The Nullarbor Project

Using the Swat Team Concept to Address Collections Backlogs

before after

William F. Simpson
Field Museum of Natural History

The Nullarbor Project

William D. Turnbull 1922 – 2011
Curator of Fossil Mammals
Field Museum of Natural History

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Catching up with Bill Turnbull!

- **Washakie Basin; Eocene Collections**
  - 1948 to 1993
  - Angielczyk & Simpson: $500,000
    NSF grant to process Washakie backlog

- **Nullarbor Plain Caves Collections**
  - 1955, 1963/1964

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Ernie Lundelius, University of Texas	1955: Fulbright Fellowship
Bill Turnbull & Ernie Lundelius	1963 & 1964: Joint FMNH/U. Texas Paleontological Expedition to Southern Australia

Nullarbor means "no trees"!

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The 13 fossiliferous caves of the Nullarbor Plain:
only 8,000 specimens had been processed and catalogued

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Only the Madura Cave fauna was studied and published

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From 1973 through 1989:
8 papers were published by Bill & Ernie on Madura Cave fossils

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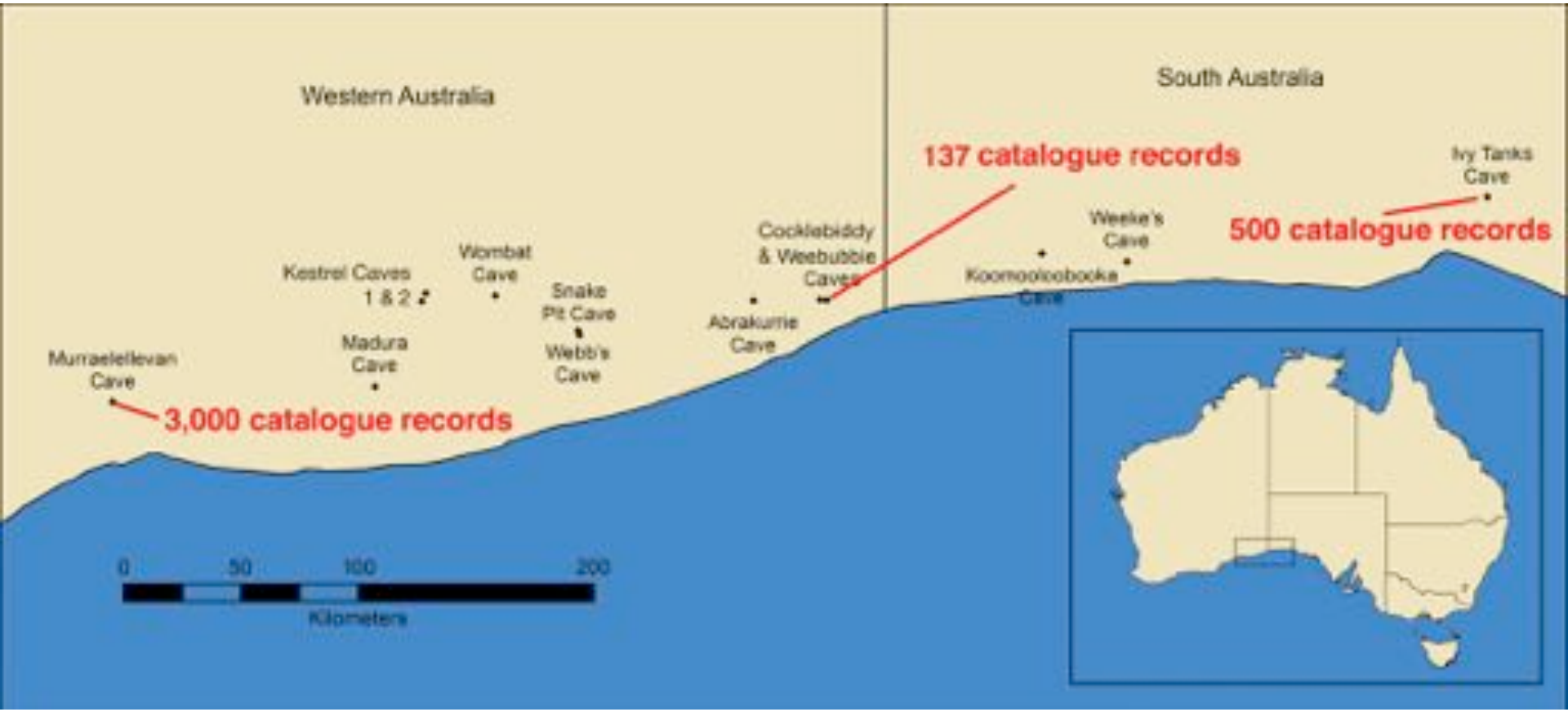

