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Hynek Burda Special Volume – An Introduction

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This volume of *Lynx*, *n. s.* is published in honour of the 70th anniversary of Hynek Burda – our dear colleague, teacher, mentor, and friend. We are pleased to present a collection of high-quality scientific studies and that the Festschrift also illustrates Hynek's scientific career very well. We are delighted that his university fellows, students of various ages, and renowned scientists have participated in the Special Volume. Hynek's contribution to global mammalogical science and

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his broad scientific interest are reflected in the fact, that 67 researchers from 28 institutions, 12 countries, and nearly every continent have contributed to this volume, and that many of these 23 papers were published on topics/fields that he has established or importantly influenced. Many of these research programs are being continued and further developed by him, his collaborators, and former students.

We cannot start with any other research subject than African mole-rats and subterranean rodents generally. Most of Hynek's publications deal with subterranean rodents (see his bibliography below), so it is not surprising that these mammals are best represented here as objects of his research interest. We are honoured that two "giants" in the field of biology of subterranean mammals have contributed to the Special Volume. One of the two models used in Eibi Nevo's work on the function of coding and noncoding structures in the genome is the blind mole-rat, *Spalax ehrenbergi*, from Israel, which, like the African mole-rats, has been intensively studied for a long time. Another leading person in the field, Nigel Bennett, has written a minireview together with Daniel Hart on the possible intriguing relationship between sociality and reproductive seasonality of the African mole-rats.

Jan Okrouhlík and colleagues showed how the presence of family members influences postnatal development of pups in the Mashona mole-rat, *Fukomys darlingi*. Kai Caspar delved into the taxonomic history, distribution, and morphology of one of the least known bathyergids, the Central African mole-rat, *Fukomys ochraeocinereus*, based on museum collections. Of course, the smallest, most popular, and best-known African mole-rat must not be missing from this volume. In her paper, Christiane Denys analysed the evolutionary history and the number of species of the mole-rats of the genus *Heterocephalus* from a fossil perspective. Besides the African mole-rats, the coruro, *Spalacopus cyanus*, is another representative of subterranean rodents, but from another continent. This social species is endemic to Chile. It should be mentioned that Hynek established the husbandry of the coruro for various studies in his lab, and Sabine Begall has started her scientific career studying *S. cyanus* in the field in Chile during her PhD. Together with Rodney Honeycutt, who introduced modern molecular phylogenetic methods into mole-rat taxonomy, she analysed microsatellite DNA variation in *S. cyanus*. Rodney was the first visiting professor in Hynek's lab in the 1990s and spent an entire semester teaching and conducting research at the University of Essen.

Subterranean rodents have become an important mammalian group for longevity studies over the past two decades. Although research has focused exclusively on the naked mole-rat from the beginning, Hynek's lab has also drawn the attention of the scientific community to furred mole-rats. Research on this topic is represented here by two studies. A team of three former PhD students of Hynek, led by Philip Dammann, used new or updated longitudinal data sets on the distribution of life expectancy, longevity metrics, and annual mortality rates in three social and two solitary African mole-rat species. Eugene Novikov, who introduced Hynek to the elusive Palaearctic social subterranean mole voles during his visit to Siberia, studied longevity, reproductive effort, and age-related dynamics of several physical characteristics in cricetid rodents including the Northern mole vole, *Ellobius talpinus*.

Since the beginning of his rich career, Hynek has worked on various aspects of the hearing biology of small mammals, especially the functional morphology of the auditory apparatus (see bibliography). This part of his scientific life is represented by an article on shrews focusing on the functional and ecomorphological significance of tympanic membranes in Crocidurinae and Soricinae by Wolfgang Maier and colleagues. While this morphological study focuses on the receiver side of acoustics, the work of Ema Hrouzková and Cristian Schleich supple-

ments the transmitter side of acoustics. They investigated how subterranean and aboveground lifestyles influenced the evolution of male mating vocalizations. The hearing studies are accompanied by a study of vision, an area that Hynek, along with two neuroanatomists, Leo Peichl and Pavel Němec, has also studied extensively in the African mole-rats. Leo and his colleagues analysed the histology of the retina of the fat dormouse *Glis glis* from the western Palaearctic and compared it to the African dormice of the genus *Graphiurus*. Magnetoreception is probably the most enigmatic sense in the animal kingdom. Hynek was the first to describe this sense in a mammal – Ansell's mole-rat, *Fukomys anselli* – tested under controlled laboratory conditions in the 1990s. At the time, he was a lecturer at Goethe University in Frankfurt, where he met Roswitha and Wolfgang Wiltschko – world-leading scientists in the field of magnetoreception, particularly in birds. In their review, they compare the magnetic sense of birds and mammals. John Philips – who has been involved in magnetoreception studies almost as long as the Wiltschkos – showed in his paper with Mike Painter that the magnetic sense of C57BL/6 mice is affected by small differences in the intensity of weak magnetic fields. Two studies supervised by František Sedláček have shown that bank voles can learn to use magnetic cues when orienting in a water maze (Oliveriusová and colleagues), but that the animals cannot rely on their magnetic sense in complete darkness (Nováková and colleagues). František who by the way had the same mentor, Leo Sigmund, as Hynek and Pavel Němec during their studies at Charles University, Prague, visited Hynek's lab in Essen many times, and his interest in magnetoreception was aroused there. Although Oldřich Nedvěd (another frequent visitor to Hynek's lab) is an entomologist, he has been also fascinated by Hynek's research in

