

# Vertebrate Pest Part 2

What aspects of rodent biology make them so successful and difficult to control?

• Adaptability



• Diet



• Size



• Reproduction

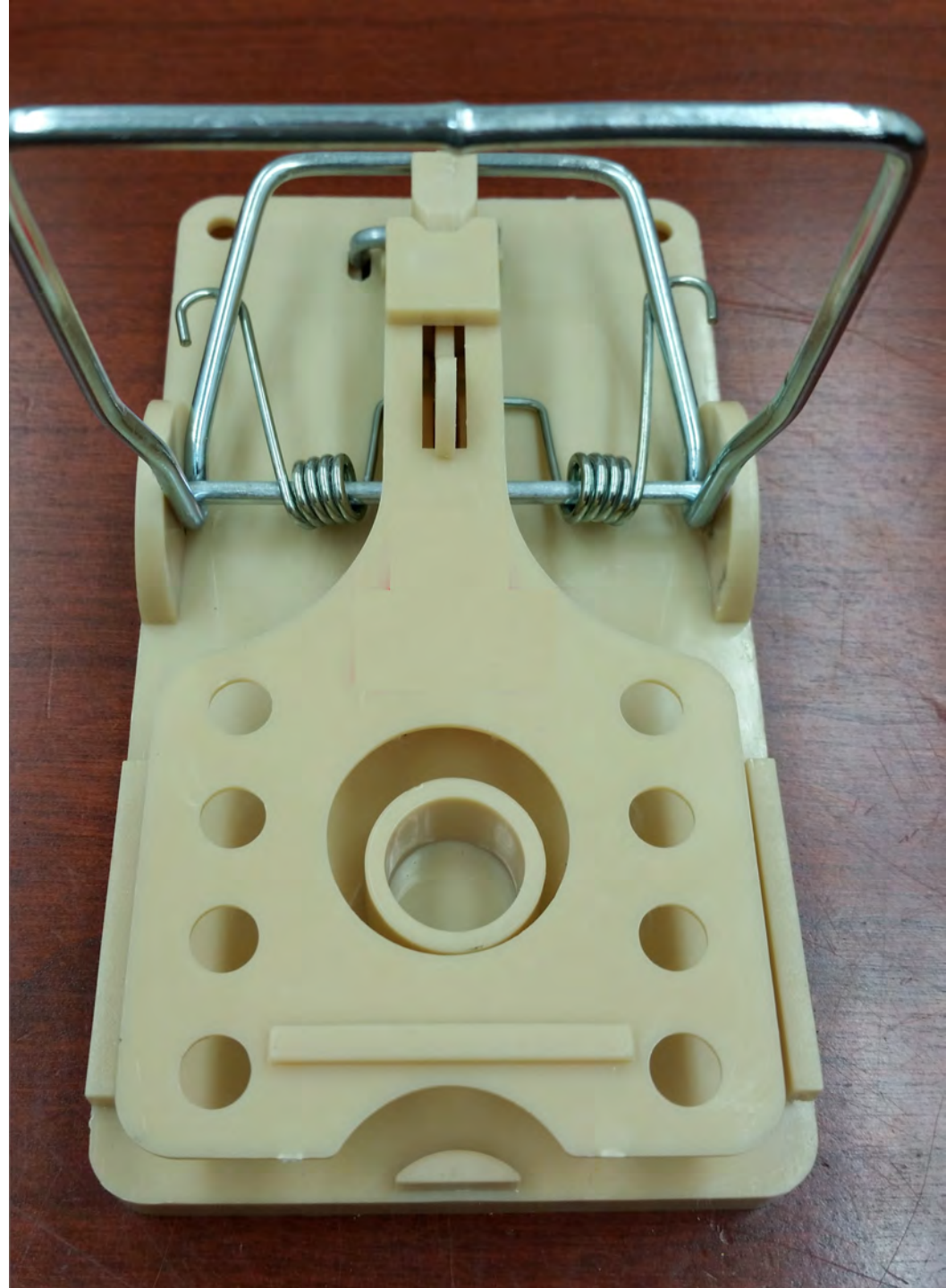


• Behavior



Be proactive!  
Not reactive!

- **Non-toxic control**
  - Examine locally available baits
    - Remove source
    - Then use bait
  - No local bait?
    - Coconut
    - Peanut butter and oats
  - Small bait balls
    - Snap traps with bait recess



## • Non-toxic control

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## • Toxic control

- Select good quality bait
- Change it up
- Monitor

# Options for toxic control

## Homeowner

- Must use bait station
- No loose baits
  - 1<sup>st</sup> generation anticoagulant
    - Antidote available
    - Low risk of both primary and secondary toxicity


## PMP

- Must use bait station
- No loose baits
  - 2<sup>nd</sup> generation anticoagulant
    - Antidote available
    - Higher risk of secondary toxicity
    - Request bromadiolone over brodifacoum

# 1<sup>st</sup> generation anticoagulants

- Chlorophacinone
  - Diphacinone
  - Warfarin
- 
- Multiple feeding anticoagulants
  - Several days
  - Metabolized in the liver

# 2<sup>nd</sup> generation anticoagulants

- Bromadiolone
  - Difenacoum
  - Difethialone
  - Brodifacoum
- 
- Single feeding anticoagulants
  - Takes several days to die after single dose
  - Super-lethal dose
  - Not easily excreted in the body

# Non anticoagulant rodenticides

- Bromethalin
  - No antidote
  - Little risk of secondary toxicity.
  - More research needed on toxicity on efficacy
  - Not known to be as effective as 2<sup>nd</sup> generation



The image shows a stage with a red curtain backdrop. The Tomcat logo is centered on the curtain. Below the logo, the words 'presents' and 'Dead Mouse Theatre' are written in a cursive font. At the bottom of the stage, there is a line of small text providing product information.

**TOMCAT<sup>®</sup>**

*presents*

*Dead Mouse Theatre*

Each 1 oz. bait block kills up to 12 mice. Based on no-choice laboratory testing. Time from first consumption of lethal dose to death.

# Primary toxicity

- Occurs when nontarget consumes anticoagulant directly
- Why?
  - Incorrect bait application
  - No bait station
  - No pest to consume the bait



# Secondary toxicity

- Occurs when nontarget ingests prey that has previously been exposed to anticoagulant
- Associated mostly with the use of 2<sup>nd</sup> generation anticoagulants
- Why?
  - Incorrect bait application
  - Super-lethal dose



