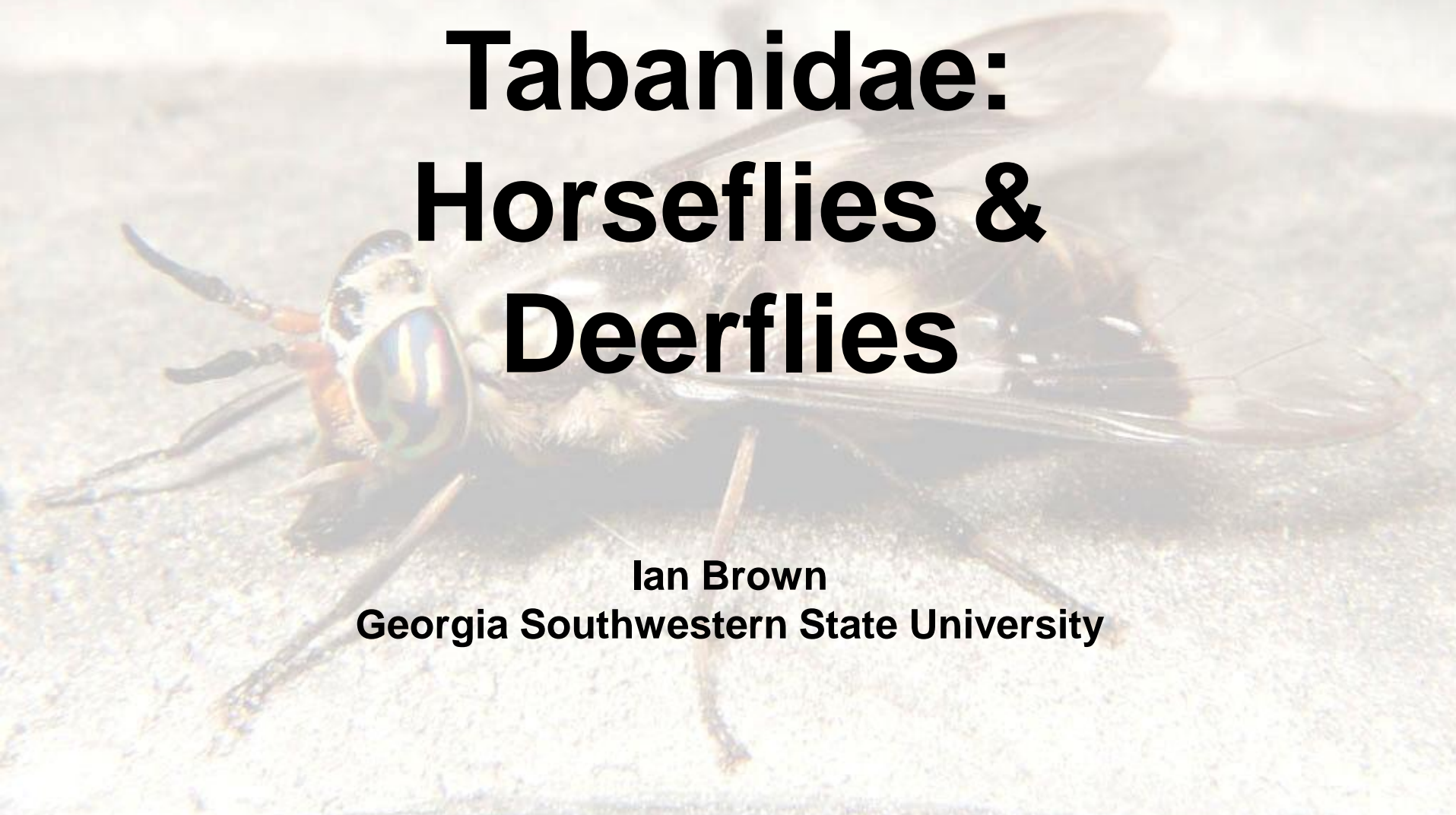


Tabanidae: Horseflies & Deerflies

**Ian Brown
Georgia Southwestern State University**



Importance of Tabanids

4300 spp, 335 US, *Chrysops* 83, *Tabanus* 107, *Hybomitra* 55

Transmission of Disease

Humans Tularemia, Anthrax & Lyme?? Loiasis,
Livestock & wild - Surra & other *Trypanosoma* spp.
various viral, protozoan, rickettsial, filarid nematodes

