Book of Abstracts

of the

31st Mustelid Colloquium

25-26 October 2013, Szczecin

Polish Society for Conservation Genetics LUTREOLA
Department of Genetics and Animal Breeding
of the West Pomeranian University of Technology in Szczecin
Green Federation "GAJA"
West Pomeranian Nature Society

Polish Society for
Conservation Genetics LUTREOLA

FEDERACJA ZIELONYCH GAJA
organizacja pożytku publicznego istniejemy od 1993 roku

DEPARTMENT OF GENETICS and ANIMAL BREEDING

ZTP



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Szczecin 2013

Preface

Dear colleagues, ladies and gentlemen,

It is our great pleasure, and a true honour, to welcome you most warmly, on behalf of the Organising Committee and the Scientific Committee, to the *31st Mustelid Colloquium*, held in the city of Szczecin – the capital of West Pomerania region. This year Conference is organized by the *Polish Society for Conservation Genetics LUTREOLA*, the *Department of Genetics and Animal Breeding* of the *West Pomeranian University of Technology in Szczecin*, the *Green Federation "GAJA"* and the *West Pomeranian Nature Society*. It is the first time in the *Mustelid Colloquium's* 31 year history that the Conference meets in Poland. The Colloquium is attended by nearly 60 participants from 11 different countries, what makes the Conference truly international in scope.

This focused, theme-based scientific Conference was organized in recognition of:

- the growing threat of extinction, often poorly described and known species of the weasel family,
- the need to share and expand the knowledge and practice of mustelids biology, ecology, evolution, conservation and management, as well as other mustelid issues,
- the need to encourage young scientists to undertake research in the specified range,
- the need for integration of researchers and enthusiasts associated with a broad range of studies on members of the *Mustelidae* family.

Over 20 papers were delivered and presentations made on the conference topics, which are: *Mustelid Ecology and Behaviour*, *Mustelid Distribution, Status and Conservation*, and *Mustelid Genetics, Evolution and Research Methodology*. All papers submitted for presentation went through a blind-refereed process and were evaluated by the Scientific Committee. The author of the poster with the most votes from participants will receive the "Best Poster Award" at the Conference. We also encourage attendees to attend presentations of outstanding *Opening Lecturers* and *Keynote Speakers*, who will bring to the *31st Mustelid Colloquium* an international flavour, as well as varied perspectives on the biology, conservation and management of mustelids. It is also worth mentioning that included among the speakers are several young scientists, who bring some fresh ideas and new perspectives.

Putting together the 31st *Mustelid Colloquium* was a volunteer-based, team work. We first would like to recognize and thank all the speakers and all those who submitted papers for review, for taking the time and effort to share their knowledge and experience in *Mustelidae* issues. We are most grateful to the *Scientific Committee* who worked devotedly in reviewing papers and providing feedback for authors. Reviewers' effort and hard work reflect their commitment and dedication to the profession. We would also like to acknowledge the Conference *Organizing Committee* for their dedication and hard work. Finally, we would like to thank the participants who have chosen to take time out of their busy schedules to attend this year's meeting in Szczecin. The Conference would not

have been possible without the generous support of the sponsors who contributed to making it all happen. Last but not least, enough thanks cannot be expressed to *the Teaching and Research Centre of Nanotechnology* of the *West Pomeranian University of Technology in Szczecin*, which kindly host the *31st Mustelid Colloquium*.

Notably, the Conference coincides and graces celebrations of the 20th anniversary of the *Green Federation "GAJA"* association. This nongovernmental organization works on the field of nature conservation and environment protection, as well as civil society awareness rising since 1993. It is written in the Association's Statute: *"Every day more species disappear from the surface of the planet Earth. It is a great challenge of our times. We want to cope it. We focus our efforts on prevention of the loss and restoration of what seems to be lost: rare species, traditional landscapes, respect for the Earth and humans"*. We found these values indeed consistent with the message and the idea of the *Mustelid Colloquiums*.

What is more, we have an exciting social programme planned for the *31st Mustelid Colloquium*, including the *Welcome Buffet*, the *Conference Dinner*, and *Exhibition of photographs* and *Screening of Nature Films* by Włodzimierz Puchalski (1909-1979), an outstanding Polish wildlife photographer. In many of his works, Włodzimierz Puchalski has been preserved unique scenes from the life of Polish representatives of the weasel family, including rare and endangered species, like European mink and steppe polecat. The exhibition was made available courtesy of the Niepołomickie Museum. Włodzimierz Puchalski's work includes also dozens of wildlife films, the award-winning of many national and international festivals.

We hope that you will find the *31st Mustelid Colloquium* programme interesting and thought-provoking and that the Conference will provide you with a valuable opportunity to share ideas with other researchers and practitioners from institutions around the world. We would wish to encourage all participants to actively engage in our discussions and debates of the coming days, to share their experience and not to hesitate ask questions, not only to our speakers, but also to one another in order to make this a truly interactive and lively event.

Sincerely,

Jakub Skorupski
Polish Society for Conservation Genetics LUTREOLA,
Green Federation "GAJA", Department of Genetics and Animal Breeding
of the West Pomeranian University of Technology in Szczecin

Arkadiusz Terman, Ph.D.
Department of Genetics and Animal Breeding
of the West Pomeranian University of Technology in Szczecin

Jakub Szumin
Green Federation "GAJA"

Jacek Kaliciuk, Ph.D.
West Pomeranian Nature Society

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Committees

Organizing Committee

Jakub Skorupski, Main Organizer
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Aneta Kozłowska, Committee Member

West Pomeranian Nature Society, Poland

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Prof. Marek Kmieć, Ph.D., Committee Member
Faculty of Biotechnology and Animal Husbandry of the West Pomeranian University of Technology in Szczecin, Poland

Johnny Birks, Ph.D., Committee Member
Swift Ecology, United Kingdom

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Waterford Institute of Technology, Ireland

Lidia Orłowska, Ph.D., Committee Member
Department of Ecology, Wildlife Research and Ecotourism of the Pedagogical University of Krakow, Poland

Przemysław Śmietana, Ph.D., Committee Member
Department of Ecology and Environment Protection, University of Szczecin, Poland

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Jakub Skorupski, Committee Member
Polish Society for Conservation Genetics LUTREOLA, Green Federation "GAJA", Department of Genetics and Animal Breeding of the West Pomeranian University of Technology in Szczecin, Poland

Honorary Patronage

The *31st Mustelid Colloquium* has been kindly granted the *Honorary Patronage* of:

Mr Janusz Zaleski, *Undersecretary of State in the Ministry of the Environment, Chief Nature Conservator, Ministry of the Environment*

MINISTRY OF THE ENVIRONMENT

His Magnificence* Prof. Włodzimierz Kiernożycki, Ph.D., *Rector of the West Pomeranian University of Technology in Szczecin

Zachodniopomorski Uniwersytet Technologiczny w Szczecinie

Mr Piotr Krzystek, *President of the City of Szczecin*

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Prof. Jan Udała, Ph.D., *Dean of the Faculty of Biotechnology and Animal Husbandry of the West Pomeranian University of Technology in Szczecin*

Faculty Of Biotechnology And Animal Husbandry

Prof. Andrzej Zawal, Ph.D., ***Dean of the Faculty of Biology of the University of Szczecin***

Mr Rafał Kowalczyk, Ph.D., ***Director of the Mammal Research Institute of the Polish Academy of Sciences***

Prof. Henryk Okarma, Ph.D., ***Director of the Institute of Nature Conservation of the Polish Academy of Sciences***

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Department of Genetics and Animal Breeding of the West Pomeranian University of Technology in Szczecin



Niepołomickie Museum (Muzeum Niepołomickie Zamek Królewski w Niepołomicach)



Organizational Remarks

Conference venue

The Teaching and Research Centre of Nanotechnology of the *West Pomeranian University of Technology in Szczecin* hosts the *31st Mustelid Colloquium*. Address: Piastów 45 St., 70-311 Szczecin.

