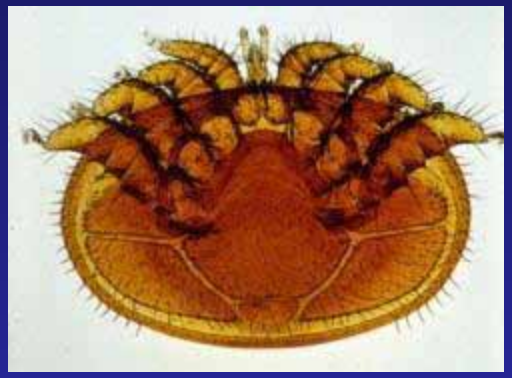
Colony Collapse Disorder? What is Happening? What Are We Doing?

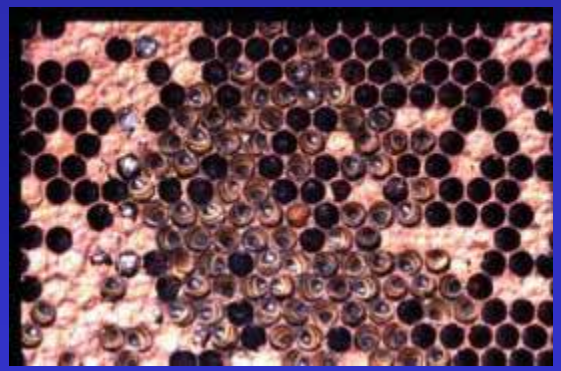


Mites?

Diseases?

Pesticide Contamination?

Beetles?



Nutrition?

