CAREER DEVELOPMENT FOR TAXONOMISTS –
typical skills necessary to build a career in taxonomy

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Let me hear your expectations about this talk.....What do you think I should touch on?
9 – 10 yrs apart ..... have something in common?
OVERVIEW

• The different contexts of Taxonomy & Taxonomists
• Where is the greatest need for Taxonomy skills - areas and numbers?
• What do Taxonomists do?
• What skills do Taxonomists require?
  • What does the career path (learning and work placement) of the Taxonomists look like?
• What are the issues that the emergent Taxonomists experience?
• Where do Taxonomists work (the network)?
THE CONTEXTS OF TAXONOMY –
Main roles of taxonomists:

- **Discovering** and **describing** species / other taxa (what have we got?), providing revisions
- **Classifying** / **organising species** into groupings based on evolutionary history (understanding of evolution – predictions, uniqueness)
- **Identification** of biological material and developing tools for this (for wide range of stakeholders)
- **Understanding the distribution** of species / other taxa (for Red List assessments, conservation, use, understanding impacts of climate and other changes)
Different approaches:

- **Morphology only** – what it looks like
- **Morphology and molecular analyses combined** – using DNA as an extra character to describe
- **Molecular approaches only**
  - *Fungi, bacteria* – where this is the only way to identify them
  - *Animals* – molecular specialist but without knowledge of morphological characters
  - *Genetic variation* within species / evolution (phylogeography)
Assessment of capacity in taxonomy (2012/13) – posts filled

• **Plants:** 19 SANBI, 16 universities, 9 citizen scientists, 5 technicians, 13 retired = **62**

• **Animals:** 13 retired (minimum activity), 7 retired but still active, 14 some activity but not main function, 65 at museums, universities, science councils = **99**

• **Fungi:** 20 (not all are dedicated to taxonomy)

• **Algae:** none full time, **9**

• **Bacteria:** **15** (not dedicated taxonomy)
How do we measure capacity in taxonomy? ....controversial!!

• **Main drive** — to name the Earth’s species before they go extinct (Castello et al., 2013a)
• Increased outputs? (Beber et al., 2014)
• The number of people actually doing the tasks
• The number authors in taxonomic publications ....Wheeler (2014) disagrees
WHERE IS THE GREATEST NEED?

Based on numbers of species and number of taxonomists, and needs identified in strategy:

- **Entomology** – especially beetles, moths, some of the smaller groups of insects
- **Marine invertebrates** – crustaceans, molluscs
- **Plants** – mesembs (vygies), Hyacinthaceae
- **Fungi** – indigenous ones in natural habitats, macrofungi
- **Bacteria** – indigenous habitats, soil
- **Algae** – marine (excl. seaweeds) and freshwater

**CHALLENGE:** WE TRAIN STUDENTS IN GROUPS WHERE THERE IS EXPERTISE – SO WE DON’T ADDRESS THE GAPS!
WHAT DO TAXONOMISTS DO?

• Field work to collect specimens (should be quantified sampling)
• Sorting, labelling, data capture of material collected and incorporation into collections
• Identification of material in collections using the literature / other tools
• Describing new species and re-describing those that need additional information, illustrating characters using drawing, photography
• DNA analysis – extraction of DNA, sequencing, comparison with global repositories of sequence data to match or identify new sequences

• Analyses to look at relationships

• Extracting data from collection, data checking & cleaning

• Mapping and interpretation of distribution maps

• Writing papers
SKILLS NEEDED BY TAXONOMISTS

- Ability to dissect specimens
- Drawing, photography, microscopy
- Laboratory techniques – DNA work
- Data capture, management and manipulation
- Interpreting DNA sequence/molecular data and using repositories
- Scientific writing
- Literature searches, use of existing literature
SUMMING IT UP

OVERARCHING SKILL - Doing all meticulously
ATTRIBUTES

• Attention to detail
• Patience and perseverance
• Powers of observation
• Organised
• Real desire to be a taxonomist
CAREER PATH FOR TAXONOMISTS

• **Level 1**: MSc completed & working on PhD; work mostly under supervision

• **Level 2**: PhD completed, work with some guidance/ mentorship, but able to write papers independently

• **Level 3**: Raise own funding for research projects and conferences, designs and develop own projects, present research nationally / internationally at conferences, may collaborate with other specialists on large papers; may supervise Honours and MSc students, *Y-rated*. 
• **Level 4:** Supervise PhD students, develop and lead implementation of large projects, raise funds for team projects, recognised as a leader in own field, publishes books on speciality; **C-rated**

• **Level 5:** Supervise postdocs, young scientists and lead large teams, provide national / international leadership for taxonomy more broadly than own field or recognised globally as an expert; **B-rated**
SOME POINTS ABOUT DEVELOPING A CAREER

- Understand the milestones and achievements that are needed to build a career and work on these.

- **Mentorship VERY NB.** – not necessarily within-institution and not necessarily a supervisor.

- Look for opportunities to gain skills, to collaborate and be part of bigger projects with experienced researchers.
- Look at how your research contributes to the country or your institution or to the development of others (avoid only focussing on your own agenda)
- **Scientists must publish** – practice, get input and comments from others and have the confidence and courage to submit to a journal
- Take criticism – reflect on it and take it in a positive way.
WHERE DO TAXONOMISTS WORK?

• Universities - academics, curators & researchers
• Research institutes - museums, herbaria, science councils etc.
• Government agencies - public health, agriculture, wildlife management and forestry
• Environmental Impact Assessment companies that do biodiversity surveys
• Private industries - pharmaceutical companies, commercial suppliers of plants and animals, agricultural processors,
• Botanical gardens
GOOD OLD DAYS!!!

#taxonomy

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