If we want to preserve our cultural heritage, we need your support.

Ulrike Wulf-Rheidt endowment fund
The basis of any safeguarding and preservation measures of past buildings is their analysis. The field of building archaeology was developed with this in mind. The Ulrike Wulf-Rheidt endowment fund is dedicated to the future of building archaeology. In remembrance of building archaeologist Prof. Dr. Ulrike Wulf-Rheidt it supports young building archaeologists.

Ulrike Wulf-Rheidt’s projects and publications have significantly influenced the field of building archaeology with regard to contents and methods. Through her work as head of the Division of Building-Archaeology at the German Archaeological Institute, as a professor at the FU Berlin and as a mentor of numerous building archaeology and cultural preservation projects in Germany and abroad she has substantially contributed to the profiling of the discipline. One of her central concerns was the promotion of young academic talents. In order to continue her work after her premature and tragic death, her parents and her husband founded the Ulrike Wulf-Rheidt endowment fund. With your donation you can support this endowment fund and thus contribute to the preservation of our cultural heritage, by investing in the future of young building archaeologists.

Additional information: www.twges.de/stiftungsfonds.html

Donations for the support of promotional actions by the Ulrike Wulf-Rheidt endowment fund can be deposited in the bank account of the Theodor-Wiegand Gesellschaft. Please state “Spende Ulrike Wulf-Rheidt Stiftungsfonds” as a payment reference. Your donations will be tax-deductible.
ARCHAEOLOGY WORLDWIDE

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THE COVER PICTURE

was taken in 2018 35 kilometres east of Trinidad, the capital of the Beni department in the north-eastern part of Bolivia. As is the case for all the routes in the region this swathe across the rainforest was laid out ramrod straight, as there was almost no relief that had to be taken into account for road construction. Only fords across the numerous rivers led to a change in direction of these straight roads.

The photo was taken on the occasion of a project carried out by the Commission for Archaeology of Non-European Cultures (KAAK), the aim of which was to study pre Hispanic settlement centres in the Bolivian Amazon region. Today these settlements have been absorbed by the rainforest. From page 57 on you can read how this could happen.

Photo: Priemers

Archeology meets high-tech

Geoinformation systems, LiDAR-scans, mass spectrometry for the analysis of ancient coins… The contributions in this volume already show the implementation of modern techniques in “every-day archaeology”.

Archaeologists use high-resolution surveying technologies not only to create three-dimensional surface models of landscape and settlement areas but also, for example, for precise planning of heritage preservation matters. The structure-from-motion procedure allows it to construct 3D models of objects, buildings and landscapes. X-ray fluorescence analysis makes it possible to analyse metal, glass and pottery in a non-invasive way. And the continuing improvement of scientific technology enables to identify so-called environmental DNA stemming from soil samples.

Inspiring possibilities, archaeology will be offered in the future. But thorough understanding of the methods and knowledge about how and where these can be implemented is still essential.

This requires collaboration with corresponding institutions and specialists.

READ MORE ABOUT THIS ISSUE IN THE NEXT VOLUME!

IN ORDER TO SAVE THE GREAT TEMPLE OF YEHA (ETHIOPIA) FROM THREATENING COLLAPSE, ARCHAEOLOGISTS MEASURED THE TEMPLE IN DETAIL USING A 3D-SCAN. A SUPPORTING STRUCTURE MADE OF STAINLESS STEEL WAS THEN VIRTUALLY INCORPORATED INTO THE BUILDING AND ADAPTED WITH MILLIMETRE PRECISION.

Photo: Schnelle
DEAR READERS,

You may be surprised to see that this magazine about archaeology is dedicated to the theme of climate change. Modern archaeology, however, examines all aspects of human life. This also includes understanding the effect that climate change has had on the environmental conditions in which people lived in the past. At the same time, early societies had already changed their environment through the exploitation of resources and the development of agricultural techniques such as farming and stock breeding. Already in Antiquity forest clearance and agriculture furthered the erosion of fertile soils by water and wind. In parallel, the change in the environment triggered the development of new agricultural techniques, for example the emergence of oasis technology on the Arabian Peninsula during the 4th millennium BC. But during Antiquity humans have also scarred the earth through the exploitation of resources. Holes and shafts attest to the mining of metals as do seemingly endless slag heaps. Half mountains were removed through quarrying and the landscape was greatly transformed. Nonetheless durable and soft types of exploitation were also practised during ancient times. Entire forests were not necessarily cut down for charcoal production. Sophisticated techniques were developed for the use of water resources. This is highlighted by the irrigation systems of early societies on the Arabian Peninsula or in present-day Jordan. The examples in this volume are designed to inspire reflection about the current use of resources and to contribute to an enhanced understanding of complex human-environment relationships.

I wish you pleasant reading,
With regards,

Prof. Dr. Dr. h. c. Friederike Fless

President of the
German Archaeological Institute

Photo: Kuckertz
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190 years of the German Archaeological Institute

Anniversary celebration on 17th May 2019

The foundation stone for the German Archaeological Institute (DAI) was laid on 21st April 1829 in Rome. So the DAI is now celebrating its 190th anniversary. Over these last 190 years this European network initially composed of savants and diplomats has developed into a globally active research institute including important research infrastructures. The anniversary is an occasion to remember the history of the institute on 17th May with a celebration colloquium in Berlin. However, this celebration event is first and foremost dedicated to the current work carried out by the departments and commissions. Reports on current research are accompanied by presentations at 16 stands. The event will be brought to a close with an official speech by the president and with the institute’s annual reception in the evening. For the DAI the 190th anniversary celebration is not only an occasion to look back on its history but also to discuss future perspectives.

Since its foundation in 1829 in Rome the DAI has aimed to study the past and to publish newly gained knowledge. Based on a European idea the institute was part of the development of national research institutions and European competitions. From a privately organised institution in Rome it developed into a public institution, which was affiliated to the Federal Foreign Office in 1874. The core of the work at the German Archaeological Institute is its international cooperation. The DAI is comprised of a worldwide network of members, cooperation partners and sponsors.

The DAI published an illustrated book showing the highlights of the institute’s history on the occasion of the institute’s anniversary.

Cover: Denkinger

LION’S PAWS,
BIRD HEAD

AND FEATHERED
WINGS …?
Anniversaries of the departments in 2019

Several “decadal anniversaries” at the DAI

190 YEARS OF THE ROME DEPARTMENT
On 21st April 1829 the “Instituto di Corrispondenza Archeologica”, the predecessor of today’s Rome Department, was founded on the Capitoline Hill. For this reason a ceremonial act took place on 30th April 2019 in collaboration with the Antiquities Authority Sovrintendenza Capitolina ai Beni Culturali and the Capitoline Museums on the Capitoline Hill, in order to look back at the institute’s 190 years of history from an international perspective. In 2019 the annual spring guided tours of the Rome Department were organised under the slogan “190 years of the German Archaeological Institute.” The staff members of the department lead public tours to archaeologically and historically significant places, in which scholars of the Rome institute have carried out research in the last 190 years.

50 YEARS OF EXCAVATION AT ELEPHANTINE (CAIRO DEPARTMENT)
Ninety years ago the Cairo Department was affiliated to the DAI. This year it also celebrates the first cut of the spade during the excavation on Elephantine 50 years ago. On 9th January 1969 archaeological excavations carried out by the Cairo Department of the DAI started on Elephantine Island at the northern end of the first cataract of the Nile near Aswan. Half a century of fieldwork in collaboration with the Swiss Institute of Architectural and Archaeological Research on Ancient Egypt in Cairo has produced a wealth of results that have fundamentally enhanced our vision of life in Ancient Egypt. On the occasion of the anniversary the international conference “Daily Life in Ancient Egyptian Settlements” takes place in March 2019 in Cairo.

90 YEARS OF THE ISTANBUL DEPARTMENT
The celebration of the centenary founding of the DAI in 1929 provided an occasion to found new departments abroad. After its foundation in 1929 the Istanbul Department was located in an annexe of the German Hospital of Istanbul for 60 years and then moved to the German Consulate General. The department celebrated its 90-year existence with a ceremonial speech held by Dr.-Ing. Katja Piesker, the scientific director of the department. On 24th October she speaks about “Krankenhaus, Konut, Konsulat: Zur Unterbringung des DAI Istanbul seit seiner Gründung 1929” at the DAI Istanbul Department.

40 YEARS OF KAAK
On the occasion of the 150th anniversary in 1979 the “Commission for General and Comparative Archaeology” (KAV), today “Commission for Archaeology of Non-European Cultures” (KAAK), was founded. This enabled the DAI to widen its perspective beyond the antique cultures of the Mediterranean to include the concept of “world archaeology.” For forty years KAAK researchers have been collaborating with local cooperation partners in numerous countries of South America, Africa, Asia and Oceania. On the occasion of the 40th anniversary a celebration will take place on 23rd May 2019 at the KAAK building in Bonn.

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THE WINCKELMANN MEDAL
was designed by the sculptor Edwin Scharff. Since 1929 it has been awarded by the DAI for special services rendered to archaeology. Photo: Wagner

THE GRIFFIN
– a hybrid creature with the body of a lion and the head of a bird of prey, which bears large wings on its back – connects the DAI with the antique world.
CLIMATE CHANGE AND HUMAN ADAPTATION

The development of the Tayma oasis in north-west Arabia

Located within desert landscapes, oases are emblematic of agricultural wealth based on the presence of water. In contrast to areas with abundant rainfall the living conditions in this case are concentrated within small favourable areas. The latest interdisciplinary research carried out by the DAI in the Tayma oasis in present-day Saudi Arabia makes it possible to understand how oases developed there and how the climate change affected life there.
Right up to the present day climate changes affecting our planet require adaptation strategies by the human communities. Climate-sensitive regions, for example the desert regions in the north-western part of the Arabian Peninsula, are particularly suitable for the exploration of complex human-environment relationships. Here, at the interface between Africa and Asia, local and regional adaptation processes that enable life in desert regions can be traced. These processes are closely linked to global climate developments.

The investigations were carried out as part of an international cooperation project by archaeologists, building archaeologists, archaeohydrologists, archaeobotanists, earth scientists and bio-geochemists. Over the past millennia the African-Arabian region was subject to abrupt climate fluctuations. Large parts of the Sahara turned into green savannah landscapes during the Early and Middle Holocene (11,500 to 5000 years ago). The following development towards a drier climate (aridification) required different adaptation strategies by humans, animals and plants. Some species died out, others survived in “retreat areas” such as oases or mountains. Humans and animals migrated to adjacent regions. In addition, humans adapted their economic system to the changing living conditions. While initial climate-related settlement-models were developed for northeast Africa, research in the Arabian desert regions is still in its infancy. The project of the DAI’s Orient Department and its cooperation partners now provides new data with regard to Holocene climate change and the settlement history of the Tayma region. This allows for filling an important research gap between Africa, the Levant and Syria, Mesopotamia, the Gulf region and South Arabia.