Conference office

Green Federation "GAJA", 5 Lipca 45 St., 70-374 Szczecin, tel. +48 512 014 658, e-mail: ptgk@lutreola.pl

Conference website

http://en.lutreola.pl/projects/31st-mustelid-colloquium/

Other important information

The *Registration Desk* will be open from 17:00 to 19:00h in the main lobby of the Teaching and Research Centre of Nanotechnology on Thursday October 24th. The following days it will be open from 8:00 to 15:00.

In order to allow testing the oral presentations, authors should bring them to the conference room between 8:00 and 9:00 of the presentation day.

Participants presenting posters are asked to set them at the in the hallway to the left of the main lobby of the Teaching and Research Centre of Nanotechnology (lobby of the *Department of Genetics and Animal Breeding*), ground floor, as early as possible. Fixation materials will be available at the Registration desk. During the poster session authors are requested to stand by their posters.

Participants that wish to access computers can use the wireless connection. Access log-in/password will be attached to the conference materials.

Lunches will be served in the room no. 0/30, in the *Department of Genetics and Animal Breeding*. Coffee will be offered to the Colloquium participants during coffee breaks, served at the same place.

No food or drink is allowed in the plenary room (except water bottles).

Smoking is prohibited inside the buildings.

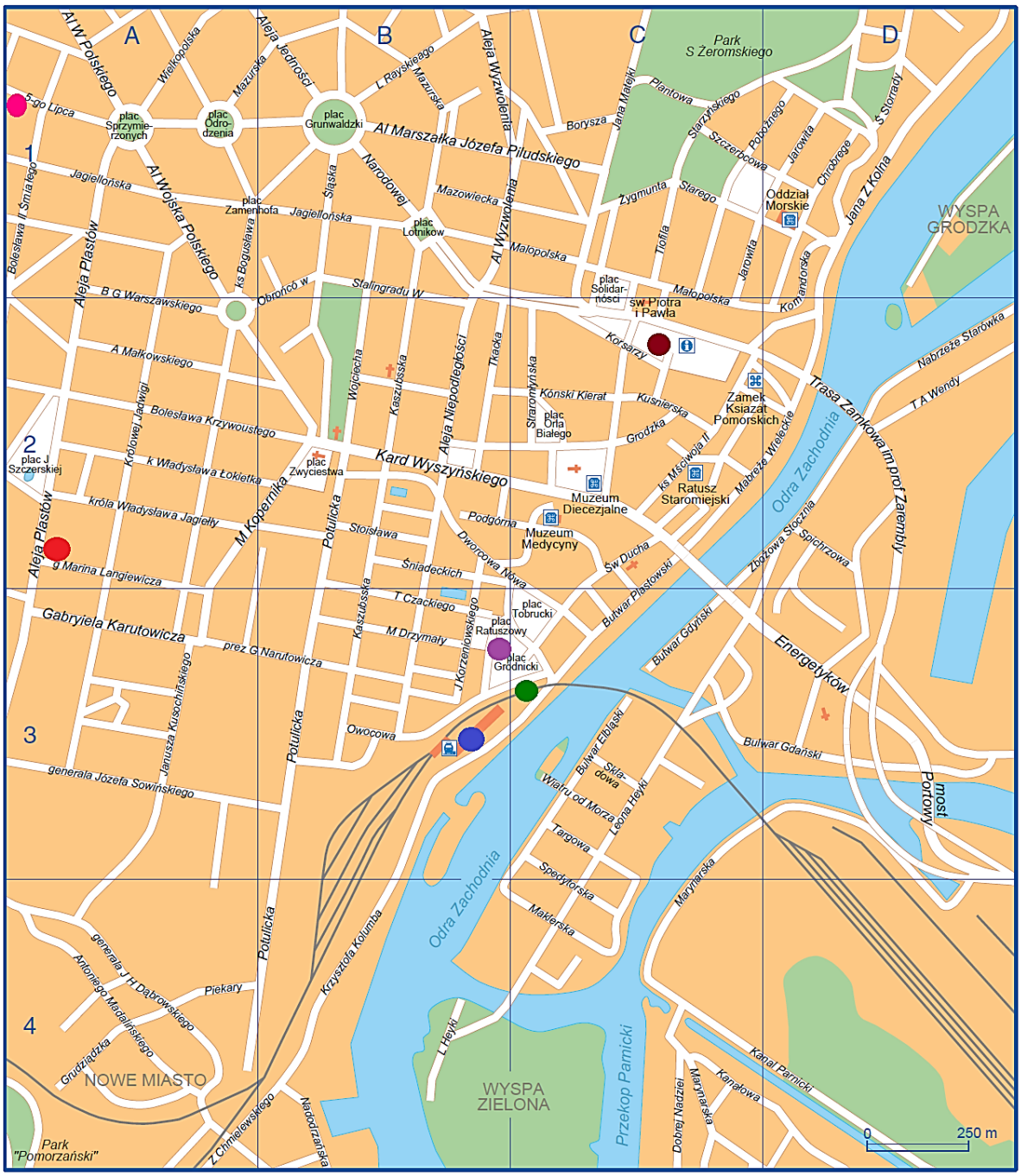
Parking will be available at the Faculty of Sciences parking lots. If you need parking space please contact the *Registration Desk*.

In case of emergencies please contact the *Registration Desk*.

Conference schedule

	Thursday, October 24th	Friday, October 25th		Saturday, October 27th	
Morning	–	**8:00-9:00** REGISTRATION **9:00-9:30** OPENING REMARKS **9:30-10:30** OPENING LECTURES **10:30-11:00** COFFEE BREAK **11:00-12:30** ORAL PRESENTATIONS - SESSION 1	**9:00-10:30** EXHIBITION OF PHOTOGRAPHS BY WŁODZIMIERZ PUCHALSKI	**9:00-10:30** ORAL PRESENTATIONS - SESSION 3 **10:30-11:00** COFFEE BREAK **11:00-12:30** ORAL PRESENTATIONS - SESSION 4	**9:00-12:30** EXHIBITION OF PHOTOGRAPHS BY WŁODZIMIERZ PUCHALSKI
Lunch	–	**12:30-13:30**		**12:30-13:30**	
Afternoon	**17:00-19:00** REGISTRATION AND WELCOME BUFFET	**13:30-15:00** ORAL PRESENTATIONS - SESSION 2 **15:00-15:30** COFFEE BREAK **15:30-17:00** SCREENING OF NATURE FILMS BY WŁODZIMIERZ PUCHALSKI **18:30 – 21:30** CONFERENCE DINNER	**13:30-15:30** EXHIBITION OF PHOTOGRAPHS BY WŁODZIMIERZ PUCHALSKI	**13:30-14:30** POSTER SESSION **14:30-15:00** CLOSING CEREMONY AND POSTER AWARD ANNOUNCEMENT	**13:30-14:30** EXHIBITION OF PHOTOGRAPHS BY WŁODZIMIERZ PUCHALSKI

Colloquium map



- CONFERENCE VENUE
- RAILWAY STATION
- BUS STATION
- AIRPORT TRANSFER BUS STOP
- CONFERENCE DINNER
- CONFERENCE OFFICE

Scientific Programme

DAY 0, 24 October 2013

17:00 – 19:00 REGISTRATION AND WELCOME BUFFET

DAY 1, 25 October 2013

8:00 – 9:00 REGISTRATION

9:00 – 9:30 OPENING REMARKS

Welcome address
Arkadiusz Terman, Ph.D., Head of the Department of Genetics and Animal Breeding of the West Pomeranian University of Technology in Szczecin, Poland
Opening Remarks
Jakub Skorupski, Organising Committee

9:30 – 10:30 OPENING LECTURES

9:30 – 10:00 'Monitoring of the Eurasian otter (*Lutra lutra* L., 1758) recolonization of Central Poland'
Prof. Jerzy Romanowski, Ph.D., Poland

10:00 – 10:30 'Marked decline in the mustelid species diversity in Belarus: tragedy of the last decades. Stories, decline causes revealed and hypotheses established'
Prof. Vadim Sidorovich, Ph.D., Belarus

10:30 – 11:00 COFFEE BREAK

11:00 – 12:30 SESSION 1 – MUSTELID ECOLOGY AND BEHAVIOR I
Chairman and Keynote Speaker: Andrzej Zalewski, Ph.D., Poland

