

APHODIINAE



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Presentation

- Part 1: Aphodiinae
- Part 2: Collecting techniques
- Part 3: Test

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APHODIINAE

- *"It's The Little Things That Makes Living Worthwhile."* ~ Unknown
- *"It has long been an axiom of mine that the little things are infinitely the most important."*  
~ Sir Arthur Conan Doyle



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### APHODIINAE

- Known from all continents (even Antarctica!)
- Worldwide ~300 genera, 3500 spp
- Generally small scarabs (>1 cm), elongate body
- Pygidium partially covered by complete elytra
- Antenna with fewer than 11 segments
- Antennal club tight, of 3 antennomeres
- Abdomen with 6 visible sternites
- Mesotibial spur not pectinate
- Most adult mandibles reduced (except Aegialiini)

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### APHODIINAE

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### Natural History

- Common name “small **dung** beetles” is basically WRONG for the majority
- Feed on specific accumulations of rich organic matter
- Larvae mostly detritivores (some in dung)
- Adults with mandibles – detritivores
- Adults reduced mandibles – liquid feeders (?) (some in dung)
- Many unknown habits

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### Natural History

- Dung (= special type of detritus), many types
- Decaying plant matter (+ dung of insects?)
- Inquilines, feeding on 'dung' or nest materials
- Predators, feeding on ant/termite brood, fly larvae, opportunistic liquids (blood)
- Fungivores (?)
- Pollinators (?)
- Niche collecting best way to learn about aphodiines and their diversity

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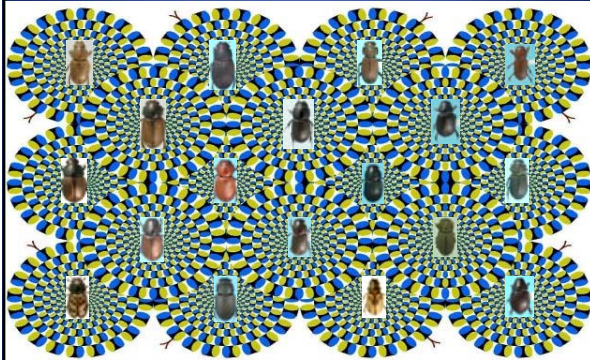
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### APHODIINAE CLASSIFICATION



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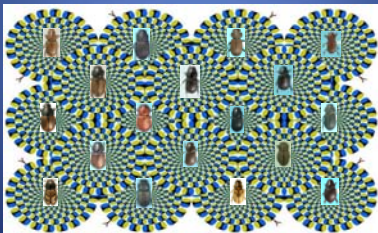
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### Higher Classification?

- What is a genus? Lumpers vs. Splitters.
- Ranks of recognized higher taxa debated.
- Relationships need solid phylogenetic work.



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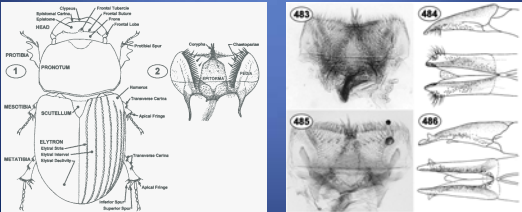
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## General Morphology

- External, internal, sexual dimorphisms, etc.
- Some poorly (?) defined, subtle distinguishing characters
- **There are always exceptions and oddities.**




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## 10 “Tribes” in New World

- With well developed mandibles: *Aegialiini*, *Eremazini*
- With reduced mandibles:
  - Pygidium smooth: *Aphodiini*, *Didactyliini*, *Proctophanini*
  - Pygidium modified elytral locking mechanism:
    - Prosternum not stellate, tibial spurs present: *Eupariini*, *Odontolochini*, *Psammodiini*
    - Prosternum stellate, tibial spurs lacking: *Rhyparini*, *Stereomerini*

NOTE: May not follow evolutionary history. Grouped for ease in identification.

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## AEGIALIINI

- Mandibles visible
- 9 genera, 65 spp. worldwide
- 6 genera, 36 spp. New World, mostly Nearctic




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### AEGIALIINI - habits

- Detritivores
- Many prefer sandy soils, sand dunes, sandbars.
- Some live in high elevation detritus.
- All seem to be active in 'cooler' seasons.
- Sifting, Berlese/Winkler samplers, night walking on ground, washup.



