

Australian Museum

Entomology and Wildlife Hazard

Management

31 July 2014

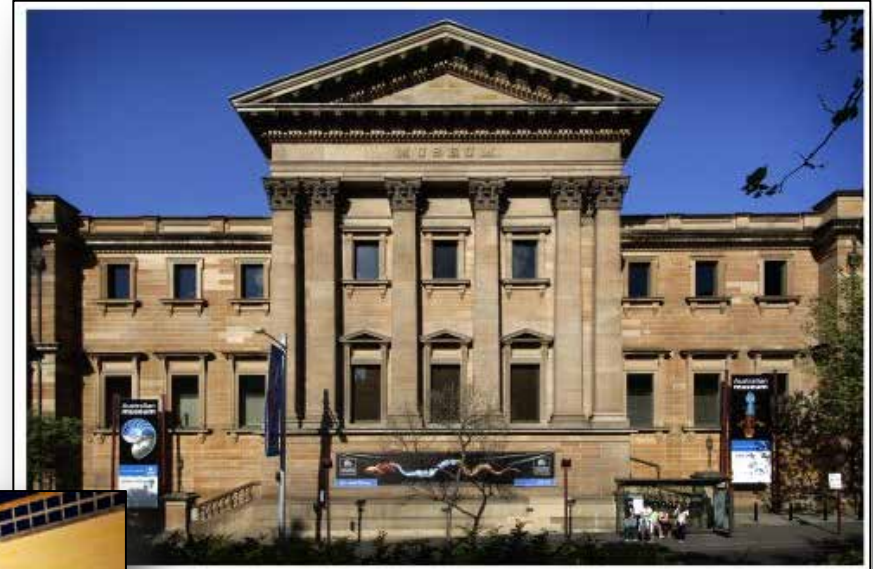
2014 AAWHG Forum

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nature culture **discover**



Australian Museum Research Institute

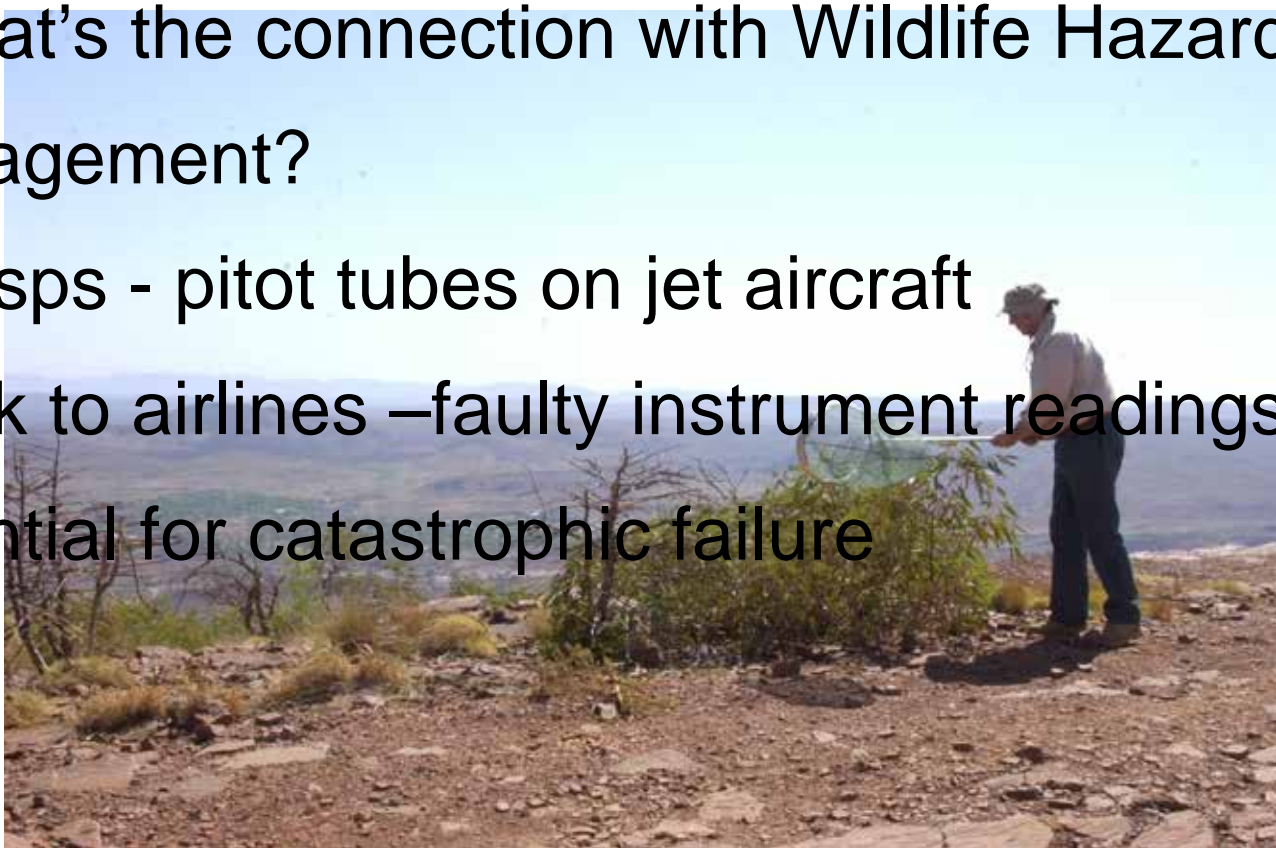


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Why Entomology and Wildlife Hazard Management?



- Say what? An entomo-watcha-ma-call-it??
- What's the connection with Wildlife Hazard Management?
- Wasps - pitot tubes on jet aircraft
- Risk to airlines –faulty instrument readings - potential for catastrophic failure



Entomology and Wildlife Hazard Management



Entomology – study of insects

- Wasps – Hymenoptera – mud wasps
- What do they do for a living?

Wildlife Hazard Management

- Attraction to aircraft Pitot tubes
- CSI – museum style – case study
- How to minimize their airport presence?

Mud wasps; mud dauber wasps, potter wasps



- Identification – important to know the species you are dealing with.
- ~12000 species of wasps in Australia
- ~300 species of Mud wasps – Eumeninae
- ~130 species of Potter wasps - Genus *Paralastor*
- Can look very similar to naked eye

