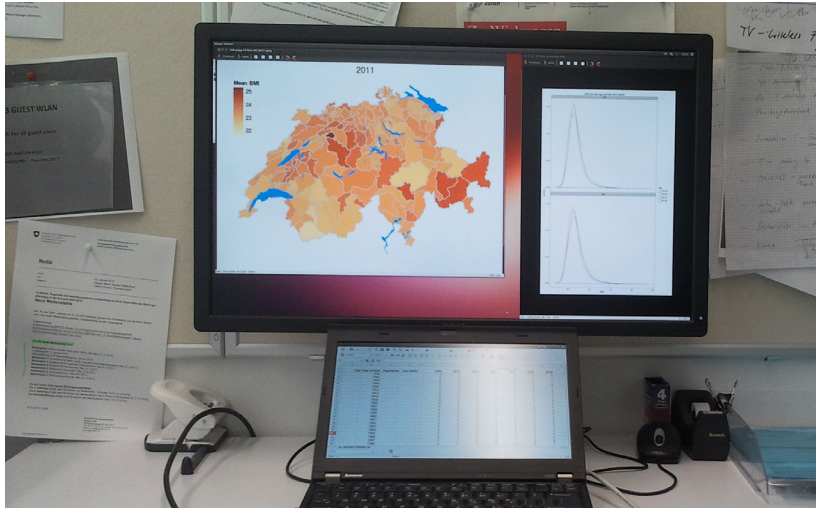




# ZEMNews



## Spotlight on the ongoing ZEM Research: Socio-economic differences in BMI of Swiss conscripts

Military conscription data yield a yearly picture of the height and weight of young men at a proscribed age. The analysis of trends in body shape based on already existing, standardised and regular data collection mechanism can offer a fast and cost effective tool for monitoring of the health status of young men over time.

(Dr. Kaspar Staub and Dr. Radoslaw Panczak)

Conscript data often cover extended periods of time and, where conscription is compulsory, can cover a large proportion of the census population of living young men (e.g., ca. 90% in Switzerland), thus allowing nationwide, population-level studies. In addition to body measurements, Swiss records of each of the conscripts include information about contemporary occupation and place of residence, which in turn offer possibilities for regional, socio-economic and epidemiological research.

In July 2012 the Federal Office for Public Health funded the project „Regional and socio-economic differences in body mass index (BMI) of Swiss con-

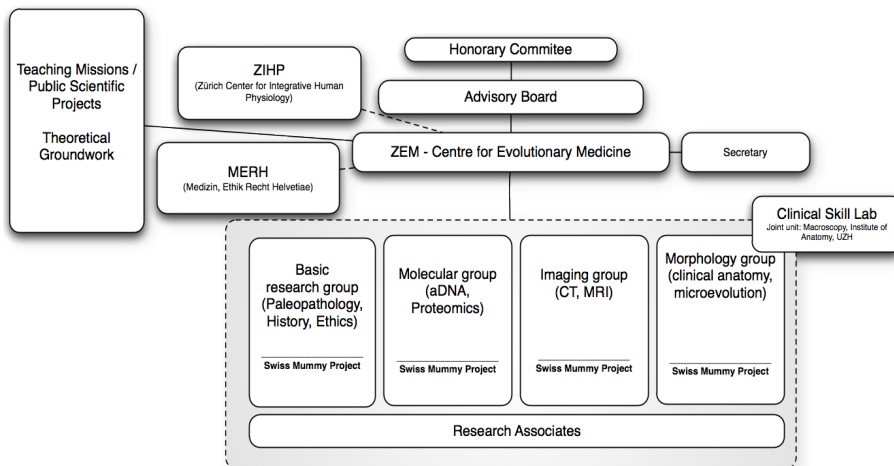
scripts 2004-2012“. Using these representative height and weight measurements the project team members from the ZEM (Radoslaw Panczak, Frank Rühli, Ulrich Woitek and Kaspar Staub) are investigating national trends in the prevalence of overweight and obese men during the last nine years. The output of these analyses will be an additional source of data and new insights into the national Nutrition and Physical Activity Monitoring System (MOSEB).

