

The Role of Culture in Early Expansions of Humans (Frankfurt and Tübingen)

The objective of the project “The Role of Culture in Early Expansions of Humans” is to answer the question of when, where and in which form the interplay of changing climatic conditions, biological evolution and cultural development allowed the genus *Homo* to move beyond the behavioral niche of a large African ape and develop culturally defined niches outside of Africa. These niches are notably characterized by a wide spectrum of material and cognitive innovations. The goal of the research center is to identify the spatial and temporal patterns of migration in Africa and Eurasia and to reconstruct possible causes of early human expansions between three million years ago and the last glacial maximum 20,000 years ago. Through the investigation of early migrations in Africa and the subsequent settlement of first subtropical, then warm temperate, and finally cold temperate to polar regions of Eurasia, the project will follow the transformation of the human species from its biologically determined nature to a culturally driven organism. The history of human expansions opens up new perspectives on the temporal and spatial dimensions of the increasing independence of the genus *Homo* from its purely biological limitations.

Members of the Scientific Commission: Karl Fuchs, Lothar Ledderose, Joseph Maran, Ekkehard Ramm, Volker Sellin (Chairman), Prof. Dr. Ofer Bar-Yosef (Cambridge/Mass.), Prof. Dr. Manfred Ehlers (Osnabrück), Prof. Dr. Bernhard Eitel (Heidelberg), Prof. Dr. Wulf Schiefenhövel (Andechs), Prof. Dr. Mark Stoneking (Leipzig) and Prof. Dr. Elisabeth Vrba (New Haven).

Principal Investigators: Prof. Dr. Volker Mosbrugger, Prof. Dr. Friedemann Schrenk (Frankfurt), Prof. Nicholas Conard Ph.D. (Tübingen) and Prof. Dr. Volker Hochschild (Tübingen).

Staff Members of the Research Center: Dorothee Bauer (Frankfurt), Knut Bretzke, M.A. (Frankfurt), Dr. Angela Bruch (Frankfurt), Priv.-Doz. Dr. Miriam Haidle (Frankfurt, Projekt coordination), Dr. Christine Hertler (Frankfurt), Rebekka Volmer (Frankfurt), Priv.-Doz. Dr. Michael Bolus (Tübingen), Dipl.-Inf. Zara Kanaeva (Tübingen), Dr. Andrew Kandel (Tübingen), Maria Malina (Tübingen) and Dr. Michael Märker (Tübingen).

The first year of the research center was devoted to several important tasks related to establishing a working infrastructure at both the Senckenberg Museum and the University of Tübingen. These activities focused on developing the framework for hardware and software and bringing the system online; creating working drafts of the database that will serve as the foundation of data management; forging and maintaining contacts with cooperation partners; participating in important international congresses and symposia; publicizing the project through lectures; evaluating find materials in museums; and finally, conducting field work. The Inaugural Workshop took place in Heidelberg on 21-22 February 2008. Here,

the research team composed of the Principal Investigators and Staff Members introduced the intended goals and interdisciplinary nature of the research center to the Scientific Commission, to selected local and international scientists, and to potential cooperation partners. Accompanied by commentary from invited speakers, the lectures held by the research group led to enlightening discussion. Over the course of 2008, the research team prepared brochures in German and English and set up its home page: www.roceeh.net.

ROCEEH Out-of-Africa Database (ROAD)

To initiate the construction of ROAD at the end of May, Zara Kanaeva organized a two-day introduction to the basic structure of the database for the research team, including Entity Relationship Modeling, MySQL Workbench and WebGIS connections. In early June, Michael Märker held a two-day seminar about Geographic Information Systems (GIS). During the rest of 2008, the research team attended monthly meetings to discuss the further structure and characteristics of the temporal and spatial geoarchaeological database that would serve as the foundation for its future research. Geographical aspects played an especially important role. Basic materials for the focus region of Africa were collected (bathymetry, ASTER, LANDSAT, SRTM data, aerial photographs) and analyzed with the help of GIS tools. After the derivation of additional topographical data, these datasets were integrated into the database. The first prototype of ROAD was loaded with archaeological datasets to test its functionality. At the end of the year, the structure of the database incorporated metadata that included find sites, geographical information and literature, as well as entities for vegetation and climatic history, faunal and hominid data and archaeological-cultural information, such as raw material utilization, technology, functional analysis and cognitive background. In 2009 Zara Kanaeva will give the database a user-friendly structure and begin a test run for South Africa.

