



ZEMNews

Zentrum für Evolutionäre Medizin
Centre for Evolutionary Medicine

No. 3 - Jan 2012



Picture: Heinz Sonderegger, Institute of Anatomy

Exhibition: «Mummy: Man Medicine Magic» Irchel Campus, Oct. 2011 - Jan. 2012.

Exhibition Mummy: Man, Medicine, Magic

After 3 months, the ZEM exhibition at the Campus Irchel can be called a great success. Showing techniques, projects and current research, people have been particularly impressed with clinical approach and the immediateness of the results for everyday medicine.

The research results that are presented in the exhibition, are produced by the ZEM, 3deluxe, Life Science and the Institute of Anatomy of the University of Zurich. Amongst others the group comprises researchers from the human medicine, veterinary medicine, biological and historical fields. These researchers are members of the worldwide unique “Centre for Evolutionary

Medicine” that was founded at the University of Zurich in 2010 thanks to a generous donation. At the centre that bridges past, present and future evolutionary processes of disease causes and disease incidences are studied. This is done primarily on three levels: morphologically, via imaging and molecularly. Tissue structure can be studied using morphological techniques on

tissue sections or with macroscopic analysis.

Thanks to radiological imaging techniques mummies can be examined without taking tissue samples. In addition variants and pathologies can be defined and depicted virtually. Molecular biological methods enable DNA extraction from these thousand-year-old mummified bodies. This DNA comprises information about diseases and about the human genome. All these aspects have been shown through newly produced videos.

In addition part of the exhibition also covers the religious background of mummification in ancient Egypt. Finally further questions concerning evolutionary medicine and its relevance to modern medicine are high-

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The exhibition on medical research with mummies finished earlier this year and can be called a great success

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Clinical Skills Lab

For more information about the CSL and the conditions of reservation:
<http://evolutionäremedizin.ch/zem/csl/>



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Picture on the cover

Heinz Sonderegger, Institute of Anatomy

Authorship

Frank Rühli and employees of the Centre for Evolutionary Medicine

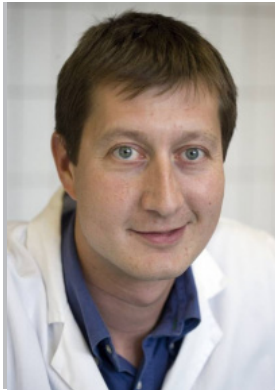
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<http://evolutionarymedicine.ch>

Foreword

Dear Ladies and Gentlemen



It is with true pleasure that I present to you the newest ZEM Newsletter. It covers roughly the time span since Spring 2011.

During this time, a lot of notable developments happened: First, we were able to further establish the ZEM within and outside the UZH. More collaborations and research projects

are launched, eg in the molecular field. Also, with the ZEM exhibition "Mumien: Mensch, Medizin, Magie" we were able to present our and other mummy researchers work to a wider audience, this exhibition was possible thanks to the tremendous support of the UZH, the Mäxi foundation and other foundations such as the Mercator foundation.

With the wonderful team of my employees we were able to acquire further grant money eg by the Swiss National Science foundation or the Novartis Stiftung. Also a constant flow of publications under the ZEM name shows the academic impact of this still unique endeavor. Various national and international media reports show the growing public interest in the ZEM as well.

Finally, we expanded the ZEM by officially adding a fourth research group covering basic research issues such as ethics or paleopathology.

The new year will bring further adjustments of organisation structures, the launch of larger third-party funded projects and some final moving to larger room facilities, all together another important step in the path to keep the ZEM fully rolling.

In the name of all my employees I thank for your interest, the support by the various members of the honorary committee, advisory board as well as the local and international collaborators and the Mäxi Foundation for their continuous support who makes this all possible. If you have any comments or further specific interest let us know!

Frank Rühli
Head



Visitors at the opening night of the exhibition
<Mummies: Man, Medicine, Magic>

«Congratulations to the ZEM for a Successful First Year».

The most recent member of the ZEM Honorary Committee, State Secretary for Education and Research Mauro Dell'Ambrogio offers his greetings.