Animal Stress - painful bites

Weight loss & hide damage

Milk loss

Recreation & Tourism >10 bites/min - bad for business

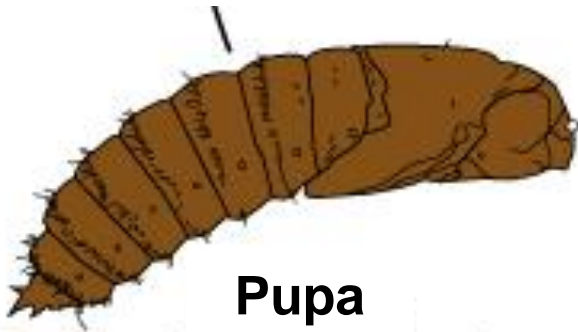
Agricultural workers





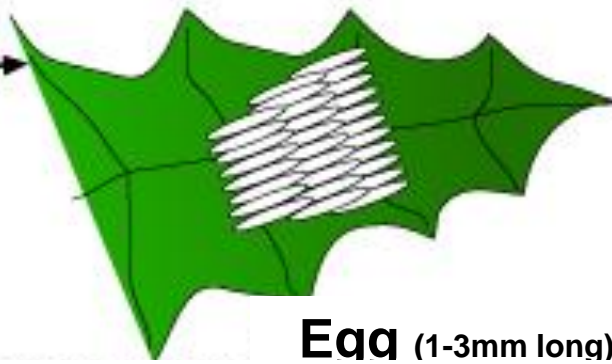
Adults

Emerge in late spring- summer (species dependent).
Feed on nectar & mate.
Females feed on blood to develop eggs.
Adult lifespan 30 to 60 days.



Pupa

Pupal stage completed in 1-3 weeks
Found in upper 2in of drier soil

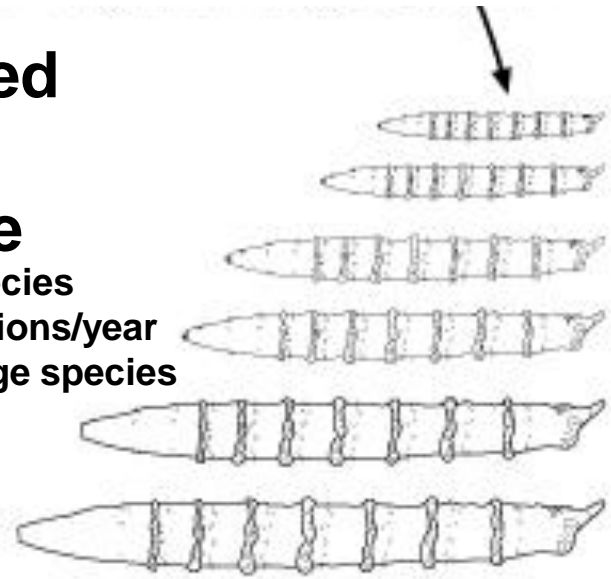


Egg (1-3mm long)

Hatch in 2-3 days Larvae drop into soil or water

Generalized Tabanid Lifecycle

Deerfly small species
upto 2-3 generations/year
Horsefly very large species
2-3 years/ year



Larvae

Horsefly Predaceous, Deerfly- scavengers??
Final instar overwinters,
pupates in early spring

Eggs

Single or 2-4 layered clusters (100-1000 eggs) laid on vertical substrates above water or damp soil.

Laid white & darken in several hrs.