Only three of the other caves had many specimens processed & catalogued

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The rest of the collection was unprocessed and consisted of trays of thousands of isolated bones

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The deposits are mostly derived from owl pellets

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Notomys mitchelli
"Mitchell's hopping mouse"

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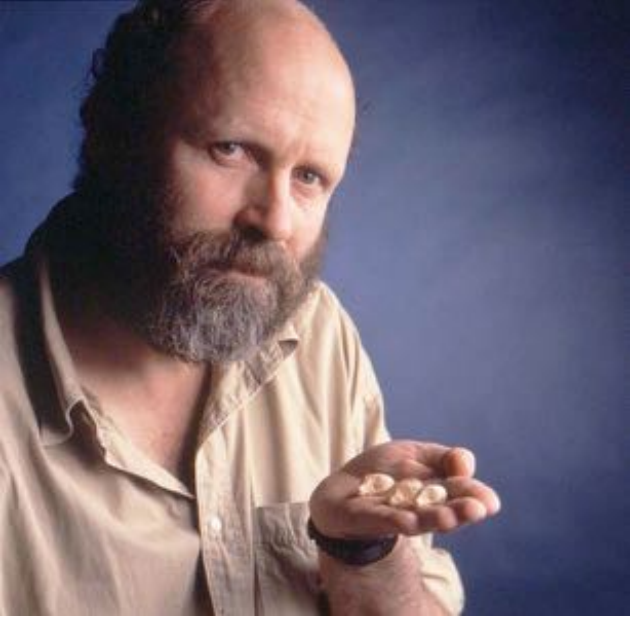
Over time, they fall apart into many individual bones



Bill Stanley 1957 – 2015
Director of Collections,
Collections Manager, Extant Mammals
Field Museum of Natural History

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Bill Stanley's Swat Team Concept:

- For backlogs involving specimens for which we do not have expertise in house.

- Two parts:

1. Find an expert to come spend some time with us, IDing our specimens

2. Assemble a team of interns or collections assistants to process the newly catalogued specimens

Nullarbor Solution: Swat Team Project!

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Step 1:
our expert!

Dr. Matthew McDowell, Flinders University

- Endeavour Fellowship from the Australian Government
- Augmented with some funding from Bass Fellowship, Field Museum
- 6 month stay at Field Museum

Mariah Green,
REU intern, Northeastern Illinois U.

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Nicole Karpus, recent grad of U. Illinois, Chicago
photographic collections assistant

Step 2:
Our collections team!

Natalie Kieruzel,
summer intern from U. of Chicago

Robert North,
summer intern from Northeastern Illinois U.

Elena Peterman,
summer intern from U. of Chicago

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- Matt arrived in early May,
  - began familiarizing himself with the Nullarbor collection
  - started identifying tooth-bearing Specimens
  - Began sorting and building up an inventory of identified specimens to be processed by the interns

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- 4 interns and photographic assistant began in mid-June
    - Matt trained them to sort specimens
    - I taught them to process specimens
        - enter data into database
        - write numbers on bones or gelcaps
        - print out labels
        - house in gelcaps, plastic vials, ethafoamed trays

- cataloguing is done in 4D database
- then imported into KE EMu at end of project

