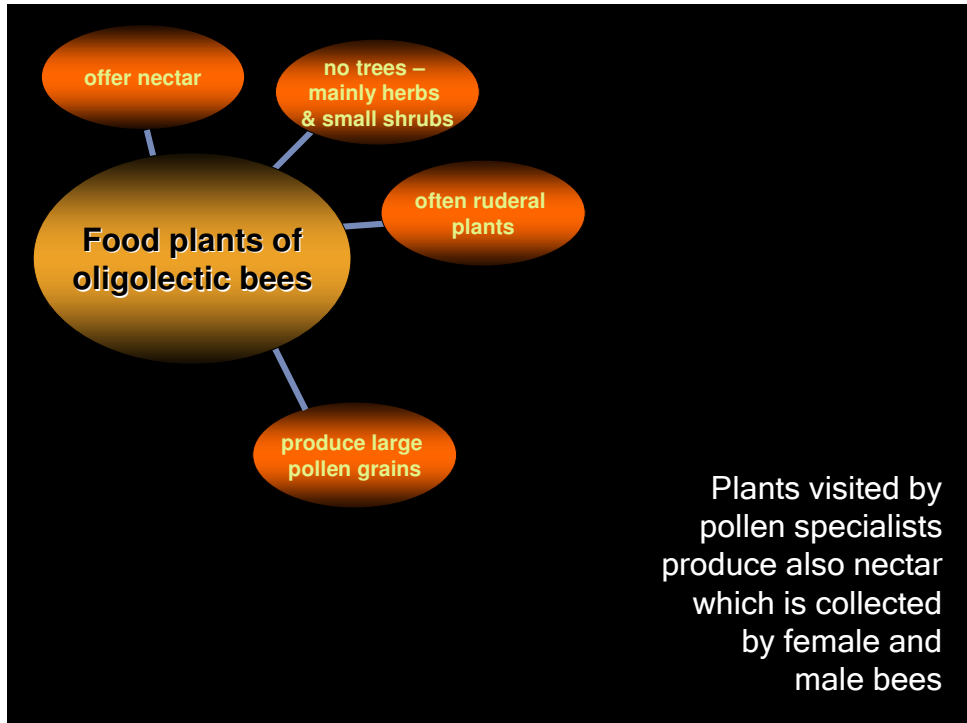


Food plants of oligolectic bees

- no trees – mainly herbs & small shrubs
- often ruderal plants
- produce large pollen grains

