Causal and historical evolutionary biology: Papers in honour of Professor Klaus Peter Sauer

Klaus Peter Sauer. Photo 2007 by H. Kullmann.

During the last decades, Professor Klaus Peter Sauer, who will soon retire as Director of the Institute for Evolutionary Biology and Ecology at the University of Bonn, Germany, exerted an invaluable influence on the development of evolutionary biology and zoology in Germany. Besides his own seminal scientific work he has been – and still is – a very active member of different scientific societies and organizations, highly dedicated to the advancement of his university, faculty and institute and last but not least an eminently inspiring teacher who filled large numbers of students with enthusiasm for evolutionary biology. With this special issue of ZOOLOGY we honour the extraordinary scientific work of Klaus Peter Sauer upon the occasion of his retirement.

Klaus Peter Sauer studied biology at the Justus-Liebig-University of Gießen, Germany from 1962 to 1966. Afterwards, he continued at the Zoological Institute of the same university with his dissertation study under the late Professor Wulf Emmo Ankel, who stimulated his interest in ecology and marine biology. In 1969, Klaus Peter Sauer obtained his Dr. rer. nat. with a thesis entitled “Zur Monotopbindung einheimischer Arten der Gattung Panorpa (Mecoptera) nach Untersuchungen im Freiland und im Laboratorium” (Investigations in the wild and in the laboratory on habitat preferences of autochthonous species of the genus Panorpa (Mecoptera)) and published in “Zoologische Jahrbücher, Abteilung Systematik, Ökologie und Geographie der Tiere” in 1970. This fascinating taxon would accompany Klaus Peter Sauer’s scientific work throughout his scientific career.

Scorpionflies (see the cover of this issue showing a male Panorpa vulgaris; photo by A. Vermeulen) are especially suited for studying principles of sexual and natural selection due to their mating system. This special mating system is best described by Klaus Peter Sauer himself (Sauer et al., 1998):

“Recent research on sexual selection in animals has begun to indicate that handicaps, honest signalling, and indicators of ecological quality may play more important roles than hitherto thought (Maynard Smith, 1991; Andersson, 1994). Panorpa scorpionflies are ideal animals for understanding the adaptive significance of honest signaling. [...]”

“[... ] P. vulgaris is an ideal animal for understanding both the mating system and the conspicuous mating behaviour of males that have evolved around food limitation. Males of Panorpa scorpionflies provide the females with different numbers of salivary masses during copulation. This conspicuous, sexually dimorphic character requires an evolutionary explanation. We hypothesize that variation in the capability of secreting salivary masses acts as a signal that indicates different ecological quality (viability) of males.”

“P. vulgaris males employ three alternative tactics to obtain copulations. Two alternatives involve nuptial offering, i.e., the male either presents a dead arthropod...
and the female feeds on it throughout copulation, or the male initiates matings by secreting salivary masses on which the females feed. The third male behaviour is to initiate matings without any nuptial offering but without use of force. From this intrapopulation variation in male reproductive behaviour the question arises as to whether the three male alternatives are differentially profitable in terms of genetic propagation. Because females terminate copulations within approximately 20 min if they receive no or no further nuptial offering, males employing alternative mating tactics obtain copulations of varying duration according to the following sequence: saliva secretion > food offering > without nuptial offering (Sindern et al., 1994, 1995; Sindern, 1996). This implies a sexual conflict over mating duration (Thornhill and Sauer, 1991)."

After obtaining his Ph.D., Klaus Peter Sauer held postdoctoral positions in two different research groups (under Prof. H.D. Cremer and Prof. A. Wessing) in Gießen, and in 1971 he joined the group of Professor Günther Osche who held a chair in Evolutionary Biology and Ecology at the Albert-Ludwigs-University of Freiburg. This was a decisive step in his scientific career and resulted in a lifelong friendship with his teacher who is well known for his contributions to historical evolutionary biology. In Freiburg, Klaus Peter Sauer conducted his classic study on photoperiodism in Panorpa vulgaris. The results entered into his habilitation thesis, which gave him the status of Associate Professor in 1977.