Field Work and Data Collection

In its first year, the research team gathered data from museums, reviewed collections and conducted field work, activities which were enabled through the research team's existing contacts. Interaction between the projects members was greatly enhanced by cooperative efforts during their various activities in the field. From January until the end of March, Andrew Kandel completed the analysis of inventories of archaeological finds from the sites of Geelbek and Anyskop which were stored in the Iziko South African Museum in Cape Town with support from Nicholas Conard for two weeks. Up through April, Maria Malina digitalized the profiles from the site of Hohle Fels and analyzed them using GoCAD. In early May she oversaw the excavation work at Vogelherd. For four weeks in June, Angela Bruch conducted botanical field work in the Caucasus within the framework of the Volkswagen Foundation project, "The

environment of early humans in Armenia—climate and vegetation reconstruction of the early Pliocene.” There, she was joined by Andrew Kandel, who joined her to initiate a new archaeological research program. Together they used the time in Armenia to prospect for new botanical and archaeological sites. Additionally Angela Bruch collected pollen samples from areas beyond her core study region in Armenia, solidifying contact with scientists in the Georgian Republic and organizing a one-day workshop in Yerevan. Mario Damolin, a freelance journalist allied with the *Frankfurter Allgemeine Zeitung*, covered the field work in Armenia in depth, as did a film crew from Armenia’s TV5. Angela Bruch also dedicated herself to compiling data and evaluating the Plio-Pleistocene flora of Italy. This work was part of the VIGONI Project, “Pliocene-Pleistocene climatic trends on a latitudinal gradient from NW Germany to Central Italy” with her colleagues Dr. Adele Bertini of Florence and Dr. Edoardo Martinetto of Turin. In July, Friedemann Schrenk, Christine Hertler, Angela Bruch and Prof. Dr. Heinrich Thiemeyer of the University of Frankfurt conducted 14 days of field work in the area surrounding the archaeological and hominin site of Makuyuni, Tanzania, during which they conducted site survey and collected pollen samples. In Tanzania, the team members met with local researchers and future cooperation partners. The field work in Armenia, Tanzania and Syria was documented by the photographer Alexander Gonschior.

Starting in August Maria Malina supervised 8 weeks of excavation campaigns at Hohle Fels near Schelklingen, which she continued to analyze and organize through the end of the year. Additionally, she oversaw the water screening and sorting program for the material from Vogelherd. With a stipend from Naturalis, Leiden (The Netherlands), Christine Hertler conducted research on the specialized Pleistocene finds if Indonesia housed in its Dubois Collection for three weeks in September. From the middle of September through the middle of October, Nicholas Conard, Andrew Kandel and Knut Bretzke spent five weeks in Syria in order to expand their regional survey and continue excavations at Wadi Mushkuna Rockshelter. Also in September Michael Bolus spent two weeks examining archaeological materials from the early Aurignacian site of Reclau Viver at the Museu Arqueològic Comarcal de Banyoles in Catalonia. He also conducted material studies on the assemblages from Arbreda, Bora Gran and Banyoles. Additionally, he concentrated on the analysis of Aurignacian finds from Geissenklösterle during the second half of 2008. Together with Charles Sanaane of the University of Dar es Salaam, Christine Hertler traveled to Arusha, Tanzania for a week in October to prepare for the planned field school in the summer of 2009. Together with Renekka Volmer, she dedicated the last part of the year to the analysis of finds from the Makuyuni collections housed in Frankfurt. Angela Bruch took a three-week trip to China in October within the framework of the project “Sino-German Joint Group of Paleontology and Geosciences” at the newly founded Paleontological Museum of Liaoning in Shenyang, the Jilin University in Changchun, and the German-Chinese Center for Scientific Advancement in Beijing. Dorothee Bauer prepared pollen samples from Armenia, Georgia, Tanzania, Uganda and Iran.