Hatch in 2 –14 days between 70-95°F depending on species and weather conditions,

Deer fly, *Chrysops cincticornis*, laying eggs photo J Butler



Egg mass on cattail



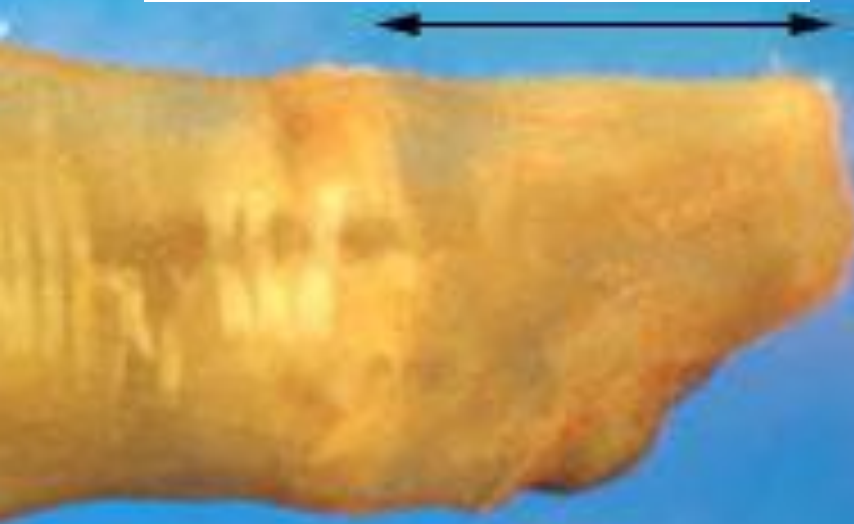
Open Aquatic vegetation i.e. Cattails & sedges with vertical foliage is preferred.

Larvae Identification

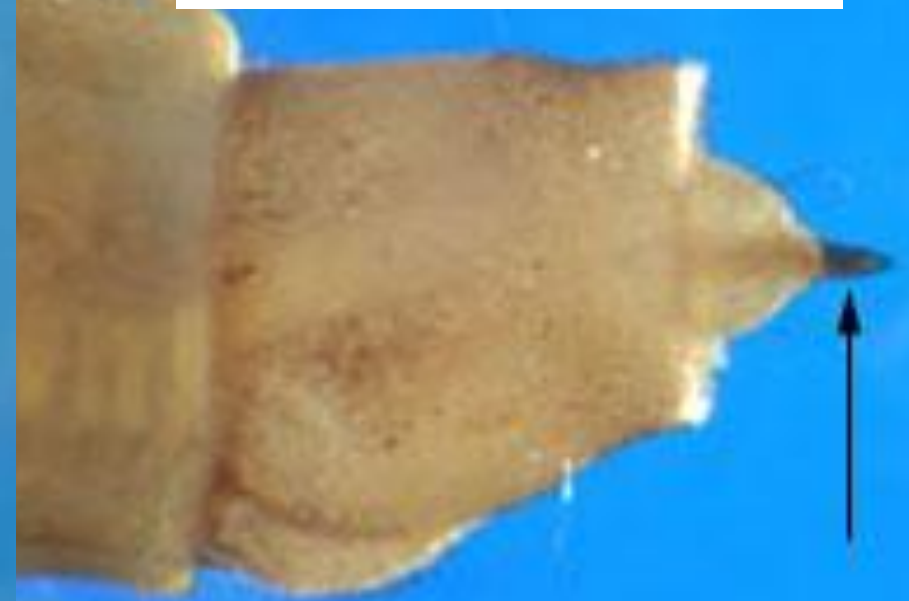
Spindle shaped with pointed ends and rings of knobs
Small head with elongate paired blade-like mandibles

	Horsefly	Deerfly
Size	upto 2.5in	upto $\frac{3}{4}$ in
Color	whitish plain or green- brown bands	clear- whitish
Rings of Prolegs on first 7 abdominal segments	4 pairs	3 pairs
Respiratory siphon on final abdominal segment	Tubular - as long as it is wide, to several times longer than it is wide (looks blunt)	Spine-like- longer than its base or has a spine (looks pointy)
Habitat	Aquatic to moist soil	Aquatic

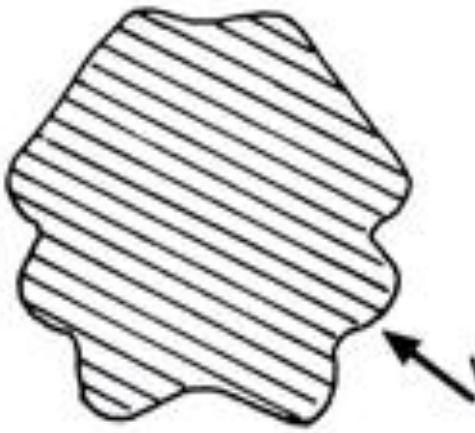
Horsefly respiratory siphon



Deerfly respiratory spine



Proleg distribution



Horse Fly (4prs)



Deer Fly (3prs)

Larval abdominal cross sections showing the distribution of pairs of prolegs.