Mauro Dell'Ambrogio
(Swiss Undersecretary for Public Education)

As the most recent member of the Honorary Committee I am pleased to witness the first steps of the Centre for Evolutionary Medicine as it establishes a number of very promising transdisciplinary projects. The breadth of experimental approaches at the cutting edge of science, combined with empathic information of the public at large about the goals, the major issues and results are most commendable. The excellent scientific training of Dr. Frank Rühli owes much to the University of Zürich and an Institute of Anatomy with a long-standing reputation. This is a rigorous professional setting where scientific fascination for unexplored horizons is encouraged in the face of many technical, social,

political challenges as well as sometimes superstitions and taboos. It is evidence of the competitiveness and professionalism of the new research groups, that they have obtained support not only from different charities but to a large extent also from the most demanding providers of peer-reviewed research funding such as the Swiss National Science Foundation and the German Research Foundation.

«...it is gratifying to note that private charities recognize excellent research competence in Swiss universities... »

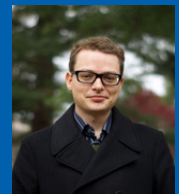
While national research administration often involves very complex negotiations with any number of stakeholders, it is gratifying to note that private charities recognize excellent research competence in Swiss universities and support brilliant scientific careers here and elsewhere with no red tape and only the strict minimum of bureaucratic constraints. The significant commitment of the Mäxi Foundation is a vibrant

testimony of its confidence in the dedication and the individual responsibility of scientists. That highly original research on ancient mummies may contribute to our understanding of evolution and have relevance for the future of mankind is also a remarkable expression of hope. Personally, and I am sure, in the name of all the members of the Honorary Committee, I wish Dr. Rühli a lot of success in guiding and motivating the ZEM research teams.

New International Collaborations



Prof. Barry Bogin

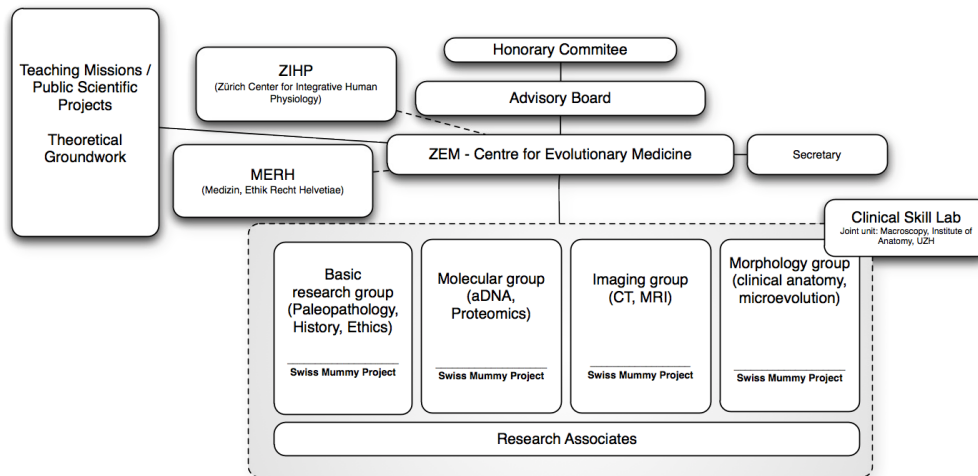


Prof. Tom Gilbert

In 2011, the ZEM has been particularly active in reaching out to other researchers in adjacent fields and securing strong international collaborations.

Thus, we are proud to welcome Prof. Tom Gilbert from the Copenhagen ancient DNA Lab and Prof. Barry Bogin, Professor for Biological Anthropology from Loughborough University to the Centre for Evolutionary Medicine.

ZEM Organigramm



The current composition of the ZEM committees and collaborators.

Honorary Committee:

Dr. M. Dell Ambroggio

Staatssekretär für Bildung und Forschung,
Bern

Dr. T. Heiniger

Regierungsrat Kanton ZH

Prof. F. Gutzwiller

Ständerat ZH

Prof. D. Wyler

Prorektor Medizin und Naturwissen-
schaften UZH

M. Coninx

Geschäftsführer "Finanz und Wirtschaft"
Tamedia AG

M. Prenosil

VR Präsident Sprüngli AG, Präsident City
Vereinigung

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Dekan Medizinische Fakultät, UZH

Prof. M. Hengartner

Dekan Mathem.-Naturwiss. Fakultät UZH

Prof. M. Thali

Direktor Institut für Rechtsmedizin UZH

Prof. M. Gassmann

Direktor Institut für Veterinärphysiologie,
Zürich Center for Integrative Human
Physiology, UZH

