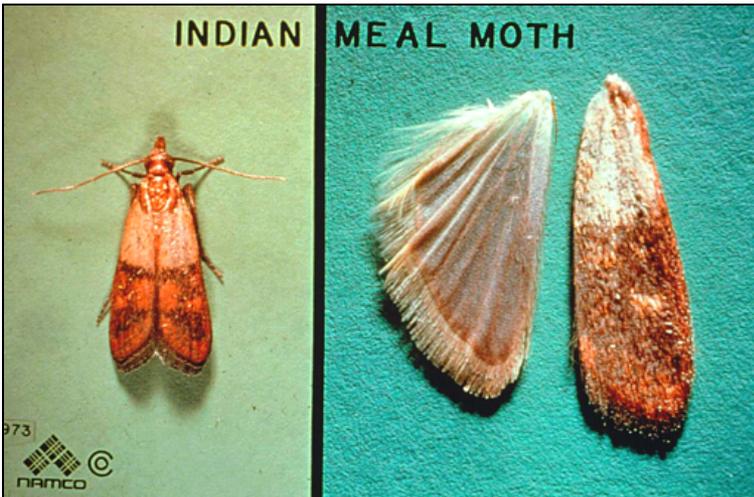




Stored Product Pests



Stored Product Pests

- ***80% of human food is from grains and legumes***
- ***Stored product pests compete with humans for this food both pre- and post-harvest***
- ***It is estimated these pests destroy 10% of world's grain production each year***
- ***Equivalent to 100% loss every tenth year***

Stored Product Pests

- ***Most of the stored product pests are:***
 - ***Beetles (Order Coleoptera)***
 - ***Moths (Order Lepidoptera).***

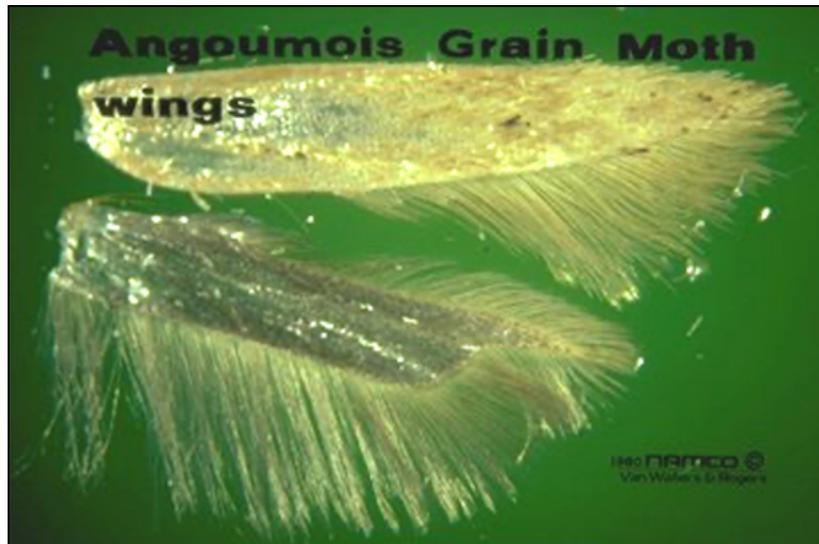
Stored Product Pests

There are four types of stored product pest feeders:

