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Introducing the Department of Anthropology

The Anthropological Student Conference is organized by the Department of Anthropology at the Faculty of Science, Masaryk University located in Brno, Czech Republic. The Department offers education and training in undergraduate, graduate, and doctoral anthropology programs and conducts research activities that fall within the disciplines of Physical/Biological Anthropology, Forensic Anthropology, Social/Cultural Anthropology, and Bioarcheology. Over the past decade, the Department has attracted steady interest from applicants, and more than one hundred students are enrolled in the two programs (undergraduate, graduate) each year. Seven students are currently enrolled in the doctoral study program.

The Department is a small-sized unit and the least numerous department at the faculty in terms of total headcount. Despite its size, the Department has a long tradition at the university. Inaugurated in the academic year 1923/1924, shortly after the foundation of Masaryk University in 1919, it represents one of the founding units of the Faculty of Science. The Department was founded by Vojtěch Suk, a renowned anthropologist with degrees in medicine and arts, who graciously accepted the task of establishing a new teaching and research unit. The first academic year began with four courses: Human Somatology, Selected Chapters in Primate Comparative Anatomy, Origins of Man and Humankind, and Development of Schoolchildren. However, as is well known, Professor Suk's activities went beyond teaching and research duties at his home university. A passionate explorer, he undertook numerous expeditions throughout Europe, North America, and North Africa. The photographs and objects collected during his travels have become invaluable components of the department's archives. He was also in close professional and personal contact with Dr. Aleš Hrdlička, an acclaimed physical anthropologist and equally enthusiastic traveler. These diverse activities have been imprinted in the foundations of the Department as an institution that studies humans in the full range of their activities.

During the World War II and the Nazi protectorate, the activities of the department came to a halt, and towards the end, the building was hit in a bombing raid that destroyed most of the inventory. After the war, Suk and his colleagues returned to rebuild the department from scratch. In the post-war era, Suk's former colleague Jindřich Valšík succeeded him as head of the department. Under his leadership, the department flourished and carried out several unique anthropological research projects, including the scientific study of Greek children resettled in what was then Czechoslovakia after the Greek Civil War, Lusatian Sorbs, and other specific ethnic groups. However, the subsequent period after the communist coup d'état of 1948 brought this development to a halt and in turn led to the almost complete destruction of the department.

The department was re-established in its present form in 1993 after a long period of weakening and staff shortages during the Communist era (1949-1989) and as a result of the lifelong efforts of the late Jan Beneš. Prof. Beneš, an established biological anthropologist and academic with extensive social activities, invited a diverse range of colleagues to join him as collaborators (including Jaroslav Malina, Vladimír Novotný, Josef Unger among others), who were further instrumental in introducing cultural, social, and behavioral aspects of anthropology. This concept adopted Suk's tradition of interdisciplinarity and synergy between natural sciences and humanities.

After the death of Jan Beneš in 1999, the following 2000s were characterized by an increase in research activities, the development of international cooperation, and extensive social-cultural activities, first with Jaroslav Malina and then with Jiří Svoboda as appointed department heads. Funded by an EU grant (FITEAMP), these activities led to important accomplishments, including expeditions to the Awash region, to the banks of the Blue Nile, and to the Galili site in Afar.

Today, the department's staff consists mainly of faculty members, joined by a small number of junior researchers who are still at the very beginning of their careers. Since 2019, the Department has been led by Petra Urbanová, who was appointed the first female Head of the Department in its history. Under her management, the Department has focused on transforming itself into a progressive, multicultural unit with an international staff. Of the 15 teaching and research core staff members, four are not of Czech origin, and three of them are English speakers only.

The Department of Anthropology embodies both teaching and research strategies in approximately equal measure. The concept of research activities follows a vision of anthropology as the study of the relationships between human biological roots and cultural adaptations. The department follows current, progressive trends in anthropology while remaining true to the tradition that has shaped it since its founding days. In keeping with the concept of anthropology as the science of humans and for humans, the Department balances research activities in basic and applied research. Ultimately, the department covers the responsibilities arising from the status of the Faculty of Science as a certified forensic institute (field of Criminalistics – Anthropology) and is a sought-after expert unit in the field of forensic image identification.

Fig. 1. Vojtěch Suk, the founder of the Department, examines a young child on his expedition to Labrador (top left), a group of Labrador residents (bottom left), the Labrador coastline (right).