Prof. S. Gay

Rheumaklinik, Institut für Physikalische
Medizin USZ

Prof. Ch. Gerber

Chefarzt Orthopädie Balgrist ZH

Prof. B. von Rechenberg

Direktorin Center for Applied Biotechno-
logy and Molecular Medicine UZH,
Vetsuisse

Prof. M. Rudin

Institute for Biomedical Engineering ETH

Prof. C. van Schaik

Direktor Anthropologisches Institut UZH

Prof. B. Tag

Rechtswissenschaftliches Institut UZH,
Vorsitzende Kompetenzzentrum Medizin -
Ethik - Recht Helvetiae

Prof. O. Ullrich

Direktor Anatomisches Institut UZH

Prof. B. Bogin

Loughborough University

Prof. T. Gilbert

Centre for GeoGenetics, Natural History
Museum & University of Copenhagen

Prof. M. Henneberg

Anatomical Sciences, University of Adelaide

Prof. I. Hershkovitz

Anatomy and Anthropology, Faculty of
Medicine, Tel Aviv Univ.

Prof. S. Ikram

Department of Egyptology, American
University Cairo

Prof. em. J. Komlos

Volkswirtschaftliches Institut, LMU
München

Dr. Ch. Scheffler

Institut für Biochemie und Biologie,
Universität Potsdam

Prof. W. Schiefenhövel

Human Ethology Group, Max-Planck-
Institute, Andechs

Prof. B. Solomon

Department of Orthopaedics, Royal
Adelaide Hospital

Prof. N. Tuross

Department of Human Evolutionary
Biology, Harvard University

PD A. Zink

Institute for Mummies and the Iceman,
Bozen

International Collaborators:

Prof. B. Blümich

Rheinisch-Westfälische Technische
Hochschule, Aachen

PD M. Bock

Deutsches Krebsforschungszentrum,
Heidelberg

The ZEM Research

Words from the research groups

Dr. Martin Häusler

Our new group member of the Morphology Group about his future work at the ZEM

I joined the ZEM in October 2011. My background includes both anthropology and medicine, which I would like to contribute to the expertise of the Morphology Group. My anthropological PhD thesis was on the evolution of human bipedal locomotion based on a recently discovered 2.5 million year old partial skeleton of an *Australopithecus africanus* from South Africa. After a one-year post-doctoral position with Prof. Henry McHenry in the Anthropological Department at the University of California, Davis, I lectured at the Anthropological Institute, University of Zürich. I then worked as a senior researcher at the Institute of Forensic Medicine in Zürich, where I was involved in the application of 3D visualization techniques, followed by work as an assistant doctor in orthopaedics, surgery and internal medicine.



My current research at the ZEM focuses on the evolutionary background of low back problems that are omnipresent in modern humans. This is often attributed to the increasingly sedentary lifestyle of industrialized populations as well as to our upright, bipedal locomotion that places huge mechanical stress on the vertebral column. However, little is known of this situation during the course of human evolution.

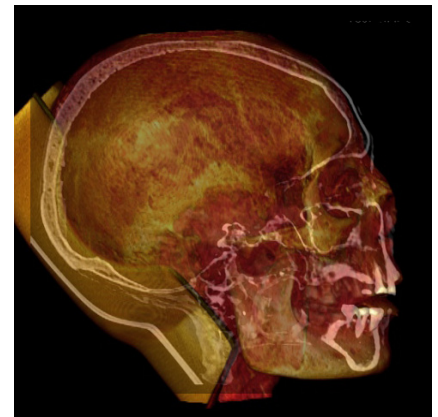
My ongoing study of the early hominid spinal column has already produced some surprising results. Thus, almost all fossils that preserve more than a handful isolated vertebrae show evidence for pathologies related to biomechanical overload despite their generally young individual age. Most remarkable is the skeleton of a nine-year-old *Homo erectus* boy from Nariokotome, Kenya, dated to 1.5 million years ago. Alterations of its lumbar spine suggest a disc pathology that might have caused disabling back pain and sciatica. This not only indicates that the lifestyle of early hominids was physically very demanding. Perhaps, their vertebral column was also less adapted to bipedal locomotion as that of modern humans. It is thus not possible to conclude that our back is an evolutionary maladaptation to bipedal locomotion.