11:00 – 11:30 'Relation between pine marten (*Martes martes* L., 1758) behaviour and population dynamics'
Andrzej Zalewski, Ph.D., Poland

11:30 – 11:50 'Sable (*Martes zibellina* L., 1758) fatness as an indicator of population condition in Yakutia (North-Eastern Siberia, Russia)'
Evgeny S. Zakharov, Ph.D., Russia

11:50 – 12:10 'The characteristics of stoat (*Mustela erminea* L., 1758) diet in Norway based on stomach content analyses'
Aleksandra Piontek, Poland

12:10 – 12:30 'Ecological niche segregation of two sibling species: pine marten (*Martes martes* L., 1758) and stone marten (*Martes foina* Erxl., 1777) in Białowieża Forest'
Anna Wereszczuk, Poland

12:30 – 13:30 LUNCH

13:30 – 15:00 SESSION 2 – MUSTELID DISTRIBUTION, STATUS AND CONSERVATION
Chairman and Keynote Speaker: Johnny Birks, Ph.D., United Kingdom

13:30 – 14:00 'Population change in the rarer mustelids of Britain – The Good, The Bad and The Ugly!'
Johnny Birks, Ph.D., United Kingdom

14:00 – 14:20 'Pine marten (*Martes martes* L., 1758) recovery in Scotland: results of a scat-based expansion zone survey'
Lizzie Croose, United Kingdom

14:20 – 14:40 'The challenges of re-establishing carnivore populations; Pine marten (*Martes martes* L., 1758) in a Welsh context'
David Bavin, United Kingdom

14:40 – 15:00 'American mink in Iceland in the years 1931-2012 – a history of conquest'
Kaja Prüffer, Poland

15:00 – 15:30 COFFEE BREAK

15:30 – 17:00 SCREENING OF NATURE FILMS BY WŁODZIMIERZ PUCHALSKI

18:30 – 21:30 CONFERENCE DINNER

DAY 2, 26 October 2013

8:00 – 9:00 REGISTRATION

9:00 – 10:30 SESSION 3 – MUSTELID GENETICS, EVOLUTION AND RESEARCH METHODOLOGY
Chairman and Keynote Speaker: Catherine O'Reilly, Ph.D., Ireland

9:00 – 9:30 'Non-invasive sampling and genetic analysis of a pine marten (*Martes martes* L., 1758) population in Ireland'
Catherine O'Reilly, Ph.D., Ireland

9:30 – 9:50 'Craniometric variation between wild and farmed American mink (*Neovison vison* Schreb., 1777) in Poland'
Agnieszka Radek, Poland

9:50 – 10:10 ‘Phylogenetic relationships of wild, ranch and feral American mink (*Neovison vison* Schreb., 1777) in Poland determined on the basis of the growth hormone gene polymorphism’
Jakub Skorupski, Poland

10:10 – 10:30 ‘New single nucleotide polymorphisms of the Melanocortin 4 Receptor gene in the American mink (*Neovison vison* Schreb., 1777)’
Anna Majewska, Poland

10:30 – 11:00 COFFEE BREAK

11:00 – 12:30 SESSION 4 – MUSTELID ECOLOGY AND BEHAVIOR II
Chairman: Jakub Skorupski, Poland
Keynote Speaker: Agnieszka Samsonowicz, Ph.D., Poland

11:00 – 11:30 ‘Representatives of the weasel family in Polish historical sources of the XII-XVIII c.’
Agnieszka Samsonowicz, Ph.D., Poland

11:30 – 11:50 ‘American mink (*Neovison vison* Schreb., 1777) in the Aldan River basin (North-Eastern Siberia, Russia)’
Evgeny S. Zakharov, Ph.D., Russia

11:50 – 12:10 ‘Ticks (*Ixodidae* Koch, 1844) parasitizing forest dwelling mustelids – a literature review and preliminary data’
Tim R. Hofmeester, Netherlands

12:10 – 12:30 ‘The insects’ variability in the diet of European badger (*Meles meles* L., 1758) in Norway’
Marika B. Gubała, Poland

12:30 – 13:30 LUNCH

13:30 – 14:30 POSTER SESSION
Chairman: Arkadiusz Terman, Ph.D., Poland

14:30 – 15:00 CLOSING CEREMONY AND POSTER AWARD ANNOUNCEMENT

Social Programme and Accompanying Events

Opening Ceremony

The conference will start on Friday, October 25th at 9:00 with a short Opening Ceremony followed by the first plenary lectures.

The Registration Desk will be open already on Thursday, October 24th from 17:00 at the conference venue. A Welcome Buffet will be offered from 17:00 till 19:00.

Conference Dinner

The Conference Dinner is being held on the evening of Friday 25th October, from 18:30. It costs 20 EUR per person and features a delicious seated dinner with a traditional Polish cuisine.

The Conference Dinner is a fantastic way to spend your Friday evening and great opportunity to meet other participants.

The event will take place in the „Opera“ restaurant in Szczecin, located in the beautiful Pomeranian Dukes' Castle, one of the main centres of cultural life in the Western Pomerania.

Exhibition of photographs by Włodzimierz Puchalski

The photo-exhibition will be open for all participants during all conference-days in room no. 0/30.

Screening of nature films by Włodzimierz Puchalski

Screening of two films about weasels will be held on 25th October in room no. 33, or in the plenary room (depending on number of attenders).

Abstracts – Opening Lectures



PROF. JERZY ROMANOWSKI, PH.D. – zoologist and ecologist, with a long lasting focus on field studies of otters. Graduated at the University of Warsaw in 1982, received Ph.D. at the Institute of Ecology of the Polish Academy of Sciences, PAS (*"Habitat selection of otters during recolonization"*) in 2000, and habilitation at University of Łódź in 2012. Visiting Researcher at Rutgers University, USA from 1990-1992. Currently Assistant Professor and director of the Centre for Ecological Research PAS in Dziekanów Leśny near Warsaw. The main field of interest is ecology. Conducted several projects on monitoring of recolonisation and habitat selection of otters in Poland and co-authored the guidelines for monitoring of the otter in Europe (2000). Other topics of research include dietary studies of mustelids and owls, connectivity within river valleys, biological diversity of Vistula river valley and farmland, ecological modelling. Member of SSC-IUCN Otter Specialist Group.

Monitoring of the Eurasian otter (*Lutra lutra* L., 1758) recolonization of Central Poland

Polish Academy of Sciences, Centre for Ecological Research, Dziekanów Leśny, Konopnickiej 1 St., 05-092 Łomianki, Poland

romanowski@cbe-pan.pl

Key words: Eurasian otter, recolonization, species status.

The Eurasian otter (*Lutra lutra*) populations declined in large areas of Europe during the 20th century. However, the increase in otter populations in their natural range and recolonization processes are recently observed in several European countries. As revealed by the first national survey, otters were already widespread in most of the Poland except two areas in south and in the centre of the country in the early 1990s. Field surveys in 1998 and 2008 documented increase in occurrence of the species in central Poland: The frequency of positive sites denoted 15% in 1993, 38% in 1998 and 89% in 2007. Otter occurrence at study sites was positively affected by river width, while negatively by presence of buildings at the site and river regulation. The sites inhabited by otters after 1998 were characterized by lower river width and tree cover and were more often located on regulated river sections, suggesting change in habitat tolerance during expansion. The otter abundance in transformed habitats is a result of increasing population numbers and the necessity to inhabit suboptimal sections of watercourses. Data collected during the monitoring were analysed in order to evaluate the factors affecting the field technique. The results indicate that detection of otter signs is partially affected by specific elements unrelated to otter occupancy and habitat potential. Additional measure of the distance searched for the first otter signs provides additional indication of otter status at a regional scale and could be used to identify specific habitats where detection of otter signs during surveys is difficult.



PROF. VADIM SIDOROVICH, PH.D. – main researcher of the Scientific and Practical Centre of National Academy of Sciences of Belarus for Biological Resources (former Institute of Zoology). Field of Investigation: teriology, animal ecology, environmental sciences. Graduated at the Belarusian State University (Minsk) in 1985, received Ph.D. at the Institute for Nature Conservation and Reserves (Moscow) in 1989. Habilitation degree – zoology, Institute of Zoology of National Academy of Sciences of Belarus (Minsk), 1997. Studied on population ecology of vertebrate predators since 1985. Leader of the research group on vertebrate predators in Belarus. The main investigated species include European mink, American mink, European otter, stoat, weasel, badger, lynx and wolf.