The oasis of Tayma offers the possibility to study the local and regional paleo-environments and its changes. Combining investigations of natural sciences and archaeology the Holocene history of Tayma, which starts at the beginning of the Holocene (about 11,500 years ago) and lasts up to the Bronze Age (over 4000 years ago), can be reconstructed.

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The continuously deposited sediments can be dated through scientific methods (14C), thus establishing an absolute chronology of the environmental history of the oasis. In addition, the plant pollen deposited in the sediments enable the reconstruction of the vegetation and its changes through time, informing about landscape transformations as well as the availability of biotic resources, such as pastures, fire- and construction materials and naturally growing crops. Thus, a direct link to humans could be established with regard to economic systems as well as effects of land use.

**THE DESERT GREENS**

11,500 years ago, the climate changed. In terms of geological eras, the long-lasting Pleistocene era, including cold and warm periods, transitioned again into an interglacial (lasting up to the present day), the Holocene. In dry regions, increasing rainfall led to a greening, more particularly in the the African Sahara and parts of the Arabian desert in which Tayma is located. During this period, characterised by increased humidity and often called the “African Humid Period” savannahs and grasslands established in the Saharo-Arabian belt. The changing environmental conditions offered possibilities to develop new economic systems in this area.

In Tayma, 9300 years ago a brackish lake emerged north of the todays oasis settlement, which over time turned into the present-day salt flat (sabkha). Scientific analyses of the lake sediments reveal a short humid phase during the period between 8500 and 8000 years ago, during which grassland expanded. These additional pasturage resources may have favoured the spread of mobile or semi-mobile groups across the region which practised pastoral economy. Increased proportions of burnt plant remains in the sediments may be indicative of more intensive human activities during this short humid phase.

Almost 8000 years ago the lake reached its maximum depth because of higher regional rainfall. The metres-thick deposits of countless snails and barnacles allow for determining the maximum lake levels. These living organisms are typical of inland lakes. Sea birds were probably responsible for their spread. Fish were not attested to in the Tayma lake.

**IT BECOMES DRY AGAIN**

After several humid centuries, the climate became dry again about 8000 years ago. The aridification of northwest Arabia started, the lake level dropped. The grassland abruptly decreased. A smaller number of burnt remains can be found in the lake sediments. This may indicate that the region surrounding Tayma was less densely settled. However, about 8000 years ago, shrubs increasingly spread again, which are highly valued as firewood and pasturage up to the present day. This regional resource thus may have compensated the effects of aridification and may have enabled human communities to remain in the region of Tayma. During the period between 8000 and 4200 years ago the vegetation in the surroundings of Tayma underwent only minor changes. As a result, the subsistence means of the nomadic pastoralists in the region remained quite constant.

**A LAKE AS AN ENVIRONMENTAL ARCHIVE**

Tayma has an exceptional environmental archive in closest proximity to the archaeologically investigated settlement remains. This is an ancient lake located north of the oasis. In the course of time it turned into a wetland before it finally became a periodically flooded salt flat (Arabic: sabkha) still present today. The climate history of Tayma is preserved in the sediments of the former lake. The continuously deposited sediments can be dated through scientific methods (14C), thus establishing an absolute chronology of the environmental history of the oasis. In addition, the plant pollen deposited in the sediments enable the reconstruction of the vegetation and its changes through time, informing about landscape transformations as well as the availability of biotic resources, such as pastures, fire- and construction materials and naturally growing crops. Thus, a direct link to humans could be established with regard to economic systems as well as effects of land use.

**PISTACHIOS**

spread during the Holocene humid phase in the Mediterranean region. In Tayma, the highest occurrences of this tree are also documented during the humid phase, together with GRASSES. ACACIAS are typical shrubs and trees of the wadis and lake shores. They are documented with invariably constant values as are the representatives of AMARANTH PLANTS, typical plants of the desert vegetation.

**GRASSES**

**ACACIAS**

**AMARANTH**

**PISTACHIOS**

**GRASSES**

**ACACIAS**

**AMARANTH**

**PISTACHIOS**

**GRASSES**

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**AMARANTH**

**PISTACHIOS**

**GRASSES**

**ACACIAS**

**AMARANTH**
CULTIVATION OF GRAPEVINE AND FRUITS

About 7000 years ago, with the palynological records of grapevine and figs, intensive cultivation for the Tayma oasis is attested: At least by that time people had started to cultivate grapevine and figs. As the limit of the natural area of distribution of wild grapevine is located at least 500 kilometres north of Tayma, natural occurrence can be excluded. Wild grapevines were used long before their domestication. Wild and domesticated grapevines cannot be differentiated by means of pollen morphology. Therefore it is not possible to decide whether we are dealing with domesticated grapevines in Tayma – but wine grapes were definitely cultivated and thus indicate the latest possible start of cultivation at the Tayma oasis.

At least 6800 years ago the then shallow lake turned into a swamp. The regular and sometimes high percentages of grapevine and figs in the pollen record make it likely that horticulture was continuously practised on the margins of the swamp area. This remained unchanged during the following 2000 years – until the introduction of the date palm.

Oasis cultivation in Tayma therefore did not start with the classical three-storey palm gardens which are described for the oases in Mesopotamia and the Gulf region, but with horticulture on the lake shores. Yet, it is unclear whether the people who harvested fruits in these places also settled there permanently.

The production of carnelian beads of industrial scale is dated to over half a millennium later, about 6000 years ago. The beads were probably manufactured at the eastern margin of the swamp area. Initial analyses of the carnelian fragments indicate that a large number of the beads came from Tayma, whereas only fragments and production waste were found on-site. As for similar cases in the region, it can be assumed that these objects were produced and distributed by mobile groups living in desert regions.

THE BRONZE AGE NECROPOLIS OF TAYMA

The archaeological record provides further insights into the history of Tayma, stretching back to the Bronze Age. The inhabitants of the oasis left traces not only during their life but also after their death. South of the oasis large cemeteries cover the area, in which inhumations dated to the transition between the 3rd and the 2nd millennium BC were identified. The grave monuments of local architectural character are part of the regional tradition of visible, above-ground monuments characterising the preceding periods, which are distributed over the entire region.

In one part of the necropolis, which includes over 8000 grave monuments, characteristic Syro-Levantine bronze weapons were discovered. These illustrate the participation of the oasis to wide-ranging networks during the Bronze Age. The large-scale trade relationships and cultural contacts, which repeatedly emerge during the history of Tayma, show that the people who lived there over 4000 years ago took part in supra-regional networks – yet 1000 years prior to the global “success story” of incense trade, which later made the region famous.
The results obtained from research carried out in the Tayma oasis will be published in the DAI’s homonymous publication series. The first volume appeared 2018 and is available online (https://publications.dainst.org/books/index.php/dai/catalog/book/61). Additional volumes are in preparation.

A COMPLEX HUMAN-ENVIRONMENT RELATIONSHIP

If we look at the occupational history of the Tayma oasis in this way, the development appears to have been quite straight-lined. However, the process is probably based on a more complex system of reciprocal dependencies. Former explanatory models related to human-environment relationships often highlighted the dependence of humans on climatic or environmental conditions, without taking into account the impact of humans and the range of actions they took. Not all human actions should be understood as adaptations to changing climate conditions. Equally, any climate change leads to a change in environmental conditions. Ecosystems are characterised by specific buffering capacities, so that resources remain available even in “difficult periods”. In addition, human actions are not exclusively based on ecological conditions; social, economic, political and religious motivations also have to be taken into account, which influenced the decisions of former cultures.

For example, the cultivation of wine grapes in the Tayma oasis is the result of supra-regionally developed, locally adapted horticulture, the distribution of which is linked to cultural factors. After the lake at Tayma dried out, the supply of water at the oasis remained stable. Archaeohydrological investigations confirmed that the water balance of the oasis remained sufficient even during dry periods because of a specific geological setting (the so-called Tayma fault). The groundwater resources guaranteed the supply to the inhabitants of the oasis as well as to the cultivated plants and the livestock. The exploitation of the oasis can be interpreted as a successful optimisation of the living conditions of prehistoric people.

Still today the Bir Haddaj, one of the largest wells known on the Arabian Peninsula, is emblematic. It was probably constructed in the first millennium BC in the centre of the ancient oasis. Future investigations on the Arabian Peninsula will primarily focus on the reconstruction of specific regional conditions and their variability. The marked diversity of landscape forms and of regional climatic differences create a need for specific adaptation strategies. They can be increasingly presented in more detail through the combination of archaeological and scientific methods.

THE BIOLIGIST MICHELE DINIES works as an archaeobotanist at the DAI and studies the vegetation history of the Tayma region based on pollen analyses.

Photo: Walter
All past cultures left traces: ancient routes and walls mark landscape; settlements and sanctuaries are distributed across the territory. All this evidence of material culture can be located on maps. Today this is no longer done using analogue maps; it is primarily done using geographic information systems (GIS). Here, for example, digitally recorded information about cultural heritage is mapped digitally.
Over the last few years the German Archaeological Institute and many cooperation partners have registered, within “Palmyra GIS” project, large amounts of data about the UNESCO-World Heritage site of Palmyra in a geographic information system (GIS). As a result, an almost complete digital mapping of existing research data, which are also available online, was created for the first time. A large quantity of data stems from research projects which were headed by the Damascus Department of the DAI and which were completed by information transmitted by numerous project partners and visitors to the ancient site. The initial comprehensive topographic map including plotted monuments by Klaus Schnädelbach played an important role in the development of “Palmyra GIS”.

“Palmyra GIS means that for the first time a digital map series including detailed geodata is available for research”, explains Benjamin Ducke, Head of Scientific Computing at the DAI. “Palmyra GIS provides the basis for the construction of three-dimensional terrain models. In the future it can build the foundation for damage mapping and systematic monitoring of archaeological sites. It could also be suitable to support later reconstruction. Furthermore, the data served as a basis for training sessions for the education of archaeologists and monument conservators. And last but not least initiatives such as “Palmyra GIS” are the bedrock for advanced international cooperation for safeguarding, preservation and mediation of the World Heritage site”, he summarises the possible applications.

The online version of “Palmyra GIS” is available via the DAI’s geodata system (“iDAI.geoserver”, see boxout). Currently the baseline data are accessible to registered users of the system. Additional data will be shared progressively.

“Palmyra GIS” is a digital information system and map series related to the UNESCO World Heritage site of Palmyra. It was developed as part of the project “Zéro Hour – A future after the crisis”, a proposal initiated by the Archaeological Heritage Network (ArchHerNet) and funded by the Federal Foreign Office.
mapped on the layers (so-called factual or attribute data) are related to database entries, which can be accessed in multiple ways and searched for specific information.