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### EREMAZINI ?

- Worldwide 2 genera, less than 20 species
- *Argeremazus*, 1 sp. – questionable placement in tribe (Eremazini ?)
- Mandibles of *Argeremazus* not exposed



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### EREMAZINI ? - habits

- Detritivore?
- Collected at light on sand dune
- Sifting? Lighting? Night walking on dunes?
- Few specimens known, from Argentina



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**APHODIINI**

Lumpers:

- Worldwide, ~20 genera, +2000 spp.
- New World, ~5 genera, ~370 spp.

Splitters:

- Worldwide ~200 genera, +2000 spp.
- New World, ~80 genera, ~370 spp.
- New World, mostly North America




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**APHODIINI**

- Adult mandibles reduced
- Pygidium smooth, not modified
- Elytral base lacking marginal bead
- Prosternum not projecting, or stellate
- Metatarsus articulates between apical spurs
- Transverse metatibial carina usually present (reduced in some)




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**APHODIINI - habits**

- “Detritivores”, many in ‘dung’
- Few attracted to light.
- Baited pitfalls useful when in the preferred niche.
- Barrier pitfalls for flightless taxa.
- Litter samples, in flights, washup, etc.
- Key is niche collecting at the right time/season.




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### APHODIINI - habits

- Many cool weather active (higher elevations). Seasonal activity.
- Rodent burrow/nests
- Sand dunes
- Dung specialists – pats, pellets, etc. in niche.
- Organic muck around marshes
- Few ant specialists



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### DIDACTYLIINI

- Adult mandibles reduced
- Pygidium smooth, not modified
- Elytral base lacking marginal bead
- Prosternum not projecting, or stellate
- Metatarsus **does not** articulate between apical spurs
- Transverse metatibial carina lacking
- Worldwide 10 genera, 40 spp.
- Only genus *Aidophus* in New World, 12 spp., mostly South America



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### DIDACTYLIINI - habits

- Lights in sandy areas
- Flight traps in sandy areas
- Detritivore?



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### PROCTOPHANINI

- Adult mandibles reduced
- Pygidium smooth, not modified
- Elytral base lacking marginal bead
- Prosternum not projecting, or stellate
- Metatarsus **does not** articulate between apical spurs
- Transverse metatibial carina present
- Worldwide 5 genera, 30 spp.



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### PROCTOPHANINI - habits

- Only genus *Australaphodius*, 1 sp., in New World
- Single species introduced into New World: W-USA, Chile
- Maybe locally common.
- Domestic animal dung?



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### EUPARIINI

- Worldwide 45 genera, 565 spp.
- New World 31 genera, 341 spp., mostly tropical



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### EUPARIINI

- Adult mandibles reduced
- **Pygidium modified**
- **Elytral base with marginal bead**
- Prosternum not projecting, or stellate
- Metatarsus does not articulate between apical spurs
- Transverse metatibial carina absent
- Pronotum without transverse ridges/grooves




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### EUPARIINI - habits

- More tropical, fewer in temperate areas.
- Most detritivores, RARELY in 'dung'
- Some under bark in decaying frass(?)
- Some species come to light.
- Myrmecaphiles, termitophiles(?)
- Sift from detritus, substrates.
- Knowledge of specific detritus and seasonality vital to collecting.




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### ODONTOLOCHINI

- Worldwide 7 genera, 33 spp.
- New World, 4 genera, 11 spp., tropical
- Similar to Eupariini
- Pronotum more declivous (not expanded laterally)
- Head more gibbous
- Protibial teeth more apical (usually)




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### ODONTOLOCHINI - habits

- Rarely collected
- At lights, flight traps, litter samples, under bark
- Termites?



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### ODONTOLOCHINI NEWS FLASH!

San Ramon, Peru: students in a Scarab identification workshop discovered *Saprositellus* sp., larvae and adults feeding on red rotten wood boring insect frass(?). Detailed study in progress.



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### PSAMMODIINI

- Worldwide 26 genera, 400 spp.
- New World 15 genera, 89 spp.
- Similar to Eupariini
- Pronotum with transverse ridges/grooves



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### PSAMMODIINI - habits

- PSAMMODIINI – live in sandy substrates.
- Some come to light.
- Some are found walking on sand.
- Most need to be sifted.