Cordia
Cucurbita
Ipomoea
Ludwigia
Pavonia
Opuntia
Sida





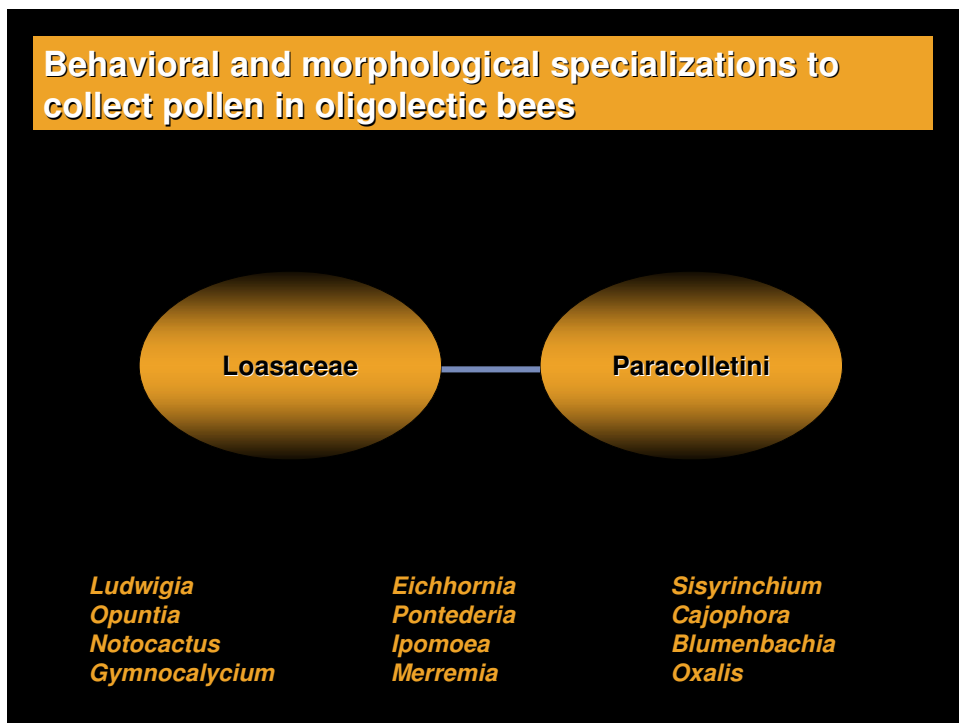
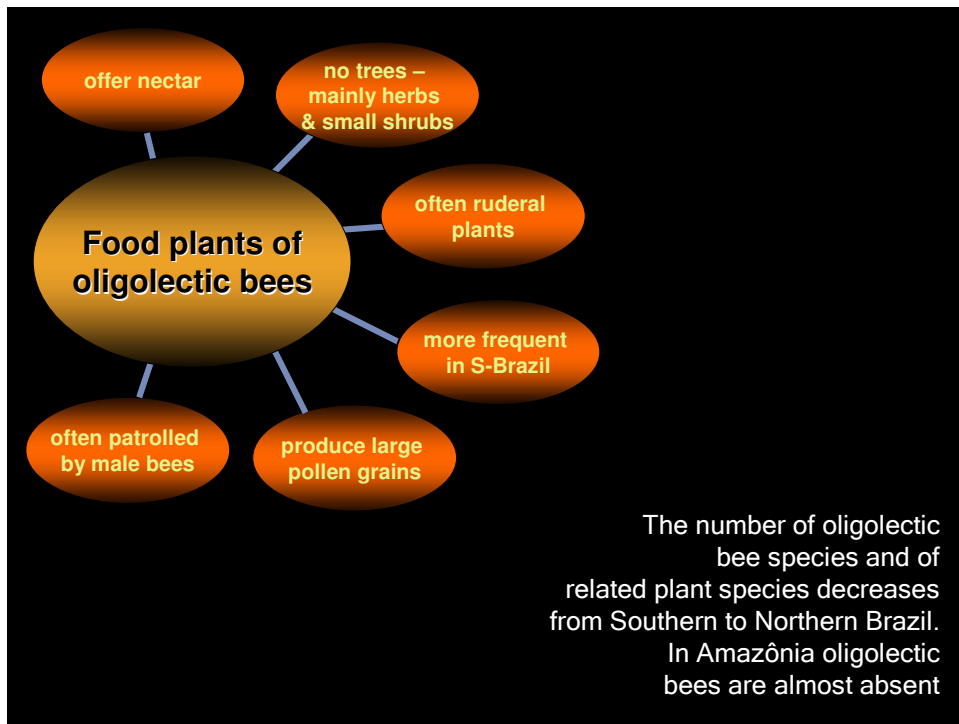
Food plants of oligolectic bees

- offer nectar
- no trees – mainly herbs & small shrubs
- often ruderal plants
- produce large pollen grains
- are patrolled by male bees

Ancyloscelis
Anthrenoides
Arhyosage
Cephalocolletes
Callonychium
Melitoma
Melitomella

Diadasina
Ptilothrix
Bicolletes
Ceblurgus
Lithurgus
Protomeliturga
Actenosigynes

The complex block also features three photographs: a bee on a yellow flower, a bee on a white flower, and a close-up of a bee on a yellow flower.