The digital geodata in “Palmyra GIS” also include detailed aerial photogrammetric surveys of the visible monuments, locations of about 500 monuments related to photos and online data sets, current satellite images and historical aerial photographs, sensor data images (magnetic field measurements) and excavation features of some areas as well as a digital terrain model created on the basis of these data.

"PALMYRA GIS" CONTAINS A MULTITUDE OF DATA LAYERS AND INTERLINKED FACTUAL AND IMAGE DATA. Here are shown building and field data from the publication by K. Schnädelbach (2010), the image produced from the magnetic survey carried out by the Department of Earth- and Environmental Sciences (LMU Munich) and photographic material from DAI archives. Screenshot: Ducke

Further information concerning “Palmyra GIS” is provided in a film by the German Archaeological Institute in German and English. It is available online: https://arachne.dainst.org/project/palmyra-gis

Numerous monuments are moreover linked to object data sets in the DAI’s central object database (IDAI/objects/Arachne). Furthermore, over 15,000 digital images of the site are registered, which are also stored in the DAI’s digital infrastructure for research data, IDAI.world.

THE 3D PRINT OF THE DIGITAL TERRAIN MODEL PROVIDES A THREEDIMENSIONAL VIEW OF THE PALMYRA SITE. Photo: Götting

SYRIAN HERITAGE ARCHIVE PROJECT

“Palmyra GIS” was developed on the basis of Syrian Heritage Archive Project (SHAP). This project, which aims to build a digital register of heritage monuments, is carried out concomitantly by the DAI and the Museum of Islamic Art Berlin (MIK). Both institutions have, thanks to many years of research activity, large databases related to Syrian cultural heritage. In addition, there are historical photographic data dated to the time prior and subsequent to WWII, which show landscapes and monuments without modern transformation. The data collection is completed by significant private legacies from scholars and by images taken by travellers, who made their photographs available.

These days a temporary exhibition at the Museum of Islamic Art Berlin provides insights into the work of “Syrian Heritage Archive Project”. Photographs, films, reports and maps invite visitors to the exhibition “Cultural Landscape Syria – Preservation and Archiving in Times of War” to take an exploration trip through the rich cultural variety of Syria.


The joint Syrian Heritage Archive Project (SHAP) digitises analogue data in order to make these data available for cultural heritage preservation and reconstruction after the crisis in Syria. For this purpose German-Syrian teams in Berlin compile large amounts of research data. These are processed and managed in a standardised manner – and are therefore durably preserved and made accessible. The project is funded as part of a cultural preservation programme by the Federal Foreign Office. https://arachne.dainst.org/project/syrher www.archenet.org/2019/03/06/shap-das-syrian-heritage-archive-project/
Climate change

“...a single night of torrential rain stripped the acropolis of its soil and reduced it to bare limestone.” With these words the Greek philosopher Plato in the 4th century BC describes a torrential rain event followed by a landslide in Athens. In the same work Plato reports on other transformations of the landscape at that time: “But in that age our land was undiminished and had high hills with soil upon them; what we now call the ‘rocky barrens’ were covered with deep rich soil. And in the mountains there were dense forests of which there still survives clear evidence.” Plato thus observed the transformations of his environment. But obviously he did not notice the causal relationship between forest clearance, soil erosion and landslide. How human activities transformed the environment during and since Antiquity is today analysed by cooperative multidisciplinary research. In this respect development is not always a straight line. Currently, reforestation is dominant in many regions of Greece. In addition only a few herders with their sheep and goats graze the brushes. This was not the case in the early 20th century. At that time the landscape was open and void, as is shown by the contribution referring to the research project regarding the ancient landscape of Phocis in the present issue. Erosion by wind and water could strip the fertile soil. This is, however, not completely prevented by reforestation. Also, today the small rivers and brooks in Greece such as the Kladeos river in Olympia carry soil with them during heavy rain. The stones and the soil which are carried away are deposited as sediments. As part of a DFG project the geoscientist Andreas Vött is currently investigating if this process in ancient Olympia was sufficient to bury the sanctuary under a metre-deep deposit or if an earthquake followed by a tsunami was the cause of the burial.

Exceptional events such as earthquakes, tsunamis or floods with all their consequences for living and environmental conditions in our present-day perception mask continuous transformations such as the erosion of good quality arable land and karstification. The identification and understanding of causal relationships are complicated by the slow speed of the processes. The situation is further complicated when it comes to climate change and its consequences. Societies in the past witnessed temperature changes related to more humid or more arid phases. Every ecosystem was affected in a different way. Regions with low rainfall reacted highly sensitively to rainfall changes, such as the Arabian Peninsula with the emergence of an oasis economy. These observations related to climate changes in the past, into which the present issue provides insights, influence the current debate about climate change. The data collected for Antiquity will be incorporated into the data sets used for the simulation of climatic changes over longer periods. Simulation in this respect means trying to understand the complex interaction of factors such as marine currents, temperature changes, etc. over longer periods, simulating these using high-performance computers and making a prognosis about future transformation. At the same time the simplified process presented here holds many dangers. The fact that the climate in the past seemingly changed without serious consequences for present-day humans, may lead to the false assessment that the warning messages with regard to global warming caused by humans may be exaggerated, because climate changes also existed in the past. So it could be assumed that human action will not have to change significantly and we should wait and see, because a warm period will be followed by a cold period. This simplistic and selective perception is favoured by a misunderstanding of modelling and simulations. The forecasting of more complex systems such as the global climate, i.e. the making of a prognosis, through the incorporation of the historic data basis improves and at the same time modifies the results. But results are also influenced by mathematical models and algorithms as well as by computer performance. As science continuously goes on working with new methods and increasing data, the results of the working teams differ. In order to provide political decision makers with reliable decision-making tools, the “Intergovernmental Panel on Climate Change” (IPCC) was founded in 1988. The “Intergovernmental Panel on Climate Change” compares and discusses the results in progress reports. Statements about climate change are therefore based on the data from international research and on the evaluation of the results by an international panel. As a matter of fact, this complex research and evaluation process with its results does not indicate any minimisation of the latest forecasts, so that the ultimate argument of the deniers remains only a populist fundamental critique of science as such. The effects of distinct environmental factors such as air pollution on our cultural heritage have been known for a long time. Objects in museums are in many cases better preserved than objects that were and are exposed not only to wind and weather but also to air pollution and acid rain. However, the effects of climate change on cultural heritage have only recently become an issue. Permafrost soils are thawing, the rise of the sea level threatens the cultural heritage in coastal regions with flooding. Archaeology is confronted with these effects of climate change and has to react. Thus the changes of the human-environment relationships during Antiquity are analysed in archaeological projects and this consequently generates data for simulations of climate change. In parallel, archaeology has to look for solutions as regards the effects of climate change on archaeological heritage.

Additional information:
https://whc.unesco.org/en/climatechange/
https://www.nature.com/articles/s41467-018-06645-9

THE KLADEOS RIVER AT OLYMPIA carries large quantities of soil and debris in the case of torrential rainfall. Photo: Fless

Prof. Dr. h. c. Friederike Fless President of the German Archaeological Institute. Photo: Ruckertz

ALL BUT ONE OF THE KORAI OF THE ACROPOLIS HAVE BEEN EXPOSED TO WIND, WEATHER AND AIR POLLUTION SINCE ANTIQUITY. Today they are replaced by copies. Photo: Fless
Today metal is ubiquitous in all areas of life: in computers and cars, in cutlery drawers and toolboxes, and in purses. But metal was not just there. The exploitation, smelting and processing of ore was one of the central innovations of prehistoric societies. In 1836 the Danish archaeologist Christian Jürgensen Thomsen published his subdivision of European Prehistory into Stone, Bronze and Iron Age (the so-called Three-Age System), the different periods of which are characterised by the change from stone to metal tools. However, the transition did not take place at the same time throughout the world, nor did it take place with the same intensity.
Around 5000 BC the bases for copper processing were created in Iran and Anatolia. From then on the development took place rather rapidly and led to the systematic mining of resources. This often left veritable moonscapes of opencast mining including slag heaps and production waste.

MINING IN THE IBERIAN PENINSULA

The rich metal sources – gold, silver, copper, iron, tin – on the Iberian Peninsula played an important role throughout Antiquity. The ore resources attracted Phoenicians, Greeks and Romans in particular to the Iberian Peninsula during ancient times. Trading posts and settlements were founded, and mining areas emerged in which ore was systematically exploited and smelted. This caused massive changes in the landscape.

Tharsis provides one of the few opportunities to carry out archaeological investigations into ancient ore mining on the Iberian Peninsula. In the other large mining areas in Hispania, the ancient remains have been largely destroyed through the continuous use and re-use of the antique areas.

In the late 9th/8th century BC the Phoenicians, stemming from the Eastern Mediterranean, landed on the southern coast of Spain. They triggered multiple developments in the region. In Tharsis, about 40 kilometres from the coast, technical and economic developments also took place. With the arrival of the Phoenicians, Hispanic ore casters were introduced to the complex process of iron smelting. Metal smelting, in use since the Copper Age in the 3rd millennium BC, entered a new dimension. The furnaces became larger, they were blown with hitherto unknown bellows, ore production increased. The importance of mining in Tharsis becomes obvious if we view the vast ancient slag heaps.

The intensive exploitation of the mines brought about social developments. The population focused on mining and increasingly moved their settlements to the mining locations. Given the increase in production it can be assumed that we are dealing here with a completely new type of specialisation. The inhabitants of the mining settlements probably exclusively lived from mining and smelting. This is possible only in a system with a division of labour – the surrounding settlements supplied the mining settlements with food products.

In addition the inhabitants of the surrounding region directly participated in mining. Chemical characteristics make it possible to connect the slag remains with the ore sources. Slag remains from almost every settlement of the region show that the ore mined in Tharsis was smelted there as well as in the surrounding areas.

The intensive use of resources in Tharsis during the following centuries was linked to further economic and sociocultural changes as well as transformations of the landscape that led to the impressive present-day picture.

The research cluster 2 “Innovations: technical, social” of the German Archaeological Institute investigates as a key issue the influence that the introduction of metallurgy had on past societies.


PROF. DR. THOMAS SCHATTNER (DAI Madrid) conducted research in Tharsis from 2007 to 2010.

COOPERATION PARTNERS

Archaeological Institute, University Huelva
Ayuntamiento de Cerro Andévalo
Servicios Generales de Investigación de Investigación y Desarrollo de la Universidad de Huelva
Universidad Autónoma de Madrid, Departamento de Prehistoria y Arqueología
Division of Natural Sciences at the DAI Head Office, Berlin
Instituto Portugués de Tecnología Nuclear
FLOWERING LANDSCAPES: MUNIGUA

Munigua is located about 50 kilometres north-east of Sevilla and is thus much more remote in the hinterland than Tharsis. Over the last 60 years the Roman city has been continuously studied by the Madrid Department of the DAI. Over the last few years there has been particular focus on the economic bases of Munigua. The economy of the city was primarily founded on the metal sources in the surrounding areas. There are copper and iron slag heaps the size of football fields. The ore was exploited by opencast and underground mining; the mines with their shafts and galleries are partially preserved.