Marked decline in the mustelid species diversity in Belarus: tragedy of the last decades. Stories, decline causes revealed and hypotheses established

Institute of Zoology, National Academy of Sciences of Belarus, Nezhaleznasti 4 Av., 220030 Minsk, Belarus

sid@biobel.bas-net.by

Keywords: endangered species, population decline, European mink, polecat, stoat, badger.

In the presentation the stories of population crashes of five native species of mustelids during the last decades (5-40 years ago) in Belarus are described. Amongst the endangered or already disappeared species there are following: the European mink (*Mustela lutreola*), European otter (*Lutra lutra*), stoat (*Mustela ermine*), polecat (*Mustela putorius*) and badger (*Meles meles*). In Belarus the species population declines were registered country-wide and in both semi-natural and man-made landscapes. During long-term studies the causes of population crashes of the European mink, polecat, stoat and badger were revealed and a hypothesis on the European otter decline was established. All these results are summarized in the presentation too.

Abstracts – Keynote Lectures



JOHNNY BIRKS, PH.D. – following his Ph.D. and post-doctoral research on the behavioural ecology of feral American mink, Johnny Birks worked for government conservation agencies in Britain and for The Vincent Wildlife Trust, where he was able to indulge his passion for mustelids. He now works for a small ecological consultancy called Swift Ecology. Johnny Birks has studied the conservation ecology of the Eurasian otter, European polecat and pine marten; he continues small-scale research on pine martens in Scotland and elsewhere.

Population change in the rarer mustelids of Britain – The Good, The Bad and The Ugly!

Swift Ecology, Glen Cottage, Lower Dingle, West Malvern, WR14 4BQ Malvern, United Kingdom

johnny.birks@swiftecology.co.uk

Keywords: population change, rare mustelids, anthropogenic impacts.

The past two hundred years have seen huge changes in the status and distribution of mustelids in Britain as a consequence of different anthropogenic impacts. Direct persecution, habitat loss and pollution have exerted profound influences upon the mustelid fauna. The three species most severely affected, the otter (*Lutra lutra*), pine marten (*Martes martes*) and polecat (*Mustela putorius*) are now recovering and expanding their ranges. This paper explores the ecological and cultural factors driving these changes and identifies threats and opportunities for the future.



CATHERINE O'REILLY, PH.D. – obtained a B.A. (Mod) in Genetics from Trinity College Dublin in 1978 and stayed on in the Genetics Department for her Ph.D. Following this she spent two years at the Max Planck Institute in Cologne followed by a postdoctoral fellowship at Durham University. In 1986 Catherine O'Reilly was appointed as lecturer in molecular genetics at the University of Sunderland. Since coming to Waterford Institute of Technology in 1995 her research interests have expanded into the area of molecular ecology. In collaboration with Dr. Peter Turner at WIT as well as numerous external collaborators the Molecular Ecology Group at WIT has developed a range of novel DNA analysis techniques to monitor a wide range of mammals with a particular emphasis on pine marten, stone marten and otter.

Non-invasive sampling and genetic analysis of a pine marten population in Ireland.

Catherine O'Reilly*, Jacinta Mullins, John Power and Peter Turner

Waterford Institute of Technology, Cork Rd., Waterford, Ireland

coreilly@wit.ie

Keywords: Pine marten, non-invasive sampling, genotyping.

Portlaw Woods is a 320 ha site and is part of a commercial conifer/mixed forest in Co. Waterford, Ireland. Scat and hair samples have been collected on a regular basis since 2006 in order to develop the use of genetic tests. Samples have been analysed for species and sex using qPCR. Microsatellite analysis has been used to identify individual animals over that period. The qPCR data has been used to screen samples and thereby reduce the failure rate of microsatellite analysis; this was particularly useful for faecal samples as the overall success rate was low. The distribution of scats was patchy and great heterogeneity was found in the use of hair traps. Thus the use of both scats and hair samples was found to be important as neither was 100% effective in detecting marten. The data has provided estimates of home range and territorial fidelity in this group of pine marten.



AGNIESZKA SAMSONOWICZ, PH.D. – medievalist historian, a graduate of the Faculty of History at the University of Warsaw. Since 1954, she joined just created Institute of the Material Culture History of the Polish Academy of Sciences. Defended his doctoral thesis in 1979 on the basis of monograph “The Leather Production in the Early Medieval Poland". In 1992 she published her outstanding monograph "Hunting in Piast’s and Jagiellonian’s Poland". It is a momentous source supporting the expert biological (zoological) knowledge with valuable historical data, enabling a holistic and inter-disciplinary approach to the issues related to the overall biology of the *Mustelidae* family, greatly increasing the value and attractiveness of many studies in the field of zoogeography, historical distribution, and conservation of the mentioned mammals. One example is the European mink (*Mustela lutreola*) – hard to find in the scientific literature, both Polish and foreign, as a valuable source of historical data on the occurrence and economic exploitation of this species. In 1992, she retired, still taking part in the scientific life of the Institute of Archaeology and Ethnology of the Polish Academy of Sciences, as well as presenting papers at regularly organized conferences on hunting.

Representatives of the weasel family in Polish historical sources of the XII-XVIII c.

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Keywords: fur trade, historical written sources, hunting.

The paper presents the XII – XVIII c. written sources on the weasel family species: stone marten, pine marten, sable, ermine, weasel, polecat, European mink, Eurasian otter, badger and wolverine. It shows importance of these species for the Polish state formation, its early economy, social differentiation and for emerging market. Many sources reveal a high importance of mustelid, which were obligatory tribute to supply the Treasury, and serving as a medium of exchange. That duty has fostered intensification of peels obtaining by subjects. This in turn could satisfy excess demand not only Polish, but also Western European customers. Shown are also difficulties with identification of commercial names of furs, which could come from mercantile or furrier terminology, as well as from the natural scientists of that time. The importance of the fur trade is also indicated by many examples of goods forgery mentioned in historical sources. Discussed historical sources are also a valuable source of information about distribution, occurrence and economic exploitation of mustelids’ species.



ANDRZEJ ZALEWSKI, PH.D. – a senior researcher and a leader of the Research Unit Behavioural Ecology and Ecophysiology at the Mammal Research Institute Polish Academy of Sciences. In 2005-2007, he was a postdoctoral fellow at the University of Aberdeen, UK. He is the author of over 50 scientific papers and one book. Research interests of Andrzej Zalewski cover behavioural and ecological studies of mammals, especially carnivores (population regulation, social systems, competition, and feeding habits). His current research projects focus on ecology and adaptation of alien invasive species in the range of introduction and its influence on native fauna.

Relation between pine marten behaviour and population dynamics

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Keywords: Pine marten, population regulation, behavioural ecology, body size.

Organisms typically exhibit a broad range of responses (behavioural, physiological or morphological) that allow them to cope with various environmental conditions. Behavioural response enables the individuals to adjust to the wide range of environments in which they live. Understanding how behavioural choice affects the dynamics of population is one of the basic questions of ecology. I analysed how the pine marten (*Martes martes*) changes its behaviour in response to environmental variation, and how this variation affects the population dynamics and morphological variation of this predator at a local scale and throughout their geographical range. At the local scale, the pine marten showed specific behavioural thermoregulation. Their energy loss and exposure to low temperatures were reduced by curtailing their activity, and markedly changed their mode of the home range use. They also selected well insulated resting sites in response to seasonal climate variations. Marten compensated curtailing of hunting time with the decrease of ambient temperature by preying on larger prey. At a geographical scale, in northern Europe pine marten selected well insulated resting sites (at ground level) and generally hunted bigger prey than in southern regions. However, in contrast to local scale, average daily movement distance of pine marten increased with increase of winter severity throughout their geographical range. Due to specific marten behavioural adaptation to severe winter conditions, their number and dynamics are related to climate and predation.

