Browntail Moth (*Euproctis chrysorrhoea*) Research at UMaine

- Defoliator of many deciduous trees species
- Serious Public Health Issue

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Charlene Donahue, Forest Entomologist (RETIRED)

Maine Department of Agriculture, Conservation & Forestry

Research Projects:

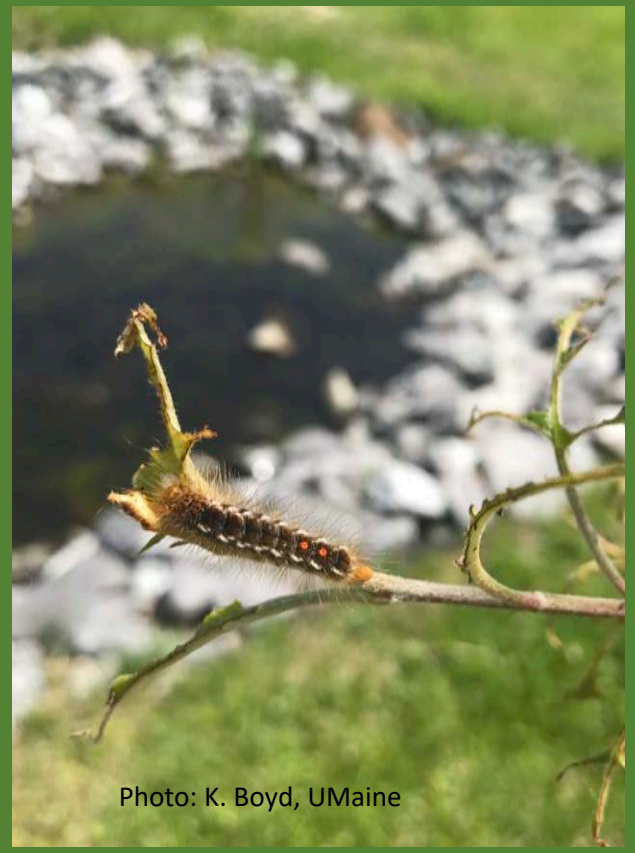


Photo: K. Boyd, UMaine

1. Assess the natural mortality of browntail moth throughout various parts of the outbreak area,

1. Investigate factors contributing to the severity of the browntail moth (BTM) outbreak in Maine, and

2. Evaluate potential management options for browntail moth

Challenges

- **Difficult to work with due to health affects**


Photo: E. Groden, UMaine

Photo: S. Hersey, UMaine


Photo: H. HaverKamp, UMaine

Challenges

- **Difficult to work with due to health affects**
- **Difficult to sample and treat**
  - **High up in trees**
  - **Moths don't necessarily lay their eggs in same trees year after year**

