BIENNIAL REPORT

INSTITUTE OF VERTEBRATE BIOLOGY
ACADEMY OF SCIENCES OF THE CZECH REPUBLIC

2007–2008

INSTITUTE OF VERTEBRATE BIOLOGY

Biennial Report 2007–2008

Periodical continuation of the former Institute's bulletins Vertebratologické Zprávy (1969–1987), Zprávy ÚSEB (1988–1991) and the ILE Biennial Report (1993–1994).

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PREFACE

The last two years provided the Institute with interesting blend of new experience. After our transformation into a public research institution in 2006, we gained new stimuli and challenges for research and its logistic background. The new management bodies started their activities, and the staff could evaluate their efficiency and contribution. I can say that changes following the transformation were mainly positive and promising.

The institute became deeply involved in international research programmes, particularly in the projects of the 6th Framework Programme of European Union. The laboratories of the Institute participated in three integrated projects, a project of the INTAS Programme, one Marie Curie research training network, and a Marie Curie intra-European fellowship. We were engaged in three research networking programmes of the European Science Foundation, in inter-regional programmes and European projects supported by IUCN. The staff of the Institute was further involved in various bilateral and individual projects. As a result, the quality of our research as well as reputation of the Institute in national and international circles continues to grow. The publication output has significantly increased. The staff of the Institute co-authored 69 scientific papers in international journals with the total impact factor (ISI) of 97.2 in 2007 and 63 papers with the total impact factor of 117.4 in 2008.

The growth in enrolment of undergraduate and graduate students is further evidence of the increasing quality of research performed in the Institute. In 2007 and 2008, 100 undergraduate and 62 graduate PhD students worked in the Institute under supervision of its fellows. The success in obtaining grant money also enabled our Institute to increase the number of staff. In the previous two years, the Institute employed 61 fellows paid from the institutional sources, whereas additional 48 fellows were contracted on the basis of research grant funding. In the same time period, 29 foreign workers were employed.

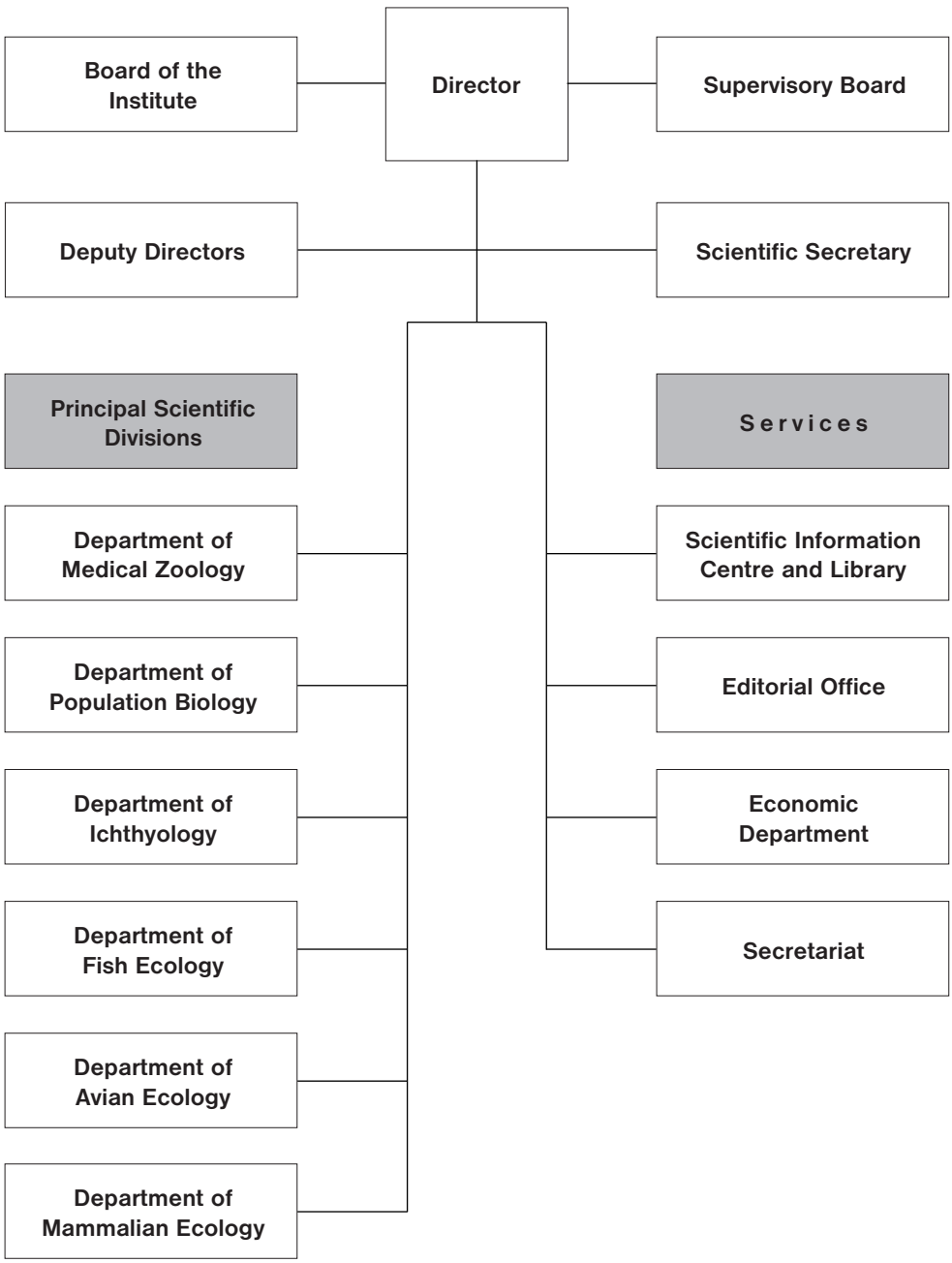
The institutional budget assigned from the state contribution in the frame of the Institutional Research Plan reached approximately 22.68 and 23.43 million of CZK in 2007 and 2008, respectively. An additional 4.5 million of CZK was provided in both years for investments of laboratory equipment and maintenance of buildings. Research grants and diverse contract funding contributed to the budget, with 30.87 and 38.47 million CZK in 2007 and 2008, respectively.

Recently, the Institute has devoted considerable efforts to prepare applications for projects financed from the European Regional Development Fund. These applications were submitted in 2008 or are currently in submission and are aimed towards operational programmes “Research and Development for Innovations” and “Education for Competitiveness”. These programmes provide unique opportunities for the development of the Institute and building its research infrastructure.

I finished my period of heading the Institute at the end of March, 2009. The new director was appointed in April, 2009, and I expect this change will offer new challenges, insights and ideas for further development of the Institute. I believe the future of the Institute will be successful and feel confident that the management and staff have the talent and commitment to stay the course. I wish to extend my sincere thanks to all my colleagues who helped and supported me in the previous years.

Jan Zima

STRUCTURE OF THE INSTITUTE OF VERTEBRATE BIOLOGY OF THE ACADEMY OF SCIENCES OF THE CZECH REPUBLIC, v. v. i.



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RESEARCH PROJECTS

Institutional Research Plan

AV0Z60930519 Biodiversity and ecology of vertebrates: implications in conservation and sustainable management of natural populations – J. Zima, 2005–2010.

Projects supported by the Grant Agency of the Academy of Sciences of the Czech Republic

IAA600930506 Behavioral and genetic study of prezygotic isolation barriers in the house mouse hybrid zone

Provider: Academy of Sciences of the Czech Republic (AS CR), Recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Jaroslav Piálek. Research years: 2005–2008.

IAA600930605 Evolution of antiparasitic strategies of selected hosts towards avian brood parasitism

Provider: Academy of Sciences of the Czech Republic (AS CR), Recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Marcel Honza. Research years: 2006–2010.

IAA600930608 The role of MHC in sexual selection – observational and experimental study in three model vertebrate species

Provider: Academy of Sciences of the Czech Republic (AS CR), Coordinating recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Josef Bryja. Research years: 2006–2008.

IAA600930609 Genetic structure of chamois populations in Central Europe

Provider: Academy of Sciences of the Czech Republic (AS CR), Recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Jan Zima. Research years: 2006–2009.

IAA600930611 (Re)emerging mosquito-borne virus diseases

Provider: Academy of Sciences of the Czech Republic (AS CR), Coordinating recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Zdeněk Hubálek. Research years: 2006–2008.

IAA601410802 Biology of African mole-rats from mesic tropic areas.

Provider: Academy of Sciences of the Czech Republic (AS CR), Coordinating recipient: University of South Bohemia, České Budějovice / Faculty of Science, Charles University, Prague, Head Investigator: Radim Šumbera, Recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Josef Bryja. Research years: 2008–2011.

IAA6093403 Evolutionary determinants of brood parasitism in ducks

Provider: Academy of Sciences of the Czech Republic (AS CR), Coordinating recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Marcel Honza. Research years: 2004–2008.

IAA6093404 Species diversity and ecology of selected West African vertebrates

Provider: Academy of Sciences of the Czech Republic (AS CR), Coordinating recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Petr Koubek. Research years: 2004–2008.

KJB600930501 The impact of mating tactics on individual reproductive success and population parameters in the European bitterling: behavioural and genetic approach

Provider: Academy of Sciences of the Czech Republic (AS CR), Recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Martin Reichard. Research years: 2005–2007.

KJB600930508 European Reed Warbler populations across a migratory divide: insights to migration by analyses of DNA sequences, stable isotopes and ringing recoverie

Provider: Academy of Sciences of the Czech Republic (AS CR), Recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Petr Procházka. Research years: 2005–2007.

KJB600930610 Phylogeography and evolutionary history of a semi-fossorial rodent Microtus subterraneus

Provider: Academy of Sciences of the Czech Republic (AS CR), Recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Natália Martínková. Research years: 2006–2008.

KJB600930611 Brood parasitism as an alternative reproductive strategy of ducks: genetically – endocrinological approach

Provider: Academy of Sciences of the Czech Republic (AS CR), Recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Radka Piálková. Research years: 2006–2009.

KJB600930613 Diversity of cultivable microorganisms of ixodid ticks, recognized vectors of vertebrate pathogens

Provider: Academy of Sciences of the Czech Republic (AS CR), Coordinating recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Ivo Rudolf. Research years: 2006–2008.

KJB600930615 Feeding behavior, parasite infections and self-medicative abilities of an introduced chimpanzee population, Rubondo Island National Park, Tanzania

Provider: Academy of Sciences of the Czech Republic (AS CR), Recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Klára Petrželková. Research years: 2006–2008.

KJB600930701 Quantitative trait loci (QTL) for male aggression in the house mouse

Provider: Academy of Sciences of the Czech Republic (AS CR), Recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Barbora Bímová. Research years: 2007–2009.

KJB600930802 The European bitterling – endangered or non-native species in Central Europe?

Provider: Academy of Sciences of the Czech Republic (AS CR), Coordinating recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Martin Reichard. Research years: 2008–2010.

KJB600930804 Genetic consequences of population decline in Eurasian otter (Lutra lutra) populations in the Czech and Slovak Republics

Provider: Academy of Sciences of the Czech Republic (AS CR), Recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Petra Hájková. Research years: 2008–2010.

KJB601110803 Variation in resource allocation between reproductive phases in waterfowl

Provider: Academy of Sciences of the Czech Republic (AS CR), Coordinating recipient: Faculty of Science, Charles University, Prague, Head Investigator: David Hořák, Recipient: Institute

of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Tomáš Albrecht. Research years: 2008–2010.

1QS500450513 Population and genetic structure of brown trout and grayling as groundwork for efficient management of fisheries in salmonid waters

Provider: Academy of Sciences of the Czech Republic (AS CR), Coordinating recipient: Institute of Animal Physiology and Genetics ASCR, v. v. i., Liběchov, Head Investigator: Vlastimil Šlechta, Recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Karel Halačka. Research years: 2005–2009.

Projects supported by the Czech Science Foundation (CSF)

GA206/05/2159 Genetic, population and reproductive variability of invazive fish species, Carassius „gibelio" with alternating bisexual/asexual reproduction in central Europe

Provider: Czech Science Foundation (CSF), Recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Věra Lusková. Research years: 2005–2007.

GA206/06/0851 Extra-pair fertilizations and the strength of sexual selection in socially monogamous passerine

Provider: Czech Science Foundation (CSF), Recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Tomáš Albrecht. Research years: 2006–2008.

GA206/06/0953 Phenotypic plasticity of thermal physiology traits in newts

Provider: Czech Science Foundation (CSF), Recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Lumír Gvoždík. Research years: 2006–2008.

GA206/06/0954 Intraspecific variability of populations of two cryptic bat species of genus Pipistrellus in Central Europe

Provider: Czech Science Foundation (CSF), Recipient: Faculty of Science, Masaryk University, Head Investigator: Zdeněk Řehák, Subrecipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Josef Bryja. Research years: 2006–2008.

GA206/06/0955 Genetics

Provider: Czech Science Foundation (CSF), Recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Jaroslav Piálek. Research years: 2006–2008.

GA206/08/0640 Immunogenetic study of a house mouse hybrid zone

Provider: Czech Science Foundation (CSF), Recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Jaroslav Piálek. Research years: 2008–2012.

GA206/08/1281 Components of sexual selection in the monogamous grey partridge

Provider: Czech Science Foundation (CSF), Recipient: Faculty of Forestry, Wildlife and Wood Sciences, Czech University of Agriculture, Prague, Head Investigator: Miroslav Šálek. Subrecipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Tomáš Albrecht. Research years: 2008–2012.

GA524/06/0264 Ciliates of genus Troglodytella: pathogens or endosymbionts? Novel approach towards veterinary care and understanding digestion in apes

Provider: Czech Science Foundation (CSF), Recipient: Faculty of Veterinary Medicine, University of Veterinary and Pharmaceutical Sciences, Brno, Head Investigator: David Modrý. Subrecipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Klára Petrželková. Research years: 2006–2008.

GA524/06/0687 Importance of red fox in different ecosystems of Central Europe

Provider: Czech Science Foundation (CSF), Recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Jaroslav Červený. Research years: 2006–2008.

GD524/05/H536 Evolutionary ecological analysis of biological systems: research center for PhD studies

Provider: Czech Science Foundation (CSF), Recipient: Faculty of Science, Masaryk University, Brno, Head Investigator: Milan Chytrý. Subrecipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Pavel Jurajda. Research years: 2005–2008.

GP206/06/P152 Reproductive isolating mechanisms in *Nothobranchius* fishes (Aplocheilidae)

Provider: Czech Science Foundation (CSF), Recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Martin Reichard. Research years: 2006–2008.

GP206/06/P302 Genetic structure of black grouse populations in the Czech Republic

Provider: Czech Science Foundation (CSF), Recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Jana Svobodová. Research years: 2006–2008.

GP521/08/P529 The ecological importance of set-aside and cultivated crops for the small mammals of agrocenosis

Provider: Czech Science Foundation (CSF), Recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Eva Jánová. Research years: 2008–2010.

Projects supported by the Ministry of Agriculture

QF3028 Development of new technologies of rearing commercially important riverine species of fish and crayfish endangered by environment degradation.

Provider: Ministry of Agriculture (MZe), Coordinating recipient: University of South Bohemia, České Budějovice, Head Investigator: Pavel Kozák. Recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Miroslav Prokeš. Research years: 2003–2007.

QF3029 Harmonization with the EU in application of the principles of pharmacovigilancy in aquaculture in the Czech Republic

Provider: Ministry of Agriculture (MZe), Coordinating recipient: University of South Bohemia, České Budějovice, Head Investigator: Jitka Kolářová. Recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Miroslav Prokeš. Research years: 2003–2007.

QH71305 Development of new methods of rearing selected promising species for aquaculture using non-traditional technologies.

Provider: Ministry of Agriculture (MZe), Coordinating recipient: University of South Bohemia, České Budějovice, Head Investigator: Pavel Kozák. Recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Miroslav Prokeš. Research years: 2007–2011.

QH72075 Rodents as an important factor influencing forest regeneration

Provider: Ministry of Agriculture (MZe), Coordinating recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Miloslav Homolka. Research years: 2007–2011.

Projects supported by the Ministry of Environment

SM/6/3/05 Genetic diversity of endangered fish species-base of effective protection of biodiversity

Provider: Ministry of Environment (MŽP), Recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Stanislav Lusk. Research years: 2005–2007.

SPII2D1/9/07 The biological and ecological requirements of fishes: factors determining the function of fish ladders

Provider: Ministry of Environment (MŽP), Recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Stanislav Lusk. Research years: 2007–2010.

SP/2D4/55/07 Fish biodiversity in the Morava and Dyje confluence area – supporting and stabilization of rare and endangered species populations

Provider: Ministry of Environment (MŽP), Recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Karel Halačka. Research years: 2007–2009.

SP/2D4/16/08 Filling gaps in knowledge of biology and ecology of Eurasian otter: ecological modelling

Provider: Ministry of Environment (MŽP), Recipient: ALKA Wildlife, o.p.s., Head Investigator: Kateřina Poledníková. Subrecipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Petra Hájková. Research years: 2008–2010.

Projects supported by the Ministry of Education, Youth and Sport

LC06073 Biodiversity Research Center

Provider: Ministry of Education, Youth and Sports (MŠMT), Coordinating recipient: Institute of Systems Biology and Ecology ASCR, v. v. i., České Budějovice, Head Investigator: Pavel Kindlmann. Recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Jan Zima. Research years: 2006–2010.

LC522 Ichthyoparasitology Research Centre

Provider: Ministry of Education, Youth and Sports (MŠMT), Coordinating recipient: Faculty of Science, Masaryk University, Head Investigator: Milan Gelnar. Recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Pavel Jurajda. Research years: 2005–2009.

2B08003 Changes of mosquito biodiversity – vectores of pathogenic agents in relationship with weather changeability

Provider: Ministry of Education, Youth and Sports (MŠMT), Coordinating recipient: Biology Centre ASCR, v. v. i., České Budějovice, Head Investigator: Ivan Gelbič. Recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Jiří Halouzka / Oldřich Šebesta. Research years: 2008–2011.

MEB080890 Gastrointestinal ciliates and their role in digestion of great apes

Provider: Ministry of Education, Youth and Sports (MŠMT), Recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Klára J. Petrželková. Research years: 2008–2009.

MEB090802 Conservation genetics of selected vertebrates in the Western Balkans

Provider: Ministry of Education, Youth and Sports (MŠMT), Recipient: Institute of Vertebrate Biology ASCR, v. v. i., Brno, Head Investigator: Josef Bryja. Research years: 2008–2009.

International projects

European Union – 6th Framework Programme

Integrated project EDEN (no. 010284–2) Emerging diseases in a changing European environment (coordinated by CIRAD Montpellier, France) – Z. Hubálek, 2004–2009.

Integrated project MODELKEY (no. SSPI-CT-2003–511237–2) Models for assessing and forecasting the impact of environmental key pollutants on marine and freshwater ecosystems

and biodiversity (coordinated by Umweltforschungszentrum Leipzig – Halle GmbH, Germany) – P. Jurajda, 2005–2010.

Integrated consortium on ticks and tick-borne diaseases (ICTTD – 3) – L. Grubhofer (Biology Center ASCR, České Budějovice), Z. Hubálek (IVB ASCR), 2004–2008.

Marie Curie research training network SEXASEX (no. MRTN-CT-2004–512492) Sex to asex: a case study on transitions and coexistence between sexual and asexual reproduction (coordinated by the Royal Belgian Institute of Natural Sciences, Belgium) – J. Zima, 2004–2008.

Marie Curie intra-European fellowship PHYLOMICROTUS (no. 24956) Phylogeography of the Orkney vole *Microtus arvalis orcadensis* (cooperation with University of York, UK) – N. Martínková, 2006–2008.

Project INTAS (no. 03–51–4030) A multidisciplinary study of hybrid zones in the common shrew (coordinated by the University of York, UK) – J. Zima, 2004–2007.

Other EU projects

European Science Foundation Research Networking Programme Integrating population genetics and conservation biology: Merging theoretical, experimental and applied approaches – J. Bryja (member of the steering committee), 2004–2009.

European Science Foundation Research Networking Programme Thermal adaptation in ectotherms: Linking life history, physiology, behaviour and genetics – L. Gvoždík (member of the steering committee), 2006–2011.

Bavarian Interreg-IIIA-Project Wildlife and human in Bavarian-Czech-Austrian border region – example of the otter (cooperation with the Bavarian Forest Institute and Technical University of Munich, Germany) – P. Hájková, 2006–2007.

IUCN and European Commission Assessment of European mammal species – J. Zima (participant), 2006–2007.

Bilateral projects

National Science Foundation (no. BCS-0642297) Collaborative research: On the verge of modernity: Post-Pleistocene evolution of the European skeleton. (coordinated by The Johns Hopkins University, USA) – V. Sládek, 01/03/2007–29/02/2010.

Individual projects

The Leakey Foundation (USA), General grant The possible role of ciliate (*Troglodytella abrassarti*) in chimpanzee hind gut fermentation – K. Petrželková, 2006–2007.

British Ecological Society (UK), Early career project grant (ref no. 551–617) Phenotypic correlates of lifetime reproductive success in the bitterling fish – M. Reichard, 2006–2007.

Association for the Study of Animal Behaviour (ASAB), UK, Research grant Reproductive isolating mechanisms in *Nothobranchius* annual fishes – the roles of mate choice, ecological divergence and vicariance – M. Reichard, 2008.

Leverhulme Trust, Research project Host specialization and host race formation in the European bitterling (coordinated by University of Leicester, UK) – M. Reichard, 2007–2010.

LIST OF PUBLICATIONS

Books, textbooks, edited proceedings

AULAGNIER S., HAFFNER P., MITCHELL-JONES A.J., MOUTOU F., ZIMA J., 2008: Guide des mammifères d'Europe, d'Afrique du Nord et du Moyen-Orient. Les Guides du naturaliste, Delachaux et Niestlé, Paris, 272 pp. ISBN 978-2-603-01505-6.

BRYJA J., ZUKAL J., ŘEHÁK Z. (eds), 2007: Zoologické dny Brno 2007. ÚBO AV ČR, Brno, 224 pp. ISBN 978-80-903329-7-3.

BRYJA J., NEDVĚD O., SEDLÁČEK F., ZUKAL J. (eds), 2008: Zoologické dny České Budějovice 2008. ÚBO AV ČR, Brno, 244 pp. ISBN 978-80-87189-00-9.

DUŠEK L., HARUŠTIAKOVÁ D., MARTÍNKOVÁ N. (eds), 2008: Proceedings of the 4th International Summer School on Computational Biology. Masaryk University, Brno, 122 pp. ISBN 978-80-210-4793-8.

GAISLER J., ZIMA J., 2007: Zoologie obratlovců. 2nd ed. Academia, Praha, 692 pp. ISBN 978-80-200-1484-9.

HÁJKOVÁ P., RŮŽIČKOVÁ O. (eds), 2007: 25th Mustelid colloquium, 4–7 October 2007, Třeboň, Czech Republic. ÚBO AV ČR, Brno, 85 pp. ISBN 978-80-903329-9-7.

HUBÁLEK Z., RUDOLF I., 2007: Mikrobiální zoonózy a sapronózy. Masarykova univerzita, Brno, 176 pp. ISBN 978-80-210-4460-9.

HUDEC K., KOLIBÁČ J., LAŠTŮVKA Z., PEŇÁZ M. (eds), 2007: Příroda České republiky: průvodce faunou. Academia, Praha, 439 pp. ISBN 978-80-200-1569-3.

LUSK S., LUSKOVÁ V. (eds), 2008: Biodiverzita ichtyofauny České republiky (VII). ÚBO AV ČR, Brno, 134 pp. ISBN 978-80-87189-01-6.

TKADLEC E., 2008: Populační ekologie: struktura, růst a dynamika populací. Univerzita Palackého, Olomouc, 400 pp. ISBN 978-80-244-2149-0.

Chapters in books

BARTOŇOVÁ E., LUSKOVÁ V., LUSK S., KOŠČO J., ŠVÁTORA M., 2008: Sekavčík horský (*Sabanejewia balcanica*): genetická diverzita a možnosti obnovy výskytu v povodí Bečvy. In: Lusk S., Lusková V. (eds), Biodiverzita ichtyofauny České republiky (VII). ÚBO AV ČR, Brno; 54–66. ISBN 978-80-87189-01-6.

HEROLDOVÁ M., ZEJDA J., ZAPLETAL M., 2007: Savci. In: Kůdela V., Braunová M. (eds), Česko-anglická rostlinolékařská terminologie. Academia, Praha; 270–282. ISBN 978-80-200-1550-1.

HUBÁLEK Z., 2008: Birds. In: Bonnefoy X., Kampen H., Sweeney K. (eds), Public health significance of urban pests. WHO Press, Geneva; 239–287. ISBN 978-92-890-7188-8.

HUFFMAN M.A., PETRŽELKOVÁ, K.J., MOSCOVICE L.R., MAPUA M.I., BOBÁKOVÁ L., MAZOCH V., SINGH J., KAUR T., 2008: Introduction of chimpanzees onto Rubondo Island National Park, Tanzania. In: Soorae P. (ed.), Global re-introduction perspectives: re-introduction case-studies from around the globe. IUCN/SSC Re-introduction Specialist Group, Abu Dhabi; 213–216. ISBN 978-2-8317-1113-3.

LUSK S., HANEL L., KŘESINA J., 2008: Je zánik populace mihule ukrajinské *Eudontomyzon mariae* v Račím potoce neodvratný? In: Lusk S., Lusková V. (eds), Biodiverzita ichtyofauny České republiky (VII). ÚBO AV ČR, Brno; 6–16. ISBN 978-80-87189-01-6.

LUSK S., LUSKOVÁ V., HANEL L., 2008: Nepůvodní druhy v ichtyofauně České republiky – jejich vliv a význam. In: Lusk S., Lusková V. (eds), Biodiverzita ichtyofauny České republiky (VII). ÚBO AV ČR, Brno; 96–113. ISBN 978-80-87189-01-6.

LUSK S., VETEŠNÍK L., HALAČKA K., LUSKOVÁ V., PEKÁRIK L., TOMEČEK J., 2008: První záznam o průniku hlaváče černoústého *Neogobius (Apollonia) melanostomus* do oblasti soutoku Moravy a Dyje (Česká republika). In: Lusk S., Lusková V. (eds), Biodiverzita ichtyofauny České republiky (VII). ÚBO AV ČR, Brno; 114–118. ISBN 978-80-87189-01-6.

LUSK S., BARTOŇOVÁ E., LUSKOVÁ V., LOJKÁSEK B., KOŠČO J., 2008: Vranka pruhoploutvá *Cottus poecilopus* – rozšíření a genetická diverzita v povodí řek Morava, Odra (Česká republika) a Hornád (Slovensko). In: Lusk S., Lusková V. (eds), Biodiverzita ichtyofauny České republiky (VII). ÚBO AV ČR, Brno; 67–80. ISBN 978-80-87189-01-6.

LUSK S., PAPOUŠEK I., LUSKOVÁ V., HALAČKA K., KOŠČO J., 2008: Výskyt a genetická diverzita drska menšího a drska většího v povodí Moravy (Česká republika). In: Lusk S., Lusková V. (eds), Biodiverzita ichtyofauny České republiky (VII). ÚBO AV ČR, Brno; 81–87. ISBN 978-80-87189-01-6.

LUSKOVÁ V., BARTOŇOVÁ E., LUSK S., 2008: Karas obecný *Carassius carassius* Linnaeus, 1758 v minulosti obecně rozšířený a v současnosti ohrožený druh v České republice. In: Lusk S., Lusková V. (eds), Biodiverzita ichtyofauny České republiky (VII). ÚBO AV ČR, Brno; 46–53. ISBN 978-80-87189-01-6.

LUSKOVÁ V., BARTOŇOVÁ E., LUSK S., 2008: Ostrucha křivočará *Pelecus cultratus* – vzácný objekt ochrany v České republice. In: Lusk S., Lusková V. (eds), Biodiverzita ichtyofauny České republiky (VII). ÚBO AV ČR, Brno; 38–45. ISBN 978–80–87189–01–6.

MENDEL J., LUSK S., HALAČKA K., LUSKOVÁ V., VETEŠNÍK L., ĆALETA M., RUCHIN A., 2008: Genetická diverzita a poznámky k výskytu ouklejky pruhované *Alburnoides bipunctatus*. In: Lusk S., Lusková V. (eds), Biodiverzita ichtyofauny České republiky (VII). ÚBO AV ČR, Brno; 25–37. ISBN 978–80–87189–01–6.

MENDEL J., LUSK S., LUSKOVÁ V., KOŠČO J., VETEŠNÍK L., HALAČKA K., 2008: Druhová pestrost hrouzků rodu Gobio a Romanogobio na území České republiky a Slovenska. In: Lusk S., Lusková V. (eds), Biodiverzita ichtyofauny České republiky (VII). ÚBO AV ČR, Brno; 17–24. ISBN 978–80–87189–01–6.

PAPOUŠEK I., LUSKOVÁ V., LUSK S., KOŠČO J., 2008: Výskyt a genetická diverzita ježdíka žlutého a ježdíka dunajského v České republice. In: Lusk S., Lusková V. (eds), Biodiverzita ichtyofauny České republiky (VII). ÚBO AV ČR, Brno; 88–95. ISBN 978–80–87189–01–6.

PROCHÁZKA P., 2008: Rákosník proužkovaný (*Acrocephalus schoenobaenus*). In: Cepák J. (ed.), Atlas migrace ptáků České a Slovenské republiky. Aventinum, Praha; 410–412. ISBN 978–80–86858–87–6.

PROCHÁZKA P., 2008: Rákosník velký (*Acrocephalus arundinaceus*). In: Cepák J. (ed.), Atlas migrace ptáků České a Slovenské republiky. Aventinum, Praha; 420–421. ISBN 978–80–86858–87–6.

PROCHÁZKA P., POLICHT R., 2008: Rákosník obecný (*Acrocephalus scirpaceus*). In: Cepák J. (ed.), Atlas migrace ptáků České a Slovenské republiky. Aventinum, Praha; 416–419. ISBN 978–80–86858–87–6.

ŠEDIVÝ J., HEROLDOVÁ M., 2007: Poškození způsobovaná živočišnými škůdci. In: Kůdela V., Braunová M. (eds), Česko-anglická rostlinolékařská terminologie. Academia, Praha; 393–401. ISBN 978–80–200–1550–1.

Papers in journals included in the databases ISI Web of Knowledge

ADÁMEK Z., ANDREJI J., GALLARDO J.M., 2007: Food habits of four bottom-dwelling gobiid species at the confluence of the Danube and Hron rivers (South Slovakia). International Review of Hydrobiology 92: 554–563.

ALBRECHT T., SCHNITZER J., KREISINGER J., EXNEROVÁ A., BRYJA J., MUNCLINGER P., 2007: Extrapair paternity and the opportunity for sexual selection in long-distant migratory passerines. Behavioral Ecology 18: 477–486.

ARSLAN A., ZIMA J., ÖZPARLAK H., 2008: C-heterochromatin variation in the karyotype reflects species level distinction between *Erinaceus roumanicus* and *E. concolor* (Eulipotyphla: Erinaceidae) in Turkey. Zootaxa 1961: 1–10.

BARANČEKOVÁ M., KROJEROVÁ-PROKEŠOVÁ J., HOMOLKA M., 2007: Impact of deer browsing on natural and artificial regeneration in floodplain forest. Folia Zoologica 56: 354–364.

BARTOŇOVÁ E., PAPOUŠEK I., LUSKOVÁ V., KOŠČO J., LUSK, S., HALAČKA, K., ŠVÁTORA M., VETEŠNÍK L., 2008: Genetic diversity and taxonomy of *Sabanejewia balcanica* (Osteichthyes: Cobitidae) in the waters of the Czech Republic and Slovakia. Folia Zoologica 57: 60–70.

BARUŠ V., JARKOVSKÝ J., PROKEŠ M., 2007: *Philometra ovata* (Nematoda: Philometroidea): a potential sentinel species of heavy metal accumulation. Parasitology Research 100: 929–933.

BEGALL S., ČERVENÝ J., NEEF J., BURDA H., VOJTĚCH O., 2008: Magnetic alignment in grazing and resting cattle and deer. Proceedings of the National Academy of Sciences of the United States of America 105: 13451–13455.

BOCHKOV A.V., LITERÁK I., ČAPEK M., 2007: *Neharpyrhynchus baile* n. sp. (Prostigmata: Harpirhynchidae) parasitizing *Turdus leucomelas* Vieillot (Aves: Turdidae) from Brazil. International Journal of Acarology 33: 35–39.

BRYJA J., CHARBONNEL N., BERTHIER K., GALAN M., COSSON J.-F., 2007: Density-related changes in selection pattern for major histocompatibility complex genes in fluctuating populations of voles. Molecular Ecology 16: 5084–5097.

BRYJA J., PATZENHAUEROVÁ H., ALBRECHT T., MOŠANSKÝ L., STANKO M., STOPKA P., 2008: Varying levels of female promiscuity in four *Apodemus* mice species. Behavioral Ecology and Sociobiology 63: 251–260.