Note extra ventro-lateral pair (arrow) in horseflies

Deerfly larva *Chrysops vittatus*



Earlier instars



Later instar

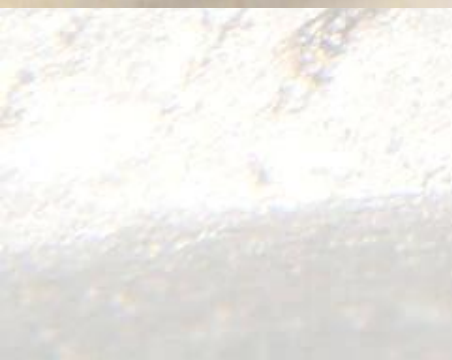
Note: long blade-like paired mandibles (arrow) and knob-like prolegs all photos S McKeever



Horsefly larvae

Tabanus spp.

**Note: blunt
banding coloration
and blunt siphons**





**Pupal aster
6-pointed
projections**



UGA1471024

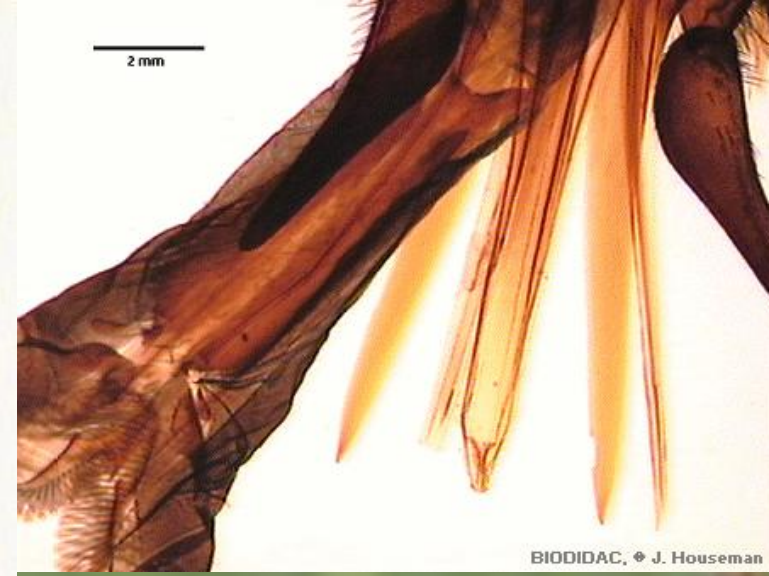
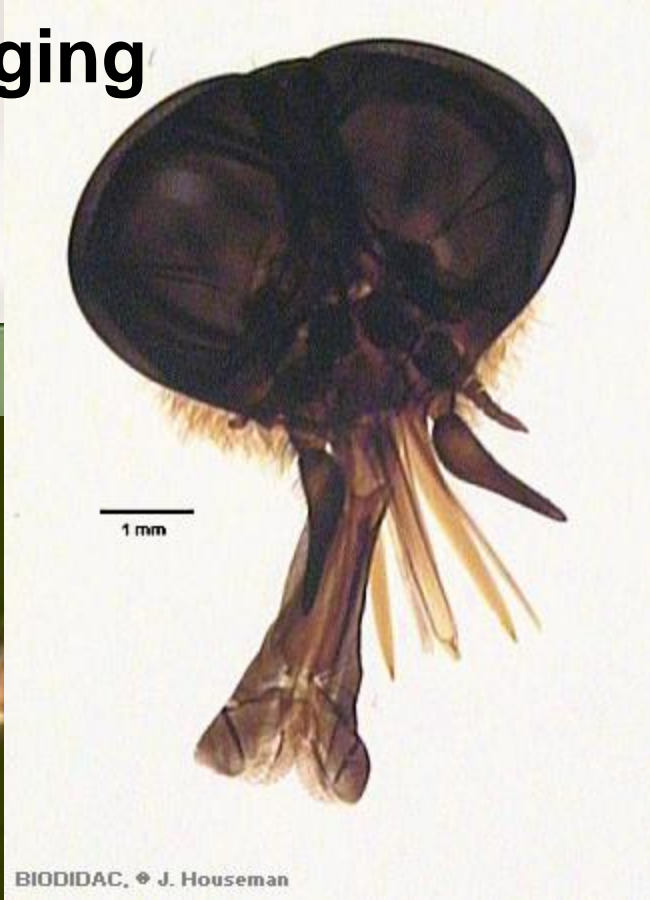
***Tabanus nigrovittatus* Salt marsh Greenhead pupa**, photo S McKeever