In contrast to Tharsis, other economic sectors such as limestone quarries and oil production played an essential role in Munigua. The flourishing of Munigua started with the exploitation of metal sources at the beginning of the Roman Imperial Period in the 1st century AD. When the mineral resources were exhausted in the 4th century AD, the city declined. More particularly iron smelting as an economic factor played a crucial role. If the iron mine at Navalazaro had not been present in the Munigua area, the city would probably have been abandoned – as is the case for many other locations – much earlier. Although the metal was important for the city, the tonnage of the preserved slag heaps (20,000 tonnes) is rather low compared to today’s standards. Iron smelting did not cause overexploitation of the surrounding forests. The oak forests in the Munigua region were not exhaustively cleared, as was confirmed unanimously by archaeologists, epigraphists and palaeobotanists. In contrast, charcoal production was seemingly practised in the same way as this was frequent in Southern Spain up to the 1960s. The charcoal burners in the Sierra Morena regularly cut the trees and only produced charcoal using the waste stemming from tree cutting. This is sustainable tree exploitation.

The Roman author Pliny the Elder also recommends the use of young tree branches for the production of charcoal. “A better charcoal is obtained from young trees. Piles of freshly cut sticks are fitted closely together and made into an oven with clay, and the structure is set to fire, and the shell as it hardens is prodded with poles and so discharges its moisture.” Pliny the Elder, Natural History, 16, 8 (Transl. H. Rackham, W.H.S. Jones and D.E. Eichholz, 1938)

OLIVES ARE STILL CULTIVATED TODAY IN MUNIGUA AND USED FOR OIL PRODUCTION. The “green gold of Andalusia” is famous. In the background of the olive orchard the Roman terrace sanctuary of Munigua is visible.

Photo: Patterson

THE LANDSCAPE OF MUNIGUA IS CHARACTERISED BY CORK AND HOLM OAKS. Since Roman times pigs were kept in the oak forests of southern Spain.

Photo: Patterson

CHARCOAL IS PRODUCED IN KILNS. Charcoal is lighter than wood and therefore easier to transport. Charcoal produces greater heat than wood and was the only fuel that made it possible to reach the temperature necessary for iron smelting.

Photo: picture alliance / Arco Images GmbH

THE MONUMENTAL TERRACE SANCTUARY OF MUNIGUA. Such huge complexes are primarily known from Roman Italy.

Photo: Zulueta

30 × 55 metre terrace sanctuary in the western part of the city is enthroned at the highest point of the city and overlooks the latter and the surroundings - a special type of landscaping.

The proportion of water is higher in young trees and branches. This decreases the process and produces high-grade charcoal. Some imprints of the used branches were preserved in the kiln slags from ancient Munigua. Their narrow diameter shows that mainly small branches were used for the production of charcoal, for which it was not necessary to cut the whole tree.

ROMAN LANDSCAPING

Munigua’s mining profits contributed to the wealth of the city and were probably also used for its architectural design. The monumental terrace sanctuary is primarily known from Roman Italy and its architectural structure can be linked to similar complexes known in the Italian motherland. The complex is enthroned at the highest point of the city and overlooks the latter and the surroundings - a special type of landscaping.

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CASA TARPEIA – The “birthplace” of the DAI

On 21st April 1829 the Instituto di Corrispondenza Archaeologica, the predecessor of the later German Archaeological Institute, was founded on the Capitoline Hill. This, the most important of the seven hills of Rome, was the location of the religious centre of the city during Antiquity. Today crowds of tourists climb the Capitoline Hill using the long outside stair-case with the statues of the Dioscuri. In 1836 the Institute’s first building, the so-called Casa Tarpeia, designed by the architect Johann Michael Knapp, was erected here. The name refers to the Roman priestess Tarpeia, who opened the gate to the Capitolium to the attacking Sabines after the rape of their women by the Romans. The author Livy reports this story from the early times of Rome and also tells about the beautiful Dioscuri heads from the Capitoline Hill, which were part of the Tarpeian rock. The choice of location for the new institute, above the Tarpeian rock, was highly symbolic, not only because of the mythical historic background, but also because of its proximity to the most important sanctuary of the whole Roman state, the temple of the highest god, Jupiter Optimus Maximus. The terracotta pediment designed by Emil Wolff, which recalls the Tarpeia myth, refers to Jupiter Optimus Maximus, shows the Jupiter temple as a placemark and features the goddess Minerva as a central figure. She was worshipped together with godfather Jupiter on the Capitoline Hill. As the goddess of wisdom and art she patronised archaeologists, philologists, diplomatists and artists who were impassioned by Antiquity and who in the newly founded institute were devoted to the scientific study and publication of antiquities.

A PRUSSIAN COMPLEX ON THE CAPITOLINE HILL

Casa Tarpeia was part of a “Prussian complex” on the Capitoline Hill comprised of the Palazzo Caffarelli, the residence of the Prussian envoy to the Holy See, the Protestant Hospital and the Prussian embassy chapel. For forty years, Casa Tarpeia was the main seat of the Institute. In particular because of its fast-growing library it became an attraction for classical scholars in Rome. The institute’s forecourt at that time became a kind of outdoor museum as is shown on the photograph, which was taken around 1870. The original-size copies of the Dioscuri heads from the Capitoline Hill, which are surrounded by small statues and low-relief fragments, appear particularly prominent. Because of an increasing need for space and rising moisture in the Casa Tarpeia the institute was moved to a newly built, larger building in 1876/77. The Prussian-German presence on the Capitoline Hill ended when Italy entered the First World War in 1915. Casa Tarpeia was demolished in the 1920s – only its façade was preserved.

CURRENT EXCAVATIONS IN THE GARDEN OF THE CASA TARPEIA

190 years after its foundation, the German Archaeological Institute is again active on the Capitoline Hill. In collaboration with the archaeological Superintendency (Sovrintendenza Comunale di Roma) excavations are being carried out in the garden of Casa Tarpeia, with the aim of investigating in more detail the complex ancient and modern history of the Capitolium. In 2018 the remains of the initial walls of the Institute’s library were documented. Beneath these remains a huge basement made in opus caementitium was discovered, which was built in at least three building stages between the 1st century BC and the Roman Imperial Period. The basement extends below the former Protestant Hospital and it probably supported an additional temple building in the sanctuary of Jupiter Optimus Maximus. This closes the circle to the 19th century: During the construction of the second institute building and modifications in the Palazzo Caffarelli ancient re-mains belonging to the basement of the temple of Jupiter had already been identified. Its investigation also leads from the excavations on the Capitoline Hill to the archive of the Federal Foreign Office, to which the Institute has been affiliated since 1874. Here, some of the drawings of the temple basement which were made at that time by early institute members have been, and still are, stored.
What could be written on a poster during today’s weekly climate demonstrations was formulated by the Roman author Pliny the Elder as long as 2000 years ago. The Romans had a great impact on their environment: through mining and large-scale forest clearing, through river pollution by cloaca wastewater and by intensive farming which led to erosion.

For several millennia, especially since the emergence of farming and stock breeding, we humans have strongly impacted on our environment.

“By the aid of poisons we taint the waters of the stream, and we infect the various elements of Nature; indeed, the very air even, which is the main support of life, we turn into a medium for the destruction of life.”

An increase in temperature of up to five degrees compared to preindustrial conditions is forecast by experts at the Intergovernmental Panel on Climate Change up to the end of the 21st century. Does that mean that the view of the snow-covered Forum Romanum will then be a thing of the past?

Photo: picture alliance/Photoshot

HUMANS, ENVIRONMENT AND CLIMATE

About change, interference and adaptation
Since the start of industrialisation these impacts have become increasingly massive. A new age marked by humans has therefore been characterised by the term Anthropocene. Humans have shaped nature and radically changed it in a manner never before seen in the history of earth. Humans have become the influencing factor with regard to geological, biological and atmospheric processes throughout the world. The effects of human activities on the environment and climate are scientifically analysed and simulated in international cooperation. Gigantic digital data sets are collected and processed in order to enable us to understand human and non-human influences on the complex climate setting and its changes. Archaeologists also contribute to this. While reconstructing past environments they also collect data related to paleoclimate, for example from core drillings in lake sediments or from plant and animal remains. A still more detailed picture of the transformations of human-environment relationships by ancient cultures and their climate conditions can be drawn.

A look at the climate history of the last 12,000 years shows how this changed. The present warm period, the so-called Holocene, started around 11,700 years ago with a global warming and the environment changed. New economic systems emerged which in turn triggered new forms of society. Up to modern times particularly humid, and or cold phases, so-called small ice ages, influenced the forms of settlement and economic systems of humans. An example of such an evolution on a local scale provides the contribution by Karl-Uwe Heußner on the following pages. He decodes the information about climate history contained in trees.

ANCIENT HUMAN-ENVIRONMENT RELATIONSHIPS

The relationship between humans and the environment during Antiquity is a central issue in current research. At all times human activities have transformed the environment. For example, on the coast of Asia Minor intensive farming caused heavy erosion, which reinforced the natural transformation of the coast line. In his contribution Felix Pirson explains how the people on site dealt with this. This also raises the question as to how people of past cultures perceived the changes to their environment. What did they think caused the shortage of rainfall for the irrigation of their fields? How did they react when sea levels rose and threatened the basis of their existence? In their contributions Markus Reindel and Mayke Wagner report on quite different strategies developed by humans.

The investigation of the past enables archaeology to identify the contributions made by humans to the transformation of their environment and how they dealt with that. The answers to these questions also help us to tackle current issues soundly.

HOW MODERN IMPRESSIONS CAN BE MISLEADING

Whereas many projects analyse the effects of environmental changes in the past, the contributions of Heiko Prümers and Katja Sporn show how present conditions can mask our view of the past. For example, settlements in the Amazonas region, which were established under completely different environmental conditions, are hidden in the present-day rainforest. And the change undergone by the ancient landscape of Phocis is only now revealed by laser beams.

The final contribution by Sabine Reinhold about the thawing of permafrost remains in Siberia stresses that archaeological work can be directly impacted by current climate change. This exemplary presentation shows how global warming destroys archaeological discoveries. What applies to the permafrost in the Polar Circle also applies to other projects worldwide: the challenges raised by archaeology in the Anthropocene can only be met through international collaboration.
What trees reveal about climate changes

At the DAI Karl-Uwe Heußner carries out research into the growth rings of trees to obtain information about age and climate history. In the laboratory for dendrochronology he analyses wood remains which stem from archaeological excavations amongst others. With the aid of specific growth patterns, which have to be precisely reconstructed for each tree species and each region, archaeological objects and remains can be dated to the exact year. In addition the growth ring sequences provide significant data related to weather and climate and thus to environment history concerning periods that reach back far into the past.