# Anticoagulants and mange



# Anticoagulant Exposure and Notoedric Mange in Bobcats and Mountain Lions in Urban Southern California

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**ABSTRACT** Humans introduce many toxicants into the environment, the long-term and indirect effects of which are generally unknown. We investigated exposure to anticoagulant rodenticides and evaluated the association between notoedric mange, an ectoparasitic disease, and anticoagulant exposure in bobcats (*Lynx rufus*) and mountain lions (*Puma concolor*) in a fragmented urban landscape in southern California, USA. Beginning in 2002, an epizootic of notoedric mange, a disease previously reported only as isolated cases in wild felids, in 2 years reduced the annual survival rate of bobcats from 0.77 (5-yr average) to 0.28. Anticoagulants were present in 35 of 39 (90%) bobcats we tested, multiple compounds were present in 27 of these 35 (77%), and total toxicant load was positively associated with the use of developed areas by radiocollared animals. Mange-associated mortality in bobcats showed a strong association with anticoagulant exposure, as 19 of 19 (100%) bobcats that died with severe mange were also exposed to the toxicants, and for bobcats with anticoagulant residues >0.05 ppm, the association with mange was highly significant ( $\chi^2 = 10.36$ ,  $P = 0.001$ ). We speculate that concomitant elevated levels of rodenticide exposure may have increased the susceptibility of bobcats to advanced mange disease. Bobcats were locally extirpated from some isolated habitat patches and have been slow to recover. In 2004, 2 adult mountain lions died directly from anticoagulant toxicity, and both animals also had infestations of notoedric mange, although not as advanced as in the emaciated bobcats that died with severe disease. Two other mountain lions that died in intraspecific fights also exhibited exposure to 2–4 different anticoagulants. These results show that the effects of secondary poisoning on predators can be widespread, reach even the highest-level carnivores, and have both direct and possibly indirect effects on mortality. Further research is needed to investigate the lethal and sub-lethal effects of anticoagulants and other toxicants on wildlife in terrestrial environments. (JOURNAL OF WILDLIFE MANAGEMENT 71(6):1874–1884; 2007)

The first paragraph is very blurry and illegible. It appears to contain several lines of text, possibly a title or introductory sentence, but the content cannot be discerned.

The second paragraph is also illegible. It seems to be a continuation of text, but the specific words and structure are not readable.

association between notoedric mange, an ectoparasitic disease, and anticoagulant exposure in bobcats. Although we have not found a specific association between mange and first-generation anticoagulants, we have tested for

The third paragraph is illegible. It appears to be a list or a series of points, but the details are not visible. It may contain several lines of text.

The fourth paragraph is illegible. It appears to be a concluding sentence or a reference, but the content is not discernible.

# Remember!!

- No toxicant registered for use for protection of home fruit or nut trees.
- Bait stations can be placed in trees if they are not more than 50ft from a structure and the rodent pests are associated with that structure.

# Size

- Small
  - Holes
  - Cracks
  - Vents
  - Door sweeps
  - Burrows
- Stamp out or fill burrows
- Exclusion is the most successful and permanent form of house mouse control
- On siding, use high quality, exterior grade caulks and sealants





# Reproduction

- Best to target females
  - Not really possible
  - Breeding occurs year round
- Good to know when breeding females are controlled
- Examine carcasses (wear gloves)

- Teats
  - Barely visible
  - Visible with fur
  - Visible without fur





Aplin et al. (2003) Field methods for rodent studies in Asia and the Indo-Pacific