The project team places particular interest on the identification of geographical areas of young men with elevated BMI, therefore, the data are analysed not only on cantonal, but

also on district, community and post-code levels. The project team will also explore ecological and other regional level data (such as area-based index of socio-economic position, taxable income, consumption patterns, access to sport facilities, terrain characteristics or ethnic composition) to attempt to explain these regional patterns in BMI. Moreover, influences of the individual-level socio-economic background (as indicated by occupation) on body shape of the young men are addressed.

The findings of this project will be of use for the public health community by providing regional breakdown of national trends and as a starting point for further regional research projects and health programs. The final report is provisioned for October 2013, when the Federal Office for Public Health will release the final report of the project to the public.

# ZEM Organigramm



## The current composition of the ZEM committees and collaborators.

### Honorary Committee:

**Dr. M. Dell Ambroggio**  
Staatssekretär für Bildung und Forschung

**Dr. T. Heiniger**  
Regierungsrat Kanton ZH

**Prof. F. Gutzwiller**  
Ständerat ZH

**Prof. D. Wyler**  
Prorektor Medizin und Naturwissenschaften UZH

**M. Coninx**  
Geschäftsführer "Finanz und Wirtschaft"  
Tamedia AG

**M. Prenosil**  
VR Präsident Sprüngli AG, Präsident City  
Vereinigung

**Dr. Th. Wellauer**  
COO Swiss Re

### Advisory Board:

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Dekan Medizinische Fakultät, UZH

**Prof. M. Hengartner**  
Dekan Mathem.-Naturwiss. Fakultät UZH  
zu neuem Rektor UZH gewählt (ab 2014)

**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**  
Center of Experimental Rheumatology, Department of Rheumatology, USZ

**Prof. Ch. Gerber**  
Chefarzt Orthopädie Balgrist Zurich

**Prof. B. von Rechenberg**  
Direktorin Center for Applied Biotechnology 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

### Local Collaborators:

**Prof. J. Hodler**  
Institutsdirektor Institut für Diagnostische und interventionelle Radiologie, USZ

**Prof. Ch. Pfirrmann**  
Chefarzt Radiologie, Uniklinik Balgrist UZH

**PD D. Schaer**  
Klinik und Poliklinik für Innere Medizin, USZ

**Prof. R. Schlapbach**  
Functional Genomics Center, UZH, ETH

**Divisionär A. Stettbacher**  
Oberfeldarzt, Schweizer Armee, Bern

**Prof. G. Székeley**  
Institut für Bildverarbeitung, ETH

**Prof. U. Woitek**  
Institut für Empirische Wirtschaftsforschung, UZH

### International Collaborators:

**Prof. B. Blümich**  
Rheinisch-Westfälische Technische Hochschule, Aachen

**Prof. M. Bock**  
Radiologisches Department Universitätsklinik Freiburg im Breisgau

**Prof. B. Bogin**  
School of Sport, Exercise & Health Sciences, Loughborough University

**Dr. E. Cappellini**  
Centre for GeoGenetics, Natural History Museum & University of Copenhagen

**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, EURAC, Bozen

**Prof. J. Tutkuviene**  
Department of Anatomy, Histology and Anthropology, Faculty of Medicine, Vilnius University

**Prof. R. Jankauskas**  
Department of Anatomy, Histology and Anthropology, Faculty of Medicine, Vilnius University

**Dr. D. Piombino-Mascali**  
Department of Cultural Heritage and Sicilian Identity, Palermo

**Amàlia Valls Martínez**  
Head of Paleopathology and Anthropology Dept. at Instituto de Estudios Científicos en Momias (IECIM), Madrid

**Mercedes González Fernández**  
Director at Instituto de Estudios Científicos en Momias (IECIM), Madrid

**Prof. A. Nebel**  
Institut für Klinische Molekularbiologie, Christian-Albrecht-Universität Kiel

**Prof. Dong Hoon Shin**  
Department of Anatomy/Institute of Forensic Medicine, Seoul National University College of Medicine, Seoul