© 2011 R.J. Adams

Note: the fringe of spines on the posterior margin of the abdominal segments

Cutting-Sponging Mouthparts



Structural Differences of Horse and Deer fly Adults

	Horse Flies	Deer Flies
Size (length)	most 0.5 to 1.25 inches	nearly all species 0.25 to 0.33 inches
Antennae	shorter than head, with a thick base	longer than head, nearly uniformly slender
Wings	clear or uniformly cloudy	dark bands or patches on a clear background
Ocelli (3 eyes in forehead)	Vestigial or absent	Present
Apical tibial spurs (on hind leg)	Absent	Present

A Typical Female Deerfly Adult



head of male

Chrysops vittatus photo S McKeever

Yellow Fly *Diachlorus ferrugatus*

New Jersey to Texas

Florida SW Georgia **peak season**

April -June.

Eggs hatch in 5 to 12 days.

Larvae aquatic predators & scavengers
in tree root mats in deeply shaded areas.
e.g Cypress, oak & other woody plants



Adults: found around larval habitat, may fly long distances to find a
blood meal. **Anautogenous** - need blood for egg development
1-2 generations/year

Prefers shade making it less of a pest to animals in open pastures.

A fierce biter of humans and domestic animals. Bites all exposed skin areas
throughout daylight hours. Peak activity late afternoon and on overcast days

Especially common near large bodies of water.
One of the few tabanids which attacks indoors.



Good Yellow fly ambush territory- partially shady flight path

Saltmarsh Greenhead

Tabanus nigrovittatus

Females are powerful long distant fliers, that attack persistently, during daylight **April-September** peaking in **July**

Predacious **larvae** forage in upper vegetational zone reached by daily high tides.

Larvae overwinter and pupate in early spring and adults emerges in late spring.

Females are **facultatively autogenous**. First egg masses (100-200 eggs) are laid after mating & without a blood meal. Additional egg masses, require a blood meal.

Older females migrate from the salt marsh to nearby wooded or open areas along the marsh edge to seek suitable blood meals i.e. people and livestock. Adult lifespan 3-4 weeks



**male: no gap
between eyes**

Typical saltmarsh greenhead flight paths through gaps between vegetation.

Greeheads prefer to fly at <10ft around barriers rather than over them.



General Tabanid Behavior

- **Long-range cue Carbon dioxide**
short range visual cues i.e. motion, size, shape, and dark color
- **Aggressive, persistent feeders, return quickly to bite on interruption**
- **Daytime feeders. Peak hours of activity –species dependent**
E.g. Deer fly biting activity begins at sunrise & lasts 3 hrs.
2nd peak last 2hrs before sunset.
- **Attack frequency is low on overcast days or below 72°F & above 90 °F.**
- **Horse flies typically large stationary mammals**
- **Deer flies wide host range, attacking mammals of all sizes, humans, birds and reptiles. Moving hosts**
- **Males nectar feeders Exhibit territorial behavior**
hover at certain times of day, to attract females

Trapping Tabanids

Traps work by exploiting the behavior of their target insect.

Therefore the more you know about Fly behavior the better your trap will be at catching it!

A Good trap should:

Attract host-seeking flies from a distance

Entice flies to circle, land on and investigate the trap

Direct flies into a compartment where escape is difficult

Trap Attractiveness and Efficiency

“There are many idiosyncrasies of trap performance, even for the same species in different localities. There is no such thing as a "universal" fly trap.”