Abstracts – Oral Presentations

SESSION 1 – MUSTELID ECOLOGY AND BEHAVIOUR I

Sable (*Martes zibellina* L., 1758) fatness as an indicator of population condition in Yakutia (North-Eastern Siberia, Russia)

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Keywords: sable, Yakutia, fatness, population ecology.

The vast territory of Yakutia (1.3 million sq. km) complicates estimation of ecological condition of sable population significantly. Fatness analysis in sable population samples provided by hunters was the purpose of our study. The result was quantitative characteristics of gender, age, seasonal and geographical variability of sable fatness based on the presence and changes in fat mass on kidneys. Over 5000 animals form 12 regions of Yakutia have been studied using standard methods. Interpopulation differences in sable fatness were expressed by natural increase in number of animals with low fatness northwards due to worsening of forage and abiotic living conditions. In separate favourable years the proportion of well-nourished sables in the North increased sharply (54.4±6.0%), while other years it reduced by more than 3 times (14.6±5.0%). For southern animals this parameter is much higher and more stable. Differences in number of fat sables among various age groups have been revealed, as well as the fatness index reduce in medium-aged groups most actively participating in reproduction. Adult females featured lower index values as compared to the males. Lack of inner energy resources could be one of the reasons of higher female winter mortality in comparison with the males. Relatively low fatness of females in winter time might be explained by insufficient summer battening due to giving birth and feeding the offspring rather than their current pregnancy with prolonged latent stage. Fatness changes in males and females from year to year showed statistically significant strong correlation. The research was supported by "Scientific and Educational Foundation for Young Scientists of the Republic of Sakha (Yakutia)" N 201302010006

The characteristics of stoat (*Mustela erminea* L., 1758) diet in Norway based on stomach content analyses

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Keywords: stoat, Norway, stomach content, Levins' index, Shannon index.

137 stoats were caught in Norway with killing traps set in two municipalities, i.e. Hadsel and Hemsedal, northern and southern Norway respectively. Both landscapes are dominated by boreal birch forest in the vicinity to cultivated land and summer farms. All trapped animals were adult; 101 and 36 males and females respectively. The mean body mass (±SD) of males was 201.80 ± 37.71 g and of females 85.06 ± 13.26 g. 69 animals had stomachs filled with content. Six food categories were identified, i.e. lagomorphs, small rodents, insectivores, birds, invertebrates, and anthropogenic food. The Shannon diversity index for calculated diet of all animals was H=1.48, and H= 1.48, and H=1.35, for males and females, respectively. Small rodents, birds, and anthropogenic were dominant food categories, with FO% (Occurrence frequency) 35.3%, 21.2%, 24.7%, respectively. Among rodents dominant species were bank vole (*Myodes glareolus*) and root vole (*Microtus oeconomus*). There were identified three species of insectivores, i.e. common shrew (*Sorex araneus*), lesser shrew (*S. minutus*), and European water shrew (*Neomys fodiens*). Anthropogenic food comprised of paper, string, fish remains, and domestic sheep' (*Ovis aries*) hair. The Levins' trophic niche breadth index was B=3.88 for all animals, B=3.86 for males, and B=3.77 for females. The trophic niche overlap (Pianka's index) between northern and southern stoats was O_{jk}= 0.66, and between males and females O_{jk}= 0.97. Corresponding studies evaluated on stomach content analysis of stoats in Denmark (Elmeros 2006), and Great Britain (McDonald et al. 2000) calculated lower trophic niche breadth indices, respectively B= 2.11 and B=1.67.

Ecological niche segregation of two sibling species: pine marten (*Martes martes* L., 1758) and stone marten (*Martes foina* Erxl., 1777) in Białowieża Forest'

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Keywords: niche segregation, habitat selection, activity pattern, pine marten, stone marten.

Coexistence of two ecologically and morphologically similar species is possible only when their niche is at least partly segregated in space or time. Different diurnal activity rhythms or utilization of different habitats may reduce food competition between species and allow co-occurrence. Pine marten (*Martes martes*) and stone marten (*Martes foina*) are sibling species with highly overlapped ranges of distribution. These two species can occur

in natural forests as well as in human-impacted habitats. We investigated, how these two species spatially and temporally segregated their ecological niche to reduce competition in Białowieża Primeval Forest (north-eastern Poland). Thirteen pine martens (7 females and 6 males) and 22 stone martens (11 females and 11 males) were collared and radio-tracked from 1991 to 2012. Our results demonstrated spatial niche segregation between these carnivores. Pine marten preferred various forested habitats, such as deciduous forest, bog forest and coniferous forest, whereas stone marten inhabited anthropogenic habitats – generally built-up areas, meadow and small wooded patches. There were no significant differences in diurnal activity of both species, however stone marten ceased their activity later than pine marten. Spatial niche segregation may allow coexistence of sibling species in the same area but is not necessarily a result of competition. It might arise as a result of different adaptation of both species to climate conditions.

SESSION 2 – MUSTELID DISTRIBUTION, STATUS AND CONSERVATION

Pine marten (*Martes martes* L., 1758) recovery in Scotland: results of a scat-based expansion zone survey'

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Keywords: pine marten, distribution, scat survey, Scotland.

The pine marten (*Martes martes*) is recovering in Scotland following a widespread historical decline, which lead to the population becoming restricted to the north-west Highlands of Scotland in the early 20th century and being extirpated from most of England and Wales. Following systematic surveys in the early 1980s and mid-1990s, there was a need for a new survey to provide reliable information on current patterns of pine marten distribution beyond the species' previously recorded range in Scotland. In 2012 we undertook an expansion zone survey in the area beyond the pine marten's known range in the 1990s. The main methodology consisted of a scat survey approach, using DNA-typing to confirm the species of scats collected. A 1km transect in woodland habitat was surveyed in every hectad (10km x 10km grid square) in the survey area. In addition, verified records of pine martens were gathered from a variety of sources. The results demonstrate that pine marten range expansion in Scotland has continued into the 21st century. The species is now re-established in many areas of its former range from which it was extirpated over 100 years ago and occurs close to some of Scotland's major urban areas. The pine marten is the first of Britain's native carnivores that suffered complete or near-complete anthropogenic extinctions to make a substantial recovery in Scotland.

The challenges of re-establishing carnivore populations; Pine marten (*Martes martes* L., 1758) in a Welsh context

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Keywords: pine marten, reintroduction, carnivore.

Carnivores have the power to affect whole ecosystems and regulate trophic webs within animal communities, and have therefore received attention from conservationists seeking to protect or rejuvenate robust ecosystems. Many initiatives aim to re-establish carnivores in areas from which they have been absent for a prolonged period of time, which can be a major conservation challenge, particularly in countries with an impoverished carnivore fauna. This presentation describes the Vincent Wildlife Trust's efforts to reinforce pine marten populations in Wales, with a particular focus on the challenges faced by such work.

American mink in Iceland in the years 1931-2012 – a history of conquest

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The range of American mink, outside North America, includes now most of the countries of Continental Europe and the British Isles and Iceland, and outside Europe also significant parts of the Asian part of Russia, Kazakhstan, part of the Japanese Islands, southern Chile and Argentina in South America and New Zealand. All of this causes that the *N. vison* is a mammal with the largest geographical coverage and is one of the most dangerous invasive alien species. To assess causes of separating farming minks and non-autochthonous (it means they live in the environment which is outside their original geographical scope) we have to know the farming history of American mink in Iceland. Large multilocus genetic similarity between farming Sapphire minks and animals caught in the natural environment of Iceland may indicate the origin of the latter mainly from Sapphire mink. American mink is in Iceland an invasive alien species. It is known that the first American minks were brought to Iceland from Norway in 1931, for breeding and fur-farming purposes, and their ancestors were mainly two subspecies – *N. vison letifera* and *N. vison lacustris*. The expansion of free-living mink population of Iceland, strictly correlated with the development of farming breed on the Island, is well documented. The lack of an effective and complete large-scale eradication is evidenced by long-term and expensive trials of elimination this alien and invasive species in Iceland or Great Britain. Successful programmes of total elimination of non-autochthonous American mink were carried out only on small islands located at an adequate distance from continental coasts with no animal farms. Nowadays, much more realistic and recommended are local eradication programmes on environmentally valuable areas and especially endangered by American mink. It is also recommended to control population on large-scale by continuous maintenance of the population at a low level, the promotion of natural enemies and

dominant competitors and improvement of the living conditions of the American mink victims.