Mud wasps; mud dauber wasps; potter wasps

- E.g. *Paralastor* species

- known species

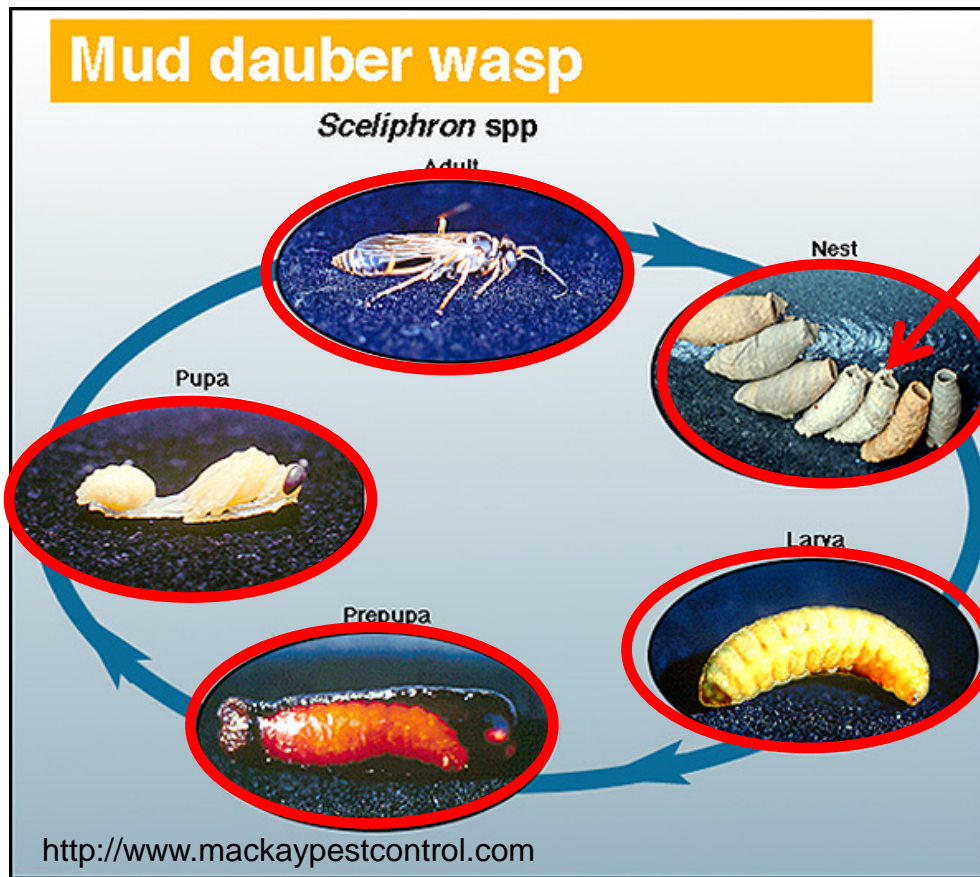
- undetermined species



Mud wasp biology



- Life histories – what we know



- Adult wasp
- mud nest – paralyzed live prey
- egg layed on/in prey & seals mud nest
- Wasp grub
- Pupal stage
- Adult emerges

Wasps – what do they do for a living



- Biology – when? – where? – what?
- Spring emergence of adults
- Coincides with **rain**, mud, puddles
- Coincides with warmer, longer days
- New plant growth, caterpillar activity, spider presence

Wasps – what do they do for a living



- Ideal reproductive conditions - plentiful availability of resources –
- mud – for nest building
- food - for feeding offspring
- Results in high adult population presence in next season

Nest location choice

Preferred niche for mud nest –

e.g.

- stand-alone mud nest
- holes in ground
- In trees
- buildings
- objects
-aircraft!



<http://www.brisbaneinsects.com>

Wasp entering hole on aluminium ladder



<http://www.mtfca.com>

Mud wasp nest in valve of
Model T Ford

Why pitot tubes?

- mistaken identity
- convenient ready-made nest
- opportunistic location due to competition for available suitable nest sites.
- Driven by high adult population numbers

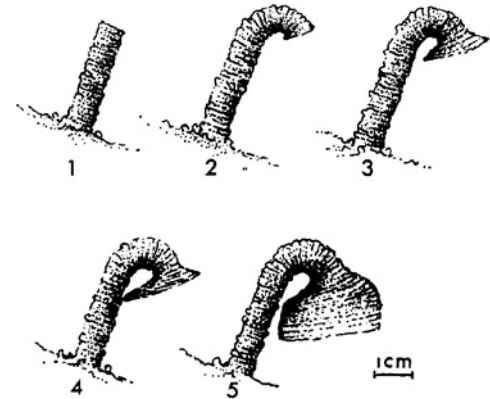


Fig. 3. Stages I to V in construction of the funnel by *Paralastor* sp.