# Foreword

Dear Ladies and Gentlemen,



Approximately half a year has passed since the last newsletter appeared. These past months have again been very important for the ZEM for various reasons:

Firstly, a lot of scientific publications which originate from research undertaken last year have appeared. They all reflect our broad approach we take to looking at the evolution of humans and pathogens, by undertaking relevant research in evolutionary medicine; with a particular focus on musculo-skeletal disease. One article to mention is entitled „New perspectives on evolutionary medicine: the relevance of microevolution for human health and disease“ (BMC Med, 2013).

Also, we were finally able to move into new spacious lab rooms for the molecular group. Thanks to the kindness of the University, we are now able to provide a full in house workflow as required for state-of-the-art ancient DNA research. In total we have now three labs only dedicated to ZEM molecular work. This will certainly speed up these molecular projects in future.

Another major development is the now constantly increasing number of master and PhD students affiliated with or directly located at the ZEM, including those that are linked with the newly started University Research Priority programme „Evolution in action“ which the ZEM is part of. We are heavily investing in these future generations of scien-

tists who shall eventually further disseminate our unique field of research in a few years time after their graduation.

In the coming months one highlight will be the first full course on evolutionary medicine to be taught at the University of Zurich. We will run this course at the science faculty based on a similar course which we have successfully run together with Australian collaborators at the University of Adelaide.

Another effort will be to acquire more external funding and to set-up short half/one day workshops/ symposia in the field of evolutionary medicine at the University of Zurich to locally promote this field of science. Also, the newly launched ZEM grants shall be awarded for the very first time toward the end of this year. We look forward to obtaining more imaging equipment (e.g. a portable x-ray unit) to be used for ZEM research but will also be made available to other research groups. Finally, we will intensify the collaboration within the Institute of Anatomy, particularly with the macroscopy unit, to promote our clinically relevant aspects in anatomy and teaching.

It is my great privilege, in the name of all the ZEM employees and affiliates, to thank the members of the Honorary committee and members of the Advisory board, especially the heads of the Institute, related faculties and the vice-chancellor and chancellor for their support, as well as the main funding body, the Mäxi foundation: without whose continuing support this endeavour would not be possible!

Sincerely,

Frank Rühli (Head)



Part of the ZEM-team at the summer BBQ, 2013

Editor:  
Centre for Evolutionary Medicine, Institute of Anatomy,  
University of Zürich, Winterthurerstr. 190, 8057 Zürich,  
Switzerland

Managing Editors:  
Kaspar Staub and Lena Öhrström

<http://evolutionarymedicine.ch>

# «Words from an international collaborator of the ZEM»

The Wood Jones Professor of Anthropological and Comparative Anatomy at the University of Adelaide about the ZEM and the impact of international collaboration.



Prof. Maciej Henneberg (University of Adelaide, Medical School)

We are still evolving. With the recent human population increase over 7 billion people, spread of new medical technologies, improved sanitation, imbalanced nutrition, increased migration and a host of other new developments, our bodies are changing faster than in the past. There is only one predictable effect of all these developments – increase in human biological variation, and there is only one certainty – we will not be the same in the future as we were in the past. Directions and mechanisms of future changes need to be understood, and this can only be done by studying changes that have occurred in our historical past.

Studying human variation across geographical space and historical time requires access to a broad spectrum of information, some of it unique for specific countries. Thus international collaboration is a must. From its inception ZEM attracted a number of international collaborators from a dozen countries located on all continents of the

world. To my knowledge this is the first time such a broad collaboration has been focussed in one Center. It covers many disciplines, including molecular biology, cultural heritage, evolutionary biology, ethology, Egyptology, biological anthropology, genetics, sport sciences, economics and a number of medical specialities.