John A. Skinner
University of Tennessee

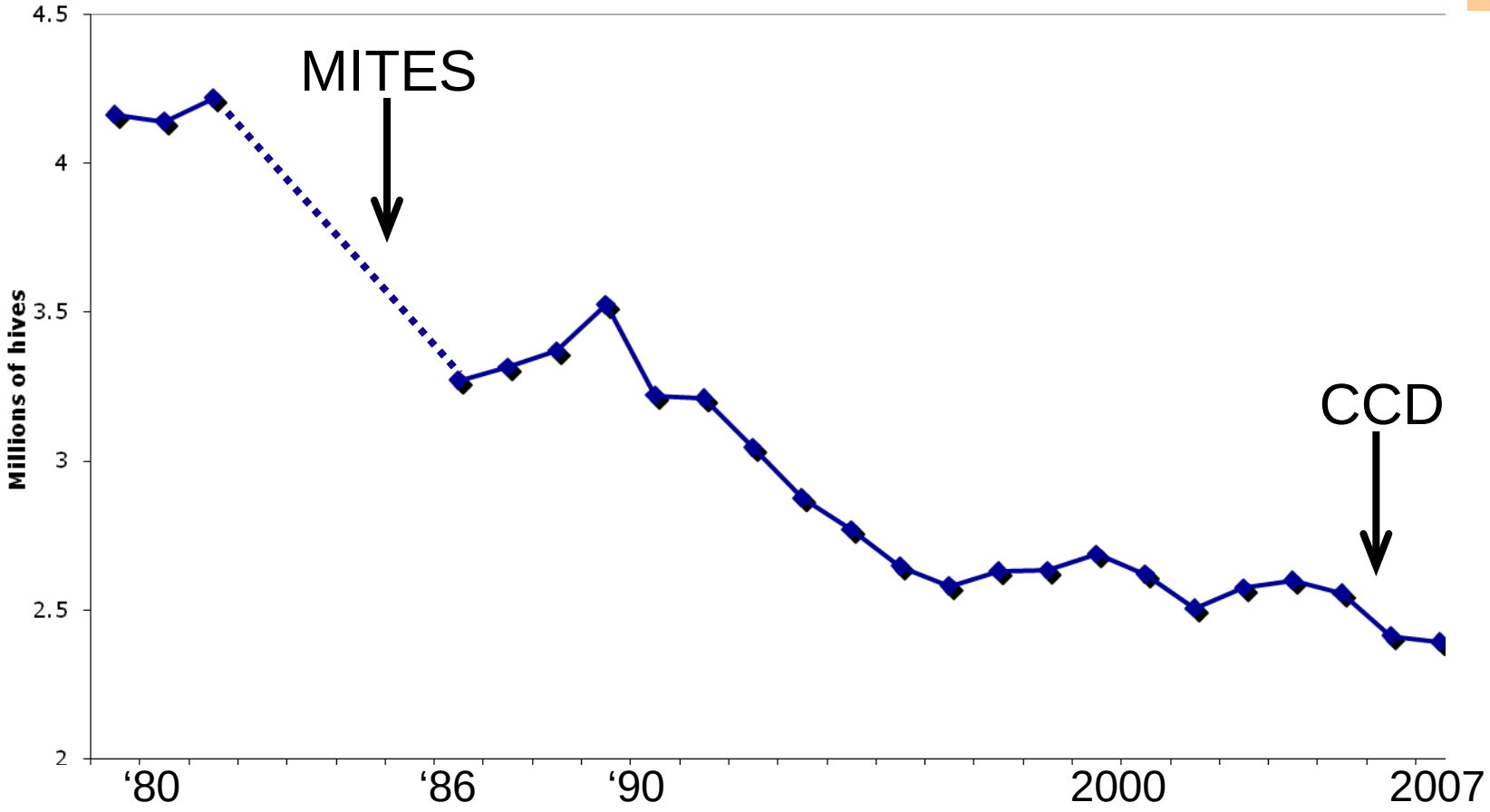
Annual Pollinated Crop Value

- United States – $14.6 Billion
- Tennessee - $300 Million

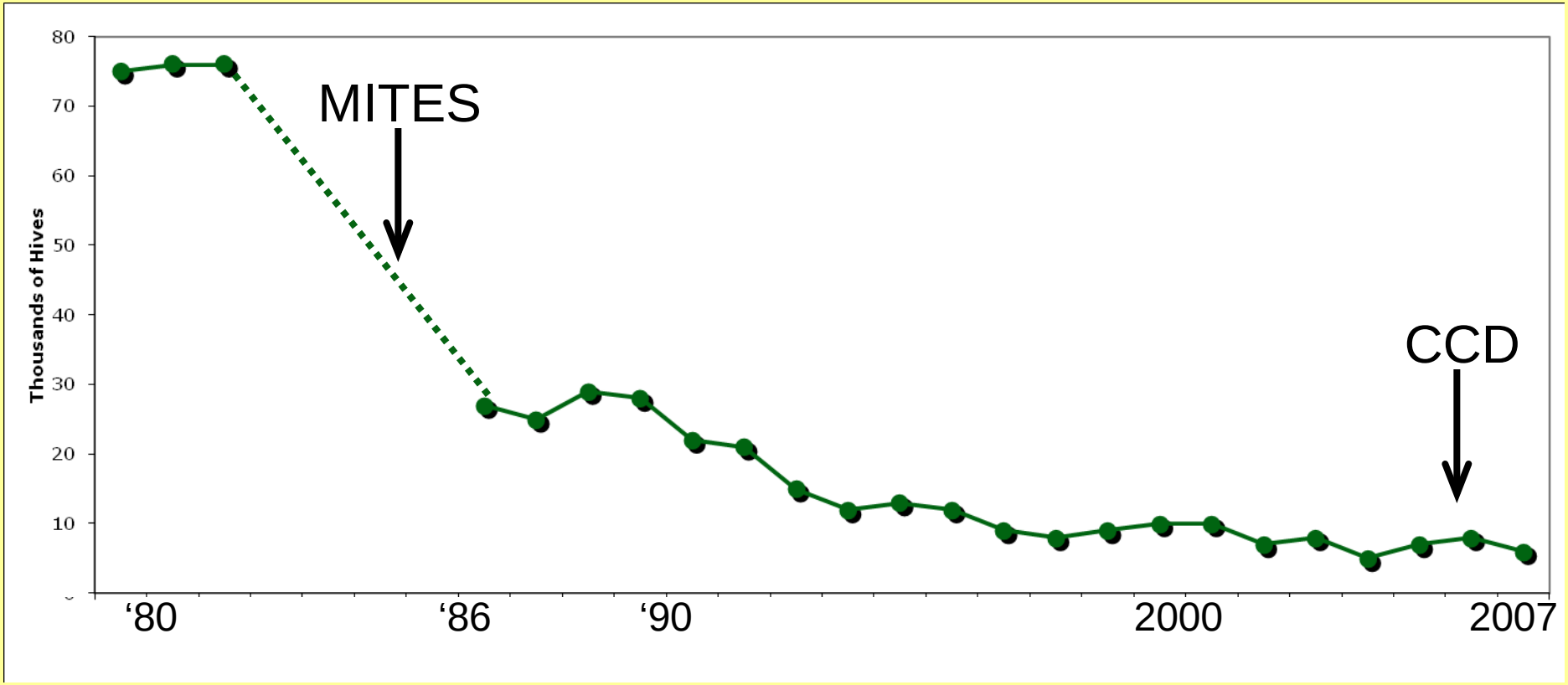
Why Do We Need Bees?

