

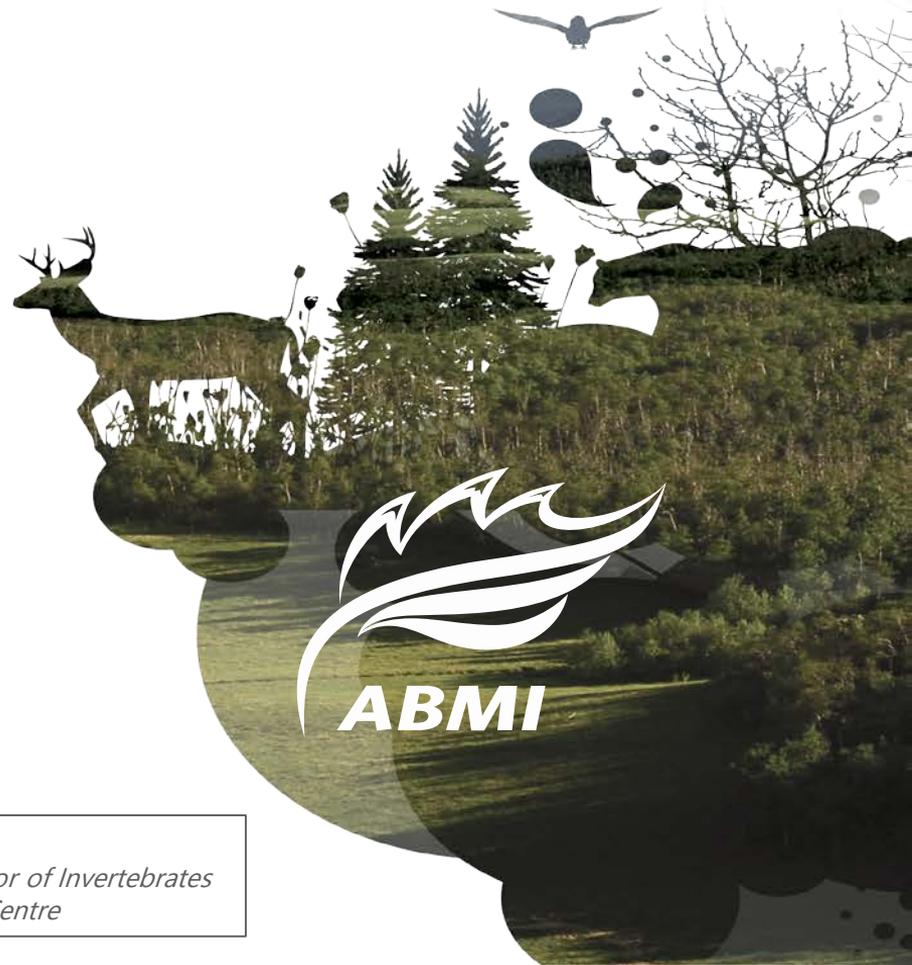
# ABMI Evolving to Meet Emerging Needs

*Taxonomic challenges and opportunities*

Jan 30, 2019

Tyler Cobb, PhD

*Head of Life Sciences/Curator of Invertebrates  
Director, ABMI Processing Centre*



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# Outline:



## *Background*

- 1. ABMI – RAM partnership*
- 2. Processing Centre*

## *Importance of Taxonomy and Taxonomic Breadth*

- 1. Who cares?*
- 2. Taxonomic Impediment/opportunity*
- 3. Investing in taxonomic resources*