In the recent years, the department's research strategy has crystallized into four major research topics, which follow traditional anthropological interests and seek to answer the questions of "who we are, where we come from, and where we are headed". The department blends these interests with a variety of advanced technological and analytical innovations such as 3D technologies, image analysis, PC-aided big data processing, and virtual modelling.

1) Mankind and the Environment in the Past

In the research topic "Mankind and the Environment in the Past" the Department focuses on studies of human skeletal remains and burial practices, evolutionary aspects of human variations, and interactions between past human populations and their living conditions. These studies shed light on the life and death of our ancestors, their appearance, form, and demographic profile, which includes sex, height, age at death, and population affinity, as well as the structure of their society and contact with other populations.

Our attention is on developing sound, research-based methods for skeletal anthropology and bioarcheology. Here, we recognize that modern trends include advanced 3D digital methods of on-site and laboratory documentation, molecular-genetic, proteomic, and isotopic assessment of skeletal remains. In addition, the interactions between skeletal and dental remains as proxies for human biology and a variety of extrinsic and intrinsic factors are considered essential in understanding our past. These include living environment, hygiene or dietary habits (through the study of intestinal parasites), migration patterns, dietary composition (stable isotopes), or exposure to steroid hormones (prenatal and postnatal skeletal and dental morphogenesis and tissue modifications). Our new ambition is to include stable isotope assessment in conjunction with an open-science isotope database – IsoArcH.

Studies of microevolutionary trends are grounded in the departmental fieldwork and the work of close collaborators. In terms of geo-temporal embedding, current research focuses primarily on the study of the physical appearance, lifestyle, and traditions of the South Moravian Hutterites, an Anabaptist (Protestant) ethno-religious group that sought and found refuge from Catholic oppression in the South Moravian region in the 1500s. The Department benefits largely from data (skeletal and environmental) collected at the Přibice burial site, which has been excavated and processed by the Department over the past four years.

Fig. 2. IsoArcH - open-science isotope database, excavations at the Přibice burial site, aerial on-site documentation using drones, 3D model mapping the excavated area (top left to bottom right).

2) Mankind and the Environment in the Modern Era

The studies of contemporary human variations are ones of the traditional topics of biological and physical anthropology. Our environment is constantly undergoing significant changes that affect human biology. Research at the Department focuses on microevolutionary trends and relationships between the modern environment and human body form and composition, and on the origins of health and disease (DOHaD) in Central European populations. Special attention is paid to the relationship between body fat and changes in its distribution and diseases that are now considered major social phenomena (obesity, metabolic and cardiovascular diseases). In addition, the effects of stress on the body at different stages of development are studied. This includes the influence of extrinsic and intrinsic factors on sexual maturation, human sexuality, and the timing of reproduction.

Along with the population studies, research activities are aimed at development and growth of individuals (individual life history data) to conduct growth assessment and develop growth prediction methods (including mathematical modelling). The Department houses large datasets on somatic growth and development, bone maturation, and environmental agents from several longitudinal and cross-sectional studies conducted in Central Europe in the 1900s and 2000s, e.g., the Brno Growth Study (BGS). Other datasets (reference or comparative) come from numerous collaborative projects (international and national).

This line of research falls equally on the side of the basic and the applied research. As one of the most important outcomes, the team has developed a SW application for an assessment of children's' height, weight and body mass index (BMI) growth based on individual growth models, available for family physicians and other practitioners.

A novel emerging, albeit perspective, subtopic which resonates with the deep-rooted topics of Mankind and the Environment at the Department is Environmental Anthropology. The topic examines the human-environment interactions through the lens and methodology of social and cultural anthropology and ethnography. The topic includes studies of interactions that link humans in their biosocial environment to various issues such as human-environment interactions, cultural views of the environment and forms of environmental experience in different societies, the political environment, and the complexity of these interactions in light of the ecological crisis. Currently, the topic is intertwined with the research activities focused on indigenous groups in the Amazon (e.g., Mebengokré tribe), which aim to discuss current teleological