# Behavior

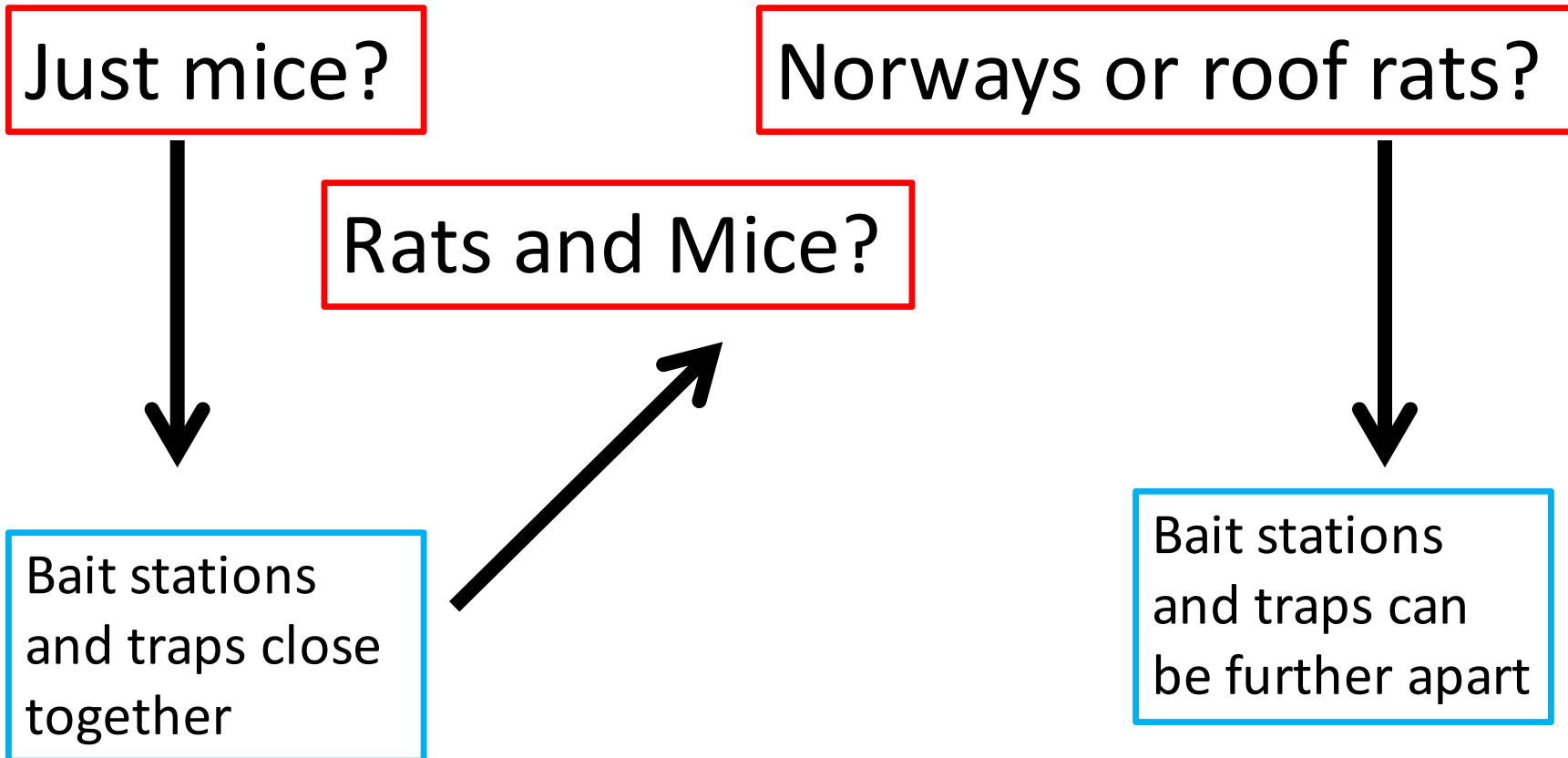
- Activity

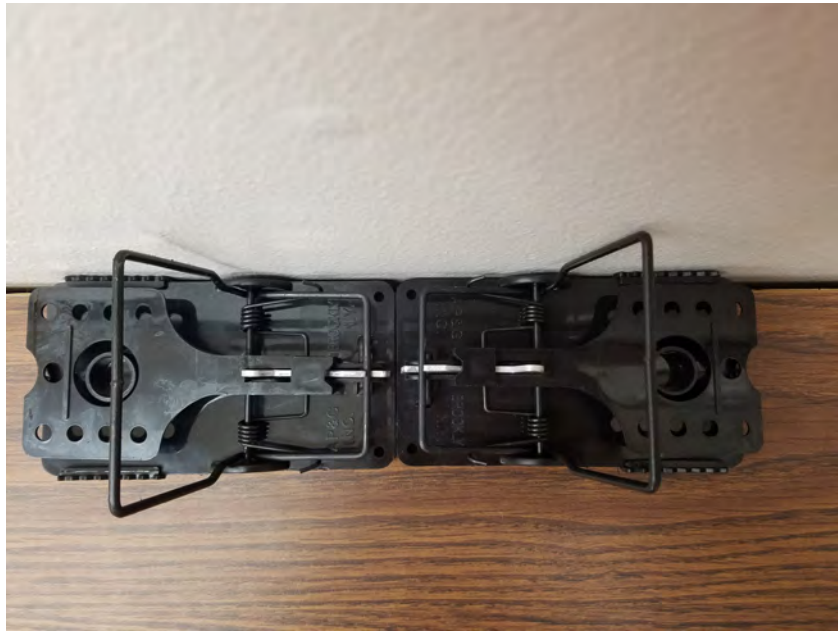
- concerned about non natives/pets/humans
- Set traps/open bait stations at night