Winter webs at tops of trees

Large caterpillars feeding in spring

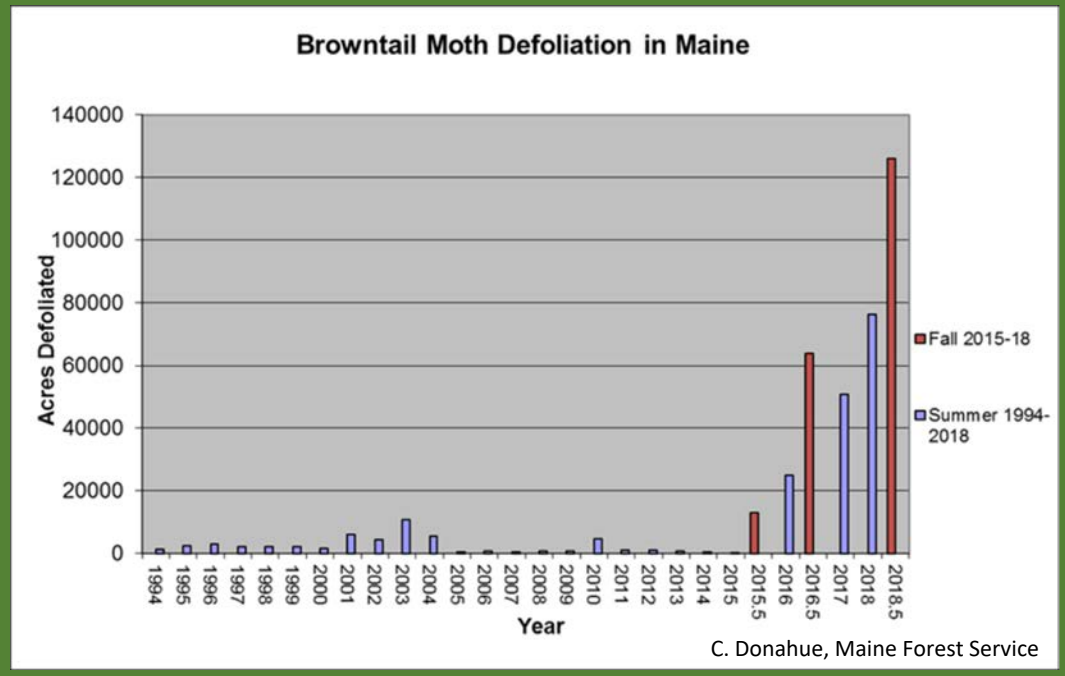
Female laying eggs

Bronzing of leaves from small caterpillar feeding in August and September

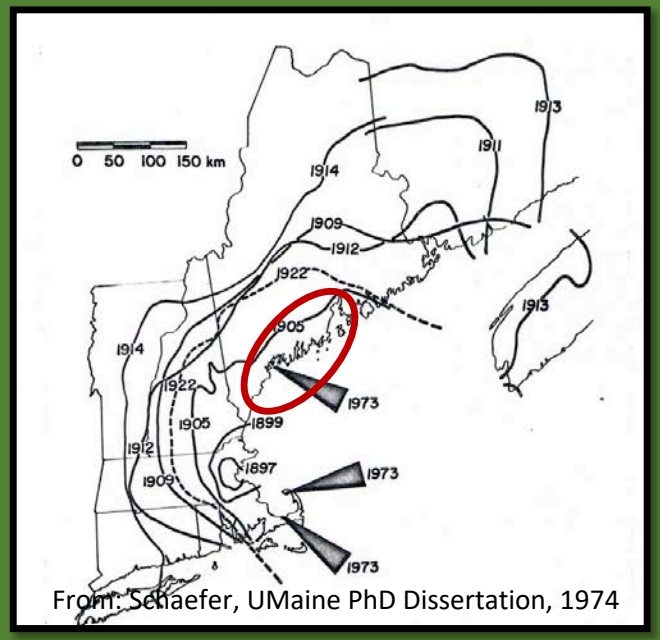
Small caterpillars feeding in September

Challenges

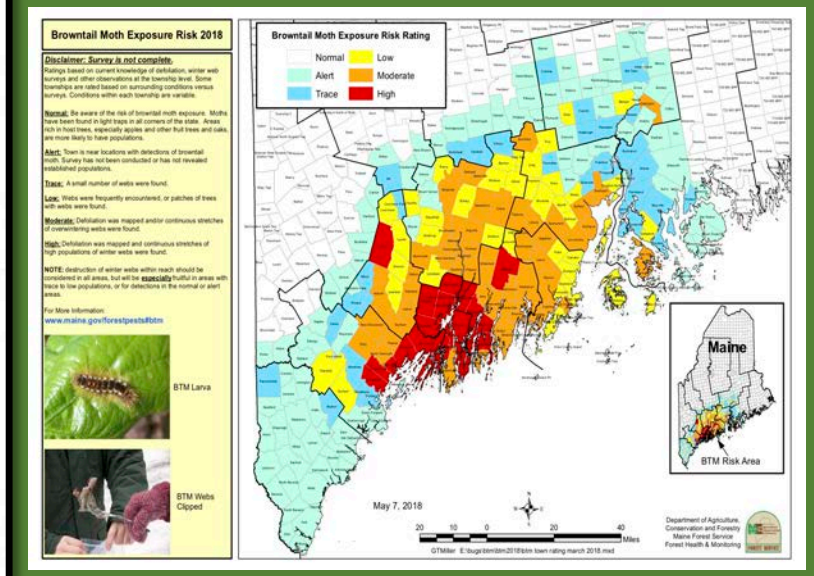
- Difficult to work with due to health affects
- Difficult to sample and treat
  - High up in trees
  - Moths don't seem to necessarily lay in same trees
- Difficult to fund research
  - Populations rise and fall
  - Small problem in a big world (current outbreak restricted to Maine)