Fruit and Vegetable Production Requires Pollination

DECLINE IN NUMBERS OF US BEE HIVES (NASS STATS)



DECLINE IN NUMBERS OF INDIANA BEE HIVES

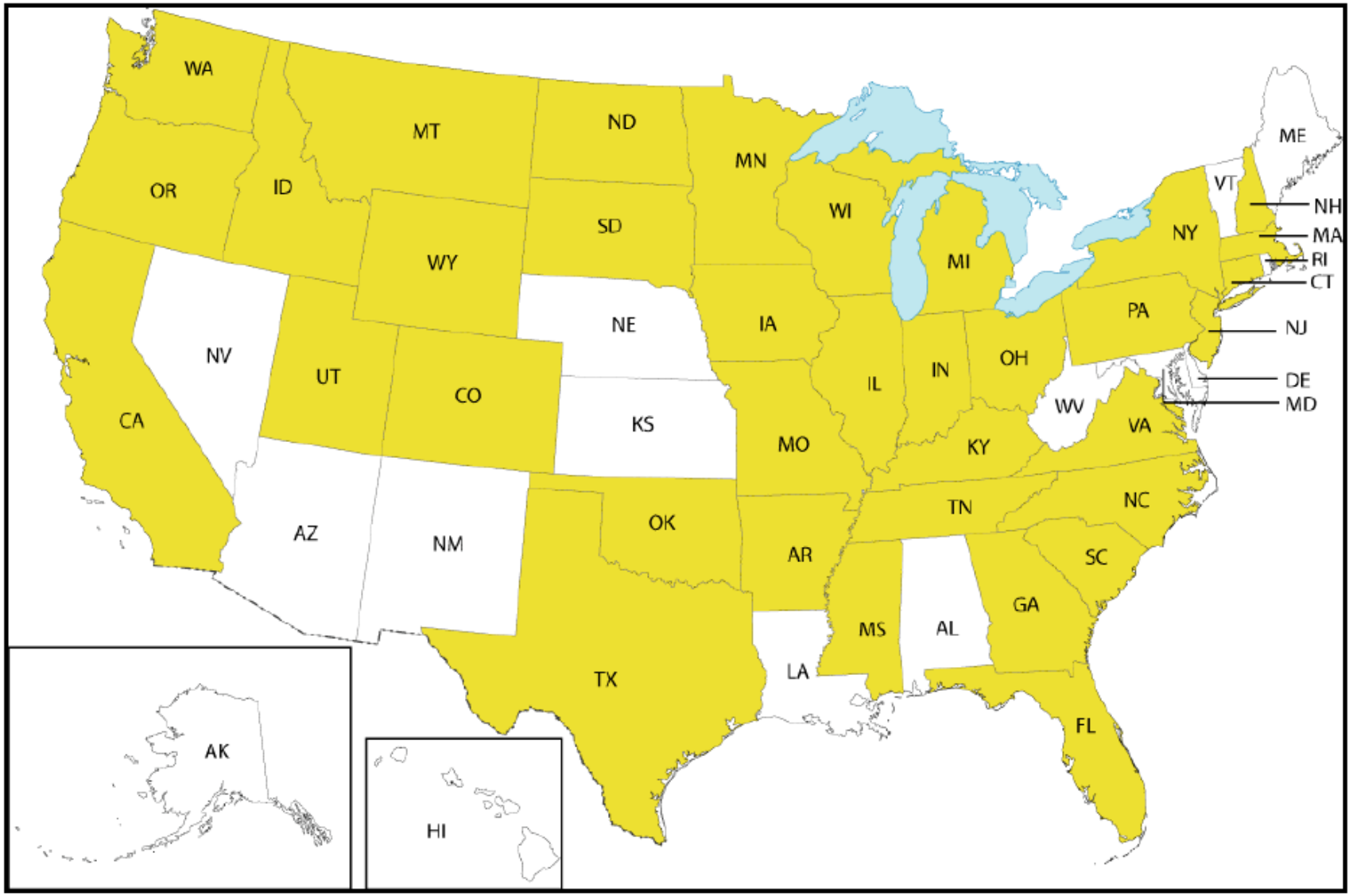


WHAT IS CCD?

SYMPTOMS of Colony Collapse Disorder

- **BEES FAIL TO RETURN TO HIVE**
- **FEW OR NO DEAD BEES PRESENT**
- **SMALL CLUSTER OF YOUNG ADULTS AND QUEEN**
- **COLONY LOSSES WERE RAPID - MUCH BROOD PRESENT**

Figure 1. Colony Collapse Disorder, Affected States, June 2007