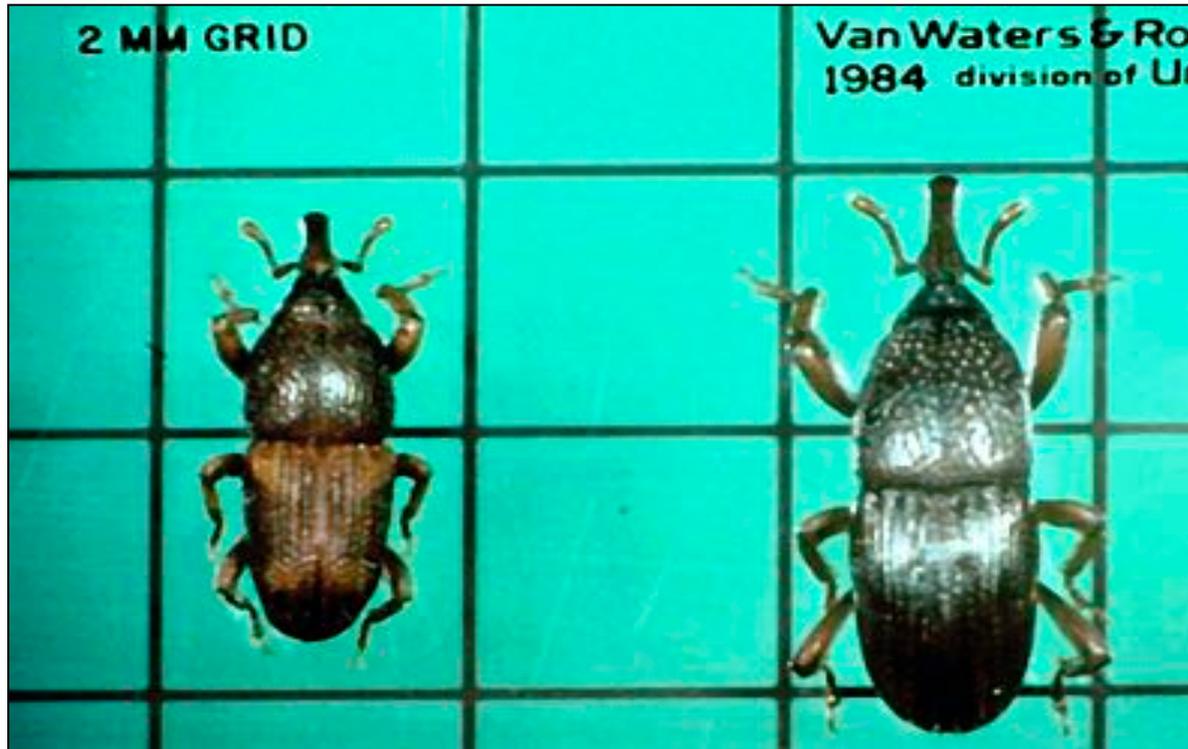
- ***Internal Feeders***
- ***Scavengers***
- ***External Feeders***
- ***Secondary Feeders***

Internal Feeders

Internal feeders feed entirely within the seed coat or grain



Internal Feeders



Rice Weevil – 3mm

- *have a snout*
- *can fly*
- *found in the south*
- *identified by four orange spots on the elytra (front wings)*

Granary Weevil – 4mm

- *have a snout*
- *can't fly*
- *found in the north*
- *larger than the Rice Weevil and solid dark brown*

Internal Feeders



Lesser Grain Borer:

- ***3mm in length***
- ***Head hidden under pronotum***
- ***depressions on the prothorax and the elytra (front wings)***