C. Donahue, Maine Forest Service



From: Schaefer, UMaine PhD Dissertation, 1974



Research Projects:

Browntail moth caterpillars killed by fungal pathogen, *Entomophaga aulicae*, Bowdoinham, ME

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BTM Natural Enemies

Photo: H. HaverKamp, UMaine

UMaine Entomology Graduate Student, Karla Boyd

Photos: K. Boyd, UMaine

Assessing the natural mortality :

- Larvae, pupal nests, and overwintering nests collected and reared for parasitoid emergence and disease mortality - **100's from 46 sites**
- Larvae collected – molecular tools will be used to document presence of disease pathogens (fungi and virus)

Natural enemies found in these studies

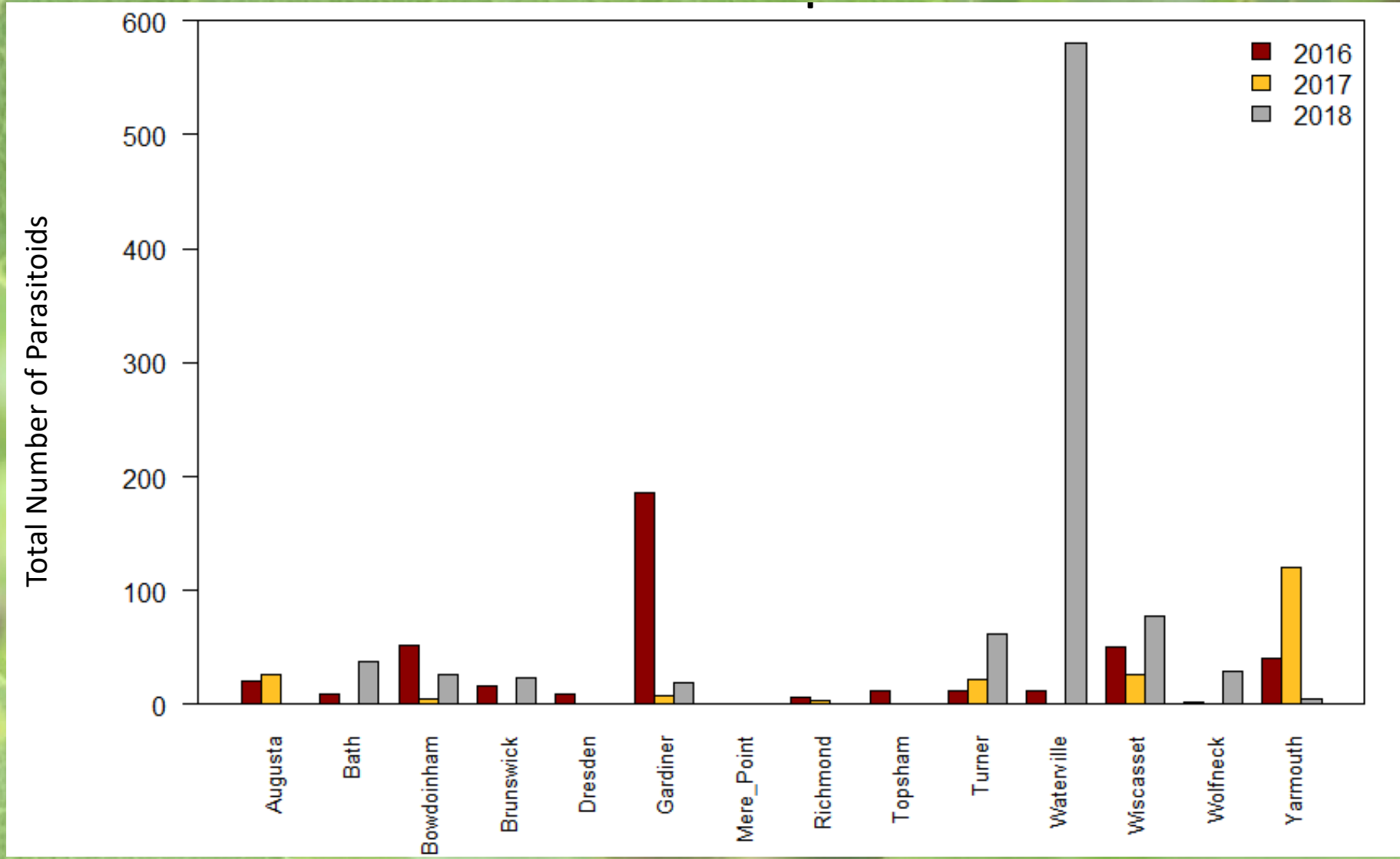
- **Fly parasitoids (Tachinidae)**
  - ***Compsilura concinnata***
  - ***Townsendiellmyia nidicola***
- **Wasp parasitoids**
  - ***Brachymeria tibialis***
  - ***Pimpla/Ictoplectus disparis***
  - ***Pimpla/Ictoplectus conquistador***
  - ***Theronia fluvesens***
  - ***Meteorus versicolor***
  - ***Monodontomerus aerus****
  - ***Dibrachys microgastri****
  - **1 UNK Ichneumonidae**

