University of Zurich[UZH]

Institute of Evolutionary Medicine
Institut für Evolutionäre Medizin
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IEMNews

Conference group picture
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Evolutionary Medicine Conference 2019

In August 2019 the Institute of Evolutionary Medicine (IEM) organised the 5th international meeting of the International Society for Evolution Medicine and Public Health (ISEMPH). This international conference brought together distinguished keynote speakers from all over the world as well as experts from different research areas to debate the evolutionary origins of diseases and to contemplate how the knowledge of the past informs the present and the future.

The IEM was chosen to organize this year's meeting given its previous experience with international conferences in this field, and for the successful conference outcome observed in 2015. The opportunity to organize the annual meeting for ISEMPH in 2019 allowed the IEM to solidify its international position and reputation as one of the leading institutions in the field of evolutionary medicine.

Almost 200 delegates from over 30 nations participated at the conference, showing that evolutionary medicine is reaching an increasingly international level of professional interest. Six travel grants were awarded, 3 to US students and 3 to delegates of middle and low income countries.

The scientific program itself consisted of keynote talks, mini-symposia, talk sessions, a diverse poster session, and several social events. Further, the scientific program featured four keynote speakers, three special plenary speakers, and two price award winners that contributed to the scientific rigor that characterized the conference content. The congress offered in depth discussion of topically relevant areas, including ethical issues surrounding evolutionary medicine in clinical praxis and medical curricula, along with those introduced via round table and plenary discussions. Special contribution slots were reserved for young investigators and students to insure an inclusive environment that represented individuals of all professional levels.

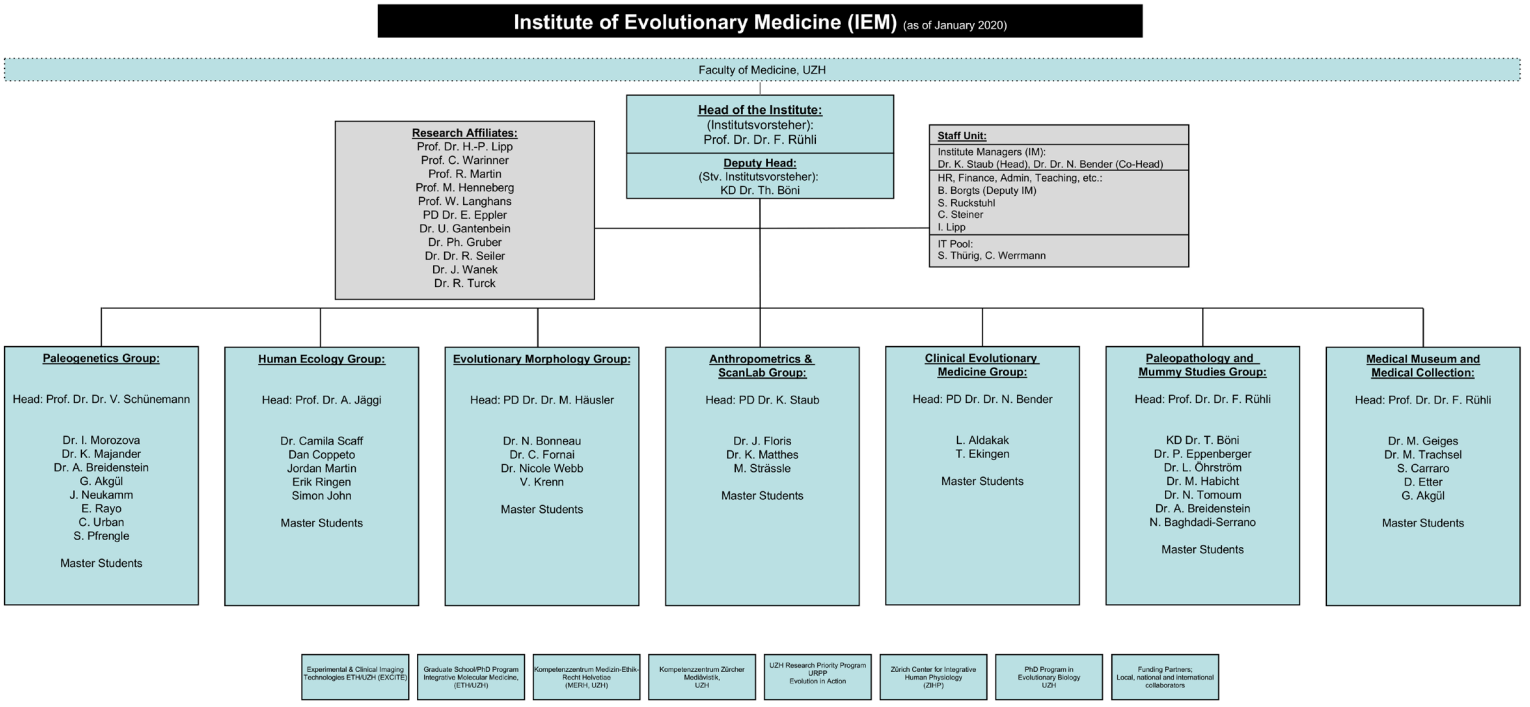
This year's conference also offered vast opportunities of scientific networking between Swiss and international researchers in a number of evolutionary medicine subfields. Of particular interest, the pre-conference workshop "Oxytocin and social disorders – from evolutionary theory to clinical applications" was organized by the IEM, the symposium on translational aspects involved three Swiss panel participants, and the symposium on one health featured two Swiss panel participants. One of the keynote speakers, Prof. Verena Schünemann, an IEM member, was idependently chosen by the international scientific committee to participate.

