



**Sandra Newbury, DVM**

Koret Shelter Medicine Program  
Center for Companion Animal Health  
*U C Davis School of Veterinary Medicine*  
[www.sheltermedicine.com](http://www.sheltermedicine.com)

Adjunct Assistant Professor of Shelter Animal Medicine  
Department of Pathobiological Sciences  
*University of Wisconsin-School of Veterinary Medicine*



## Ringworm 101 for Shelters



## Dedicated to volunteers everywhere but especially to...

- Sue Meyer who passed away this year.
- Sue was among the first to volunteer when Karen Moriello and I started the Dane County Humane Society Dermatophyte Treatment Project in 2003.
- Her ongoing leadership and mentoring for new volunteers played an immeasurably important role in keeping that program alive.
- Animals everywhere can hope many others will follow her incredible example.



## Fungus is a lot like us.



The similarities between mammalian cells and fungal cells make it difficult to design drugs that will kill the fungus without killing us.



## Potential for human infection: Zoonosis



## Mechanical Carriers vs. True Infection

- True infection happens when micro-trauma allows fungal spores to invade the skin and hair to establish growth.
- Mechanical carriers are animals who have spores, like dust, on their hair coat from the environment.
- No true carrier state

## Know your Dust Mop



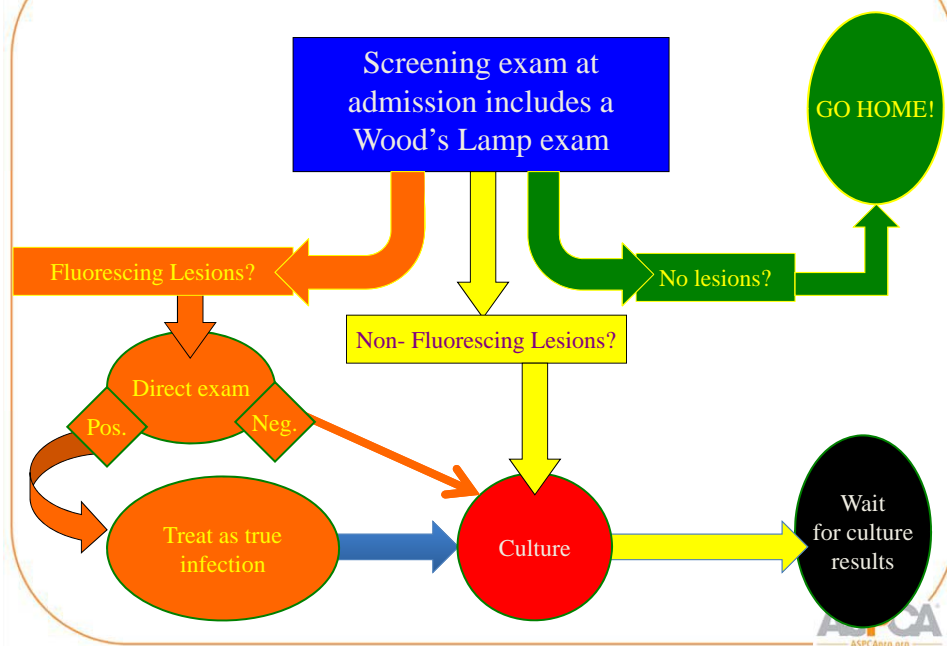
ASPCA  
ASPCApro.org

## Screening Animals for Ringworm: Recognition and Diagnostics

Screening exams, Wood's lamp exams, direct exams of hair and cultures define cases, direct animal movement and guide treatment protocols.

ASPCA  
ASPCApro.org

## Screening Protocol

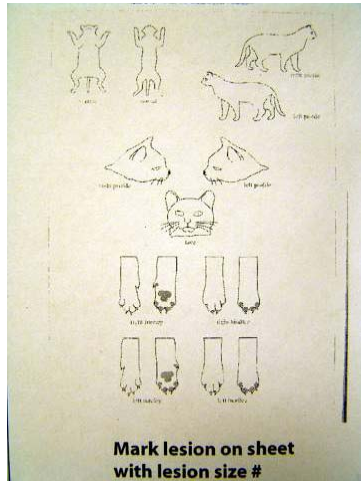


## Choose the Right Location

- Non-Lesional first, please.
- Clean up after yourself.
- Admitting areas consistently have the highest levels of environmental contamination.