*hyperparasitoids

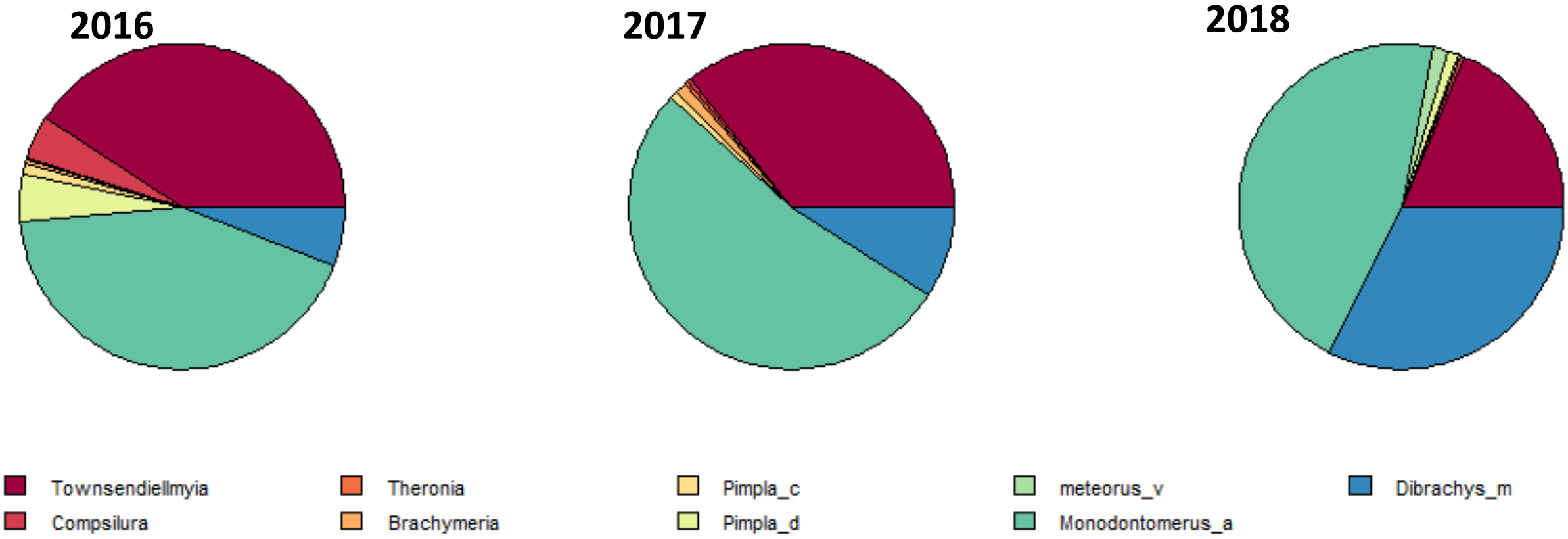
Photos: DAFC-MFS – Entomology Lab

Wasp attacking BTM pupae

Total Number of Parasitoids Found in BTM Pupation Nests Across Maine Townships



Diversity of Parasitoid Species Found in BTM Pupation Nests



Fungal and Viral Natural Enemies



- *Entomophaga aulicae*
- Nuclear polyhedrosis virus (NPV)