the field of magnetic orientation. He together with his daughter Tereza Schimerová noticed an increase in heart attacks in humans on days with higher fluctuating magnetic fields (but not during "magnetic storms"). Apart from small mammals, Hynek has also stimulated research on magnetoreception in large mammals (e.g., grazing cattle, resting deer, mousing fox) and this research has generated an extremely high response from scientists and laypeople alike. The discovery that dogs are sensitive to small changes of the Earth magnetic field earned him and his team the 2014 Ig Nobel Prize in Biology. And Hynek is still deeply involved in this kind of research today. The contribution by Benediktová and colleagues examines the dog's behaviour during homing in which magnetoreception probably also plays an important role.

Hynek has also made a remarkable contribution to the knowledge of mammal diversity and distribution, especially with regard to those living on the African continent. It was Hynek who encouraged Radim Šumbera during his first fieldwork in Malawi to collect other small mammals in addition to African mole-rats. This collection was the beginning of an extensive Czech research program on the diversity of small mammals in eastern Africa, which was later extended to the entire continent. In their contribution, Ondřej Mikula and colleagues analyzed one of the largest pygmy mice species *Mus callewarti*. This very rare rodent was first captured by the Czech team in the Nyika Mountains of Malawi, where Hynek was conducting fieldwork on small mammals ten years before the capture. Of all African countries, Zambia is the one where Hynek and his family have been at home the longest: in the 1980s, he spent two years as a teacher in Lusaka.

Therefore, Zambia cannot be missing from this commemorative publication. Petr Benda with colleagues have written a list of bats from Zambia in the collection of the National Museum in Prague (NMP) with records of several new species from that country; without Hynek's initial effort in the Zambian field, this NMP bat collection would not have arisen. Although Hynek spent most of his career studying small creatures, he was always fascinated by large African mammals. He spent several months near one of the largest land mammals when he was working as a student at the zoo Dvůr Králové nad Labem. This zoo has started to be very famous in the 1970s for keeping an extensive collection of large African mammals including rhinos, especially the Northern white rhino *Ceratotherium* (*simum*) *cottoni*. It is therefore a pleasure, that the Special Volume also includes a study dealing with these ungulates. Jan Robovský and Kees Rookmaaker have compiled a list of 40 rhinoceros individuals recorded in anatomical and morphological studies by rhino specialist Alexander J. E. Cave. Of the total number of individuals in his studies, three quarters belong to the two African genera *Diceros* and *Ceratotherium*.

Shrews belong to the most species-rich mammalian families. In their contribution, Christian Montermann and shrew expert Rainer Hutterer studied in 41 shrew species the auricle morphology, the topic which was also touched by Hynek in the beginning of his career. Although auricle morphology is primarily adapted for environment, the authors found that auricles might be used as a diagnostic tool at the subfamily level. A university classmate, chiropterologist and paleontologist, Ivan Horáček, together with Klára Lebedová, provided insight into the diversity of hamsters in the Quaternary fossil record in the former Czechoslovakia in light of glacial cycles. Luděk Bufka and colleagues provided an updated list of recent occurrences of the wildcat, *Felis silvestris*, in the Czech Republic. This species had disappeared from the country for several decades and recently started a slow return among the members of Czechia's mammalian fauna.

Finally, Hynek was always an excellent teacher and mentor. One of his most memorable pedagogical activities were the traditional (bi-)annual excursions for German students to Šumava National Park in the Czech Republic, which he organized together with Jaroslav Červený. From the 20-year history of Šumava excursions, 16 years of faunistic records were compiled in detail by Marcus Schmitt who created a list of mammals and other animals recorded during these excursions to the largest national park in the Czech Republic. It is no coincidence, that after their return to the Czech Republic, Hynek with his wife Jana spend most of their time just in Šumava mountains.

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The Editors

Full bibliography of Hynek Burda

Full-papers and book chapters

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Photos by J. Červený or the family archive of Hynek Burda; p. 15: HB with Walter Poduschka at the International Theriological Congress, Brno, 1978; p. 17: with Vladimír Hanák at Zoological Days, Brno, 2008; p. 18: with wife Jana in the Šumava Mountains, 2022.