- Secrecy

- Set traps in dark and secluded areas
- Set traps and bait stations properly

# Home range





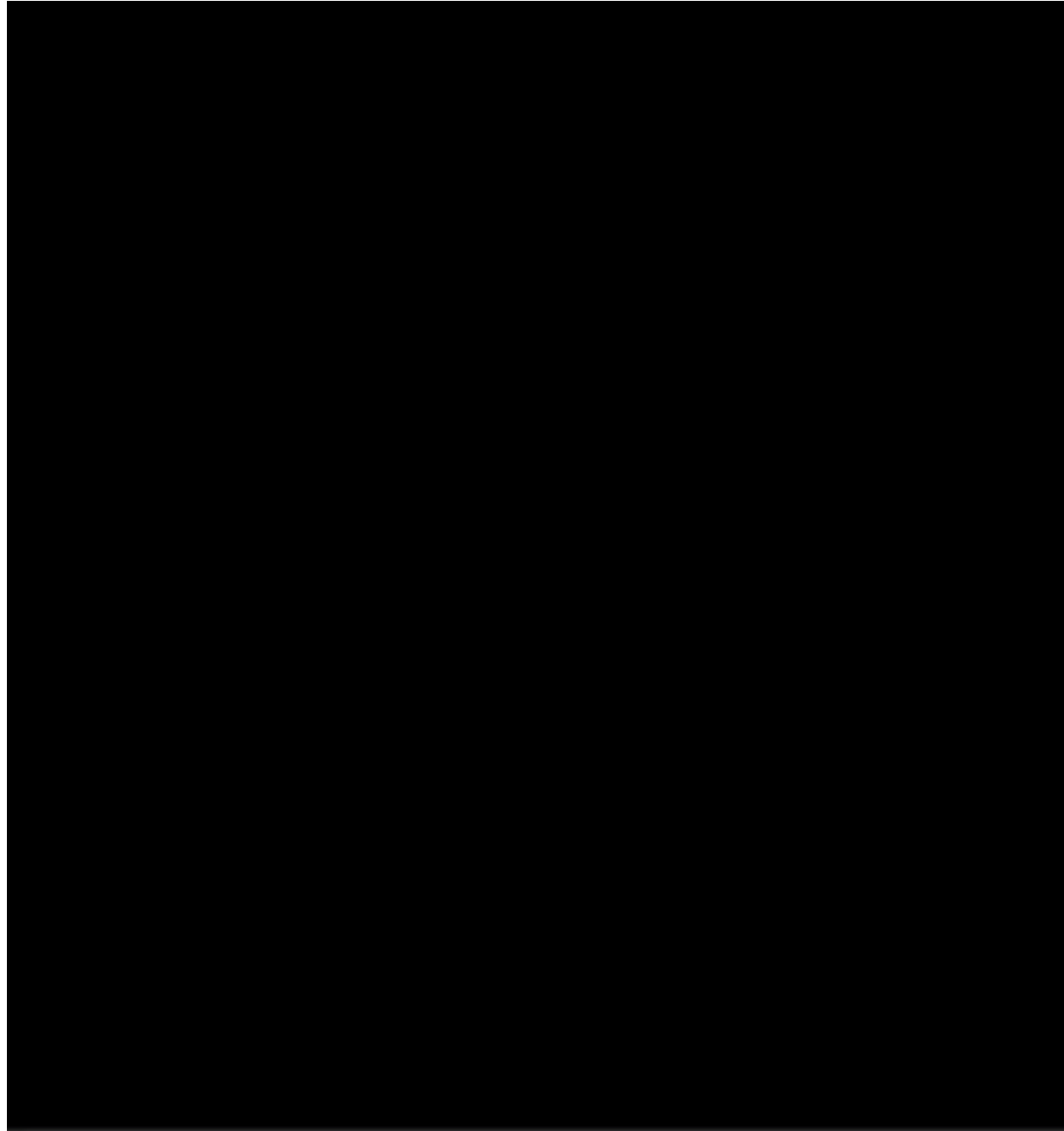
## Setting your traps

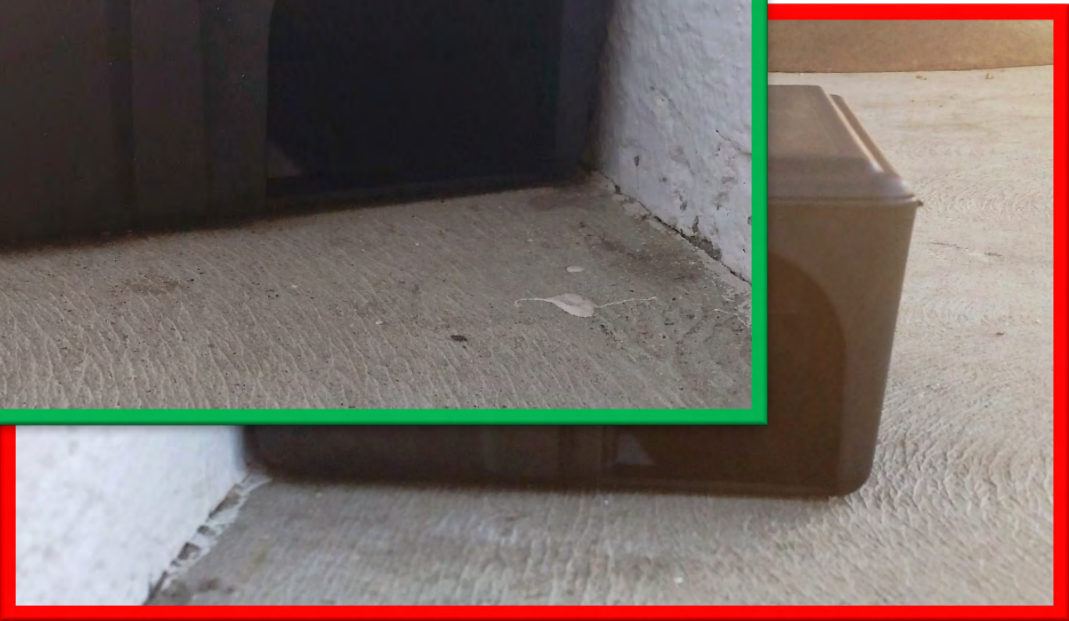
- Always in twos





# The importance of trap placement







# Speed/Agility/Swim

- Difficult
- Be aware
  - Poor
  - Sewer

The screenshot shows a web browser window with the URL <https://www.list.co.uk/article/68098-sir-david-attenborough-shocked-by-rat-on-the-toilet/>. The page features a navigation bar with categories like Music, Film, Comedy, Theatre, Clubs, Visual art, Life & style, Books, and More. A banner for the '2015 STANZA Scotland's International Poetry Festival' is visible. The main article title is 'Sir David Attenborough shocked by rat on the toilet', with a source of 'Bang Showbiz' and a date of '3 February 2015'. A large photo of Sir David Attenborough is shown, with a caption identifying him. Below the photo, there is a short paragraph of text. To the right of the article, there is a sidebar with a 'Great Winter Rates!' advertisement for a hotel, social media sharing options (Tweet, +1, Like), and a 'SIMILAR ARTICLES' section listing several related TV gossip items.

# Neophobic

- Be patient
- Don't be tempted
  - Especially for rats



Niche level

Just mice?



Roof rats?



Rats and Mice?



Norway rats?



# Rodent clean up

- Wear ru
- Spray th  
bleach a
- Use a p  
the was
- Disinfect  
their ur

**DO NOT  
SWEEP!!!!**

ure of

dispose of

ents or

# Gophers



Photograph courtesy of Ed Williams



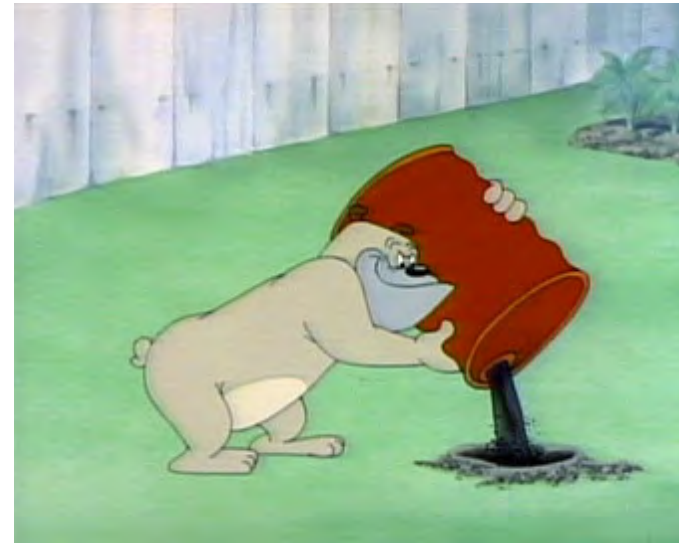
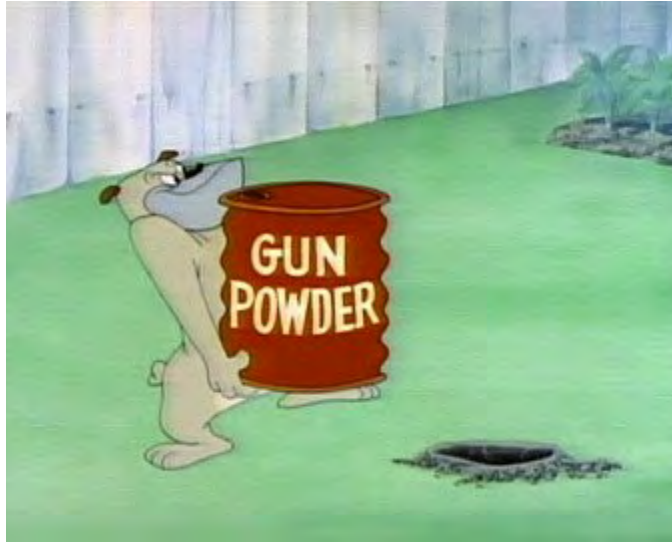
# Damage

- Mounds and burrows
  - Hazard to farm equipment and laborers
  - Erosion



Photos courtesy of Dr. Roger Baldwin

I have a gopher in my yard! What are my options?



- Hire a PMP
- Do it yourself
  - Repellants
  - Trapping
  - Toxicants
  - Fumigation

Repe



# Trapping

- Time consuming but very effective
- Best option for DIY homeowner
- Non-toxic method
- Economical





\$7.25



\$9.99



\$11.61

\$12.13



\$9.33



\$29.99



# Where to purchase equipment

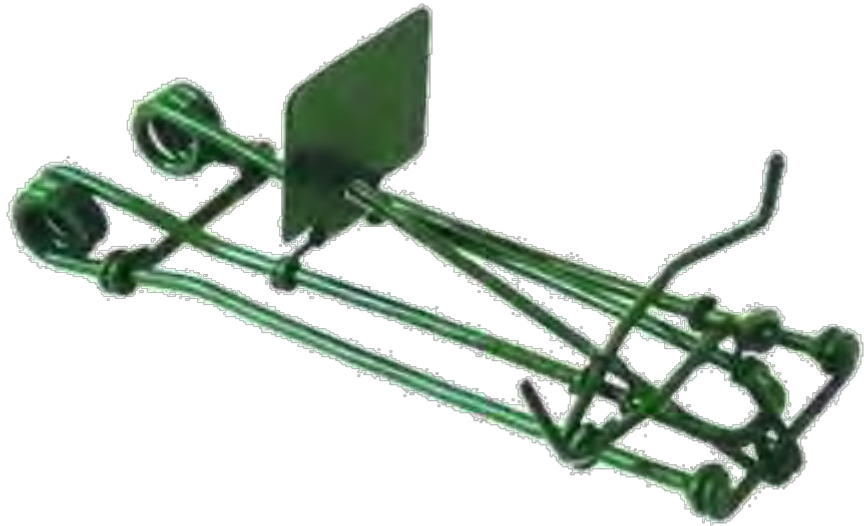
- Most hardware stores
- <http://www.traplineproducts.com/>
- <http://www.wildlifecontrolsupplies.com/>
- <http://store.gopherslimited.com/>

