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September 10, 2018

Dissertation of Dr. Pavel Skutschas

Dear Sir or Madam,

It is a pleasure for me to write this review of Dr Pavel Skutschas' dissertation for the degree of Doctor of Biological Sciences. I have known Pavel Skutschas since I first met him in 2009 at a congress of vertebrate paleontologists in Bonn, Germany. In the following years, I met him several times during collection visits in Berlin, and I am familiar with is work on Mesozoic salamanders. I was always impressed by his great knowledge, inquiring mind and dedication to the field of paleozoology. Despite his young age, Pavel Skutschas has already become an internationally highly respected vertebrate paleontologist who has established numerous collaborative projects with international scientists from institutions in North America, Europe, and China. His list of publications in international, peer-reviewed and ISI-listed journals is impressive.

The subject of his dissertation is Jurassic and Cretaceous salamanders from Asia (Siberia, Kazakhstan, Middle Asia). It deals with the origin of salamanders, the evolutionary and ecological changes from stem- to crown-group representatives, and the associated vertebrate fauna (comprising different other amphibians, reptiles and even early mammals). Pavel Skutschas' articles that are summarized in his thesis are throughout original and based in large parts on material found during his scientific expeditions to Siberia, Kazakhstan and Middle Asia. The results are of considerable interest for paleontologists and zoologists working with fossil or living amphibians.

Pavel Skutschas' approach contains a broad array of methods. He employs classical descriptive morphology in the best sense. This is indispensable to establish a sound data basis on which further interpretations and analyses can be built. His description of *Kokartus* is one of the best and most detailed morphological descriptions of a fossil salamander that I know. The morphological approach is supplemented by histological investigations of dermal and long bones which gave important insights into the mode of life and the paleoenvironment of stem-salamanders. Furthermore, Pavel Skutschas was one of the first scientists who investigated both the morphology of fossil salamander bones and their inner microstructure with micro-CT. Based on the vast amount of morphological data collected by him he applied computer-based cladistic analyses of fossil and extant salamanders.

Using these different approaches, Pavel Skutschas' work concentrates on different aspects of early salamander evolution. First, he added significant new data for the reconstruction of early salamander phylogeny, and he identified the origin of novel traits during the transition from the stem- to the crown-group. Moreover, he also addressed the question of the origin of salamanders from their Paleozoic ancestors, which is still one of the most hotly debated topics in vertebrate paleontology, and presented his own phylogenetic analysis of early salamanders and basal tetrapods in his *Kokartus* monograph. Another salamander phylogeny published with Yuri Gubin in 2012 has far-reaching consequences for salamander diversification and distribution in the Mesozoic. Based on his detailed morphological and

histological data, Pavel Skutschas also discussed and reconstructed various aspects of the paleobiology of early salamanders, including life cycles (biphasic life cycle versus neoteny), mode of life (terrestrial versus aquatic), physiology (e.g., CO_2-elimination during breathing), and biomechanics of the salamander skull. Furthermore, using an innovative paleopathological approach, he was able to draw inferences concerning intraspecific behavior in early salamanders based on femoral injuries. Last but not least, Pavel Skutschas' work also includes the geographical and temporal distribution of early salamanders. For example, he was the first to demonstrate that stem-salamanders survived the Jurassic-Cretaceous boundary.

Pavel Skutschas' work is not restricted to the recognition and description of interesting patterns in the evolution of early salamanders; he always intends to identify the underlying developmental processes. His scientific work including his field work at different Mesozoic localities in Asia has significantly contributed to our understanding of the early evolution of salamanders and Jurassic and Cretaceous terrestrial ecosystems. Avoiding unnecessary speculations, his conclusions and interpretations are always comprehensible and based on a large set of data and detailed observations. He set the standard for zoologists and paleontologists working with Mesozoic lissamphibians. To summarize, Pavel Skutschas is an outstanding scientist, enthusiastic and skilled, exceptionally hard working, and an extremely productive and amazingly talented vertebrate paleontologist. I have no doubt that this fine young scientist will be one of the leading vertebrate paleontologists in the upcoming years. Therefore, I enthusiastically support the award of Doctor of Biological Sciences to Pavel Skutschas without reservations.

Sincerely yours,

F. Wit

PD Dr. Florian Witzmann

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