BUŇKOVÁ L., ŠVEC P., HALOUZKA J., RUDOLF I., NĚMEC M., 2008: Ribotyping and whole-cell protein analysis of spirochetes isolated from arthropods in the Czech Republic. Annals of Agricultural and Environmental Medicine 15: 225–230.

CASSEY P., HONZA M., GRIM T., HAUBER M. E., 2008: The modelling of avian visual perception predicts behavioural rejection responses to foreign egg colours. Biology Letters 4: 515–517.

CEPÁKOVÁ E., ŠÁLEK M., CEPÁK J., ALBRECHT T., 2007: Breeding of little ringed plovers *Charadrius dubius* in farmland: do nests in fields suffer from predation? Bird Study 54: 284–288.

DÁVIDOVÁ M., ONDRAČKOVÁ M., JURAJDA P., GELNAR M., 2008: Parasite assemblages of European bitterling (*Rhodeus amarus*), composition and effects of habitat type and host body size. Parasitology Research 102: 1001–1011.

DETER J., BRYJA J., CHAVAL Y., GALAN M., HENTTONEN H., LAAKKONEN J., VOUTILAINEN L., VAPALAHTI O., VAHERI A., SALVADOR A.R., MORAND S., COSSON J.-F., CHARBONNEL N., 2008: Association between the DQA MHC class II gene and Puumala virus infection in *Myodes glareolus*, the bank vole. Infection, Genetics and Evolution 8: 450–458.

DUSBÁBEK F.; LITERÁK I., ČAPEK M., HAVLÍČEK M., 2007: Ascid mites (Acari: Mesostigmata: Ascidae) from Costa Rican hummingbirds (Aves: Trochilidae), with description of three new species and a key to the *Proctolaelaps belemensis* species group. Zootaxa 1484: 51–67.

FLAJŠHANS M., RODINA M., HALAČKA K., VETEŠNÍK L., GELA D., LUSKOVÁ V., LUSK S., 2008: Characteristics of sperm of polyploid Prussian carp *Carassius gibelio*. Journal of Fish Biology 73: 323–328.

GVOŽDÍK L., PUKY M., ŠUGERKOVÁ M., 2007: Acclimation is beneficial at extreme test temperatures in the Danube crested newt, (Caudata, Salamandridae). Biological Journal of the Linnean Society 90: 627–636.

GVOŽDÍK L., VAN DAMME R., 2008: The evolution of thermal performance curves in semi-aquatic newts: thermal specialists on land and thermal generalists in water? Journal of Thermal Biology 33: 395–403.

HÁJKOVÁ P., PERTOLDI C., ZEMANOVÁ B., ROCHE K., HÁJEK B., BRYJA J., ZIMA J., 2007: Genetic structure and evidence for recent population decline in Eurasian otter populations in the Czech and Slovak Republics: implications for conservation. Journal of Zoology 272: 1–9.

HALAČKA K., VETEŠNÍK L., LUSK S., MENDEL J., PAPOUŠEK I., 2007: The X1X1X2X2/X1X2Y multiple sex chromosome system in the *Zingel zingel* (Pisces: Perciformes) from the Morava River (Czech Republic). Caryologia 60: 222–225.

HALOUZKA J., JUŘICOVÁ Z., JANKOVÁ J., HUBÁLEK Z., 2008: Serologic survey of wild boars for mosquito-borne viruses in South Moravia (Czech Republic). Veterinární medicína 53: 266–271.

HAMÁČKOVÁ J., LEPIČOVÁ A., PROKEŠ M., LEPIČ P., KOZÁK P., POLICAR T., STANNY L.A., 2007: Success of nursing ide (*Leuciscus idus* L.) fry related to the period of feeding with live food. Aquaculture International 15: 255–265.

HARTEMINK N.A., DAVIS S. A., REITER P., HUBÁLEK Z., HEESTERBEEK J.A.P., 2007: Importance of bird-to-bird transmission for the establishment of West Nile virus. Vector-Borne and Zoonotic Diseases 7: 575–584.

HEROLDOVÁ M., BRYJA J., ZEJDA J., TKADLEC E., 2007: Structure and diversity of small mammal communities in agriculture landscape. Agriculture, Ecosystems and Environment 120: 206–210.

HEROLDOVÁ M., HOMOLKA M., KAMLER J., KOUBEK P., FOREJTEK P., 2007: Foraging strategy of mouflon during the hunting season as related to food supply. Acta Veterinaria Brno 76: 195–202.

HEROLDOVÁ M., TKADLEC E., BRYJA J., ZEJDA J., 2008: Wheat or barley? Feeding preferences affect distribution of three rodent species in agricultural landscape. Applied Animal Behaviour Science 110: 354–362.

HOMOLKA M., HEROLDOVÁ M., BARTOŠ L., 2008: White-tailed deer winter feeding strategy in area shared with other deer species. Folia Zoologica 57: 283–293.

HONZA M., MOSKÁT C., 2008: Egg rejection behaviour in the great reed warbler (*Acrocephalus arundinaceus*): the effect of egg type. Journal of Ethology 26: 389–395.

HONZA M., POLAČIKOVÁ L., 2008: Experimental reduction of ultraviolet wavelengths reflected from parasitic eggs affects rejection behaviour in the blackcap *Sylvia atricapilla*. Journal of Experimental Biology 211: 2519–2523.

HONZA M., POLAČIKOVÁ L., PROCHÁZKA P., 2007: Ultraviolet and green parts of the colour spectrum affect egg rejection in the song thrush (*Turdus philomelos*). Biological Journal of the Linnean Society 92: 269–276.

HONZA M., POŽGAYOVÁ M., PROCHÁZKA P., TKADLEC E., 2007: Consistency in egg rejection behaviour: responses to repeated brood parasitism in the blackcap (*Sylvia atricapilla*). Ethology 113: 344–351.

HONZA M., VOŠLAJEROVÁ K., MOSKÁT C., 2007: Eviction behaviour of the common cuckoo *Cuculus canorus* chicks. Journal of Avian Biology 38: 385–389.

HOŘÁK D., ALBRECHT T., 2007: Using net sacks to examine the relationship between egg size and young size in common pochards. Journal of Field Ornithology 78: 334–339.

HOŘÁK D., ALBRECHT T., KLVAŇA P., MUSIL P., 2007: Inter-nest variability in the egg to hatchling mass ratio in the common pochard *Aythya ferina*: Does female body mass matter? Acta Ornithologica 42: 33–38.

HOŘÁK D., KLVAŇA P., ALBRECHT T., 2008: Why there is no negative correlation between egg size and number in the common pochard? Acta Oecologica-International Journal of Ecology 33: 197–202.

HUBÁLEK Z., 2008: Mosquito-borne viruses in Europe. Parasitology Research 103(Suppl. 1): S29–S43.

HUBÁLEK Z., ČAPEK M., 2008: Migration distance and the effect of North Atlantic Oscillation on the spring arrival of birds in Central Europe. Folia Zoologica 57: 212–220.

HUBÁLEK Z., HALOUZKA J., JUŘICOVÁ Z., ŠIKUTOVÁ S., RUDOLF I., HONZA M., JANKOVÁ J., CHYTIL J., MAREC F., SITKO J., 2008: Serologic survey of birds for West Nile *Flavivirus* in Southern Moravia (Czech Republic). Vector-Borne and Zoonotic Diseases 8: 659–666.

HUBÁLEK Z., SCHOLZ H., SEDLÁČEK I., MELZER F., SANOGO Y. O., NESVADBOVÁ J., 2007: Brucellosis of the common vole (*Microtus arvalis*). Vector-Borne and Zoonotic Diseases 7: 679–688.

HUBÁLEK Z., WEGNER E., HALOUZKA J., TRYJANOWSKI P., JERZAK L., ŠIKUTOVÁ S., RUDOLF I., KRUSZEWICZ A.G., JAWORSKI Z., WŁODARCZYK R., 2008: Serologic survey of potential vertebrate hosts for West Nile Virus in Poland. Viral Immunology 21: 247–254.

CHROUST K., PAVLOVÁ M., PROKOP Z., MENDEL J., BOŽKOVÁ K., KUBÁT Z., ZAJÍČKOVÁ V., DAMBORSKÝ J., 2007: Quantitative structure–activity relationships for toxicity and genotoxicity of halogenated aliphatic compounds: Wing spot test of *Drosophila melanogaste*r. Chemosphere 67: 152–159.

JANÁČ M., JURAJDA P., 2007: A comparison of point abundance and continuous sampling by electrofishing for age-0 fish in a channelized lowland river. North American Journal of Fisheries Management 27: 1119–1125.

JÁNOVÁ E., HAVELKOVÁ D., TKADLEC E., 2007: Does reproduction accelerate the growth of eye lens mass in female voles? Belgian Journal of Zoology 137: 85–88.

JÁNOVÁ E., HEROLDOVÁ M., BRYJA J., 2008: Conspicuous demographic and individual changes in a population of the common vole in a set-aside alfalfa field. Annales Zoologici Fennici 45: 39–54.

JÁNOVÁ E., NESVADBOVÁ J., TKADLEC E., 2007: Is the eye lens method of age estimation reliable in voles? Folia Zoologica 56: 119–125.

JURAJDA P., ADÁMEK Z., JANÁČ M., VALOVÁ Z., 2007: Fish and macrozoobenthos in the Vlára stream drainage area (Bílé Karpaty Mountains). Czech Journal of Animal Science 52: 214–225.

KAMLER J., DVOŘÁK J., 2007: Prediction of water content in game trophies by near infrared reflectance spectroscopy. Journal of Near Infrared Spectroscopy 15: 401–404.

KAŇUCH P., FORNŮSKOVÁ A., BARTONIČKA T., BRYJA J., 2007: Multiplex panels of polymorphic microsatellite loci for two cryptic bat species of the genus cross-species amplification within the family Vespertilionidae. Molecular Ecology Notes 7: 871–873.

KAŇUCH P., HÁJKOVÁ P., ŘEHÁK Z., BRYJA J., 2007: A rapid PCR-based test for species identification of two cryptic bats *Pipistrellus pipistrellus* and *P. pygmaeus* and its application on museum and dropping samples. Acta Chiropterologica 9: 277–282.

KMENT P., BRYJA J., 2007: Description of *Nasocoris lautereri* sp. nov. from the Balkan peninsula, with a review of the genus *Nasocoris* (Hemiptera: Heteroptera: Miridae: Phylinae). Zootaxa 1633: 39–61.

KOPEČNÁ M., TRČKA I., LAMKA J., MORÁVKOVÁ M., KOUBEK P., HEROLDOVÁ M., MRLÍK V., KRÁLOVÁ A., PAVLÍK I., 2008: The wildlife hosts of *Mycobacterium avium* subsp. *paratuberculosis* in the Czech Republic during the years 2002–2007: Veterinární medicína 53: 420–426.

KORTAN D., ADÁMEK Z., POLÁKOVÁ S., 2007: Winter predation by otter, *Lutra lutra* on carp pond system in South Bohemia (Czech Republic). Folia Zoologica 56: 416–428.

KOŠČO J., LUSK S., PEKÁRIK L., KOŠUTHOVÁ L., LUSKOVÁ V., KOŠUTH P., 2008: The occurrence and status of species of the genera *Cobitis*, *Sabanejewia*, and *Misgurnus* in Slovakia. Folia Zoologica 57: 26–34.

KOUBKOVÁ B., BARUŠ V., HODOVÁ I., ŠIMKOVÁ A., 2008: Morphometric and molecular characteristics of *Labeonema synodontisi* n. comb. (Nematoda: Atractidae) from the West African fishes. Parasitology Research 102: 1013–1020.

KREISINGER J., ALBRECHT T., 2008: Nest protection in mallards *Anas platyrhynchos*: untangling the role of crypsis and parental behaviour. Functional Ecology 22: 872–879.

KROJEROVÁ-PROKEŠOVÁ J., BARANČEKOVÁ M., ŠÍMOVÁ P., ŠÁLEK M., ANDĚRA M., BEJČEK V., HANÁK V., HANEL L., LUSK S., MIKÁTOVÁ B., MORAVEC J., ŠŤASTNÝ K., ZIMA J., 2008: Species richness of vertebrates in the Czech Republic. Folia Zoologica 57: 452–464.

KRYŠTUFEK B., BAXTER R.M., HABERL W., ZIMA J., BUŽAN E. V., 2008: Systematics and biogeography of the Mozambique thicket rat, *Grammomys cometes*, in Eastern Cape Province, South Africa. Journal of Mammalogy 89: 325–335.

LAMKOVÁ K., ŠIMKOVÁ A., PALÍKOVÁ M., JURAJDA P., LOJEK A., 2007: Seasonal changes of immunocompetence and parasitism in chub (*Leuciscus cephalus*), a freshwater cyprinid fish. Parasitology Research 101: 775–789.

LEŽALOVÁ-PIÁLKOVÁ, R., HONZA M., 2008: Responses of black-headed gulls *Larus ridibundus* to conspecific brood parasitism. Journal of Ornithology 149: 415–421.

LISICKÁ L., LOSÍK J., ZEJDA J., HEROLDOVÁ M., NESVADBOVÁ J., TKADLEC E., 2007: Measurement error in a burrow index to monitor relative population size in the common vole. Folia Zoologica 56: 169–176.

LOISEAU A., KONEČNÝ A., GALAN M., BRYJA J., COSSON J.-F., BROUAT C., 2007: New polymorphic microsatellite loci for rodents of the genus *Mastomys* using PCR multiplexing, and cross-species amplification in *Myomys* and *Praomys*. Molecular Ecology Notes 7: 684–687.

LOISEAU A., RAHELINIRINA S., RAHALISON L., KONEČNÝ A., DUPLANTIER J.-M., BROUAT C., 2008: Isolation and characterization of microsatellites in *Rattus rattus*. Molecular Ecology Resources 8: 916–918.

MACHOLÁN M., BAIRD S.J.E., MUNCLINGER P., DUFKOVÁ P., BÍMOVÁ B., PIÁLEK J., 2008: Genetic conflict outweighs heterogametic incompatibility in the mouse hybrid zone? BMC Evolutionary Biology 8: 271–284.

MACHOLÁN M., MUNCLINGER P., ŠUGERKOVÁ M., DUFKOVÁ P., BÍMOVÁ B., BOŽÍKOVÁ E., ZIMA J., PIÁLEK J., 2007: Genetic analysis of autosomal and X-linked markers across a mouse hybrid zone. Evolution 61: 746–771.

MACHOLÁN M., VYSKOČILOVÁ M., BONHOMME F., KRYŠTUFEK B., ORTH A., VOHRALÍK V., 2007: Genetic variation and phylogeography of free-living mouse species (genus *Mus*) in the Balkans and the Middle East. Molecular Ecology 16: 4774–4788.

MÁCHOVÁ J., PROKEŠ M., SVOBODOVÁ Z., ŽLÁBEK V., PEŇÁZ M., BARUŠ V., 2007: Toxicity of Diazinon 60 EC for *Cyprinus carpio* and *Poecilia reticulata*. Aquaculture International 15: 267–276.

MALETZKY A., MIKULÍČEK P., FRANZEN M., GOLDSCHMID A., GRUBER H.-J., HORÁK A., KYEK M., 2008: Hybridization and introgression between two species of crested newts (*Triturus cristatus* and *T. carnifex*) along contact zones in Germany and Austria: morphological and molecular data. Herpetological Journal 18: 1–15.

MARTÍNKOVÁ N., MCDONALD R.A., SEARLE J.B., 2007: Stoats (*Mustela erminea*) provide evidence of natural overland colonization of Ireland. Proceedings of the Royal Society of London, B-Biological Sciences 274: 1387–1393.

MARTÍNKOVÁ N., ZIMA J., JAAROLA M., MACHOLÁN M., SPITZENBERGER F., 2007: The origin and phylogenetic relationships of *Microtus bavaricus* based on karyotype and mitochondrial DNA sequences. Folia Zoologica 56: 39–49.

MAŠOVÁ Š., BARUŠ V., HODOVÁ I., MATĚJUSOVÁ I., KOUBEK P., KOUBKOVÁ B., 2008: Morphometric and molecular characterization of *Parapharyngodon echinatus* (Nematoda, Pharyngodonidae) from the Senegal gecko (*Tarentola parvicarinata*). Acta Parasitologica 53: 274–283.

MAYS JR. H.L., ALBRECHT T., LIU M., HILL G.E., 2008: Female choice for genetic complementarity in birds: a review. Genetica 134: 147–158.

MEISTER T., LUSSY H., BAKONYI T., ŠIKUTOVÁ S., RUDOLF I., VOGL W., WINKLER H., FREY H., HUBÁLEK Z., NOWOTNY N., WEISSENBÖCK H., 2008: Serological evidence of continuing high Usutu virus (Flaviviridae) activity and establishment of herd immunity in wild birds in Austria. Veterinary Microbiology 127: 237–248.

MENDEL J., LUSK S., KOŠČO J., VETEŠNÍK L., HALAČKA K., PAPOUŠEK I., 2008: Genetic diversity of *Misgurnus fossilis* populations from the Czech Republic and Slovakia. Folia Zoologica 57: 90–99.

MENDEL J., LUSK S., VASIL'EVA E.D., VASIL'EV V.P., LUSKOVÁ V., EKMEKCI F.G., ERK'KAN F., RUCHIN A., KOŠČO J., VETEŠNÍK L., HALAČKA K., ŠANDA R., PASHKOV A.N., RESHETNIKOV S.I., 2008: Molecular phylogeny of the genus *Gobio* Cuvier, 1816 (Teleostei: Cyprinidae) and its contribution to taxonomy. Molecular Phylogenetics and Evolution 47: 1061–1075.

MIKULÍČEK P., CRNOBRNJA-ISAILOVIĆ J., PIÁLEK J., 2007: Can microsatellite markers resolve phylogenetic relationships between closely related crested newt species (*Triturus cristatus* superspecies)? Amphibia-Reptilia 28: 467–474.

MIRONOV S.V., LITERÁK I., ČAPEK M., 2008: New feather mites of the subfamily Pterodectinae (Acari: Astigmata: Proctophyllodidae) from passerines (Aves: Passeriformes) in Mato Grosso do Sul, Brazil. Zootaxa 1947: 1–38.

MODRÝ D., PETRŽELKOVÁ K.J., JIRKŮ M., KOUBEK P., 2008: Two new species of *Eimeria* Schneider, 1875 (Apicomplexa: Eimeriidae) from *Gerbilliscus guineae* Thomas (Rodentia: Gerbillinae) in the Niokolo Koba National Park, Senegal. Systematic Parasitology 71: 223–228.

MOKSNES A., RØSKAFT E., RUDOLFSEN G., SKJELSETH S., STOKKE B.G., KLEVEN O., GIBBS H.L., HONZA M., TABORSKY B., TEUSCHL Y., VOGL W., TABORSKY M., 2008: Individual female common cuckoos *Cuculus canorus* lay constant egg types but egg appearance cannot be used to assign eggs to females. Journal of Avian Biology 39: 238–241.

MOSCOVICE L.R., ISSA M.H., PETRŽELKOVÁ K.J., KEULER N.S., SNOWDON C.T., HUFFMAN M.A., 2007: Fruit availability, chimpanzee diet, and grouping patterns on Rubondo Island, Tanzania. American Journal of Primatology 69: 1–16.

MUSIL J., ADÁMEK Z., BARANYI C., 2007: Seasonal dynamics of fish assemblage in a pond canal. Aquaculture International 15: 217–226.

NICOLAS V., BRYJA J., AKPATOU B., KONEČNÝ A., LECOMPTE E., COLYN M., LALIS A., COULOUX A., DENYS C., GRANJON L., 2008: Comparative phylogeography of two sibling species of forest-dwelling rodent (*Praomys rostratus* and *P. tullbergi*) in West Africa: different reactions to past forest fragmentation. Molecular Ecology 17: 5118–5134.

PAPOUŠEK I., LUSKOVÁ V., KOŠČO J., LUSK S., HALAČKA K., POVŽ M., ŠUMER S., 2008: Genetic diversity of *Cobitis* spp. (Cypriniformes: Cobitidae) from different drainage areas. Folia Zoologica 57: 83–89.

PAPOUŠEK I., VETEŠNÍK L., HALAČKA K., LUSKOVÁ V., HUMPL M., MENDEL J., 2008: Identification of natural hybrids of gibel carp *Carassius auratus gibelio* (Bloch) and crucian carp *Carassius carassius* (L.) from lower Dyje River floodplain (Czech Republic). Journal of Fish Biology 72: 1230–1235.

PAVLAČÍK L., CELER V., KOUBEK P., LITERÁK I., 2007: Prevalence of canine distemper virus in wild mustelids in the Czech Republic and a case of canine distemper in young stone martens. Veterinární medicína 52: 69–73.
PEČÍNKOVÁ M. VØLLESTAD L.A., KOUBKOVÁ B., HUML J., JURAJDA P., GELNAR M., 2007: The relationship between developmental instability of gudgeon *Gobio gobio* and abundance or morphology of its ectoparasite *Paradiplozoon homoion* (Monogenea). Journal of Fish Biology 71: 1358–1370.
PEJCHALOVÁ K., ŽÁKOVSKÁ A., MEJZLÍKOVÁ M., HALOUZKA J., DENDIS M., 2007: Isolation, cultivation and identification of *Borrelia burgdorferi* genospecies from *Ixodes ricinus* ticks from the city of Brno, Czech Republic. Annals of Agricultural and Environmental Medicine 14: 75–79.
PIÁLEK J., VYSKOČILOVÁ M., BÍMOVÁ B., HAVELKOVÁ D., PIÁLKOVÁ J., DUFKOVÁ P., BENCOVÁ V., ĎUREJE Ľ., ALBRECHT T., HAUFFE H.C., MACHOLÁN M., MUNCLINGER P., STORCHOVÁ R., ZAJÍCOVÁ A., HOLÁŇ V., GREGOROVÁ S., FOREJT J., 2008: Development of unique house mouse resources suitable for evolutionary studies of speciation. Journal of Heredity 99: 34–44.
PIECUCH J., LOJKÁSEK B., LUSK S., MAREK T., 2007: Spawning migration of brown trout, *Salmo trutta* in the Morávka reservoir. Folia Zoologica 56: 201–212.
POLAČIK M., JANÁČ M., JURAJDA P., VASSILEV M., TRICHKOVA T., 2008: The sampling efficiency of electrofishing for *Neogobius* species in a riprap habitat: a field experiment. Journal of Applied Ichthyology 24: 601–604.
POLAČIK M., TRICHKOVA T., JANÁČ M., VASSILEV M., JURAJDA P., 2008: The ichthyofauna of the shoreline zone in the longitudinal profile of the Danube River, Bulgaria. Acta Zoologica Bulgarica 60: 77–88.
POLAČIKOVÁ L., HONZA M., PROCHÁZKA P., TOPERCER J., STOKKE B.G., 2007: Colour characteristics of the blunt egg pole: cues for recognition of parasitic eggs as revealed by reflectance spectrophotometry. Animal Behaviour 74: 419–427.
POLÁKOVÁ R., VYSKOČILOVÁ M., MARTIN J.-F., MAYS JR. H.L., HILL G.E., BRYJA J., ALBRECHT T., 2007: A multiplex set of microsatellite markers for the scarlet rosefinch (*Carpodacus erythrinus*). Molecular Ecology Notes 7: 1375–1378.
PROCHÁZKA P., BELLINVIA E., FAINOVÁ D., HÁJKOVÁ P., ELHALAH A., ALOMARI K., 2008: Immigration as a possible rescue of a reduced population of a long-distant migratory bird: Reed warblers in the Azraq Oasis, Jordan. Journal of Arid Environments 72: 1184–1192.
PROCHÁZKA P., HOBSON K.A., KARCZA Z., KRALJ J., 2008: Birds of a feather winter together: migratory connectivity in the Reed Warbler *Acrocephalus scirpaceus*. Journal of Ornithology 149: 141–150.
PRZYBYLSKI M., REICHARD M., SPENCE R., SMITH C., 2007: Spatial distribution of oviposition sites determines variance in the reproductive rate of European bitterling (*Rhodeus amarus*). Behaviour 144: 1403–1417.
RANDOLPH S.E., ASOKLIENE L., AVSIC-ZUPANC T., BORMANE A., BURRI C., GERN L., GOLOVLJOVA I., HUBÁLEK Z., KNAP N., KONDRUSIK M., KUPCA A., PEJČOCH M., VASILENKO V., ŽYGUTIENE M., 2008: Variable spikes in tick-borne encephalitis incidence in 2006 independent of variable tick abundance but related to weather. Parasites & Vectors 1(44): 1–18.
REICHARD M., 2008: Microhabitat use by fishes in the middle course of the River Gambia in the Niokolo Koba National Park, Senegal: a unique example of an undisturbed West African assemblage. Journal of Fish Biology 72: 1815–1824.
REICHARD M., JURAJDA P., 2007: Seasonal dynamics and age structure of drifting cyprinid fishes: an interspecific comparison. Ecology of Freshwater Fish 16: 482–492.
REICHARD M., LE COMBER S.C., SMITH C., 2007: Sneaking from a female perspective. Animal Behaviour 74: 679–688.
REICHARD M., LIU H., SMITH C., 2007: The co-evolutionary relationship between bitterling fishes and freshwater mussels: insights from interspecific comparisons. Evolutionary Ecology Research 9: 239–259.
REICHARD M., PRZYBYLSKI M., KANIEWSKA P., LIU H., SMITH C., 2007: A possible evolutionary lag in the relationship between freshwater mussels and European bitterling. Journal of Fish Biology 70: 709–725.
REICHARD M., SMITH C., BRYJA J., 2008: Seasonal change in the opportunity for sexual selection. Molecular Ecology 17: 642–651.
ŘEHÁK Z., BARTONIČKA T., BRYJA J., GAISLER J., 2008: New records of the Alcathoe bat, *Myotis alcathoe* in Moravia (Czech Republic). Folia Zoologica 57: 465–469.
SCHOLZ H.C., HUBÁLEK Z., SEDLÁČEK I., VERGNAUD G., TOMASO H., AL DAHOUK S., MELZER F., KÄMPFER P., NEUBAUER H., CLOECKAERT A., MAQUART M., ZYGMUNT M.S., WHATMORE A.M., FALSEN E., BAHN P., GÖLLNER C., PFEFFER M., HUBER B., BUSSE H.-J., NÖCKLER K., 2008: *Brucella microti* sp. nov., isolated from the common vole *Microtus arvalis*. International Journal of Systematic and Evolutionary Microbiology 58: 375–382.
SCHOLZ H.C., HUBÁLEK Z., NESVADBOVÁ J., TOMASO H., VERGNAUD G., LE FLECHE P., WHATMORE A.M., AL DAHOUK S., KRÜGER M., LODRI C., PFEFFER M., 2008: Isolation of *Brucella microti* from soil. Emerging Infectious Diseases 14: 1316–1317.

SKORIČ M., SHITAYE E.J., HALOUZKA R., FICTUM P., TRČKA I., HEROLDOVÁ M., TKADLEC E., PAVLÍK I., 2007: Tuberculous and tuberculoid lesions in free living small terrestrial mammals and the risk of infection to humans and animals: a review. Veterinární medicína 52: 144–161.

SLÁDEK V., BERNER M., SOSNA D., SAILER R., 2007: Human manipulative behavior in the Central European Late Eneolithic and Early Bronze Age: humeral bilateral asymmetry. American Journal of Physical Anthropology 133: 669–681.

SMITH C., ZHU Y., LIU H., REICHARD M., 2007: Deceptive female oviposition behaviour elicits male ejaculation in the European bitterling. Journal of Fish Biology 71: 1841–1846.

SOSNA D., GALETA P., SLÁDEK V., 2008: A resampling approach to gender relations: the Rebešovice cemetery. Journal of Archaeological Science 35: 342–354.

SREEPADA K.S., KOUBÍNOVÁ D., KONEČNÝ A., KOUBEK P., RÁB P., RÁBOVÁ M., ZIMA J., 2008: Karyotypes of three species of molossid bats (Molossidae, Chiroptera) from India and western Africa. Folia Zoologica 57: 347–357.

STEKOL'NIKOV A.A., LITERÁK I., ČAPEK M., HAVLÍČEK M., 2007: Chigger mites (Acari: Trombiculidae) from wild birds in Costa Rica, with a description of three new species. Folia Parasitologica 54: 59–67.

STOKKE B.G., HAFSTAD I., RUDOLFSEN G., BARGAIN B., BEIER J., CAMPAS D.B., DYRCZ A., HONZA M., LEISLER B., PAP P.L., PATAPAVIČIUS R., PROCHÁZKA P., SCHULZE-HAGEN K., THOMAS R., MOKSNES A., MØLLER A.P., RØSKAFT E., SOLER M., 2007: Host density predicts presence of cuckoo parasitism in reed warblers. Oikos 116: 913–922.

SUCHOMEL J., HEROLDOVÁ M., 2008: Effect of the seed crop of trees on the abundance and body parameters of granivorous mammals in isolated forest stands of southern Moravia (Czech Republic). Polish Journal of Ecology 56: 181–186.

SVOBODOVÁ J., ŠÁLEK M., ALBRECHT T., 2007: Roads do not increase predation on experimental nests in a highly fragmented forest land. Folia Zoologica 56: 84–89.

SYCHRA O., LITERÁK I., ČAPEK M., HAVLÍČEK M., 2007: Chewing lice (Phthiraptera) from ovenbirds, leaftossers and woodcreepers (Passeriformes: Furnariidae: Furnariinae, Sclerurinae, Dendrocolaptinae) from Costa Rica, with descriptions of four new species of the genera *Rallicola* and *Myrsidea*. Caribbean Journal of Science 43: 117–126.

SYCHRA O., LITERÁK I., ČAPEK M., HAVLÍČEK M., 2007: Chewing lice (Phthiraptera) from buntings, cardinals and tanagers (Passeriformes: Emberizidae, Cardinalidae, Thraupidae) from Costa Rica, with descriptions of two new species of the genus *Myrsidea* (Phthiraptera: Menoponidae). Zootaxa 1631: 57–68.

SYCHRA O., JENSEN J.-K., BROOKE M. DE L., TRNKA A., PROCHÁZKA P., LITERÁK I., 2008: The identity of *Menacanthus eisenachensis* Balát (Insecta: Phthiraptera: Amblycera: Menoponidae) from the Reed Warbler (Passeriformes: Sylviidae). Acta Parasitologica 53: 404–406.

ŠÁLEK M., SVOBODOVÁ J., ZASADIL P., 2007: Diversity loss to bird communities after regulation of riverine meanders: Is it compensated by growing oaks on fishpond dams? Acta Ornithologica 42: 89–97.

ŠICHA V., PROCHÁZKA P., HONZA M., 2007: Hopeless solicitation? Host-absent vocalization in the common cuckoo has no effect on feeding rate of reed warblers. Journal of Ethology 25: 147–152.

ŠIKUTOVÁ S., RUDOLF I., GOLOVCHENKO M., RUDENKO N., GRUBHOFFER L., HUBÁLEK Z., 2007: Detection of Anaplasma DNA in *Ixodes ricinus* ticks: pitfalls. Folia Parasitologica 54: 310–312.

ŠIMKOVÁ A., LAFOND T., ONDRAČKOVÁ M., JURAJDA P., OTTOVÁ E., MORAND S., 2008: Parasitism, life history traits and immune defence in cyprinid fish from Central Europe. BMC Evolutionary Biology 8: 1–11.

ŠIMKOVÁ A., PEČÍNKOVÁ M., ŘEHULKOVÁ E., VYSKOČILOVÁ M., ONDRAČKOVÁ M., 2007: *Dactylogyrus* species parasitizing European *Barbus* species: morphometric and molecular variability. Parasitology 134: 1751–1765.

ŠUMILO D., BORMANE A., ASOKLIENE L., VASILENKO V., GOLOVLJOVA I., AVSIC-ZUPANC T., HUBÁLEK Z., RANDOLPH S.E., 2008: Socio-economic factors in the differential upsurge of tick-borne encephalitis in Central and Eastern Europe. Reviews in Medical Virology 18: 81–95.

TOLLENAERE C., BRYJA J., GALAN M., CADET P., DETER J., CHAVAL Y., BERTHIER K., RIBAS SALVADOR A., VOUTILAINEN L., LAAKKONEN J., HENTTONEN H., COSSON J.-F., CHARBONNEL N., 2008: Multiple parasites mediate balancing selection at two MHC class II genes in the fossorial water vole: insights from multivariate analyses and population genetics. Journal of Evolutionary Biology 21: 1307–1320.

TÓTHOVÁ A., KNOZ J., SONNEK R., BRYJA J., VAŇHARA J., 2008: Taxonomic problems in the subgenus *Meloehelea* Wirth of the genus *Atrichopogon* Kieffer (Diptera: Ceratopogonidae) inferred from both morphological and molecular characters. Entomologica Fennica 19: 1–12.