## Screening Exam



- Get into the habit of doing an exam the same way every time
- Document lesions
- Use a physical exam form
- A careful physical at intake also helps identify other problems.

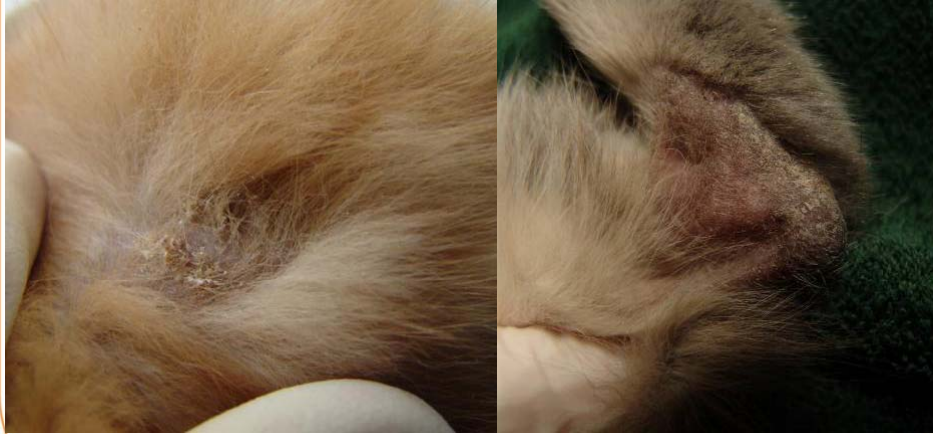
## Check for Lesions



Look for ***inflammatory*** abnormalities of the skin.



## Classic Lesions



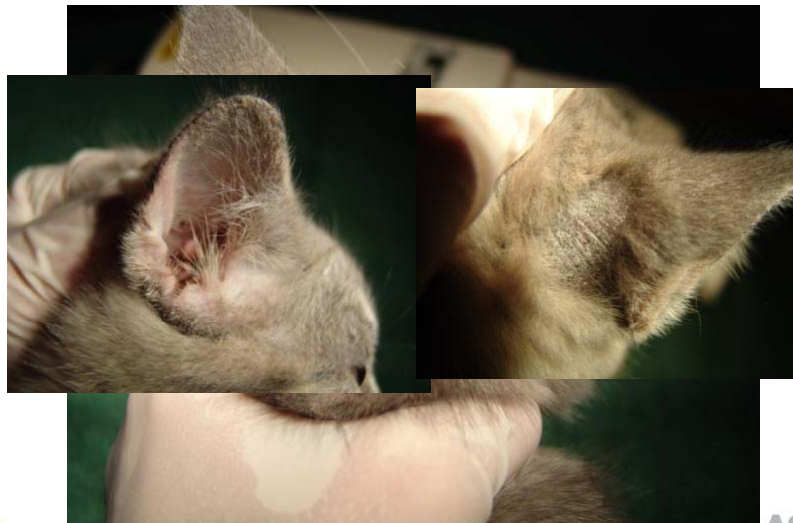
## Sites Not to Be Missed



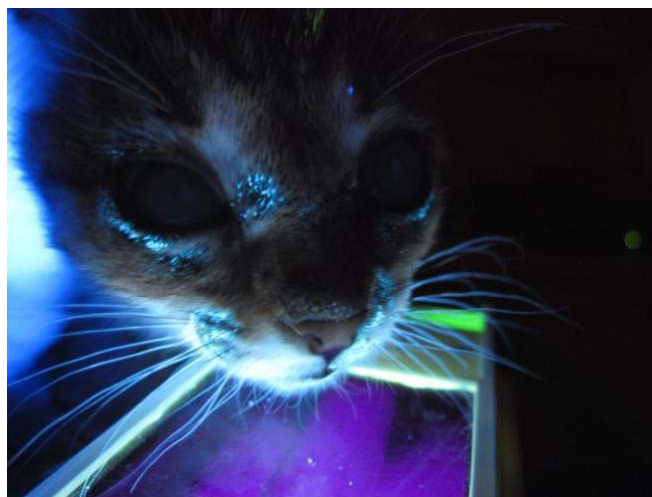
- Inside the ears
- Nose, eyes and whiskers
- Tips of toes and bottoms of the feet



## Ringworm Lesions?



## Systematic Wood's Lamp Screening





## Wood's Lamp 101



## Woods' Lamp 101

- Invest in a good lamp.
  - Wood's lamps have UV wavelength that will cause the most effective fluorescence.
  - Consider a magnifying glass.
- ☐ <http://www.minresco.com/uvlamps/fraud.htm>  
(see UVL- 21 compact lamp  
at bottom of page)



## Turn out the lights, warm up the lamp, invite company



- Give your eyes time to adjust to the dark.
- Give the lamp time to warm up.
- You will need **at least** three hands.