- Steven Mihok Ph.D.

Black Sphere Trap or Attractor

Used as a trap when suspended and coated in tanglefoot .
Good for deer flies and stable flies.

Often used as mobile lures to enhance other types of traps



EPPS Biting Fly Barrier Trap

Many Tabanids tend to circle around the host before landing to bite. Flies are attracted to the large, dark shape.

As the fly circles the trap it attempts to fly through the clear angled deflector panels, and is deflected into the trays of soapy water immediately below. Good for Tabanids?



Manitoba Canopy Trap

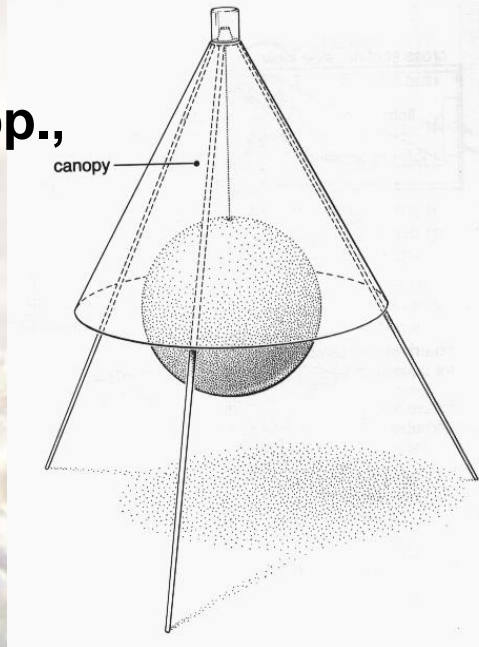
The first canopy trap.

Developed for Northern horseflies *Hybomitra* spp., in Manitoba CA.

Original design, white conical canopy (set 1 m off the ground) with a 30in dia black acrylic sphere

Thorsteinson et al. (1965)

- Trap height off ground,
 - Sphere size and shininess,
 - Presence or absence of sphere and/or black skirt,
 - canopy construction materials (ordinary plastic or uv-stabilized PVC)
- All affect which species are caught.





Box trap

Blue- or black-painted box traps are effective for certain species of horse flies e.g. the salt marsh greenhead

Picture to right; trap specifications for *Tabanus nigrovittatus* at Cape Cod, MA. (with the addition of a hanging black sphere and white collection pyramid). The inside is painted black.

A commercial version of the basic box trap concept is the Horse-Pal® horsefly trap.