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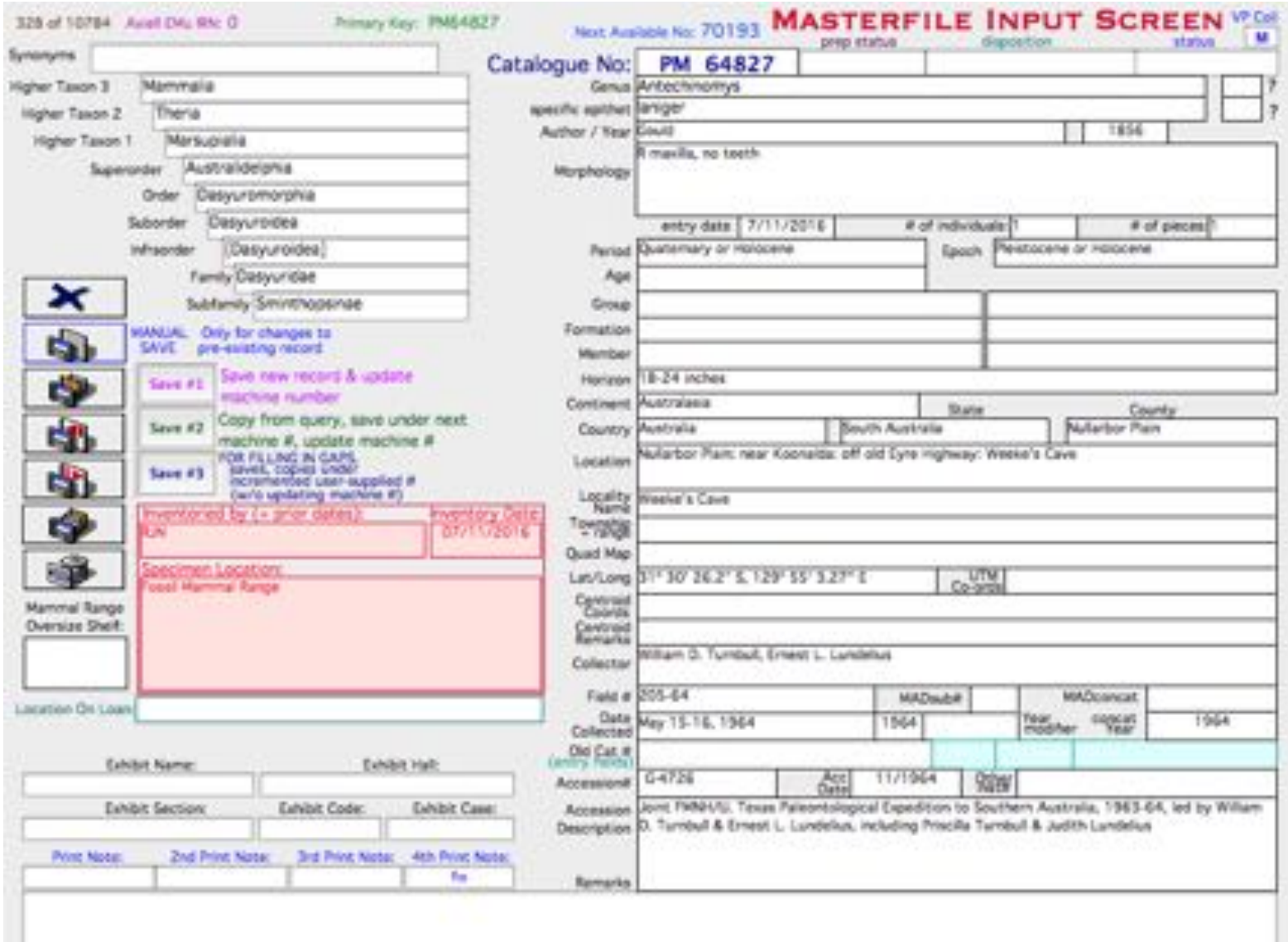