# The science of trapping

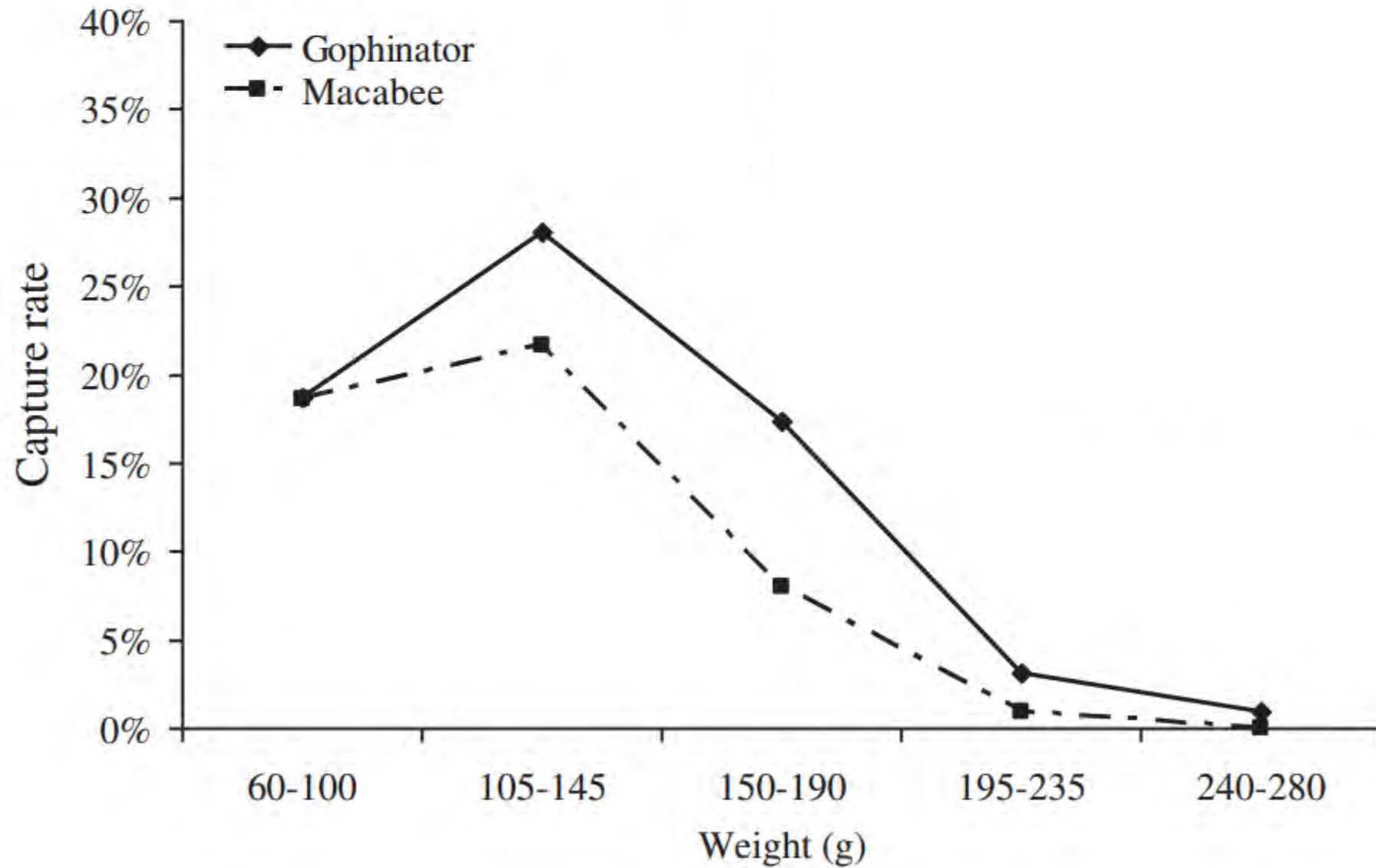
- Macabee vs Gophinator
- Covered vs uncovered
- Attractant vs no attractant
- Trained vs untrained
- Gloves vs no gloves
- “above” ground traps vs “in” tunnel traps