Box trap adapted for Horse flies on Horse farms

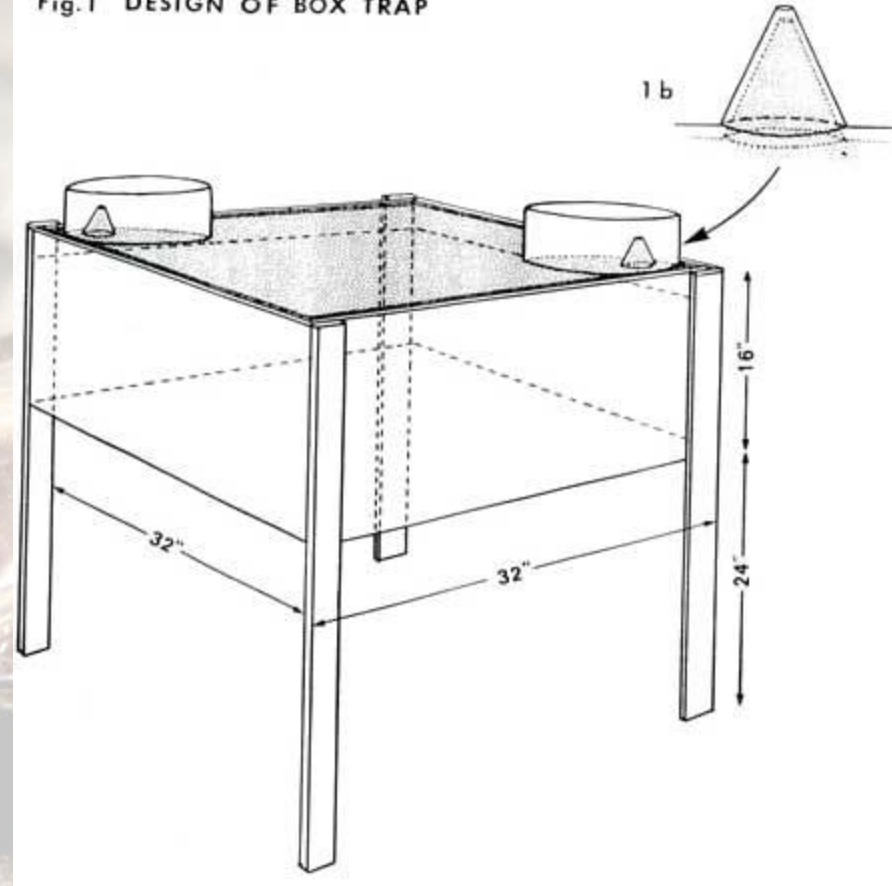


Salt marsh Greenhead Box Trap- Rutgers Version

Addition of a 14-16in black sphere
improves efficacy





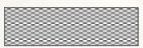
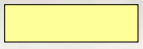
Fig.1 DESIGN OF BOX TRAP



Nzi Trap www.nzitrap.com

is a cloth trap developed in Kenya for savanna tsetse. Also very effective trap for stable flies (*Stomoxys* spp.) and horseflies (Tabanidae). Less so for deerflies



-  Blue
-  Black
-  Back Net
-  Horizontal Net Shelf
-  Gap

Top "Cone"