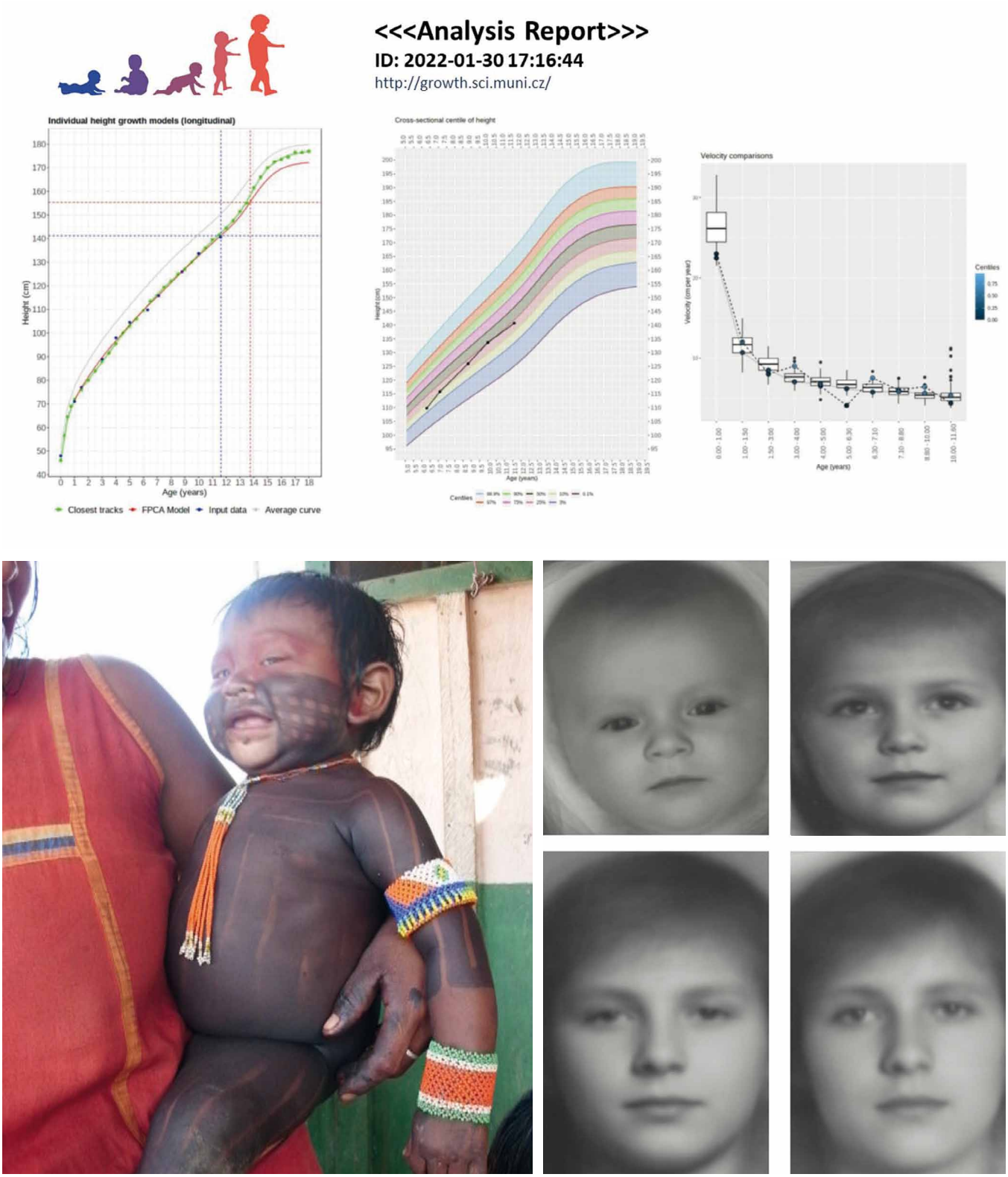

Fig. 3. Growth predictive methods (top), a Mebengokré child (bottom left), averaged participants of the Brno Growth Study.

approaches to ecosystems in biology and ecology and to establish a dialogue with indigenous experiences of ecosystem self-organization. Central to this is a discussion of the possibilities of an intercultural science that promotes more integrative approaches to both knowledge production and dissemination and environmental protection.

Fig. 4. Multi-camera photogrammetry system (top left), a human skull examined using a CT unit (top right), virtual reality workspace for assembling fragmented skeletal remains (bottom).

3) Virtual Anthropology

The Department has had a long-standing interest in diverse scientific topics which intertwine with the use of advanced, mostly imaging and PC-aided, technologies (MRI, CT, virtual reality, 3D scanning, photogrammetry, etc.). Emphasis is placed on the benefits derived from the non-invasiveness and non-destructiveness of these approaches. Overall, the traditional research topics related to human variations in the living and skeletal remains are explored. These include complex studies of human remains (skeletal, mummified) of historically important figures and other valuable finds (e.g., Jobst of Moravia, Franz von der Trenck).