VALLO P., GUILLÉN-SERVENT A., BENDA P., PIRES D.B., KOUBEK P., 2008: Variation of mitochondrial DNA in the *Hipposideros caffer* complex (Chiroptera: Hipposideridae) and its taxonomic implications. Acta Chiropterologica 10: 193–206.

VAŠÍČKOVÁ P., PŠIKAL I., KRÁLÍK P., WIDEN F., HUBÁLEK Z., PAVLÍK I., 2007: Hepatitis E virus: a review. Veterinární medicína 52: 365–384.
VETEŠNÍK L., PAPOUŠEK I., HALAČKA K., LUSKOVÁ V., MENDEL J., 2007: Morphometric and genetic analysis of the *Carassius auratus* complex from an artificial wetland in Morava River floodplain, Czech Republic. Fisheries Science 73: 817–822.
VINŠÁLKOVÁ T., GVOŽDÍK L., 2007: Mismatch between temperature preferences and morphology in F1 hybrid newts (*Triturus carnifex* x *T. dobrogicus*). Journal of Thermal Biology 32: 433–439.
VYSKOČILOVÁ M., ONDRAČKOVÁ M., ŠIMKOVÁ A., MARTIN J.-F., 2007: Isolation and characterization of microsatellites in *Neogobius kessleri* (Perciformes, Gobiidae) and cross-species amplification within the family Gobiidae. Molecular Ecology Notes 7: 701–704.
VYSKOČILOVÁ M., ŠIMKOVÁ A., MARTIN J.-F., 2007: Isolation and characterization of microsatellites in *Leuciscus cephalus* (Cypriniformes, Cyprinidae) and cross-species amplification within the family Cyprinidae. Molecular Ecology Notes 7: 1150–1154.
ZAKI S. A.H., JORDAN W.C., REICHARD M., PRZYBYLSKI M., SMITH C., 2008: A morphological and genetic analysis of the European bitterling species complex. Biological Journal of the Linnean Society 95: 337–347.

Papers in other refereed journals

ADÁMEK Z., PROKEŠ M., BARUŠ V., SUKOP I., 2007: Diet and growth of 1+ Siberian sturgeon, *Acipenser baerii* in alternative pond culture. Turkish Journal of Fisheries and Aquatic Sciences 7: 153–160.
BARÁNEK V., MAREŠ J., JIRÁSEK J., PROKEŠ M., SPURNÝ P., 2007: The effect of application of semimoist feeding mixture when converting the advanced fry of zander (*Sander lucioperca*) to intensive culture conditions. Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis 55: 17–23.
BENDA P., DIETZ C., ANDREAS M., HOTOVÝ J., LUČAN R.K., MALTBY A., MEAKIN K., TRUSCOTT J., VALLO P., 2008: Bats (Mammalia: Chiroptera) of the Eastern Mediterranean and Middle East. Part 6. Bats of Sinai (Egypt) with some taxonomic, ecological and echolocation data on that fauna. Acta Societatis Zoologicae Bohemicae 72: 1–103.
BRYJA J., KMENT P., 2007: True bugs (Heteroptera) of the Bukovské vrchy Hills (Poloniny National Park, Slovakia). Acta Musei Moravice, Scientiae biologicae 92: 1–51.
CERKAL R., DVOŘÁK J., VEJRAŽKA K., KAMLER J., 2007: The effect of leaf area reduction on the yield and quality of sugar beet (Beta vulgaris L. var. altissima Döll). Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis 55: 37–43.
ČERVENÝ J., KOUBEK P., 2008: Four new bat species from the „territory of the Czech Republic". Vespertilio 12: 11–14.
DVOŘÁK J., CERKAL R., KAMLER J., VEJRAŽKA K., 2007: Poškozování porostů kukuřice zvěří. Úroda 8: 35–37
FLAJŠHANS M., RODINA M., HALAČKA K., VETEŠNÍK L., GELA D., LUSKOVÁ V., LUSK S., 2008: Charakteristika spermatu polyploidního karase stříbřitého, *Carassius gibelio*. Bulletin VÚRH Vodňany 44: 78–81.
GRABOWSKA J., PIETRASZEWSKI D., ONDRAČKOVÁ M., 2008: Tubenose goby *Proterorhinus marmoratus* (Pallas, 1814) has joined three other Ponto-Caspian gobies in the Vistula River (Poland). Aquatic Invasions 3: 261–265.
GVOŽDÍK L., STEJSKAL D., DVOŘÁK J., 2007: *Triturus alpestris* (Alpine newt): hypomelanism. Herpetological Bulletin 100: 33–34.
HÁJKOVÁ P., 2007: Genetická štruktúra a recentný pokles početnosti populácií vydry riečnej v ČR a SR. Bulletin Vydra 14: 50–57.
HEROLDOVÁ M., SUCHOMEL J., PURCHART L., HOMOLKA M., KAMLER J., 2007: Small forest rodents – an important factor in the regeneration of forest stands. Beskydy 20: 217–220.
HEROLDOVÁ M., SUCHOMEL J., PURCHART L., HOMOLKA M., 2008: Impact intensity of rodents on the forest regeneration in artificial plantations in the Smrk – Kněhyně area. Beskydy 1: 33–35.
HEROLDOVÁ M., SUCHOMEL J., PURCHART L., HOMOLKA M., 2008: The role of granivorous rodents in beech forest regeneration in the Beskydy Mts. (Czech Republic). Beskydy 1: 131–134.
HEROLDOVÁ M., OBDRŽÁLKOVÁ D., ZAPLETAL M., ZEJDA J., 2008: Počty nor užívaných hrabošem polním na jaře 2008: Rostlinolékař 2008(6): 9–10.
JURAJDA P., PEŇÁZ M., REICHARD M., BERNARDOVÁ I., 2008: Water quality improvements following political changes, enhanced fish communities, and fisheries in the Czech Republic. American Fisheries Society Symposium 49: 845–850.
KAMLER J., HOMOLKA M., CERKAL R., VEJRAŽKA K., PROKEŠOVÁ J., BARANČEKOVÁ M., HEROLDOVÁ M., DVOŘÁK J., 2007: Zvěř poškozuje také slunečnici. Úroda 6: 30–32.

KOŠČO J., LUSK S., HALAČKA K., PEKÁRIK L., KOŠUTHOVÁ L., 2007: Výskyt chráněných a inváznych druhov rýb v povodí Ipľa. Natura Carpatica 48: 141–152.
KOUBEK P., ČERVENÝ J., 2007: The golden jackal (*Canis aureus*) – a new mammal species in the Czech Republic. Lynx 38: 103–106.
LOSÍK J., LISICKÁ L., HŘÍBKOVÁ J., TKADLEC E., 2007: Demografická struktura a procesy v přírodní populaci křečka polního (*Cricetus cricetus*) na Olomoucku. Lynx 38: 21–29.
LOYKA P., ADÁMEK Z., JANÁČ M., HUML J., 2008: Nová horní hranice výskytu hrouzka Kesslerova (*Gobio kessleri* Dybowski, 1862) v řece Moravě (ČR). Bulletin VÚRH Vodňany 44: 44–47.
MÁCHOVÁ J., PROKEŠ M., KROUPOVÁ H., PEŇÁZ M., BARUŠ V., 2007: Toxicita Diazinonu 60 EC pro raná vývojová stadia lína obecného (*Tinca tinca*). Bulletin VÚRH Vodňany 43: 74–80.
OBDRŽÁLKOVÁ D., ZAPLETAL M., ZEJDA J., HEROLDOVÁ M., 2007: Početní stavy hraboše polního v ČR v roce 2006 a prognóza pro jaro 2007: Rostlinolékař 2007(2): 18–19.
OBDRŽÁLKOVÁ D., ZAPLETAL M., ZEJDA J., HEROLDOVÁ M., 2008: Prognóza výskytu hraboše polního pro rok 2008: Agromanuál 2008(3): 58–59.
OBDRŽÁLKOVÁ D., ZAPLETAL M., ZEJDA J., HEROLDOVÁ M., 2008: Hraboš polní před jarem 2008: Rostlinolékař 2008(2): 13–14.
POLAČIK M., JANÁČ M., TRICHKOVA T., VASSILEV M., KECKEIS H., JURAJDA P., 2008: The distribution and abundance of the Neogobius fishes in their native range (Bulgaria) with notes on the non-native range in the Danube River. Large Rivers 18: 193–208.
PROCHÁZKA P., POŽGAYOVÁ M., HONZA M., 2007: Zajímavý případ mezidruhové krádeže hnízdního materiálu. Sluka 4: 91–94.
RUDOLF I., HUBÁLEK Z., ŠIKUTOVÁ S., ŠVEC P., 2008, Opomíjené virové infekce přenášené hematofágními členovci v České republice. Epidemiologie, Mikrobiologie, Imunologie 57: 80–89.
SEARLE J.B., HAUSSER J., ZIMA J., FREDGA K., WÓJCIK J.M., VOLOBOUEV V.T., BULATOVA N.S., NADJAFOVA R., 2007: The ISACC heritage. Russian Journal of Theriology 6: 123–167.
SUCHOMEL J., HEROLDOVÁ M., 2007: A pheasantry as the habitat of small terrestrial mammals (Rodentia, Insectivora) in southern Moravia (Czech Republic). Journal of Forest Science 53: 185–191.
SUCHOMEL J., HEROLDOVÁ M., PURCHART L., 2007: The study of changes in the synusia of small terrestrial mammals (Insectivora, Rodentia) of top parts of the Beskids (preliminary results). Beskydy 20: 211–216.
UHLÍKOVÁ J., MINÁRIKOVÁ T., ČERVENÝ J., 2008: Rys ostrovid v České republice. Ochrana přírody 63: 21–23.
ZBOŘIL J., HLADÍKOVÁ B., TKADLEC E., 2007: Populační dynamika zajíce polního (*Lepus europaeus*) na střední Moravě. Lynx 38: 89–97.

Papers in proceedings

HABÁN V., PROKEŠ M., BARUŠ V., MAREŠ J., PEŇÁZ M., 2007: Individuální růst značkových jedinců kapra obecného (*Cyprinus carpio f. domestica*) ve dvou rozdílných nádržích povodí Moravy (ČR) v prvním roce po vysazení násad. In: Švátora M. (ed.), 10. česká ichtyologická konference. Univerzita Karlova, Praha; 41–47. ISBN 978–80–86561–82–0.
HAJDÚ J., KOŠČO J., PEKÁRIK L., LUSKOVÁ V., LUSK S., VALACHOVIČ D., TOMEČEK J., 2008: Blatniak tmavý (*Umbra krameri*): súčasný stav a perspektívy. In: Kopp. R. (ed.), 11. česká ichtyologická konference. MZLU, Brno; 67–71. ISBN 978–80–7375–246–0.
HALAČKA K., LUSK S., VETEŠNÍK L., 2008: Sekundární rybí pásma a výskyt lipana podhorního (*Thymallus thymallus*) v České republice. In: Pithart D., Benedová Z., Křováková K. (eds), Ekosystémové služby říční nivy. ÚSBE AV ČR, Třeboň; 52–56. ISBN 978–80–254–1834–5.
HALAČKA K., PAPOUŠEK I., KOHOUT J., VETEŠNÍK L., LUSK S., MENDEL J., ŠLECHTA V., 2008: Populační a genetická struktura pstruha obecného a lipana podhorního jako základ úspěšného rybářského obhospodařování. In: Kopp. R. (ed.), 11. česká ichtyologická konference. MZLU, Brno; 72–76. ISBN 978–80–7375–246–0.
HUBÁLEK Z., 2007: Mosquito-borne viruses in Europe. In: Vector-borne diseases: impact of climate change on vectors and rodent reservoirs. Umweltbundesamt, Berlin; 23–27.
JURAJDA P., JANÁČ M., VALOVÁ Z., STRECK G., 2008: Indikační význam rybího společenstva v případě chronického chemického znečištění toku. In: Kopp. R. (ed.), 11. česká ichtyologická konference. MZLU, Brno; 100–105. ISBN 978–80–7375–246–0.
KAMLER J., HOMOLKA M., BARANČEKOVÁ M., KROJEROVÁ J., DVOŘÁK J., 2007: Potravní ekologie siky. In: Jelen sika v západních Čechách. Česká lesnická společnost; 18–21. ISBN 978–80–02–01942–8.
KAMLER J., HOMOLKA M., HEROLDOVÁ M., 2007: Únosný stav zvěře – komplex vztahů mezi býložravci a vegetací. In: Zjišťování početních stavů zvěře a myslivecké plánování. Česká lesnická společnost, Most; 23–26. ISBN 978–80–02–01903–9.

KONEČNÁ G., JANÁČ M., JURAJDA P., 2008: Účinnost metody opakovaných odlovů ryb. In: Kopp. R. (ed.), 11. česká ichtyologická konference. MZLU, Brno; 109–114. ISBN 978–80–7375–246–0.
LUSK S., HARTVICH P., LOJKÁSEK B., LUSKOVÁ V., PRAŽÁK O., HALAČKA K., SOVÍKOVÁ L., 2008: Nezbytnost cílených zásahů v záplavových územích pro rozvoj a stabilizaci rybí bioty. In: Pithart D., Benedová Z., Křováková K. (eds), Ekosystémové služby říční nivy. ÚSBE AV ČR, Třeboň; 142–147. ISBN 978–80–254–1834–5.
LUSK S., PRAŽÁK O., LUSKOVÁ V., HALAČKA K., VETEŠNÍK L., 2007: Velkoplošná rehabilitace říční krajiny v záplavovém území dolní části řeky Dyje. In: Měkotová J., Štěrba O. (eds), Říční krajina 5. Univerzita Palackého, Olomouc; 169–175. ISBN 978–80–244–1890–2.
LUSK S., LUSKOVÁ V., LOJKÁSEK B., HARTVICH P., 2007: Vlivy určující druhovou skladbu rybích společenstev řek Moravy, Dyje, Odry a Lužnice v úsecích s přilehlým záplavovým územím. In: Měkotová J., Štěrba O. (eds), Říční krajina 5. Univerzita Palackého, Olomouc; 176–184. ISBN 978–80–244–1890–2.
LUSK S., LUSKOVÁ V., KLÍMA O., 2008: Obnova podélné migrační prostupnosti fragmentované říční sítě povodí řeky Moravy. In: Kopp. R. (ed.), 11. česká ichtyologická konference. MZLU, Brno; 144–149. ISBN 978–80–7375–246–0.
LUSKOVÁ V., LUSK S., HALAČKA K., VETEŠNÍK L., PAPOUŠEK I., 2008: Ploidní a sexuální status komplexu „*Carassius auratus*" ve vodách České republiky. In: Kopp. R. (ed.), 11. česká ichtyologická konference. MZLU, Brno; 150–155. ISBN 978–80–7375–246–0.
MARTÍNKOVÁ N., 2008: Tutorial in phylogenetic analyses. In: Dušek L., Haruštiaková D., Martínková N. (eds), Proceedings of the 4th International Summer School on Computational Biology. Masaryk University, Brno; 92–106. ISBN 978–80–210–4793–8.
MENDEL J., LUSK S., LUSKOVÁ V., KOŠČO J., VETEŠNÍK L., HALAČKA K., 2008: Nejnovější poznatky o druhové pestrosti hrouzka rodu *Gobio* a *Romanogobio* na území ČR a SR. In: Kopp. R. (ed.), 11. česká ichtyologická konference. MZLU, Brno; 166–173. ISBN 978–80–7375–246–0.
PLHAL R., KAMLER J., DVOŘÁK J., 2007: Jaké jsou reálné stavy zvěře a jak je zjistit? In: Zjišťování početních stavů zvěře a myslivecké plánování. Česká lesnická společnost, Most; 64–66. ISBN 978–80–02–01903–9.
PROKEŠ M., MAREŠ J., BARUŠ V., HABÁN V., PEŇÁZ M., 2008: Růst a distribuce kapra obecného (*Cyprinus carpio*) v ÚN Brno a Dalešice. In: Kopp. R. (ed.), 11. česká ichtyologická konference. MZLU, Brno; 180–186. ISBN 978–80–7375–246–0.
ŠUSTR P., JIRSA A., KROJEROVÁ J., BARANČEKOVÁ M., 2008: Chování a prostorová aktivita jelenovitých (jelen lesní, srnec obecný) v Národním parku Šumava ve vztahu ke škodám na lesních porostech. In: Knížek M. (ed.), Škodliví činitelé v lesích Česka 2007/2008: VÚLHM, Praha; 42–45.
ŠVANYGA J., JANÁČ M., JURAJDA P., 2008: Struktura plůdkového společenstva ryb v podélném profilu řeky Labe. In: Kopp. R. (ed.), 11. česká ichtyologická konference. MZLU, Brno; 229–234. ISBN 978–80–7375–246–0.
VALLO P., 2008: Basic phylogenetic methods. In: Dušek L., Haruštiaková D., Martínková N. (eds), Proceedings of the 4th International Summer School on Computational Biology. Masaryk University, Brno; 72. ISBN 978–80–210–4793–8.

Book reviews

BARUŠ V., 2007: Moravec F.: Dracunculoid and Anguillicoloid Nematodes Parasitic in Vertebrates. Academia, Praha, 2006, 636 pp. Folia Parasitologica 54: 108.
ČAPEK M., 2008: Sigrist T.: Aves do Brasil: uma visão artística. Avis Brasilis, São Paulo, 2006, 672 pp. Tichodroma 20: 189–190.
HÁJKOVÁ P., 2007: Kruuk H.: Otters: ecology, behaviour and conservation. Oxford University Press, 2006, 280 pp. Folia Zoologica 56: 118.
KAMLER J., 2007: Hespeler B., Černá zvěř. Grada, Praha, 2007, 127 pp. Myslivost: Stráž myslivosti 55(7): 77.
ZIMA J., 2007: Jak se maluje prales. Akademický bulletin 3/2007: 24–25.
ZIMA J., 2007: Avise J.C.: Evolutionary pathways in nature. Folia Geobotanica 42: 443–444.

Popularization books and articles

ALTMAN K., BARTOŇ J., HRÁDEK M., HUDEC K., KLOFEROVÁ S., LACINA J., LASÁK M., LAUTERER P., NOVÁKOVÁ L., PECHOVÁ J., PEŇÁZ M., RYŠAVÁ L., ŠRÁMEK R., 2008: Vír v údolí Svratky. Obec Vír, Vír, 252 pp. ISBN 978–80–254–3430–7.
ANDĚRA M., ČERVENÝ J., 2007: Nutrie – z farem do přírody. Živa 55: 182–184.
BÍMOVÁ B., MACHOLÁN M., 2007: Je důležité znát pachové preference domácích myší? Živa 55: 281–283.
BURDA H., ČERVENÝ J., VOJTĚCH O., 2008: Magnetické krávy a internet přitahují. Vesmír 87: 750–753.

ČAPEK M., NOVÁČKOVÁ L., 2008: Tribute to prominent Czech ornithologist Karel Hudec on his 80th birthday. Folia Zoologica 57: 199–200
ČAPEK M., SLABÁKOVÁ H., ZIMA J. (eds), 2007: Biennial Report 2005–2006. ÚBO AV ČR, Brno, 85 pp. ISBN 978–80–903329–8–0.
ČERVENÝ J., 2007: Kongres Unie biologů zvěře v Uppsale. Myslivost: Stráž myslivosti 55(10): 40.
ČERVENÝ J., 2007: Miloš Anděra šedesátiletý. Živa 55: LXVII.
ČERVENÝ J., 2007: Návrat bez návratu? Seminář o návratu velkých savců do střední Evropy. Svět myslivosti 8(9): 10–11.
HÁJKOVÁ P., 2007: Čo je nového vo výskume a ochrane vydier? alebo Vydry na konferenciách v roku 2007. Bulletin Vydra 14: 65–68.
HUBÁLEK Z., 2008: Ptactvo Islandu. Živa 56: 178–180.
JIRKŮ M., PETRŽELKOVÁ K.J., 2008: Maiombé – a Esmeralda de Angola. ÚBO AV ČR, Brno, 91 pp. ISBN 978–80–87189–02–3.
KAMLER J., 2007: Co čekáme od pojištění odpovědnosti? Svět myslivosti 8(11): 20–21.
KAMLER J., 2007: Jak nás vidí jeleni? Svět myslivosti 8(7): 11.
KAMLER J., 2007: Jedním z hlavních výsledků mysliveckého hospodaření jsou škody zvěří. Myslivost: Stráž myslivosti 55(5): 10–11.
KAMLER J., 2007: Konference: Zjišťování početních stavů zvěře a myslivecké plánování. Myslivost: Stráž myslivosti 55(7): 58–59.
KAMLER J., 2007: Podstatou myslivosti byl a stále je odpovědný lov zvěře. Myslivost: Stráž myslivosti 55(3): 11.
KAMLER J., 2007: Zoologické dny 2007 a problematika zvěře. Svět myslivosti 8(3): 26.
KAMLER J., DVOŘÁK J., 2007: Seminář o škodách působených zvěří v zemědělství a o ochraně proti nim. Svět myslivosti 8(12): 16–17.
KAMLER J., HOMOLKA M., CERKAL R., PROKEŠOVÁ J., BARANČEKOVÁ M., HEROLDOVÁ M., DVOŘÁK J., 2007: Pozor na škody působené zvěří na slunečnici! Svět myslivosti 8(9): 8–9.
KAMLER J., PLHAL R., DVOŘÁK J., 2007: Jaká je realita současného mysliveckého hospodaření? Svět myslivosti 8(7): 6–7
KAMLER J., PLHAL R., DVOŘÁK J., 2007: Jaké stavy zvěře jsou opravdu únosné? Svět myslivosti 8(3): 12–13.
KOUBEK P., 2007: Jeřábek lesní – zapomenutý druh lovné zvěře. Svět myslivosti 8(4): 10–12.
KOUBEK P., 2008: Šakal obecný v České republice. Svět myslivosti 9(4): 8–10.
KOUBEK P., ČERVENÝ J., 2007: Kam se ubírá výzkum zvěře? Zamyšlení nad 28. kongresem IUGB. Svět myslivosti 8(10): 14–16.
KROJEROVÁ J., BARANČEKOVÁ M., 2008: 1. mezinárodní konference věnována rodu *Cervus*. Svět myslivosti 9(1): 10–11.
KROJEROVÁ J., BARANČEKOVÁ M., ŠUSTR P., 2008: Potravní strategie šumavského jelena. Svět myslivosti 9(6): 8–10.
LITERÁK I., STEKOL'NIKOV A.A., HAVLÍČEK M., ČAPEK M., RODRÍGUEZ B.C., 2007: Sametky – paraziti ptáků Kostariky. Živa 55: 271–274.
LOTOCKI T., VETEŠNÍK L., 2007: Jak se daří našim pstruhům?! Český rybář 10(11): 36–38.
LOTOCKI T., VETEŠNÍK L., 2007: Jak se dělá vánoční kapr. Český rybář 10(12): 36–38
LOTOCKI T., VETEŠNÍK L., 2007: Kapr trochu jinak. Český rybář 10(5): 36–38
LOTOCKI T., VETEŠNÍK L., 2007: Kapr trochu jinak II. Český rybář 10(6): 36–38
LOTOCKI T., VETEŠNÍK L., 2007: Nepůvodní druhy ryb v našich vodách. Český rybář 10(3): 36–38.
LOTOCKI T., VETEŠNÍK L., 2007: Nepůvodní druhy ryb v našich vodách II. Český rybář 10(4): 36–38.
LOTOCKI T., VETEŠNÍK L., 2007: O přirozeném výtěru v našich vodách. Český rybář 10(2): 37–39.
LOTOCKI T., VETEŠNÍK L., 2007: Věkové a růstové schopnosti ryb. Český rybář 10(8): 36–38.
LOTOCKI T., VETEŠNÍK L., 2008: Poznáme naše ryby? Amur, tolstolobik a tolstolobec. Český rybář 11(9): 36–38.
LOTOCKI T., VETEŠNÍK L., 2008: Poznáme naše ryby? Bolen, ouklej, ouklejka, slunka. Český rybář 11(8): 36–38.
LOTOCKI T., VETEŠNÍK L., 2008: Poznáme naše ryby? Candát obecný, candát východní a okoun říční. Český rybář 11(12): 36–38.
LOTOCKI T., VETEŠNÍK L., 2008: Poznáme naše ryby? Cejni a cejnek. Český rybář 11(2): 36–38.
LOTOCKI T., VETEŠNÍK L., 2008: Poznáme naše ryby? Hrouzci. Český rybář 11(7): 36–38.
LOTOCKI T., VETEŠNÍK L., 2008: Poznáme naše ryby? Jelci. Český rybář 11(3): 36–38.
LOTOCKI T., VETEŠNÍK L., 2008: Poznáme naše ryby? Karasi. Český rybář 11(5): 36–38.
LOTOCKI T., VETEŠNÍK L., 2008: Poznáme naše ryby? Perlín vs. plotice. Český rybář 11(6): 36–38.
LOTOCKI T., VETEŠNÍK L., 2008: Poznáme naše ryby? Podoustev říční vs. Ostroretka stěhovavá. Český rybář 11(4): 36–38.
LOTOCKI T., VETEŠNÍK L., 2008: Poznáme naše ryby? Pstruh obecný, pstruh americký duhový, siven americký, losos obecný. Český rybář 11(11): 36–38.

LOTOCKI T., VETEŠNÍK L., 2008: Ryba se žhavým srdcem. Český rybář 11(1): 36–38.
LUSK S., LUSKOVÁ V., HALAČKA K., 2008: Zamyšlení nad příčinami trvalého poklesu úlovků pstruha obecného. Rybářství. 2008 (4): 14–19.
MARTÍNKOVÁ N., SEARLE J.B., 2008: Stoats and the Irish question. Planet Earth Spring 2008: 37.
PEŇÁZ M., 2008: Návraty a mizení ryb. Veronica 22(1): 6–9.
RYŠAVÁ M., 2008: Vliv zemníků na reprodukci ryb dolního toku Dunaje. ZooReport 2: 3–4.
SLÁDEK V., 2007: Oživují podobu člověka: Seminář o rekonstrukci podoby lidského obličeje podle lebky v laboratoři biologické antropologie FF ZČU. Stady: měsíčník Západočeské univerzity v Plzni: 1(4): 11.
SUCHOMEL J., HEROLDOVÁ M., 2007: Sika v Japonsku. Svět myslivosti 8(12): 10–12.
SUCHOMEL J., HEROLDOVÁ M., 2008: Vliv siků na lesní porosty v Japonsku. Svět myslivosti 9(10): 14–15.
VETEŠNÍK L., 2008: Český rybář v Senegalu. Český rybář 11(8): 6–9.
VETEŠNÍK L., LOTOCKI T., 2007: Červený seznam mihulí a ryb České republiky. Český rybář 10(9): 36–38.
VETEŠNÍK L., LOTOCKI T., 2007: Červený seznam mihulí a ryb České republiky – pokračování. Český rybář 10(10): 36–38.
VETEŠNÍK L., LOTOCKI T., 2008: Poznáme naše ryby? Sekavec, sekavčík, piskoř a mřenka. Český rybář 11(10): 36–38.
ZAPLETAL M., OBDRŽÁLKOVÁ D., HEROLDOVÁ M., 2007: Hraboš polní – aktuální v roce 2007 a dalších letech. Farmář 13(9): 20–21.
ZAPLETAL M., OBDRŽÁLKOVÁ D., HEROLDOVÁ M., 2007: Hraboš se zřejmě opět přemnoží. Zemědělec 15(37): 39.
ZEJDA J., 2008: Vracejí se savci do naší krajiny? Veronica 22(1): 2–5.
ZIMA J., 2007: Zoologické zahrady patří do našeho života. ZooReport 2: 3.

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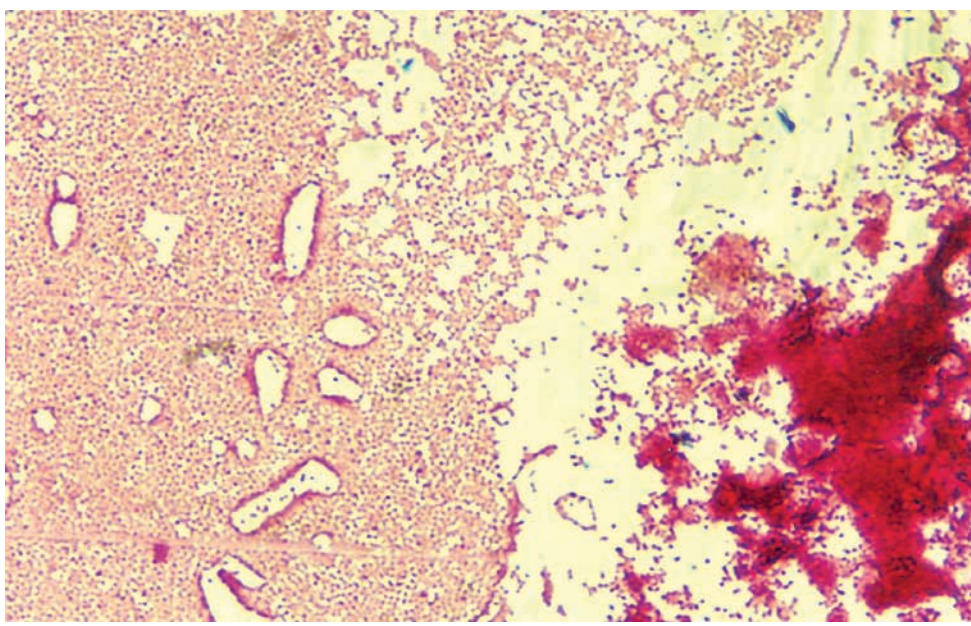
Research Priorities

Research is focused on the ecology of selected microbial pathogens, causative agents of human and animal diseases, including emerging infectious diseases. Natural focality of zoonotic diseases is investigated in relation to the role played by wild vertebrates (hosts or reservoirs of infections) and their haematophagous ectoparasites (arthropod vectors of infections), under effects of recent changes of environmental conditions.
Main research topics include:

- arboviruses (i.e. viruses transmitted by ticks, mosquitoes and other haematophagous arthropods), such as West Nile, Ťahyňa, and tick-borne encephalitis viruses

Colliquating abscess on a leg of a common vole.*Microtus arvalis* (Photo by M. Škorič)



Pus from the hind leg of a common vole, Gram stain (Photo by Z. Hubálek)

- spirochetes (*Borrelia burgdorferi* sensu lato, the agent of Lyme borreliosis) and some other bacterial zoonotic agents
- circulation of zoonotic pathogens in terrestrial and aquatic ecosystems under changing environmental conditions also involving enhanced anthropogenic impacts
- development and optimisation of new molecular-biological techniques for detection and characterization of the pathogens investigated
- surveillance of free-living and domestic vertebrates and humans for selected zoonotic pathogens, using serological surveys and epidemiological methods, in relation to preventive medicine (human and veterinary), environmental protection, and nature conservation

Selected Research Results

Brucella microti sp. nov. – a 'missing link' in the evolution of brucellae, the pathogens of mammals?

Severe systemic disease in population of the common vole (*Microtus arvalis*) appeared in South Moravia a few years ago, caused by a bacterium which has been described as a new species *Brucella microti* (type strain CCM 4915). Its inclusion in the genus *Brucella* was confirmed using DNA-DNA hybridization and a number of other molecular-genetic techniques. Biochemical tests revealed a surprisingly high level of enzymatic activity of this species and also certain metabolic features not present in other brucellae while common in some saprophytic soil microorganisms, e.g. in the related genus *Ochrobactrum* of the same family *Brucellaceae*. Additional isolates of *B. microti* were reported from enlarged lymphatic nodes of several red foxes (*Vulpes vulpes*) in Lower Austria, and even from the soil samples collected in vole burrows at the original South-Moravian site of the prototype strain, i.e. several years after the vole epizootic. It is therefore possible that *B. microti* is essentially a soil bacterium but potentially pathogenic to mammals. This species could represent a 'missing link' in the evolutionary trajectory of brucellae from saprophytic to parasitic microorganisms. Brucellae belong to dangerous and frequently studied pathogens of humans and domestic animals. The unexpected discovery of their brand new species could be helpful for experimental studies of pathogenicity and therapy of brucellosis.

HUBÁLEK Z., SCHOLZ H.C., SEDLÁČEK I., MELZER F., SANOGO Y.O., NESVADBOVÁ J., 2007: Brucellosis of the common vole (*Microtus arvalis*). Vector-Borne and Zoonotic Diseases 7: 679–688.

SCHOLZ H.C., HUBÁLEK Z., SEDLÁČEK I, VERGNAUD G., TOMASO H., AL DAHOUK S., MELZER F., KÄMPFER P., NEUBAUER H., CLOECKAERT A., MAQUART M., ZYGMUNT M.S., WHATMORE A.M., FALSEN E., BAHN P., GÖLLNER C., PFEFFER M., HUBER B., BUSSE H.-J., NÖCKLER K., 2008: *Brucella microti* sp. nov., isolated from the common vole *Microtus arvalis*. International Journal of Systematic and Evolutionary Microbiology 58: 375–382.