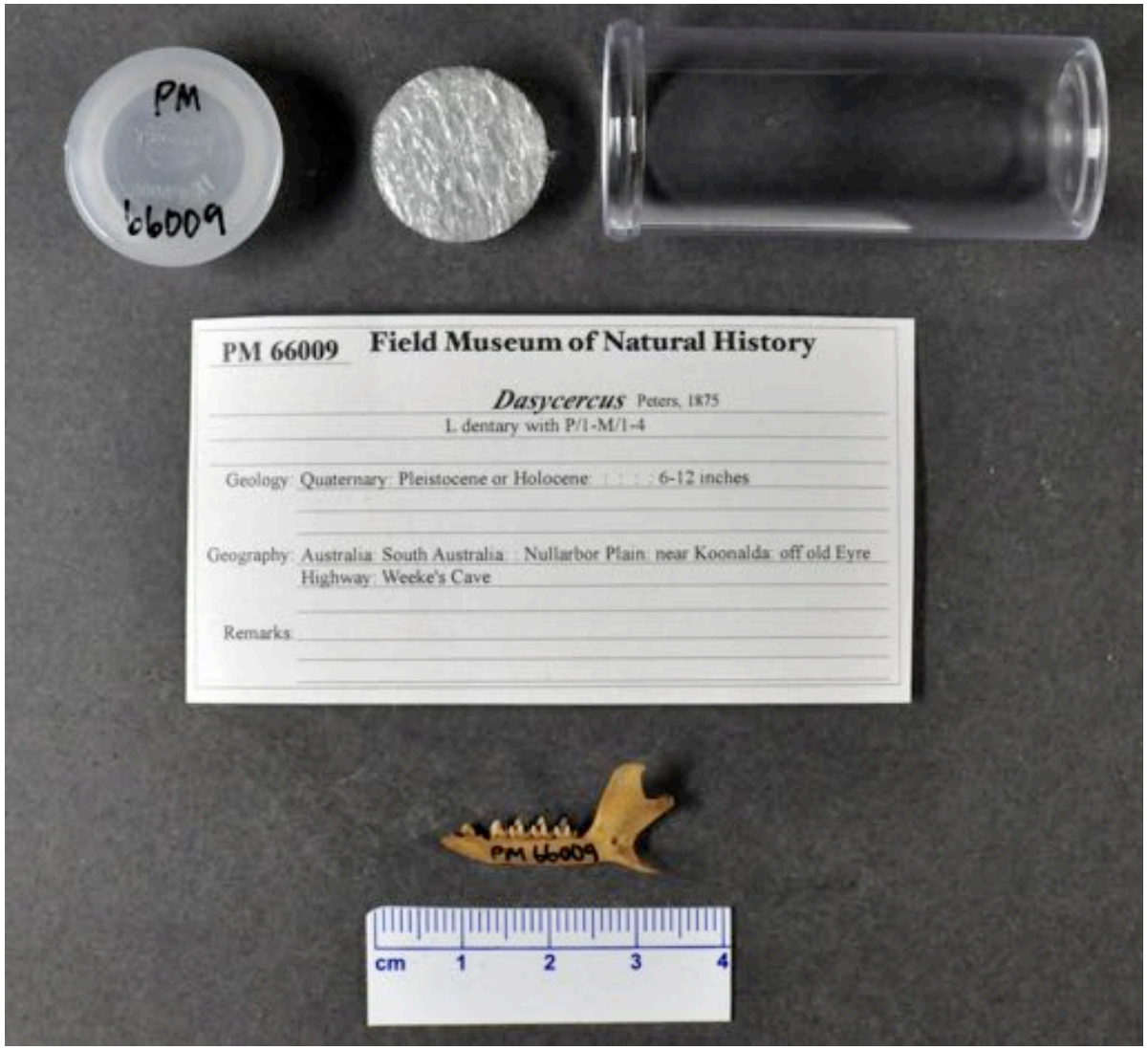

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Most specimens were housed in plastic vials with ethafoam liners

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Many specimens were too small to write on, and were put in gelcaps which received the catalogue numbers

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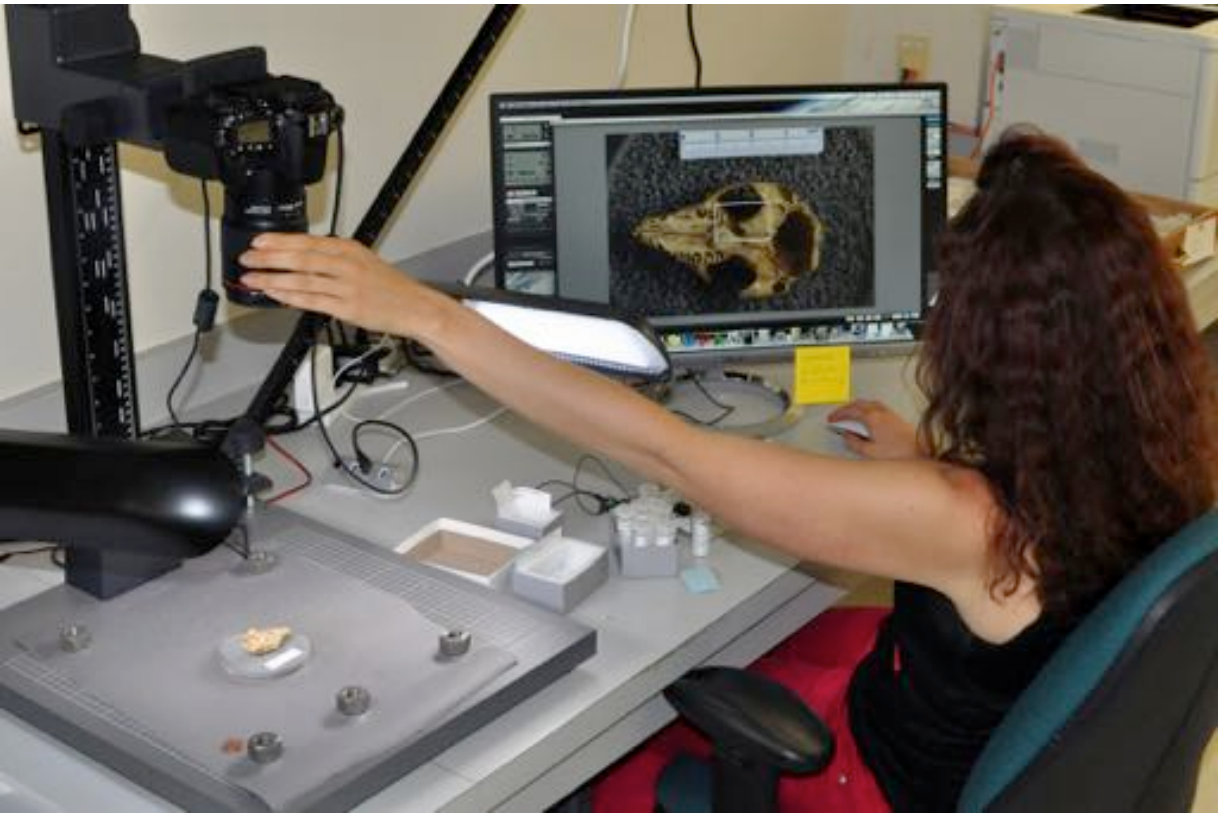