How does it work? The width of the wood layer formed each year by the tree depends on various factors. Climatic influences such as solar radiation, precipitation, temperature and local factors such as the supply of nutrients and water determine the growth of the wood. In this sense, trees can be regarded as “meteorological yearbooks”. An example from the Dulan region in the Qinghai province of the People’s Republic of China shows how dendrochronological analysis can be connected to the reconstruction of climate history and furthermore to historically documented events. In cooperation with the Archaeological Institute of the Qinghai province and Peking University the DAI analysed construction wood. Karl-Uwe Heußner evaluated a total of 45 wood samples using dendrochronology. This analysis resulted in a continuous chronology spanning 1315 years, which through “overlapping” with existing dendrochronological sequences stemming from the region could accurately date the samples to the period between 515 BC and 800 AD.

The samples make it possible to draw conclusions about climate changes during this period. The very narrow growth rings reveal low rainfall for a period of 400 years after the turn of the era. More particularly, periods of drought occurred between 230 and 380 AD. This made field cultivation almost impossible. These arid phases led to the withdrawal of the Chinese farmers from the region and to the advance of nomadic stock breeders. It is still debated who these nomads were – Chinese sources describe them as being “the others”. Pastoralism was still possible in the region and the pastoralist societies used their advantage to found several – albeit short-lived – kingdoms. Only 400 years later, during a more humid climate phase, a Chinese dynasty took back control of the region.

**WHAT IS DENDROCARTHONOLOGY?**
Dendrochronology or “tree-ring dating” means the dating of wood. During their lifetime trees each year form a so-called growth ring. Growth rings formed in years with fair growth conditions are larger, those formed in lean years are narrower. Given that the living conditions in a region are the same for all the trees of a species, they show the same characteristic sequence of narrow and large annual rings. Dendrochronologists analyse these specific growth patterns and use them to determine the age of pieces of wood. By combining many different growth ring sequences of different ages long periods can be covered without any gaps: a tree calendar covering several millennia can be created. Apart from the dating of pieces of wood from archaeological excavations or historical buildings dendrochronological data are increasingly used to analyse environmental changes and long-term climate changes.

**ENCODING CLIMATE HISTORY:**
Climate fluctuations and environmental changes are recorded in the growth rings of trees.

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**ENCODED CLIMATE HISTORY:**
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**FROM LEFT TO RIGHT: PINE, OAK AND BEECH EACH FORMS A DIFFERENT GROWTH RING PATTERN.**

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**CLIMATE FACTORS INFLUENCE TREE GROWTH.**
The state of the previous year influences the formation of the following growth ring.

**THE 45 ANALYSED SAMPLES (ALL JUNIPER WOOD) PROVIDED A CHRONOLOGY RANGING FROM 515 BC TO 800 AD.**

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WOOD FROM SHIPWRECKS, CHURCH ROOFS AND BOGS

In the Dulan region samples provided insights into the climate history of the region. But the wood samples analysed by Karl-Uwe Heußner originate from completely different contexts. They range from tree disks, excavated pieces of wood, shipwrecks and drill cores to large pieces of charcoal or computer tomographies of art objects. As these samples do not cover every period, additional samples taken from geological contexts (bog oaks from rivers, sunken forests) and for example roof timbers from churches were incorporated.

The dendrochronological studies carried out at the DAI focus on the dating of the pieces of wood stemming from excavations carried out by the DAI and its cooperation partners. These also include the creation and maintenance of data sets. Further analysis of the series for climate reconstructions or other investigations is organised in close cooperation with other research institutes such as the Helmholtz Centre Potsdam (GFZ German Research Centre for Geosciences).

While these data series are well developed for Europe and North America, they have still to be established for many other regions. Currently the series encompass rather large areas. The development of an improved spatial resolution is ongoing.

THE CLIMATE CURVE FOR EUROPE BASED ON DENDROCHRONOLOGICAL DATA indicates a particularly cold and dry period between 300 and 500 AD. The so-called Barbarian Invasions can be dated to that time.

Diagram © U. Bünzgen

THE BAOBAB ARCHIVE

According to the Intergovernmental Panel on Climate Change it is highly probable that Africa will undergo supra-global climate warming. Certain areas are threatened by high warming and possible catastrophic droughts. There are no accurate, large-scale measurement data available for evaluating the effects of climate change on these regions. Baobab trees in southern Africa can reach ages up to 2000 years and because of their specific growth patterns they serve as long-term growth-ring archives for climate studies.

In order to access this information we need to know how these trees grow and what structures are formed every year. The “deciphering” is made difficult because of damage caused by elephants, human exploitation and other things. The “Baobab chronology” will not only provide insights into regional climate history; but it will also contribute to improving the forecasting of effects caused by the currently changing climate.

The baobab project has been carried out in southern Africa since 2015. https://www.dainst.org/project/4137917

COOPERATION

Institute of Geological Sciences, FU Berlin
GFZ Helmholtz Centre Potsdam

A similar data collection has been carried out since 2018 by the DFG (German Research Foundation) supported cooperation project ClimCellMed (Climate dynamics during the late Holocene derived from Cell structure measurements of juniper trees in the eastern Mediterranean) in north-east Africa. The research project is part of the priority programme 2143: Entangled Africa.
SEAPORTS IN ASIA MINOR

Humans and environment at the point of intersection between land and sea

Modern visitors to Troy, Ephesus or Miletus perceive the famous ancient sites on the western coast of Turkey primarily as settlements located in the inland, surrounded by mountains and fertile plains. Current research results, however, show that the present-day situation results from profound environmental changes.

During Antiquity these places were located much closer to the coast and had their own harbours and quays which connected them to the sea. What has happened since? Geoarchaeological research carried out by German-Turkish teams proved that the coast lines at the estuaries of river valleys such as the Skamander valley (now called Karamenderes Çayı) near Troy, the Kaystros valley (Küçük Menderes) near Ephesus and the Meander valley (Büyük Menderes) near Miletum advanced towards the sea over the centuries. Former bays and gulfs, which were cut deep into the inland, thus silted up in the course of time.

In the Meander valley it was possible to reconstruct this process in more detail thanks to numerous core drillings, in which the sequences of marine and terrestrial sediments are documented. The different stages of coastline shift reflect a sequence of historical landscape settings that can be connected with the development of cities such as Miletum and the associated settlement structures. This makes it possible to draw a picture of human-environment relationships, which is equally significant for our understanding of ancient life, as are the political, social and economic framework conditions of the different eras.

A particularly striking example of the significance of landscape changes for ancient urban development is provided by the Roman metropolis of Ephesus: after the silting-up of a more ancient harbour bay the former alluvial land was levelled and a complete town quarter was built in this place which was oriented towards the new huge harbour. Its hexagonal shape is still recognisable today in the field. The channel which connected the harbour basin to the sea can be easily identified. Written sources together with the results stemming from geoarchaeological research attest that the history of the trading and pilgrimage town of Ephesus was a continuous battle against the silting-up of the harbour which was fought with channels, harbour walls and regular dredging.
What caused these profound changes to the natural environment in places such as Troy, Ephesus and Miletum which confronted their inhabitants with constantly new challenges? In the large river valleys the silting up was caused primarily by natural factors such as the progressive formation of river deltas, dynamic changes to the coast as a result of growing beach areas or the erosion of soil on slopes caused by wind and weather. In addition the impact of humans on the natural environment played a role: forest clearing and agriculture in particular favoured erosion and thus the movement of sediment into the rivers.

**THE SEAPORT OF ELLAIA AND THE ADAPTABILITY OF ITS INHABITANTS**

A particularly obvious connection between human impacts on the natural environment and serious consequences for the living conditions of the inhabitants could be attested to Ellaia, the seaport of Pergamon. With the support of the German Research Foundation the DAI together with geographers from the University of Cologne and geophysicists from the University of Kiel, investigated the development from a small seaport to the maritime satellite of the Hellenistic residence of Pergamon. Apart from the influence of Pergamon particular focus was on the human-environment relationship. This combination made it possible to draw a complex picture which shows the development of the town and the settlement as a complex and above all interactive process between nature and culture. The evolution of the coastlines in the bay of Ellaia shows that in prehistoric times the acropolis hill was a cape which advanced into the sea. It has been a place of settlement since the 3rd millennium BC. Up to 300 BC the coastline clearly changed, particularly between the acropolis and the adjacent hill of Bozyer Tepe in the north-western part, but less extensively than in the large river valleys on the western coast of Anatolia. Along this coastline the Hellenistic seaport developed, which was clearly enlarged under the influence of Pergamon and of which today only the enclosed harbour can be identified above ground. This harbour was only accessible by a closable entrance. In an eastern direction an open harbour followed. This latter was already silted up at the turn of the era and it was filled. The enclosed harbour was navigable until 400 AD, lastly thanks to an artificial channel. The situation therefore is similar to that in Ephesus. The decline of the city coincided with the silting-up of the harbour. At the same time the remaining inhabitants benefited from the natural environmental conditions in the bay and between the 4th and the 6th century they built large salines in the marshland outside the city. In these “salt gardens” salt was produced through evaporation of sea water. Because of the rising sea level the existing stone rows of the ramparts and platforms are located today in shallow water. They attest to human resilience and creativity in dealing with environmental changes. Soon afterwards the settlement of Ellaia ceased to be. Around the same time two kilometres inland a new settlement was founded, which compared to Ellaia was better protected against sudden sea-borne attacks during increasingly turbulent times.

**TITLES**

**GRADUAL CHANGE TO THE COASTLINE IN THE BAY OF ELLAIA.**

Small-scale and Large-scale Human Infl uence

What part did the inhabitants of Elaia and its hinterland play in the changes to the natural environment described? Although the Kaikos river (Bakır Çayı) fl ows into the Aegean sea immediately west of Elaia, the extent of its delta was not responsible for the siltng-up of the bay and the harbours. In this respect the analysis of sediments attests to the strong fl ow of soil material stemming from the immediate surroundings of the town in which intensive agriculture was practised from about 850 BC and which were particularly vulnerable to erosion. The analysis of plant pollen from the harbour basin not only indicated a decrease in forest cover and an increase in crops such as olive trees but also directly attested to soil erosion through the identifi cation of specifi c mushroom spores. From about 180 AD the cultivation of olives decreases and pasturages increase, which again reinforced erosion processes and may be a possible explanation for the subsequent siltng-up of the harbour. The example of Elaia shows how humans through their impact on the natural environment created new living conditions through agriculture, urban construction and the building of harbours and at the same time caused their destruction. What happened here on a local scale between 850 BC and 600 AD also happened in other regions and at different times. The investigation of the historical human-environment relationship is an important task for archaeology which can be fulfilled only within an interdisciplinary framework involving social and ecological approaches. The Dhi and its cooperation partners in this matter have been carrying out, amongst other things, the long-term project “The Transformation of the Pergamon Micro-Region between Hellenism and Roman Imperial Period” (Die Transformation der Mikroregion Pergamon zwischen Hellenismus und römischer Kaiserzeit), which is supported since 2019 by the German Research Foundation.