Publications

In 2008 the project team published a total of 20 research papers in which the research center played a significant role:

Conard, N. J. & Bolus, M. 2008. Radiocarbon dating the late Middle Paleolithic and the Aurignacian of the Swabian Jura. *Journal of Human Evolution* 55/5, 886-897.

Conard, N.J. & Malina, M. 2008. Die Ausgrabung 2007 im Hohle Fels bei Schelklingen, Alb-Donau-Kreis, und neue Einblicke in die Anfänge des Jungpaläolithikums. *Archäologische Ausgrabungen Baden-Württemberg* 2007, 17-20.

Conard, N.J. & Malina, M. 2008. New Evidence for the Origins of Music from Caves of the Swabian Jura. In A. A. Both, R. Eichmann, E. Hickmann, L.-CH. Koch (Eds.) *Orient-Archäologie Band 22. Studien zur Musikarchäologie VI. Herausforderungen und Ziele der Musikarchäologie*, 13-22.

Conard, N.J., Malina, M. & Masri, M. 2008. The 2007 Excavation at Wadi Mushkuna Rockshelter, Damascus Province, Syria. *Chroniques Archéologiques Syriennes*.

Conard, N.J., Malina, M. & Miller, C.E. 2008. Die Fortsetzung der Nachgrabung am Vogelherd bei Niederstotzingen-Stetten ob Lontal, Kreis Heidenheim. *Archäologische Ausgrabungen Baden-Württemberg* 2007, 21-24.

Conard, N.J., Walker, S.J., & Kandel, A.W. 2008. How heating and cooling and wetting and drying can destroy dense faunal elements and lead to differential preservation. *Palaeogeography, Palaeoclimatology, Palaeoecology* 266, 236-245.

Fuchs, M., Kandel, A.W., Conard, N.J., Walker, S.J., & Felix-Henningsen, P. 2008. Geoarchaeological and chronostratigraphical investigations of open-air sites in the Geelbek Dunes, South Africa. *Geoarchaeology* 23, 425-449.

Grimm, R., Behrens, T., Märker, M. & Elsenbeer, H. 2008. Soil organic carbon concentrations and stocks on Barro Colorado Island – Digital Soil Mapping using Random Forest analysis. *Geoderma* 146/1-2, 102-113.

Haidle, M. N. 2008. The role of culture in early expansions of humans – A new research center. In P. Kukla & R. Littke (Eds.) *Geo2008 – Resources and Risks in the Earth System. International Conference and 106th annual meeting of the Deutsche Gesellschaft für Geowissenschaften e. V. (DGG) and 98th annual meeting of the Geologische Vereinigung e.V. (GV) September 29 - October 2, 2008, Aachen,*

Germany. Kurzfassungen der Vorträge und Poster. Schriftenreihe der Deutschen Gesellschaft für Geowissenschaften SDGG 60, 167.

Haidle, M. N. mit Kritiken von B. Baldus, T. Bargatzky, A. Bender, O. Breidbach, D. Brock, L. Fiedler, U. Frey, M. Herrgen & W. Henke, M. Kronfeldner, U. Krull, R. Löther, H.-J. Niedenzu, R. Oerter, H. Peter-Röcher, H. Prior, P. Schauer, T. Schauer, T. Sukopp, N. Thais Uomini, J. Wettlaufer 2008. Kognitive und Kulturelle Evolution. Erwägen – Wissen – Ethik 19/2, 149-209.

Haidle, M. N. 2008. Verschiedene Welten. Umweltwahrnehmung und Umweltgestaltung im Laufe der menschlichen Evolution. In T. Knopf (Ed.) Umweltverhalten in Geschichte und Gegenwart. Vergleichende Ansätze. Attempto, Tübingen, 30-41.

Hardy, B. L., Bolus, M. & Conard, N. J. 2008. Hammer or crescent wrench? Stone-tool form and function in the Aurignacian of southwest Germany. *Journal of Human Evolution* 54/5, 648-662.