The state-of-the-art, non-invasive digital techniques being developed at the Department benefit primarily from being image-based and therefore respecting the integrity of bodies and artifacts, cultural traditions, and religious beliefs, as well as contributing to cultural inclusion by being accessible online. To this end, the Department has provided in-demand services in the production of digital replicas of museum items and digital exhibition displays (e.g., virtual facial reconstructions).

In addition, human skeletal, dental and body morphogenesis is being extensively researched using 3D digital technologies. A particular focus is on facial morphogenesis, where studies of facial variation (including normal and abnormal facial morphogenesis, sexual dimorphism, and variation due to facial expressions) are conducted in conjunction with the FIDEN-

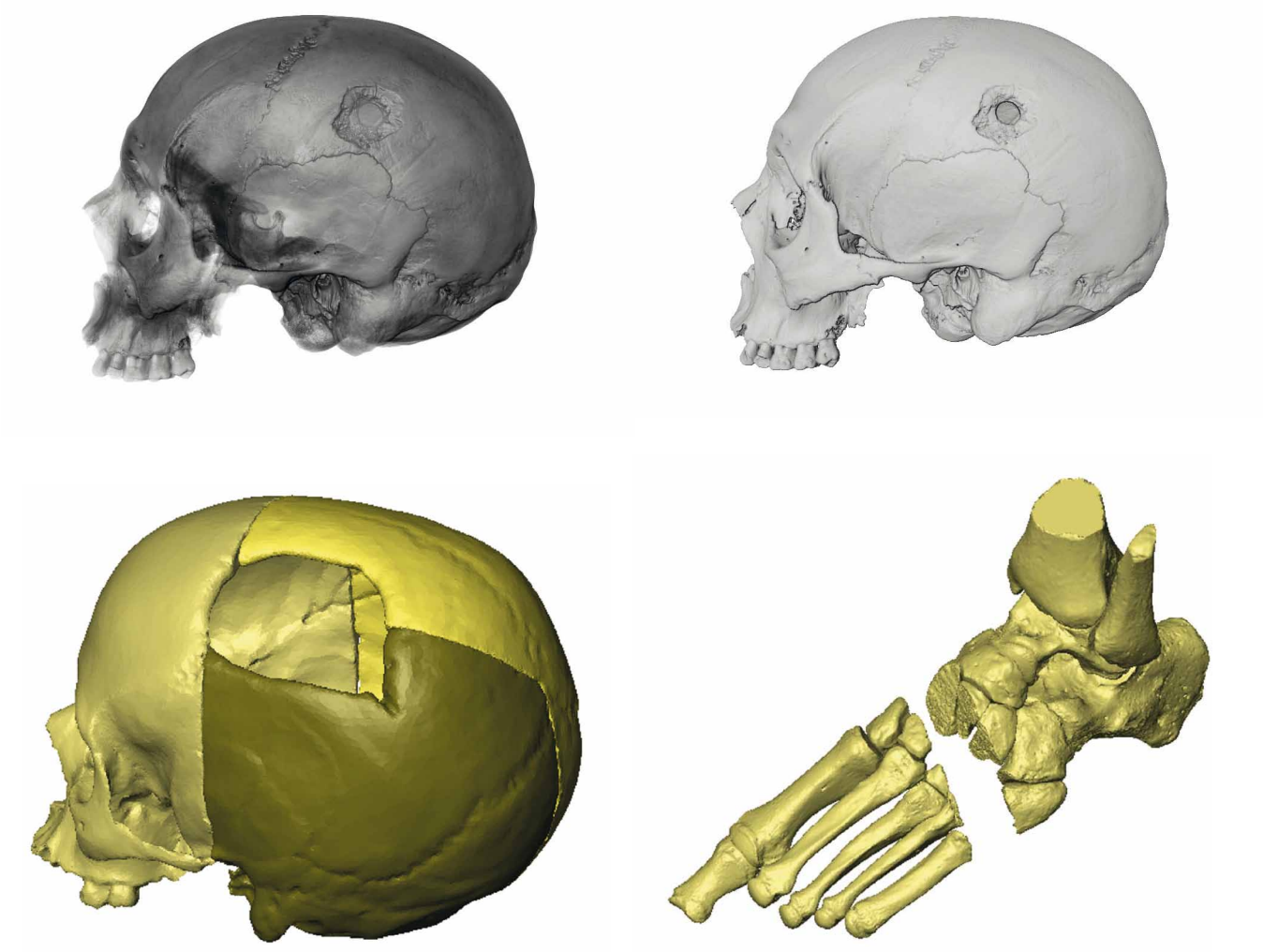

Fig. 5. PC-assisted examination of forensic trauma cases: gunshot wound (top) and saw-cut injuries (bottom).