- Canon EOS 70D camera

- Canon EF 100mm macro lens [f/2.8L Macro IS USM]

- Canon EOS Utility software running on a Mac, & displayed on a 28” monitor

- Kaiser 36” camera stand [RS 1]

- Kaiser dimmable LED lights [RB 5070 DX]

- Nicole set up the photographic work station, taught everyone the most efficient work flow.
- Everyone got to spend a few days taking photographs

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- Canon EF 100mm macro lens [f/2.8L Macro IS USM]

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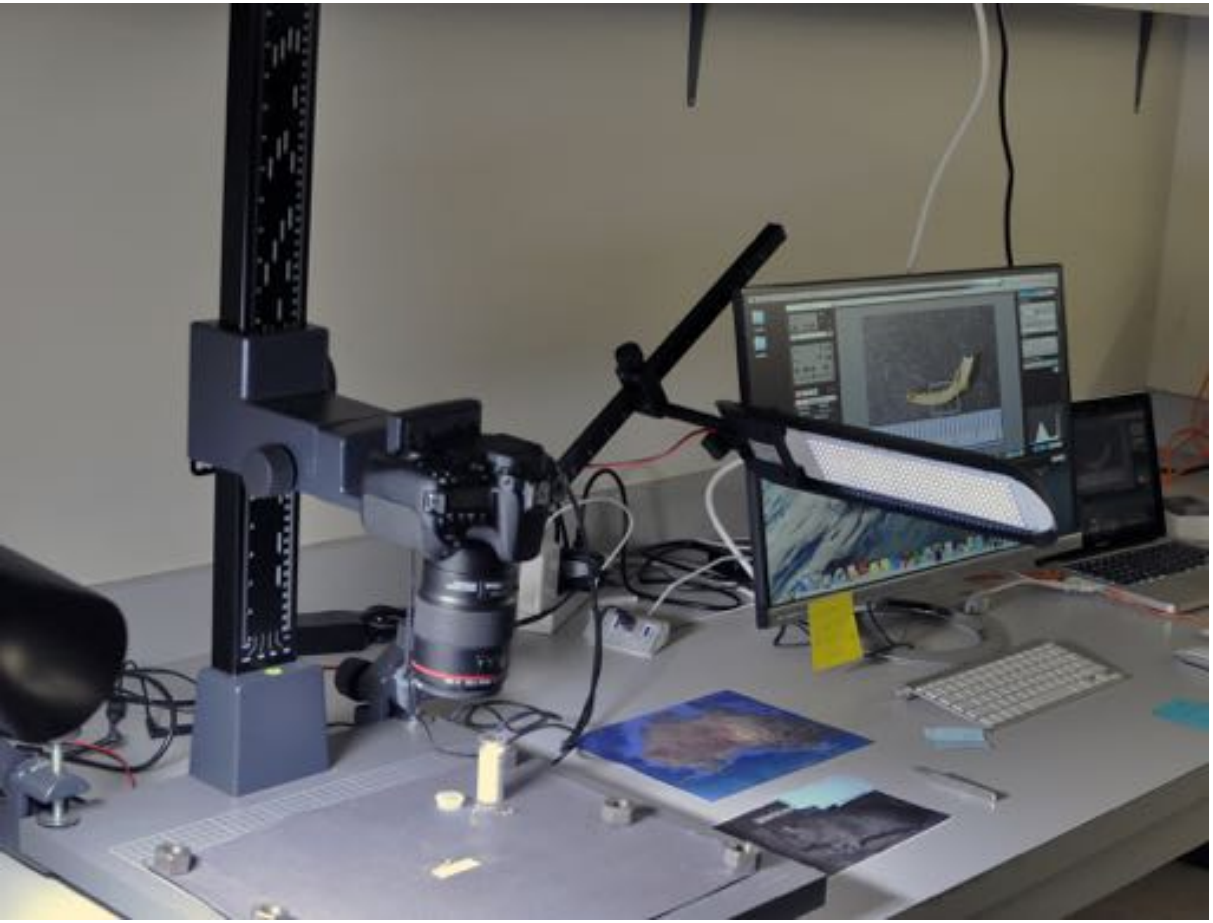
- We selected a Canon camera system that others at the museum had used successfully
- The 100mm macro lens gives 1 to 1 close up capability