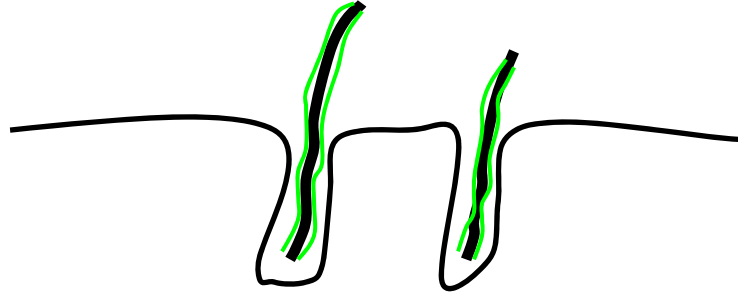
ASPCA  
ASPCApro.org

## Ringworm Glow: Basics

- Apple-green
- Occasionally blue-white
- The whole hair shaft should glow
- Especially the base
- Fungal growth does not make the hairs stick together.

ASPCA  
ASPCApro.org

## Why Cats Glow

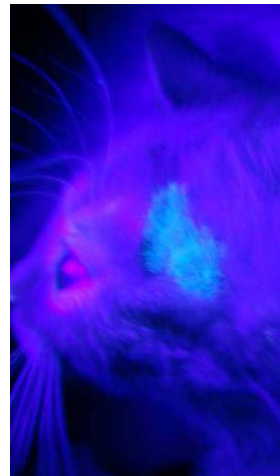


Fluorescence is a metabolite of the fungus that coats the hair as it is produced. The fungus grows in the hair follicle and along the base of the hair. So, fluorescence will be seen most commonly close to the skin. Often the entire shaft of the hair will glow.



## What will glow?

- *M. canis* is the only pathogen of veterinary importance that fluoresces
- Previously estimated that only 50% of *M. canis* strains glow
- The truth is we don't know how many strains glow and what factors influence fluorescence.
- **In our experience, most infected cats do have fluorescing hairs.**



## Tricky Things that also Glow

- Doxycycline
- Terramycin
- Carpet fibers
- Dust



ASPCA  
ASPCApro.org

## Direct Examinations of Fluorescing Hair

ASPCA  
ASPCApro.org

## Direct exam of Wood's positive hair

### Supplies:

- Wood's lamp
- Mineral oil  
(Chlorphenolac or KOH with caution)
- Microscope
- Microscope slide
- One cat or one dog
- At least FOUR hands
- Patience, practice and testing



## Plucking hairs

Third Hand



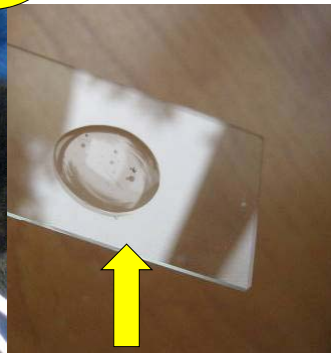
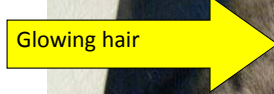
Wood's Lamp



