Strengthening Paleontology
The German hub for global cooperation

This innovative project is funded by the Volkswagen Foundation and supported by the Friedrich-Alexander University

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About...

Over the last few decades, Paleontology has been transforming from a largely descriptive subject to a predictive science with potential to elucidate global change impacts and evolutionary laws. Novel research directions, an increasingly quantitative approach and new techniques offer many opportunities for Paleontology.

This longterm project funded by the Volkswagen Foundation will strengthen Paleontology structurally; it will reduce weaknesses; and it will build on the opportunities provided by the low number of actors in a rare subject.

We aim to **strengthen** paleontology

We envision a community connected by tight **personal bonds**

We work to improve **networking** and **knowledge exchange**

We are building a long-term research vision for **scientific cooperation**

PaleoSynthesis is an initiative for all paleontologists and interested researchers

Team & Contact

PostDoc & scientific contact: Dr Elizabeth Dowding[1]
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Scientific workshops

In our opinion, the best way to motivate structural changes and enhance personal networks in Paleontology is to engage the paleontological community in joint scientific projects and workshops to develop ideas.

Implementation Science workshops will be held at the FAU in the newly established educational center. An open call for proposals will be announced every year. The scientific advisory board will select the most promising workshop topics based on scientific and societal impact and the potential to overcome structural problems of the field.

Workshops - First Series

In the first series three workshops are supported by PaleoSynthesis.

BioDeepTIME

Pincelli Hull (Yale), Marina Costa Rillo (ICBM Oldenburg) & Seth Finnegan (UC Berkeley) **Motivation:** „In a rapidly changing world, there is an urgent need to understand how communities respond to environmental perturbations of varying magnitudes & rates". **Approach:** Examine turnover of communities (from Modern to millions of years back in time) in response to climate changes, including the current climate crisis (i.e., global warming and biotic change). **Goal:** "Identify those climate change scenarios where community turnover scales in step, catastrophically shifts catastrophically shifts, or remains relatively stable."

Diversity Dynamics & Crisis in Paleontology

Nussaibah Raja-Schoob (FAU) & Emma Dunne (Univ. Birmingham) **Motivation:** „Considering the global challenges of climate change and current diversity crisis, and the perspective palaeobiology can contribute to tackling these challenges, our field cannot afford exclusion of or mistrust by any group". **Approach:** Bring together paleontologists from various cultural, racial, socio-economic and research backgrounds in collaboration with JEDI specialists. **Goals:** 1) Identify and quantify the nature and scale of the diversity crisis in paleontology and how it affects research output, 2) evaluate the current state of paleontology in order to be able to dismantle identified barriers to resources and opportunities.

PaleoNovelty

Tim Staples & John Pandolfi (Univ. of Queensland, Australia) **Motivation:** Paleontological research is critical to understand the extent and drivers of ecological novelty, being able to place modern patterns in a deep-time context. **Approach:** Examine strengths and weaknesses of past uses of the term „novelty" in ecology and paleoecology as a team of interdisciplinary researchers. **Goal:** Develop a standardized definition and measure of novelty for application across scales and disciplines.

NEW Workshops - Second Series

Both new workshops will be on database management. The benefit of funding both - BITE and IRAL - is that they can operate in synergy and also will build on BioDeepTime.

Biotic Interactions in Deep Time (BITE)

Devapriya Chattopadhyay (IISER Pune, Department of Earth and Climate Science) and Aleksandra Skawina (University of Warsaw) **Motivation:** „Biotic interaction plays an important role in the evolution of groups through time." **Approach:** A collaborative initiative to develop a standardized database is needed as it will allow researchers to quantitatively evaluate the relive role of abiotic and biotic drivers of evolution through time. It will also contribute to conservation efforts by predicting future changes in biotic interactions in relationship with diversity and climatic fluctuations. **Goals:** The primary objective of the planned workshops is to develop a standardized way to report ancient biotic interactions.

Integrated Record of Ancient Life (IRAL)

Ádám Kocsis (FAU) and Emma Dunne (FAU) **Motivation:** „Compilations of fossil data are fundamental to modern paleon tology." **Approach:** Multiple databases exist, each focusing on specific domains of paleontological research. Unifying the data service in a single, Big Data framework can open new dimensions of paleontological research and more equitable global cooperation. **Goals:** The proposed workshops are intended to pave the pathway to a new, globally integrated infrastructure for paleontological data. Such a new 'data lake' can transcend the previous design choices, allow a wider spectrum of data registration, while allowing the integration, access and curation of previously accumulated data for the next 25+ years.

Work Package

✓ Formation of an 8-member **scientific advisory board** nominated by the entire scientific community in Germany.

✓ Regular **scientific workshops** for the identification of a research agenda for paleontology in Germany, with initiation and implementation of cooperative, international projects.

✓ Organization of **science schools** for PhD students and experienced scientists for the introduction of new quantitative methods including data analysis in paleontology.

✓ Development of the **interactive app** „FossilDiscovery" together with the Pattern Recognition Lab (FAU, Erlangen-Nuremberg).

Science Schools

- Annual science schools based on previous Analytical Paleobiology Workshops
- Focus on data analysis and subject-specific quantitative methods.
- Courses are run by local staff and national / international experts on particular topics.
- Applications reviewed by experts to decide on the participants regarding career potential, course readiness, access to relevant training resources at their home institution, potential to improve practical programming skills, and inclusiveness.

Big Questions

Goal: Develop a community-based vision to guid research in paleontology in the years ahead. **Approach:** (1) paleontologists from around the world were invited to submit their Big Questions, and (2) to participate in the working groups. **Current state:** More than 170 paleontologists (from several dozen countries and the full range of career level) are participating in 12 working groups to refine the >500 submitted Big Questions to transform them into a manuscript.

Fossil Discovery

- FossilDiscovery is based on and combining the advantages of both Rockd and FossilFinder.
- FossilDiscovery will allow users to upload fossils and data to get identification by volunteering experts.
- Improvements are in collaboration with the FAU's Pattern Recognition Lab to gradually move to automated identification of fossil specimens.
- Implementation of a reward-based system of expertise to increase the fun.
- FossilDiscovery will use verified data to allow the study of (regional) biodiversity patterns.
- FossilDiscovery will be available for Android and iOS

✓ **FossilDiscovery will be true citizen science and will create a network of amateur and professional paleontologists.**

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