Learning and Teaching Showcase #8

Teaching innovation that leads to student engagement, retention and success.

November 7, 2018
The Bush Medicine Project: A cross-course, cross-campus, cross-discipline undergraduate research project

Ben Long
School of Health Life Sciences
Indigenous Medicine

• At least 50,000 years of Indigenous Australian culture
• Holistic in nature but many herbal remedies and concoctions
• Much of which is lost information or poorly documented
• Some Examples
  • Black Wattle – Dysentery
  • Coastal Ballart – Insect repellent
  • Old Man’s Beard – Pain relief

F. Cahir, I. Clark, P. Clarke, Aboriginal Bicultural Knowledge in South Eastern Australia, 2018, CSIRO publishing
One Modern Approach to Medicine

- Bioprospecting for new active compounds
- Natural product extraction, followed by testing

- 3rd year project students
- What about other undergraduate students?

Involving The Undergraduate Students

- Combine research and teaching
- Align existing practical classes across courses

- Enhance learning outcomes for students
- Aboriginal history and culture
- Research skills
- Interdisciplinary nature of research
- Engagement
# Project Outline

<table>
<thead>
<tr>
<th>Plant Selection</th>
<th>Collaboration with AEC and Literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant Collection and Identification</td>
<td>SCENV2100 Australian Flora</td>
</tr>
<tr>
<td>Chemical Extraction</td>
<td>SCCHM3004 Medicinal Chemistry</td>
</tr>
<tr>
<td>Biological Activity</td>
<td>SCCOR3001 Medicinal Chemistry</td>
</tr>
<tr>
<td>Targeted Analysis</td>
<td>SCCOR3001 Research Project</td>
</tr>
<tr>
<td></td>
<td>SCMIC3003 Clinical Microbiology</td>
</tr>
<tr>
<td></td>
<td>SCMED3010 Pharmacology and Toxicology</td>
</tr>
<tr>
<td></td>
<td>SCCOR3001 Research Project</td>
</tr>
<tr>
<td></td>
<td>Research Degrees</td>
</tr>
</tbody>
</table>
Teaching and Learning Outcomes I

- Student surveys
  - n=55 (60% Response rate)
  - 17 Likert questions plus qualitative feedback.
  - Around engagement, research and indigenous culture

- Student focus groups

- Interview staff
Selected Likert Questions

1. I found this to be **interesting** practical class

2. I took **more care** in this practical session because I knew the results were meaningful

3. I am **excited** to know how my sample performs beyond my contribution

4. I have learnt something new about **indigenous Australian culture**
What aspects of the Bush Medicine Project did you find most enjoyable and interesting?

- Learning about traditional uses of plants by indigenous Australians.
- The "real-ness" of it
- The importance of accurate data collection was emphasised so we knew what was expected of us.
- "I feel I'm attending a science project and feel excited"
Summary and where to from here?

• Successful first year
  • Some “Hits” to investigate further
  • Educational outcomes promising

• Next year+
  • Toxicology
  • Replication and expansion
  • Addition of more cultural content

20180022 + 25 tested against S. aureus
Acknowledgements

SHaLS Staff
Nicolas Shultz
Simone Louwhoff
David Bean
Andrew Greenhill
Lara Wakeling
Mark Myers
Scott Nankervis
Jenny Mosse
Sarah Preston
Winston Doherty

Additional FedUni Staff
Jasmine Graham (AEC)
Nina Fotinatos (CLIPP)
Ian Clark (FBS)
Fred Cahir (Arts)
Peggy Hsu (Library)
Clare Duffy (Library)

Technical Staff
Geoff Rodgers
Benjamin Webb
Sarah Bean

https://federation.edu.au/bush-medicine-project
Australian Flora

- Australian Flora student collected leaf material
  - Mt Helen, Churchill, Berwick, Online
  - Identified Plant Family, Genus, Species
  - Photographically Documented
  - Gathered GPS Data
  - Affixed Barcodes
  - 36 unique samples (30 Species)
Medicinal Chemistry

- Medicinal Chemistry students created extracts of leaf material
  - Methanol extraction and transfer into aqueous
  - Screened crude extracts against *M. Luteus*
  - HPLC Fingerprinting
  - Freeze dried aqueous extracts for quantification
Clinical Microbiology

- Clinical Microbiology
  - Redissolved known amounts of extracts
  - Screened extracts series of microorganisms
  - Disc diffusion assays

20180022 + 25 tested against S. aureus
Research Outcomes

- **Initial “Screening” Results**
- **Clinical Microbiology Results**
  - Green “Hit”
  - Grey “No Activity”
  - White “Not Tested”

<table>
<thead>
<tr>
<th></th>
<th>BMP20180006</th>
<th>BMP20180011</th>
<th>BMP20180012</th>
<th>BMP20180013</th>
<th>BMP20180021</th>
<th>BMP20180022</th>
<th>BMP20180025</th>
<th>BMP20180027</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. baumannii</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. subtilis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Candida albicans</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. coli ATCC 25922</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. faecalis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K. pneumoniae</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M. luteus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P. aeruginosa</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S. aureus ATCC 25923</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salmonella Typhimurium</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Wedge Leaf Hop Bush (Colds, sore throats and fevers)

Hop Goodenia (Sedative)

Rock Correa

Red Ironbark (anti-fungal, anti-septic)


van Welzen JLCH, *Plant Resources of South-East Asia: Medicinal and poisonous plants 2*, 2001, Backhuys Publishers, Leiden, the Netherlands
Questions, comments, suggestions