



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 aparthave 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.**

...cont.

- **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

...cont.

- 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