The Nullarbor Project

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- **Kaiser dimmable LED lights [RB 5070 DX]**

- LED lights were great; cool, and dimmable

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lower jaws (dentaries) got three shots:

labial

lingual

occlusal

Each specimen got multiple photographs, depending on the element

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upper jaws (maxillae) get two shots:

labial

occlusal

Each specimen got multiple photographs, depending on the element

Skulls got six shots:

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left lateral

posterior

dorsal

right lateral

anterior

ventral (occlusal)

Each specimen got multiple photographs, depending on the element

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Some specimens were catalogued and photographed as a lot:

36 edentulous (no teeth!) maxillae

Drawers of Finished Collections!

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Specimen processing results:

- This project was to serve as a test case, a pilot project for use later by Ken and me in producing a larger grant proposal.

- Ken Angielczyk and I had hoped the summer phase of the project might:
  - create 3,000 – 5,000 new specimen records
  - create photographs for maybe half of these

BUT!

- By the end of the summer:
  - 11,098 new specimen records!
  - nearly 6,000 specimens photographed (more counting lots!)

- Nicole came back for a second stint to continue photographing specimens and finished all 11,098 in about six months
- She is now formatting the 34,000 photographs for inclusion in KE EMu

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Photo Formatting for KE EMu:

- Originally each shot was saved as a raw image (CR2) and a JPEG.
- Since we started, IT has settled on a DNG format.
- Nicole is using Adobe Lightroom to format the photos:
  - Each CR2 is saved as a TIFF (to standardize different camera raw formats)
  - Then, each TIFF is used to produce a DNG and also a JPEG (for a preview)

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So What? Why is this collection worth all this effort?

This collection documents the pre-European ecosystem of the Nullarbor.

- some taxa driven to extinction
- many still present, but now live in marginal habitats, far from their original range
- this collections provides land managers with a target for restoring the small mammal component of this fractured and fragmented ecosystem

Additional research outcomes Matt McDowell is working on with these faunas:

- small mammals appear less influenced by aridity than large mammals
- evidence of climate-driven faunal change

Latest: we have sent 36 specimens out for carbon-14 dating to get a better handle on the age of these deposits

Acknowledgements

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The Nullarbor Project Team

Post-doc: Matt McDowell

Interns: Mariah Green
Natalie Kieruzel
Robert North
Elena Peterman

Photographic Assistant: Nicole Karpus

- Bill Stanley
- Financial support:
  - The Negaunee Foundation
  - Endeavour Foundation of Australia
  - Field Museum Bass Fellowship Fund
- Ken Angielczyk
- Paul Mayer and Crystal Maier

UCMP iDigBio Integrated Digitized Biocollections

Gil Nelson & his team
Jillian Goodwin
Erica Clites
Pat Holroyd
Talia Karim

Postcript: Specimens!