Fourth Hand



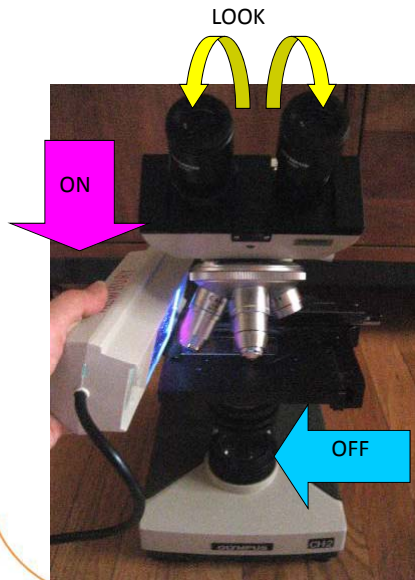
Glowing hair



Drop of mineral oil or chlorphenolac

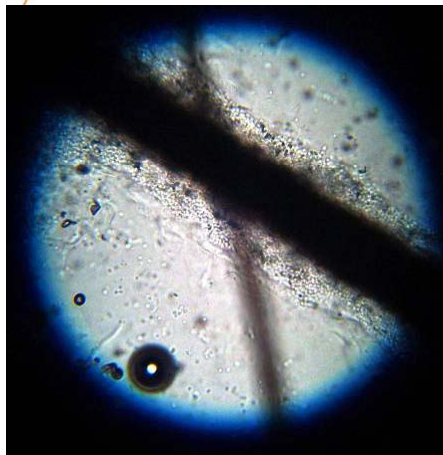


## Setting up the microscope



- With the room lights low and the microscope OFF
- Look through the eyepiece
- Find the glowing hair using woods lamp next to the stage
- NEXT
- Turn on the microscope light to examine the hair

ASPCA  
ASPCApro.org



Direct Exam



ASPCA  
ASPCApro.org





**Always back up your results  
with a culture.**

As close as we get to a SNAP test for ringworm



## **Using and Understanding Fungal Cultures**



## How to Culture

- A toothbrush is an ideal means of collecting spores from the hair coat.
- Brush the whole cat vigorously from nose to toes.
- Remember to brush common areas of infection such as the face, inside the bell of the ears and tips of toes.
- For lesional cats, brush the whole cat first, then the lesion.
- Most cats love this!

cost comes to \$0.06 per toothbrush

TB50	50 tuft polypropylene bristle Tooth brush	\$88.40	1,440
------	--	---------	-------

[http://www.hotelsupplies-online.com/fs\\_toothpaste.htm](http://www.hotelsupplies-online.com/fs_toothpaste.htm)



## Dermatophyte Test Media

- Fungal culture media.
- Contains an indicator that turns the media gel from orange to red as the pH of the media changes.
- Incubate at slightly warmer than room temperature. (78-80 F)



[www.remel.com](http://www.remel.com) and search under Catalog for DTM



## Inoculating Culture Media



- Always set up cultures in a clean area.
- Hold culture plates upside-down.
- Gently stab the tips of the toothbrush into the media.
- Cover the whole plate in a consistent pattern.

ASPCA  
ASPCapro.org

## DTM



- Avoid using slants, if possible.
- Purchased petri dish style plates are currently the best alternative to making your own plates.
- Derm Duets from Bacti Labs as a substitute
- Treat fungal cultures as a biohazard for disposal.

ASPCA  
ASPCapro.org

## Culture Interpretation



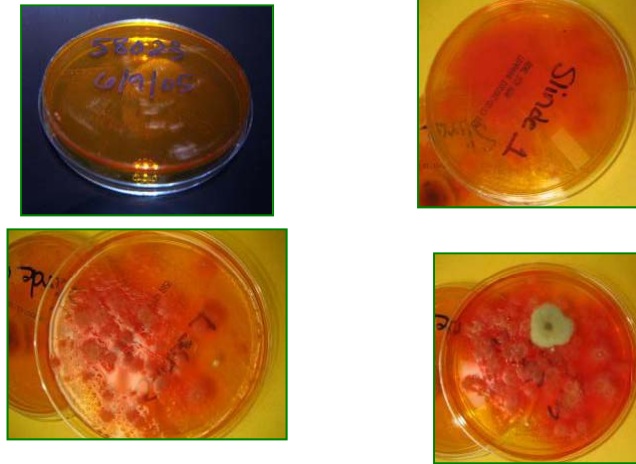
- Red only means "Look at me!"
- All pathogens turn DTM red.
- Not every organism that turns the media red is a pathogen.

## Contaminant Growth

- Pigmented colonies are non-pathogenic contaminants.
- Contaminants are often common environmental organisms.
- Ringworm is never normal flora.



## Early Growth



ASPCA  
ASPCapro.org

## Culture Interpretation

- All suspect fungal colonies should be examined microscopically to identify the organism.
- Microsporium species are most common
- *M. canis* \*\*\*
- *M. gypseum*
- Trichophyton species may be pathogenic but are less common.