## *Beyond Taxonomy: Unlocking hidden potential*

- 1. Unexpected use of collections*
- 2. New directions*



# ABMI – RAM partnership



... Operationalized in 2007 by annually renewed contract



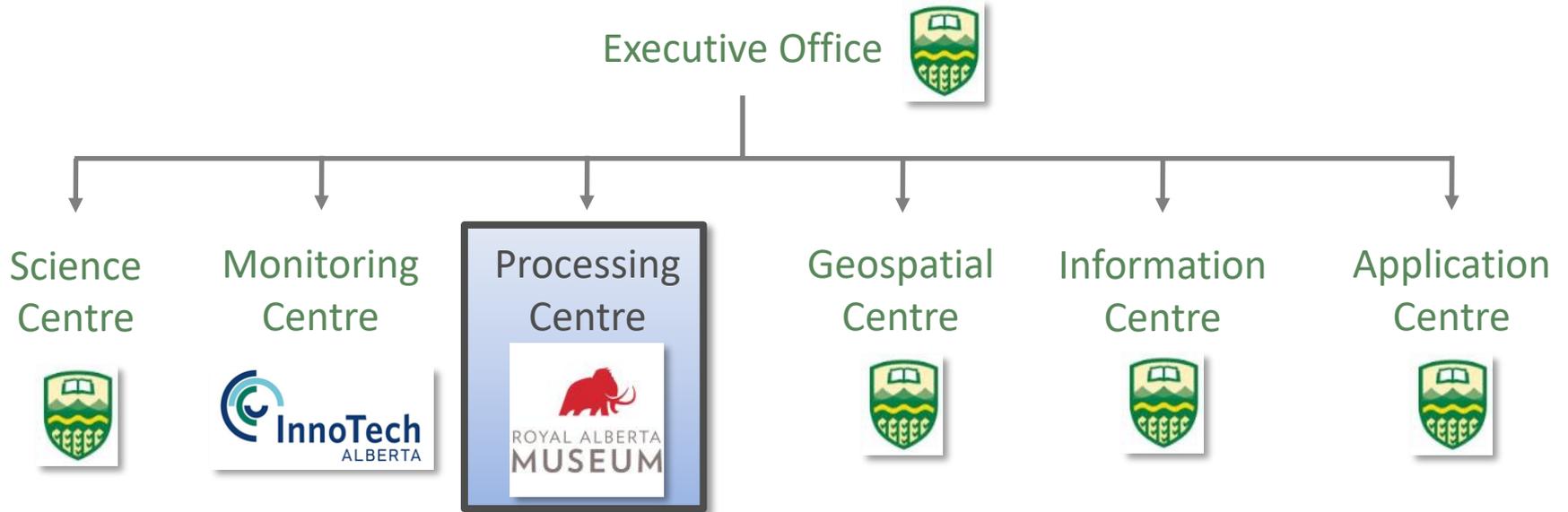
- Strong alignment of core principles (e.g., scientific credibility, transparency, independence, accessibility)
- Taxonomic breadth and geographic scale of ABMI is unparalleled (documenting natural history)
- ABMI has no capacity of its own to identify and archive specimens

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# ABMI Processing Centre at RAM



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# ABMI Processing Centre at RAM



- current team is 14 full time taxonomists and technicians
- taxonomic training for field crews
- receiving, tracking, routing field samples
- specimen sorting and preparation
- species-level identification
- taxonomic research
- long-term specimen archival for future research and verification

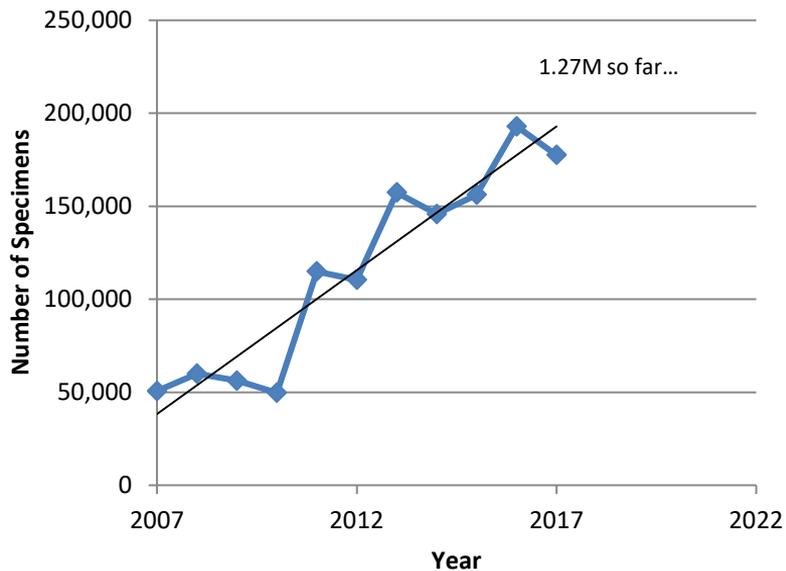
**Turn specimens into data and then archive them as verifiable evidence.**

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# ABMI Processing Centre at RAM



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# ABMI Processing Centre at RAM