SCHOLZ H.C., HUBÁLEK Z., NESVADBOVÁ J., TOMASO H., VERGNAUD G., LE FLECHE P., WHATMORE A.M., AL DAHOUK S., KRÜGER M., LODRI C., PFEFFER M., 2008: Isolation of *Brucella microti* from soil. Emerging Infectious Diseases 14: 1316–1317.

Serologic surveys of the wild boar for arthropod-borne viruses and bacteria

A serosurvey for mosquito-borne viruses was carried out in 93 wild boars (*Sus scrofa*) sampled on 24 hunting grounds of the Břeclav district (South Moravia) from 2000 to 2002. Specific antibodies neutralizing *Flavivirus* West Nile (WNV) were detected in six animals, exclusively at Lanžhot and Kostice, i.e. in the area of the "Soutok" game reserve where WNV-Rabensburg was isolated in South Moravia from mosquitoes in 1997. However, the antibody titres were comparatively low (1:20–1:40). A substantially higher seroprevalence was revealed against

Orthobunyavirus Ťahyňa: 18 wild boars were positive, and the titres ranged from 1:20 up to 1:640. Only single animal seroreacted with *Orthobunyavirus* Batai (Čalovo), at a low titre of 1:20. The sera were additionally examined by haemagglutination-inhibition test against *Alphavirus* Sindbis: two boars revealed antibodies, the titres were 1:20 and 1:80. The serosurvey indicates that the activity of mosquito-borne viruses in South Moravia has decreased compared with the past decades, but surveillance for these viruses is still necessary.

Sera of 642 wild boars (*Sus scrofa*) shot by hunters in 10 administrative regions of the Czech Republic during 1995–2000 were tested by indirect hemagglutination assay for the presence of anti-*Borrelia* IgG. Antibodies to *B. burgdorferi* sensu lato (*Bb*) were detected in serum samples from all 10 regions: overall seroprevalence rate was 12.8%, and titres of antibodies ranged from 1:80 to 1:640. Seasonal seroprevalence rate increased in March and April, the peak was in May. The results suggest frequent exposure of wild boars to ixodid ticks infected with *Bb,* predominantly in rural and forested regions. Wild boar serology may provide another means of surveillance of endemic areas for lyme borreliosis.

HALOUZKA, J., JUŘICOVÁ Z., JANKOVÁ J., HUBÁLEK Z., 2008: Serologic survey of wild boars for mosquito-borne viruses in South Moravia (Czech Republic). Veterinární Medicína 53: 266–271.

JUŘICOVÁ Z., HUBÁLEK Z., in press: Serologic survey of the wild boar (*Sus scrofa*) for *Borrelia burgdorferi* sensu lato. Vector-Borne and Zoonotic Diseases (DOI: 10.1089/vbz.2008.0125).

Borrelia burgdorferi sensu lato in *Ixodes ricinus* ticks

Six *Borrelia burgdorferi* sensu lato isolates were recovered from *Ixodes ricinus* ticks and compared with one strain of spirochete with uncertain taxonomic position isolated from *Culex pipiens* mosquito collected in Valtice area (South Moravia, Czech Republic), as well as with representative type strains of *B. burgdorferi* sensu lato, using ribotyping and whole-cell protein fingerprinting. The ribotype patterns obtained with *HindIII* and *EcoRV* showed good correlations with the established genotypes and grouped each genomic species in a well-separated cluster. The whole-cell protein profiles of genomospecies were more heterogenous than the ribotype patterns. The non-identified spirochetal strain from mosquitoes was clearly separable from the *Borrelia* isolates by both methods demonstrating thus their good capacity to differentiate and characterize *B. burgdorferi* s.l. strains.

Ixodes ricinus ticks were collected by flagging vegetation in suburban woods of the city of Brno. The midgut of each tick was dissected out and transferred individually into BSK-H medium. Forty-five of 305 tick samples were positive when tested by dark-field microscopy for borreliae. Polymerase chain reaction (PCR) then revealed 37 samples positive for *B. burgdorferi* s.l. DNA. All samples were further analyzed by restriction fragment length polymorphism (RFLP) method. PCR-RFLP analysis revealed 15 strains of *Borrelia garinii*, 14 strains of *B. afzelii* and two strains each of *B. burgdorferi* sensu stricto and *B. valaisiana*. Four samples showed a mixed population of these genomic species. Isolation attempts resulted in 21 spirochaetal strains (including two strains of *B. valaisiana*). The results show a remarkable diversity of *B. burgdorferi* s.l. in tick population in the examined suburban park.

BUŇKOVÁ L., ŠVEC P., HALOUZKA J., RUDOLF I., NĚMEC M., 2008: Ribotyping and whole-cell protein analysis of spirochetes isolated from arthropods in the Czech Republic. Annals of Agricultural and Environmental Medicine 15: 45–50.

PEJCHALOVÁ K., ŽÁKOVSKÁ A., MEJZLÍKOVÁ M., HALOUZKA J., DENDIS M., 2007: Isolation, cultivation and identification of *Borrelia burgdorferi* genospecies from *Ixodes ricinus* ticks from the city of Brno, Czech Republic. Annals of Agricultural and Environmental Medicine 14: 75–79.

Application of Research Results

A review of mosquito-borne viruses in Europe

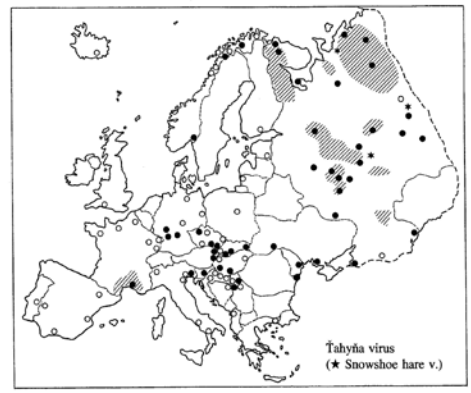
A review was prepared on mosquito-borne viruses ('moboviruses') that have occurred in Europe since the 20th century: their number now stands at ten. They belong to families Togaviridae (Sindbis, Chikungunya), Flaviviridae (West Nile, Usutu, Dengue), and Bunyaviridae (Batai, Ťahyňa, Snowshoe hare, Inkoo, Lednice). Several of them play a definite role in human or animal pathology (Sindbis, Chikungunya, West Nile, Ťahyňa). Mobovirus outbreaks are strictly determined by the presence and/or import of particular competent vectors of the disease. Ecological variables affect moboviruses considerably, the main factors are: population density of mosquito vectors and their vertebrate hosts; summer precipitations, floods; summer temperatures and drought; presence of appropriate habitats, e.g., wetlands, small water pools, or intravillan sewage systems. Surveillance for moboviruses and the diseases they cause in Europe is recommendable, otherwise the cases may often pass unnoticed or misdiagnosed.

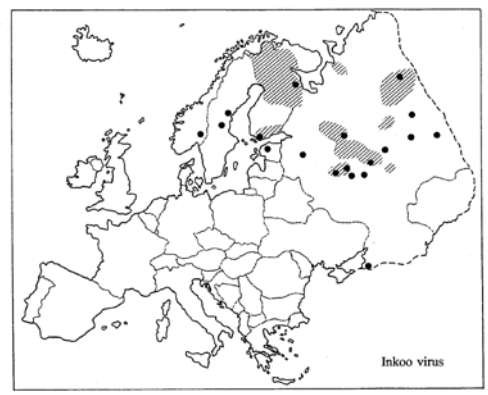
In the Czech Republic, four generally less known moboviruses (flavivirus West Nile, bunyaviruses Ťahyňa, Batai, and Lednice) circulate, of which the first three have been reported to cause human disease. Moreover, antibodies against another pathogenic virus found in Europe, i.e. alphavirus Sindbis, were detected in this country.

HUBÁLEK Z., 2008: Mosquito-borne viruses in Europe. Parasitology Research 103, Supplement 1: 29–43.
RUDOLF I., HUBÁLEK Z., ŠIKUTOVÁ S., ŠVEC P., 2008: Opomíjené arbovirové infekce přenášené hematofágními členovci v České republice [Neglected arthropod-borne viral infections in the Czech Republic]. Epidemiologie Mikrobiologie Imunologie 57: 80–89.

Urban birds as a public health problem

Beside the harm that some wild urban bird species (mostly feral pigeons) cause to buildings by their activity and droppings, their nesting sites can be the source of abundant ectoparasites such as argasid ticks, mites or fleas that produce allergic reactions in people. Also, certain microorganisms pathogenic to people have been found to be associated with wild urban birds: some arboviruses (St. Louis encephalitis virus, West Nile virus); *Chlamydophila psittaci* (the etiologic agent of ornithosis); *Borrelia burgdorferi* sensu lato (the agent of Lyme disease); *Campylobacter jejuni* (the agent of campylobacterosis); *Salmonella enterica* serovars Enteritidis and Typhimurium (the agents of salmonellosis); *Histoplasma capsulatum* (the agent of histoplasmosis); and *Cryptococcus neoformans* (the agent of cryptococcosis). Cases of human disease acquired directly from urban birds or from their habitats have been reported for ornithosis, histoplasmosis, salmonellosis, campylobacterosis, mycobacteriosis, cryptococcosis, and toxoplasmosis. Monitoring zoonotic and sapronotic diseases associated with birds in urban areas is the first essential step in controlling these diseases. In circumstances of established risk, managing urban bird populations should include restricting their feeding at public sites; control of scavenging birds on landfill sites and at harbours; and controlling and sanitizing large communal roosts of birds in city parks and suburban habitats. Also, proactive and reactive control measures can be implemented, such as: dispersing birds (for example, by acoustic or light signal methods, predation by trained raptors or water-mist sprayers); modifying habitats (for example, by thinning or clearing vegetation); inhibiting birds from breeding on buildings by blocking the loft orifices and perch sites in, on, and below the roofs, using netting, spike systems, repellent gels or electroshock deterrents; collecting and inactivating eggs; trapping and





Geographic distribution of mosquito-borne viruses in Europe. Explanation: dots – virus isolation or human disease; circles and hatchures – antibodies detected.

euthanizing the captured birds, if permitted; and sterilizing birds chemically with a treated feed bait, if permitted.

Integrated management approach should also involve educational and legal components. This material resulted from several meetings of a WHO expert group on Public Health Significance of Urban Pests.

HUBÁLEK Z., 2008: Chapter 8 – Birds. In: Bonnefoy X., Kampen H., Sweeney K. (eds.), Public Health Significance of Urban Pests, pp. 239–287. WHO (Europe), Copenhagen.

International Cooperation

Bird-to-bird transmission of West Nile virus: mathematical modelling

West Nile virus (WNV) is principally considered to be maintained in a mosquito–bird transmission cycle. Under experimental conditions, several other transmission routes have been observed, but the significance of these additional routes in nature is unknown. Within the framework of the FP6 European project EDEN, we derived an expression for the basic reproduction number (R_0) for WNV including all putative routes of transmission between birds and mosquitoes to gauge the relative importance of these routes for the establishment of WNV. Parameters were estimated from published experimental results. Sensitivity analysis reveals that R_0 is sensitive to transmission between birds via close contact, but not to mosquito-to-mosquito transmission. At times of year or in areas where the mosquito-to-bird ratio is low, bird-to-bird transmission may be therefore crucial in determining whether WNV can establish or not. We explain the use of R_0 as a flexible tool to measure the risk of establishment of vector-borne diseases.

HARTEMINK N.A., DAVIS S.A., REITER P., HUBÁLEK Z., HEESTERBEEK J.A.P., 2007: Importance of bird-to-bird transmission for the establishment of West Nile virus. Vector-Borne and Zoonotic Diseases 7: 575–584.

New data on the incidence of tick-borne encephalitis in Central and Eastern Europe

Tick-borne encephalitis (TBE) increased 2–30–fold in Central and Eastern European (CEE) countries from the early 1990s. Archival data (1970–2005) record major changes in the agricultural and industrial sectors, and consequent changes in the environment and socio-economic conditions, which could have increased the contact of humans with infected vector ticks: e.g., abandoned agricultural fields became suitable for rodent hosts; use of pesticides and emissions of industrial pollutants plummeted; wildlife hosts for ticks increased; unemployment and inequality increased. Some of these factors, by acting synergistically but differentially among the countries, can explain the marked spatio-temporal heterogeneities in TBE epidemiology better than climate change alone. Link between socio-economic conditions and epidemiology is indicated by striking correlations across eight CEE countries between the degree of TBE upsurge and, e.g., poverty or household expenditure on food.

The incidence of TBE showed a dramatic spike in several countries in Europe in 2006. Field data for eight countries across Europe on tick abundance, collected monthly, were analyzed in relation to TBE incidence and weather conditions. The data suggest that the TBE spike was not due to weather-induced variation in tick population dynamics. An alternative explanation involves human behavioural responses to weather favourable for outdoor recreational activities,

including mushroom and berry harvest, differentially influenced by national cultural practices and economic constraints.

Blood sera collected from 400 domestic animals in northeastern Hungary were examined for antibodies to tick-borne viruses TBEV and Bhanja (BHAV), using ELISA as screening test and plaque-reduction neutralization as confirmatory test. Antibodies to TBEV were found in 26.5% of cattle, in 7.0% of sheep, while in no horse. Among cattle, the animals up to 3 years old had significantly lower seroprevalence rate than those in older age groups. Natural foci of TBE are obviously present in northeastern Hungary. On the other hand, no antibodies neutralizing BHAV were detected.

These studies were all supported by the Framework 6 Programme of EC within the project Emerging diseases in a changing European environment (EDEN).

RANDOLPH S.E., ASOKLIENE L., AVSIC-ZUPANC T., BORMANE A., BURRI C., GERN L., GOLOVLJOVA I., HUBALEK Z., KNAP N., KONDRUSIK M., KUPCA A., PEJCOCH M., VASILENKO V., ZYGUTIENE M., 2008: Variable spikes in tick-borne encephalitis incidence in 2006 independent of variable tick abundance but related to weather. Parasites and Vectors 1:44.

ŠIKUTOVÁ S., HORNOK S., HUBÁLEK Z., DOLEŽÁLKOVÁ I., JUŘICOVÁ Z., RUDOLF I., 2009: Serological survey of domestic animals for tick-borne encephalitis and Bhanja viruses in northeastern Hungary. Veterinary Microbiology 135: 267–271.

ŠUMILO D., BORMANE A., ASOKLIENE L., VASILENKO V., GOLOVLJOVA I., AVSIC-ZUPANC T., HUBÁLEK Z., RANDOLPH S.E., 2008: Socio-economic factors in the differential upsurge of tick-borne encephalitis in Central and Eastern Europe. Reviews in Medical Virology 18: 81–95.

Serological surveys for West Nile flavivirus in vertebrates in Central Europe

A serosurvey for West Nile virus (WNV) was carried out in 54 domestic waterfowl bred on fishponds and 391 wild birds representing 28 migratory and resident species, using a plaque-reduction neutralization microtest on Vero cells. The birds were sampled in South-Moravian fishpond ecosystem, 2004–2006. Antibodies to WNV were not detected in domestic waterfowl, but 23 free-living birds of 10 species showed a positive response: *Fulica atra*, *Alcedo atthis*, *Acrocephalus scirpaceus*, *A. schoenobaenus*, *A. palustris*, *Locustella luscinioides*, *Emberiza schoeniclus*, *Sylvia atricapilla*, *Remiz pendulinus*, *Cyanistes caeruleus*, and *Sturnus vulgaris*. When 14 of the sera reacting with WNV were titrated in parallel with Usutu *Flavivirus*, one coot had a titer higher against Usutu virus than to WNV, and another one could not be attributed to any of the two viruses. In conclusion, 3.3% of wild birds had specific antibodies to WNV. The virus activity in southern Moravia was therefore limited.

A survey for antibodies to WNV was carried out by plaque-reduction neutralization microtest also in 78 horses, 20 domestic chickens, and 97 wild birds belonging to 10 species from different areas in Poland. Specific antibodies were detected in five juvenile (hatch-year) birds collected in 2006: three white storks (*Ciconia ciconia*) in a wildlife rehabilitation centre (5.4% of all examined storks, one mute swan (*Cygnus olor*) and one hooded crow (*Corvus cornix*) in a wildlife rehabilitation centre); i.e., overall seropositivity to WNV was 5.2% among wild birds sampled. The data do not indicate a significant WNV activity in Poland with a 100% certainty, but they are a respectable trace, which demands verification. One black-headed gull (*Larus ridibundus*) revealed antibodies neutralizing Usutu *Flavivirus* – this is the first record for Poland.

This study was supported by the FP6 programme of EC, within the project Emerging diseases in a changing European environment (EDEN).

HUBÁLEK Z., HALOUZKA J., JUŘICOVÁ Z., ŠIKUTOVÁ S., RUDOLF I., HONZA M., JANKOVÁ J., CHYTIL J., MAREC F., SITKO J., 2008: Serologic survey of birds for West Nile Flavivirus in southern Moravia (Czech Republic). Vector-Borne and Zoonotic Diseases 8: 659–666.

HUBÁLEK Z., WEGNER E., HALOUZKA J., TRYJANOWSKI P., JERZAK L., ŠIKUTOVÁ S., RUDOLF I., KRUSZEWICZ A.G., JAWORSKI Z., WŁODARCZYK R., 2008: Serologic survey of potential vertebrate hosts for West Nile Virus in Poland. Viral Immunology 21: 247–254.

Mass mortality of free-living birds caused by Usutu virus in Austria

Mosquito-borne Usutu flavivirus (USUV) caused avian mortality in Austria from 2001 to 2006, especially in Turdidae and in birds of prey. However, the proportion of USUV-positive dead birds decreased dramatically after 2004. To test the hypothesis of establishment of herd immunity, serological survey of susceptible wild birds was performed. Blood samples of 442 wild birds were collected. In addition, 86 birds from a prey centre were bled before, at the peak, and after the USUV transmission season in order to identify titre dynamics and seroconversions. The haemagglutination inhibition test was used for screening and the plaque reduction neutralization test for confirmation. In 2003 and 2004 the proportion of seropositive birds was <10%, but the percentage of seroreactors raised to >50% in 2005 and 2006. Almost three quarters of the owls and raptors (in a prey centre) exhibited antibodies before the 2005 transmission season; this percentage dropped to less than half at the peak of USUV transmission and raised to almost two thirds after the transmission season.

MEISTER T., LUSSY H., BAKONYI T., ŠIKUTOVÁ S., RUDOLF I., VOGL W., WINKLER H., FREY H., HUBÁLEK Z., NOWOTNY N., WEISSENBÖCK H., 2008: Serological evidence of continuing high Usutu virus (Flaviviridae) activity and establishment of herd immunity in wild birds in Austria. Veterinary Microbiology 127: 237–248.

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Research Priorities

The studies are performed on both laboratory and natural populations. Empirical data from observations and experiments supplemented by simulation modelling are used to discuss important questions of evolutionary biology, such as (model organisms given in parentheses):

- hybrid zones as barriers against gene flow and their role in speciation (*Mus, Sorex, Triturus*)
- study of factors affecting population structure (fish, bats and mammals)
- links between life history traits, adaptive genetic variation and population dynamics in small mammals (voles)

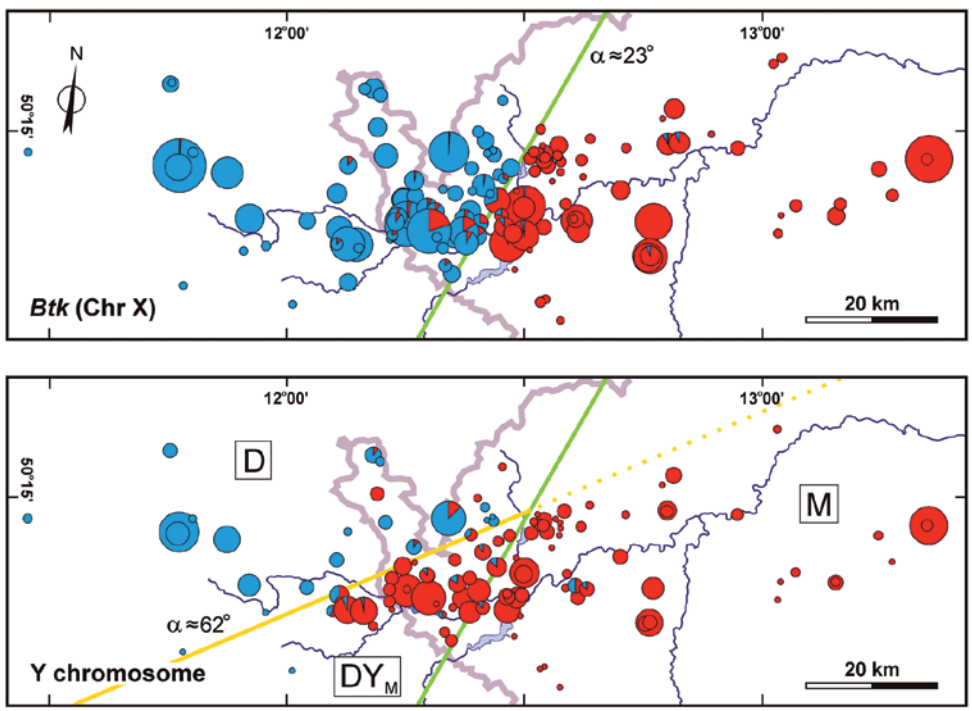
- phylogeography and reconstruction of historical colonization (*Mustela*, *Clethrionomys, Microtus*)
- analysis of reproductive success by using DNA markers (paternity analyses in fish, birds,and mammals)
- conservation genetics of endangered vertebrate species (*Lutra*, *Rupicapra*)
- mechanisms and evolution of thermal physiology traits in ectotherms (*Triturus*)
- functional approaches in studying morphological adaptations (*Zootoca*, *Triturus*)
- development of non-invasive techniques of DNA sampling and new molecular markers

The results of these studies are used in preparing recommendations for nature conservation, rodent pest control, lecturing at universities in Brno, České Budějovice, Prague, and Olomouc.

Selected Research Results

Genetic study of speciation in a hybrid zone in the house mouse, *Mus musculus*

The *Mus musculus musculus/M. m. domesticus* contact zone in Europe is characterised by sharp frequency discontinuities for sex chromosome markers at the centre of wider clines in allozyme frequencies. However, on contrary to other transects studied so far in Denmark or southern



The upper part shows frequencies of *musculus* (red) and *domesticus* (blue) alleles for an X-linked locus (exemplified by B1–type SINE retroelement, mapping the *Btk* gene) and the lower part shows frequencies of a marker on the Y chromosome (insertion in the *Zfy2* gene). The pies are proportional to sample sizes. The bold lines indicate orientation of the X and Y chromosome front, respectively. M (*musculus*), D (*domesticus*), and DY_M (see text) indicate areas delimited by the lines.

Germany, we identified a triangular area (approximately 330 km^2) in the hybrid zone where the *musculus* Y chromosome introgresses across this front for up to 22 km into *domesticus* territory (designated as DY_M in the figure). Introgression of the Y chromosome is accompanied by a perturbation of the census sex ratio: the sex ratio is significantly female biased in *musculus* localities and *domesticus* localities lacking Y chromosome introgression (designated as M and D in Fig. 1, respectively). In contrast, where the *musculus* Y is detected in *domesticus* localities, the sex ratio is close to parity, and significantly different from both classes of female biased localities. We suggest that clines for genes involved in sex-ratio distortion have escaped from the centre of the mouse hybrid zone, causing decay in the barrier to gene flow between the two house mouse taxa.

MACHOLÁN M., BAIRD S.J.E., MUNCLINGER P., DUFKOVÁ P., BÍMOVÁ B., PIÁLEK J., 2008: Genetic conflict outweighs heterogametic incompatibility in the mouse hybrid zone? BMC Evolutionary Biology 8: 271.

Development of unique house mouse resources suitable for evolutionary studies of speciation

Despite long-term intensive studies of the house mouse hybrid zone, we still know relatively little about the causes and mechanisms maintaining the two taxa as separate subspecies; therefore, to gain insight into this process, we developed eight wild-derived inbred house mouse strains. In order to produce strains with as pure *domesticus* or *musculus* genomes as possible, the individuals used to establish the breeding colony for three *domesticus* and two of the *musculus* strains were captured in the Czech Republic from wild populations at extreme western and eastern edges of the contact zone, respectively. The remaining three *musculus* strains were bred from mice captured about 250 km east of the hybrid zone. Genetic analysis based on 361 microsatellite loci showed that 82% of these markers are diagnostic for either the *musculus* or the *domesticus* strains. In order to demonstrate the potential utility of this genetic differentiation in such strains, phenotypic variation was scored for two strains from opposite edges of the hybrid zone and significant differences in morphology, reproductive performance, in vitro immune responses, mate choice based on urinary signals, and aggressiveness were found. In addition, the three strains derived from *musculus* populations far from the hybrid zone display significant differences in polymorphism in hybrid male sterility when crossed with the laboratory strains C57BL/6 or C57BL/10, which have a predominantly *domesticus* genome. Although further studies will be necessary to demonstrate *domesticus-musculus* differences, all analyses presented here indicate that these newly developed house mouse strains represent a powerful tool for elucidating the genetic basis of isolation barriers in hybrid zones and for studying speciation in general. To facilitate studies of quantitative trait loci underlying genetic incompatibilities between *Mus musculus musculus* and *M. m. domesticus*, we prepared a panel of 96 fluorescently labeled microsatellites and 10 single nucleotide polymorphisms. For efficient genotyping, we optimized multiplex conditions using five microsatellites per polymerase chain reaction. The uniform distribution of markers on autosomes and on the X chromosome makes these panels potentially also useful tools for quantitative trait loci mapping of wild house mice.

KAWAŁKO A., DUFKOVÁ P., WÓJCIK J.M., PIÁLEK J., 2009: Polymerase chain reaction multiplexing of microsatellites and single nucleotide polymorphism markers for quantitative trait loci mapping of wild house mice. Molecular Ecology Resources 9: 140–143.

PIÁLEK J., VYSKOČILOVÁ M., BÍMOVÁ B., HAVELKOVÁ D., PIÁLKOVÁ J., DUFKOVÁ P., BENCOVÁ V., ĎUREJE Ľ, ALBRECHT T., HAUFFE H. C., MACHOLÁN M., MUNCLINGER P., STORCHOVÁ R., ZAJÍCOVÁ A., HOLÁŇ V., GREGOROVÁ S., FOREJT J., 2008: Development of unique house mouse resources suitable for evolutionary studies of speciation. Journal of Heredity 99: 34–44.

The house mouse, the model organism for biomedicine and evolutionary studies (Photo by R. Mrkvica)

Evolutionary thermal biology of newts

The position and shape of the thermal performance curve (TPC) for ecologically relevant physiological functions will directly affect the performance of ectotherms and therefore should be under strong selection. However, thermodynamic considerations suggest that trade-offs among different characteristics of the TPC may constrain the evolution of thermal sensitivity. Due to the disparate thermal properties of water and air, semi-aquatic organisms face the additional potential difficulty of having to accommodate opposing selection pressures on TPCs in both environments. We examined co-evolutionary patterns between parameters of TPCs for maximum swimming and running capacity within the newt genus *Triturus.* Phylogenetic comparative analyses reveal that running and swimming speed in *Triturus* differ substantially in evolutionary patterns of variation and covariation of TPC parameters. Whereas TPCs for swimming speed have evolved mainly in shape, the shift in mean performance across all temperatures accounts for most of the interspecific variation in TPCs for running speed in *Triturus* species. Some newts possess the capacity for seasonal plasticity (acclimation) of TPCs, which acts as pacemaker in the evolution of thermal sensitivity. In addition, the mismatch between thermal biology and morphology traits may contribute to ecological disadvantage of hybrids between closely related newt species.

GVOŽDÍK L., PUKY M., ŠUGERKOVÁ M., 2007: Acclimation is beneficial at extreme test temperatures in the Danube crested newt, *Triturus dobrogicus* (Caudata, Salamandridae). Biological Journal of the Linnean Society 90: 627–636.

GVOŽDÍK L., VAN DAMME R., 2008: The evolution of thermal performance curves in semiaquatic newts: thermal specialists on land and thermal generalists in water? Journal of Thermal Biology 33: 395–405.

VINŠÁLKOVÁ T., GVOŽDÍK L., 2007: Mismatch between temperature preferences and morphology in F1 hybrid newts (*Triturus carnifex* × *T. dobrogicus*). Journal of Thermal Biology 32: 433–439.

Danube crested newt *Triturus dobrogicus* – semiaquatic species with disparate thermal physiology in terrestrial and aquatic environment (Photo by L. Gvoždík)

Ecological correlates of mating systems in field mice of the genus *Apodemus*

Sexual selection in most vertebrates is based on the evolution of fitness optimisation strategies such as multiple-male mating (MMM). Several ecological correlates of MMM have been identified in bird and fish populations; however, only few studies have documented the effects of environmental change on promiscuity in mammals. In this study, the 127 pregnant females from four ecologically diverse species of field mice were studied to assess the role of ecological factors that may have shaped the evolution of particular mating systems. MMM was found in all analyzed species: in *Apodemus uralensis* and *A. flavicollis*, up to two males could be identified as the fathers of a particular litter, while three males sired 9.1% of analyzed litters of *A. sylvaticus* and 20.6% of *A. agrarius*. Furthermore, there were obvious differences between species in relative testes size and the proportion of multiple sired litters. The species with the smallest testes and the least promiscuous was *A. uralensis* (only 43.5% of multiple sired litters), while the species with the biggest testes and the most promiscuous was *A. agrarius* (69.2%). MMM was significantly associated with higher litter size in *A. flavicollis*, and the probability of MMM strongly increased with season in *A. agrarius* and with abundance in *A. uralensis*. These results indicate that ecological factors are associated with MMM rates in *Apodemus* field mice and more research is needed to fully understand the evolution of mating strategies at different levels of biological resolution.

BRYJA J., PATZENHAUEROVÁ H., ALBRECHT, T., MOŠANSKÝ L., STANKO M., STOPKA P. 2008: Varying levels of female promiscuity in four *Apodemus* mice species. Behavioral Ecology and Sociobiology 63: 251–260.

Application of Research Results

Microsatellites as valuable genetic markers for ecological studies of vertebrates

Short tandem repeats (called also "microsatellites") are among the most polymorphic codominant single-locus genetic markers used in current molecular ecology. Individual alleles differ in the number of repetition units and the number of alleles in a single population can be very high. The combination of genotypes from more loci can thus be used for relatively secure identification of individuals (i.e. DNA "fingerprinting"). Microsatellite loci are very frequent in vertebrate genome, however, for their routine use it is necessary to describe the sequences next to the repetition (the so-called "flanking regions") and design here the primers for polymerase chain reaction (PCR). It is very simple procedure in species where the complete genome has been described; nevertheless, it is not a case for most non-model species. In general, there are two methods how to find microsatellites in a genome of wild species. First, it is possible to test the primers already designed for relative species (i.e. the cross-amplification). Unfortunately, the flanking regions often differ even between closely related taxa and it is necessary to test many loci to obtain usable set of markers. Alternatively, the genomic library is created and positive clones containing fragments with repetition are looked for by hybridization screening. Once the primers for PCR are designed, the individual loci are combined in multiplex sets allowing significant decrease of time and money necessary for population screenings. In last two years, microsatellite sets have been described at IVB for several non-model species of fishes, birds and mammals and they are now routinely used in many population studies, including e.g. paternity testing, genetics of biological invasions and conservation genetics of endangered species.

KAŇUCH P., FORNŮSKOVÁ A., BARTONIČKA T. & BRYJA J., 2007: Multiplex panels of polymorphic microsatellite loci for two cryptic bat species of the genus *Pipistrellus*, developed by cross-species amplification within the family Vespertilionidae. Molecular Ecology Notes 7: 871–873.

KAWAŁKO A., DUFKOVÁ P., WÓJCIK J.M., PIÁLEK J., 2009: Polymerase chain reaction multiplexing of microsatellites and single nucleotide polymorphism markers for quantitative trait loci mapping of wild house mice. Molecular Ecology Resources 9: 140–143.

LOISEAU A., KONEČNÝ A., GALAN M., BRYJA J., COSSON J.-F., BROUAT C., 2007: New polymorphic microsatellite loci for rodents of the genus *Mastomys* using PCR multiplexing, and cross-species amplification in *Myomys* and *Praomys*. Molecular Ecology Notes 7: 684–687.

LOISEAU A., RAHELINIRINA S., RAHALISON L., KONEČNÝ A., DUPLANTIER J.-M., BROUAT C., 2008: Isolation and characterization of microsatellites in *Rattus rattus*. Molecular Ecology Resources 8: 916–918.

POLÁKOVÁ R., VYSKOČILOVÁ M., MARTIN J.-F., MAYS H.L., HILL G.E., BRYJA J., ALBRECHT T., 2007: A multiplex set of microsatellite markers for the Scarlet Rosefinch (*Carpodacus erythrinus*). Molecular Ecology Notes 7: 1375–1378.

RUDÁ M., ŽIAK D., GAUFFRE B., ZIMA J., MARTÍNKOVÁ N., 2009: Comprehensive cross-amplification of microsatellite multiplex sets across the rodent genus *Microtus*. Molecular Ecology Resources 9: 974–978.