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### RHYPARIINI

- Worldwide, 11 genera, 77 spp.
- New World, 5 genera, 17 spp. , tropical
- Prosternum stellate and projecting posteriorly
- Elytra with large modified tubercles at apex
- Body highly modified



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### RHYPARIINI - habits

- Termitophilus (Myrmecophilus?)
- *Rhyparus* come to light, others do not
- Litter samples, in termite colonies, flight traps



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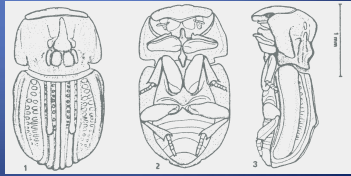
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### STEREOMERINI

- Worldwide, ~7 genera, 18 spp.
- New world, only *Termitaxis*, 1 specimen from termite nest in Peru
- Prosternum stellate
- Elytra lacking tubercle at apex
- Body highly modified



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### Literature/handouts

- Electronic handouts
  - Electronic Key from website
  - PDFs of generic keys
  - PDFs of important generic revisions
- Text books to view
- Specimens to study

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### COLLECTING METHODS

- Time for a break

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### Lighting, Light trapping

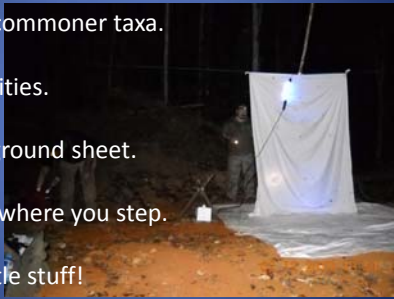
Catch mostly commoner taxa.

Occasional rarities.

Always use a ground sheet.

Always watch where you step.

Look at the little stuff!



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### Lighting, Light trapping

Rarely collected areas/habitats.

Recent weather considerations.

LUCK - **THE** night of a flight.

Always pay attention to small beetles on the ground sheet!

WATCH YOUR STEP!



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### Surface pitfall trapping

- Dung baited pitfalls on surface collect common surface generalist aphodiines.
- Placement of baited pitfalls vital for many aphodiines.



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### Surface pitfall trapping

- Unbaited traps can be effective, require patience and persistence.
- Examples: barrier pitfalls, fake burrow pitfalls near other animal burrows.



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### Flight traps



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### Feces, Dung, Caca



Pellets or Patties? Where and when deposited?

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### Termite nests

- *Coptotermes* sp.
- "*Rhinotermes*" sp.

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### Small burrowing animals

- Mice
- Pack rats
- Pocket gophers, tuco tuco
- Ground squirrels, prairie dogs, ....
- Tortoises
- Many other possibilities unexplored
- Know the local vertebrate fauna, dung or nest associates possible

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### Pocket Gophers



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### Gopher beetle trap



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### Plague\*-Scooping



\* Some rodents carry flea transmitted diseases.  
Sample with caution.

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### Why stop?



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Prairie



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Aphodiines in flight video



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Snow banks



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### Sifting substrates

- Sand, small screen, watch for beetles on screen (or float)
- Litter for extraction with Berlese or Winkler separators, use larger screen, sample materials falling through screen
- Throw detritus in sun and see what moves!

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### Litter samples



Spoils from nests in logs, litter under foot & over head, endless possibilities

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### Simply look!



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### The TEST it next

- Time for a short break

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### Niche (Microhabitat) collection discussion

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### **Let's Go Collecting !**

Let's walk through some landscapes and discuss things we've learned (or might explore) about where/when/how to collect aphodiines.

(I apologize for lack of tropical pictures, I am still learning!)

Look for 'edges', niches, and accumulations of rich organic matter.

~ Audience Participation Expected ~

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USA, North Dakota Prairie



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USA, Wyoming, high desert



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USA, Arizona Deserts



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USA, Oregon

Desert  
+ Dunes



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USA, Nevada, Sand Dunes



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USA, Florida scrub, fossil dunes



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USA, N.Carolina, Hardwood forest



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USA, Florida, mesic woodland



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Surinam, lowland tropical forests



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Surinam, Lowland tropical savannah



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USA, Utah, Alpine meadow



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USA, Wyoming, sand dune edge



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Collecting aphodiines is exhausting



GOOD LUCK

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