The Cretaceous World - TCN
Cretaceous World – TCN: Participants and Institutions

*University of Kansas* – Bruce S. Lieberman, Julien Kimmig, Chris Beard & Jim Beach

*Paleontological Research Institution* – Jonathan Hendricks

*American Museum of Natural History* – Neil Landman & Ruth O’Leary

*University of Texas* – Ann Molineux, Rowan Martindale, Lisa Boucher & Matt Brown
Cretaceous World – TCN: Participants and Institutions, cont.

Yale University Peabody Museum of Natural History – Susan Butts & Chris Norris

University of Colorado – Talia Karim

South Dakota School of Mines & Technology – Laurie Anderson & Maribeth Price

University of New Mexico – Corinne Myers

Sternberg Museum / Fort Hays State University – Laura Wilson

And PEN at University of Oklahoma – Steve Westrop & Roger Burkhalter
Cretaceous World – TCN: Data

> 175,000 specimens databased

> 12,250 fossil localities georeferenced

> 8,250 images of fossil specimens

Data shared/published via iDigBio and institutional websites
Cretaceous World – TCN: Research
Focus on GIS and ecological niche modeling

Present Day  ~87Ma

Cretaceous World – TCN: Outreach

Digital Atlas of Ancient Life
Guide to Ordovician, Pennsylvanian, and Neogene fossils

www.digitalatlasofancientlife.org

@PaleoDigAtlas

Digital Atlas App
Free for iPhone/iPad

Hendricks, Stigall, and Lieberman. 2015. *Palaeontologia Electronica*
Welcome to the Cretaceous Atlas!

A digital field guide to the ancient life of the Western Interior Seaway, which divided North America in half during the age of dinosaurs.

Identify the fossils left behind. Learn where they were found. Discover how they once lived.
Cretaceous World – TCN: Outreach, cont.

Cretaceous Atlas of Ancient Life Website:
www.cretaceousatlas.org

More than 225 species represented with information and images, maps to come soon
Cretaceous World – TCN: Outreach, cont.

Digital Encyclopedia of Ancient Life: www.digitalatlasofancientlife.org/learn

Open Access textbook on History of Life
Chapters on “Geological Time”; “Evolution”; “Systematics”; and more
Contributions to museum exhibits
Creating collections for K-12 classrooms
Outreach to K-12 students
Undergraduate and graduate student training
Digital Atlas of Ancient Life
Electronic Field Guide

Explore taxonomic information, images and maps for three Paleontological time periods.

START
BROWSE
TIME PERIOD
Ordovician
Pennsylvanian
Neogene
Digital Atlas of Ancient Life App

Derived from *Digital Atlas of Ancient Life* website
Works on *iPad* and *iPhone*
Available for free at *Apple App Store*
Programmers Rod and Zach Spears
> 7,900 downloads and > 4,300 active users
The Paleoniches - TCN

Ordovician
Cincinnati Region

Pennsylvanian
Midcontinent U.S.

Neogene
Southeastern U.S.


Paleoniches – TCN: Data

> 1,000,000 specimens databased

> 14,000 fossil localities georeferenced

> 1,250 fossil species imaged

Data shared/published via iDigBio and institutional websites
Paleoniches – TCN: Research

Scientific publications in various journals including:

- *Global Ecology and Biogeography,*
- *Proceedings of the Royal Society Series B,*
- *Journal of Biogeography,* and *Paleobiology*

Used GIS, Ecological Niche Modeling and analysis of physiology to study macroevolutionary effects of climate change
Nitrogen

Diatom Phytoplankton

\[ p(x) = e^{(\lambda_1 x_1 + \ldots + \lambda_n x_n)} \]

SSS

Nitrogen

Diatom Phytoplankton
Metabolic rates, climate and macroevolution: a case study using Neogene molluscs

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1. Introduction

Metabolic rate is defined as the rate of energy uptake, transformation and allocation for an individual organism [1], and plays a fundamental role in resource use and rates of senescence [3–5]. Notably, population dynamics [6], geographical patterns in species richness [7] and community dynamics [8] are all related to body size and temperature, the primary determinants of metabolic rate for poikilotherms. There is also an association between metabolic rate and latitudinal diversity gradients, and perhaps between metabolism and rates of speciation [1,7,9]. These examples provide a clear connection as to how ecological processes operating at the organismic level scale up to higher level patterns, a hypothesis previously investigated in a variety of modern [1,7,10,11] and fossil ecosystems [12,13].

Here, we explore the relationship between metabolic rate and extinction to try to further consider the connection between organismic ecology and macroevolutionary dynamics [15–18]. An metabolic rate is a primary control for traits important for identifying extinction likelihood [19] and with maximum lifespan shown to scale with body size and temperature [4,20,21]. We propose metabolic
Hendricks, Stigall, and Lieberman. 2015. *Palaeontologia Electronica*
Survival of the Sluggish

Paleoniches – TCN: Research

Species containing organisms with higher physiologies more likely to go extinct

Total energy used by mollusk assemblages constant
Paleoniches – TCN: Outreach

*Digital Atlas of Ancient Life Website:*
[www.digitalatlasofancientlife.org](http://www.digitalatlasofancientlife.org)

More than 1,000 species represented with information, images, and maps

> 1,700,000 hits
Digital Atlas of Ancient Life
Electronic Field Guide

Explore taxonomic information, images and maps for three Paleontological time periods.

START
BROWSE
TIME PERIOD
Ordovician
Pennsylvanian
Neogene
Architectonica nobilis
Roding, 1798

Class: Gastropoda
Order: Heterobranchia
Family: Architectonicidae
Genus: Architectonica
Species: Architectonica nobilis
Conclusions

Digitizing museum collections provides insights into macroevolution and biogeography.
Conclusions, cont.

Approach digitization of fossils same way as digitization of extant taxa
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