Among those, anatomy occupies important place since a broad spectrum of anatomical variations needs to be documented and their change through time allows to focus attention on the rates of microevolutionary changes, their directions and possible causes. Methods used to study those causes, out of necessity include genetics, especially molecular methods of ancient DNA characterisation, most advanced imaging techniques, and an array of morphological and morphometric observations. Teaching of anatomy and of its clinical applications needs to be enriched by ongoing observations of changing occurrences of various vessels, nerves and muscles. This has a potential to change various aspects of medical practice, especially in orthopaedic and transplant surgery.

Studies of the co-evolution of patients and pathogens conducted by members of the ZEM point to new methods of treatment of infectious diseases that are still common in developing countries.

Over the three years of its activity ZEM produced well over 100 publications in a broad array of journals, including leading medical specialist (eg "Spine") and generalist (eg. BMC Medicine) journals and prime anthropological and scientific (eg PLoS ONE) periodicals. No wonder then that research results of members and collaborators of ZEM featured frequently in the media.

I have no doubt that ZEM will in the future increasingly serve as a focus of international and interdisciplinary research improving human health.

## New International Collaborators



Prof. Almut Nebel



Prof. Dong Hoon Shin

In 2013, the ZEM has been active in reaching out to other researchers in adjacent fields and securing strong international collaborations. We are proud to welcome Prof. Almut Nebel from the Institute of Clinical Molecular Biology (IKMB), Christian-Albrechts-University Kiel and Prof. Dong Hoon Shin from the Department of Anatomy/Institute of Forensic Medicine, Seoul National University College of Medicine, Seoul.

# The ZEM-Research

## Selected ZEM PhD students about their future work at the centre

### SABRINA MEYER, MSc

I am an anthropologist by training, having completed my Master's thesis at the Anthropological Institute and Museum, UZH, studying the functional morphology of the hominoid fibula. My PhD will involve the palaeopathological, anthropological, and molecular examination of Medieval and Early Modern Age populations in Central Switzerland with a special focus on nutrition and health status.



### GIADA FERRARI, MSc

I obtained my master's degree in genetics from the University of Zurich and collaborated on different projects ranging from insect virology to great ape genomics. The focus of my PhD project at the ZEM is the characterisation of historic mutations and recombination events in pathogenic viruses and bacteria using Next Generation Sequencing approaches on historic and forensic soft tissue samples.



### SANDRA MATHEWS, MSc

I finished my master thesis on the functional morphology of the shoulder girdle at the Anthropological Institute and Museum at the University of Zurich in 2011. In my PhD I'll go on with these studies and additionally I'm interested in the evolutionary origin of pathologies of the human shoulder girdle.



### CLAUDIA VIGANO, MSc

I obtained my master's degree in pharmaceutical chemistry/biology at the University of Sassari, Italy. In my PhD project I will focus on the evolution of malaria and G6PD deficiency in Europe and especially in Switzerland, Sardinia and Corsica.



### NAKITA FRATER, MSc

I obtained my MSc in biology/anthropology at the Anthropological Institute and Museum, UZH. My Master's thesis was on a study on the comparative morphology of the cervical spine in hominoids. In my PhD I will focus on the thoracic and lumbar spine, with an emphasis on the micro- and macroevolution of spinal morphology and pathology.



### CECILIA COLLINS, MSc

I am a bioarchaeologist working with human remains in Iceland. My PhD involves assessing the middle ear and the maxillary sinuses for pathological change caused by chronic infection. I am registered at the University of Reading, UK, and delighted to be a visiting student at ZEM.