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The Nullarbor Project was featured as the concluded section of a new Field Museum exhibit called:

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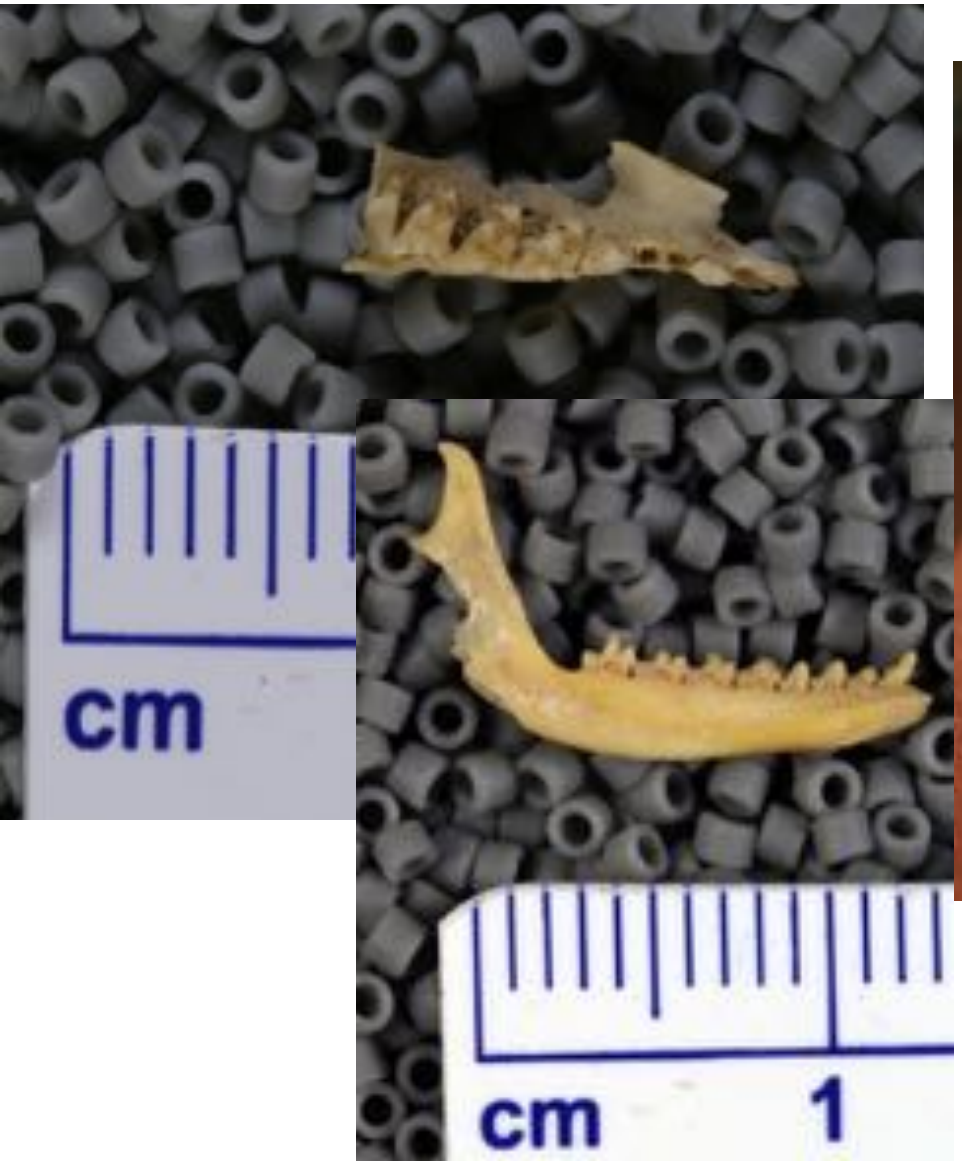
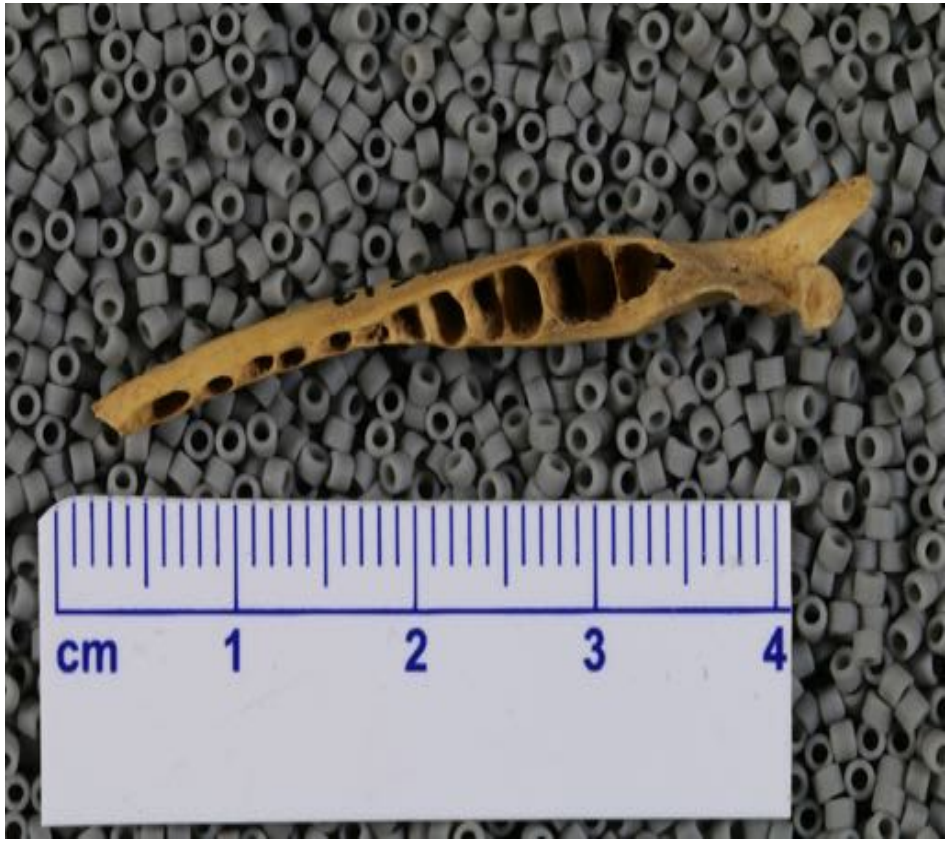
Antechinomys laniger – Kultarr