Internal Feeders



Both the Bean Weevil and the Cowpea Weevil are similar

Internal Feeders

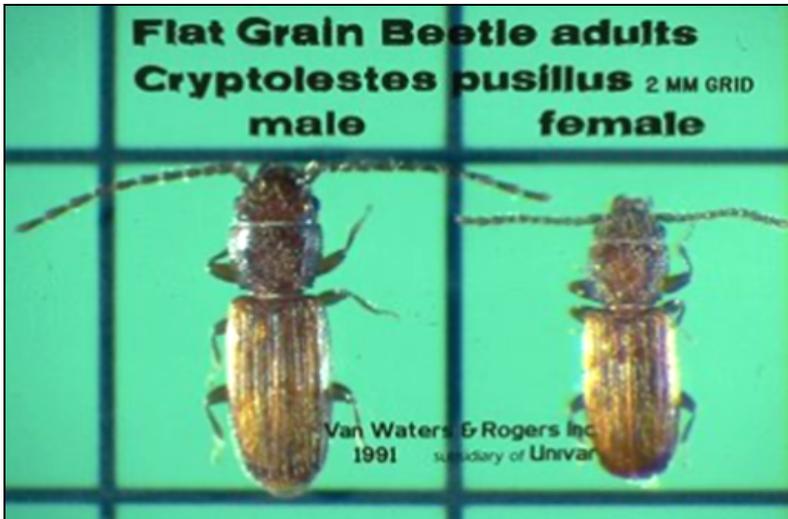
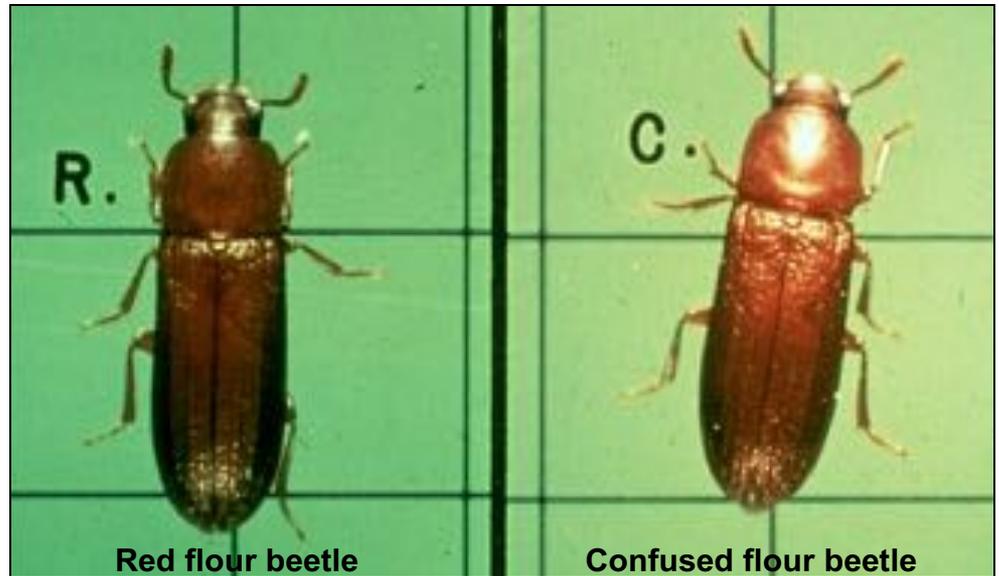
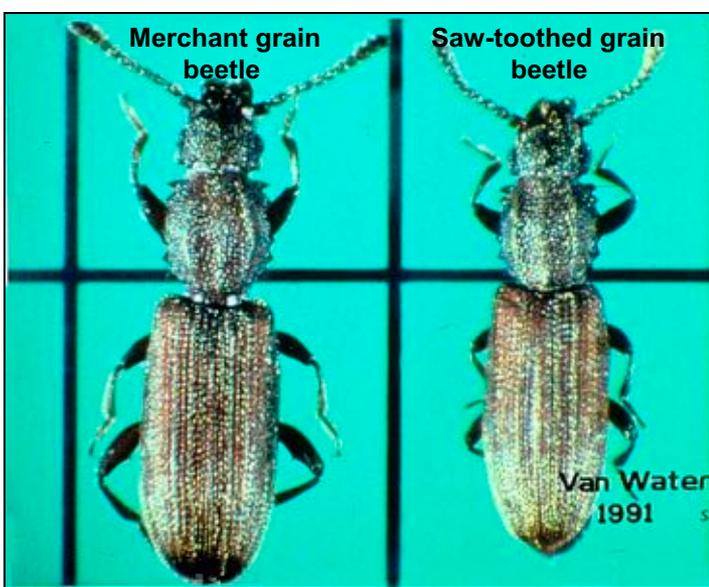


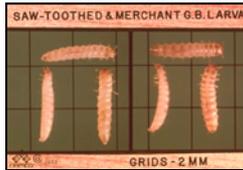
Angoumois Grain Moth:

- ***2/3" wingspan***
- ***rear wings are pointed and fringed***

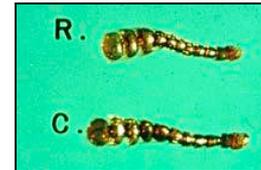
Scavengers

Scavengers feed on the broken-up bits and pieces of grain





Scavengers



Merchant Grain Beetle

- *can fly*
- *found mainly in the North*

Saw-toothed Grain Beetle

- *can't fly*
- *found mainly in the South*

Red flour beetle

- *can fly*
- *found in South*
- *3 seg. clubbed antennae*

Confused flour beetle

- *can't fly*
- *found in North*
- *clubbed antennae gradually enlarged*

These are all approximately 1/8" in length

Scavengers



Flat Grain Beetle:

- ***One of the smallest stored product beetles (< 2mm in length)***
- ***Can fly and jump***
- ***Feeds on stored corn in the South***

Scavengers



Mediterranean Flour Moth:

- *Pale grey wings with wavy black lines running across*
- *Characteristic pose when resting - front of the body is raised & pushed away from the wall giving the wings a distinct downward slope with the tip of the abdomen protruding up between them*

Note the two rows spots on the top of the larvae

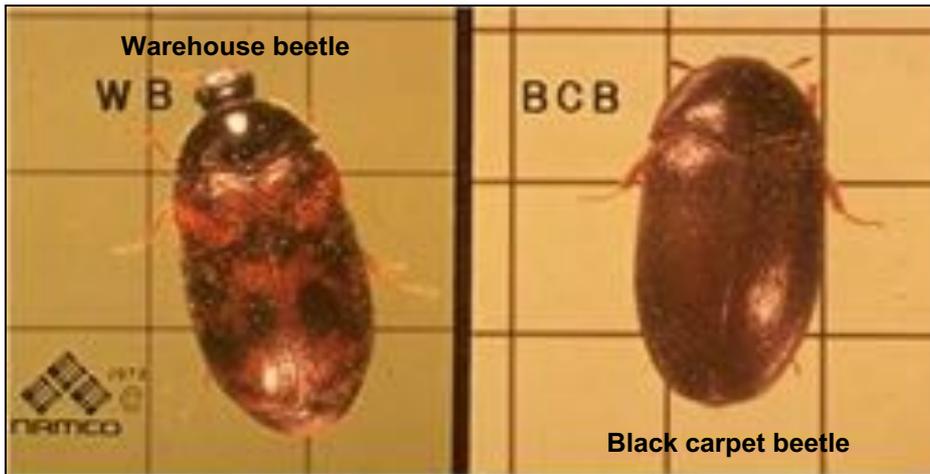
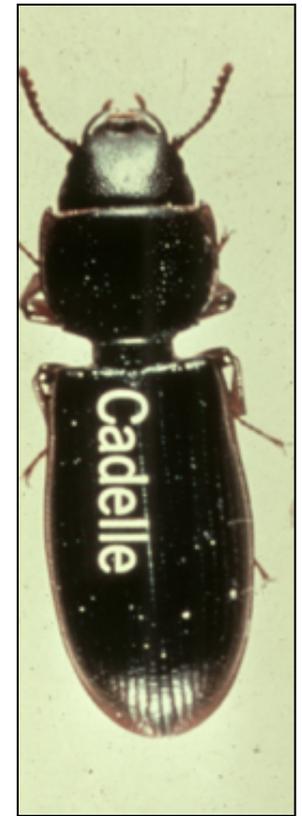
Scavengers