Sea Shells in the Desert

In the southern part of Peru, about 400 kilometres south of the capital Lima and 40 kilometres north of the town of Nasca, several thousands of years ago, humans drew huge pictures in the ground (geoglyphs). Here – on the arid coastal plain at the foot of the Andes – animals like orcas and monkeys are depicted, which normally live in the sea or in the jungle. They were part of a ritual landscape that was centered on water and fertility. Well understandable in this region, where survival depended on the availability of water.
Markus Reindel, researcher at the Commission for Archaeology of Non-European Cultures (KAAK), investigates the climate and settlement history in the Andes and explains how the people of the Nasca culture prayed to their gods in order to ensure their supply of water, a valuable resource.

The people of the Nasca culture mainly settled in river oases of the Rio Grande between the desert on the southern coast of Peru and the western slopes of the Andes mountains. Here, over a distance of only 100 kilometers, several ecological zones follow each other, and the difference in altitude between west and east is 5000 metres. This region is extremely sensitive to climate changes.

Within the interdisciplinary cooperative project ‘Andean-Transect’ Markus Reindel and his cooperation partners analysed the influence of environmental changes and long-term climate fluctuations on the development of ancient societies.

The sediment archives were explored for the geoarchaeological reconstruction of pre-historic climate conditions. In a peat bog of the highlands, drilling cores up to ten-metres deep were obtained and analysed using various scientific processes. The plant and pollen remains from these cores provide insights into the climate and landscape changes of the last 8000 years.

In the arid coastal region the analysed sediments indicate that more humid and vegetation-rich conditions were present here in former times compared to the present-day desert. The investigations evidenced that stable and more humid environmental conditions reigned during the Nasca period (200 BC–650 AD) and that the agricultural exploitation potential on the western slopes of the Andes was high. During that time the Nasca culture witnessed a period of prosperity. The development of settlements of the Nasca culture is therefore closely connected to favourable environmental conditions. When supplied by sufficient water resources, the large river flood plains provided perfect conditions for intensive irrigation agriculture.

The survey area of the ‘Andean Transect’ is located on the west side of the Andes Mountains in the southern part of Peru. The survey corridor crosses the coastal desert and extends to the western range of the Andes Mountains at an altitude of over 4500 metres. In the course of the project, a total of 1500 pre-Hispanic settlements were documented.

DISTRIBUTION OF SETTLEMENTS FROM SELECTED PERIODS. Over time climate changes have repeatedly triggered new settlement patterns. During the Paracas period massive immigration from the highlands took place. During the Nasca period the coast was a privileged settlement area. The Middle Horizon is characterised by low settlement density whereas during the Late Intermediate Horizon large settlements were established on the coast as well as in the highlands.

COOPERATIVE PROJECT ‘ANDEAN TRANSECT’ (2008–2011)

COOPERATIONS
Heidelberg University, Institute of Geography
Heidelberg University, Institute of Environmental Physics
Instituto Andino de Estudios Arqueológicos (INDEA)
Mineralogical State Collection Munich
University of Göttingen, Abt. Historische Anthropologie und Humanökologie

SUPPORT
Federal Ministry for Education and Research (BMBF)

https://www.dainst.org/project/58701

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RITUAL SUPPLICATIONS FOR WATER

The geoglyphs of the Nasca culture, which cover the arid plateaus between the river valleys, also date from the time before 600 AD. Figurative depictions of plants and animals, but primarily lines and geometric shapes several hundreds of metres long, were drawn in the desert soil and in this way transformed the landscape into ritual activity areas. These were used for processions related to water and fertility cults. One of the most significant indicators of this practice are the spondylus shells which were deposited on stone altars uncovered by archaeologists on the geoglyphs.

Spondylus shells do not exist on the Pacific coast of the Nasca territory. They occur about 2000 kilometres further north in the warm tropical waters of present-day Ecuador. Occasionally these warm streams flow in a southern direction (the so-called El Niño phenomenon), which leads to heavy rainfall on the otherwise arid coast of Peru. Spondylus shells also reached the Peruvian north coast within the warm currents. The relation between the occurrence of spondylus shells and heavy rainfall has been observed by the inhabitants of the Andes since time immemorial and the spondylus shell was connected with water and fertility.

Similarly the figurative geoglyphs can be symbolically related to water. Depictions of orcas 60 kilometres away from the coast are symbols of the sea. The hummingbird is the animal which sucks liquids from flowers in the form of nectar. Even spiders were considered as being indicators of water and moisture in the desert by the inhabitants of the Nasca region.
It is therefore likely that by their ritual actions, most particularly on the geoglyphs, the Nasca intended to influence the natural events in order to ensure a permanent sufficient supply of water for their agriculture. Water is the element which was the basis for life in the river oases of the Nasca coastal region. When the climate became increasingly arid towards the end of the Nasca period, the ritual activities were intensified in order to implore the gods for water. But these supplications could not help. There was insufficient water and the inhabitants of the Nasca region had to emigrate from the greater part of their home territory.

The exhibition “Nasca. Buscando huellas en el desierto” (“Nasca. Searching for traces in the desert”) can be visited up to 19th May 2019 in Madrid.

BETWEEN LAND AND OCEAN

The sea hunters of Hokkaido

20,000 years ago the Japanese island of Hokkaido was not yet an island but part of the mainland. Then global warming changed things. The ice shields thawed, the sea level rose. Portions of land were flooded and Hokkaido became an island. How did humans deal with those dramatic environmental changes? Mayke Wagner explores how the inhabitants of Hokkaido completely changed their economic system and based their existence on the riches of the ocean.

https://www.dainst.org/project/58759

PROF. DR. MARKUS REINDEL
is senior researcher for America at the Commission for Archaeology of Non-European Cultures (KAAM). Since 1997 he has been head of the Nasca-Palpa project in Peru.

Photo: Baumgarten

https://www.dainst.org/project/58759
During the longest period of human evolution our subsistence was based on hunting and gathering. Only relatively recently, since the transition from the last ice age to the present warm period about 11,500 years ago, did humans in some parts of the world start to domesticate plants and to become sedentary. In the 1930s the archaeologist V. Gordon Childe coined the term “Neolithic revolution” to characterise this process. This development towards a way of living based mainly on agriculture and stock breeding was for a long time considered by scientists as being a rather rapid, irreversible process that was similar, although not simultaneous throughout the world. Prehistoric cultures were subdivided into two categories: mobile hunter-gatherers and sedentary farmers. Only recently has archaeological science agreed about the fact that many societies used various strategies, which cannot be exclusively attributed to one or the other category. Humans adapted to the resources of their natural environment. Agriculture, pottery and sedentism were independent developments, which emerged at different times and in different orders. Their spread and adaptation were specific from region to region.

SAME, BUT DIFFERENT

Unlike the hunter-gatherers at the western end of the Eurasian continent, those at its eastern end first invented pottery and became sedentary thousands of years later and lastly practised crop cultivation. Why and when these innovations reached Hokkaido, the northernmost of the Japanese islands, and what the inhabitants made of these under the climatic conditions of Hokkaido are the issues tackled by the research project “Jomon on Hokkaido”.

During the last ice age, approximately 20,000 years ago, Hokkaido, as the southern part of a huge headland, was connected to Sakhalin island and the Japanese mainland.

During that period humans on Hokkaido did not yet live in permanent settlements and they started crop cultivation only 12,000 years later.

The intensive exploitation of marine resources – squids and mussels, tuna and salmon, brown algae and sea urchins – became a characteristic feature of the Jomon culture. This is illustrated also by food remains in pottery containers on Hokkaido and Sakhalin, which are proof that these pots were used for the cooking of fish or marine mammals.

HUNTERS AND FARMERS

In most of Japan hunting and gathering became continuously less significant by the end of the Jomon culture because farming, originating from the Korean peninsula, was introduced and spread 3000 to 2000 years ago. By contrast to the Japanese core area the Jomon culture development lasted longer on Hokkaido. Subsequently immigrants reached the island from the north and introduced new economic systems. Communities of the so-called Okhotsk culture settled on the offshore islands of Rebun and Rishiri and in the north-eastern coastal area of Hokkaido.

The earliest pottery containers on Hokkaido can be dated to this period of probably highly specialised hunter-gatherers. They mark the beginning of the so-called Jomon culture.

At the beginning of the subsequent warm period, the Holocene, the sea level rose by more than one metre and Hokkaido became an island.

How did the hunters of Hokkaido deal with this? The temporal and spatial distribution of the sites shows that 90% of the sites dated prior to 14,000 years ago are located in the interior, over ten kilometres away from the coast. By contrast, most of the more recent sites, which were established between 10,000 and 6000 years ago, were located close to the coast. This means that after the dramatic rise of the sea level, communities settled in the coastal area. They adapted their economic system to suit the changed environmental conditions, away from land hunting towards coastal and sea hunting.

Ice-age hunters followed the numerous animals (mammoths, elks, steppe bisons and aurochs among others), which migrated to the southernmost tip of the peninsula during winter and back to the north during summer. On this occasion they carried with them points, blades and semi-finished products made from obsidian as is attested to by obsidian objects stemming from central Hokkaido discovered on Sakhalin island.

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SPATIAL DISTRIBUTION OF PALAEOLITHIC SITES (dated prior to 14,000 years ago) and of sites dated to the Incipient and Initial Jomon period (about 10,000–6000 years BCE) on Hokkaido.


The Okhotsk people were highly specialised sea fishers and hunters of marine mammals such as seals and whales. They hitherto were therefore considered as classical hunter-gatherers. Recent excavations carried out at the Hamanaka 2 site on the Rebun island, near to the northern tip of Hokkaido yielded hundreds of carbonised seeds of naked barley, which on a scientific basis could be dated directly to the period of the Okhotsk culture. Apart from abundant remains of barley stemming from an at least 500-year-long period, there are traces of significant forest clearing and opening of the densely forested landscape. This makes it possible to assume that these communities of highly specialised hunter-gatherers also cultivated crops. Nonetheless, according to our current knowledge, crop cultivation did not lead to the transformation of the hunter-gatherer society into an agricultural society. People combined the two economic strategies. This exceptional discovery is the first scientifically documented example of a hybrid subsistence economy during the protohistory of East Asia and is therefore of revolutionary significance.

NAKED BARLEY SEEDS FROM THE ARCHAEOLOGICAL LAYER ASSIGNED TO THE OKHOTSK PERIOD AT THE HAMANAKA 2 SITE ON THE REBUN ISLAND.

Photo: Leipe

The Amazon region in South America.

Photo: Prümers

Our perception of landscape is marked by everyday viewing habits. Our impression of foreign landscapes is determined by pictures in the media. So we associate the Amazon region with tropical and impenetrable primeval forest – it is hard to imagine that this was quite different once.