The accompanying social program offered additional opportunities to meet and network. The social program included a welcome reception, an evening Swiss chocolate event, a formal conference dinner, a farewell dinner and two guided tours including one through the city at night and one of the Wax Moulage Museum. The Medical Collection group of the IEM organized an exhibition on the eradication of diseases at the conference venue which was free to all conference delegates.

One of the sponsor partners, University of Zurich URPP Evolution in Action, organized a PhD students meet and greet between local PhD students and international PhD students that were participating in the congress. This activity took place during the Swiss Chocolate event and all PhD students were invited to participate free of charge to encourage them to socialize and to have a scientific exchange in a relaxed environment.

Nicole Bender, PD MD, PhD

IEM organigram



Vision and mission statement

We are a leading international and globally connected research, teaching and service institute which is part of the medical faculty at the University of Zurich. We analyse ancient biological material and associated data to better understand modern human health issues and diseases. Due to specialist scientific expertise, excellent infrastructure and state-of-the-art methodologies, we are able to work on various interdisciplinary research questions in the context of the field of Evolutionary Medicine. Our core competencies include:

• In the area of morphology: Clinical Anatomy; Variability and adaptation of body morphology as a function of sex, robustness, time (Microevolution), socio-economic factors (etc.); Macroevolution of joint pathologies.

• In the area of imaging: application of modern imaging techniques (MRI, terahertz) on historical tissues; Radiological diagnosis of pathologies.

• In the area of ancient DNA: Co-evolution of diseases and the human genome (evolution of human pathogens, microbiome analyses etc.).

• Maintaining the historic Medical Collection for both scientific research and inter-museal exchange.

• Ethical considerations for research on historical human tissues.

We will increase the recognition of the research field of Evolutionary Medicine and expand academic teaching of the subject within and outside the Faculty of Medicine. This will be of a sustainable value for our stakeholders at the University of Zurich, in the research community of evolutionary medicine and adjacent areas, to the economy and ultimately for society in general.

Words from an international collaborator

Jonathan Stieglitz, Assist. Prof., Ph.D.
Institute for Advanced Study in Toulouse,
and Université Toulouse 1 Capitole

I work on the Tsimane Health and Life History Project (THLHP), jointly with IEM Prof. Adrian Jäggi. The THLHP is an integrated bio-behavioral study of the human life course, focusing primarily on age-related change in health, resource use, sociality and cognition in a population representative sample of ~9,000 individuals. Some examples of ongoing Tsimane projects that I am involved with include: mechanisms underlying wealth-health gradients (led by Prof. Jäggi), effects of schooling on children's cognitive performance, trade-offs between children's growth and immune responses, and maternal immunological changes during pregnancy and lactation.

Two ongoing Tsimane projects that I wish to highlight involve factors affecting: 1) language acquisition and proficiency among children; and 2) skeletal robusticity over the life course. Regarding language acquisition, a former PhD student (Camila Scaff, now an IEM post-doc) is studying whether verbal input, particularly from parents, influences children's verbal output. Camila's work utilizes speech labeling algorithms applied to daylong audio recordings in naturalistic settings (>1,500 hours). Camila finds that Tsimane children receive very little child-directed verbal input overall (<2 min/hour), and mostly receive it from siblings rather than parents. This work is significant because Tsimane children do not appear to experience obvious linguistic deficiencies later in life, suggesting – contrary to widely held view – that large quantities of parental input are not crucial for normal language development. During her post-doc at IEM, Camila will continue pursuing this research, while also contributing to Dr. Jäggi's new, related project on Tsimane social intelligence and the development of social disorders.