ASPCA  
ASPCapro.org

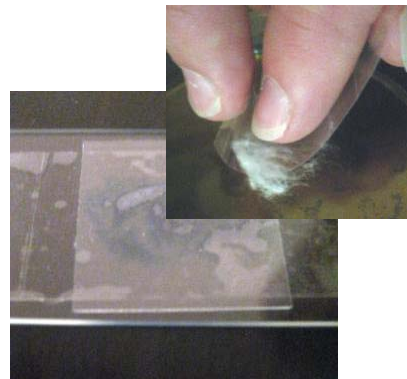
## Tape Preps

- Supplies
- Clear tape works best
- Stains
  - Lactophenol cotton blue
  - or
  - New Methylene blue
- Microscope
- Microscope slides



## Tape Preps

1. Drop of stain on microscope slide
2. Gently touch tape to colony (sticky side down)
3. Place tape sticky side down over stain
4. Drop of stain on top
5. Cover-slip

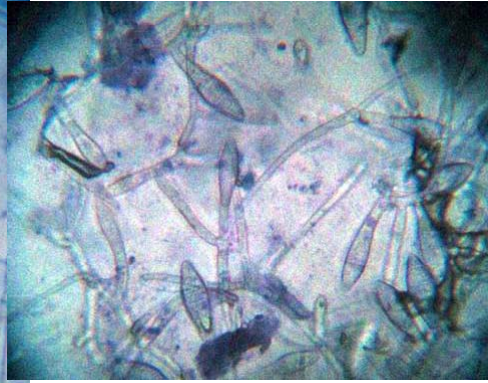




## Microscopic Identification



*M. canis*



*M. gypseum*

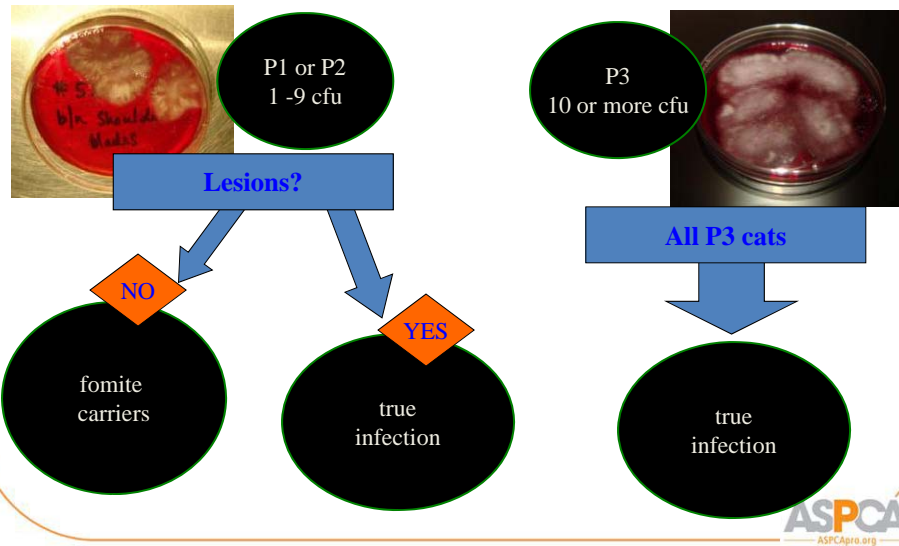


## The P Scoring System

- Pathogen Score strongly influences treatment decisions
- Helps define cases
- Benefits from complete and consistent sampling method
- Must be used in conjunction with a thorough check for lesions



## Assessment Based on Pathogen Score Results



## Screening the Environment

- Use all the same tools
- Substitute a Swiffer for the toothbrush
- Look for where hair and dust would collect



## Create an Isolation Facility



**ASPCA**  
ASPCApro.org

## Mandatory Dress Code

- Prevention of zoonotic infection should be the top priority.