VYSKOČILOVÁ M., ONDRAČKOVÁ M., ŠIMKOVÁ A., MARTIN J.-F., 2007: Isolation and characterization of microsatellites in *Neogobius kessleri* (Perciformes, Gobiidae) and cross-species amplification within the family Gobiidae. Molecular Ecology Notes 7: 701–704.

VYSKOČILOVÁ M., ŠIMKOVÁ A., MARTIN J.-F., 2007: Isolation and characterization of microsatellites in *Leuciscus cephalus* (Cypriniformes, Cyprinidae) and cross-species amplification within the family Cyprinidae. Molecular Ecology Notes 7: 1150–1154

Genetic structure and evidence for recent population decline in Eurasian otter populations in the Czech and Slovak Republics

Over the latter part of the 20th century, Eurasian otter (*Lutra lutra*) populations suffered dramatic declines, resulting in extinction or fragmentation of populations in many Western and

Family of Eurasian otters *Lutra lutra* (Photo by P. Hájková)

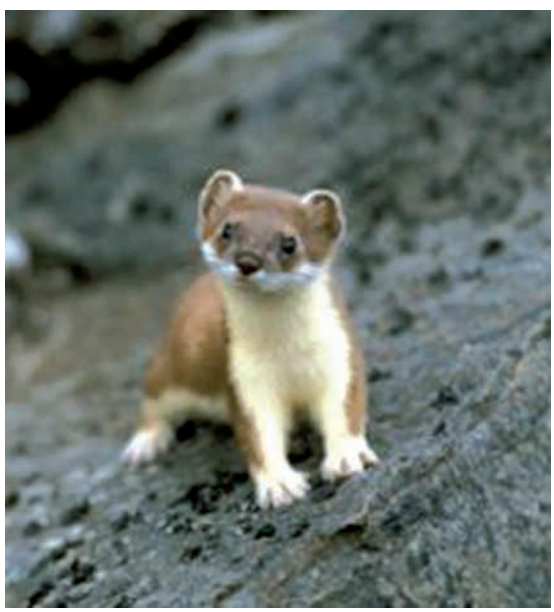
Central European countries. Part of the Czech otter population became totally isolated while the Slovak population remained partly connected to the relatively continuous Central and Eastern European otter distribution range. We examined the genetic structure and past demographic history of otters in the Czech and Slovak Republics, using microsatellite DNA extracted from faecal samples of wild ranging otters and tissue samples from carcasses. A relatively high level of genetic differentiation was found between the Czech and Slovak populations (F_{ST} = 0.15), supported by a perfect assignment in Bayesian cluster analysis. Both the Czech and Slovak populations showed significant heterozygosity excess, indicating recent population bottlenecks. A very recent population decline was also suggested by coalescent analysis, inferring a drop to ca. 25% of past effective population size in both populations. The timing of the decline was in accordance with published data from otter surveys, suggesting that the strongest decline probably occurred between the 1970s and the mid-1990s. The results of this study confirm that otter populations remain vulnerable to any violent demographic change and, despite the claims of fish-farmers and anglers for legal culls; it is highly desirable that they remain a strongly protected species in both countries. The spreading and re-connection of otter populations observed recently is essential for the future health of the populations, and should be supported through habitat conservation.

HÁJKOVÁ P., PERTOLDI C., ZEMANOVÁ B., ROCHE K., HÁJEK B., BRYJA J., ZIMA J., 2007: Genetic structure and evidence for recent population decline in Eurasian otter (*Lutra lutra*) populations in the Czech and Slovak Republics: implications for conservation. Journal of Zoology 272: 1–9.

International Cooperation

Stoats (*Mustela erminea*) provide evidence of natural overland colonization of Ireland

As the ice sheets retreated after the last glaciation, Ireland was a bleak and frozen place. Few animals or plants had survived the millennia of freezing cold and ice. We investigated the stoat (*Mustela erminea*) as a possible cold-tolerant model species for natural colonization of Ireland within the context of its Holarctic range at the last glacial maximum itself. Such a coverage of a species as evasive as the stoat might have taken many years to collect directly. Therefore, exploiting already available material from museums may be more practical for rapid and competitive research projects. Europe has a formidable network of natural history museums, providing superb geographic coverage. We isolated DNA from nearly 400 stoat samples primarily originated from across Europe, majority of which were represented by museum pelts. We used methods derived from analysis of ancient DNA, such as that of mammoths or fossil bears, and altered them for specification of museum pelt samples. Molecular genetic analysis showed that Ireland was colonised around the height of the last glaciation and suggests that Britain was colonised later. The cold-tolerant stoats followed the retreating ice at the end of the last glaciation and spread throughout Britain, Ireland and the Isle of Man. The stoats in Ireland would have become isolated with rising sea level as the ice retreated. Later, the Isle of Man population of stoats would also have become separated from the British. However, Ireland and the Isle of Man would have become islands well before Britain was separated from continental Europe. The research suggests that a land bridge with continental Europe would have been available to stoats during the warm periods of the Late Glacial and Postglacial when the



Stoat *Mustela erminea* survived the last glaciation in close vicinity of the ice-sheets (Photo by O. Gilg)

Natália Martínková isolates DNA from museum skin samples to investigate post-glacial colonisation of stoats (Photo by S. Martínek)

climate in Britain would have been similar to today. Therefore, we believe, stoats, adapted to the warm conditions, used the bridge to enter Britain and replace the original cold-tolerant lineage that continues to survive in the isolated populations of Ireland and the Isle of Man.

MARTÍNKOVÁ N., MCDONALD R.A., SEARLE J.B., 2007: Stoats (*Mustela erminea*) provide evidence of natural overland colonisation of Ireland. Proceedings of the Royal Society B-Biological Sciences 274: 1387–1393.
MARTÍNKOVÁ N., SEARLE J.B., 2006: Amplification success rate of DNA from museum skin collections: a case study of stoats from 18 museums. Molecular Ecology Notes 6: 1014–1017.

Phylogeography of African rodents

Numerous materials of small mammals collected during the research activities of Czech and French scientists in last decade in Western Africa are now intensively analysed. The main purpose of ongoing projects is to describe the diversity of living forms and by using the genetic information on intraspecific level to reconstruct the processes that influenced the African fauna since the Pleistocene. The necessary prerequisite is the availability of suitable genetic markers. We therefore described sets of microsatellites for two rodent groups. First, the *Praomys* complex contains some of the most important agricultural pests of Africa, including *Mastomys* species. We developed microsatellite markers for *Mastomys huberti*. We also showed the potential utility of *M. huberti* microsatellites as population markers for two other species of *Mastomys* , and two other species of the *Praomys* complex, *Myomys daltoni* and *Praomys* cf. *rostratus*. Second, the black rat (*Rattus rattus*) is an invasive species in many countries of Western Africa. To effectively describe the mechanisms of its invasion, we succeeded to develop microsatellite markers that are now used in detailed population genetic study in Senegal.

The first model for phylogeographic reconstructions were two sibling species of the rodent genus *Praomys* occurring in West African forests. By sampling across their geographical ranges, we tested the hypothesis that climatic oscillations during the Quaternary made an impact on the observed pattern of cytochrome *b* sequence variation. We showed that their phylogeographic histories are dissimilar, which could be related to their distinct ecological requirements. The genetic pattern of *P. tullbergi* fits the refuge hypothesis, indicating that a very small number of populations survived in distinct forest blocks during the arid phases, then expanded again with

The murid rodent *Praomys rostratus* became a model for phylogeographical analyses in western Africa (Photo by J. Červený)

The fieldworks in southeastern Senegal: Capturing of small terrestrial mammals by using the wire mesh live traps (Photo by J. Červený)

forest recovery. In contrast, a number of populations of *P. rostratus* appear to have survived the dry periods in more fragmented forest habitats, with varying levels of gene flow between them. In addition, historical variations of the West African hydrographic network could also have contributed to the pattern of genetic differentiation observed in both species.

LOISEAU A., KONEČNÝ A., GALAN M., BRYJA J., COSSON J.-F., BROUAT C., 2007: New polymorphic microsatellite loci for rodents of the genus *Mastomys* using PCR multiplexing, and cross-species amplification in *Myomys* and *Praomys*. Molecular Ecology Notes 7: 684–687.

LOISEAU A., RAHELINIRINA S., RAHALISON L., KONEČNÝ A., DUPLANTIER J.-M., BROUAT C., 2008: Isolation and characterization of microsatellites in *Rattus rattus*. Molecular Ecology Resources 8: 916–918.

NICOLAS V., BRYJA J., AKPATOU B., KONEČNÝ A., LECOMPTE E., COLYN M., LALIS, A., COULOUX A., DENYS C., GRANJON L., 2008: Comparative phylogeography of two sibling species of forest-dwelling rodent (*Praomys rostratus* and *P. tullbergi*) in West Africa: different reactions to past forest fragmentation. Molecular Ecology 17: 5118–5134.

Associations between infection by pathogens and genotypes at major histocompatibility complex genes

Major histocompatibility complex (MHC) genes are ideal candidates for the study of selection in natural populations. The way in which their extreme polymorphism evolved, however, remains a matter of debate. We therefore investigated in details the factors mediating selection acting on MHC class II genes in water voles. Almost exhaustive screening for parasites, including gastrointestinal helminths, brain coccidia and antibodies against viruses responsible for zoonoses, was carried out. We applied a co-inertia approach to the genetic and parasitological data sets to avoid statistical problems related to multiple testing. Two alleles, Arte-DRB-11 and Arte-DRB-15, displayed antagonistic associations with the nematode *Trichuris arvicolae*, revealing the potential parasite-mediated selection acting on DRB locus. On the other hand, population genetics showed significant homogeneity in allelic frequencies (i.e. the signs of balancing selection) only at the DQA1 locus. Selection mechanisms acting on the two MHC class II genes thus appeared different.

In the next study, we investigated the potential role of MHC class II gene polymorphism in the susceptibility/resistance to Puumala virus (PUUV) in the wild reservoir *Myodes glareolus*. We used multivariate analyses to explore DQA polymorphism/PUUV associations while considering the potential antagonist and/or synergistic effects of the whole parasite community. Our study suggests links between MHC class II characteristics and viral infections including PUUV and Cowpox virus. Several alleles are likely to be involved in the susceptibility or in the resistance of bank voles to these infections.

BRYJA J., CHARBONNEL N., BERTHIER K., GALAN M., COSSON J.-F., 2007: Density-related changes in selection pattern on major histocompatibility complex genes in fluctuating populations of voles. Molecular Ecology 16: 5084–5097.

DETER J., BRYJA J., CHAVAL Y., GALAN M., HENTTONEN H., LAAKKONEN J., VOUTILAINEN L., VAPALAHTI O., VAHERI A., SALVADOR A.R., MORAND S., COSSON J.-F., CHARBONNEL N., 2008: Association between the DQA MHC class II gene and Puumala virus infection in *Myodes glareolus*, the bank vole. Infection, Genetics and Evolution 8: 450–458.

TOLLENAERE C., BRYJA J., GALAN M., CADET P., DETER J., CHAVAL Y., BERTHIER K., RIBAS SALVADOR A., VOUTILAINEN L., LAAKKONEN J., HENTTONEN H., COSSON J.-F., CHARBONNEL N., 2008: Multiple parasites mediate balancing selection at two MHC class II genes in the fossorial water vole: insights from multivariate analyses and population genetics. Journal of Evolutionary Biology 21: 1307–1320.

Evolution and hybridization in crested newt species (*Triturus cristatus* superspecies)

Investigation of evolutionary relationships between closely related species requires analyzing fast evolving genetic markers. Microsatellites may be good candidates for such studies due to their high mutation rate and polymorphism. In this study we aim to show limitations of microsatellites to resolve phylogenetic relationships in closely related crested newt species *T. cristatus*, *T. dobrogicus*, *T. carnifex* and *T. karelinii* (*Triturus cristatus* superspecies). In total, 195 individuals originating from central Europe, the Balkans and Turkey were examined. The performance of six different genetic distances in estimation of genetic divergence was tested using seven highly polymorphic microsatellite loci. We *a priori* expected that if microsatellite markers are suitable for phylogenetic reconstruction within the *T. cristatus* superspecies group, intraspecific distances should be much lower than interspecific ones. Despite this expectation we found many intraspecific distances exceeded interspecific values likely due to loss of genetic distance linearity in time, revealing that none of them was able to estimate divergence between the species. This study thus revealed limits of microsatellites to estimate phylogenetic relationships between closely related amphibian species.

In the area between south-eastern Bavaria and Upper Austria the distribution ranges of northern and Italian crested newts (*T. carnifex*) are narrowly sympatric. In our study of 35 autochthonous populations, we compared distribution patterns and hybridization on the basis of morphological and molecular (cytochrome *b*, microsatellites) markers. Results showed good concordance for all markers in most populations. We detected admixed populations and individuals in three regions of Salzburg and Upper Austria. The hybrid zone is probably unimodal, with hybrid individuals predominating in the centre. The analysis of molecular markers revealed considerable genetic uniformity. The studied area has been colonized by a limited number of individuals and probably less often than areas with slightly higher diversity.

MALETZKY A., MIKULÍČEK P., FRANZEN M., GOLDSCHMID A., GRUBER H.-J., HORÁK A., KYEK, M., 2008: Hybridization and introgression between two species of crested newts (*Triturus cristatus* and *T. carnifex*) along contact zones in Germany and Austria: morphological and molecular data. Herpetological Journal 18: 1–15.

MIKULÍČEK P., CRNOBRNJA-ISAILOVIĆ, J., PIÁLEK J., 2007: Can microsatellite markers resolve phylogenetic relationships between closely related crested newt species (*Triturus cristatus* superspecies)? Amphibia-Reptilia 28: 467–474.

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Research Priorities

The research of fishes is performed at various levels of spatial and biological organization (individual, population, and community), in relation to distribution, biology, genetics, ecology, and diversity. The study reflects the heterogeneity of aquatic environment, both in term of habitats and microhabitats, and the biodiversity between and within species. Fishes are considered to be complex bioindicators of degradation as well as regeneration of aquatic habitats. Accordingly, a number of activities are aimed at restoring and revitalisation of aquatic ecosystems. Main research topics:

- diversity of fish communities and population parameters of key species in various types of aquatic habitats
- taxonomy and phylogeny, genetic diversity of fish populations

- rehabilitation of aquatic habitats and ecosystems for the restoration and conservation of fish biodiversity
- biology and conservation management of threatened species
- alien invasive species and their impact on native fish biodiversity

Selected Research Results

Morphological, genetic and reproductive analysis of the *Carassius auratus* complex and identification of natural hybrids with crucian carp *Carassius carassius*

The *Carassius auratus* complex from artificial wetlands in the Morava River basin is composed of triploid females. Based on the body depth, sampled females could be divided into two groups, the high-dorsal vs. low-dorsal. Both groups differed also in number of gill rakers. In concordance with morphological differences, genetic analysis proved the existence of two haplotypes in examined individuals. The first haplotype is bound to the high-dorsal form with higher number of gill rakers. This is the most frequent haplotype in populations of *C. a. gibelio* in the Czech Republic. The second haplotype is characteristic of the low-dorsal form with a lower number of gill rakers. This haplotype is close to haplotypes described in *C. a. langsdorfii*, which is known from Japan, and its occurrence within haplotypes reported from Europe is sporadic.

Morphological and genetic variation was examined in parental *C. a. gibelio* and *Carassius carassius* individuals, and their natural hybrids. Of meristic traits, only the number of gill rakers

Electrofishing on the lowland Morava River: J. Mendel (left) and L. Vetešník (right) (Photo by K. Halačka)

clearly distinguished hybrids (39.4±1.4) from parental *C. a. gibelio* (48.3±0.7) and *C. carassius* (28.6±1.1). MtDNA sequences showed that the hybrids were descendants of female *C. a. gibelio*. Microsatellite analysis of hybrids confirmed the presence of variants typical of *C. a. gibelio* and *C. carassius*.

Wild-captured 16 diploid, five triploid and one tetraploid *C. a. gibelio* males produced motile haploid, aneuploid (1.5n) and haploid to aneuploid (>2n) sperm, respectively, in similar concentration and with the lowest percentage of live spermatozoa in sperm for the tetraploid male compared to diploid and triploid males.

FLAJŠHANS M., RODINA M., HALAČKA K., VETEŠNÍK L., GELA D., LUSKOVÁ V., LUSK S., 2008: Characteristics of sperm of polyploid Prussian carp *Carassius gibelio*. Journal of Fish Biology 73: 323–328.

FLAJŠHANS M., RODINA M., HALAČKA K., VETEŠNÍK L., PAPOUŠEK I., GELA D., LUSKOVÁ V., LUSK S., 2007: Ploidy levels and reproductive patterns of *Carassius auratus gibelio* as revealed by means of artificial hybridization and flow cytometry. Aquaculture 272: S256.

PAPOUŠEK I. 2008: Molecular-genetic analyses of *Carassius* species in the central Europe. PhD thesis, Brno, 128pp.

PAPOUŠEK I., VETEŠNÍK L., HALAČKA K., LUSKOVÁ V., HUMPL M., MENDEL J., 2008: Identification of natural hybrids of gibel carp *Carassius auratus gibelio* (Bloch) and crucian carp *Carassius carassius* (L.) from lower Dyje River floodplain (Czech Republic). Journal of Fish Biology 72: 1230–1235.

VETEŠNÍK L., PAPOUŠEK I., HALAČKA K., LUSKOVÁ V., MENDEL J., 2007: Morphometric and genetic analysis of the *Carassius auratus* complex from an artificial wetland in floodplain of the Morava River (Czech Republic). Fisheries Science 73: 817–822.

Genetic diversity of three cobitid species (*Sabanejewia balcanica*, *Cobitis elongatoides* and *Misgurnus fossilis*) from the Czech Republic and Slovakia

Phylogenetic analysis of seven Czech and Slovakian populations of Balkan spined loach (*Sabanejewia balcanica*) based on sequencing of the cytochrome *b* gene and mitochondrial-specific marker discriminated five groups, with distinctly low genetic distances between groups and populations. Analysis of relations to Danubian-Balkanian complex of *Sabanejewia* has shown that four groups are genetically close to sublineage III, while the fifth one to the sublineage IV. These findings lead to conclusion about conspecificity of analysed populations, belonging to monotypic *S. balcanica*. Further analyses have shown that the most suitable populations for restoration of this species in the Bečva River are populations from the Ipeľ and Vlára rivers in Slovakia.

Genetic analysis of three Czech and Slovakian pure populations of *Cobitis elongatoides* based on sequencing of the cytochrome *b* gene manifested low overall genetic diversity, displaying existence of 11 different haplotypes divided into three clusters. Only three haplotypes were manifested in more than one individual.

Genetic diversity of eight populations of weather loach (*Misgurnus fossilis*) from waters of the Czech Republic and Slovakia was assessed using microsatellite analysis and sequencing of a part of the mitochondrial control region. It was the first time that microsatellite markers for weather loach were found. Five polymorphic microsatellite markers clearly discriminated respective populations. All sampled populations contained unique alleles. Analysis of the mitochondrial control region showed great haplotype similarity due to wide-spread haplotype H_1, thus suggesting possible recent spreading of weather loach from a single source.

BARTOŇOVÁ E., PAPOUŠEK I., LUSKOVÁ V., KOŠČO J., LUSK S., HALAČKA K., ŠVÁTORA M., VETEŠNÍK L., 2008: Genetic diversity and taxonomy status of *Sabanejewia balcanica* (Karaman 1922) (Osteichthyes: Cobitidae) in the waters of the Czech Republic and Slovakia. Folia Zoologica 57: 60–70.

BARTOŇOVÁ E., LUSKOVÁ V., LUSK S., KOŠČO J., ŠVÁTORA M., 2008: Sekavčík horský (*Sabanejewia balcanica*): genetická diverzita a možnosti obnovy výskytu v povodí Bečvy [Balkan spiny loach (*Sabanejewia balcanica*): distribution, genetic diversity, and possible renewal of occurrence in the Bečva River drainage area]. Biodiverzita ichtyofauny České republiky VII: 54–66.

MENDEL J., LUSK S., KOŠČO J., VETEŠNÍK L., HALAČKA K., PAPOUŠEK I., 2008: Genetic diversity of *Misgurnus fossilis* populations from the Czech and Slovak Republics. Folia Zoologica 57: 90–99.

PAPOUŠEK I., LUSKOVÁ V., KOŠČO J., LUSK S., HALAČKA K., POVŽ M., ŠUMER S., 2008: Genetic diversity of *Cobitis spp.* (Cypriniformes: Cobitidae) from different drainage areas. Folia Zoologica 57: 83–89.

Early ontogeny, growth and diet of selected fish species important in fishery production and recreational angling

During experimental reproduction and rearing of Siberian sturgeon (*Acipenser baerii*), ide (*Leuciscus idus*), and vimba bream (*Vimba vimba*) using non-traditional technologies, the early ontogeny, growth and diet of larvae and juveniles were investigated. The possibility of rearing larvae right from the beginning of exogenous feeding on purely artificial one using ASTA was performed. Survival parameters were comparable with rearing on natural food (*Artemia salina*). However, the growth and development intensity were significantly lower when the ASTA food was used than when live *A. salina* was used. Also the occurrence of visually detectable parasitic diseases was significantly higher with artificial food. Growth intensity and factor of weight condition increased proportionally with the period of feeding with live food from the beginning of exogenic feeding. The differences between individual groups of larvae (with various lengths

Experimental rearing of fish larvae (Photo by M. Prokeš)

of initial feeding) were not significant. The most advanced ontogenetic development was observed in larvae fed with live prey and the slowest development was recorded in larvae fed with live food. The results obtained can be implemented in the artificial rearing of vimba bream. Application of new information in developmental biology and reproduction of selected fish species may reduce the adverse effects of fishery exploitation of natural populations.

ADÁMEK Z., PROKEŠ M., BARUŠ V., 2007: Diet and growth of 1+ Siberian sturgeon *Acipenser baerii* in alternative pond culture. Turkish Journal of Fisheries and Aquatic Science 7: 153–160.

HAMÁČKOVÁ J., LEPIČOVÁ A., PROKEŠ M., LEPIČ P., KOZÁK P., POLICAR T., STANNY L. A., 2007: Success of nursing ide (*Leuciscus idus*, L.) fry related to the period of feeding with live food. Aquaculture International 15: 255–265.

HAMÁČKOVÁ J., PROKEŠ M., KOZÁK P., PEŇÁZ M., STANNY L.A., POLICAR T., BARUŠ V., 2009: Growth and development of vimba bream (*Vimba vimba*) larvae in relation to feeding duration with live and/or dry starter feed. Aquaculture 287: 158–162.

Application of Research Results

Monitoring of invasive fish species, their morphological and physiological adaptations

The occurrence of alien round goby, *Neogobius (Apollonia) melanostomus* was recorded for the first time in the waters of Czech Republic in July to October, 2008. Three specimens were caught in the Morava River below the weir at river km 74.1, and in the Dyje River (the tributary to the Morava River in its river km 70.0) two specimen in the stone rip-rap (river km 13.8), three specimen below the weir in Břeclav (river km 26.7). The record below the weir, i.e. migration barrier, indicates active upstream migrations.

Round goby *Neogobius (Apollonia) melanostomus* (Photo by K. Halačka)

Establishment and spread of invasive fish species are influenced by morphological, physiological, and behavioural traits. Amur sleeper (*Perccottus glenii*) is an appropriate model organism to evaluate the importance of the traits for success at each invasion stage. That is for structure of the gonads (presence of melanophores) and the epidermis were studied. Exterior and interior of male gonads contains a lot of melanophores, which provide important protection against

the radiation. The thickness of the epidermis, which is significant for mechanical resistance, is relatively distinct especially in its superficial layer. The melanophores are always present in superficial layer of epidermis. Thereby Amur sleeper shows some physiological-morphological features suggesting higher tolerance and adaptability to habitats compared with other fish species and predisposition to effective colonization of new areas.

LUSK S., VETEŠNÍK L., HALAČKA K., LUSKOVÁ V., PEKÁRIK L., TOMEČEK J., 2008: První záznam o průniku hlaváče černoústého (*Neogobius* (*Apollonia) melanostomus*) do oblasti soutoku Moravy a Dyje (Česká republika) [Round goby (*Neogobius* (*Apollonia) melanostomus*) recorded for the first time in the confluence area of the Morava and Dyje rivers (Czech Republic)]. Biodiverzita ichtyofauny České republiky VII: 114–118.

LUSK S., LUSKOVÁ V., HANEL L., 2008: Nepůvodní druhy v ichtyofauně České republiky – jejich vliv a význam [Alien species in the ichthyofauna of the Czech Republic: their impact and meaning]. Biodiverzita ichtyofauny České republiky VII: 96–113.

KOŠCO J., HALAČKA K., VETEŠNÍK L., 2008: The role of morphological and physiological adaptations of Amur sleeper (*Perccottus glenii*) in the invasion success. In: Gherardi F., Aquiloni L. (eds), Managing Alien Species for Sustainable Development of Aquaculture and Fisheries. University of Florence; 84.

Amur sleeper *Perccottus glenii* (Photo by K. Halačka)

Removing of migratory barriers on large rivers

Construction of a fish-pass on Dyje River in Břeclav (river km 27) was followed by subsequent construction, which has removed the next migratory barrier in Bulhary (river km 40). In November 2007, a fish-pass was put into use. Its length of 170 m makes it one of the longest fish-passes in Czech Republic. It enabled fish migration (through Slovakian-Austrian 70 km long stretch of Morava River) from the Danube till the Nové Mlýny waterworks (r. km 52). Furthermore, the intrinsic properties of the fish-pass markedly improved diversity of the water environment which became suitable for rheophile fish species (*Barbus barbus*, *Chondrostoma nasus*).

Fishpass on the Dyje River in Bulhary (Photo by K. Halačka)

Abundance of fishes found in the Bulhary fish-pass confirms its effectiveness (Photo by K. Halačka)

International Cooperation

Species diversity of gudgeons of the genus *Gobio* in the Eurasian context

Taxonomy and systematics of species of the genus *Gobio* is rather confused and validity of a number of species, subspecies and forms described in the past is under discussion. The phylogenetic relationships among gudgeons that represent most nominal taxa within *Gobio gobio* sensu lato were examined by mitochondrial and nuclear genome sequencing. The molecular analyses confirmed the separate generic status of *Gobio* as a monophyletic group and revealed 15 Eurasian lineages divided into two main clades, the Northern European and the Ponto-Caspian. The validity of eleven nominal taxa as distinct species was confirmed, gudgeons from the Volga River basin were described as a new species *G. volgensis*, and three revealed phylogenetic lineages were submitted for a comprehensive revision as "species-in-waiting". The species *G. gobio* showed a wide range extending from the British Isles to the Black Sea coast and overlapping the areas of several other species. Four pure lineages were detected in the middle Danube River basin. The Crimean Peninsula was found to be a region with the occurrence of individuals of hybrid origin. This region will require special investigation to define species participating in hybridization events, and to establish further steps for the conservation of endemic native gudgeon species. A simple diagnostic method, based on different lengths of the PCR products, called "S7indel diagnostics" was developed for further taxonomic investigations

Morphological siblings *Gobio gobio*, *Gobio obtusirostris*, *Gobio* sp. 1, *Gobio* sp. 2 and their hybrids from Ponávka River (Photo by K. Halačka)

in the genus *Gobio*. The findings important for preservation of ichthyofauna of the Czech Republic and Slovakia include confirmation of generic differentiation of the original genus *Gobio* into two genera *Gobio* and *Romanogobio*. The originally accepted uniform structure of the species *Gobio gobio* was divided into the lineages which can be assigned the species level (*Gobio gobio*, *Gobio obtusirostris*, *Gobio carpathicus* and *Gobio* sp.). The areas of sympatric occurrence of these species were localized.

MENDEL J., 2007: The using of mtDNA for characteristics of population structures of species from the genera *Gobio* and *Romanogobio*. PhD thesis, Brno, 203pp.

MENDEL J., LUSK S., VASIL'EVA E.D., VASIL'EV V.P., LUSKOVÁ V., EKMEKCI F.G., ERK'AKAN F., RUCHIN A., KOŠČO J., VETEŠNÍK L., HALAČKA K., ŠANDA R., PASHKOV A.N., RESHETNIKOV S.I., 2008: Molecular phylogeny of the genus *Gobio* Cuvier, 1816 (Teleostei: Cyprinidae) and its contribution to taxonomy. Molecular Phylogenetics and Evolution 47: 1061–1075.

MENDEL J., LUSK S., LUSKOVÁ V., KOŠČO J., VETEŠNÍK L., HALAČKA K., 2008: Druhová pestrost hrouzků rodu *Gobio* a *Romanogobio* na území České republiky a Slovenska [The species diversity of gudgeon of the genera *Gobio* and *Romanogobio* in the territory of the Czech Republic and Slovakia]. Biodiverzita ichtyofauny České republiky VII: 17–24.

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Research Priorities

We use fish to investigate questions in ecology and evolution as well as applied issues in fisheries management, conservation of aquatic habitats and floodplain restoration. Our field and experimental studies are conducted in Europe, Asia and Africa. The current topics investigated in our department are:

- behavioural and evolutionary ecology of bitterling fish
- adaptation and coevolution of bitterling and their mussel hosts
- ecology, distribution and parasites of invasive *Neogobius* fishes
- 0+ juvenile fish community structure in lowland rivers and their flood plains
- optimisation of methods for fish sampling
- impacts of metazoan parasites on 0+ juvenile fish development
- community ecology of fishes in the Gambia River floodplain, Senegal, West Africa
- ecology and evolution of African annual fishes *Nothobranchius* spp.

Selected Research Results

Sexual selection, sperm competition and alternative mating tactics in the bitterling fish

The sexual selection theory postulates how and why morphology and behaviour is adapted to increase the inclusive fitness. Our research on two closely related bitterling species, the European *Rhodeus amarus* and Chinese *Rhodeus ocellatus*, was concerned with the behaviour of individual males and females to maximise fertilization rate, the effect of temporal and spatial breeding site distribution on the variability in reproductive success among males and females, intersexual conflict between males and females, and with the distribution and abundance of the European bitterling.

We found that females performed a conspicuous behaviour that attracted sneaker males and allowed them to participate in a spawning. We then reviewed recent literature on other taxa and suggested that the general female role in sneaking may be very different from our current view. Females may actively solicit particular inferior males to join the spawning of female with a dominant male. We proposed that females may therefore gain direct benefits from using superior breeding sites monopolized by dominant males and indirect genetic benefits of having some of their offspring sired by preferred males even if they were unable to hold a territory. Consequently, sneaking may augment rather than decrease female choice. Testing this idea, we then indeed found that females benefited from mating with the preferred males, though not with the dominant males. Female preference enables them to benefit from complementary genes rather than good genes effect. Another aspect of female preference of mating with sneakers may stem from a severe risk of sperm depletion of many territorial males over a course of a single spawning, a day, and even over a season. We further found that different distribution of breeding resources (freshwater mussels that serve as the bitterling spawning substrate) significantly affected the variation in mating success over breeding densities treatments and over a spawning season. It even had microevolutionary consequences manifested by differential selection on phenotypic traits across breeding resource treatments. Finally, we participated in a study that investigated the specific status of *R. amarus* species-complex and we examined the factors determining recruitment and population size of bitterling in a lowland river.

CASALINI M., AGBALI M., REICHARD M., KONEČNÁ M., BRYJOVÁ A., SMITH C., 2009: Male dominance, female mate choice and intersexual conflict in the rose bitterling (*Rhodeus ocellatus*). Evolution 63: 366–376.

KONEČNÁ M., JURAJDA P., REICHARD M., 2009: River discharge drives recruitment success of the European bitterling (*Rhodeus amarus*) in a regulated river in Central Europe. Journal of Fish Biology 74: 1642–1650.

PRZYBYLSKI M., REICHARD M., SPENCE R., SMITH C., 2007: Spatial distribution of oviposition sites determines variance in male reproductive success in European bitterling, *Rhodeus amarus*. Behaviour 144: 1403–1417.

REICHARD M., LE COMBER S.C., SMITH C., 2007: Sneaking from a female perspective. Animal Behaviour 74: 679–688.