Hertler, C. 2008. Modelling food supply and demography in prehistoric human populations. In D. Hummel (Ed.) *Population Dynamics and Supply Systems*. campus, Frankfurt/Main, 73-98.

Hertler, C. 2008. Jenseits von Afrika – Expansionen früher Menschen. In Müller, H.A. (Ed.) *Evolution: Woher und Wohin?* Vandenhoeck und Ruprecht, Stuttgart, 110-129.

Hertler, C., de Vos, J. & Bautista, A. 2008. Dwarfing and gigantism. In A. M. Sémah, K. Setiagama, F. Sémah, F. Détroit, D. Grimaud-Hervé & C. Hertler (Eds.) *First Islanders – Human Origins Patrimony in Southeast Asia*. Exhibition Catalogue, 76-80. <http://www.mnhn.fr/pc/index.html> (13.10.2008).

Hertler, C. & Volmer, R. 2008. Assessing prey competition in fossil carnivore communities – a scenario for prey competition and its evolutionary consequences for tigers in Pleistocene Java. *Palaeogeography, Palaeoclimatology, Palaeoecology* 257, 67-80.

Märker, M., Angeli, L., Bottai, L., Costantini, R., Ferrari, L., Innocenti, L. & Siciliano, G. 2008. Assessment of land degradation susceptibility by scenario analysis. A case study in Southern Tuscany, Italy. *Geomorphology* 3/1-2, 120-129.

Pelacani, S., Märker, M. & Rodolfi, G. 2008. Simulation of soil erosion and deposition in a changing land use: A modelling approach to implement the support practice factor *Geomorphology* 99/1-4, 329-340.

Pinhasi, R., Gasparian, B., Wilkinson, K., Bailey, R., Bar-Oz, G., Bruch, A., Chataigner, C., Hoffmann, D., Hovsepyan, R., Nahapetyan, S., Pike, A.W.G., Schreve, D. & Stephens, M. 2008. Hovk 1 and the Middle and Upper Paleolithic of Armenia: a preliminary framework. *Journal of Human Evolution* 55/5, 803-816.

Serangeli, J. & Bolus, M. 2008. Out of Europe – The dispersal of a successful European hominin form. *Quartär* 55, 83-98.

Conferences and lectures

In addition to the Inaugural Workshop that the research center held in February, the project team participated in 17 additional conferences. In summary, the team organized 3 sessions, held 22 lectures and presented 4 posters. Furthermore, the project team introduced the project 9 times at various colloquia, lecture series and as part of Tübingen's *Studium Generale*.

- 17.1.2008 Tübingen: Vortragsreihe des Forum Scientiarum. *Vortrag Haidle*: Evolution von Kognition und Kultur.
- 11.2.2008 Tübingen: Kolloquium der Max-Planck-Institute. *Vortrag Haidle*: Problems and solutions. Tool use and cognitive complexity of animals and in human evolution.
- 19.2.2008 Frankfurt/M.: Frankfurt Institute of Advanced Studies (FIAS) der Goethe-Universität. *Vortrag Hertler*: Reconstructing hunting strategies in carnivore guilds and their evolutionary implications.
- 7.-14.3.2008 Cascais, Portugal: International Symposium of the Wenner Gren Foundation “Working Memory and the Evolution of Modern Thinking”. *Vortrag Haidle*: The development of working memory capacity: implications from animal and early human tool use.
- 7.-9.3.2008 Bad Kissingen: Arbeitskreis Wirbeltier-Paläontologie. *Vortrag Hertler*: Ökologische Determinanten von Migrationsvorgängen bei Hominiden.
- 25.-29.3.2008 Erlangen: 50. Tagung der Hugo-Obermaier-Gesellschaft. *Vortrag Serangeli, Haidle*: Kunst und Ästhetik als Spiegelbild der kulturellen und kognitiven Evolution.
- 21.-22.4.2008 Heidelberg: Inaugural Workshop der Forschungsstelle “The Role of Culture in Early Expansions of Humans”. *Vortrag Mosbrugger*: Introduction of the New Research Center “The role of culture in the early expansions of humans”. *Vortrag Haidle*: Tracing expansions –spatial, biological, cognitive, cultural. *Vortrag Schrenk*: The paleontological potential of the new research center. *Vortrag Hertler*: Competitors and resources – the impact of the habitat on dispersal potential. *Vortrag Bruch*: Reconstructing past climate and vegetation in space and time. *Vortrag Hochschild*: The geographical potential of the new research center. *Vortrag Märker*: Database and GIS – integrating biological, cultural and geographical data. *Vortrag Conard*: The archaeological

