



What is your BIG Question in Paleontology?

The goal of the Big Questions project is to develop a community-based vision to guide research in paleontology in the years ahead. To accomplish this goal, paleontologists from around the world were invited to submit their Big Questions and to participate in the working groups that will further develop and refine those questions.

Presently, there are 12 working groups (e.g., fundamental issues, climate change, biodiversity drivers,...) and approximately 170 paleontologists participating in the project. The paleontologists come from several dozen countries and include the full range of career level, from students to emeriti.

Scan the QR code for more information!



The webpage is in English, but translations into Spanish, French and Chinese are available for most important information.

FossilDiscovery

The application is developed from two already existing apps combining the advantages of both Rockd and FossilFinder. It will allow users to upload fossils and their data (e.g., GPS-data, measurements, preservation) and get identification by volunteering experts. Improvements will be in collaboration with the FAU's Pattern Recognition Lab to gradually move to automated identification of fossil specimens.



Amateurs will enjoy fossil identification as FossilDiscovery will have an implementation of a reward-based system of expertise. The app will also allow the professional scientific community to use verified data to study (regional) biodiversity patterns – thus, FossilDiscovery will be true citizen science and will create a network of amateur and professional paleontologists.

Science schools

Based on previous Analytical Paleobiology Workshops (APW) and regarding new developments, we will hold annual science schools within the new edu-



cational center. The science schools will focus on data analysis and subject-specific quantitative methods. Training content with many hands-on exercises will be defined and continuously updated in interaction between lecturers and attendants. The courses will be run by local staff as well as national and international experts on particular topics.

Application will be online on our website and reviewers, who will rate applications in a standardized fashion, will evaluate each application 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.

Meet our team

PI's Professor Wolfgang Kiessling (FAU, Erlangen)

Professor Manuel Steinbauer (University of Bayreuth)



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PaleoSynthesis Project



Synthesis Center



Strengthening Paleontology The German seed for global cooperation

Over the last few decades, Paleontology has been transforming from a largely descriptive subject to a predictive science with underestimated 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 innovative project is funded by the Volkswagen Foundation and supported by the Friedrich-Alexander-University Erlangen-Nuremberg, and it invites all Paleontologists to cooperate. The PI's are Prof. W. Kiessling (FAU) and Prof. M. Steinbauer (University of Bayreuth).

About...

Paleontology is a small subject at universities. In Germany, there are fewer than 50 professorships scattered across different locations. The fragmentation makes it difficult to develop common visions and research priorities.

The initiative of the Volkswagen Foundation for the structural strengthening of "small subjects" focuses on this issue and promotes innovative ideas.

The paleontology of the FAU has prevailed with its concept against numerous applicants in the competition. This long-term project will **strengthen** Paleontology structurally, reduce weaknesses, and build on the opportunities provided by the low number of actors in a rare subject.

At the Paleosynthesis Center we want to **develop** visions and strategies **together**.

work package

- 1) Formation of an 8-member scientific advisory board nominated by the scientific community in Germany;
- 2) Regular scientific workshops for the identification of a research agenda for paleontology in Germany, with the initiation and implementation of cooperative, international projects;
- 3) Organization of **science schools** for PhD students and experienced scientists for the introduction of new quantitative methods including data analysis in paleontology;
- 4) The **interactive app** „FossilDiscovery“: developed together with the Pattern Recognition Lab in Nürnberg-Erlangen; with the help of this app interested lay researchers can identify their own fossil finds and at the same time contribute their findings to the scientific community.

Scientific workshops

The best way to motivate structural changes and enhance personal networks in Paleontology is to engage of the paleontological community in joint scientific projects. We will therefore

establish repeated synthesis workshops to work on research questions that arise from a joint discussion of the paleontological community. Workshops will provide a place of inherent horizon scanning and bring together existing but disparate data, tools, and theories in new and perhaps unexpected ways.

Implementation

Workshops will take place in spring and fall of each year. Science workshops will be held at 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.

Our workshops

Currently we have three workshops in our PaleoSynthesis Project that are funded or supported by our PostDoc. These are BioDeep-Time, Diversity Dynamics and Crisis in Paleontology, and PaleoNovelty.



PIs are [Pincelli Hull](#) (Yale), [Marina Costa Rillo](#) (ICBM, Univ. Oldenburg) and [Seth Finnegan](#) (UC Berkeley).

The motivation of their workshop is: „*In a rapidly changing world, there is an urgent need to understand how communities respond to environmental perturbations of varying magnitudes and rates*“. This need will be addressed in a series of workshops and by integrating timeseries data from ecological and paleontological sources. The working group, besides paleontologists and ecologists, will also include specialists on databases and time-series.

The approach of the workshop is to examine the turnover of communities, spanning from the Modern to millions of years in the past, in response to climate changes, including the current climate crisis (i.e., global warming and biotic change) to achieve the main **goal**: “*identify those climate change scenarios (in terms of tempo and magnitude) where community turnover scales in step, catastrophically shifts (i.e., tipping points), or remains relatively stable (i.e., coordinated stasis).*” This will help to evaluate and understand the relationship, in

rates and magnitudes, between climate change and modification of biological communities.



The advisory board also decided to provide partial funding for the workshop proposal submitted by [Nussaibah Raja-Schoob](#) (FAU) and [Emma Dunne](#) (Univ. Birmingham, UK).

With their workshop „Diversity Dynamics and Crisis in Paleontology“ they **address** a sensitive topic based on the realization that when „*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*“. Nussaibah and Emma have identified a need to change the way that research is conducted with the purpose to improve the representation of a wide range of abilities, perspectives, and backgrounds in paleontology.

With their workshop they **aim** to bring together paleontologists from various cultural, racial, socio-economic and research backgrounds to collaborate with JEDI (Justice, Equality, Diversity and Inclusion) specialists.

Goals are to 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.



The workshop series PaleoNov is implemented in PaleoSynthesis scientifically and is led by [Tim Staples](#) and [John Pandolfi](#) (both University of Queensland, Australia).

Tim and John **aim** to „*Examine strengths and weaknesses of past uses of the term „novelty“ in ecology and paleoecology as a team of interdisciplinary researchers.*“ **Key message** is that „*Paleontological research (is) critical to understand the extent and drivers of ecological novelty, placing modern patterns in a deep-time context*“. This is based on the fact that these days humans increase the rate of ecosystem change and force these to shift into „novel states“. However, this is not new - the fossil record shows that ecosystems constantly had to change forced by ecological, environmental and evolutionary drivers.

Goal of the workshop is to develop a standardized definition and measure of novelty for application across scales and disciplines.