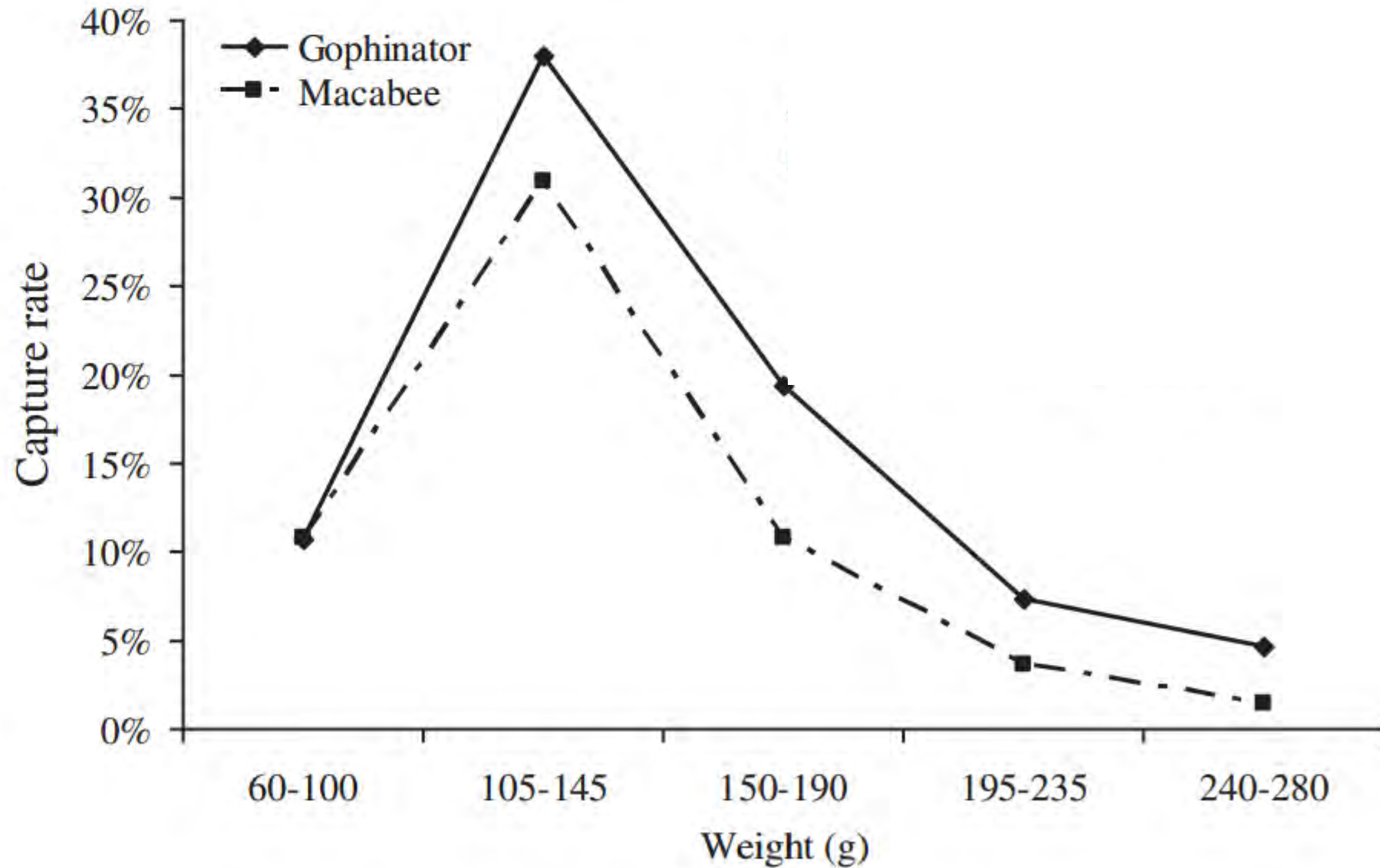
# Macabee vs Gophinator



## Spring--Trap Type

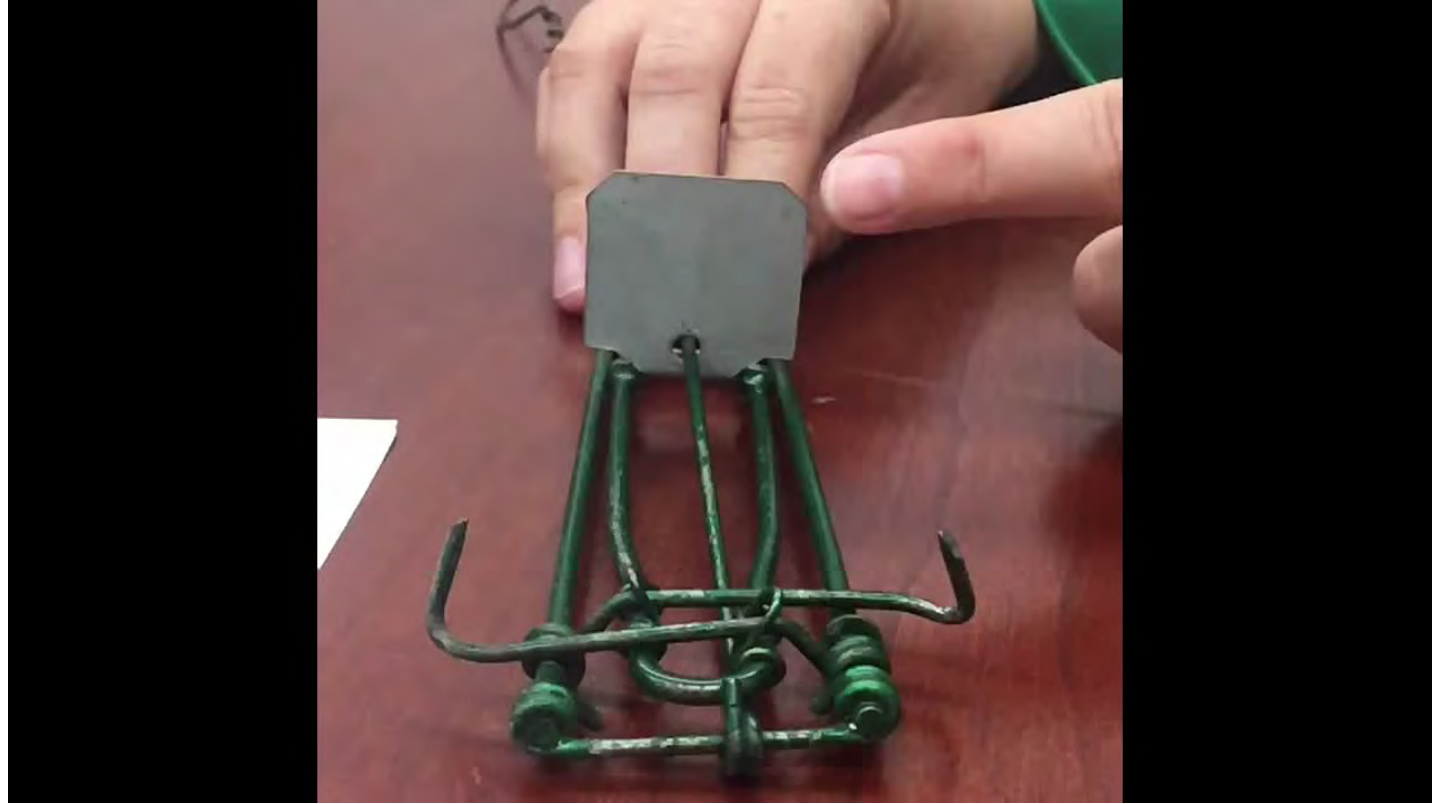


## Autumn--Trap Type



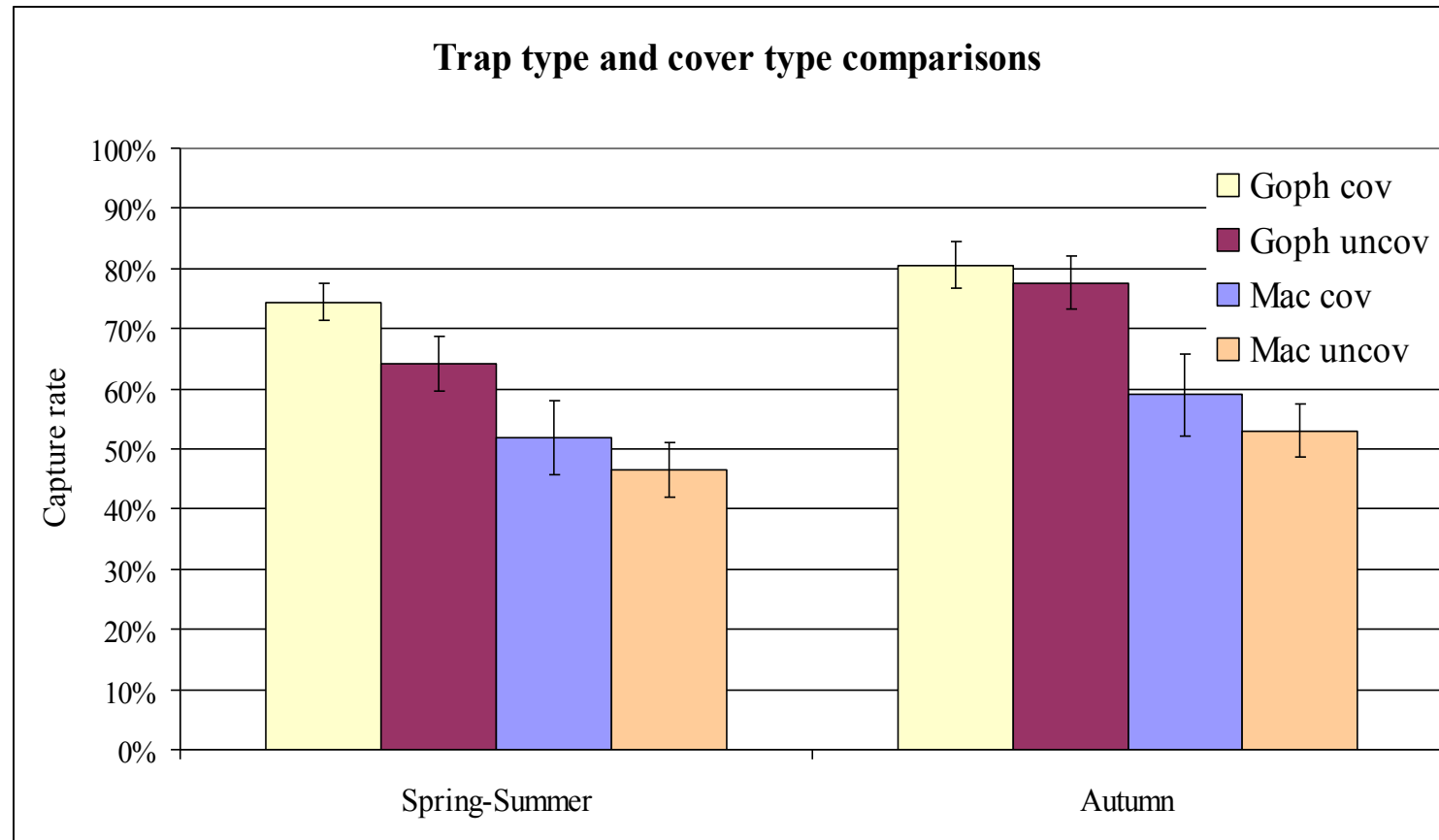
# Gophinator

- Powerful trap
- Grips the animal high on the body
- Trigger arm offset to prevent upward pressure on gopher
- Rotating pincer arm that clamps to stationary arm
  - More secure capture