# Groups & Projects

## The Molecular Group

Dr. Abigail Bouwman

Dr. Michael Campana

Gülfirde Akgül

Giada Ferrari, MSc

Claudia Vigano, MSc

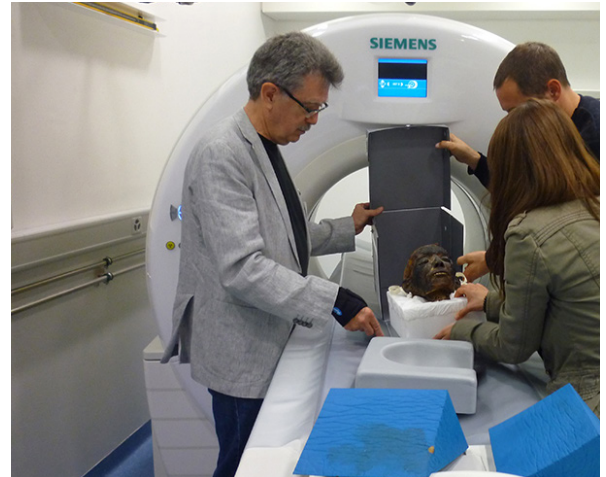


## The Imaging Group

Dr. Dr. Roger Seiler

Dr. med. Lena Öhrström

Johann Wanek, MSc Med Phys



- Ascertaining the microbiome preservation from naturally preserved archaeological soft tissues from the Peruvian Andes (Joint with Harvard University)
- Using high-throughput sequencing to investigate the cause of a colonial native Mexican (Mixtec) epidemic (Joint with Harvard University)
- Ancient DNA investigation of lactase persistence in Medieval Central Europe (Joint with Pre- and Protohistory UZH)
- Ancient DNA investigation of the change of frequency and evolutionary pressure of the CCR5Δ32 allele in Central Europe
- Clarifying the migration patterns of native South African peoples using DNA markers from modern and ancient individuals (Joint with University of Pretoria)
- Analyzing genomic and proteomic data from dental calculus (Joint with University of Oklahoma)
- Swiss Mummy Project: Diagnostic imaging in ancient mummies: Pathologies and post-mortem artefacts (X-ray and CT as the current gold-standard)
- Evaluation and further development of other emerging imaging techniques such as MR and Terahertz specifically for ancient mummified tissues
- Swiss Mummy Dental Project: Assessment of dentition/dental pathologies in ancient mummies (e.g. mummies in the Capuchin Catacombs (Palermo, Italy), the Iceman (Bozen, Italy) and Egyptian Mummies in Swiss collections)
- Direct Action of Radiation on Mummified Cells: Model of Computed Tomography by Monte Carlo Algorithms

## The Basic Research Group

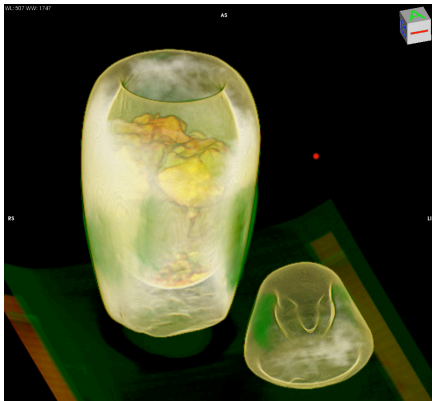
KD Dr. med. Thomas Böni

Michael Habicht, M.A.

Dr. med. Urs Leo Gantenbein (research associate)

Dr. Ina Kaufmann (research associate)

Dr. med. Philipp Gruber (research associate)



- Clinical paleopathology Group: Medical consultancy to anthropologists and archeologists in interpreting historic human pathologic remains, esp. in Switzerland
- Historic aspects of mummy research
- Canopic Jar Project: Investigation of ancient Egyptian canopic jars from various museum collections by Egyptological, radiological and molecular techniques
- Ethical aspects of research with human remains

## ZEM calls for grant applications

The applicants are free to submit any research project within the wider field of Evolutionary Medicine. Applications can be submitted at any time. Find more information and detailed guidelines on our website. (<http://evolutionarymedicine.ch/grant/>)