Regarding Tsimane skeletal robusticity, I lead a project addressing long-standing debates in evolutionary anthropology, kinematics and epidemiology. This project will test whether greater physical activity levels lead to greater bone strength, and protect against age-related bone loss. It will also examine the extent to which bone tissue responses to habitual, physically intensive subsistence tasks are weakened by older age, female sex, energy limitation and high pathogen burden. Contrary to the hypothesis that greater physical activity promotes bone strength, our recent Tsimane studies using ultrasound and computed tomography (CT) find reduced bone strength and greater age-related strength decline among Tsimane compared to Americans. By studying both behavior and morphology in a population whose lifeways share various features with those present over much of human history, this research will improve our ability to infer prehistoric activity patterns through analyses of morphological variation in the fossil record. Given IEM's expertise in evolutionary morphology and radiology, I am currently launching new collaborative opportunities using the CT scans resulting from this project.

Words from a new member of the IEM

Nicole Webb, Ph.D
Postdoc Research Assistant
Evolutionary Morphology Group

I joined the IEM in October 2018 as a post-doc for the Swiss National Science Foundation project entitled "Birth and Human Evolution—Implications from Computer-Assisted Reconstructions and Birth Simulations" under the supervision of Martin Haeusler. This project is a fitting expansion of my PhD work, which I completed in September of 2018 through the Graduate Center (City University of New York). My dissertation work examined pelvic morphology for the purposes of reconstructing primate locomotor behavior in the fossil record, specifically bipedalism in early hominins. I combined several methodological approaches including 3D geometric morphometrics, phylogenetic comparative methods, trabecular bone analyses and finite element modeling. The collective utility of these approaches has enabled me to truly appreciate the complex functional relationships between external and internal pelvic skeletal features. Throughout my academic career I have not only embraced a diverse ensemble of methods but have also sought to integrate extensive comparative samples that encompass a disparate range of taxa including primate species that extend back to the Miocene epoch to large-bodied kangaroos from the Pleistocene. Prior to beginning my Ph.D. studies, I received my master's degree in forensic anthropology. I focused primarily on trauma analysis and pathological conditions affecting the vertebral column in both contemporary populations and in a pre-Columbian skeletal collection from Southwest Florida. The exposure to human remains afforded through my casework is responsible for cultivating my initial interest in the evolutionary underpinnings of pathologies and skeletal morphology which, combined with my previous experience with finite element analysis, eventually led me to my current position in Martin Haeusler's Evolutionary Morphology and Adaptation Group of the IEM.

Since joining the IEM, I have had the opportunity to work on australopithecine pelvic reconstructions and to incorporate them into dynamic finite element birth simulations to test scenarios that can explicate the origins of obstructed labor and the development of a human-like rotational birth mechanism. I am excited to continue my work on bipedalism, this time focusing on the evolutionary trade-offs that occur as a result of it, namely those that have important implications for birth outcomes. I am also working with the Senckenberg Museum in Frankfurt, Germany, continuing my investigation into the evolution of bipedalism in various fossil mammals.

IEM-publications (selected publications since last IEM News March/2019)

Beckmann C, Aldakak L, Eppenberger et al. (2019). Body height and waist circumference of young Swiss men as assessed by 3D laser-based photonic scans and by manual anthropometric measurements. PeerJ 7:e8095.

Moscovice L, Surbeck M, Fruth B et al. (2019). The cooperative sex: Sexual interactions among female bonobos are linked to increases in oxytocin, proximity and coalitions. Hormones and Behavior, 116:104581.

NCD-RisC (2019). Rising rural body-mass index is the main driver of the global obesity epidemic in adults. Nature, 569(7755):260-264.

Floris J, Staub K (2019). Water, sanitation and mortality in Swiss towns in the context of urban renewal in the late nineteenth century. The History of the Family, 24(2):249-276.

Floris J, Höpflinger F, Stohr C et al. (2019). Wealthier – older – taller: measuring the standard of living in Switzerland since the 19th century. Schweizerische Zeitschrift für Geschichte (Revue suisse d›histoire), 69(2):207-232.

Fuentes Artiles R, Staub K, Aldakak L et al. (2019). Mindful eating and common diet programs lower body weight similarly: Systematic review and meta-analysis. Obesity Reviews, 20(11):1619-1627.