Source: Bee Alert Inc., "Latest U.S. CCD Map," [http://www.beealert.info/]. Shaded areas show reported affected states.

COLONY LOSSES OF ~30% WERE EXPERIENCED BETWEEN 2000-2006, MOSTLY ATTRIBUTED TO VARROA (MAAREC SURVEY).

(Burdick and Caron, http://maarec.cas.psu.edu/pdfs/MAARECSurveyPub.pdf)

US COLONY LOSSES WERE ~32-35% DURING THE CCD YEARS OF 2006-2007 (AIA REPORT)

DOES IT REALLY MATTER?

1) COLONY LOSSES ARE SIMILAR TO PERIOD BEFORE CCD

2) EXTENT OF PROBLEM MAY BE EXAGGERATED

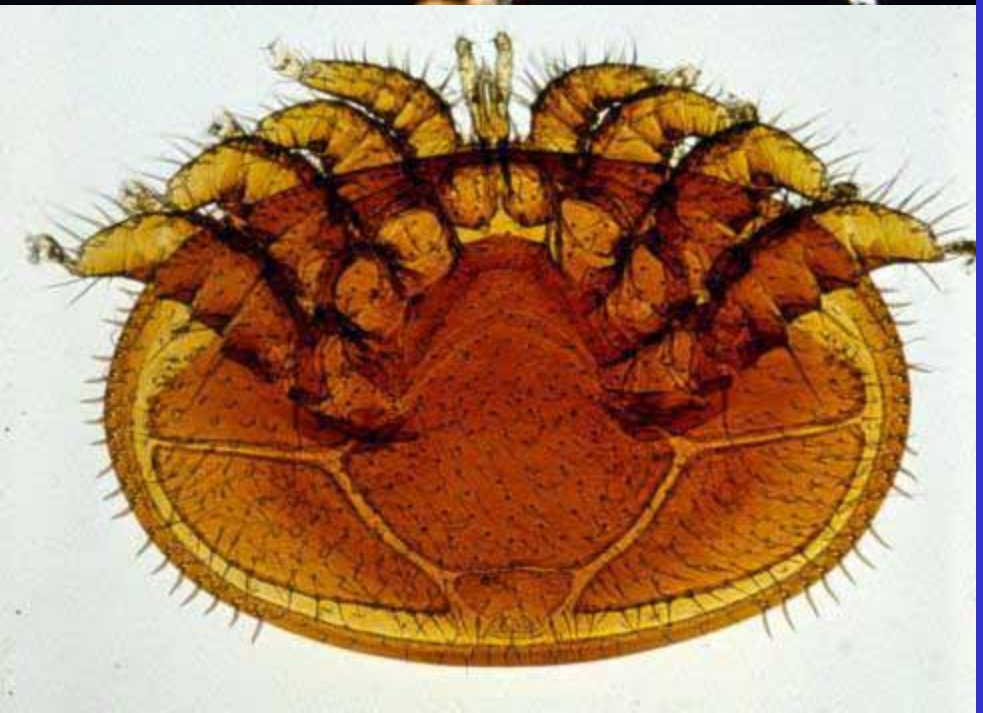
3) SIMILAR EPISODES: “DISAPPEARING DISEASE”