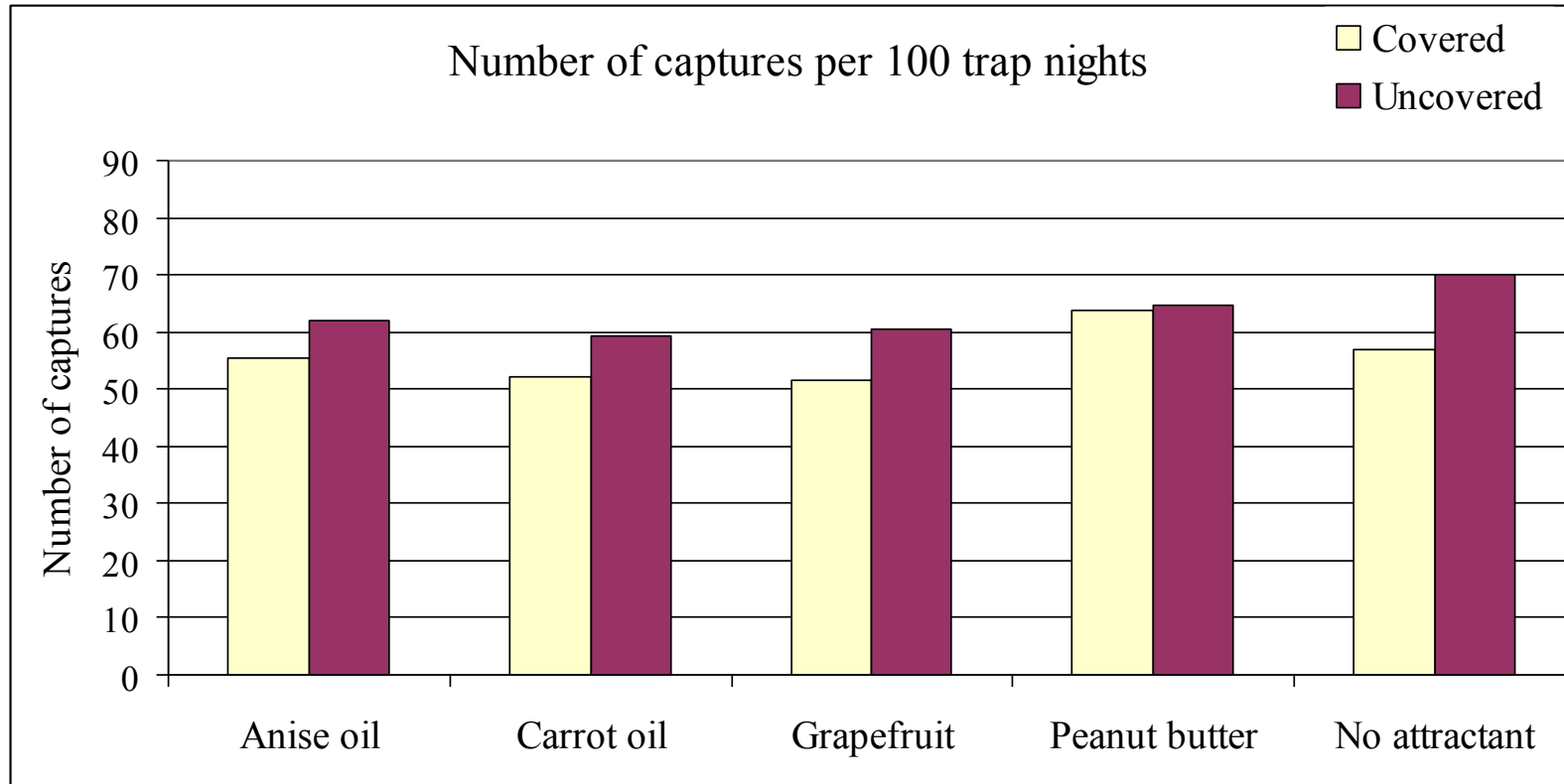
# Maccabee vs Gophinator

## Covered vs uncovered



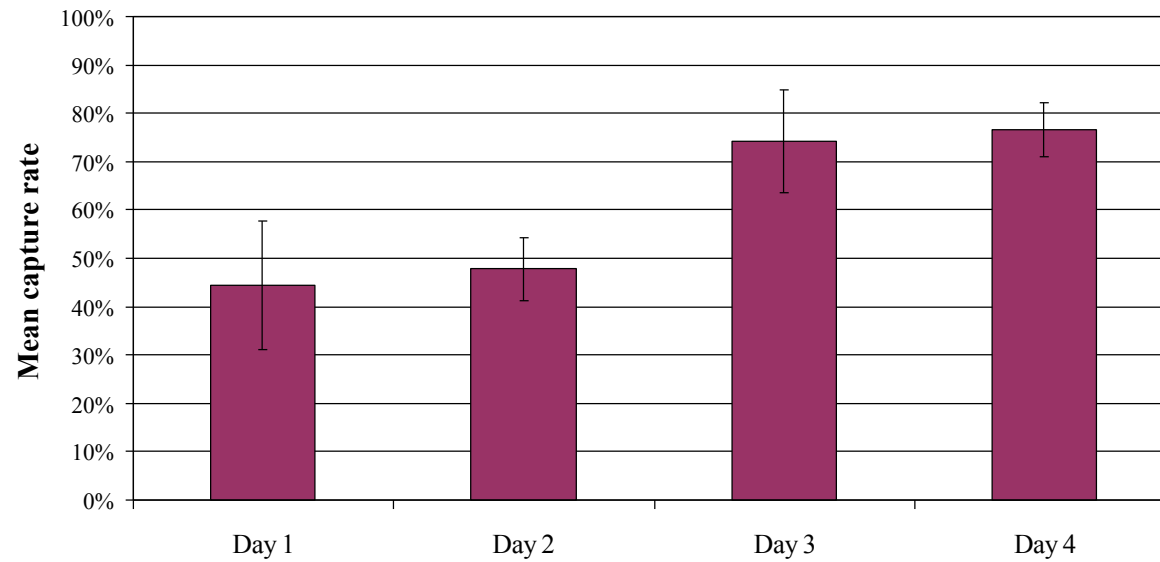
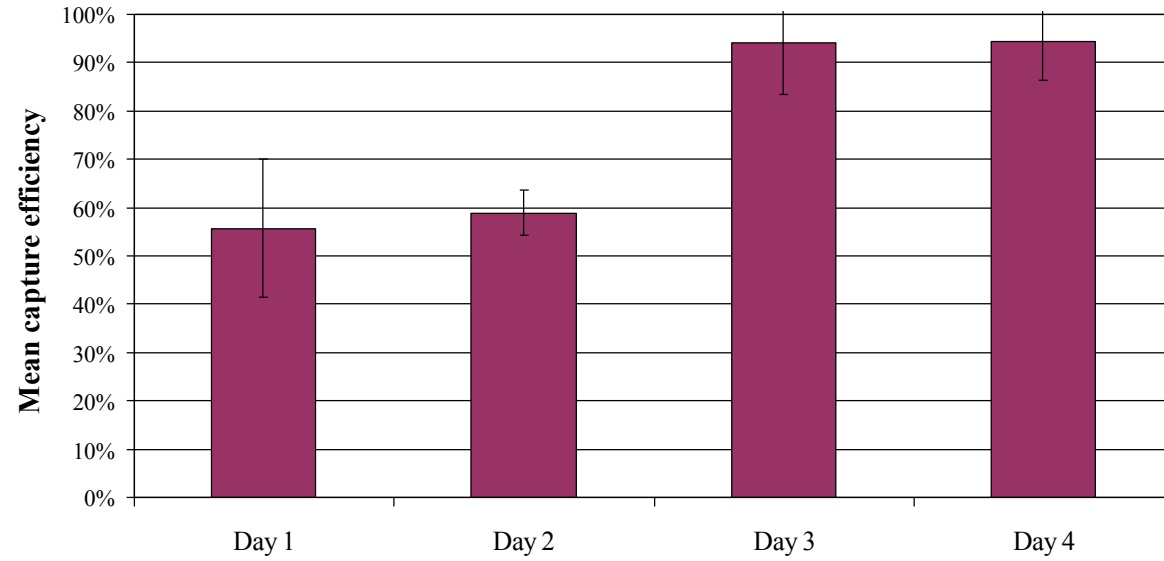
- The increase in efficacy associated with covered trap sites during spring was negated by the increased time required to set covered trap sets.

# Attractant vs no attractant





# Trained vs untrained



# Gloves vs no gloves

Crop Protection 77 (2015) 176–180



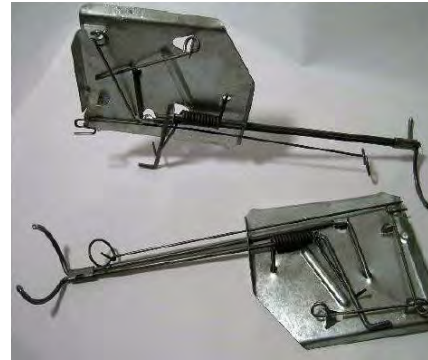
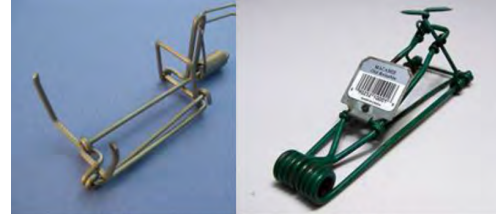
Accepted 7 August 2015  
Available online xxx

**Keywords:**  
California  
Gophinator  
Modified Macabee  
Pocket gopher  
Scent  
Trap

Macabee is still widely used given large stockpiles of these traps by land managers and pest control operators. The addition of a cable restraint to the front of the Macabee may be sufficient to keep larger individuals from escaping capture, thereby allowing trappers to more effectively use this common trap. Human scent may also impact trap success by deterring pocket gophers from entering trap sets. Therefore, we tested the capture efficiency and visitation rate of trap sets when using both Gophinator and modified Macabee traps to determine the potential utility of these trap designs. We compared these results to a previous investigation to better define the potential usefulness of