SESSION 3 – MUSTELID GENETICS, EVOLUTION AND RESEARCH METHODOLOGY

Phylogenetic relationships of wild, ranch and feral American mink (*Neovison vison* Schreb., 1777) in Poland determined on the basis of the growth hormone gene polymorphisms

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Keywords: feral mink, genetic polymorphism, growth hormone gene/GH, ranch mink, wild mink.

Despite the constant development of the American mink (*Neovison vison* Schreb., 1777) fur production and continuous spread of feral invasive populations of this species in many areas of the world, studies on its genome are rather limited. The aim of this study was to determine the genetic structure of the study population on the basis of genetic variation of the growth hormone gene. For this purpose 1,745 bp region of the mink genomic DNA, encompassing five exons and four introns, as well as 5'- and 3'-UTRs of the somatotropin gene, was amplified by nested-PCR and sequenced. The study included 389 individuals of wild mink (Nova Scotia, Canada), ranch mink (Brown, Scanblack, Sapphire, Pearl, Black Cross and Sapphire Cross; West Pomerania, Poland) and feral mink (Poland and Iceland). 12 new SNP substitutions, one single nucleotide deletion and one ins/del polymorphism were identified. Analysis of the phylogenetic relationships at the species level, as well as at higher taxa level, shows that the *GH* gene is a useful measure of micro- and macro-evolutionary processes that determine the genetic structure and the systematic position of the taxon. The results revealed a significant differences between originally wild mink and domesticated animals (both ranch and feral) in identified SNPs type and distribution, indicating similarity of feral mink to farm animals, as well as the influence of environmental factors in shaping genetic variability of animals under high natural selection pressure in new environment. Inference based on nucleotide variation of the *GH* gene suggests that Icelandic and Polish animals used in the present study are genetically more similar to farm-mink than to wild animals from Canada. That proves the origin of themselves or their ancestors from animals originating from ranch-animals. Examined genetic polymorphism, based on SNPs, can serve as an alternative to microsatellite genetic profiling and differentiation of wild, ranch and feral mink's populations. This is particularly important in connection with introduction and naturalization of the species outside its original/natural range.

New single nucleotide polymorphisms of the *Melanocortin 4 Receptor* gene in the American mink (*Neovison vison Schreb., 1777*)

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Keywords: MC4R polymorphism, American mink, synonymous mutation/SNP, melanocortin 4 receptor.

An important group of factors controlling both the food intake and the body weight are melanocortins. The most important hormone involved in the appetite modulation, weight loss and energy expenditure in the body is the α-MSH. This effect is caused by the impact of specific membrane receptors. So far, five types of receptors for α-MSH were identified: MC1R, MC2R, MC3R, MC4R and MC5R. MC4R protein regulates the food intake and body weight by the interaction with leptin and AGRP (agouti-related protein) and played an important role in the healthy body weight maintenance. The mink fur traits related to growth are important because the animal's body weight is related to the size of the obtained skin/fur, and this is directly reflected in its value. The aim of this research was to find the MC4R mutations in the different color varieties of the American mink representatives that were bred on a farm in order to obtain high quality material for fur production. Material for the study consisted of a group of 139 adult males of the five color varieties (Sapphire-S, Sapphire Cross-SC, Pearl-P, Brown-BR & Black-BL) from which the tissues for the DNA isolation were obtained. Using the gene sequence MC4R for the American mink, which size was 1206 bp, two synonymous mutations in the coding sequence of the gene at positions 291 and 330 were identified by sequencing. MC4R gene polymorphism was detected by ACRS-PCR-RFLP. The resulting PCR products were digested with the enzyme: *Nco*I (291) and *Bam*HI (330). Statistically significant differences in the frequency of CC genotype occurrence between the individuals of different color varieties for both the 291 (S-0, 16, SC-0 and 42, P-0, 16, BR-0, 14, BL-0, 37) and 330 (S-0, 80, SC-1, 00 P-1 00, BR-1, 00, BL-0, 7) polymorphism were detected. Also, the nucleotide genetic imbalance between the genotype groups numbers observed and theoretically calculated in accordance with the Hardy-Weinberg equilibrium for the polymorphism *MC4R*/*Nco*I have been demonstrated.

SESSION 4 – MUSTELID ECOLOGY AND BEHAVIOUR II

American mink (*Neovison vison* Schreb. 1777) in the Aldan River basin (North-Eastern Siberia, Russia)

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Keywords: American mink, Yakutia, Aldan River, introduction.

In 1961–1964, 686 specimens of the American mink were introduced into South Yakutia. Later, in 1985, 150 animals were additionally brought to the basin of the Middle Aldan River, and 170 mink in 1986. In 1970-1980s, the population in the Aldan River basin was estimated to be about 2,000 animals. Nowadays, the mink has established not only in typical riparian biotopes, but also in lake systems severely affecting musk rat population. It significantly expanded northward, however, the modern population size of the American mink in Yakutia has not been estimated yet. In 2007-2012 we have conducted the study of ecology of the American mink in Yakutia based on the samples (n=71) provided by hunters. Average weight of the males aging over 1 year was 652.6±36.6 g (lim. 460–966 g), while the females weighed 382.5±8.4 g (355–404 g), their length was 411.5±6.5 mm (363–452 mm) and 346.5±4.3 мм (332–365 mm) respectively. The animals under 1 year old (hereafter youngsters) made up 42.0%, while elder specimens made up 58.0%. The latter were mainly represented by the animals aging 1+ (50.0%) and 2+ (27.3%). The minks of 3-5 years old constituted 22.7%. The oldest animals were the 5-year-old males and 3-year-old females. The gender structure featured prevalence of males (62.0±5.6%; $p<0.01$). Among the youngsters both sexes were represented equally, while among the elder animals males dominated. The ratio was 1:2.7 for the animals of the second year of life and 1:1.7 for elder minks. This is generally characteristic for other Mustelidae species. Relatively large portion of youngsters in the Aldan River basin, as compared to other Mustelids, probably indicates incomplete realization of its breeding potential. Climate warming, expressed by winter temperatures increase, favours further expansion and population growth of the American mink in Yakutia. The research was supported by "Scientific and Educational Foundation for Young Scientists of the Republic of Sakha (Yakutia)" N 201302010006

Ticks (*Ixodidae*) parasitizing forest dwelling mustelids – a literature review and preliminary data

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Keywords: tick, tick-borne pathogens, pine marten, badger.

Tick-borne pathogens form an increasing risk to public health world wide. One of the prerequisites for a pathogen to infect humans via the bite of a tick is that the tick should parasitize both humans and wildlife hosts which can infect the tick with the pathogen. For this to occur, the tick should be a generalist parasite. In Europe, Ixodes ricinus, the sheep tick, is the most common generalist tick, transmitting diseases such as Lyme borreliosis, human granolithic anaplasmosis and tick-borne encephalitis. I. ricinus is known to infect several Mustelid species such as badgers (Meles meles), polecats (Mustela putorius) and pine martens (Martes martes). However, the role of Mustelids in the maintenance of tick populations and in the transmission cycle of different pathogens is unknown. We investigated the role that badgers and pine martens, two species that occur in many forests in Europe, could play in these cycles, by investigating their tick burdens and by doing a literature search. Both badgers and pine martens were found to host at least two tick species (I. ricinus and I. hexagonus). Future research will focus on the different pathogens that these two Mustelid species could transmit to ticks.

The insects' variability in the diet of European badger (*Meles meles* L., 1758) in Norway

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Keywords: European badger, Norway, stomach content analysis, CCA – canonical correspondence analysis.