## The Morphology Group

Dr. Kaspar Staub

Dr. Dr. Karl Link

Dr. Radoslaw Panczak

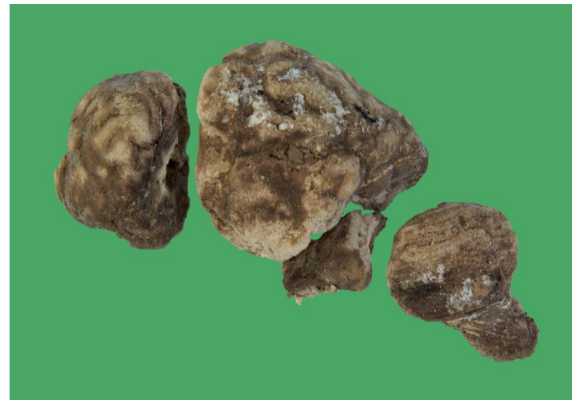
Sabrina Meyer, MSc

Sandra Mathews, MSc

Nakita Frater, MSc

Cecilia Collins, MSc

Dr. med. Martin Häusler (research associate)



Belgian medieval brains: Cerebrum; Cerebellum & Pons; Spinal cord

- Histological, radiological and electronmicroscopic analyses of ancient mummified tissues (Iranian Salt mummies, mammoth baby Lyuba, Belgian medieval brains)
- Historic Galler pathological bone reference series database: Completion of online-database and study of bone pathologies
- Secular trend (evolution), regional and socio-economic differences in height, BMI and body shape (biological standard of living) in Swiss and German conscripts since the 19th century
- Evolution of bipedal locomotion and in particular its relationship to functional morphology and pathologies
- Evolutionary background of pathologies of the human shoulder girdle, knee and spine

## ZEM-Publications Selected publications since last ZEM News 4/2012

Schiess R. and Haeusler M.

No Skeletal Dysplasia in the Nariokotome Boy KNNM-WT 15000 (*Homo erectus*)—A Reassessment of Congenital Pathologies of the Vertebral Column.  
Am J Phys Anthropol. 2013 Mar;150(3):365-74

Öhrström L, Von Waldburg H, Speier P, Bock M, Rühli F.  
MR Imaging versus CT of Ancient Peruvian and Egyptian Mummified Tissues.  
RadioGraphics, Jan-Feb;33(1):291-6, 2013

Bouwman A, Rühli F.

Advances in ancient DNA research can help radiological interpretations of archaeological diseases.  
Skeletal Radiol. 2013 Jun;42(6):751-2

Henneberg M, Saniotis A.

The future mismatch between biological and social development of youths.  
International Journal of Education and Research 1, 2, 2013, 1-5

Schär DJ, Bühler PW.

Cell-Free Hemoglobin and Its Scavenger Proteins: New Disease Models Leading the Way to Targeted Therapies.  
Cold Spring Harb Perspect Med. 2013 Jun 1;3(6)

Staub K, Woitek U, Rühli F, Pfister C.

Wissenschaft: Grenzüberschreitende Zusammenarbeiten mit anthropometrischen und medizinischen Daten der Rekrutierung.  
Informationsschrift KSD 1/13, 41-44, 2013

Rühli F. and Henneberg M.

New perspectives on evolutionary medicine: the relevance of microevolution for human health and disease.  
BMC Med. 2013 Apr 29;11:115

Seiler R, Spielmann A, Zink A, Rühli F.

The oral pathologies of the Neolithic Iceman, ca. 3300 BC.  
Eur J Oral Sci. 2013 Jun;121(3 Pt 1):137-41

Holloway K, Henneberg R, de Barros Lopes M, Staub K, Link K, Rühli F and Henneberg M.  
Secular Trends in Tuberculosis during the Second Epidemiological Transition: A Swiss Perspective.  
Advances in Anthropology 3(2):78-90

Haeusler M, Schiess R. and Boeni T.

Evidence for Juvenile Disc Herniation in a *Homo Erectus* Boy Skeleton.  
Spine 2013 Feb 1;38(3):E123-8

Meyer S, Reichlin T, Rühli F, Häusler M.

Skelettfunde aus Harmettlen, Arth-Goldau, Opfer des Bergsturzes von 1806.  
Bull Soc Suisse Anthropol 19/1, 2013

Kirchengast S, Rühli F.

Evolutionary medicine and its implications for endocrinological issues (e.g. menopause).  
Gen Comp Endocrinol. 2013 Jun 1;186:145-9.