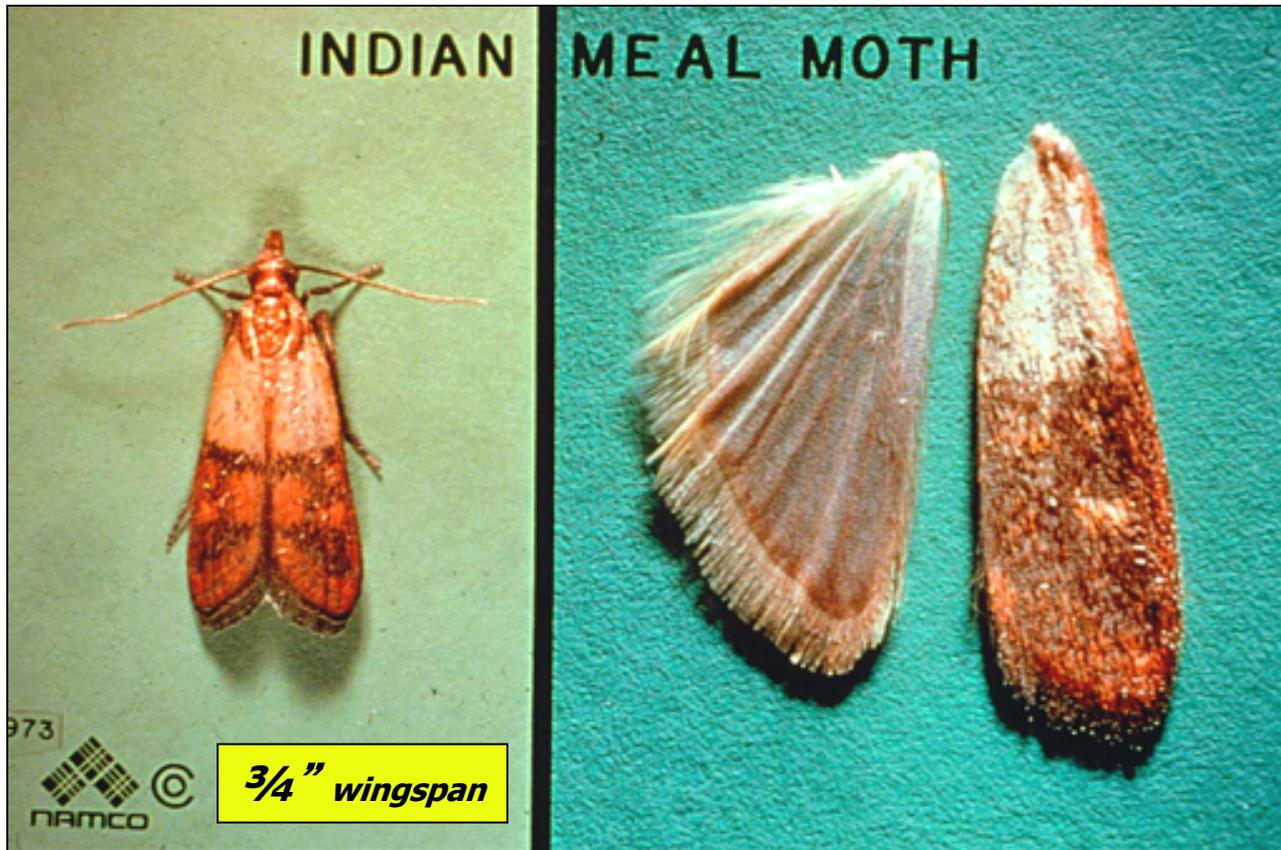
The Larder Beetle adult has a yellow stripe across the front of its elytra with 6 dark spots.

External Feeders

External feeders feed on the outside of the seed coat



External Feeders



Indian Meal Moth:

- *1/3 of front wing at the base is tan and the outer 2/3 of the front wing is reddish-brown with a copper luster*
- *attracted to lights*
- *major pest of dog food, bird seed and cereal*
- *rests flat against the wall*



The larva of the Indian Meal Moth is dirty white, but may range from pink to brown to a greenish tinge. It is 9 mm to 19 mm in length. The larva feeds in or near a tunnel-like case of frass and silk it webs together.

External Feeders



Cadelle:

- ***Adult is 1/3" (8 mm) in length***
- ***Flattened body and pinched waist (gap between prothorax and front of elytra (front wings))***
- ***major pest of rice and flour mills as well as in grain stored in farms.***

Cadelle larvae:

- ***strikingly marked – pronotum with dark spot and second and third segments of the thorax each have two small brown spots – the last segment of the abdomen has two distinct projections***
- ***larvae and adults are cold tolerant***

External Feeders



Humpbacked

Cigarette Beetle

(1/8")

- elytra smooth
- antennae serrated
- #1 pest of tobacco
- pest of pet food, cereals, spices, drugs, raisins, pasta and peppers

Drugstore Beetle

(1/8")

- elytra lined (rows of deep pits)
- 3 segmented clubbed antennae
- major pest of dog food & biscuits, spices & drugs



serrated

3 segmented club

External Feeders



Warehouse Beetles:

- ***3 mm in length***
- ***can fly***
- ***attracted to lights***
- ***feeds on animal hair and skins, dead insects, fish meats, drugs, nuts, dried fruits, pasta***



The larvae of the warehouse beetle have numerous hairs on all sides of their body and have slightly longer hair at the end of their abdomen.