potential of the new research center. *Vortrag Kandel*: The role of culture – the African perspective. *Vortrag Bolus*: The role of culture – the Eurasian perspective.

- 24.4.2008 Frankfurt/M.: Workshop zur Vorbereitung der geplanten Forschergruppe “Reconstructing hominid biogeography and dispersal by means of modeling”. *Organisation C. Hertler, Vorträge Hertler, Bruch, Haidle*.
- 7.-11.5.2008 Basel: International Conference on the Early and Middle Paleolithic in Syria and its adjoining countries, Basel. *Vortrag Kandel* group paper: Lower and Middle Paleolithic Landuse in the Central Levant.
- 12.-16.5.2008 Siena, Italien: 37th International Symposium on Archaeometry. *Poster Scharrer, Bruch, Gabrielyan, Kircher, Bachtadse*: Early to Middle Pleistocene environment in Armenia – preliminary results of a new project.
- 13.-17.5.2008: Mannheim: 6. Deutscher Archäologiekongress. *Organisation der Sektion „Paläoanthropologie“ Burger, Haidle*
- 20.6.08 Frankfurt/Main: Seminar der Arbeitsgruppe Paläobiologie der Wirbeltiere am Institut für Ökologie, Evolution und Diversität der Goethe-Universität. *Vortrag Haidle*: Introduction of a new research center: The role of culture in early expansions of humans.
- 30.8.-5.9.2008 Bonn: Joint 12th International Palynological Congress and 8th International Organisation of Palaeobotany Conference. *Vortrag Bruch, Martinetto, Bertini*: Quantification of Pliocene-Pleistocene climate in Northern and Central Italy based on palaeofloral data. *Organisation des Symposiums “Mio-Pliocene climate and vegetation patterns in Eastern and Western Eurasia” Bruch, Li. Mitorganisation des NECLIME annual meeting 2008 und Vortrag Bruch*: Changes in Precipitation patterns in Miocene of Central Europe as a force for landscape opening? *Vortrag Martinetto, Bertini, Bruch*: Mesic vegetation during humid and “equable” warm-temperate intervals in south-European Pliocene. *Vortrag Scharrer, Bruch, Gabrielyan, Kircher, Bachtadse*: Early Pleistocene climate and vegetation change in Armenia based on pollen, leaves, fruits and seeds - the environment of early men in the Caucasus. *Poster Gabrielyan, Gasparyan, Scharrer, Bruch*: The Early Pleistocene Flora of the Darbas locality (Southern Armenia).
- 7.-11.9.2008 Frankfurt/Main: 19th Biennial Meeting of the Society of Africanist Archaeologists. *Poster Haidle, Bolus, Bruch, Hertler, Kanaeva, Kandel, Märker*: The Role of Culture in Early