Link K, Allio I, Rand JS, Eppler E.

The effect of experimentally induced chronic hyperglycaemia on serum and pancreatic insulin, pancreatic islet IGF-I and plasma and urinary ketones in the domestic cat (*Felis felis*).  
Gen Comp Endocrinol. 2013 Jul 1;188:269-81

Wanek J, Speller R, Rühli F.

Direct action of radiation on mummified cells: modeling of computed tomography by Monte Carlo algorithms.  
Radiat Environ Biophys, 2013 Aug;52(3):397-410

Staub K, Rühli F.

“From growth in height to growth in breadth”: The changing body shape of Swiss conscripts since the late 19th century and possible endocrine explanations.  
Gen Comp Endocrinol. 2013 Jul 1;188:9-15

Staub K, Woitek U, Pfister C, Rühli F.

Überblick über zehn Jahre historisch-anthropometrische Forschung in der Schweiz: Säkularer Trend, soziale und regionale Unterschiede in der mittleren Körperhöhe und -form seit Beginn des 19. Jahrhunderts; [Overview over 10 years of anthropometric history in Switzerland: The secular trend, regional and socioeconomic differences in body height and shape since the 19th century].  
Bulletin der Schweizerischen Gesellschaft für Anthropologie 18(2): 37–50 2012/2013

Holloway K, Link K, Rühli F, Henneberg M.

Skeletal Lesions in Human Tuberculosis may sometimes heal: An aid to palaeopathological diagnoses.  
PLoS One. 2013 Apr 24;8(4)

Saniotis A, Henneberg M.

Conceptual Challenges to Evolutionary Biology: A necessary step.  
«Biocosmology-Neo-Aristotelism» Vol.3, No.1, Winter 2013

Gantenbein, UL.

Converging Magical Legends: Faustus, Paracelsus, and Trithemius.

In: Van der Laan JM. and Andrew Weeks A. (eds) The Faustian Century. German Literature and Culture in the Age of the Enlightenment. Camden House: Rochester, NY, 2013, 93-123

Habicht M, Bouwman A, Rühli F.

Die Bedeutung von Kanopen als Quelle medizinischer und ägyptologischer Informationen.  
Göttinger Miszellen, No. 237, 2013, in press

Hermanussen M, Aßmann C, Staub K.

The Community Effect in Swiss Conscripts.  
In: Hermanussen M (ed.): Auxology. Studying Human Growth and Development, 2013, p.72-73

Staub K, Rühli F, Woitek U.

Impact and Pitfalls of Conscript Data.  
In: Hermanussen M (ed.): Auxology. Studying Human Growth and Development, 2013, p.146-149

## Upcoming Dates with ZEM participation

31 Aug - 1st September: Scientifica, University of Zurich, Switzerland

2 - 6 September: German Society of Anthropology (GfA) 10th international meeting : Bozen, Italy

6th September: 75th Annual Meeting of Swiss society for Anatomy, Histology and Embriology (SSAHE), Fribourg, Switzerland

18 Sep - 10 October: Teaching Evolutionary Medicine, MNF, UZH

20 - 21 September: 3rd Annual Meeting ESHE, Vienna, Austria

## New MSc and PhD students

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

- Nakita Frater (PhD-Project, Zürich)
- Claudia Vigano (PhD-Project, Zürich)
- Giada Ferrari (PhD-Project, Zürich)

## Selected ZEM media and press reports

### Print/Online:

- Sonntagsblick, 6.1.2013
- 20 Minuten, 7.1.2013
- Newsnet/ Tribune de Genève, 6.1.2013
- Le Nouvelliste, 7.1.2013
- Walliser Bote, 8.1.2013
- Bündner Tagblatt, 8.6.2013
- NZZ online, 9.4.2013
- Blick am Abend, 9.4.2013
- L'Express, 10.4.2013
- Der Landbote, 10.4.2013

### Television:

- 3sat (German TV), 28.2.2013
- ARD (German TV), «Karl der Grosse», 1.5.2013