External Feeders

**Khapra Beetle adult
Trogoderma granarium**



Van Waters & Rogers Inc.
1990 University of Liverpool

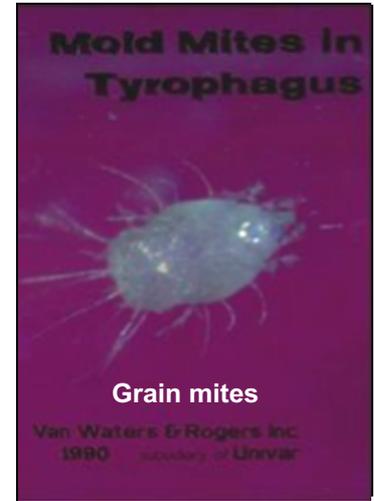
Khapra Beetle:

- ***adult beetle is 3 mm in length***
- ***Genus Trogoderma***
- ***prefers grains such as wheat, barley and rice***
- ***extremely important pest in granaries and warehouses in India***



The hairs of the larvae and those of their cast skins pose a health risk because of the allergic responses they can trigger in some persons following accidental ingestion. The larvae are highly resistant to starvation and are repelled by light.

Secondary Feeders



Secondary Feeders feed on materials that are damp, deteriorating, and have mold growth present. Some feed on the molds rather than the food.



Secondary Feeders



Yellow Mealworm:

- ***Adults are more than 1/2" in length***
- ***Adult is shiny black in color***
- ***Larva is golden-yellow in color and called the "golden grub" and sold as fish bait.***
- ***Found in cooler climates of the North***
- ***It can fly and is attracted to lights***

Secondary Feeders



- Spider Beetles:**
- ***Adult beetle is 2.2 to 4 mm in length***
 - ***Resembles small spiders – have 6 legs***
 - ***Feed on dried animal and plant matter***
 - ***Found in the nests of animals***
 - ***Feed on wool, hair, textiles fabrics and feathers.***



Secondary Feeders



The Foreign Grain Beetle:

- ***The adult beetle is about 2 mm in length***
- ***The adult beetle has 3 segmented clubbed antennae***
- ***The adult beetle has two rounded projections at the front of the thorax***