**New to Science!**  
*Oribatella abmi*  
(Behan-Pelletier and Walter, 2012)



**New to Alberta !**  
Drummond's Flapwort  
*Harpanthus drummondii*



**New to Alberta !**  
Water boatman  
*Corisella inscripta*



**New to CANADA!**  
Sticky Stubble Lichen  
*Chaenothecopsis oregana*



**New AB Orchid!**  
Dragon's mouth  
*Arethusa bulbosa*

- > 250 new species records for AB
- > 40 new species to science

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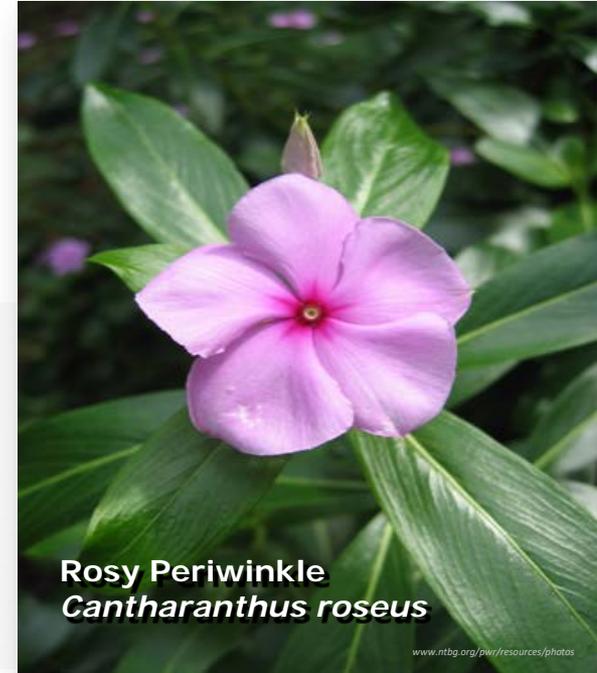
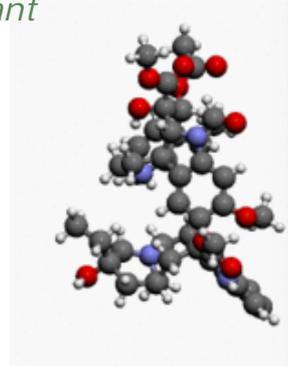
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# Taxonomy – who cares?



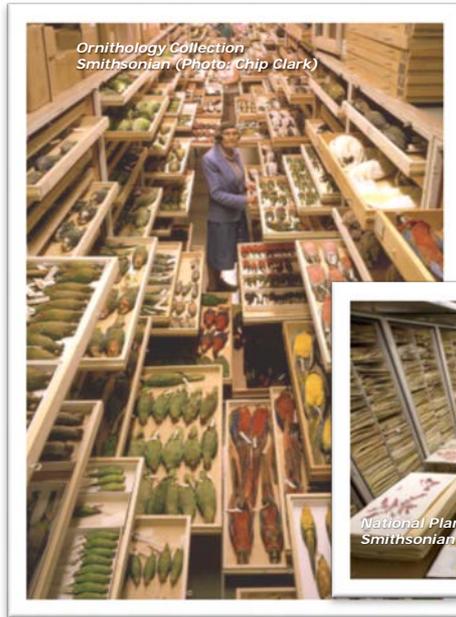
- *Taxonomy – necessary prerequisite to other inquiry*
- *C. roseus - first described by Carl von Linné in 1759 from specimens collected in Madagascar*
- *now known to be the source of >200 important compounds (alkaloids)*
- *Vinblastine ('58) and Vincristine ('61)*
  - acute lymphocytic leukemia
  - non-small cell lung cancer
  - brain cancer
  - testicular cancer
  - Hodkin's Lymphoma
  - bladder cancer
  - melanoma
  - neuroblastoma



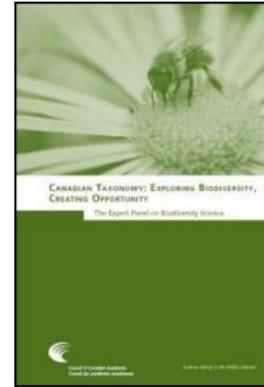
# Taxonomic Impediment / opportunity



- *Need for taxonomic resources > available resources*



- reference collections
- adequate keys
- funding
- jobs for taxonomists
- skilled personnel



...a “dying art”

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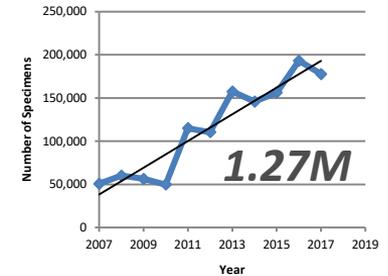
# Taxonomic Impediment / opportunity



- Investing in collections



- a reference library
- specimens hold value beyond the datasets they generate
- available to **EVERYONE** in perpetuity (for future research, verification, etc.)