264 European badgers were trapped with killing traps and collected as avc (animal-vehicle-collision) in Norway, in two regions, i.e. Østfold – eastern region and Sør-Trøndelag – central region of Norway. In total 122 females and 138 males were identified (n=260). The average age of the animals was 2.74 years. During necropsies of the animals stomachs' content was extracted. 64 stomachs contained insects from females and males, 29 and 35 respectively. The mean (±SD) body mass of females was 9.13 ± 1.95 kg and of males 8.91 ± 2.77 kg. Total biomass of consumed insects was 1275.79 ± 2481.41 g. Total number of identified insects was 1207 comprising 3 orders, i.e. *Coleoptera*, *Hymenoptera*, and *Lepidoptera*. The dominant identified insect families were *Vespidae* (40.09%), *Apidae* (27.67%), and *Scarabaeidae* (23.61%). The number of insect species in badgers' diet was associated with rural habitat, followed by forest habitat, suburban, and urban habitats,

8,10,6, and 6, respectively. There were significant differences with respect to gender of badgers. Females more frequently consumed insects from *Hymenoptera* (χ^2 = 264.01 p <0.001), whereas males more often consumed insects from *Coleoptera* order (χ^2 = 161.888 p <0.001). Male badgers preferred solitary insects, such as *Carabus hortensis* and *Geotrupes stercorosus* (χ^2 = 40.00 p <0.001), and females had more often social insects in their stomachs, such as *Bombus terrestris*, and *Vespa crabro* (χ^2 = 108.56 p <0.001). CCA was used to find out relation between identified insects in badgers' diet and different environmental factors. The two first axes described 61.2% of variance.

Dams and natural expansion of the otter. Barriers or resources? The case of two river basins in central Italy

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Keywords: Eurasian otter, standard survey, dam, re-colonization.

The Eurasian otter (*Lutra lutra*) is still listed as endangered in the Italian IUCN Red List. Only in the last decade the species is recovering after going extinct from the north and the centre of the Italian peninsula during '80s. Currently the species survives in two main isolated subpopulations in southern-central Italy. Understanding the factors affecting otter dispersal and expansion is crucial for the future conservation of the species. Despite the fact that reservoirs represent important feeding resources for otters in many European countries, the construction phase and the specific dam typology may limit the species movements. Through a standard survey in 111 sites we attested the recent expansion of the Eurasian otter in two river basins along the northern boundary of the species range in Italy. The river Sangro, showing only a limited otter occurrence since 2007, is spaced out by three large dams (Barrea, Ateleta, Bomba) and flows into two national parks (NP Majella and NP Abruzzo, Lazio and Molise); the river Trigno, still vacant of otters in 2004, was interested by the construction of a large dam. The survey evidenced the widespread presence of the otter in both river basins. Previous studies revealed that both newly colonized rivers hosted wide suitable areas for the species, and that the current expansion process could be affected by factors related to some dams. Otters were recorded in most of the main course and the tributaries of the river Sangro, including a stream upstream and downstrems two large dams (Bomba and Ateleta), allowing the otter to be recorded for the first time in the National Park of Majella where it was absent since the '80s. By contrast, the expansion in the Sangro halted downstream the Barrea dam, having a barrage embedded into steep rock cliffs. The re-colonization of the Trigno was likely related to the conclusion of the construction phase of the dam that lasted for about 20 years.

Some aspects of American mink (*Neovison vison* Schreb., 1777) reproduction

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Keywords: American mink, diapause, estrus, pregnancy, light.

The American mink has a monoestrous type of reproduction with provoked ovulation, which occurs most often between 36 and 72 hours after mating. Spontaneous ovulation may occur in a population of mink. The estrous cycle in mink is divided into four phases: resting period, proestrus, oestrus, and postestrus. The resting phase lasts from March to end December, the proestrus phase covers the period from January to February, and the phase of oestrus occurs in March. The the litter size ranges between 6 and 7 kittens, 5 on average. It may reach, however, as many as 13-15 kittens. Heat starts in March and lasts for about three weeks. The appearance of heat is closely related to the extending day light; the day of 10 hours is what stimulates the gonads and triggers oocyte maturation. Fertilization takes place in the upper part of the fallopian tube. Following the ovulation, corpus luteum is formed in place of a ruptured Graafian follicle. In the mink, the corpus luteum produces small amounts of progesterone, which promotes the cyclical oocyte maturation (two to four cycles every 6-8 days) despite prior fertilization, and which creates the possibility of multiple matings. The oocytes in estrus mature in cycles. Gestation length in mink varies over a wide range, from 36 to 85 days, which is due to diapause. The length of gestation is very important for the litter size and the health of the offspring. Too short or too long pregnancies can yield poor and underdeveloped litters, thus compromising their survival abilities. Diapause in mink can last from a few to several days; the longer the diapause, the higher the mortality of embryos and, consequently, lower the litter size. Diapause length depends on the time of fertilization–mink mated sooner have longest gestations, ie their pregnancies are characterized by a long period of diapause, as compared to mink mated at a later date. The diapause and time of embryo implantation corresponds to the length of the light phase of day and to the associated body's hormone levels.

Comparison between hair, camera, footprint traps and faeces survey to detect mustelids species in a French rural habitat: some preliminary results

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Keywords: mustelids, hair-tubes, camera-traps, footprint-tunnels, faeces.

Knowledge of species distribution is necessary to better assess their conservation status and to manage conflict between human activities and wildlife, when it occurs. Mustelids distribution has been widely studied but, to date, no standardized methods could be generalized to get an abundance index at a large scale. Considering the nocturnal habits of those cryptic species and their low density, indirect methods are required. We tested four different non-invasive methods to detect the presence of weasel (*Mustela nivalis*), stoat (*Mustela erminea*), polecat (*Mustela putorius*), pine marten (*Martes martes*) and stone marten (*Martes foina*): camera-traps, hair-tubes, footprint-tunnels and faeces survey. We aimed to compare the effectiveness of each method: contact rate, simplicity of conception and use, possibility to duplicate at a large scale. We tested the methods in the Bresse region, a famous open-air chicken farming area, where the presence of the five mustelids is attested. Camera-traps, hair-tubes, footprint-tunnels were put in place together on 30 points near open-air chicken areas, assuming that the presence of chicken would be attractive for mustelids. A walked transect linking points was defined and faeces were collected each week. The design was surveyed during 2 sessions of 4 weeks between June and August. While numerous faeces, visually assigned to mustelids, were collected (mean 2.1 ± 1.9 faeces/ walked km/week), contact rates using camera-traps, hair-tubes and footprint-tunnels were very low. We collected hairs only once in a hair-tube (with a photo of a pine marten), once in a foot-print tunnel with tracks of a weasel and a total of five stone martens pictures. The design will be tested in next winter, as we suspect a strong seasonal effect. However, recommendations to improve our design from European mustelids colloquium participants are welcome to help us understanding why our design performed worse as elsewhere in Europe.

Analysis of public and enenvironmental conditionings and capacity of protection European mink (*Mustela lutreola L.*, 1761) in Poland – review

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Keywords: European mink, conservation genetics, breeding.

Currently, about 3,000 species per year are disappearing from the surface of the Earth, which means that over 3 of them are dying in every hour. This process can be halted by using of the latest achievements of science - especially molecular genetics. Conservation genetics use methods of classical and molecular genetics, in order to protect and restore biocenotic diversity. The greatest Polish success in this field is to restore the population of the European bison (*Bison bonasus*), the breeding protection of the Polish Primative (*Equus gmelini* subsp. *Silvatica*) and gray seals (*Halichoerus grypus*). The use of conservation genetics rises high hopes associated with the preservation and restoration of the wild species which are critically threatened with extinction. The European mink (*Mustela lutreola*) is a very good example of threatened species. The Polish population of the European mink doesn't exist anymore. Only a few individuals are kept in Poznan ZOO, participating in the European Programme for the Protection of Animals (EEP). The gene pool of the species described in Poland is also preserved in the form of collections of natural history museums and universities that require urgent cataloging. Currently, the European mink in Poland is a subject to strict legal protection, but there are almost no steps to preserve the gene pool of the species and its eventual restoration carried out. This indicates the need for urgent and comprehensive preventive operations. Such activities should primarily apply to conservation genetics. One of them is the ex situ protection by the preservation of the gene pool and creating a breeding base at the present. Another one is in situ protection by populations recovery in the future. First of all, must be established to establish the subspecies which is appropriate for Polish territory. This is only possible through determining genetic similarity of both individual and population. It is also necessary to use modern breeding methods to create a breeding base. Finally, the ground for the re-introduction into environment, which requires the solution to the problem of predominance of the American mink, must be prepared.