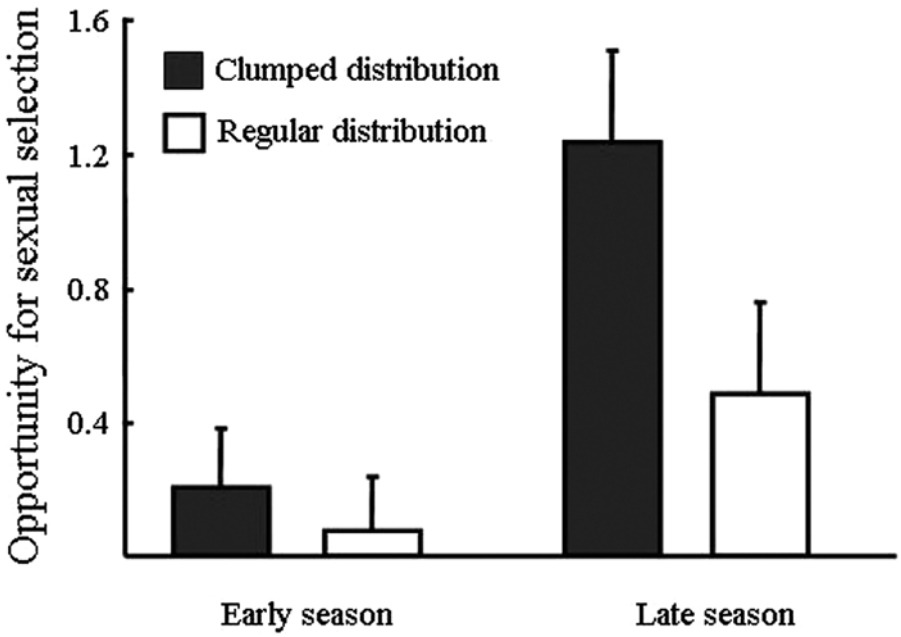
REICHARD M., ONDRAČKOVÁ M., BRYJOVÁ A., SMITH C., BRYJA J., 2009: Breeding resource distribution affects selection gradients on male phenotypic traits: experimental study on lifetime reproductive success in the bitterling fish (*Rhodeus amarus*). Evolution 63: 377–390.

REICHARD M., SMITH C., BRYJA J., 2008: Seasonal change in the opportunity for sexual selection. Molecular Ecology 17: 642–651.

SMITH C., PATEMAN-JONES C., ZIEBA G., PRZYBYLSKI M., REICHARD M., 2009: Sperm depletion as a consequence of increased sperm competition risk in the European bitterling (*Rhodeus amarus*). Animal Behaviour 77: 1227–1233.

SMITH C., ZHU Y., LIU H., REICHARD M., 2007: Deceptive female oviposition behaviour elicits male ejaculatory behaviour in the European bitterling (*Rhodeus amarus*). Journal of Fish Biology 71: 1841–1846.

ZAKI S.A.H., JORDAN W.C., REICHARD M., PRZYBYLSKI M., SMITH C., 2008: A morphological and genetic analysis of the European bitterling species complex. Biological Journal of the Linnean Society 95: 337–347.



Seasonal change in the opportunity for sexual selection measured by I_{mates} index (mean + s.e.). Higher values indicate that opportunity for sexual selection is higher.

Neogobius fishes in their native and non-native area of distribution – sampling strategy and parasites

Even though electrofishing is commonly used to sample *Neogobius* spp. and other benthic fishes lacking swimbladder, its efficiency is considered poor, especially along structured shorelines. The experimental setting enabled us to collect all fish remaining in the riprap fragments after these areas had been previously electrofished. We found that *Neogobius* spp. population sampling using electrofishing in substrates with abundant interstitial spaces underestimated *Neogobius* spp abundance by about 70% in contrast to only 25% underestimation for percids (possessing a well-developed swim bladder). Fish size had no effect on the probability of capture. The decreased electrofishing efficiency in areas of rocky substrate should be considered when attempting to estimate abundance of *Neogobius* spp. especially if estimates are to be compared with those of other species possessing swim bladders.

For parasitological survey, native populations of all four *Neogobius* spp. were collected in Bulgarian section of the Danube River, non-native populations of *N. kessleri* and *N. melanostomus* from Austrian section of the Danube River and non-native populations of *N. fluviatilis* and *N. gymnotrachelus* from Vistula River, Poland. The fish were also examined for 15 polymorphic microsatellite loci, which were newly developed for *N. kessleri.* Nine of them were successfully cross-amplified for *N. melanostomus* and *N. fluviatilis* and 11 for *N. gymnotrachelus*. The non-native populations of *N. fluviatilis* and *N. gymnotrachelus* in Poland and *N. melanostomus* in middle Danube showed a very low level of microsatellite variability in comparison to native Danubean populations, whilst the microsatellite variability of *N. kessleri* seems to be comparable between native and non-native populations. Parasite fauna of native and non-native populations of

N. kessleri and *N. melanostomus* (the same river system) showed slight differences in both parasite abundance and parasite species richness. On the other hand, non-native populations of *N. fluviatilis* and *N. gymnotrachelus* (dissimilar river system) were less parasitized compared to the native populations. Parasite fauna of *Neogobius* spp. comprised mainly common and abundant parasites in the particular site showing very low host specificity. Ponto-Caspian gobies seem to be fish hosts very susceptible to various parasite species and their parasite community reflects the fish feeding strategy and habitat preference. The results obtained from the analyses suggest that higher difference in microsatellite variability between native and non-native populations in *Neogobius* species is related to the difference in level of parasitism.

GRABOWSKA J., PIETRASZEWSKI D., ONDRAČKOVÁ M., 2008: Tubenose goby *Proterorhinus marmoratus* (Pallas, 1814) has joined three other Ponto-Caspian gobies in the Vistula River (Poland). Aquatic Invasions 3: 261–265.

POLAČIK M., JANÁČ M., JURAJDA P., VASSILEV M., TRICHKOVA T., 2008: The sampling efficiency of electrofishing for *Neogobius* species in a riprap habitat: a field experiment. Journal of Applied Ichthyology 24: 61–64.

POLAČIK M., JANÁČ M., TRICHKOVA T., VASSILEV M., KECKEIS H., JURAJDA P., 2008: The distribution and abundance of the *Neogobius* fishes in their native range (Bulgaria) with notes on the non–native range in the Danube River. Archiv für Hydrobiologie, Large Rivers 102: 1001–1011.

POLAČIK M., TRICHKOVA T., JANÁČ M., VASSILEV M., JURAJDA P., 2008: The ichtyofauna of the shoreline zone in the longitudinal profile of the Danube River, Bulgaria. Acta Zoologica Bulgarica 60: 77–88.

VYSKOČILOVÁ M., ONDRAČKOVÁ M., ŠIMKOVÁ A., MARTIN J.-F., 2007: Isolation and characterization of microsatellites in *Neogobius kessleri* (Perciformes, Gobiidae) and cross-species amplification within the family Gobiidae. Molecular Ecology Notes 7: 701–704.

VYSKOČILOVÁ M., ONDRAČKOVÁ M., VETEŠNÍKOVÁ-ŠIMKOVÁ A., 2008: The microsatellite variability and parasitism in native and introduced populations of four *Neogobius* species (Gobiidae). Annual Meeting of the Society for Molecular Biology and Evolution, Barcelona 2008.

Sampling of *Neogobius* spp. in the Danube River (Photo by J. Huml)

Ecology of floodplain fish communities

Our department has long-term interests in the ecology of floodplain fishes, including their natural reproduction, resource partitioning, habitat use and methodological aspects of their sampling. In lowland rivers and their floodplain, it is always problematic to find methods that provide accurate estimates of fish communities. Representative sampling of adult fish in larger lowland rivers is almost impossible, therefore ichthyologists recently focus on sampling of 0+ fish assemblages, which often corresponds to the adult fish community and stream condition. Electrofishing is one of the most common and efficient methods for 0+ fish sampling. Point abundance sampling with electrofishing provided very similar results as continuous sampling with electrofishing. Being less time and labor demanding, point abundance sampling appears to be more suitable for sampling 0+ fish in lowland rivers. Small closed floodplain oxbows should, in theory, provide ample conditions for sampling adult fish assemblages. However, our results showed that none of the conventional methods (electrofishing, beach seining) provided unbiased picture of adult fish assemblages on these localities. Even labor-intensive whole lake seining suffered from biases caused by fish escaping from the sides of the haul. For accurate estimation of adult fish assemblages in floodplain oxbows, it is necessary to combine different sampling methods or standardize the conventional sampling methods.

Downstream drift is an important means how young-of-the-year (YOY) stream and river fishes disperse along the river channel and across floodplain. We investigated inter-specific differences in the downstream drift of seven most common species of YOY cyprinids over a two year period in two floodplain rivers and compared drifting fish with fish inhabiting nursery areas. Our data indicated that species varied in the utilisation of the drift. While some species drifted abundantly, other species were abundant in nurseries, but drifted at low densities. Generally, fish drifted at two major developmental intervals; L3 stage and the stage at transition between larval and juvenile periods (L6/Juv) that corresponded to major changes in fish morphology, behaviour and swimming ability.

Male of the yellow morph of *Nothobranchius furzeri*, the vertebrate with the shortest lifespan (Photo by O. Sedláček)

Another studies investigated microhabitat use of West African fishes by a snorkelling survey using a point abundance method and macrohabitat use of East African fish through an extensive transect sampling across savannah landscape in Mozambique. Both studies revealed high levels of habitat differentiation among studied fish species and related habitat segregation to fish ecology and life history.

JANÁČ M., JURAJDA P., 2007: A comparison of point abundance and continuous sampling by electrofishing for age-0 fish in a channelized lowland river. North American Journal of Fisheries Management 27: 1119–1125.

JURAJDA P., JANÁČ M., WHITE S.M., ONDRAČKOVÁ M., 2009: Small – but not easy: Evaluation of sampling methods in floodplain lakes including whole-lake sampling. Fisheries Research 96: 102–108.

REICHARD M., JURAJDA P., 2007: Seasonal dynamics and age structure of drifting cyprinid fishes: an interspecific comparison. Ecology of Freshwater Fish 16: 482–492.

REICHARD M., 2008. Microhabitat use by fishes in the middle course of the River Gambia in the Niokolo Koba National Park, Senegal: a unique example of an undisturbed West African assemblage. Journal of Fish Biology 72: 1815–1824.

REICHARD M., POLAČIK M., SEDLÁČEK O., 2009: Distribution, colour polymorphism and habitat use of the African killifish, *Nothobranchius furzeri*, the vertebrate with the shortest lifespan. Journal of Fish Biology 74: 198–212.

Application of Research Results

Revitalization management in Brno reservoir

Currently, the rules of the Brno reservoir water and fisheries management are subject to re-elaboration emphasized to envisaged partial draining aimed at sediment removal and bottom treatment in the near future. Thus, data about the structure and response of fish assemblage are in high demand. Due to the difficulties regarding an appropriate fish survey the Brno reservoir, first of all, we have focused upon the evaluation of anglers' records about the exploitation of the fish assemblage in the reservoir. The validity of data obtained by this approach must be treated with caution as they might be encumbered by anglers' preferences for certain fish species and tendency to overestimate information about catch (particularly regarding fish size). Nevertheless, as demonstrated on the example of the case study on Brno reservoir, the figures they provided will be worthy for general evaluation of the composition and condition of the fish assemblage.

The research activities performed contributed to the preparation of the restoration process in the Brno reservoir environment by evaluation of the fish assemblage development and behaviour including spawning activities and recruitment success. We have also revealed that the response of macrozoobenthos assemblage markedly reflects the development and pattern of oxygen concentration in the hypolimnion and subsequent predatory pressure of benthivorous fish. The figures achieved during the last two-year period of survey before the crucial period of partial reservoir draining with the aim to evaluate its future consequences and development.

A related study in the river section downstream of the Brno dam is designed to examine the effects of altered hydrological regime on the fish community. The juvenile fish community appears to be negatively affected by the large daily fluctuation of water level via discharge from a hydroelectric facility at the dam. Juvenile fish species richness declined as a function of distance downstream from the dam, with only one fish species occurring at sites immediately below the dam, and up to six species occurring at sites approximately 15–20 kilometres downstream, where the effects of water level fluctuation are buffered by a series of weirs and tributary inputs. The likely cause for the negative effect on fish was stranding of eggs and/or juveniles during rapid water level fluctuation. Due to the aforementioned scheduled draining

Water level decrease in the Brno Reservoir (Photo by J. Huml)

of the Brno Reservoir, the hydroelectric facility will cease operation during the 2009 summer-autumn season, presenting the opportunity to compare the distribution of juvenile fish under a different scenario. Findings from this study can be used by water management authorities who wish to mediate the negative effects of hydrological regime on aquatic biota.

ADÁMEK Z., JURAJDA P., 2008: Lessons available from anglers' records: Case study of the Brno Reservoir (Czech Republic). In: 5th World Recreational Fishing Conference "The Angler in the Environment". International Game Fish Association, Dania Beach; 24.

International Cooperation

Indicative capability of the fish community as an indicator of chemical river degradation

An international project (6th FP EU MODELKEY) focused on three river catchment basins, namely the Elbe (Germany and Czech Republic), Schelde (the Netherlands, Belgium) and Llobregat (Spain) rivers deals with various biotic issues of former (and current) heavy pollution. On the Czech territory, the main effort is targeted upon biotas of the Elbe and Bílina rivers. We used preferably fish and macrozoobenthos communities to evaluate their indicative capability in these chronically polluted environments. Relatively high fish species richness (24 species) was documented in selected sites of the Elbe River with prevalence of generalists (bleak, roach, chub). Channelization and regulation of the Elbe River stretch under study seem to be the most important determinant of fish community structure. Fish community in the Bílina stream is strongly influenced by an anthropogenic impact (refinery, sewage water, coal mining). Presence of reservoir changed the structure of fish community and point source pollution affected water quality up to complete fish absence. Restoration of fish community in the longitudinal profile is rather slow. Fish community indicated inconvenient oxygen condition in stream, but not presence of xenobiotics.

Similar conclusions can be made when evaluating the macrozoobenthos assemblage. Despite different level of stream bed and water quality degradation in the Elbe River, the micro- and mesohabitat determinants appeared to be the most important factors affecting the diversity of macrozoobenthos in riffles (substrate size structure) and in shoreline zones (macrophyte community composition). The macrozoobenthos assemblages in headwater and reference sites of the Bílina River indicated clean water followed by transitional zone downstream the Kyjická reservoir and dramatic decline of water quality in subsequent river section downstream the outlets of industrial and municipal pollution. Despite several minor pollution sources on the lower river stretch until its mouth into the Elbe River, water quality indicators fluctuate in the upper half of betamesosaprobity. The species richness and biodiversity indices follow a similar pattern like river saprobiology.

ADÁMEK Z., SYCHRA J., ORENDT C., WOLFRAM G., NYKLOVÁ E., 2007: Macroinvertebrate community response upon degradation of the channelized stream (Case study Upper Elbe, Czech Republic). In: Risk Assessment in European River Basins – State of the Art and Future Challenges. Helmholtz Centre for Environmental Research – UFZ, Leipzig; 175.

HÖSS S., TRAUNSPURGER W., ORENDT C., WOLFRAM G., ADÁMEK Z., MUÑOZ I., VAN LIEFFERINGE C., DE DECKERE E., 2008: Nematode communities in river sediments of three European river basins – effects of anthropogenic contamination. In: SETAC Europe 18th Annual Meeting. SETAC Europe, Brussels; 109.

JURAJDA P., JANÁČ M., VALOVÁ Z., STRECK G., 2008: Indicative capability of the fish comunity as an indicator of river degradation. In: Velíšek J., Kroupová H. (eds), 1st International Workshop on Aquatic Toxicology and Biomonitoring. University of South Bohemia in České Budějovice, Research Institute of Fish Culture and Hydrobiology Vodňany; 34.

ONDRAČKOVÁ M., ŠIMKOVÁ A., HYRŠL P., LAMKOVÁ K., WENGER M., MACHALA M., JURAJDA P., 2008: Immunological parameters and parasite infection in chub *Leuciscus cephalus* in heavily polluted watershed. In: International Conference on Fish Diseases and Fish Immunology. University of Iceland, Reykjavik; 41–42.

The River Elbe (Photo by J. Huml)

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Research Priorities

Our research focuses on understanding the ecological and evolutionary basis of reproductive strategies. Important goals of this research are to identity the ecological factors that promote parasitic reproductive behaviour, predator avoidance and nest predation. We conduct studies adopting the adaptationist and optimality approach of behavioural ecology to examine fitness costs and benefits of various characters in bird populations. Further we aim at understanding the evolution and signalling function of secondary male ornaments in birds. Using genetic markers we study population differentiation and phylogeography of selected European passerines across migratory divides which are inferred from measurements of stable isotope ratios and ringing recoveries. Our current research also concentrates on patterns of singing activity in passerines and includes studies of parasites associated with birds of the Afrotropical and Neotropical Regions as well.

Selected Research Results

Extra-pair fertilizations and sexual selection in passerines

The extent to which extra-pair fertilizations contribute to variance in male reproductive success and hence the strength of sexual selection on males remains little studied. Using two approaches, intra-specific and comparative, we tested the hypothesis that the contribution of EPFs to variance in male fitness would increase with migration distance in North Temperate songbirds. Using data on the genetic mating system of the common rosefinch *Carpodacus erythrinus*, a long-distance migrant, we showed that the number of extra-pair mates and within-pair paternity were the most important components of variance in male reproductive success. Comparative data reveal that the opportunity for sexual selection due to EPFs is positively associated with both migration distance and breeding synchrony in north temperate passerines. In general, the data suggest that EPFs have a potential to play an important role in the evolution of sexually selected traits in long-distance migratory songbirds such as rosefinches. The potential of EPFs to increase the opportunity for sexual selection implies that absolute rather than self-referential criteria of extra-pair mate choice are common in passerines. The review over the literature indeed reveals that choice for genetic complementarity based on self-referential criteria only seldom occurs in birds. The lack of evidence for genetic complementarity in many birds may be due to an inability to make the fine distinctions among potential mates based on genes, possibly due to the comparative anosmatic nature of avian sensory system. For some species however there is compelling evidence for genetic complementarity as a criterion used in female mate choice. Understanding the ubiquity of female mate choice based on genetic complementarity and the variation in this source of female preference among and within species remains a challenge.

ALBRECHT T., SCHNITZER J., KREISINGER J., EXNEROVÁ A., BRYJA J., MUNCLINGER P., 2007: Extrapair fertilizations and the opportunity for sexual selection in long-distance migratory passerines. Behavioral Ecology 18:477–486.

MAYS H.L., ALBRECHT T., LIU M., HILL G.E. 2008: Female choice for genetic complementarity in birds: A review. Genetica 134:147–158.

Portrait of a common rosefinch *Erythrina erythrina* male, Šumava Mts. National Park (Photo by R. Poláková)

Nests of common rosefinches *Erythrina erythrina* are well hidden in *Spiraea* bushes (Photo by J. Schnitzer)

The ecology of waterfowl: antipredation behaviour and reproductive tactics

The covering of clutches with nest material in waterfowl was generally considered to improve the thermal environment of developing embryos. We tested an alternative hypothesis that this behaviour reduces the risk of clutch detection by predators. In addition, we assess the anti-predation function of the direct presence of an incubating parent on the nest for the first time in a ground-nesting non-passerine bird, the mallard (*Anas platyrhynchos*). Our data demonstrated that in mallards, concealment of the clutch with nest material reduced the risk of nest predation. Contrary to some previous studies, the relative effects of crypsis and parental anti-predation behaviour on nest survival did not differ with respect to nest concealment by surrounding vegetation.

In common pochards (*Aythya ferina*) we studied the trade-off between offspring size and number, the topic that belongs to the most discussed concepts in the life history theory. We presented a new method based on the use of separate net sacks for each egg that allowed us to study this phenomenon in common pochards without excessive disturbance of breeding birds. In congruence with most of previous studies, we did not find any evidence for negative correlation between estimated egg mass and clutch size in pochards. However, the predicted negative relationship appeared after incubation when young with many siblings were on average lighter than conspecifics in nests with fewer young. Such a pattern might be generated by differences in hatching success and energy consumption by developing embryos among particular nests. Our data indicate that females which had laid clutches containing many big eggs lost a much larger amount of energy invested and, moreover, produced hatchlings of relatively lower body mass if compared with females having few small eggs. We speculate about variation in energy allocation between two most energy demanding parts of breeding (clutch formation and incubation) and female incubation effort as leading mechanisms. Such a variation might reflect inter-individual differences in reproductive strategy or errors in energy allocation.

HOŘÁK D., KLVAŇA P., ALBRECHT T., 2008: Why there is no negative correlation between egg size and number in the Common Pochard? Acta Oecologica 33: 197–202.

HOŘÁK D., ALBRECHT T., 2007: Using nest sacks to examine the relationship between egg size and young size in Common Pochard. Journal of Field Ornitology 78: 334–339.

KREISINGER J., ALBRECHT T., 2008: Nest protection in mallards (*Anas platyrhynchos*): untangling the role of crypsis and parental behaviour. Functional Ecology 22: 872–879.

Co-evolution between brood parasites and their hosts

Interspecific brood parasitism in birds is a strong selective force affecting the life histories of hosts in many respects. During the course of the co-evolutionary struggle between the common cuckoo and its passerine hosts, many adaptation and counteradaptation have evolved and this scenario represents a suitable model for the study of co-evolutionary processes. Hosts of brood parasites use a variety of cues relating to eggshell appearance of parasitic eggs, which facilitate their recognition and rejection. Since avian and human colour vision is dramatically different, the application of portable spectrophotometers to measure reflectance spectra over the full avian visible range (i.e. 300–700 nm) has considerably increased our ability to distinguish and characterise different colour signals. Using a series of experiments, we found that combination of UV and visible parts of the colour spectrum together with a specific signature of the eggshell of the parasitic egg plays a major role in the evolution of discrimination processes, as well as in the evolution of mimicry of the parasitic egg. We also revealed that experimentally reduced

Common cuckoo *Cuculus canorus* egg and host chicks hatching (Photo by M. Požgayová)

Diverse ways of transportation of the cuckoo team in the field. Left to right: M. Požgayová and P. Procházka (Photo by M. Honza)

UV reflectance affects the recognition of the parasitic egg. We demonstrated that perceptual modelling of avian visual discrimination can predict behavioural rejection response to foreign eggs in nests of wild birds. Our studies documented that host visual perception of different colours including UV wavelengths plays an important role in the evolution of host defences against brood parasitism. Further, we discovered experimentally that cuckoo hosts are highly consistent in their response towards parasitic egg when parasitized repeatedly within one breeding attempt. In some hosts of avian brood parasites, several populations apparently escape parasitism, while others are parasitized. Therefore, we investigated populations of the reed warbler across Europe. This was the first study focusing on patterns of common cuckoo-host interactions within a specific host species on a large scale. The results indicate that if the host density is below a specific threshold, cuckoo parasitism is absent regardless of the state of other potentially confounding variables. We also studied two adaptations of the brood parasite, namely eviction and begging behaviour of the cuckoo chick. Even though the eviction behaviour was described already by Aristotle (384–322 B.C.), we were the first who described different parameters enhancing this evolutionarily important behaviour eliminating competition of the parasite chick with its nest mates. Another type of tactics which relates to nestling competition is the begging behaviour. Apart from the typical begging call characteristic of a variety of bird species, we discovered a special vocal display in the absence of hosts. These findings provide new insights into the host-parasite conflict and the evolution of signalling in birds.

CASSEY P., HONZA M., GRIM T., HAUBER M.E., 2008: The modelling of avian visual perception predicts behavioural rejection response to foreign egg colours. Biology Letters 4: 515–517.

HONZA M., MOSKÁT C., 2008: Egg rejection behaviour in the great reed warbler (*Acrocephalus arundinaceus*): the effect of egg type. Journal of Ethology 26: 389–395.

HONZA M., POLAČIKOVÁ L., 2008: Experimental reduction of ultraviolet wavelengths reflected from parasitic eggs affects rejection behaviour in the blackcap *Sylvia atricapilla*. Journal of Experimental Biology 211: 2519–2523.

HONZA M., POLAČIKOVÁ L., PROCHÁZKA P., 2007: Ultraviolet and green parts of the colour spectrum affect egg rejection in the song thrush (*Turdus philomelos*). Biological Journal of the Linnean Society 92: 269–276.

HONZA M., POŽGAYOVÁ M., PROCHÁZKA P., TKADLEC E., 2007: Consistency in egg rejection behaviour: Responses to repeated brood parasitism in the blackcap (*Sylvia atricapilla*). Ethology 113: 344–351.

HONZA M., VOŠLAJEROVÁ K., MOSKÁT C., 2007: Eviction behaviour of the common cuckoo *Cuculus canorus* chicks. Journal of Avian Biology 38: 385–389.

POLAČIKOVÁ L., HONZA M., PROCHÁZKA P., TOPERCER J., STOKKE B.G., 2007: Colour characteristics of the blunt egg pole: cues for recognition of parasitic eggs as revealed by reflectance spectrophotometry. Animal Behaviour 74: 419–427.

ŠICHA V., PROCHÁZKA P., HONZA M., 2007: Hopeless solicitation? Host-absent vocalization in the common cuckoo has no effect on feeding rate of reed warblers. Journal of Ethology 25: 147–152.

STOKKE B.G., HAFSTAD I., RUDOLFSEN G., BARGAIN B., BEIER J., CAMPÀS D.B., DYRCZ A., HONZA M., LEISLER B., PAP P.L., PATAPAVIČIUS R., PROCHÁZKA P., SCHULZE-HAGEN K., THOMAS R., MOKSNES A., MØLLER A.P., RØSKAFT E., SOLER M., 2007: Host density predicts presence of cuckoo parasitism in reed warblers. Oikos 116: 913–922.

Winter areas of birds and the effect of North Atlantic Oscillation on their spring arrival

Mean annual first arrival dates (FAD) of 45 migratory bird species recorded in Moravia (Czech Republic, c. 49° N) in 109 spring seasons between 1881 and 2007 were correlated with the preceding winter (December to March) North Atlantic Oscillation (NAO) index. The arrival of birds occurred significantly earlier following high NAO winter index values (those result in spring warmer than normal in central Europe) in all short-distance migratory species with a European or North African winter range, whereas the arrival timing did not correlate

significantly with the seasonal NAO index in long-distance migrants having sub-Saharan winter range. When the values of Pearson coefficient between NAO and FAD were correlated with the migration distance of all 45 bird species, the correlation was remarkable and significant: r = 0.848 for the distance to central locations of winter range, and r = 0.822 for the northern limits of the wintering area. The migration distance was thus responsible for 68–72 % of variation in the regression of birds' arrival on NAO winter index in central Europe. The data are robust (this is the longest avian phenological record analyzed for correlation with NAO in Europe), and indicate different mechanisms that govern timing between short-distance and long-distance migrants in their departure from wintering areas.

HUBÁLEK Z., ČAPEK M., 2008: Migration distance and the effect of North Atlantic Oscillation on the spring arrival of birds in Central Europe. Folia Zoologica 57: 212–220.

International Cooperation

Immigration as a possible rescue of a reduced population of reed warblers in the Azraq Oasis, Jordan

After a population bottleneck, genetic drift can result in sudden and dramatic changes in allele frequencies that occur independently of selection. In such instances, many beneficial adaptations may be eliminated even if the population later increases again. Conversely, immigration may successfully counter the adverse effect of reduced population size, bringing new or lost alleles and replenishing thus genetic diversity of a reduced population. Extensive groundwater

Drought in the Azraq Oasis (Photo by P. Procházka)

abstraction from the Azraq Oasis led to a considerable deterioration of the unique wetland ecosystem during the 1980s and most of the aquatic vegetation consequently died off in the early 1990s. At that time, numbers of local reed warblers (*Acrocephalus scirpaceus*) dramatically dropped to a few pairs. The numbers slightly increased again after wetland restoration efforts were begun. To infer possible consequences of the population collapse on genetic diversity, we genotyped 40 local breeders at ten polymorphic microsatellite loci. After 15 years from the crash, the population showed no evidence for past genetic bottlenecks. The absence of reduced genetic diversity suggests that the population has largely benefited from gene flow. The study shows how immigration may sustain the viability of fragmented populations of migratory birds after restoration of their former breeding habitat.

PROCHÁZKA P., BELLINVIA E., FAINOVÁ D., HÁJKOVÁ P., ELHALAH A., ALOMARI K., 2008: Immigration as a possible rescue of a reduced population of a long-distance migratory bird: Reed warblers in the Azraq Oasis, Jordan Journal of Arid Environments 72: 1184–1192.

Host associations of avian parasites from two areas of the Neotropical Region

Ectoparasites on non-passerines and passerines were studied in tropical rainforests on the Carribean slope of Costa Rica (Cordillera de Talamanca Mts.) and in a tropical savanna of the Cerrado biome in Brazil (Brazilian Shield). Altogether we examined 672 individuals of 123 bird species belonging to 14 orders and 33 families.

We concentrated on harpirhynchid mites (Prostigmata: Harpirhynchidae), chigger mites (Prostigmata: Trombiculidae), ascid mites (Mesostigmata: Ascidae), feather mites (Astigmata: Proctophylloididae), and chewing lice (Phthiraptera: Menoponidae, Philopteridae), and we found their associations with representatives of hummingbirds, (Trochilidae), woodpeckers (Picidae), ovenbirds (Furnariidae), antbirds (Thamnophilidae), antthrushes (Formicariidae), tyrant flycatchers (Tyrannidae), wrens (Troglodytidae), thrushes (Turdidae), gnatcatchers (Polioptilidae), New World sparrows (Emberizidae), grosbeaks and saltators (Cardinalidae), tanagers (Thraupidae), and orioles & blackbirds (Icteridae). Twenty three taxa of parasites were new to science, 20 of them were new species and three new genera. Some other parasite species were recorded for the first time in the study areas and moreover, our study also revealed new host-specific associations.

BOCHKOV A.V., LITERÁK I., ČAPEK M., 2007: *Neharpyrhynchus baile* n. sp. (Prostigmata: Harpirhynchidae) parasitizing *Turdus leucomelas* Vieillot (Aves: Turdidae) from Brazil. International Journal of Acarology 33: 35–39.

DUSBÁBEK F., LITERÁK I., ČAPEK M., HAVLÍČEK M., 2007: Ascid mites (Acari: Mesostigmata: Ascidae) from Costa Rican hummingbirds (Aves: Trochilidae), with description of three new species and a key to the *Proctolaelaps belemensis* species group. Zootaxa 1484: 51–67.

MIRONOV S.V., LITERÁK I., ČAPEK M., 2008: New feather mites of the subfamily Pterodectinae (Acari: Astigmata: Proctophyllodidae) from passerines (Aves: Passeriformes) in Mato Grosso do Sul, Brazil. Zootaxa 1947: 1–38.

STEKOL'NIKOV A.A., LITERÁK I., ČAPEK M., HAVLÍČEK M., 2007: Chigger mites (Acari: Trombiculidae) from wild birds in Costa Rica, with a description of three new species. Folia Parasitologica 54: 59–67.

SYCHRA O., LITERÁK I., ČAPEK M., HAVLÍČEK M., 2007: Chewing lice (Phthiraptera) from ovenbirds, leaftossers and woodcreepers (Passeriformes: Furnariidae: Furnariinae, Sclerurinae, Dendrocolaptinae) from Costa Rica, with descriptions of four new species of the genera *Rallicola* and *Myrsidea*. Caribbean Journal of Science 43: 117–126.

SYCHRA O., LITERÁK I., ČAPEK M., HAVLÍČEK M., 2007: Chewing lice (Phthiraptera) from buntings, cardinals and tanagers (Passeriformes: Emberizidae, Cardinalidae, Thraupidae) from Costa Rica, with descriptions of two new species of the genus *Myrsidea*. Zootaxa 1631: 57–68.