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# Taxonomic Impediment / opportunity



- Investing in other taxonomic resources



**Key to Adult *Heminotrus* in Canada**

- Setae on margins of notogaster long, extending well beyond next seta in series; epimere IV separated by soft cuticle; 675 long ..... *Heminotrus longisetosus*
- Setae on margins of notogaster shorter, just passing next seta in series; epimere IV fused medially; 936-972 long ..... *Heminotrus targionii*

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# Taxonomic Impediment / opportunity



- *Investing in people (skill sets)*



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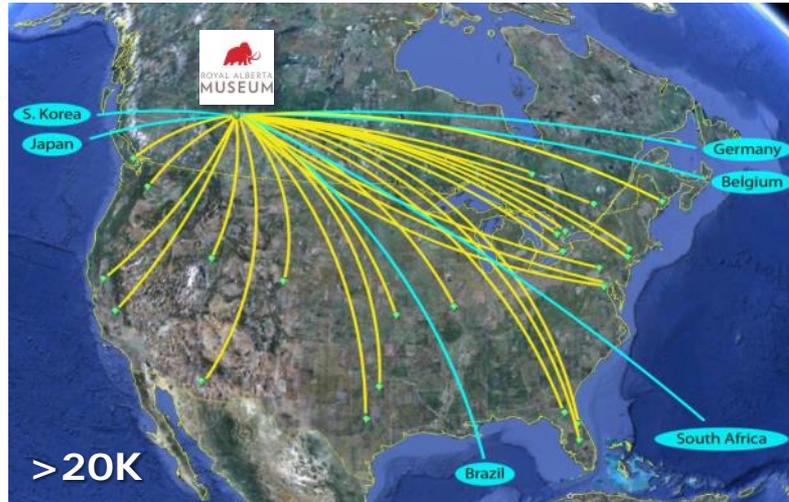
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# Beyond Taxonomy – unlocking the potential



- *Loans to support research and other collections*
- *Helping to build the DNA barcode library*



international  
BARCODE  
OF LIFE



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# Beyond Taxonomy – unlocking the potential



- *Using Residuals and training HQPS*

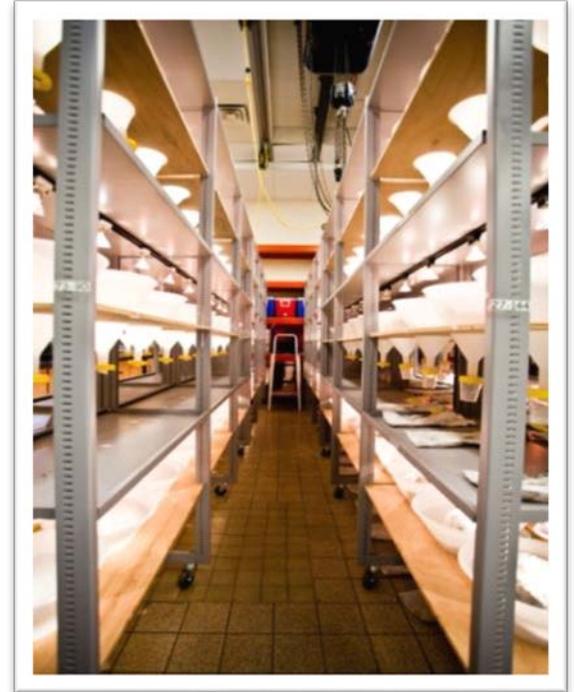
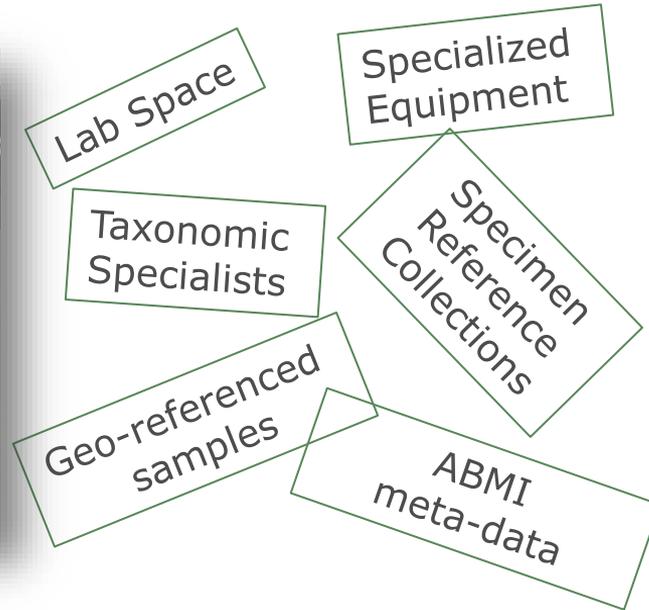
1. Genetic study of algae & fungi from archived lichen specimens, combined with chemical and morphological analyses
  - a) *Peltigera* spp. **PhD Student : Carlos Pardo De la Hoz (Duke University)**, in collaboration with Diane Haughland (RAM), Francois Lutzoni & Jolanta Miadlikoska (Duke) & Trevor Goward (UBC)
  - b) *Cladonia symphylicarpa* group. **MSc Student: Megan Lewis (UofA)**, in collaboration with Diane Haughland (RAM), Cameron Carlyle (UofA) & Raquel Pino-Bodas (Kew Gardens, UK)
2. Soil Mesostigmata (Arachnida: Parasitiformes) in boreal forests of Alberta: Diversity and utility as indicators of disturbance.
  - a) **MSc student: Matthew Meehan (UofA)**, in collaboration with Tyler Cobb (RAM), Lisa Lumley (RAM), Heather Proctor (UofA)
3. Diversity of wetland non-biting midges (Diptera: Chironimidae) and their responses to environmental factors in Alberta.
  - a) **MSc student: Qi Liu (UofA)**, in collaboration with Rob Hinchliffe (RAM) and Heather Proctor (UofA).