How pre-Hispanic settlers lived here in an environment, which was continuously changing because of climate fluctuations is topic of the research project conducted by Heiko Prümers of the DAI’s Commission for the Archaeology of Non-European Cultures and Carla Jaimes Betancourt of the University of Bonn.
The Amazon rainforest covers a huge area encompassing six million square kilometres. The climate there today is hot, humid and tropical. Almost every day there is heavy rain and atmospheric humidity exceeds 90%. Alexander von Humboldt was also exposed to these conditions when he headed an expedition across Amazonia at the beginning of the 19th century. He travelled and carried out research in the tropical lowlands of Venezuela for six months.

(He reports on) “… the immeasurable forest region in the tropical zone of South America that fills the conjoined river systems of the Orinoco and the Amazon. In the strict sense of the word, this region earns the name of “primeval forest”, a term that has of late suffered considerable misuses. Phrases using primeval, whether describing a forest, a period or a people, are inexact and for the most part subjective. (…) Not every tropical forest is a primeval forest. I have almost never used this latter in my travel works – yet I believe myself to be among those living explorers of Nature, like Bompard, Martius, Pöppig, and Robert and Richard Schomburgk, who have lived the longest in the primeval forests of the deepest interior of a great continent.”


But were the forests he saw, the plant and animal world which he described meticulously, really primeval forests? In the current state of research most scientists would refute this. They would answer that there has not been a primeval forest in the Amazon region for several thousands of years. Since humans occupied South America in about 15,000–13,000 BC, their continuous impact on nature has changed this latter irreversibly. Even the enormous biodiversity of the region is thought by the scientists to be a consequence of human action: by collecting fruits, planting favoured species near their settlements, cutting the forest for farming and keeping semi-domesticated animals in the villages humans influenced the existing ecosystem. The Amazonian black soil developed because they enriched the soil with charcoal and organic waste, the highly fertile “terra preta”.

But humans did not only change the environment in the Amazon region with their apparently random impacts. On the contrary they actively reshaped the landscape for millennia by building channels, by erecting embankments and by cutting off meanders. Although many of these impacts were apparently “reconquered” later by nature, they can still be identified in the landscape today.

The settlements discovered over the last few years show that these landscapes were at times characterised by exceptionally favourable environmental conditions, which strongly differ from the current ones. They indicate a sedentary way of life based on the division of labour. Almost everywhere where the forests of Amazonia are cut as part of modern land seizure, pre-Hispanic settlements emerge, in some cases also pre-planned cities. So the tropical forests which cover them today did in fact not existed there since time immemorial; rather they are the result of a process of "renaturalisation" as is shown by the following examples. In the lowlands of Ecuador, north of the present-day city of Macas, the so-called Upano culture (ca. 200 BC–600 AD) established settlements built with rectangular platforms assembled in modules of groups of four, on which were erected timber buildings. In this way not only small hamlets and villages were built but also large cities with fortified road systems encompassing several square kilometres.

The city of Huapula in the Upano region extended over more than two kilometres. The brown lines mark large routes, some of which were dug into the soil.

Map: Prümers

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Only a few of these settlements were investigated archaeologically. Our knowledge about the Upano culture is therefore very limited. However, the work carried out by the French archaeologist Stéphen Rostain has shown that the Upano culture ended towards 600 AD with the eruption of the nearby Sangay volcano. Thick ash layers covered the region and made it unusable for agricultural exploitation for centuries. The population emigrated, most probably to the south to the region of Ucayali in present-day Peru. The settlements were progressively covered by forest. Until 2013 about 30 sites including about 100 house platforms were known in the 300-square-kilometer-large core region of that culture. Then the region was surveyed using LiDAR technology, which enables “virtual tree-cutting”, i.e. the computational removal of surface growth. On this occasion almost 7500 house platforms were identified, which belong to 180 settlements, as well as roads and paths that interconnected these settlements.
ENIGMATIC CIRCULAR DITCHED ENCLOSURES

At the southern margin of the Amazon region pre-Hispanic settlements enclosed by ditches are also hidden in the forest. The first of these were discovered in 1999 on Google Earth images of the Brazilian state of Acre. Progressive deforestation is continuously revealing further enclosures. Meanwhile more than 450 of such enclosures were identified in the state of Acre alone. Additional ones are located in the southern adjacent regions of Bolivia and further west in the Brazilian states of Rondônia and Mato Grosso. The enclosures are dated to different periods – between 400 BC and 1500 AD – and they undoubtedly belong to different cultures or cultural traditions. Their archaeological exploration has just begun and still leaves many questions unanswered. It can, however, be ascertained that the entire region in which the enclosures are located was densely occupied for at least 2000 years. The settlements were not concentrated, as previously assumed, along the large rivers, but they attest to extensive colonisation.

In order to understand the process of this colonisation, the Commission for Archaeology of Non-European Cultures is investigating enclosures in the Iténez province. Until recently these were also hidden under the dense forest. But they were built during a period in which a savannah landscape dominated the region, as was shown by the analysis of pollen profiles stemming from neighbouring lakes. During a period of almost 2000 years the farming settlers kept the landscape largely treeless; moreover, the emergence of forests was favoured in the larger surroundings of the settlements by an increasingly humid climate. This human impact disappeared after the Spanish conquest, when about 90% of the population of South America died within a very short period because of plagues that were introduced. Only then did the forest develop which we designate today as "primeval forest".

THE FERTILE KEPHISSOS VALLEY

How the ancient Phocis landscape changed

During Antiquity the Kephissos valley in Central Greece was renowned for its agricultural products. From here, the ancient region Phocis, the finest olive oil was exported to Rome. And here, in the area of Elateia, was the most fertile farmland as is reported by written sources.
As in Greco-Roman times the Kephissos valley is today still very fertile. Currently mainly cereals, cotton and fruits are cultivated here. In the Kephissos valley the current vision of the landscape also influences the imagination regarding that of past centuries. However, the landform is constantly changing. Even over the last hundred years the changes have been dramatic. In photographs taken in 1926 by DAI travel grant holders, many things can be identified, which are no longer visible today. Comparisons between the photographs from that time and the views of today show, that the area is currently more densely forested because of reforestation or because of the lack of intensive pasturage.

Since 2018 a team of archaeologists from the Athens department of the DAI has been carrying out investigations in the Kephissos valley as part of a research project. The river valley runs between two large mountains, the approximately 2500-metres high Mount Parnassus in the south and Mount Kallidromo in the north. In addition to fertile soils, the topographic situation of the Kephissos valley as a transit area connecting Northern Greece to Boeotia and Attica was an important factor favouring its wealth during Antiquity. The ancient course of the Kephissos river, which today can be scarcely reconstructed on the ground, traverses the valley and divides the settlement areas into a southern and a northern part. DAI archaeologists are exploring how the course of the Kephissos and the water drains in the mountains changed over time. What changes in soil exploitation and settlement areas were a consequence of the landscape change?

It is a long-term objective of the investigations to understand the changes in settlement structures in their landscape context. In this respect researchers are repeatedly directly confronted with this landscape changing: whereas the travel grant holders mapped a fortification on a hill named ‘Anemomylos’ in 1926, this latter is today no longer recognisable with the naked eye. The area is completely overgrown by low but dense bushes, which makes a survey difficult.

In 2018 a new research programme carried out by the Athens Department was launched in ancient Phocis. In cooperation with Dr. Petros Kounouklas from the Antiquities Department of Phocis and Eurytania Prof. Dr. Katja Spann and Dr. Eric Laufer are carrying out an investigation related to the landscape history of a 145-kilometre-wide section of the central Kephissos valley.

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AIRBORNE INVESTIGATIONS

A solution was provided by LiDAR-scans, which were carried out in autumn 2018 with the financial support of the Fritz Thyssen Foundation. On the basis of aerial photographs it is possible to calculate a digital surface model (DSM). LiDAR scans provide the opportunity to “mask” objects at ground surface such as bushes, modern buildings or roads and to create a digital elevation model (DEM) of the natural ground surface. This offers a substantial basis for investigations relating to geomorphological and archaeological issues.

The visualisation of the Kephissos valley shows that only a few settlements are located in the valley itself, but that numerous hills on the spurs of the two mountains were occupied by fortifications. Analysing the scans it is again crucial to separate the modern impression from the ancient situation: in the area of Elateia it is possible to identify ancient field boundaries which do not correspond to current boundaries. The ancient plots have a rather uniform width of about 26 to 35 metres. However, it is yet unclear in which context they were established.

LiDAR (light detection and ranging) is a method that uses a laser beam to scan the ground surface. Based on the collected data it is possible to create surface models. Terrain models are obtained by the computational removal of the vegetation. This makes archaeological features visible even under dense overgrowth.

The computational analysis of the further results is still ongoing. In the coming years it will provide the archaeological team at the DAI Athens with a basis for intensive fieldwalking for verification and detailed documentation.

THE ARCHAEOLOGICAL ARCHIVES ARE DISAPPEARING

Climate change and Arctic archaeology

The permafrost in the Arctic is disappearing rapidly. Here, where remains of everyday life such as wooden and earth architecture as well as organic objects made of wood, birch bark and textiles were preserved in the permafrost soil, it is thawing. The last two summers for example were the warmest one ever recorded. High positive temperatures were recorded over several months. Archaeologists are seeing first-hand the effects of the current climate change on archaeological objects and remains.
The Arctic is an area at the periphery of the Eurasian and American continent, in which one would hardly assume the existence of archaeological remains. Nonetheless, the Arctic invariably is and was a living space for many people, the remains of which are preserved in an exceptional manner in the permafrost. The Arctic connects the Eurasian and the American continent. It forms a common living and cultural space. With this in mind, Arctic Archaeology in some respect stands for global archaeology.

**PERMAFROST SOILS** are frozen throughout the year. They form in areas of low rainfall in which the temperatures generally remain below freezing point. The largest permafrost areas in the world are located in the polar and high mountain regions. Global warming contributes to the thawing of ever increasing permafrost areas. As a result soil bacteria become active and cause organic material to disintegrate. This process releases large quantities of carbon dioxide and methane, which further contribute to global warming.

The Arctic encompasses the northern extensions of North America, Asia and Europe. Its extent is often defined based on climatic criteria as a region in which mid-summer temperatures normally do not exceed 10 degrees Celsius.

**CLIMATE CHANGE DESTROYS ARCHAEOLOGICAL SOURCES**

The rise of temperatures in the Arctic is highly sensitive and leads to a fundamental change to the entire ecosystem. Coastal erosion destroys essential areas, in which were preserved the remains of early sea-oriented cultures. Increasing vegetation overgrows sites hitherto visible on the ground. But the loss of organic materials is much more threatening: because of increasing warming, microbiological processes become active, which cause fragile objects to disintegrate. As a consequence preservation conditions change from permafrost soil to mineral soil. This means that organic components are only preserved in the form of earth colourations as is the case in more southern regions. During this process, over 80% of the information relating to archaeological sources gets lost. This process can be observed in an exponentially increasing manner for the Arctic sites and it is virtually impossible to prevent.