The Imaging Group

Dr. med. Lena Öhrström

Dr. Dr. Roger Seiler

Johann Wanek, MSc Med Phys



Swiss Mummy Project: State-of-the-art visualization of dentition / dental pathologies:

- Multimodality validation of post mortem dental status (mummies, anatomy cadavers), correlative assessment of dental findings by CT and endoscopy

Radiation efficiency of randomized distributed cell nuclei in different phantom tissues:

- Comparison between simulated cell damage and real irradiation experiments

Comparative CT/MR imaging of ancient mummified tissues:

- Semiquantitative analyses of tissues by multiple MR/CT (DECT) settings

A fourth research group, the «Basic Research Group: Paleopathology, History and Ethics» has newly been founded

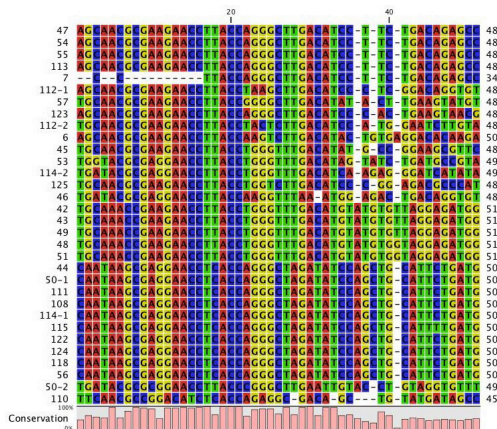
Groups & Projects

The Molecular Group

Dr. Abigail Bouwman

Dr. Natallia Shved

Dr. Christina Warinner



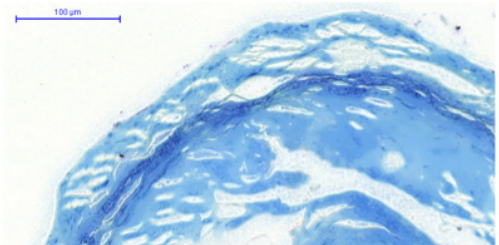
The Morphology Group

Olia Bolshakova, med. dent.

Dr. Dr. Karl Link

Dr. Martin Häusler

Dr. Kaspar Staub



Ancient DNA investigation of the European origin of the CCR5-d32 HIV-resistance allele:

- qPCR allele typing of European populations at different time points

Ancient DNA and paleoprotein investigation of dairying and the evolution of Swiss diet:

- SNP typing of the European lactase persistence allele; biomolecular analysis of dietary remnants recovered from ancient teeth

Iranian Salt Mummy Project:

- Ancestry analysis and functional gene typing of Iron Age miners spanning 1000 years in time

Human evolution in extreme environments: Genetic adaptation to hypoxia in the Himalayas:

- Genomic investigation of the origin and spread of high elevation adaptive alleles

Multimodality study of ancient mummified brains:

- Histological, GC-MS, micro-CT and micro-MRI analysis of mediaeval brains from Belgium

Histology of comparative ice mummy:

- Detailed histological analysis of multiple tissues from the mammoth baby «Lyuba»

Galler pathological bone collection:

- Database creation and study of bone pathologies, e.g. impact of tuberculosis on organ systems and bone healing in the pre-antibiotic and post-antibiotic period

Swiss Biological Standard of Living - study of Swiss Armed Forces conscripts 1875-2011:

- Secular trends of BMI, stature and body shape
- Relationship between skeletal measurements on thoracic x-rays, sport test and marching stress fractures

and is in the process of setting up its research projects on topics as varied as the history of mummification or the possibilities of attribution of post-mortem personhood - see our new code of ethics on <http://evolutionäremedizin.ch/coe>.

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Exhibition - Mummy: Man, Medicine, Magic.

lighted. Short portraits summarise the most important information concerning the mummies and mummy parts presented in the exhibition.

The exhibition was made possible due to collaborations with numerous museums and generous support from multiple foundations. Many co-workers and colleagues inside and outside of the University of Zurich have contributed to its success.

To complete this overview the Tagesanzeiger and Tamedia AG have generously accepted to accompany the exhibition with a series of articles and the organisation of public lectures where the general public had a chance to meet researchers.

ZEM Publications

(selected publications since last newsletter 2/2011)

Mumien, Mensch, Medizin, Magie - Ausstellungskatalog, F. Rühli (Ed.), Zürich 2011. ISBN 978-3-033-03121-0

Haeusler M, Schiess R, Boeni T, 2011. New vertebral and rib material point to modern bauplan of the Nariokotome Homo erectus skeleton.