In 1979, Klaus Peter Sauer was appointed a Full Professor in Evolutionary Research at the University of Bielefeld, where he continued his research on scorpionflies, extended by research on photoperiodism in butterflies. Here, he started his well-known studies on sexual selection in scorpionflies, which continue till the present day. In Bielefeld, he also had the opportunity to pursue his interest in marine organisms and started research on competition for space in sea anemones.

In 1992, Klaus Peter Sauer was appointed full professor and chair of Evolutionary Biology and became director of the Institute of Evolutionary Biology and Ecology at the Friedrich-Wilhelms-University of Bonn. Here, he extended his research on scorpionflies to all central European and some Asian and North American species, including phylogeny, comparative research, assessment of parentage using microsatellites, sperm competition, immunocompetence, chemical communication, male and female choice, male-male aggression, food-finding ability, and quantitative genetics. Scorpionflies are now one of the few taxa in which sexual selection has been studied in great detail. His research was partly embedded in two major interdisciplinary research programs initiated and coordinated by himself and funded by the German Science Foundation (DFG): “Genetic analysis of social systems” in which researchers from different German universities were brought together, and “Biodiversity in time and space” which united researchers from different fields in biology and palaeontology of the University of Bonn.

The research of Klaus Peter Sauer is characterized by experimentation and integration of proximate and ultimate aspects of sexual and natural selection. But causal evolution is not his only field of scientific interest. He also studies historical evolution (Misof et al., 2000, 2001; Sauer and Kullmann, 2005; Pollmann et al., in press) and the history of biology (e.g. Sauer and Kullmann, in press).

His scientific achievements are greatly acknowledged within and outside of Germany. In 1999, he was elected a member of the German Academy of Sciences “Leopoldina”, the oldest and most prestigious science academy of Germany.

Klaus Peter Sauer’s interest in causal and historical aspects of evolution is also reflected in his teaching. He is a gifted and motivated teacher, who is highly estimated by his students. His lectures which cover a wide range of subjects from the evolution of metazoans and human evolution to evolution and sexuality are well known for their clarity and an enthusiasm for the causal and historical aspects of evolution. A description of Klaus Peter Sauer’s teaching would not be complete without mentioning his numerous excursions with students to Banyuls-sur-Mer, France. During the last decades, several hundreds of students on these occasions had the opportunity to profit from his enormous knowledge of species and many were infected by his enthusiasm for all living beings.

Another characteristic of Klaus Peter Sauer is his energetic commitment to science management in Germany and at the university. He has been and still is very active in scientific societies like the German Zoological Society (DZG) in which he served as a member of the Advisory Council from 1990 to 1994, as Vice-President from 1991 to 1993, and as President from 1994 to 1996. From 2005 till the present day he is President of the German Society of History and Theory of Biology (DGGTB), and organized its 2007 meeting in Bonn. His historical interest is also reflected in his published laudations and historical essays (1996: Prof. Günther Osche; 1998: Prof. Peter Berthold; 2002 and 2007: Prof. Hermann Schaaffhausen; 2003: Prof. Franz Huber; 2005: Nachruf Prof. Clas Naumann; all published in German). Klaus Peter Sauer also played a very active role as a major reviewer of research project grants in Zoology funded by the German Science Foundation (DFG) during 1992–1996 and 1996–2000, and of Ph.D. grants by the “Studienstiftung des deutschen Volkes” during 1977–1979 and 1990–1992.

Within the university he held numerous management positions. The most prominent were Associate Dean from 1980 to 1981 and Dean from 1987 to 1989 at the Faculty...
of Biology at the University of Bielefeld, and Chairman of Biology at the University of Bonn from 1999 to 2000.

At the age of 65, the regular retirement age in Germany, Klaus Peter Sauer was granted permission to extend his duties for another two years. Everyone who knows him well feels confident that Klaus Peter Sauer’s retirement will be another period of productive and stimulating contributions to evolutionary biology. The scientist and the person Klaus Peter Sauer are so tightly linked that a retreat from scientific work is unthinkable.

In this issue of ZOOLOGY, some of his students, colleagues, and the editors of ZOOLOGY honour Klaus Peter Sauer who has been a driving force of research in evolutionary and comparative biology in Germany, with strong international influence. The contributions in this issue analyse causal and historical evolutionary biology with an emphasis on the former, as does Klaus Peter Sauer’s own research.

References


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