Rufous hornero *Furnarius rufus*, a species in which a feather mite belonging to the new monotypic genus *Metapterodectes* (*M. furnarius*) was discovered (Photo by M. Čapek)

Parasitic chigger mites *Blankaartia sinnamaryi* on the belly of bright-rumped attila *Attila spadiceus* (Photo by M. Havlíček)

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Jiří CHAMR

Research Priorities

Research is focused on the ecology of selected mammalian groups. The results of investigations can improve management of forest stands, game management, rodent pest control, and protection of biodiversity. Main research topics:

- feeding ecology of large herbivores and their impact on vegetation
- foraging ecology and anti-predator strategies of bats
- ecology and behaviour of large carnivores, and foraging ecology and distribution of mustelids
- synecology of small terrestrial mammals
- diversity and ecology of small mammals and ungulates of West Africa

In 2006–2008, J. Červený coordinated a project concentrated on the importance of red fox *Vulpes vulpes* in different ecosystems of Central Europe. Fifteen red foxes were radio-collared (Photo by J. Červený)

Selected Research Results

Magnetic alignment in grazing and resting cattle and deer

It was demonstrated by means of simple, noninvasive methods (analysis of satellite images, field observation, and measuring „deer beds" in snow) that domestic cattle (n = 8510 in 308 pastures) across the globe, and grazing and resting red and roe deer (n = 2974 in 241 localities), align their body axes in roughly a north-south direction. Direct observations of roe deer revealed that animals orient their heads northward when grazing or resting. Amazingly, this ubiquitous phenomenon does not seem to have been noticed by herdsman, ranchers, or hunters. Because wind and light conditions could be excluded as a common denominator determining the body axis orientation, magnetic alignment is the most parsimonious explanation. To test the

Resting and grazing roe deer *Capreolus capreolus* tend to align their body axes in the geomagnetic North-South direction (Photo by J. Červený)

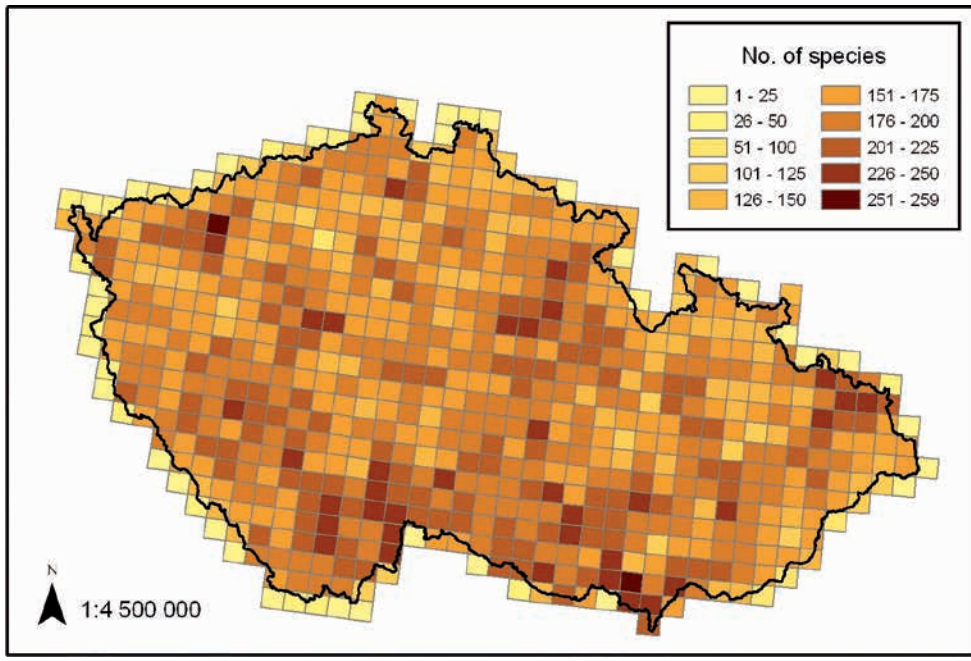
hypothesis that cattle orient their body axes along the field lines of the Earth's magnetic field, it was analyzed the body orientation of cattle from localities with high magnetic declination. Here magnetic north was better predictor than geographical north. This study reveals the magnetic alignment in large mammals based on statistically sufficient sample size. Findings open new horizons for the study for magnetoreception in general and are of potential significance for applied ethology. They challange neuroscientics and biophysics to explain the proximate mechanism.

BEGALL S., ČERVENÝ J., NEEF J., VOJTĚCH O., BURDA H., 2008: Magnetic alignment in grazing and resting cattle and deer. Proceedings of the National Academy of Sciences of the United States of America 105: 13451–13455

Species richness of vertebrates in the Czech Republic

Species richness of free-living vertebrates was analysed using mapping of occurrence within individual grid squares (12 x 11.1 km) over the territory of the Czech Republic. The data on species distribution were derived from recent distributional atlases. Altogether, 384 species of cyclostomes, bony fishes, amphibians, reptiles, birds and mammals were included in this study and their presence or absence was recorded in 678 grid squares.

The species numbers ascertained in the 523 grid squares varied from 92 to 259 species, with a median of 182 species. The first two principal components explained 44.9 % of the total variance and separated two main habitat gradients based on values of different environmental, topographic, and demographic variables in particular squares. The PC1 represents a gradient from urban habitats at lower altitudes to more homogenous habitats with dominant coniferous



Species richness of vertebrates in the Czech Republic.

forests and meadows situated at higher altitudes. The importance of natural habitats and landscape heterogeneity increases along the PC2. The species richness of all vertebrate groups except for reptiles is highly dependent on the PC1. The number of fish, amphibian, and bird species in squares decreases with increasing value of the PC1, i.e. it is higher in urban areas at lower altitudes. By contrast, the number of mammal species is higher in uninhabited areas at higher altitudes. The gradient represented by the PC2 is highly significant for species richness of reptiles and mammals, and the number of species in both the groups increases with increasing importance of natural habitats.

KROJEROVÁ-PROKEŠOVÁ J., BARANČEKOVÁ M., ŠÍMOVÁ P., ŠÁLEK M., ANDĚRA M., BEJČEK V., HANÁK V., HANEL L., LUSK S., MIKÁTOVÁ B., MORAVEC J., ŠŤASTNÝ K., ZIMA J., 2008: Species richness of vertebrates in the Czech Republic. Folia Zoologica 57: 452–464.

Small mammal species in agricultural ecosystems of southern Moravia

The termination of agricultural production in intensively managed fields leads to the succession of weed communities and to changes in the vegetation cover and food supply for animals. We studied a population of the common vole on a regularly managed alfalfa field in southern Moravia (Czech Republic). When the field was set aside, the vegetation cover transformed significantly and we studied the same vole population for the next three years. Multi-annual variation in population size disappeared; maximal abundances decreased, and mean body size tended to be lower in the weed-filled habitat. We observed conspicuous seasonal patterns in the proportion of breeding females, sex ratio and in litter size variation; however these patterns did not depend on the field management regime. The set-aside field had a strong effect on vole

population dynamics; however, other well-designed studies are needed to distinguish between the possible causal processes.

Spatial distribution of voles and mice and their abundances in agricultural landscape are largely influenced by their food preferences and the distribution of preferred crops. We examined the correspondence between food preferences of three dominant species for two cereals estimated in the lab and the long-term field abundances observed at the harvest time in southern Moravia. In the first series of laboratory tests, the standing culms of wheat and barley were offered to be harvested. Pygmy field mouse preferred wheat ear in 100% cases, wood mouse in 87% of cases, and common vole showed no preference for wheat (60%). In the second series, we observed the similar preferences in consuming the offered grains of both cereals, the wheat being preferred by pygmy field mouse, and wood mouse, while with the common vole showing no preference. In the field, abundances of rodents in wheat were higher than those in barley. Thus we demonstrated that food preferences correspond closely to field abundances and that studying diet preferences may be of key importance to predicting small rodent abundances in changing agricultural landscape.

HEROLDOVÁ M., TKADLEC E., BRYJA J., ZEJDA J., 2008: Wheat or barley? Feeding preferences affect distribution of three rodent species in agricultural landscape. Applied Animal Behaviour Science 110: 354–362.

JÁNOVÁ E., HEROLDOVÁ M., BRYJA J., 2008: Conspicuous demographic and individual changes in a population of the common vole in a set-aside alfalfa field. Annales Zoologici Fennici 45: 39–54.

Common vole *Microtus arvalis* in a study plot at Drnholec (South Moravia, Czech Republic) (Photo by E. Jánová)

International Cooperation

Molecular systematics of Afrotropical bats

Systematics of bats has been long based predominantly on morphology, which is rather substantially constrained due to adaptations to flight and echolocation. In recent years, molecular genetic methods have allowed identification of evolutionary independent units within traditionally recognized species. Bats of Africa and adjacent tropical and subtropical regions remain among the least studied on molecular level.

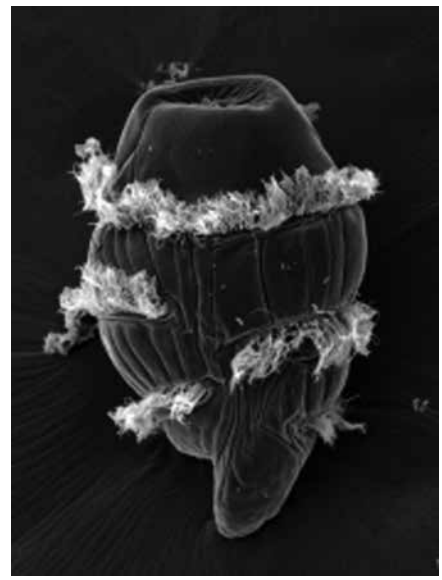
The first group of bats we investigated was the complex of forms belonging to the Afrotropical leaf-nosed bat *Hipposideros caffer*. Two morphologically cryptic species, *H. caffer* and *H. ruber*, have been traditionally recognized within this complex. Our phylogenetic analysis of nucleotide sequences of the mitochondrial cytochrome *b* gene challenged the hypothesis of two cryptic species. Instead of the two expected reciprocally monophyletic lineages corresponding to the two cryptic species, we recovered four distinct lineages with deep internal divergences. Two sister clades within a lineage of bats of *H. caffer* morphotype represent respectively the nominotypical form *H. c. caffer*, restricted to Southern Africa, and *H. c. tephrus*, inhabiting the Maghreb, West Africa and the Arabian Peninsula. Geographical isolation and deep genetic divergence suggest species status of both forms. Another lineage comprises specimens of both morphotypes from West and East Africa, probably representing a distinct species. A Central African lineage of *H. ruber* morphotype comprises two sister clades. Since they are sympatric in Cameroon, their specific status requires confirmation of their reproductive isolation. A further

Hipposideros cf. *caffer*, Senegal, August 18, 2006 (Photo by J. Červený)

divergent lineage of *H. ruber* morphotype, most probably representing another distinct species, is restricted to West Africa.

VALLO P., GUILLÉN-SERVENT A., BENDA P., PIRES D.B., KOUBEK P., 2008: Variation of mitochondrial DNA in the *Hipposideros caffer* complex (Chiroptera: Hipposideridae) and its taxonomic implications. Acta Chiropterologica 10: 193–206.

Entodiniomorphid ciliates in captive gorillas



Trophozoit of entodiniomorphid ciliate *Troglodytella abrassarti* from captive gorilla (SEM, photo by S. Imai)

Entodiniomorphid ciliates are often present in the colons of wild apes. In captive apes the infection tends to gradually disappear, with the exception of *Troglodytella abrassarti*. We used faecal examinations to screen the gorillas (*Gorilla gorilla gorilla*) in European (Czech Republic, United Kingdom) and Australian zoos to explore the ape-to-ape transmission pattern of *T. abrassarti*. Gorillas from two out of three European zoos were positive for *T. abrassarti*, while gorillas from the Australian zoo were negative. We documented a horizontal transmission of *T. abrassarti* to a non-infected adult gorilla introduced into a *Troglodytella*-positive group in the Prague Zoo and traced the origin of the ciliate infection to the Paignton Zoo (UK) using serial faecal examinations. During this study, two infant gorillas born in the Prague Zoo (CZ) first became positive for *T. abrassarti* at the age of nine months. Ciliate morphology and the sequencing of the small subunit rRNA gene and the internal transcribed spacer rDNA spacer region revealed that *T. abrassarti* affects both captive gorillas and chimpanzees. We conclude that zoo transport plays a major role in the distribution of *T. abrassarti* among captive gorillas.

MODRÝ D., PETRŽELKOVÁ K.J., POMAJBÍKOVÁ K., TOKIWA T., KŘÍŽEK J., IMAI S., VALLO P., PROFOUSOVÁ I., ŠLAPETA J., 2009: The occurrence and ape-to-ape transmission of the entodiniomorphid ciliate *Troglodytella abrassarti* in captive gorillas. Journal of Eukaryotic Microbiology 56: 83–87.

POMAJBÍKOVÁ K., PETRŽELKOVÁ K.J., TOKIWA T., IMAI S., MODRÝ D., 2008: The occurrence of *Troglodytella abrassarti* (Brumpt and Joyeux, 1912) in captive gorillas. Folia Primatologica 79: 372–373.

Cross-sectional analysis and its application in the past human behavior studies

It is assumed that the transition from the Late Eneolithic to the Early Bronze Age in Central Europe was associated with substantial changes in subsistence and the perception of gender differences. However, the archeological record itself does not entirely support this model. Alternatively, this transition may be interpreted as a continuous process. We used asymmetry in external dimensions, and asymmetry in size and distribution of cortical tissue of humeri

to elucidate the nature of this transition with respect to differences in manipulative behavior. The total sample of 67 individuals representing five archaeological cultures was used. The results indicate that the pattern of asymmetry of the humeral external measurements and the cross-sectional parameters taken at 35% of humeral biomechanical length remain stable during the Late Eneolithic and Early Bronze Age. However, females of both periods show fluctuating asymmetry for all of the cross-sectional parameters, but directional asymmetry for biomechanical length. Males are non-significantly shifted from the line of equivalence for biomechanical length, but exhibit directional asymmetry for the cortical area and polar moment of area. Only distal articular breadth yields fluctuating asymmetry for both females and males in both periods. Thus, the transition from the Late Eneolithic to the Early Bronze Age can be seen as a continuous process that probably affected only a limited part of human activities. We interpret the differences between females and males of both periods as evidence of gender-specific activities; males might have been associated with extra-domestic agricultural labor that resulted in asymmetrical manipulative loading and females with domestic labor with symmetrical manipulative loading in both periods.

SLÁDEK V., BERNER M., SOSNA D., SAILER R., 2007: Human manipulative behavior in the Central European Late Eneolithic and Early Bronze Age: humeral bilateral asymmetry. American Journal of Physical Anthropology 133: 669–681.

Maiombé – Esmeralda of Angola

The Maiombe forest is situated in Cabinda, a province of Angola. Despite the fact that the Maiombe forest is an extraordinary interesting and important forest refugium, there is a lack of knowledge about it. This publication brings first comprehensive information about Maiombe forest including brief general introduction into a problem of history, distribution and ecology of African rainforests. Basic information about location, environment, climate and vegetation of the surrounding area is provided as well. The next chapters present factors determining existence of Maiombe forest and describe Maiombe as forest refugium. The actual aims and priorities of conservation of rainforests with respect to Cabinda are highlighted including problem of invasion plant *Chromolaena odorata* and chapters about sustainable agriculture and logging activities. Last chapters give basic information about rare and huntable species of mammals. The publication is written in Portuguese to be intelligible for mainly people in Cabinda and Angola to get them acquainted with Maiombe forest. The project has been realized within the programme of the Czech Ministry of Foreign Affairs aimed to developing countries.

JIRKŮ M., PETRŽELKOVÁ K.J., 2008: Maiombé – a Esmeralda de Angola. Institute of Vertebrate Biology AS CR, Brno, 91 pp.

Maiombé forest is composed of various plant and animals species which do not occur anywhere else on the globe (Photo by D. Modrý)

Distinct red and white markings provide a silent communication within a group of red river hogs *Potamochoerus porcus* (Photo by D. Modrý)

OBITUARIES

In Memoriam

Josef Kratochvíl
9. 1. 1909 – 17. 2. 1992

Josef Kratochvíl (Painting by V. Šilhavý)

In the beginning of 2009, we remembered the 100th anniversary of the birth of the late Professor Dr. Josef Kratochvíl, DSc who was the founder and the first director of the Institute.

Josef Kratochvíl was born in the small village Kúsky at Velké Meziříčí in the region of Českomoravská vysočina Highlands in Moravia. After having passed his university examinations in the Faculty of Science, Masaryk University, he became an assistant at the Agricultural University in Brno. He was appointed professor of applied entomology and zoology to the chair and directorship of the Institute of Applied Zoology and later the Chair of Zoology at the Agricultural University in Brno in 1945. After the founding of the Czechoslovak Academy of Sciences in 1952, he was deeply engaged in building of this institution. As early as 1953, he founded the Laboratory of Vertebrate Zoology in Brno. In 1960 the laboratory was transformed into an institute and Josef Kratochvíl became its first director and headed the institute until 1976.

Josef Kratochvíl was an excellent and highly efficient organizer of scientific research and at the same time prominent zoologist of outstanding scientific reputation. His interests in spiders and insects yielded dozens of valuable papers. From the beginning of the 1950's, his research was successively focused on vertebrate biology, particularly on mammalian systematics. Josef Kratochvíl is probably best remembered for his description of two rodent species from Central Europe, *Microtus tatricus* (Kratochvíl, 1952) and *Apodemus microps* Kratochvíl et Rosický, 1952. However, his contribution to various fields of zoology, both invertebrate and vertebrate, was immense. His scientific achievements were summarized in details by Oldřich Štěrba (1992: Folia Zoologica 42: 1).

We estimate that around 500 fellows and students of zoology have been employed since the founding of the Institute. We should remember that the Institute would probably not exist without the organizational efforts of this petite but resolute man. This merit, as well as other lifetime achievements of Josef Kratochvíl, deserves high recognition.

Jiří Halouzka
(1953–2008)

Jiří Halouzka (Archives of the Halouzka family)

RNDr. Jiří Halouzka, PhD, a prominent Czech zoologist and scientist at the Institute of Vertebrate Biology, Academy of Sciences in Brno, died of pulmonary carcinoma after a 1-year illness on November 13, 2008 in the Břeclav hospital at the age of 55 years.

Jiří Halouzka was born on March 4, 1953 in Valtice, South Moravia. In 1977, he graduated in biology (specialization zoology and hydrobiology) from the University Brno, Faculty of Science, and in 1980 he earned his RNDr. (doctor rerum naturalium) degree from the same University.

1978–1981 he worked at the Institute of Parasitology CSAS (Prague) in the Department of Natural Foci of Infections in Valtice. In 1982–1992 he was affiliated with the Institute of Systematic and Ecological Biology, Academy of Sciences (Brno) in the Department of Ecology of Pathogens and Reservoirs in Valtice. During this time period (in 1990), he successfully defended his CSc. (PhD) thesis "Significance of haematophagous diptera (family *Ceratopogonidae*) in the virology of vertebrates" at the Institute of Vertebrate Biology CSAS Brno; a part of this thesis was later published in an important monograph "Biting midges (*Ceratopogonidae*) of medical and veterinary importance" (Acta Sc. Nat. Brno 30, no. 2: 1–56).

Since 1993, his institute changed the name twice again into the Institute of Landscape Ecology and Institute of Vertebrate Biology ASCR, Valtice, and Dr. Halouzka was Head of the Medical Zoology Department at the latter institute (1999–2007).

Previous or lately engagement of Jiří Halouzka was in research projects of his department on the role of haematophagous biting midges (Ceratopogonidae) in the ecology of arboviruses; isolation and characterisation of arboviruses (viruses Ťahyňa, tick-borne encephalitis, West Nile); serosurveys for arboviruses in animals and humans; natural foci of various infections; detection of borreliae in ixodid ticks and other haematophagous arthropods; ecology of other pathogenic agents (*Emmonsia*, *Salmonella*, *Francisella, Clostridium botulinum*). Dr Halouzka also collaborated with Institute of Experimental Biology, Faculty of Science, Masaryk University in Brno, and with Entomological Institute of ASCR in České Budějovice in the last years. He stayed for several weeks at the Gamaleya Institute of Epidemiology and Microbiology, Moscow, in the Reference Laboratory of Tick-borne Diseases with natural focality. His best achievements are the papers on ecology of West Nile virus and discovery of spirochetes in mosquitoes that were found to belong to as yet undescribed genus ("Spironema").

He published 80 scientific papers as a co-author or author, and these articles have been cited (as of 17 February 2009) 1039 times (Web of Science; H index 17). This is an excellent citation track list for a Czech scientist.

Dr. Halouzka was a long-time member of the Czech Society of Zoology.

Jiří was a very careful and conscientious laboratory worker and a respectable man. His hobbies included playing tennis and guitar, and also listening to ancient and baroque music. He was fond of planting trees which referred to his deep interest and love of the nature.

Jiří Halouzka is survived by his wife Anna, son Jiří (26) and daughter Barbora (26).

Ivo Grulich
(1925–2007)

Ivo Grulich (Photo by R. Obrtel)

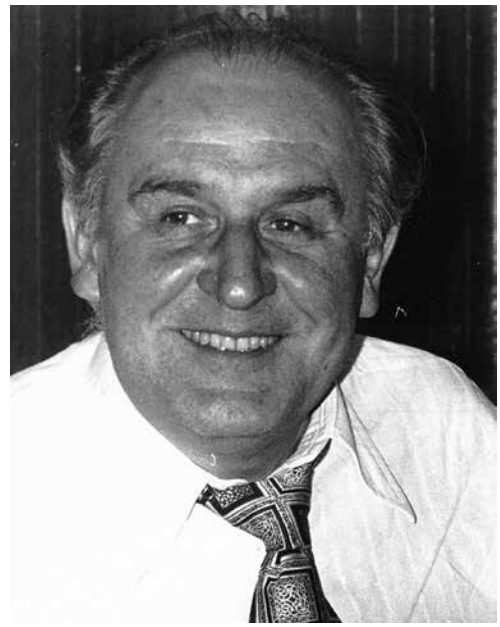
A former fellow of the Institute of Vertebrate Biology, Associate Professor Dr. Ivo Grulich, PhD died in Brno at the age of 82 years. He was a prominent Czech zoologist who is remembered with a number of studies dealing with systematics and ecology of small mammals.

Ivo Grulich was born in Hradec Králové in eastern Bohemia on September 14, 1925. He attended high school in his hometown, and was able to enter university studies only in 1945, after the Nazi occupation of Czechoslovakia during the World War II. He successfully passed final examinations and was awarded a doctoral degree at the Agricultural University in Brno in 1950. In the beginning of the 1950's, Ivo Grulich completed his PhD studies in Moscow, under the supervision of Professor A.D. Kuz'akin. He returned back home in 1954 and was subsequently employed as a research fellow in the Laboratory of Vertebrate Zoology, Czechoslovak Academy of Sciences, in 1955. He spent decades working in the laboratory and later institute, and he was conferred emeritus status in 1986.

Such are the facts, but they reveal few of the outstanding scientific achievements of Ivo Grulich, who was very enthusiastic about zoological research. He started collecting beetles as a young boy, and was famous for his hard work, especially in the field. His scientific interests were extremely diverse and his knowledge was extraordinarily deep. His prime topic was the biology of moles and hamsters, however, his research involved many other mammalian taxa such as bats, shrews and weasels. Ivo Grulich always had a special sense for applied zoological research and he contributed substantially to various parasitological and epidemiological problems and to the understanding of ecological impacts of the burrowing activities of rodents. The complete list of publications and detailed information on scientific achievements of Ivo Grulich were published by Štěrba (2007: Lynx, n.s., 38: 137–144).

Ivo Grulich died on December 10, 2007 in Brno. He was a man of special nature, with friendly and open attitude to all people around him. His contribution to development of Czech zoology and mammalogy was immense, and we shall miss Ivo very much.

Jaroslav Pelikán
(1926–2009)



Jaroslav Pelikán (Archives of the IVB AS CR Brno)

Associate Professor Dr. Ing. Jaroslav Pelikán, DSc was a prominent Czech zoologist and ecologist. He received outstanding international reputation and was among the founders of Czech population ecology.

Jaroslav Pelikán was born in the small town Ivančice near Brno on April 22, 1926. After attendance of high school in Brno, he enrolled for studies at the Agriculture University in 1945. He obtained his doctorate in 1949 and afterwards worked at the university under Professor F. Miller, who made him assistant. As with many of his contemporaries, Jaroslav Pelikán was interested initially in entomology but he subsequently switched to vertebrate studies. This transition was related to the founding of the Laboratory of Vertebrate Zoology of the Czechoslovak Academy of Sciences in Brno in 1953. Jaroslav Pelikán joined the staff of the laboratory in 1954, and worked in the Institute the next 40 years until his retirement in 1990. He was also deeply engaged in academic life at Brno universities as a lecturer and supervisor of students. He participated in the organization of several important international meetings, e.g. the 2nd International Theriological Congress in Brno, 1978.

The prime interests of Jaroslav Pelikán in vertebrate zoology included population ecology of small mammals. He published almost 80 papers on this topic and many of his studies became classics in the research of population dynamics and reproduction in rodents. Jaroslav Pelikán never left his interests in entomology and he became the world leading specialist in the biology of Thysanoptera. He published about 70 scientific papers dealing with taxonomy and ecology of this insect order. He was able to exploit his experience in basic research of various animal groups towards promoting the general knowledge of ecology. Jaroslav Pelikán co-authored or translated from English several books or textbooks on ecology that were among the first general publications in this field in Czech. In this way, he deeply influenced a whole generation of Czech or Slovak naturalists. The complete bibliography and summary of scientific achievements of Jaroslav Pelikán were reported by Povolný (1997: Klapalekiana 33: 135–141) and Zima (1998: Lynx, n.s., 29: 107–113).

Jaroslav Pelikán died on January 30, 2009 in Brno. He was an outstanding personality with extremely friendly and charming attitude to his colleagues. He had a special sense of humour and was able to disseminate optimistic feelings, even during difficult times. Jaroslav Pelikán left a tremendous scientific and human legacy and will be missed by all his friends and colleagues.

AWARDS

In 2008, Josef Bryja was awarded the Otto Wichterle Prize for his studies on molecular ecology in general. He uses various vertebrate models and genetic markers for analyses of factors shaping the genetic structure of populations. His current research has concentrated on the interactions between neutral and adaptive genetic variation, factors affecting reproductive success, and conservation genetics of endangered species. He is also involved in several projects on the evolution and ecology of African rodents (Senegal, Malawi, Tanzania) and he is a member of the International Steering Committee for the European Science Foundation scientific program "Integrating population genetics and conservation biology: Merging theoretical, experimental and applied approaches" and a member of international consortium CONGRESS (Conservation Genetic Resources towards Effective Species Survival).

The Otto Wichterle Prize award ceremony 2008. Josef Bryja (right) receives the Otto Wichterle Prize for young scientists from the former vice president of the Academy of Sciences of the Czech Republic Jiří Drahoš (left) (Photo by Z. Tichý)

In 2008, Ivo Rudolf was awarded the Czech and Slovak Young Microbiologist Prize which is administered by Czechoslovak Society for Microbiology. I. Rudolf was awarded for his studies in molecular detection and ecology of arthropod-borne pathogenic and non-pathogenic microrganisms in their vectors and vertebrates. He is also involved in the EDEN project of the 6th Framework Programme dealing with the ecology of emerging vector-borne diseases in Europe.

INTERNATIONAL ACTIVITIES

The Institute's international collaboration is a very important part of its all research activities. Our scientists work in close collaboration and exchange their views with scholars from various institutions in many countries. Each department is involved in various forms of international co-operation and we have recently been participating in 15 international projects including six projects within the EU Sixth Framework Programme and other four EU projects. We have been deriving much benefit from established links with foreign laboratories, however, we use any opportunity to find new contacts. The Institute organizes scientific meetings, offers study visits to foreign students and supports participation of our specialists in major scientific events abroad. Great emphasis is placed on young scientist-centred educational stays. Our scientists are members of 34 international organizations and 8 editorial boards, respectively.

International Scientific Meetings Organized by the Institute

Annual Meeting of EDEN project, Brno, January 14–18, 2008

After Finland in 2006 and Turkey in 2007, it was the Czech Republic that hosted the EDEN („Emerging Diseases in a changing European eNvironment") project's 3rd Annual Meeting, in Brno. EDEN is an integrated project of the European Commission's FP6 (6th Framework Programme for Research and Technological Development), aimed at anticipating, preventing and intervening against the emergence of vector-borne diseases in Europe.

The EDEN Project, which was launched in 2004 on the initiative of CIRAD (Centre de Cooperation Internationale en Recherche Agronomique pour le Développement), IRD (Institut de Recherche pour le Développement) and the Institut Pasteur in Paris, to run for five years, associates 49 partners from 24 countries, most of them European. As Renaud Lancelot, Project Coordinator and CIRAD researcher, says: "*EDEN's biggest scientific success has been to combine the approaches of specialists in the biology and ecology of vectors and the diseases they transmit and of modelling teams with complementary points of view regarding the interactions between health and the environment and the scales on which diseases are perceived. These teams, from a wide range of places and disciplines, have agreed to work towards shared objectives, using the same concepts, methods and tools.*" The teams intend to quantify the impact of environmental change on the risk of seeing emerging diseases introduced, become established and spread in Europe and the Mediterranean.

The EDEN Project became a European reference for vector-borne disease epidemiology and ecology, and covers the whole range of manmade ecosystems in Europe, from the Arctic Circle to the Mediterranean, and their connections in Sub-Saharan Africa, a "reservoir" for several of the diseases under study. Its work is based on diseases that are sensitive to environmental change. Most of them are zoonoses, diseases shared by animals and man, many of them being transmitted by ticks and insects. A number of these diseases are already found in Europe (tick-borne encephalitis, haemorrhagic fever with renal syndrome, leishmaniasis, etc). Others may emerge or reappear, such as malaria, West Nile virus or Rift Valley fever. Innovative shared approaches using the latest research successes (remote sensing and mathematical tools for epidemiology, ecological science and biodiversity studies) have enabled the scientific network set up by EDEN to understand and to model the mechanisms of emergence and to identify at-risk ecosystems. Several CIRAD internal research units and joint research units are involved in

Participants of the meeting at the International Hotel in Brno (Archives of the Department of Medical Zoology IVB AS CR, Valtice)

the project, either in disease studies (West Nile virus, Africa platform, rodent-borne diseases) or in integration activities (modelling and remote sensing). These scientific developments pave the way for innovations in the field of public health: dynamic mapping dynamic risk mapping, decision support for disease surveillance and control on a geographical Europe- and Mediterranean-wide scale. "*Ecosystems in the South are linked to those in the North through the intensification of trade, which facilitates the spread of diseases and their vectors*", says Renaud Lancelot, adding that "*diseases do not recognize borders, and the authorities have now accepted this concept; it is no longer limited to the scientific community.*"

The Institute of Vertebrate Biology at the Academy of Sciences of the Czech Republic (an EDEN partner) organized the Annual Meeting of the EDEN Project together with the CIRAD team. More than 150 participants, among them the leading specialists in emerging diseases, their vectors and modelling for epidemiological and ecological studies, attended the meeting. In the meantime, the annual report on research operations in the 24 countries – more than 70 scientific publications halfway through the project – were submitted to the European Commission, which despatched two experts to Brno who conducted a scientific audit of the project.

The meeting was supported by the Mayor of the city of Brno (Roman Onderka), and the Dean of the Faculty of Science, Masaryk University (Assoc. Prof. Milan Gelnar). It started on 14 and 15 January with a PhD meeting for graduate students. On 16 January, during the plenary session open to the public (for the first time since the start of the project), the 49 EDEN partners presented their scientific results. This was followed by a press conference attended by Czech media (radio, TV) and reporters from BBC and AFP. The following two days were devoted to scientific meetings organized by each sub-project, and the last day to the Steering Committee meeting and a debate on future operations under the EDEN project. Social programme during the conference programme included a visit to Mendel Museum, and much appreciated dinner in the wine cellar "U královny Elišky".

Summer School of Conservation Genetics: Assessing populations structure and dynamics through the use of molecular markers and novel computational models, Liblice, September 1–7, 2008.

The Conservation Genetics Summer School took place in the first week of September 2008 in the Czech Republic and it was organized by Pavel Munclinger (Faculty of Science, Charles University in Prague), Josef Bryja (Institute of Vertebrate Biology ASCR, Brno), Cino Pertoldi (University of Aarhus, Denmark), and Ettore Randi (Istituto Nazionale per la Fauna Selvatica, Ozzano dell'Emilia, Italy). It was located in the Conference Centre in Château Liblice and it lasted 7 days. 32 students from 19 countries attended the school and were taught by 10 lecturers. The selection of participants was done according to applicants' interest, CV, statement of interest quality, recommendation letters, and applicants' project significance in conservation genetics. It was financially supported by the European Science Foundation programme ConGen (Integrating population genetics and conservation biology: Merging theoretical, experimental and applied approaches). Priority was given to applicants who come from countries included in the ConGen programme, however, a balanced geographical representation, gender ratio among the participants, and broad project organism taxonomy coverage was ensured. The purpose of the Summer School was to introduce the students and young post-docs to updated procedures used in the analyses of molecular data-sets applied to problem-solving in conservation genetics. This was done by bringing together population geneticists, statisticians and empirical conservation geneticists, who presented theoretical lectures and led practical computer work. Students were encouraged to discuss their own projects and analyse their own data-sets. The Summer School was structured with morning lectures and afternoon computer exercises in

Summer School participants and lecturers (Photo by P. Munclinger)

which the students were given datasets to analyse and had an opportunity to analyse also their own data. Important part of the afternoon sessions formed presentations of students' scientific projects followed by discussions and suggestions for future progress. The course provided both an introductory overview of the most essential and commonly used methods in conservation genetics (population structure, gene flow, effective population size) and their theoretical background, as well as special methods applied in landscape and non-invasive genetics. Rather than provide comprehensive coverage of any single technique, the course aimed to teach students how to identify the most appropriate technique(s) for specific types of data sets, and for specific questions.

Conference "Zoologické dny 2007" [Zoological Days 2007], Brno, February 8–9, 2007
Conference "Zoologické dny 2008" [Zoological Days 2008], České Budějovice, February 14–15, 2008

The traditional meeting of Czech and Slovak zoologist, whose long-term history goes back to 1969, has become in last years an important annual scientific conference with hundreds of zoological presentations each year. Institute of Vertebrate Biology is the main organizer of these conferences in Brno since their origin almost 40 years ago. Since 2003, the conference has been held at the Faculty of Science, Masaryk University Brno (official co-organizer). In 2006, the zoologists (mainly from the Czech and Slovak Republics) decided to organize this conference in Brno only bi-annually (in odd years), while in even years the conference place will

Participants of the conference at Masaryk University (Photo by M. Promerová)

be in other towns of the Czech and Slovak Republics. The number of zoologists interested in participating at these largest zoological meetings in Central Europe is still increasing. In 2007 in Brno, the number of registered participants was 337 and they presented 81 lectures and 160 posters. Next year 2008 in České Budějovice (Faculty of Science, South Bohemian University České Budějovice as official co-organizer), 396 participants registered 121 lectures and 203 posters. Instead of increasing number of people and proportion of young scientists (more than half of participants are usually students), the scientific quality of presentations increases too, which is very satisfying fact. The regular student competition for the best presentations (usually 3 lectures and 4 posters) is organized thanks to sponsorship of the Olympus Company.