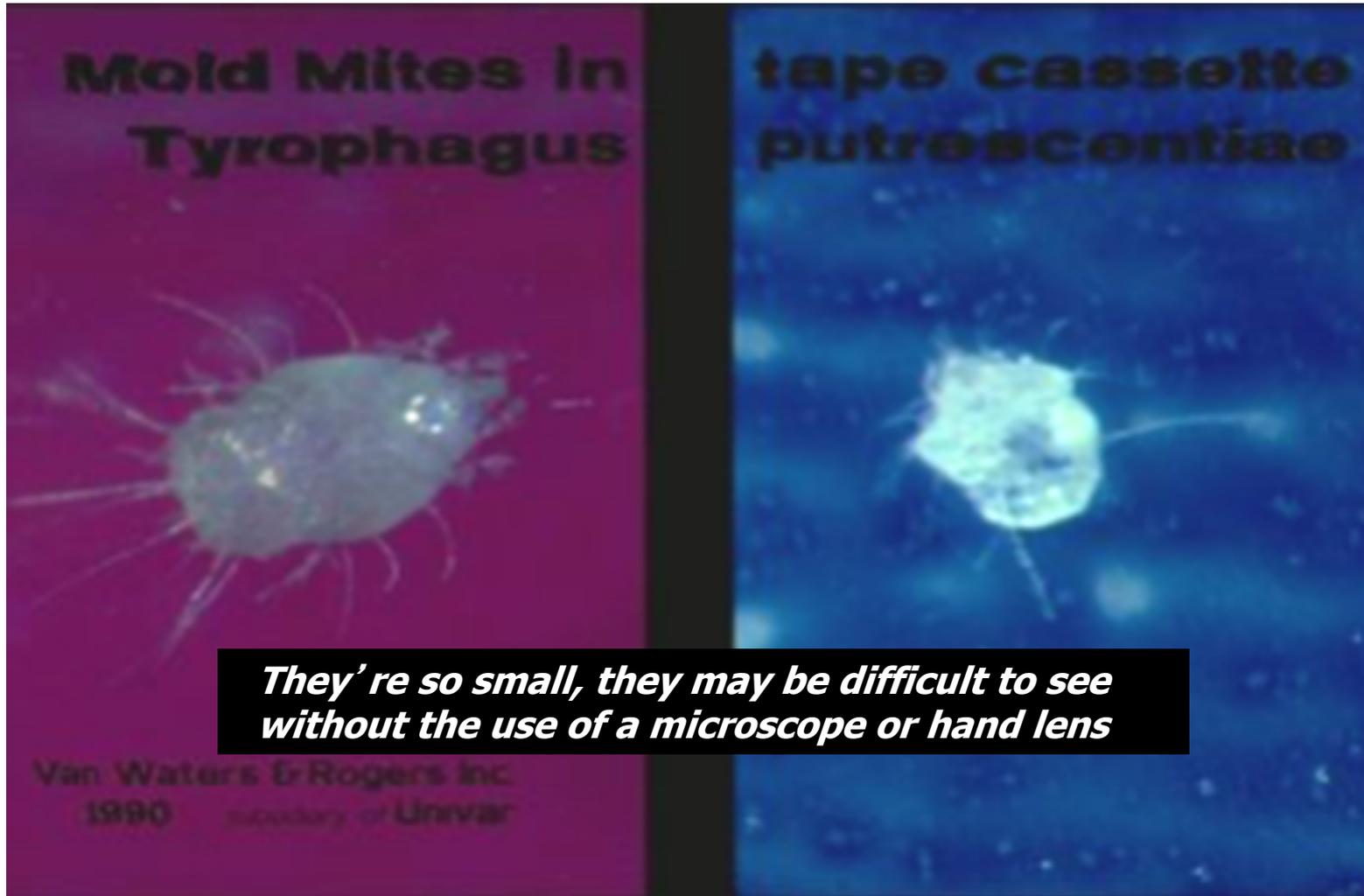
Secondary Feeders



Psocids or Booklice:

- ***Found on moldy cereal products***
- ***Adult psocids are 1 to 2 mm in length***
- ***Feed on microscopic molds and on starchy foods.***

Secondary Feeders



Grain Mites, mushroom mites, cheese mites, and sugar mites feed on microscopic molds that are found on damp, deteriorating foods

Stored Product Pests

Control of Stored Product Pests

- Perform a thorough inspection***
- Remove infested material & clean***
- Treat infested areas***
- Educate the customer***

Stored Product Pests

Perform a thorough inspection

- ***Find infested foods - keep the pest in mind***
 - ***Many species are carried into homes in pet food (usually dog food or cat food) & birdseed***
 - ***Internal feeders are found in whole grains***
 - ***Secondary pests are associated with old grain***
 - ***Species that fly are harder to track down***

Stored Product Pests

Perform a thorough inspection

- ***Start in the kitchen, but check other rooms***
 - ***Look in the garage – birdseed & pet food***
 - ***Look in the bathrooms & bedrooms – potpourri, dried peppers***
 - ***Look in the living room – dried flowers***
 - ***Look in the attic, chimney, or crawlspace – nuts or seeds stored by rodents like rats & squirrels***

Stored Product Pests

Remove infested material & clean

- ***Discard infested foods in the trash outside***
- ***Vacuum & clean the area where food is stored***



Stored Product Pests

Treat infested areas

- ***Pheromone Monitoring Traps***
- ***Usually have pitfall trap baited with grain oil for other grain beetles***
- ***Crack & crevice treatments with a residual aerosol or dessicant dust***
- ***C & C treatments can be helpful controlling sawtoothed grain beetles***

Stored Product Pests

Educate the customer

- ***Key to control is sanitation!***

- ***Clean up spilled foods***

- ***Rotate stored foods***

- ***Place stored foods in homes inside glass or plastic containers or store in the refrigerator***