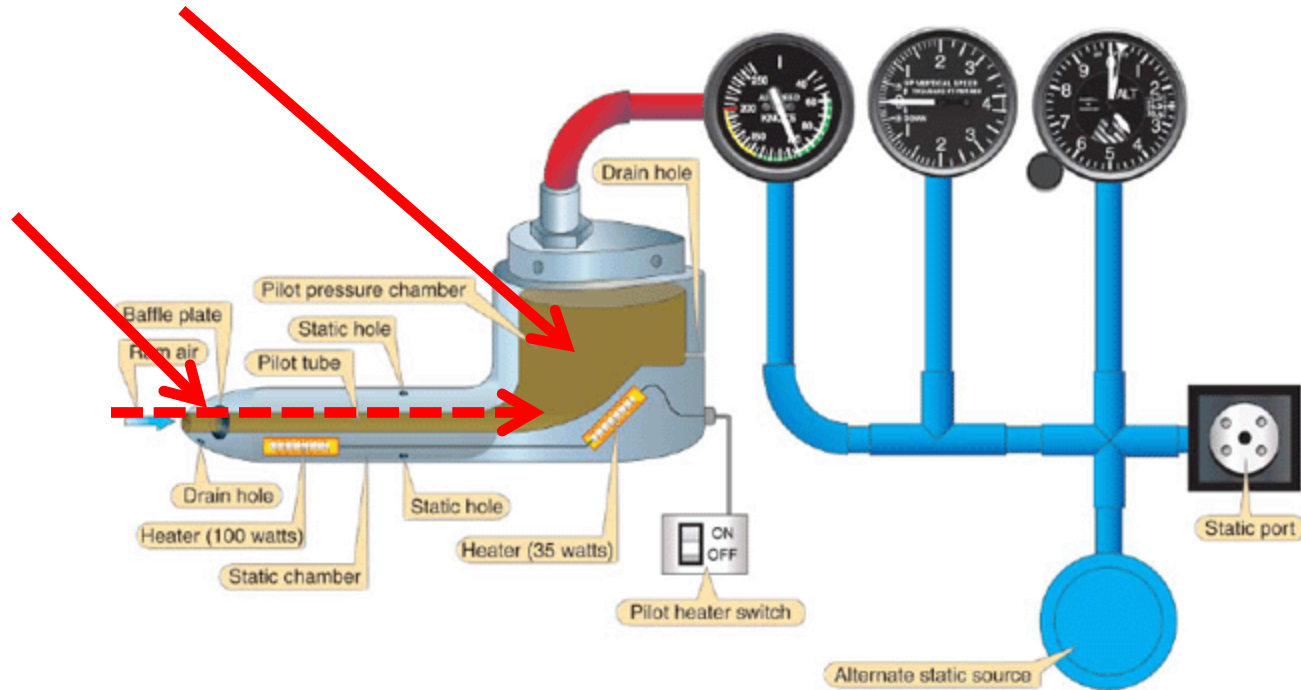
Snug Fit

Size is important – they need to be small enough to enter the pitot tube



Wasp with abdomen in pitot tube of Cessna

A ready made nest for a mudwasp



<http://luckybogey.wordpress.com>

Pitot tube diagram

Misconceptions



- Do wasps re-use their nests?
 - new nests each season – no recycling;
current one may be rebuilt if destroyed
- If there are lots of wasps around this year will there be as many again next year?
 - Depends – on optimal conditions
- Do wasps work alone or with one another?
 - Some are eusocial, mud wasps are loners

Case study – sifting through the remains from a pitot tube

CSI – museum style – case study



- Strong wasp presence – at an airport in Queensland
- Sample came to AM as a ‘wildlife airstrike’ for DNA species ID request
- Not our usual tissue or feather sample
- Charred remains of insect? Suspected wasp

CSI – museum style – case study



- And what did we find?
- 2 animals – wasp & moth caterpillar

CSI – museum style – case study

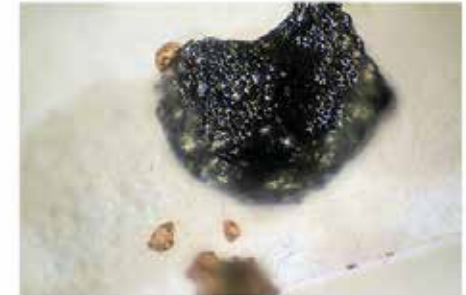
- Charred remains – unsuitable for DNA
- enough body parts to partially ID components of organism based on morphology
- Two different insects

Charred remains recovered from pitot tube of aircraft

head



body plate



leg

caterpillar



thorax



CSI – museum style – case study

Organism 1: Wasp head – comparison – charred vs normal
Key features – cut away eye, distinctive clypeus – typical of
vespoid wasps