Geber J, Tromp M, Scott A et al. (2019). Relief food subsistence revealed by microparticle and proteomic analyses of dental calculus from victims of the Great Irish Famine. PNAS, 116(39):19380-19385.

Gretzinger J, Molak M, Reiter E, et al. (2019). Large-scale mitogenomic analysis of the phylogeography of the Late Pleistocene cave bear. Scientific Reports, 9:10700.

Güsewell S, Floris J, Berlin C et al. (2019). Spatial Association of Food Sales in Supermarkets with the Mean BMI of Young Men: An Ecological Study. Nutrients, 11(3):579.

Haeusler M, Trinkaus E, Fornai C et al. (2019). Morphology, pathology and the vertebral posture of the La Chapelle-aux-Saints Neandertal. PNAS, 116(11):4923-4927.

Haeusler M, Bender N, Aldakak L et al. (2019). Musculoskeletal System. In: The Oxford Handbook of Evolutionary Medicine. Oxford: Oxford University Press, 269-299.

Haeusler M, Ruff C (2020). Pelvis. In: Hominin Postcranial Remains from Sterkfontein, South Africa, 1936–1995. Oxford: Oxford University Press, 181-201.

Haeusler M (2019). Spinal Pathologies in Fossil Hominins. In: Spinal Evolution: Morphology, Function, and Pathology of the Spine in Hominoid Evolution. Cham: Springer International Publishing, 213-245.

Krenn V, Fornai C, Wurm L, et al. (2019). Variation of 3D outer and inner crown morphology in modern human mandibular premolars. American Journal of Physical Anthropology, 169(4):646-663.

Martin J, Staes N, Weiss A et al. (2019). Facial width-to-height ratio is associated with agonistic and affiliative dominance in bonobos (Pan paniscus). Biology Letters, 15(8):20190232.

Meyer S, Galassi F, Böni T et al. (2019). Mummified proportionate dwarfs from the Valley of the Kings. The Lancet. Diabetes & Endocrinology, 7(3):173-174.

Minocher R, Duda P, Jaeggi A (2019). Explaining marriage patterns in a globally representative sample through socio-ecology and population history: A Bayesian phylogenetic analysis using a new supertree. Evolution and Human Behavior, 40(2):176-187.

Översti S, Majander K, Salmela E et al. (2019). Human mitochondrial DNA lineages in Iron-Age Fennoscandia suggest incipient admixture and eastern introduction of farming-related maternal ancestry. Scientific Reports, 9:16883.

Radini A, Tromp M, Beach A et al. (2019). Medieval women›s early involvement in manuscript production suggested by lapis lazuli identification in dental calculus. Science Advances, 5(1):eaau7126.

Ringen E, Duda P, Jaeggi A (2019). The evolution of daily food sharing: A Bayesian phylogenetic analysis. Evolution and Human Behavior, 40(4):375-384.

Seiler R, Öhrström L, Eppenberger P et al. (2019). The earliest known case of frontal sinus osteoma in man. Clinical Anatomy, 32(1):105-109.

Stübling E, Rehn A, Siebrecht T et al. (2019). Application of a robotic THz imaging system for sub-surface analysis of ancient human remains. Scientific Reports, 9(1):3390.

Stout D, Rogers M, Jaeggi A et al. (2019). Archaeology and the Origins of Human Cumulative Culture: A Case Study from the Earliest Oldowan at Gona, Ethiopia. Current Anthropology, 60(3):309-340.

Úry E, Fornai C, Weber G (2019). Accuracy of transferring analog dental casts to a virtual articulator. Journal of Prosthetic Dentistry:Epub.

Vinci L, Floris J, Koepke N et al. (2019). Have Swiss adult males and females stopped growing taller? Evidence from the population-based nutrition survey menuCH, 2014/2015. Economics and Human Biology, 33:201-210.

New IEM-members

The IEM is happy to welcome the following members to the institute:

- Kerttu Majander, PhD, Postdoc Research Assistant, Paleogenetics Group
- Saskia Pfrengle, MSc, PhD Student, Paleogenetics Group
- Camila Scaff, PhD, Postdoc Research Assistant, Human Ecology Group
- Jordan Martin, M.A., PhD Student, Human Ecology Group
- Simon John, Dr. med. student, Human Ecology Group
- Sabina Carraro, Conservator-Restorer B.A., Medical Collection
- Beatrice Borgts, Deputy Institute Manager, Finances & HR

Editorial
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