

Monitoring hive health

Jessica Henneken
Kieran Murphy
Brendan Rodoni



Why monitoring bees matters

Agricultural crops rely on pollination services

Australia is lucky – free from many serious hive pests and diseases

We are very global – risk of exotic introductions

Climate change is expanding the range of pests

Safeguarding our bees means monitoring their health now so we can rapidly respond

Pests and diseases transferred between colonies

Robbing, Foraging and Drifting

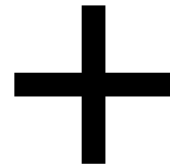
Two monitoring systems

Traceability devices

Where have the hives been?
Which colonies are interacting?

Contact tracing
Eradication of exotic invasions

Hive climate – hive health



Surveillance using eDNA

Exotic pests and pathogens
Endemic pests and pathogens

Beneficial species
Microbiome diversity

Agricultural species

Proof of concept: Can we monitor hive health?

Four commercial hives followed for four months

Placed trackers inside of the hive: Escavox and Hivemate

Irymple SmartFarm – almond orchard

Hobby farm – stone fruit trees and chickens

Collected **debris** from the bottom of the hives

- dead bees
- Insect body parts
- dead brood

Screened samples in the lab for eDNA belonging to three groups

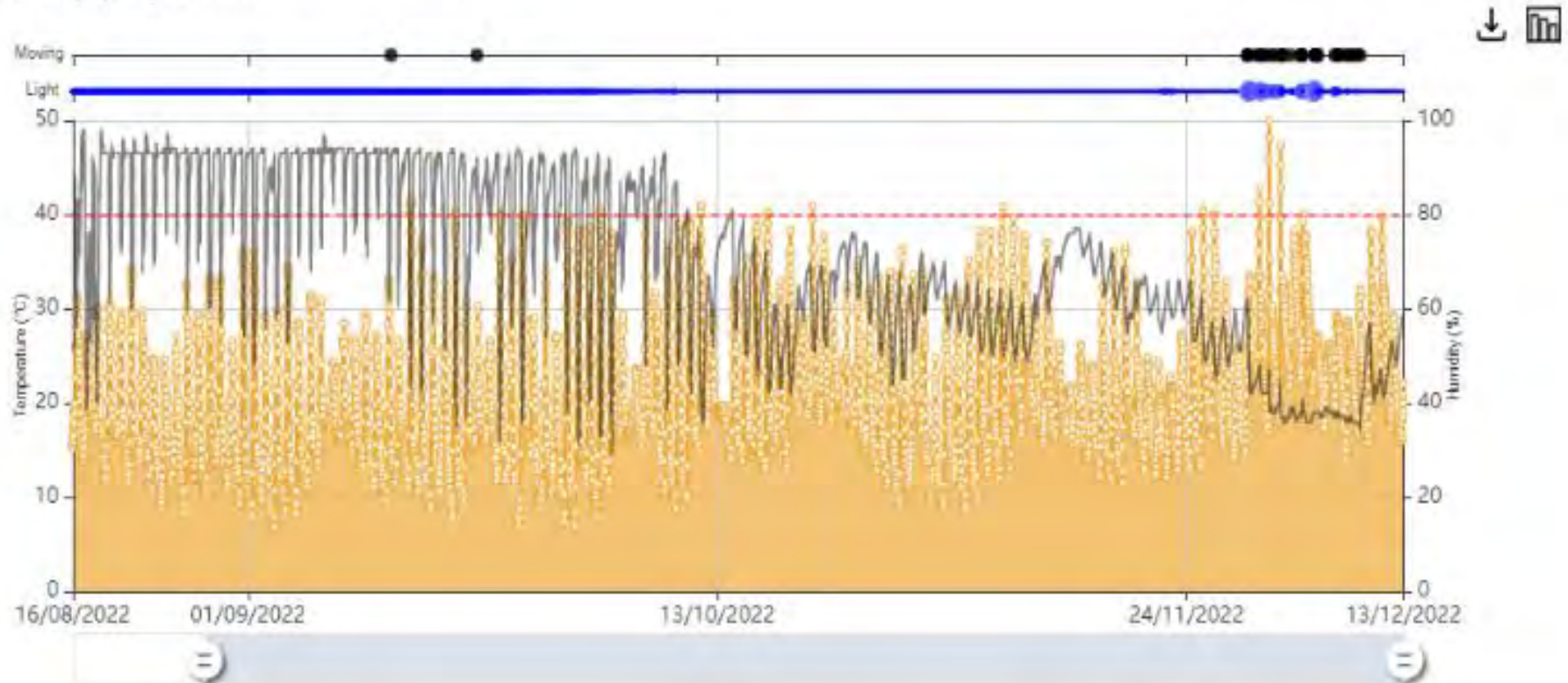
1. Insects/Mites
2. Fungi
3. Bacteria



Escavox trackers were the most reliable but it's a growing market

Track by leg for device 67510B37AE

Last updated 10:32 pm 13 Dec 2022



Riddle: Which insect DNA did we detect the most in our samples?