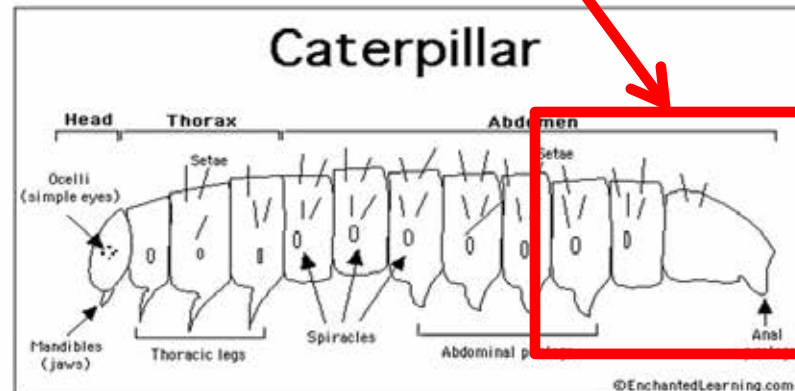
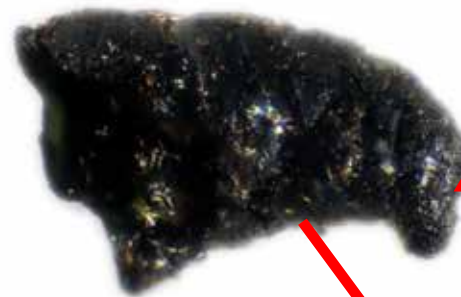
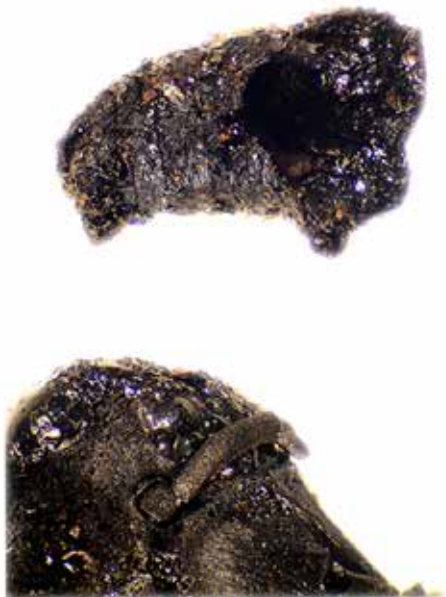
Image: S. Ginn
Australian Museum



Image: www.waspweb.org

CSI – museum style – case study

Organism 2: Caterpillar remains – rear segments of body with anal prolegs visible



CSI – museum style – case study



- Enough conclusive evidence to allow determination of both organisms

Organism 1:

- Wasp - most likely Subfamily Eumeninae
- Size of body parts matches species in Genus *Paralastor*
- Missing - vital identifying characteristics – e.g. wings, body colour

CSI – museum style – case study



Organism 2:

- Moth caterpillar – insufficient evidence other than to say it's certainly a moth caterpillar, and likely to be in Family Geometridae or Noctuidiae

CSI – museum style – case study



- Identification possible from charred remains
- Evidence of two organisms shows that wasps are entering pitot tubes with intent to use the cavity as a nest

Wildlife Hazard Management - reducing the wasp population



- Total eradication – unlikely; wasps were around long before the airports; winged and mobile
- Control of wasp numbers locally on airport still susceptible to re-population from elsewhere
- Successful minimization strategies must be ongoing

How to reduce the wasp presence at airports



Short Term

- Preventative maintenance – be alert to ‘spring bloom’ of insects
- Ongoing – observe and destroy nests
- Wasps may be active day/night or twilight
- Identify prey food source and habitat
- Remove habitat for food source
- Cover pitot tubes for aircraft grounded for more than ‘x’ hours

Uncovered pitot tubes – how long is safe?



- Wasp may take 1-2 days to build mud nest
- Pitot tube is ready-made nest
- Wasp may only have to visit tube a couple of times
- Once to put prey in tube and inject egg
- A few times to 'mud up' tube entrance
- this may only take minutes to hours not days.

Technical solutions ???



Longer term

- Research engineering solution to seal outside of pitot tube on engine shutdown

Acknowledgments



- Michael Elliot, Dr Dave Britton and Derek Smith – Australian Museum
- AAWHG
- Phil Shaw , Alan House, Avisure/Ecosure



References



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Thank you

www.australianmuseum.net.au

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