Wing

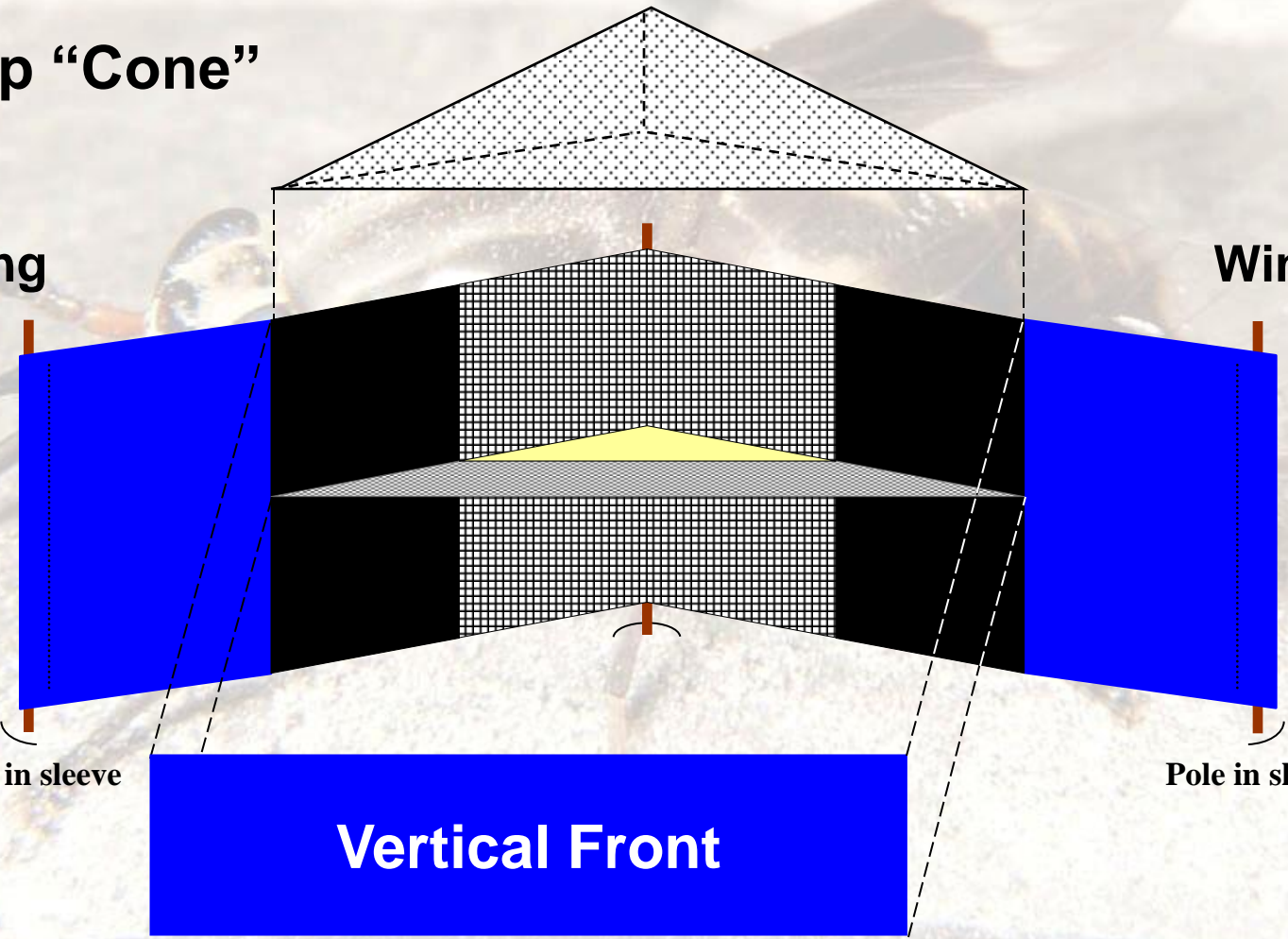
Wing

Pole in sleeve

Pole in sleeve

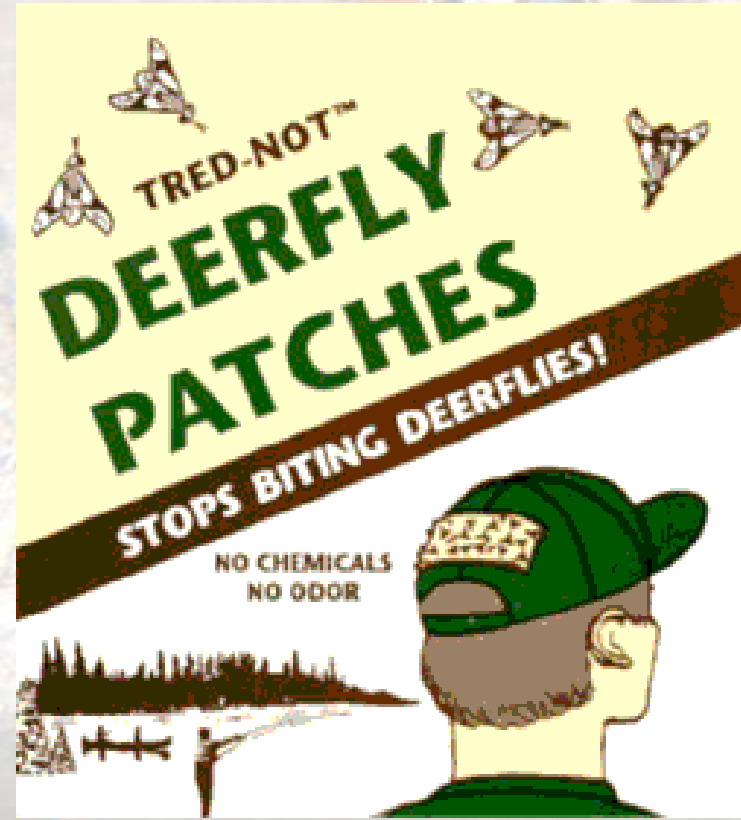
Vertical Front

Top Front Shelf removed to show inside



Stick-on Sticky Patches for Deer Fly

Work best when stuck to the back or top of the head



Trolling for Deerfly

Deer fly are attracted to blue shapes that are moving linearly at $<7\text{mph}$





Corrugated Clear Fibreglass Sticky Trap

Certain optical properties of clear corrugated fibreglass are effective for the stable fly
Stomoxys calcitrans (Muscidae).

A commercially available trap consists of disposable sticky sleeves attached to a corrugated fibreglass tube.



Photograph and Information Source Credits

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Questions?