# Beyond Taxonomy – unlocking the potential



- *Using Residuals and training HQPS*



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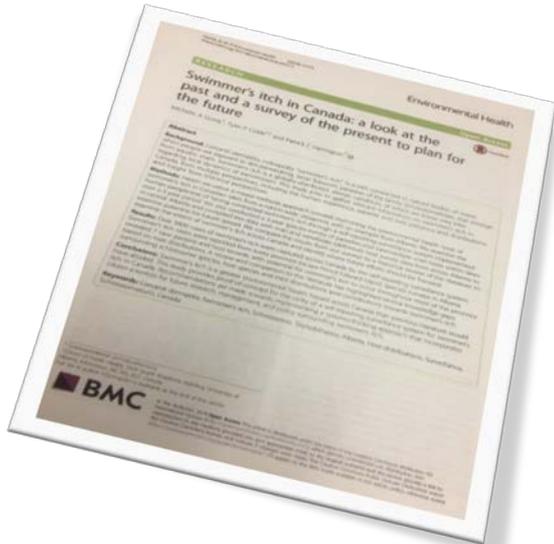
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# Beyond Taxonomy – unlocking the potential



- *Unexpected use of ABMI collections (Cercarial dermatitis?)*

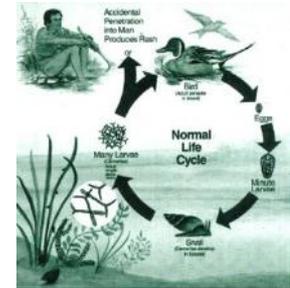


Gordy, M.A., Cobb, T.P. and Hanington, P. 2018. Swimmer's itch in Canada: a look at the past and a survey of the present to plan for the future. *Environmental Health* 17:73.

- ABMI-collected snails (intermediate host) identified and archived by RAM used to predict potential spread of swimmer's itch



*Physa sp.*



# Beyond Taxonomy – unlocking the potential

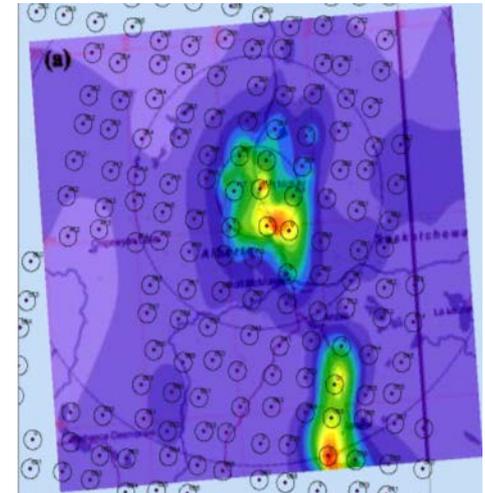


## Monitoring Contaminants using Lichens and Bryophytes

- Exploration of contaminant gradients (e.g., heavy metals, organic compounds, sulphur and nitrogen) in the OSR using retrospective analyses of archived moss and lichen samples in RAM collection compared to known gradients
- Proposed collaboration with WBEA, Shotyk Lab (UofA), RAM/ABMI (DLH and KW)



Aluminum gradient in oil sands  
from Landis et al 2019, modified  
with ABMI sites monitored in region



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# Summary



- *The ABMI-RAM partnership is mutually beneficial;*
- *Taxonomy is an important pre-requisite to other biological enquiry;*
- *Taxonomic impediment is a challenge and an opportunity (workload but investments too); and*
- *archived specimen collections hold value well beyond the datasets they generate and we are only beginning to explore their potential.*

THANK YOU!