TIS database. FIDENTIS 3D FACE DATABASE (F3D-FD) is one of the world's largest databases of 3D faces. It serves as a reference dataset for normal-range facial variations in Central Europe and has helped to improve our knowledge of facial and auricular features and their interplay with ancestral, environmental, socioeconomic, and demographic predispositions, ultimately helping us to answer the age-old question of "why we look the way we do." The topic has been researched in collaboration with a number of stomatological clinics, in particular the Department of Stomatology, Charles University in Prague and Motol University Hospital, as well as with partners from abroad (University of São Paulo, Federal University of São Paulo).

Lastly, during the COVID -19 pandemic, the Department participated in the global challenge to stop the spread of COVID -19 by answering the call to step in creatively and develop tools and resources to help those fighting the coronavirus. Using our large dataset of 3D virtual faces, our team helped in designing 3D printable masks and half-masks, and developed size categories of half-masks for subadults and adults. These personal protective equipment efforts have continued into post-pandemic era. Supported by the Security Research Grant from the Ministry of the Interior the team is currently developing a web-based application for full-body population data – A.D.A.P.T. – Anthropological DAtabase of Body ProporTions, which will aid professionals in the development, optimization, and production of personal protective equipment (e.g., respirators, protective shields or protective overalls for front-line workers) specifically designed for the Czech population.

4) Forensics-oriented Research

Research in forensics, security, and safety has traditionally been a top priority of the Department. Activities have consistently focused on applied research and experimental development applicable to criminal and legal investigations in the areas of personal identification - both living and deceased, skeletal traumatology, and crime scene investigation.

Fig. 6. The Department's educational efforts aimed at the youngest generations in the form of learning activities, science shows, and student projects.

Research is conducted primarily by the Laboratory of Morphology and Forensic Anthropology (LaMorFA). LaMorFA is recognized as a leading forensic anthropology laboratory in the country and, among other things, serves as a sought-after training center for forensic specialists (including law-enforcement officers). The Laboratory leverages this close relationship with forensic casework to develop forensic methods and techniques using advanced analytical and statistical approaches and to introduce technological innovations into routine forensic work. The lab is a state-of-the-art research facility equipped with cutting-edge technologies such as a full-body photogrammetry station (developed by the team as a functional prototype) and multiple optical scanners - facial, half-body, and handheld - human-computer interaction devices and 3D printers. It is also equipped with software licenses for surface and volume 3D image processing.

The research topic covers the increasingly important issues of personal identification through imaging technologies (CCTV, surveillance cameras, mug shots, photography in the wild). This branch of research relies on a large biometric database of 3D facial scans (FIDENTIS DATABASE - F3D-FD) which supports the development in the field of face recognition by providing access to large-scale quantitative data and on in-house software tools for processing 3D meshes – FIDENTIS Analyst, developed in collaboration with the Faculty of Informatics (Department of Visual Computing and Department of Computer Systems and Communications). In addition, issues related to forensic skeletal trauma have been extensively researched, with a focus on gunshot wounds, blunt force injuries and skeletal fracturing (e.g., laryngohyoid fractures due to force to the neck). A very innovative contribution has been microCT-based studies addressing microtraumas of sandwich-like cranial bones due to high-velocity impacts (e.g., gunshot injuries).

These four research topics have generated a variety of results with societal relevance that, among other things, help promote the Department and our scientific endeavors in general. In addition, the staff have been very active in promoting and disseminating the science by producing results of social benefit in areas such as cultural heritage preservation, regional development, health protection, etc. We have created a wide network of close public sector partners - from museums to cultural heritage institutes to regional non-profits, the church,

and religious organizations with whom staff have organized museum expositions, presentations, Q&A sessions, etc. Important are also our educational efforts aimed at the youngest generations in form of learning activities, science shows, student projects etc.

The society-oriented efforts extend abroad. For instance, the temporary exhibition entitled "Baron Trenck: The New Face of the Legend," which was held at Špilberk Castle in 2019 in cooperation with the Brno City Museum, has since been shown in several museums throughout Europe. Recently, we continued this tradition by initiating a collaboration with the Ethnographic Collection of the Centro Studi Americanistici in Perugia, Italy, where thousands of Native American artifacts are housed.

Last but not least, the Department publishes its own peer-reviewed journal – Anthropologia Integra, which offers students and young scholars the opportunity to publish their scientific texts. In the form of this special issue, the journal also offers this opportunity to the authors of selected papers presented at the conference.