Dasycercus sp. – Mulgara

Perameles bougainville – Western barred bandicoot

Macrotis lagotis – Greater bilby



Trichosurus Vulpecula – Brush tailed possum

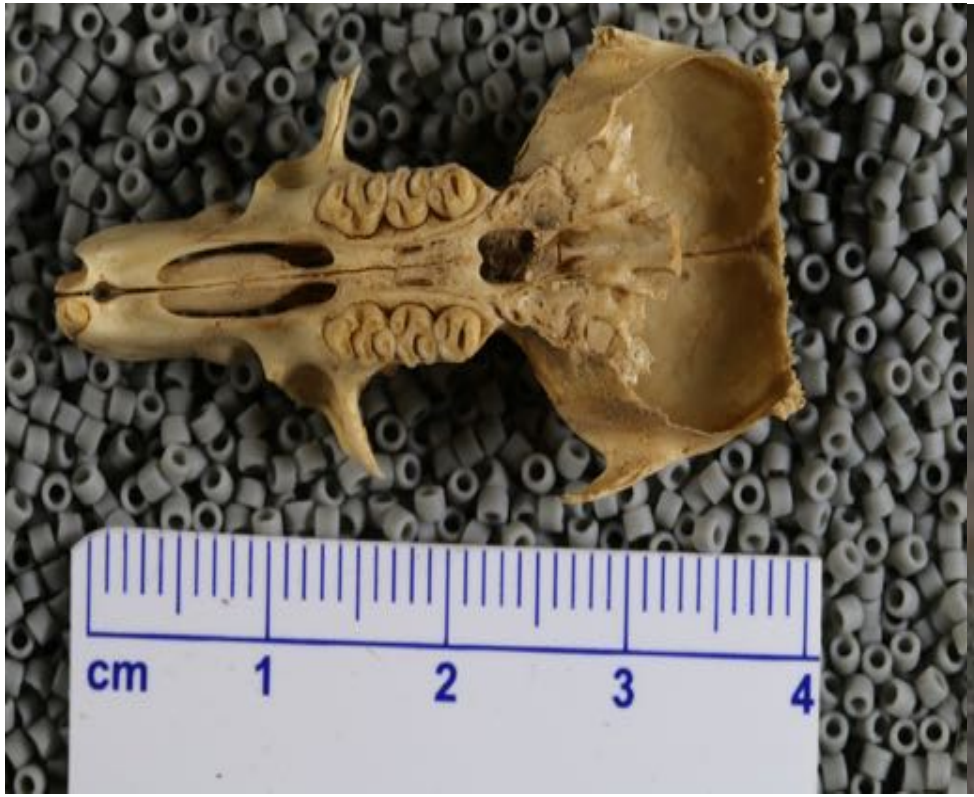
Cercartetus concinnus – Western pygmy-possum

Bettongia lusueur – Burrowing bettong

Onychogalea lunata – Crescent nail-tailed wallaby

Macropus fuliginous – Western grey kangaroo

Leporillus conditor – Stick nest rat



Notomys mitchellii – Mitchell's hopping mouse

Pseudomys bolami - Bolam's Mouse

Pseudomys australis – Plains mouse