25th Mustelid Colloquium, Třeboň, Czech Republic, October 4–7, 2007 (co-organized with the Czech Otter Foundation Fund and Agency for Nature Conservation and Landscape Protection of the Czech Republic).

25th Mustelid Colloquium

4–7 October 2007
Třeboň, Czech Republic

Mustelid Colloquium, annual conference devoted to research, conservation and management of carnivore species from Mustelidae family, observed this year its quarter-century anniversary. The 25th Mustelid Colloquium was held in Třeboň, Czech Republic, on 4–7 October 2007. The meeting was organized by Czech Otter Foundation Fund, Agency for Nature Conservation and Landscape Protection of the Czech Republic, and the Institute of Vertebrate Biology, Academy of Sciences of the Czech Republic. Nearly 100 participants from 21 countries, spreading from Russia to Portugal and from Scandinavia to Italy, presented 45 talks and 28 posters dealing with all European mustelid species, except the marbled polecat. The main topics included distribution and demography, monitoring and assessment techniques, road mortality, conservation and management, genetics, habitat use, diet, and behaviour. For the first time, the scope of the colloquium was officially extended also for the raccoon dog. Although almost 40% of presentations were dealing with the most popular mustelid – the Eurasian otter, very interesting talks were presented also for other species, such as wolverine, badger, pine and stone martens, polecat, European mink, stoat and weasel. Special session was devoted to alien species, American mink and raccoon dog. Evening programme included the workshop „How to assess the conservation status of otters in context of EU legislation?“, while on the next day the student competition awards, followed by banquet and farewell party took place. For the last day of the colloquium, a field trip to Třeboňsko Protected Landscape Area & Biosphere Reserve was organized. The area is a unique semi-natural wetland ecosystem, created by formation of comprehensive network of fishponds and channels in the Middle Ages. The excursion continued by visit of ZOO Ohrada in Hluboká nad Vltavou.
The Book of Abstracts from 25th Mustelid Colloquium can be obtained from the Institute of Vertebrate Biology AS CR.

Second European Ground Squirrel Meeting, Svatý Jan pod Skalou, Czech Republic, October 1–5, 2008

The main goal of the European Ground Squirrel (EGS) Meeting is to provide forum for the presentation of earlier and novel scientific results as well as conservation experiences concerning the European ground squirrel, and to give ground squirrel experts, biologists and field workers

from different countries the opportunity of a friendly meeting and fruitful discussions. The first EGS Meeting took place in Felsőtárkány, Hungary in 2006. The second EGS Meeting was held in Svatý Jan pod Skalou, Czech Republic, on 1–5 October 2008, hosting 44 participants from 11 countries. During the programme, 21 lectures and 14 posters concerned to monitoring and distribution, genetics, ecology, behaviour and conservation of ground squirrels were presented. Field excursions into two Protected Landscape Areas, i.e. Český kras and České středohoří were a part of the Meeting. The following institutions and organisations were partners of the Meeting: Department of Zoology, Faculty of Science, Charles University in Prague; Department of Zoology, Faculty of Science, University of South Bohemia, České Budějovice; Institute of Vertebrate Biology ASCR, Brno; Agency for Nature Conservation and Landscape Protection of the Czech Republic, Prague; Kavyl, the Centre of Ecological Research and Education in Svatý Jan pod Skalou; and the Prague ZOO.

Participation in international conferences

- Conservation Genetics: updating concepts and methods, Antalya, Turkey, January 22–23, 2007
- 4èmes Journées Internationales – Oiseaux d'Eaux et Zones Humides au Maroc, El Jadida, Morocco, February 16–17, 2007
- Ecology and Speciation, BES Symposium, Sheffield, UK, March 28–30, 2007
- 76th Annual Meeting of the American Association of Physical Anthropologists, Philadelphia, USA, March 28–31, 2007
- Annual International Symposium FSBI, Exeter, UK, July 23–27, 2007
- 28th Congress of International Union of Game Biologists, Uppsala, Sweden, August 13–18, 2007
- 14th International Bat Research Conference, Mérida, Mexico, August 19–23, 2007
- 11th Congress of European Society for Evolutionary Biology, Uppsala, Sweden, August 20–25, 2007
- 10th International African Small Mammal Symposium, Abomey-Calavi, Benin. August 20–25, 2007
- 6th European Ornithologists' Union Conference, Vienna, Austria, August 24–29, 2007
- 2nd Congress of the European Federation for Primatology, Prague, Czech Republic, September 3–7, 2007
- ECI XII, 12th European Congress of Ichthyology, Cavtat, Croatia, September 9–13, 2007
- Fish Stock Assessment in Lakes and Reservoirs: Towards the true picture of fish stock České Budějovice, Czech Republic, September 11–15, 2007
- 1st International Conference on Genus Cervus 2007, Primiero, Italy, September 14–17, 2007
- 13th Annual Meeting of the European Association of Archaeologists, Zadar, Croatia, September 18–23, 2007
- 5th European Congress of Mammalogy, Siena, Italy, September 21–26, 2007
- Conférences Jacques-Monod: Evolutionary genetics of host-parasite relationships, Roscoff, France, September 22–26, 2007
- 7th International Symposium on Fish Parasites, Viterbo, Italy, September 24–28, 2007
- 25th Mustelid Colloquium, Třeboň, Czech Republic, October 4–7, 2007

- Special Bitterling Symposium within 40th Annual Meeting of The Ichthyological Society of Japan, Sapporo, Japan, October 5–8, 2007
- 6th International Zoo and Wildlife Research Conference on Behaviour, Physiology and Genetics, Berlin, Germany, October 7–10, 2007
- 10thInternational Otter Colloquium, Hwacheon, South Korea, October 10–16, 2007
- Risk Assessment in Europen River Basins – State of Art and Future Challenges, Leipzig, Germany, November 12–14, 2007
- Mouse Meeting, Plön, Germany, March 10–11, 2008
- 77th Annual Meeting of the American Association of Physical Anthropologists, Columbus, USA, April 9–12, 2008
- SETAC Europe 18th Annual Meeting, Warsaw, Poland, May 25–29, 2008
- Annual Meeting of the Society for Molecular Biology and Evolution, Barcelona, Spain, June 5–8, 2008
- Annual Meeting of the Association for Tropical Biology and Conservation, Paramaribo, Suriname, June 9–13, 2008
- 4th European Conference on Behavioural Ecology, Dijon, France, July 18–20, 2008
- Annual International Symposium FSBI Parasites as agents of selection in fish: from genes to ecosystems, Cardiff, UK, July 21–25, 2008
- 11th International Conference on Rodent Biology „Rodens et Spatium“, Myshkin, Russia. July 24–28, 2008
- 12th International Congress of Bacteriology and Applied Microbiology, Istanbul, Turkey, August 5–9, 2008
- 12th International Behavioral Ecology Congress, Ithaca, USA, August 9–15, 2008
- 11th European Bat Research Symposium, Cluj-Napoca, Romania, August 18–22, 2008
- 1st International Workshop on Aquatic Toxicology and Biomonitoring, Vodňany, Czech Republic, August 27–29, 2008
- British Ecological Society Annual Meeting and AGM, London, UK, September 3–5, 2008
- International Conference on Fish Diseases and Fish Immunology, Reykjavík, Iceland, September 6–9, 2008
- 82nd Annual Meeting of the German Society of Mammalogy, Vienna, Austria, September 14–18, 2008
- Workshop Water Framwork Directive in Relation to Priority and Emerging Pollutants, Koblenz, Germany, September 22–24, 2008
- 4th International Conference of the Pan African Fish and Fisheries Association: African Fish and Fisheries Diversity and Utilization, Addis Ababa, Ethiopia, September 22–26, 2008
- NEOBIOTA: Towards a Synthesis – 5th European Conference on Biological Invasions; Prague, Czech Republic, September 23–26, 2008
- 2nd European Ground Squirrel Meeting, Svatý Jan pod Skalou, Czech Republic, October 1–5, 2008
- European Otter Workshop 2008, Moravske Toplice, Slovenia, October 5–10, 2008
- MALIAF International Conference, Florence, Italy, November 5–7, 2008
- 5th World Recreational Fisheries Conference “The Angler in the Environment”, Dania Beach, USA, November 10–13, 2008

Membership in international organizations

Scientist	Organization
ADÁMEK Z.	European Aquaculture Society
ALBRECHT T.	American Society of Naturalists
	International Society for Behavioral Ecology (ISBE)
BARUŠ V.	Sociedad Cubana de Parasitologia Animal, honorary chairman
BÍMOVÁ B.	International Mammalian Genome Society
BRYJA J.	Steering Committee of European Science Foundation
ČAPEK M.	IOC Standing Committee on Ornithological Nomenclature
ČERVENÝ J.	Ad Hoc Group for Environmental Problems of COST
	(Council for Research and Development, EU)
	Czech National Committee of the MAB Programme
	Working Group for Large Carnivores Initiative for Europe
GVOŽDÍK L.	American Society of Ichthyologists and Herpetologists
	American Society of Naturalists
	British Herpetological Society
	Society for Integrative and Comparative Biology
	Society for the Study of Amphibians and Reptiles
	Society for the Study of Evolution
	Steering Committee of European Science Foundation
HÁJKOVÁ P.	IUCN/SSC Otter Specialist Group
HUBÁLEK Z.	ECDC (European Centre for Disease Prevention and Control)
JURAJDA P.	Fisheries Society of the British Isles
MARTÍNKOVÁ N.	Society of Systematic Biologists
	American Society of Mammalogists
KOUBEK P.	Working Group for Large Carnivores Initiative for Europe
ONDRAČKOVÁ M.	European Association of Fish Pathologists
PIÁLEK J.	European Society for Evolutionary Biology
	Society for the Study of Evolution
PROCHÁZKA P.	Deutsche Ornithologen-Gesellschaft
REICHARD M.	Association for the Study of Animal Behaviour
	British Ecological Society
	European Society for Evolutionary Biology
	Fisheries Society of the British Isles
	Neotropical Ichthyological Association
SLÁDEK V.	American Association of Physical Anthropologists
ZIMA J.	Czech National Committee of the IUBS
	International Advisory Board, BIOTER Centre of Excellence (EU)
	Insectivores Specialits Group SSC IUCN
	International Sorex araneus Cytogenetics Committee
	Rodents Specialists Group SSC IUCN
	Societas Europaea Mammalogica
	International Federation of Mammalogy
Total 19	**34**

Membership in editorial boards

Scientist	Journal
BARUŠ V.	Transactions of the Zoological Society of India
	Helminthologia
BLAHÁK, P.	Folia Zoologica (managing editor)
GVOŽDÍK, L.	Folia Zoologica
HONZA M.	Folia Zoologica
HUBÁLEK Z.	Cryobiology
	Folia Parasitologica
KOUBEK, P.	Folia Zoologica
LUSK S.	Folia Zoologica
PEŇÁZ M.	Folia Zoologica (editor-in-chief)
	Quaderni E.T.P. – Journal of Freshwater Biology
	Polskie Archiwum Hydrobiologii
SLABÁKOVÁ H.	Folia Zoologica
ZIMA J.	Hystrix – Italian Journal of Mammalogy
	Folia Zoologica (editor-in-chief)
	Acta Theriologica
	Scopolia
Total 10	**10**

EDUCATION AND TEACHING ACTIVITIES

The Institute lays great emphasis on education and teaching activities. In 2007–2008, we gave lectures at seven faculties of seven universities and supervised 116 undergraduates and 63 postgraduates from nine faculties of nine universities. Another important fact is that 12, 27 and 12 students supervised by the staff succeeded in obtaining their bachelor, MSc and PhD degrees, respectively. We have accreditation from the Ministry of Education, Youth and Sports of the Czech Republic to perform post-gradual studies in zoology at the Faculty of Science, Masaryk University in Brno, and the Faculty of Biological Sciences, South Bohemian University in České Budějovice. We participate in research projects carried out in two joint laboratories, "Evolutionary Genetics of Animals" (established by the Department of Zoology, Faculty of Science, Charles University in Prague, the Institute of Animal Physiology and Genetics ASCR in Liběchov and the Institute of Vertebrate Biology ASCR in Brno) and "Ichthyoparasitology – The Centre of Basic Research" (established by the Faculty of Science, Masaryk University in Brno and the Institute of Vertebrate Biology ASCR in Brno). These laboratories provide a firm basis for better interaction between the Academy of Sciences CR and universities, which helps to make the institute attractive to students. Moreover, the scientists of the Institute are members of scientific councils and boards at universities.

Teaching at universities

Lecturer	Subject	2007–2008 hours	Faculty/ University
Albrecht T.	Modern statistical methods	20	6
Bryja J.	Molecular ecology	24	1
	Population ecology	8	1
Čapek M.	Ornithology	46	1
Červený J.	Field course of zoology	60	2
Halouzka J.	Tutorials in immunology	8	1
Honza M.	Ecology of birds	26	1
Hubálek Z.	Fundamentals of microbiology	30	1
	Microbial zoonoses and sapronoses	30	1
	Tutorials in microbiology	60	1
Jurajda P.	Ecology of fishes	26	1
Koubek P.	Game biology	26	1
Lusk S.	Ichthyology	36	1
Prokeš M.	Ichthyology	2	3
Reichard M.	Biogeography	26	1
Sládek V.	Biological anthropology 2	54	4
	Biological anthropology for archeologists 1	65	4
	Biological anthropology for archeologists 2	65	4
	Human variability and adaptability	54	4
	Locomotor system 1	65	4
	Tutorials in anthropology	13	4
Svobodová J.	Animal ecology	14	7
	Biodiversity	3	7
	Ecological methods	8	7
	Field course of nature preservation	42	7
	Field course of zoology	17	7
	General ecology	28	7
	Zoology	52	7

Tkadlec E.	Life history	30	5
	Population ecology	45	5
	Scientific methodology	30	5
	Time series in ecology	15	5
	Tutorials (MSc students)	30	5
	Tutorials (PhD students)	20	5
Zima J.	Biodiversity	26	1
	Biodiversity	26	6
	Field course of zoology	42	6
	Genetical methods in zoology	12	6
	Systematics and phylogeny of vertebrates	13	6
Zukal J.	Behavioral ecology	45	1
	Chiropterology	22	1
Total 17	**41**	**1264**	**7/7**

[1] Faculty of Science, Masaryk University, Brno
[2] Department of General Zoology, University of Essen
[3] Faculty of Agronomy, Mendel University of Agriculture and Forestry, Brno
[4] Faculty of Humanities, University of West Bohemia, Plzeň
[5] Faculty of Science, Palacký University, Olomouc
[6] Faculty of Science, Charles University, Prague
[7]Faculty of Forestry and Environment, Czech University of Agriculture, Prague

Undergraduate students (bachelors) working in the Institute and/or supervised by the Institute's fellows in 2007–2008

Student	Supervisor/ Consultant	2007	2008	Defended the theses	Faculty/ University
Bayerlová M.	Martínková N.		+		1
Beková M.	Hubálek Z.		+		1
Červinková J.	Tkadlec E.	+	+	2008	2
Dolinková K.	Tkaldec E.	+	+	2008	2
Fornůsková A.	Bryja J.	+		2007	1
Gettová L.	Hájková P.		+		3
Hauerland L.	Tkadlec	+	+	2008	2
Kaderová J.	Šikutová S.	+	+	2008	1
Kazdová K.	Hubálek Z.	+		2007	1
Klajblová K.	Hubálek Z.		+		1
Klima O.	Lusk S.		+		1
Králová T.	Bryja J.		+		1
Křížová P.	Bryja J.	+		2007	1
Kubíčková L.	Šikutová S.		+		1
Lešišová H.	Tkadlec E.	+	+	2008	2
Lytková L.	Rudolf I.	+	+	2008	1
Machačová L.	Tkadlec E.	+	+	2008	2
Martincová Z.	Tkadlec E.		+		2
Opatová P.	Bryja J		+		1
Píše R.	Halouzka J.	+	+	2008	1
Polcrová P.	Hubálek Z.		+		1
Široká P.	Tkadlec E.		+	2008	2
Škeříková I.	Tkadlec E.		+		2

Slaninková E.	Rudolf I.		+		1
Sommerová K.	Bryja J.		+		1
Tříska P.	Martínková N.		+		1
Venclíková K.	Svobodová J.		+		1
Total 27	**10**	**11**	**24**	**12**	**3/3**

[1] Faculty of Science, Masaryk University, Brno
[2] Faculty of Science, Palacký University, Olomouc
[3] Faculty of Science, Komenský University, Bratislava, Slovakia

Undergraduate students (MSc) working in the Institute and/or supervised by the Institute's fellows in 2007–2008

Student	Supervisor/ Consultant	2007	2008	Defended the theses	Faculty/ University
Baborová B.	Červený J.	+	+		8
Bartoňová E.	Lusková V.	+		2007	1
Bednářová J.	Zukal J.	+	+		1
Bejdák P.	Bryja J.	+	+	2008	1
Blažková P.	Bryja J.	+	+		7
Červinková J.	Tkadlec E.		+		5
Císařová L.	Sládek V.	+		2007	4
Doležálková I.	Hubálek Z.	+	+	2008	1
Dolinková K.	Tkadlec E.		+		5
Drha M.	Červený J.	+	+		8
Dvořák P.	Červený J.	+	+		8
Fainová D.	Procházka P.		+		7
Fornůsková A.	Bryja J.	+	+		1
Hájková A.	Zima J.	+	+		6
Hanuš J.	Červený J.		+		8
Hauerland L.	Tkadlec E.		+		5
Havránek M.	Tkadlec E.		+		5
Hlaváčová J.	Homolka M.	+	+		1
Hnojská V.	Sládek V.	+		2007	4
Hönig V.	Hubálek Z.	+		2007	1
Hora M.	Sládek V.		+		4
Hrabec M.	Kamler J.	+	+		2
Janura P.	Červený J.		+		8
Jarolím Z.	Červený J.		+		8
Javůrková V.	Albrecht T.	+		2007	5
Ježek M.	Červený J.	+	+	2008	8
Kalinová Z.	Koubek P.	+	+		8
Kazdová K.	Hubálek Z.	+	+		1
Konečná G.	Jurajda P.	+	+	2008	1
Koubínová D.	Zima J.	+		2007	6
Koubová M.	Svobodová J.	+	+		7
Kříž M.	Červený J.		+		8
Křížová P.	Bryja J.	+	+		1
Kubiš M.	Červený J.		+		8
Kurovec J.	Červený J.	+	+	2008	8
Lešišová H.	Tkadlec E.		+		5
Loudová J.	Svobodová J.	+	+		8

Mačák J.	Červený J.	+	+		8
Mácha M.	Červený J.	+	+		8
Machačová L.	Tkadlec E.		+		5
Malinová J.	Červený J.	+	+	2008	8
Masaříková J.	Rudolf I.	+	+	2008	1
Matějů Z.	Červený J.		+		8
Měřáková E.	Gvoždík L.	+	+		1
Michálek B.	Tkadlec E.	+	+		5
Michálková J.	Červený J.	+	+		8
Mrkvičková H.	Albrecht T.	+		2007	6
Mrkvous J.	Červený J.	+	+		8
Navrátil M.	Červený J.	+	+		8
Neměčková M.	Červený J.	+	+		8
Pajdla M.	Červený J.		+		8
Paták L.	Tkadlec E.	+	+		1
Patzenhauerová H.	Bryja J.	+		2007	1
Pecková P.	Homolka M.	+	+		1
Petrášová I.	Reichard M.	+	+		1
Polívka J.	Červený J.	+	+		8
Promerová M.	Bryja J.	+		2007	1
Rajnyšová R.	Červený J.		+		8
Řehořová T.	Sládek V.	+		2007	4
Rejchová R.	Sládek V.	+	+		4
Řežucha R.	Reichard M.	+	+		1
Ryšavá L.	Sládek V.	+		2007	4
Satinová G.	Sládek V.		+		4
Schrommová V.	Heroldová M.	+	+		1
Šefl J.	Červený J.	+	+		8
Simprová P.	Zukal J.	+	+	2008	1
Sitek V.	Červený J.		+		8
Sládkovičová V.	Hájková P.		+		9
Slavíková K.	Zukal J.	+	+	2008	1
Smetanová Z.	Koubek P.	+	+		1
Šovčík P.	Prokeš M.	+	+		3
Staněk D.	Zukal J.	+	+		1
Šťovíček O.	Albrecht T.	+		2007	6
Štrom V.	Reichard M.	+	+		1
Suvorov P.	Albrecht T.	+		2007	6
Švanyga J.	Jurajda P.	+	+	2008	1
Svobodová P.	Hubálek Z.	+	+	2008	1
Tkadlčíková R.	Tkadlec E.	+	+		7
Tůma O.	Červený J.	+	+		8
Tyrová V.	Červený J.	+		2007	8
Urbánková S.	Mendel J.		+		5
Vávra F.	Tkadlec E.	+	+		5
Vinkler M.	Albrecht T.	+		2007	6
Vlasáková M.	Červený J.	+	+		8
Vozňáková M.	Červený J.	+	+		8
Vrtílek M.	Reichard M.		+		1
Wudiová L.	Červený J.	+		2007	8
Zelinová J.	Červený J.	+	+		8
Zifčák P.	Tkadlec E.	+	+		5
Total 89	**22**	**68**	**73**	**27**	**9/8**

[1] Faculty of Science, Masaryk University, Brno
[2] Faculty of Forestry and Wood Technology, Mendel University of Agriculture and Forestry, Brno
[3] Faculty of Agronomy, Mendel University of Agriculture and Forestry, Brno
[4] Faculty of Arts, University of West Bohemia, Plzeň
[5] Faculty of Science, Palacký University, Olomouc
[6] Faculty of Science, Charles University, Prague
[7] Faculty of Biological Sciences, University of South Bohemia, České Budějovice
[8] Faculty of Forestry and Environment, Czech University of Agriculture, Prague
[9] Faculty of Science, Komenský University, Bratislava, Slovakia

PhD students working in the Institute and/or supervised by the Institute's fellows in 2007–2008

Student	Supervisor/ Consultant	2007	2008	Defended the theses	Faculty/ University
Bartoňová E.	Lusková V.	+	+		1
Bednářová J.	Zukal J.	+	+		1
Berková H.	Zukal J.	+	+	2008	1
Bímová B.	Piálek J.	+	+	2008	4
Brandl S.	Červený J.	+	+		6
Břehová J.	Piálek J.	+	+		4
Bufka L.	Červený J.		+		6
Čížková D.	Bryja J.	+	+		1
Dufková P.	Piálek J.	+	+		5
Ďureje Ľ.	Piálek J.	+	+		1
Engen J.	Červený J.		+		6
Fejková P.	Červený J.	+	+		4
Foltánková V.	Reichard M.	+	+		1
Gregor P.	Tkadlec E.	+	+		3
Hadlovská Z	Bryja J.		+		1
Hájková P.	Jurajda P.	+	+	2008	1
Hanzal V.	Červený J.	+	+		6
Hönig V.	Hubálek Z.	+	+		5
Honzírek J.	Koubek P.	+	+		2
Horák A.	Piálek J.	+		2007	5
Hořák D.	Albrecht T	+	+		
Hulová Š.	Bryja J.	+	+		5
Janáč M.l	Jurajda P.	+	+		1
Jánová E.	Tkadlec E.	+	+		1
Javůrková V.	Albrecht	+	+		4
Ježek M.	Červený J.		+		6
Klvaňa P.	Albrecht T.	+	+		4
Kocurová M.	Červený J.	+	+		4
Konečná M.	Reichard M.	+	+		1
Konečný A.	Bryja J.	+	+		1
Koubínová D.	Zima J.		+		6
Kušta T.	Červený J.	+	+		6
Piálková R.	Honza M.	+	+		5
Lisická L.	Tkadlec E.	+		2007	3
Losik J.	Tkadlec E.	+		2007	3
Malinová J.	Červený J.		+		3
Martínková D.	Albrecht T.	+	+		4

Mendel J.	Lusková V.	+	+		1
Měštková L.	Červený J.	+	+		4
Novák V.	Zukal J.	+	+		1
Ryšavá M.	Koubek P.	+	+		1
Papoušek I.	Lusková V.	+	+	2008	1
Patzenhauerová H.	Bryja J.	+	+		1
Pokorný M.	Zukal J.	+	+		1
Polačik M.	Jurajda P.	+	+	2008	1
Polačiková L.	Honza M.	+	+	2008	1
Poláková R.	Bryja J.	+	+		1
Požgayová M.	Honza M.	+	+		1
Promerová M.	Bryja J.	+	+		1
Schwarzová L.	Zima J.	+	+		4
Smolinský R.	Gvoždík L.		+		1
Suk M.	Červený J.	+	+		6
Sychra J.	Adámek Z.	+	+		1
Šicha V.	Honza M.	+	+	2008	1
Štípek K.	Červený J.		+		6
Trebatická L.	Tkadlec E.	+	+	2008	3
Valová Z.	Jurajda P.	+	+	2008	1
Vallo P.	Koubek P.	+	+	2008	1
Vinkler M.	Albrecht T.	+	+		4
Vlk P.	Červený J.		+		6
Vyskočilová M.	Piálek J.	+	+	2008	1
Zachařová J.	Červený J.	+	+		4
Zemanová B.	Bryja J.	+	+		1
Total 63	**15**	**54**	**60**	**14**	**6/6**

[1] Faculty of Science, Masaryk University, Bruno
[2] Faculty of Forestry and Wood Technology, Mendel University of Agriculture and Forestry, Brno
[3] Faculty of Science, Palacký University, Olomouc
[4] Faculty of Science, Charles University, Prague
[5] Faculty of Biological Sciences, University of South Bohemia, České Budějovice
[6] Faculty of Forestry and Environment, Czech University of Agriculture, Prague

EDITORIAL ACTIVITIES

The „Institute“ publishes the international journal *„Folia Zoologica“*. The journal is covered by many reference journals, including the Current Contents. The current value of the impact factor amounts 0.376 for 2007.

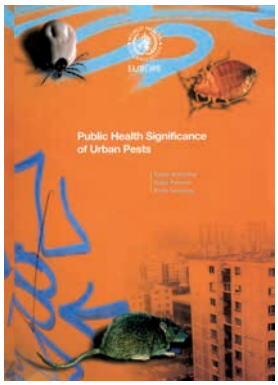
Publisher and address of Editorial Office:
Institute of Vetebrate Biology AS CR, v. v. i., Květná 8, 603 65 Brno, Czech Republic.
e-mail: editorfz@brno.cas.cz

Folia Zoologica appears in three series:

(1) basic series – published quarterly, 4 issues, 1 volume per year
(2) Folia Zoologica Monographs – published occasionally
(3) Folia Zoologica Supplements – published occasionally, usually containing contributions from important international meetings

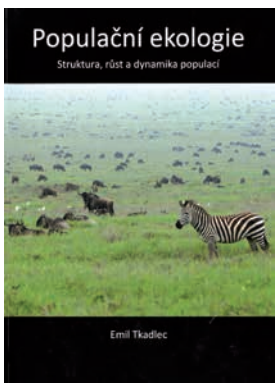
From 2007 through 2008, altogether 98 papers were published (2005: 47, 2006: 51) of which 36 articles concerned ichthyology, 38 mammalogy, 21 ornithology, and three articles were interdisciplinary.

BOOKS AUTHORED OR EDITED BY THE INSTITUTE'S FELLOWS



BONNEFOY X., KAMPEN H., SWEENEY K. (eds), 2008: Public health significance of urban pests. WHO Press, Geneva.

Zdeněk Hubálek was invited as an expert to take part in the WHO project "Public Health Significance of Urban Pests" (3 workshops in Bonn and London, 2005–2007). The results of the project led to a publication in a book of the WHO. The chapter by Z. Hubálek characterizes the role of urban birds as potential hosts and disseminators of diseases.



TKADLEC E., 2008: Populační ekologie: struktura, růst a dynamika populací. Univerzita Palackého, Olomouc, 400 pp.

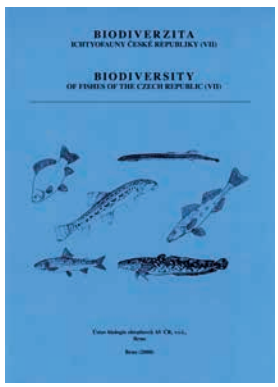
A brush new textbook of population ecology is aimed to university students, particularly to students of biology at the faculties of science. The author summarizes the modern theory of population ecology with a special respect to animals. There are many illustrative examples of model ecological studies, often inspired by the author's own research experience.

GAISLER J., ZIMA J., 2007: Zoologie obratlovců [Vertebrate Zoology]. 2nd ed. Academia, Praha, 692 pp.

The textbook for university students provides basic and comprehensive information about the biology of the vertebrates. This is the second edition of the textbook which was considerably revised and new data related to phylogeny, evolutionary developmental biology, ecology and behaviour were added. The classification and system of chordates and vertebrates are interpreted in the light of current findings of molecular phylogenetics. Molecular mechanisms controlling key features of vertebrate development are characterized, and new concepts of behavioural ecology are introduced.

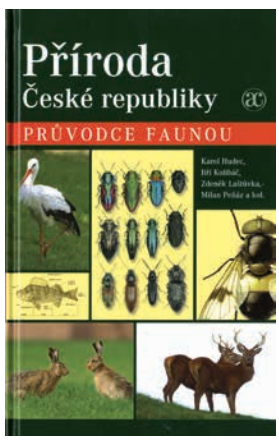
AULAGNIER S., HAFFNER P., MITCHELL-JONES A.J., MOUTOU F., ZIMA J., 2008: Guide des mammifères d'Europe, d'Afrique du Nord et du Moyen-Orient. Les Guides du naturaliste, Delachaux et Niestlé, Paris, 272 pp.

Covering over 400 species, this work presents all of the terrestrial mammal species of the Western Palaearctic, serving as an excellent guide to the great wealth of fauna in this region. Species accounts are concise and authoritative, giving information on size, distribution, habitat, behaviour, reproduction and feeding. Each account is supported by distribution maps and superb illustrations. The book features over 100 plates, comprising of over 600 colour species artworks.



LUSK S., LUSKOVÁ V. (eds), 2008: Biodiverzita ichtyofauny České republiky [Biodiversity of Fishes of the Czech Republic] (VII). ÚBO AV ČR, Brno, 134 pp.

This volume focuses on the genetic diversity of protected and rare fish species in the Czech Republic. Attention is also paid to the geographic distribution of the species under study as well as the definition of the most important factors that present real risks to fishes. The data presented were obtained within the research project VaV-SM/6/3/05, „Genetic diversity of endangered fish species: the essential basis for effective biodiversity protection" in 2005–2007.

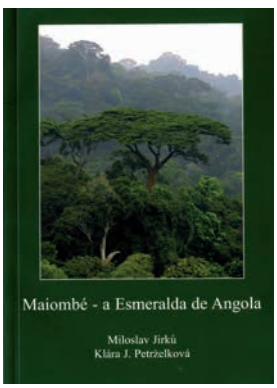


HUDEC K., KOLIBÁČ J., LAŠTŮVKA Z., PEŇÁZ M. (eds), 2007: Příroda České republiky: průvodce faunou. Academia, Praha, 439 pp.

A field guide to animals occurring in the Czech Republic was co-authored by former and current fellows of the Institute. It is the first publication of this type in our country and the book introduces representatives of all the animal groups living in the respective territory. The guide is excellently illustrated by several painters, and it is of much interest and use for specialists as well as for amateur naturalists and wide public.

SOORAE P. (ed.), Global re-introduction perspectives: re-introduction case-studies from around the globe. IUCN/SSC Re-introduction Specialist Group, Abu Dhabi, viii + 284 pp.

Klára J. Petrželková participated in a long-term project (2003–2008) focused on the population of chimpanzees released onto Rubondo Island, Tanzania. The results of the project led to a publication in a prestigious book of the IUCN / SSC Re-introduction Specialist Group. The findings of this project significantly expand the knowledge, which is of crucial importance in relation to potential future (re)introductions of this endangered species and contribute to understanding of behavioral and ecological flexibility of chimpanzees. Recommendations for (re) introduction of chimpanzees were incorporated into the chapter of the publication.



JIRKŮ M., PETRŽELKOVÁ K.J., 2008: Maiombé – a Esmeralda de Angola. Institute of Vertebrate Biology of the ASCR, Brno, 91 pp.

A project of Development Cooperation released by the Ministry of Foreign Affairs of the Czech Republic is aimed to promote economical and tourist activities in some remote parts of Angola. The preliminary phase of the Maiombe biodiversity conservation project in an Angola province Cabinda resulted under participation of Klára J. Petrželková in publication of a promotion booklet on the Maiombe forest published in 2008 and distributed in Cabinda during November 2008.