Loasaceae and *Bicolletes pampeana*



Cajophora clavata



Blumenbachia insignis



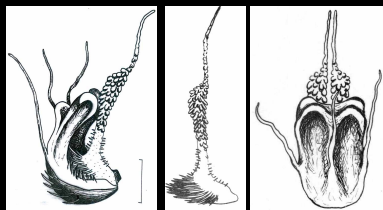
Cajophora arechavaletae

Bees collect nectar in nectar scales and trigger stamen movements

Cajophora arechavaletae



Cajophora clavata



Characteristics of stamen movements

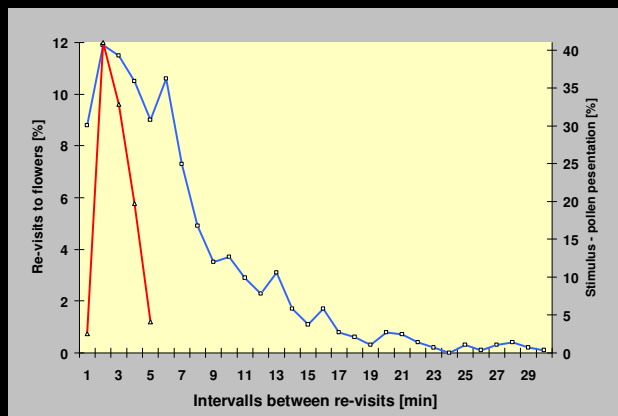
Delay after stimulus 1,1 min

Duration of migration 1,3 min

Presented pollen (90°) after 2,4 min



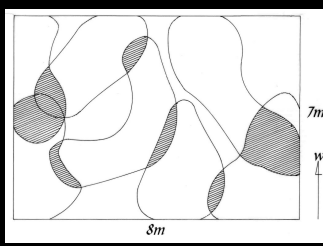
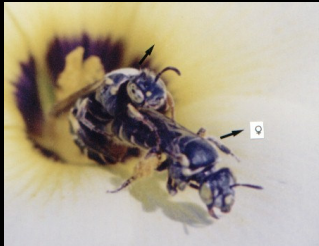
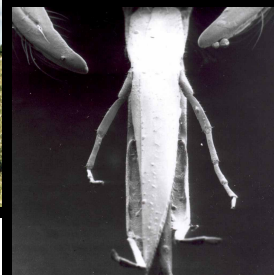
Females of *Bicolletes pampeana* come back to flowers in short intervals, similar to delay stimulus - pollen presentation



**Characteristics of the foraging behavior
of *Bicolletes pampeana***

Effective pollinator	yes
Period of pollen collection	9:00 - 15:00
Duration of a foraging trip	20 - 45 min
Number of foraging trips per day	2 - 4
Number of visited flowers per trip	300 - 500
Foraging route	25 - 62 flowers
Nr. of provisioned brood cells	<1 cell/day (?)

Protomeliturga turnerae* and *Turnera subulata



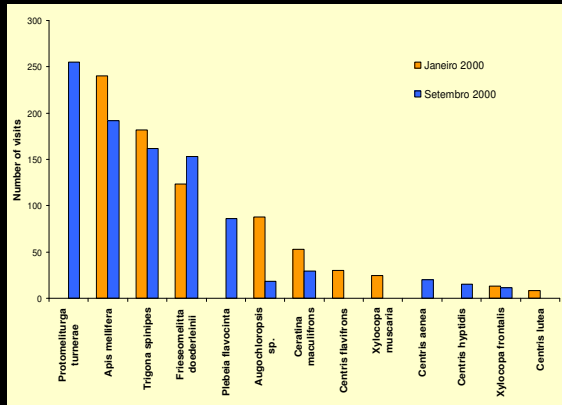
multiple mating

permanent territories of males



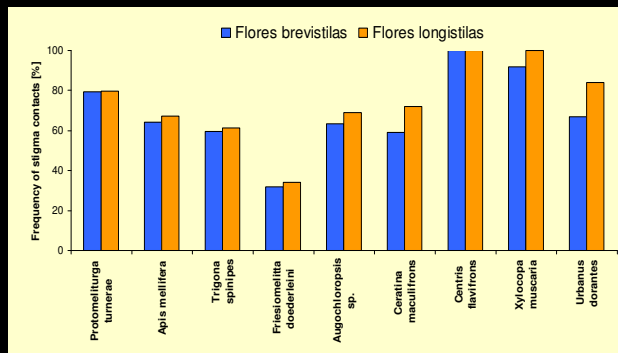
Protomeliturga turnerae and Turnera subulata

Frequency of flower visits



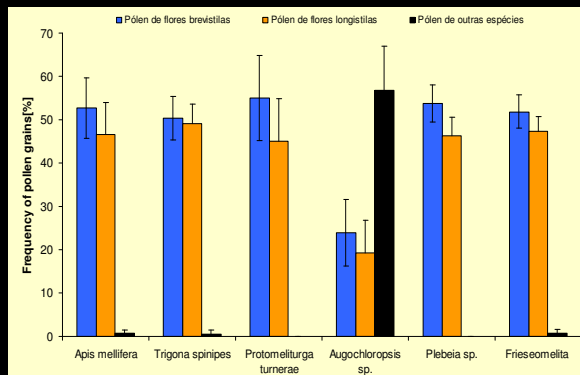
Protomeliturga turnerae and Turnera subulata

Frequency of stigma contacts



Protomeliturga turnerae and Turnera subulata

Analysis of scopa pollen loads



Effective pollinating oligolectic bees

Pollination studies in Brazil that involve oligolectic bee species show that all species are effective pollinators. No pollen or nectar thieves were reported yet.

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