**ASPCA**  
ASPCApro.org

## Treatments and Cleaning

- Treat and clean in order of infectious potential
- Infectious potential may change weekly
- Define clean and dirty zones



ASPCA  
ASPCApro.org

## Treatment Basics

Topical  
treatment



Oral / systemic  
treatment

ASPCA  
ASPCApro.org

## Topical Anti-fungal Treatment



ASPCA  
ASPCApro.org

## Lime Sulfur

Published clinical research with shelter animals (in conjunction with oral itraconazole) has:

- Demonstrated rapid times to cure (+/-14 days) for true infections (P3)
- Demonstrated excellent control of environmental contamination even after the first treatment
- Demonstrated that adverse reactions are very rare (did not occur).
- **No other product has yet been shown to have equivalent efficacy.**

ASPCA  
ASPCApro.org

## Other Promising Topicals?

- Accelerated Hydrogen Peroxide
- BUT...



ASPCA  
ASPCapro.org

## How to Make a Dip Sink

- Cheap
- Portable
- No need to call a plumber.



ASPCA  
ASPCapro.org



## Garden Sprayers

- Half gallon sprayer is preferred.
- Easily lifted when full.
- Solution stays warm.
- Short stubby spray nozzle helps with control.
- Clean thoroughly after each use.
- Fill with hot water and allow to discharge completely to prevent clogging of nozzle and valve.



ASPCA  
ASPCapro.org

## Dilution and Mixing

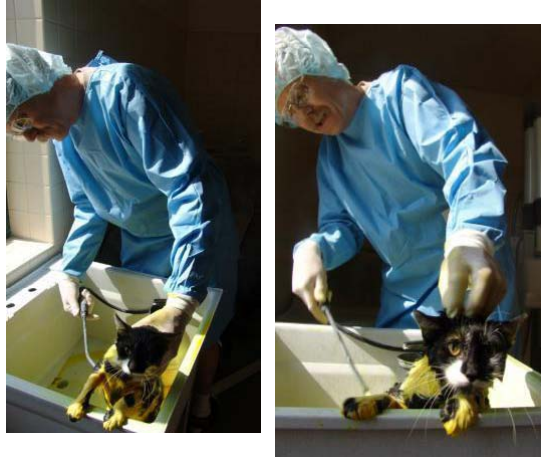
- **8 oz** LymeDyp in 1 gallon water
- Higher concentration dilution on label
- Mix by putting 8 oz. LymeDyp in the sprayer then fill to 1 gallon
- Mix fresh solution each time, discard excess



ASPCA  
ASPCapro.org

## The Dyp Show

- Use gentle but firm handling.
- Keep the spray close to the skin.
- Allow most cats to find a secure place to hold on.



ASPCA  
ASPCApro.org

## The Dyp Show



- Soak the entire cat to the skin.
- Treatment must reach the base of the hairs to be effective.
- Pre-wetting is unnecessary and causes dilution.

ASPCA  
ASPCApro.org

## The Dyp Show



- A small sponge or raglet may be used for the face and ears.
- The face and ears are the most difficult places to clear of infection.



## The Dyp Show



- No need for party hats
- Minimal side effects
- No significant adverse reactions



## Systemic (oral) Anti-fungals



## Remember this?

Published clinical research with shelter animals oral itraconazole in conjunction with lime sulfur has:

- Demonstrated rapid times to cure (+/-14 days) for true infections (P3)
- Demonstrated excellent control of environmental contamination even after the first treatment
- Demonstrated that adverse reactions are very rare (did not occur).
- **No other product has yet been shown to have equivalent efficacy.**



## Itraconazole 101



- 100 mg caps designed for humans can be split into doses for cats with a steady hand and some gel caps
- Liquid is available for dosing kittens but more costly



## Published Protocol

- LS (8 oz. / gallon) twice weekly until cure is confirmed
- Oral itraconazole daily for 21 days
- WITH THIS PROTOCOL:
- Cure is defined as two consecutive negative cultures taken at one week intervals



## Other Hopefuls

- Fluconazole
- Terbinafine
- BUT....



Thanks to you for your caring...



Ken: Our first customer

...and to the ASPCA for making my position possible





## A FEW COMING ATTRACTIONS FROM ASPCA<sup>PRO</sup>

[www.aspcapro.org/webinars](http://www.aspcapro.org/webinars)

- **Does Spay/Neuter Have a “People Problem”?** *(9/26)*
- **Ringworm Outbreak Management** *(10/02)*
- **Starting a TNR Program in Your Community** *(10/17)*
- **Beating Ringworm: Yes, You Can!** *(10/23)*