In-progress

Photo: K. Boyd & E. Groden, UMaine

Research Projects:

Emerging browntail moth adults, Bowdoinham, ME

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Comparing Biorational Products to Control Browntail Larvae

- "Biorational pesticide" –
  - Usually low applicaton rates
  - Few nontarget effects
  - Considered reduced risk
- "Organic" – OMRI listed or certified

(Organic Materials Review Institute)

Biorational Products to Control Browntail Larvae

2017 Lab Bioassays:

- apple leaves pinned to boards

- Boards with leaves sprayed with backpack sprayer

Photos: E. Groden & K. Boyd, UMaine

- Monitored mortality for 10-14 days

emerging overwintering larvae

newly hatched summer larvae

Biorational Products to Control Browntail Larvae

2018 Field Trial


Photo: E. Groden, UMaine

- 5 blocks in Harpswell and Dresden, ME
  - Results suggest that some low impact materials can manage caterpillars for short-term (1 season).
  - The most effective low impact material was *Bacillus thurengiensis (Bt)*

Future?

Caterpillars make silk webs in which they spend the winter: Can we disrupt these and make them more susceptible to our winter weather?

We are researching their webs:
- analyzing the chemistry and structure of their webs
- conducting trials to assess whether currently available products might impact web integrity.

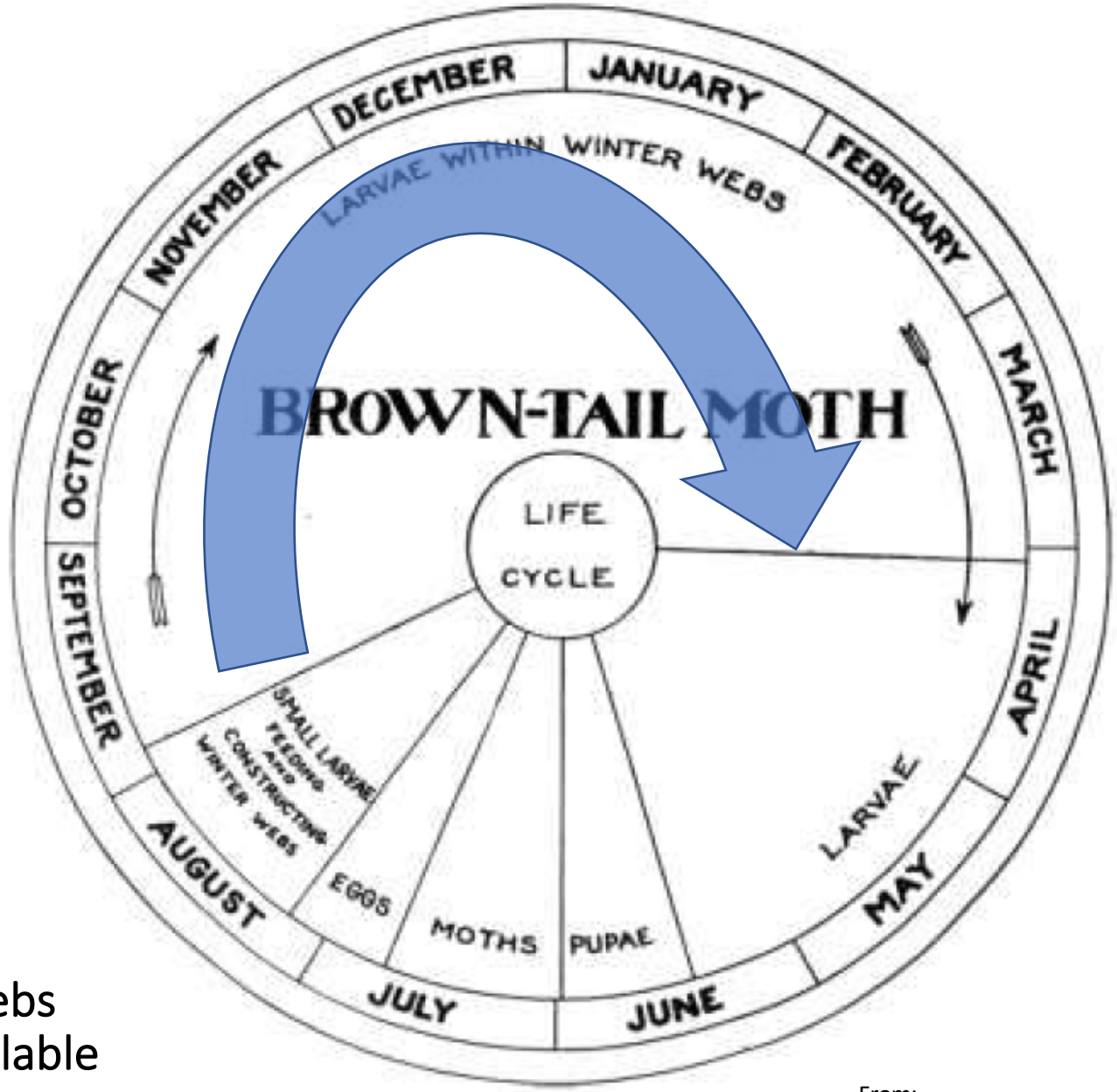

FIG. 2—Life cycle of the brown-tail moth

From:
Burgess and Crossman 1929

Collaborators: Drs. Barbara Cole and Ray Fort, and PhD student, Heyweon Hwang, Chemistry Dept, Undergrad, Eva Nazim, Biology, UMaine

Browntail Moth Research