J Hum Evol 61: 575-582

Staub K, Rühli F, Bogin B, Woitek U, Pfister C, 2011. Edouard Mallet's early and almost forgotten study of the average height of Genevan conscripts in 1835. Economics and Human Biology 9 (4):438-442

Saniotis A, Henneberg M, 2011. An Evolutionary Approach Towards Exploring Altered States of Consciousness, Mind-Body Techniques and Non-Local Mind. World.

Futures: The Journal of General Evolution April;67(3):182-200

Saniotis A, 2011. The Important Role of Evolutionary Medicine in Asian Bioethics.

Eubios J. of Asian and Int. Bioethics July 21 (4):146-148

Solomon LB, Hussenbocus S, Hoffman J, Howie DW, Rühli F, 2011. Unusual appearances following intra-capsular neck of femur fractures.

Injury 42:11, 1336-1341

Papageorgopoulou C, Suter SK, Rühli F, Siegmund F, 2011: Harris Lines Revisited: Patho-diagnostic Marker or Growth Spurt Indicator?

Am J Hum Biol. May;23(3):381-91

Henneberg M, Rühli F, Gruber P, Woitek U. Alanine Transaminase is a better marker than socio-cultural factors for body mass increase in healthy males.

Food and Nutrition Sciences, 2011, 2, 1054-1062

Staub K, 2011. Grösser - und dicker. Körperhöhe und Body Mass Index im Kanton Bern seit dem 19. Jahrhundert.

Berner Zeitschrift für Geschichte 73(4): 3-39

Staub K, Rühli F, Bogin B, Woitek U, Pfister C, 2011. Edouard Mallet's early and almost forgotten study of the average height of Genevan conscripts in 1835. Economics and Human Biology 9 (4):438-442

Kaempfer T, Duerst E, Gehrig P, Roschitzki B, Rutishauser D, Grossmann J, Schoedon G, Vallelia F, Schaer D, 2011. Extracellular hemoglobin polarizes the macrophage proteome toward Hb-clearance, enhanced antioxidant capacity and suppressed HLA class 2 expression.

J Proteome Res, May 6;10(5):2397-408, Epub Apr 14

New BSc and MSc students and visiting scholars

The ZEM is happy to welcome the following new students to the group:

- Annina Krüttli (BSc with Prof. Della Casa, and co-supervision with Dr. Christina Warinner and PD Dr. Frank Rühli)
- Nicole Hoffman (MSc with PD Dr. Frank Rühli and Dr. Dr. Karl Link)

Will be staying at the ZEM for research:

- Andreas Lehmann (collaboration Dr. Kaspar Staub)
- Antje Caelers will be replacing Gül Akgül as technician during her maternity leave.

Upcoming Dates with ZEM participation

22 - 25 March: 75th Anniversary of Albert Szent-Györgyi's Nobel Prize Award, Szeged, Hungary

11 - 14 April: American Association of Physical Anthropologists Annual Meeting, Portland, USA

16 - 19 April: Advanced Electromagnetics Symposium AES 2012, Paris, France

28 May - 1 June: International Symposium Archaeometry ISA, Leuven, Belgium

21 - 25 August: 26th Conference of the European Comparative Endocrinologists, University of Zurich, Campus Irchel

Selected ZEM media and press reports

Print/Online:

- News.Sciencemag.org, 16.06.2011
- ScienceNow, 20.06.2011
- Der Bund, 13.08.2011
- Tagesanzeiger, 13.08.2011
- L'Hebdo, 14.09.2011
- Tagesanzeiger, 14.09.2011
- NewScientist, 11.10.2011
- Süddeutsche Zeitung, 12.11.2011
- Nature, 24.11.2011
- Swissinfo.ch, 02.12.2011
- NZZ, 04.05.2011

Television:

- Discovery Channel Canada, Daily Planet
- SF Schweizer Fernsehen, Einstein, 15.09.2011
- SF Schweizer Fernsehen, PULS, 19.09.2011
- Telezüri, 22.09.2011
- Swedish Television, Vetenskapens värld, 21.20.2011
- BBC TV series, 22.12.2011

Radio:

- World Radio Switzerland, 18.08.2011
- SR DRS 1, 24.09.2011
- SR DRS 2, 12.11.2011