- Expansions of Humans – ROCEEH: A New Research Center. *Vortrag Kandel*: The significance of coastal adaptations along the southern and western coasts of South Africa
- 16.9.2008 Leiden, Niederlande: Paläontologisches Kolloquium des Naturalis Nationaal Natuurhistorisch Museum. *Vortrag Hertler*: Biogeography and dispersal of large mammal communities in Pleistocene Java.
 - 17.9.2008 Mettmann: Symposium „Der Mensch, das kreative Wesen“ am Neanderthal-Museum. *Vortrag Haidle*: (K)Eine Selbstverständlichkeit? Kreativität im Laufe der menschlichen Evolution.
 - 20.-22.9.2008 Jena: 101. Jahrestagung der Deutschen Zoologischen Gesellschaft. *Poster Hertler, Volmer*: The assessment of guild structure and competition in Pleistocene carnivores
 - 30.9.08 Aachen: Jahrestagung der DGG/EV, S10 „Early Man and Environment“. *Vortrag Haidle*: The Role of Culture in Early Expansions of Humans – A New Research Center.
 - 29.-30.9.2008 Bari, Italien: AIGEO 2008. *Vortrag Märker, Pelacani*: Assessment of land use changes and erosion processes using remote sensing methods in Southern Basilicata. *Vortrag Pelacani, Märker*: Assessment of soil erosion and deposition processes related to precipitation and support practice
 - 17.-18.10.2008 Zürich: Tagung „Anthropologie. Der Mensch zwischen Möglichkeit und Wirklichkeit. IV Naturwissenschaftliche Perspektiven“ am Institut für Hermeneutik und Religionsphilosophie. *Vortrag Haidle*: Möglichkeiten, Wirklichkeiten und die kognitive Entwicklung von Homo.
 - 24.10.2008 Tübingen: Kolloquium des Zentrums für Naturwissenschaftliche Archäologie der Universität Tübingen. *Vortrag Haidle*: Introduction of a new research center: The role of culture in early expansions of humans.
 - 5.11.08 Göttingen: Umwelthistorisches Kolloquium des Graduiertenkollegs Interdisziplinäre Umweltgeschichte der Universität Göttingen. *Vortrag Haidle*: Verschiedene Welten. Umweltwahrnehmung und Umweltgestaltung im Lauf der menschlichen Evolution.
 - 6.11.2008 Tübingen: Vortragsreihe des Forum Scientiarum. *Vortrag Bolus*: Die Anfänge von Kunst und Musik und die Frage der kulturellen Modernität
 - 9.-14.11.2008 Damaskus, Syrien: International Colloquium on Southwestern Syria. *Vortrag Kandel*: The Paleolithic Settlement of Southwestern Syria.

- 10.-14.11.2008 Wien: Venus08 – Art and Lifestyle. *Vortrag Bolus*: Early Aurignacian, Protoaurignacian, Fumanian, Kremsian, Bachokirian: Different sides of the same coin?
- 20.11.08 Tübingen: Studium generale „Charles Darwin und seine Wirkung in Wissenschaft und Gesellschaft“ der Universität Tübingen. *Vortrag Haidle*: Darwin, Lucy und das missing link. Evolutionäre Anthropologie im 21. Jahrhundert.
- 26.-28.11.2008 Paris: Les premières expansions humaines en Eurasie à partir de l’Afrique. Facteurs limitant ou favorisant. *Vortrag Haidle, Bolus, Bruch, Hertler, Kandel, Märker*: The Role of Culture in Early Expansions of Humans – A New Research Center. *Vortrag Hertler, Mishra, Gaillard, de Vos*: India and Java: Contrasting records, intimate connections. *Vortrag Haidle, Pawlik*: Faint traces - early Lower Palaeolithic evidence in Central Europe.
- 15.-19.12.2008 San Francisco, USA: AGU fall meeting. *Vortrag Kirscher, Bachtadse, Bruch, Gabrielyan*: High Resolution Magnetostratigraphy from Plio-Pleistocene Sediments, Armenia.

Teaching

In conjunction with their own research activities, the members of the project team strive to communicate the questions and results of their research to undergraduate students and to support the qualifications of graduate candidates:

- Teaching courses at the University of Frankfurt/Main: Christine Hertler
- Teaching courses at the University of Tübingen: Michael Bolus, Angela Bruch, Miriam Haidle, Christine Hertler, Michael Märker
- Teaching courses in the framework of the International Erasmus Mundus Master’s Program “Quaternary and Prehistory”: Christine Hertler
- Supervision of Master’s, Diploma and Doctoral Theses: Michael Bolus, Angela Bruch, Miriam Haidle, Christine Hertler, Andrew Kandel and Michael Märker
- Supervision of archaeotechnical apprentices: Maria Malina