Summary to Date:

1. Our evidence suggest that applications of *Bt* will control BTM caterpillars in the spring, and likely in the late summer.
   - Caterpillar reductions may require 2 applications of *Bt* in spring.
   - Very high populations are problematic, and Bt may not be effective
   - Applications only reduces caterpillars for one season.
2. There is a diversity of natural enemies attacking BTM but it is still unclear what role they might play in reducing this outbreak.
3. Preliminary climate analysis suggest that these critters are likely to be around for a while.

Lots more to learn!


BTM toxic hair (x7500) ; photo from Blair 1978


Photo: K. Boyd UMaine

Photo: C. Donahue, MFS


Photo: Maine Forest Service


Photo: K. Boyd, UMaine


Photo: K. Boyd, UMaine


Photo: E. Groden UMaine

Donations to support UMaine browntail research are greatly appreciated and can be directed to:

THE UNIVERSITY OF MAINE FOUNDATION, TWO ALUMNI PLACE, ORONO, ME 04469-5792.

PLEASE SPECIFY THAT FUNDS ARE SPECIFICALLY FOR SUPPORT OF THE UNIVERSITY OF MAINE BROWNTAIL MOTH PROJECT.

Browntail Moth Research

Edith Patch, studied Browntall in Maine in early 1900s

Image courtesy of Special Collections, Raymond H. Fogler Library

100 Years later:

Photo: H. Haverkamp, UMaine

Karla Boyd, UMaine

Photo: H. Haverkamp, UMaine

Ellie Groden, UMaine

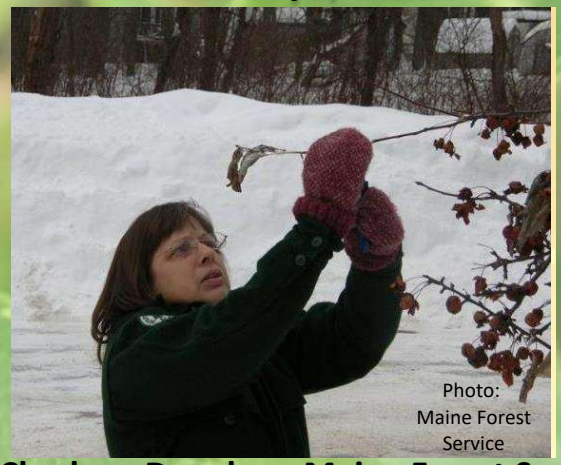

Photo: Maine Forest Service

Charlene Donahue, Maine Forest Service

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- Brenden Kelly

Technician: Judy Collins

Collaborators:

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