4) BUT, DISTURBING “NEW” SYMPTOMS MAY INDICATE A NEW PATHOGEN (OR PROBLEM)

5) CCD COULD ACTUALLY BE A BENEFIT IF IT WAKES UP THE PUBLIC

POSSIBLE CAUSES OF CCD

- existing parasites, mites, and disease
- new or more virulent pathogens
- poor nutrition
- lack of genetic diversity
- stress in adult bees
  transportation, overcrowding
  environmental, biological
- chemical contamination
  In wax, food, or from new types of pesticides
  exposure to chemicals for mites
- a combination of these and/or other factors



Varroa Mite

Ø**Severe Pest – Will Kill Colony Unless Managed.**

Ø **Reproduce in Capped Brood Stage – Protected from Chemicals.**

Monitoring for *Varroa*
Bottom Board Sticky Traps

Mites collected on commercially available sticky trap.

“Home-made” sticky trap partially pulled from hive .

- **Collects mites that fall from colony**
- **Easier to use than other methods, but must buy or construct trap**
- **Keep in hive for 3 days**
- **If >25 (UT sticky board, at left) or > 50 (commercial sticky board) collected per 24 hrs., treat (mid-Aug. to mid-Sept. for medium-sized colonies)**

New Viruses and Nosema Found in Samples

Disease Agent	Number of positive samples (% positive of samples tested)		
	CCD (n=30)	non-CCD (n=21)	Total (n=51)
IAPV	25 (83%)	1 (5%)	26 (51%)
KBV	30 (100%)	16 (76%)	46 (90%)
N. apis	27 (90%)	10 (48%)	37 (73%)
N. ceranae	30 (100%)	17 (81%)	47 (92%)
All 4	23 (77%)	0 (0%)	23 (45%)

Science Magazine Article - Fall 2007

- **The authors claimed IAPV was linked to CCD and that it probably came from Australia.**

- **BUT, IAPV has been in the U.S. since before we were importing bees from Australia !**

- **IAPV is in Israel and Australia and is not causing CCD.**

- ***N. ceranae*** **also has been in the U.S. at least 10 years.**
- **Big colony losses in Europe have been attributed to *N. ceranae*.**
- **Dennis Anderson noticed similar colony losses in Australia that he said were caused by *Nosema*.**

Nosema treatments

Dadant

What is being done about CCD ?

NC 508: Sustainable Solutions to Problems Affecting Honey Bee Health

35 participants from 23 states

Resulted in:
Coordinated Agricultural Project (CAP)
Protection of Managed Bees

$4.1 million

CAP Objectives:

I. ***Determine the cause of CCD***: **study the interactive effects of disease agents (pathogens, parasites) and environmental factors (pesticides, nutrition) on honey bee health.**

II. **Breeding - Incorporate traits that will help honey bees resist pathogens and parasitic mites and increase genetic diversity of commercially available stocks.**

III. **Conserve non-*Apis* pollinators through study of factors that impact them: new or emerging pathogens/parasites, environmental and nutritional stresses, and habitat degradation.**

IV. **Extension -Translate research knowledge to beekeepers and growers - develo technology transfer for queen breeders, Formulate a Best Management Practices guide for *Apis* and non-*Apis* managed pollinators, and make this readily available at an eXtension website.**

USDA CCD ACTION PLAN

1) CONDUCT SURVEYS
2) ANALYZE SAMPLES
3) EXPERIMENTS ON BEE HEALTH
4) DEVELOP A BEST MANAGEMENT PLAN

Specific Parts of the CAP Grant

PERMANENT RESEARCH APIARIES

CAGE AND FIELD STUDIES

PESTICIDE STUDIES

BREEDING FOR RESISTANCE

EXTENSION/eXtension

TENNESSEE HONEY HOUSE