the cable restraint on the Macabee. We also tested the impact of human scent on capture efficiency and visitation rate to determine the potential relevance of eliminating human scent from trap sets. Gender and weight of captured individuals were used to determine their potential impacts on capture efficiency and visitation rate. We found that the Gophinator was a more effective trap than the modified Macabee because of its ability to capture larger pocket gophers more efficiently. However, the modification did appear to increase capture efficiency of larger individuals when compared to the standard Macabee, suggesting that this modification could be used to increase the effectiveness of trapping programs when Gophinator traps are unavailable. Glove use had no impact on capture efficiency or visitation rate.

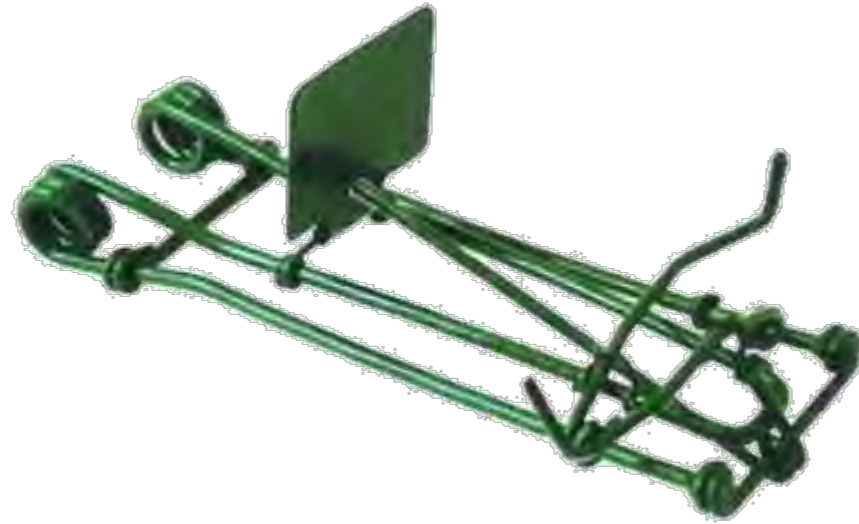
# Types of trap

- Turf damage
  - Gophinator
  - Maccabee
  - Black hole and box
- Less turf damage
  - Cinch trap
  - Gopher Hawk



# How do I trap?

- Materials
  - Traps
  - Probe
  - Gloves
  - Wire
  - Flags
  - Kneepads



# Technique

- Active mounds
- Probe for tunnel
  - Watch out for back-filled tunnels
- Leave probe in mound
- With hori-hori, dig hole
- Examine burrows for
  - Size
  - Turns
  - Divides






# Questions

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