Diversity found in hives

Apart from bees...

Hive pests

e.g. greater wax moth, lesser wax moth, small hive beetles and general insect pathogens

Hive beneficials

e.g. parasitoids, fungi and bacteria linked to hive health

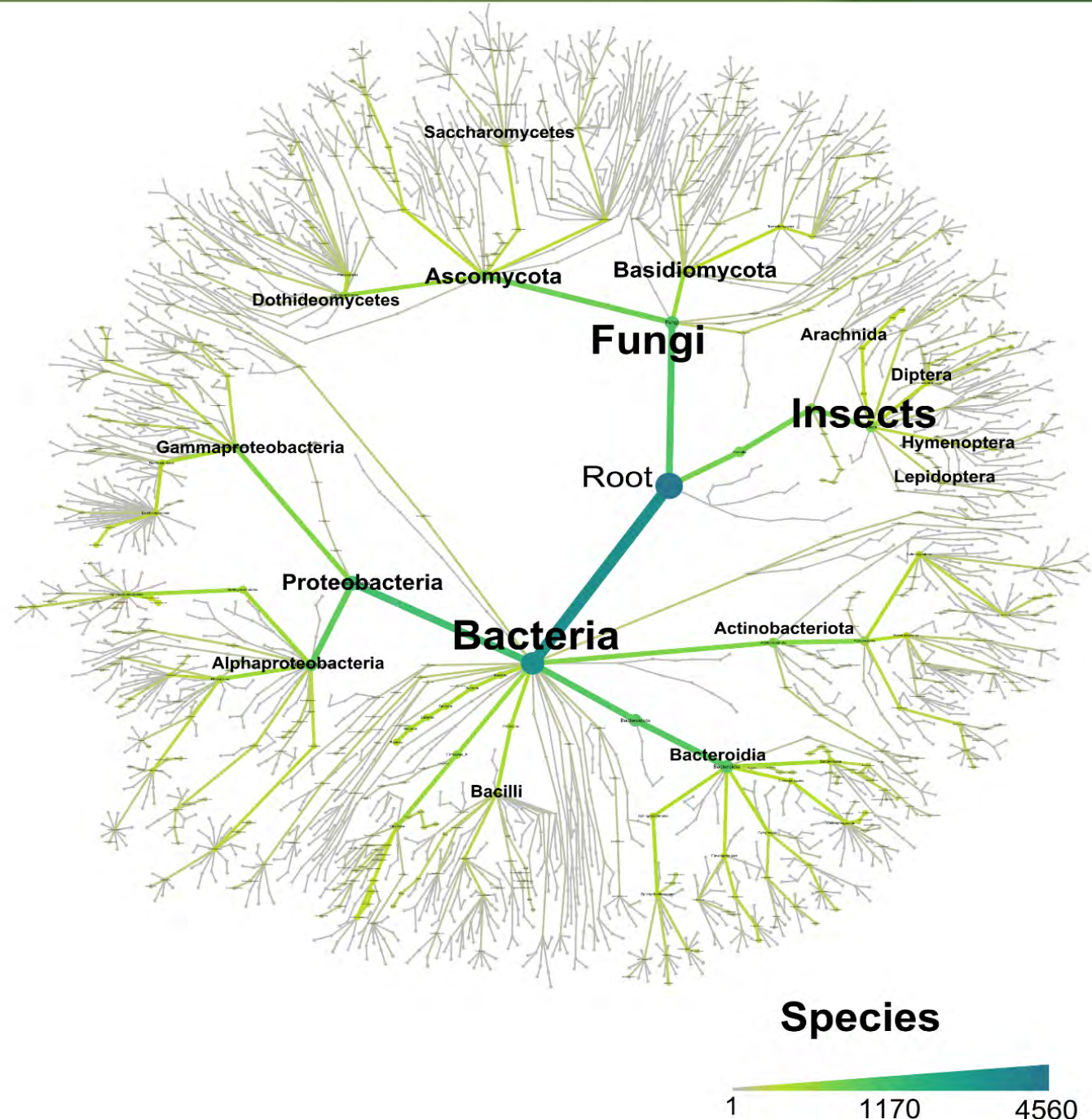
Agricultural pests

e.g. fruit flies, beetles and plant pathogens

Agricultural beneficials

e.g. biocontrol agents

Others: Native species and hive neutral species



We can monitor hives to provide a holistic view of hive health

What's next?

Method optimisation

- Placement of traceability devices
- Sampling methods
- Detection thresholds for key exotic pests

Data sharing between apiarists, growers and biosecurity agencies

Share data in a way that benefits and protects everyone

**Safeguarding our bees means
monitoring their health now**

Thank you

Apiarist:

Trevor Monson

Grower:

Jim (Hobby farm)

Agriculture Victoria Researchers:

Francesco Martoni

Reannon Smith

Alex Piper

Aimee McKinnon

All staff at the Irymple Smart Farm



Mallee Regional
Innovation Centre

Email: jessi.henneken@agriculture.vic.gov.au