Sequence and nucleotide polymorphisms of the *Prolactin receptor* gene in the American mink (*Neovison vison* Schreb., 1777)

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Keywords: prolactin receptor, PRLR polymorphism, American mink, SNP mutations.

Prolactin (PRL) is a very versatile and systemic hormone, which is secreted by eosinophilic lactotropic cells of anterior lobe of the pituitary gland. This peptide regulates more than 300 different biological processes in mammals. That processes are bound up with water and electrolyte balance, growth and development, endocrinology and metabolism, brain

and behavior, reproduction, immunoregulation and protection. The most important function of PRL is to initiate and maintain lactation and also participation in the processes of reproduction. The initial step in the action of PRL, like all hormones, is the binding to a specific membrane receptor. This receptor is the prolactin receptor (PRLR). The PRLR has also been shown to be a member of the same family as the GH receptor. PRLR is also part of the larger class of receptors - the class 1 cytokine receptor superfamily. The objective of the research was to determine polymorphism of the prolactin receptor gene in American mink. Using a part of gene sequence PRLR for the American mink (from 5 intron to 3' flanking region), which size was 8054 bp, 13 SNP mutations were identified in coding and noncoding sequences by sequencing. Discovered mutations are: 4624 G/T, 4634 A/G, 4820 C/G, 4863 G/T, 6962 C/T, 6863 T/C, 6477 C/T, 6634 A/G, 5504 C/G, 7315 G/A, 7276 G/A, 7227 G/A, 7128 A/G.

Preliminary observations on the otter (*Lutra lutra* L., 1758) sprainting behaviour in rivers of Lower Silesia , Southwestern Poland

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Keywords: otter, sprainting behavior, Poland.

This research on otter (*Lutra lutra*) sprainting behaviour was conducted on the several rivers in Sudetes Mountains and lowland areas of Lower Silesia. For study purpose, on the territory of Lower Silesia a number of rivers were surveyed, and subsequently they were divided into transects to identify otter signs (spraints, smears and jellies) and to recognize places where otter scrape up mounds and of sand, or vegetation sites. Furthermore, otter footprints were localized with GPS receiver and measured for the following reasons; firstly to distinguish different specimens within otter populations; secondly to determine otter territory sizes and boundary places. Data on vegetation, the types of substrate (stones, rocks, beaches, trunks, roots, grass or sands) and types of riverbanks constructions (gabion baskets, blockwork walls or wood piling) was also examined for each transect. These habitat parameters were surveyed within a 10 m band from the river edge including positive and negative sites. This study was also carried out to collect data on the number of otter signs and distances these signs from the riverbanks. In addition to rivers, different types of rivers were also identified. Overall, the data analysis determined otter sprainting behaviours and their activities in relation with habitat types, territorialities or other factors such as otter resting or feeding sites.

Non-invasive study of small mustelids in the Netherlands

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Keywords: small mustelids, species conservation.

The Dutch Small Mustelid Working Group (WKM) investigates the conservation status of small mustelids in the Netherlands. In 2012 the WKM started field trials throughout the country to develop practical non-invasive methods to detect Least weasel and Stoat. The WKM coordinates and carries out fieldwork through a network of volunteers. The effective use of tracking tunnels and the experimental camera trap 'Mostela' will form the basis for a future monitoring protocol for small mustelids.

National otter conservation strategy

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Keywords: Eurasian otter, management, Poland.

The otter, which causes damage to fish farming industry, is considered to be a conflict species. This is why it has been included in the project: "Preparation of national strategies for the management of selected endangered and conflict species". The outcome of this project is the "National Action Plan for the Otter Lutra lutra in Poland. The National Strategy for otter Management - a draft". Otter is encountered almost all over the country and its population is constantly growing. At present, in Poland the status of the species is good, and the mortality caused by killing by people and collision with cars (probably main causes of otter mortality in Poland) does hinder the expansion of this species. Nevertheless, in the future, we can expect the escalation of the conflict in fisheries, increased mortality caused by outgoing development of road infrastructure as well as problems related to river regulation and the construction of more and more anti-flood reservoirs. In order to avoid the increase conflict situations in fisheries, it seems to be important to work out effective methods of protecting fish farms against the otter. This work contains a number of guidelines and suggestions how to preserve the good status of the national otter population referring both to the conservation of the species and to the methods of minimizing its conflicts with fisheries. Further conservative measures should aim at lowering the number of otter road deaths and protecting otter habitats. Some suggestions, recommendations and methods and of minimizing road mortality have been included in this strategy.

Peculiarities of badger (*Meles meles* L., 1758) niche under the conditions of low earthworm biomass and high predation risk

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Keywords: European badger, feeding habits, spatial structure, earthworm availability, intraguild predation.

The poster concerns questions on food niche and spatial structure in badgers (*Meles meles*) in an area of low earthworm biomass and common occurrence of large predators. The study was conducted in semi-natural terrain in north-eastern Belarus. We analysed 1188 scats, radiotracked seven badgers and assessed variations in earthworm biomass. In the conditions of low biomass and uneven distribution of earthworms badgers were found to act as generalist predators tending to specialize on the more readily available foods during short seasonal periods. Earthworm portion in the species diet was relatively low and correlated with earthworm biomass and we did not find any evidence of badger feeding selectivity. Data on badger distribution and activity suggest that avoidance of high predation risk forces badgers towards the security of utilising primarily straight-line routes between setts. Such tactics limit availability of earthworms and other food resources and so determine low density in badgers.

Estimating density of badgers (*Meles meles* L., 1758) at a large scale: a pilot study in 3 areas in France

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Keywords: badger, density estimates, distance sampling, camera trapping, sett survey.

In France, the first case of bovine tuberculosis (*Mycobacterium bovis*) on badger was confirmed in 2009 in a region where the disease has increased in cattle since 2004. Surveillance and management programs, including culling of badgers, have been carried out to monitor infection in wildlife, especially in badgers. In the British Isles, where badger densities are high, the species is considered as a maintenance host. Apart from the prevalence, badger density is one of the key factors to better understand which role the population may play in the multi-host system of *M. bovis* epidemiology. Badger density estimates are based on estimating the number of main setts i.e. inhabited by a badger group and the mean social group size. Here we present a pilot study aimed to estimate density of badgers at a large scale, i.e. in three contrasted areas of around 100 km². In each area, a systematic sampling scheme of 50 walked transects (800 m length by 100 m width) was defined, on which all active setts were censured. Active setts densities were estimated using distance sampling. We used camera trapping to estimate the proportions of main

setts, of breeding setts with cubs and the mean group size. We also estimated the proportion of active setts inhabited by only one individual, more or less temporarily, i.e. subsidiary setts. Adult densities were estimated between 2.5 and 6.3 badger/km² and cub densities between 1.2 and 3.4 cubs/km² depending on the study site. These estimates are lower than in Britain but larger than those obtained in Mediterranean regions, in boreal environments or in mountainous regions. Despite a lack of precision, densities seem to be lower in highly forested habitat and in intensively culled area.

Biological effects of the growth hormone gene polymorphism in the American mink (*Neovison vison* Schreb., 1777) – does synonymous always mean silent?

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Keywords: American mink, synonymous mutation/SNP, silent mutation/SNP, biological effect, genetic diversity.

Most often, genetic variation causing phenotypical changes is calculated exclusively upon the occurrence of non-synonymous variation. However, it has been increasingly more common to state that synonymous mutations and polymorphisms, as well as nucleotide variation present in introns, can have very serious bilogical effects. In the following work, the potential influence of nucleotide variation on phenotypes within the growth hormone gene in American mink has been evaluated (*Neovison vison* Schreb., 1777) (*mGH*). The focus is on the possible occurence of changes in the splicing regulatory sequences and sequence motifs, different reading of codons and on the influence on the secondary structure of mRNA. The results obtained confirm the hypothesis that the synonymity of single-nucleotide variation does not always signify its neutral phenotype.

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