Yet the permafrost soil contains the remains of rich and still largely unexplored cultures. On the Chukotka peninsula in the extreme northeast of Russia, early whalers between 500 and 1000 AD left not only semi-subterranean buildings but also gorgeous art objects. Still earlier discoveries are known from the coastal regions of the Arctic such as ivory sculptures from Yana in Siberia, which were made 31,000 years ago.

**ARCTIC ARCHAEOLOGY AS A GLOBAL TASK**

The exploration and preservation of a global and hitherto still largely unknown cultural heritage will be an important task for global archaeology in the future. Over the last few decades the worldwide permafrost surface has already decreased significantly. Monitoring programmes and targeted research projects will become necessary during climate change and ice thawing, prior to the definitive disappearance of the archaeological archives. The safeguarding and exploration of Arctic cultural heritage will only be possible through international collaboration and through the implementation of jointly developed strategies.

We would like to thank Dr. Kiril Dneprovskij, Museums of Oriental Art, Moscow, for the friendly providing of photos of Chukotka.
A January evening in Berlin-Dahlem. Outside it’s dark and chilly. Inside the DAI Head Office there are no free seats left at the internal colloquium where Norbert Benecke and his colleague from the Brandenburg State Office for the Preservation of Monuments report on “Last hunter-gatherers and early farmers in Brandenburg” from a bioarchaeological perspective. The atmosphere is good, the scientific investigations are a major attraction – and not only for the specialist audience. Norbert Benecke speaks about lifestyle and prehistoric everyday life on a scientific basis, a topic of great interest to many people. Based on the animal bones which were discovered during excavations Norbert Benecke reconstructs the environment in which the people of prehistoric societies lived and their diet. He has been working as a zooarchaeologist since 1979, first at the “Zentralinstitut für Alte Geschichte und Archäologie der Akademie der Wissenschaften der DDR (ZIAGA)”, then since 1992 at the DAI, where he had been head of the Division of Natural Sciences from 2003 onwards. Over this period Norbert Benecke has witnessed how scientific methods and concepts have been increasingly used to tackle cultural and historical issues and problems. Today there are hardly any archaeological excavations in which one or several natural scientists do not participate. Norbert Benecke has taken part in projects carried out by all DAI departments and commissions on several continents and he has analysed bones, teeth and antlers as well as snails and shells. As an experienced zooarchaeologist he identifies the findings as he picks them up at excavations. A more detailed identification of the animal species is then carried out in the laboratory. Here, Norbert Benecke follows strict guidelines for the analysis of bones: for every item the species and a detailed description of the skeletal parts are registered in a database. This step is the basis for determining whether they are dealing with a young or old animal, whether it was hunted or slaughtered and what livestock was kept in different regions and at different times.

Norbert Benecke
Zooarchaeologist at the DAI

Since 2003 BIOLOGIST
PROF. DR. NORBERT BENECKE has been head of the Division of Natural Sciences at the German Archaeological Institute.
Photo: A. Benecke

THE DIVISION OF NATURAL SCIENCES AND THE AFFILIATED LABORATORIES ARE LOCATED IN BERLIN-DAHLEM. Here the disciplines zooarchaeology, archaeobotany, dendrochronology and prehistoric anthropology are represented.
Photo: A. Benecke

AFTER BEING REMOVED FROM THE GROUND AND CLEANED THE ANIMAL BONES ARE INITIALLY IDENTIFIED, MEASURED AND REGISTERED. The zooarchaeological laboratory has large reference collections of mammals, birds, amphibians, reptiles and fishes which are used to establish a definitive identification of the many different subspecies.

Photo: Hochmuth

Photo: A. Benecke
WHEN AND WHERE WERE HORSES DOMESTICATED FOR THE FIRST TIME?
In collaboration with the Leibniz Institute for Zoo and Wildlife Research (IZW), the Molecular Biological Centre (Humboldt University of Berlin) and the Institute of Biochemistry und Biology at the University of Potsdam, Norbert Benecke analyses the beginnings of horse breeding in Eurasia.

So he investigates how wild horses became domestic animals. Introduced only a few years ago, palaeogenetic analysis of "ancient DNA" preserved in bone material complements the traditional analysis of animal skeletons. It is possible to reconstruct not only the coat colouring of early domestic horses but also genetic markers for the separation of wild and domestic horses.

Isotopic analyses are an additional great methodological development in the discipline; these are used to analyse complex zooarchaeological issues. The elements present in the environment show isotopic differences, which are very characteristic on a regional scale. Isotopic analysis allows it to identify, where an animal grew up and to what environmental conditions it was exposed. It can show where the codfish which were consumed at medieval Berlin were caught, how far Bronze Age mounted warriors travelled on their horses and where early herders pastured their sheep. This information can be used to reconstruct trade relationships and economic systems.

In addition to the reconstruction of environmental conditions, which are reflected in bone material, Norbert Benecke's work focuses in particular on the impact of humans on fauna and on the question as to where wild animals were first domesticated. He investigated the impact of humans on fauna and on the question as to where wild animals were first domesticated.

Central issues of the research carried out by Norbert Benecke are related to various aspects of human-animal exploitative relationships. This also includes animal husbandry in relationship with food economy and the types and extent of hunting and fishing at different times and in different regions. However, the methods used to tackle these issues have significantly changed over the last 40 years. Whereas Norbert Benecke worked in a completely analogue manner when he carried out his dissertation project on the island of Rugen, during the 1980s computer-based data collection replaced the manual registration of discoveries. Today databases are standard tools. The project was carried out by Norbert Benecke in cooperation with the Institut für Haustierkunde (Kiel University), and the Institut für Paläoanatomie, Domestikationsforschung und Geschichte der Tiermedizin, Munich.

A COOPERATIVE DATABASE PROJECT
Over 100 animal species from 8000 archaeological assemblages were collated and analysed as part of the project "Holocene History of the European fauna." The results were published not only as print but also were made accessible in an interactive database at the research data centre IANUS. The publication of the complete data contributes to their reuse for further research.

Reinder Neef
Archaeobotanist at the DAI

"A lot of patience!" is Reinder Neef's response to the question what it takes to become a skilled archaeobotanist. He is in a good position to know: for over 35 years he has been analysing botanical material from archaeological excavations. Based on plant remains such as seeds, fruits and wood he investigates what humans cultivated in the past, what they consumed, what they used to build their houses and how their environment looked. The reconstruction of past environmental conditions and economic systems is an essential part of archaeological research. Scientific methods play a central role in this: the DAI's Division of Natural Sciences analyses remains from human skeletons, animals and plants and carries out dating.

A: FLAX POLLEN
B: ROMAN AGE OLIVE TREE CHARCOAL
C: CARBONIZED RAISINS

THE ANALYSIS OF PLANT MACROREMAINS
(Seeds, fruits and wood) and microscopic pollen yield data that make it possible to answer questions related to the evolution of cultivated plants, climate change and resource exploitation in past times.

A. FLAX POLLEN (recent), B. ROMAN AGE OLIVE TREE CHARCOAL FROM DJERBA (Tunisia), C. CARBONIZED RAISINS FROM IRON AGE TAINA (Saudi Arabia)
Currently Reinder Neef is analysing botanic samples from 17 countries which were collected during more than 30 excavations carried out by the DAI. His work starts at the excavation: sediments must be sieved patiently, sometimes for days. Generally plant materials perish rapidly. They are preserved when the plant remains are carbonised by fire but not completely burnt.

These charred remains which are found in excavations have to be separated from other materials by water sieving. Under extremely dry conditions, as in Egypt for example, plant material which was not carbonised is also preserved – in this case dry sieving replaces water sieving.

Reinder Neef then analyses the plant remains in the laboratory for archaeobotany. He has identified several millions of plant seeds under the microscope. This needs time – and a large comparative collection of specimens.

Reinder Neef has been working as an archaeobotanist at the DAI since 1992. Back then only a small botanical collection existed. As Reinder Neef intended to carry out archaeobotanical analyses for DAI projects on several continents, it became necessary to rapidly build reference collections. Thanks to intensive collection and exchange activities over the last 25 years, the archaeobotanical laboratory today has abundant comparative material.

As part of his collaboration on DAI projects Reinder Neef travelled to Africa, to the Arabian peninsula and to the Balkans. “Participation to so many projects provides fantastic material”, he says. Already after his degree at Groningen University (NL) he worked a lot in the Near East. The region remained an important focus. On an archaeobotanical basis Reinder Neef investigates the beginning of the oasis economy in Saudi Arabia, Jordan and Egypt and the spread of farming in the Near East. And his work never fails to throw up surprises. Near Pietrele (Rumania) plant remains were discovered in a Copper Age site, which were identified as being a huge stock of seeds of the deathly nightshade. The most plausible explanation for this exceptional discovery is that these toxic seeds were used as a remedy or as a drug.

One particular interest of him is his work on the digital plant atlas. One of the project’s main objective is to create a globally valid standard for material identification in archaeobotany. Thousands of photographs and identification criteria allow it to compare which crop plants occurred where and where they were cultivated. The results of the project are constantly published in multilingual publications and on an interactive website.

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Whether in purses or as loose change in our pockets – (almost) all of us carry coins with us. This was just the same during Antiquity: loose change for everyday needs was transported in purses, bags and sometimes also in the mouth. Larger quantities, for example soldier’s pay was well secured in chests and cases. But time and again coins got lost or were intentionally hidden away. These are an essential source of information for classical and ancient studies. The date of the year in which they were minted provides evidence for the dating of the excavation layers in which they were discovered. The combination of material, image and script enables numismatics scholars to study complex questions related to ancient economic history, social developments and political structures, as well as to the life of the people who once held these coins in their hands.
Since Renaissance times ancient coins have been valued as historical sources of information as well as precious items. They have been collected and catalogued. The inscriptions related to the portraits of Roman emperors and empresses depicted on them were helpful for the identification of ancient marble sculptors. The ancient minting systems and processes on them were progressively reconstructed so that it became possible to date, mint and designs.

Today the cataloguing of coin finds is still an essential step in their study and analysis, and digital databases play an increasingly important role. They simplify the search for similar coins and their identification. International linkage of the data sets enables research within a huge information pool. In this respect the Romano-Germanic Commission (DAG) in collaboration with the German Mining Museum (DBM) in Bochum analyses the chemical composition and the isotope of silver denarii dated to the Roman Imperial Period with the aim of gaining insights into ancient financial politics: how was the need for coin metal met and how were shortages dealt with?

Initially coins were documented through drawings, later also in three-dimensional casts in plaster or sulphur paste. The invention of photography in the 19th century facilitated the graphic reproduction of coins. Plaster casts as three-dimensional objects, however, continued to offer certain advantages for the observation of particular details. Today digital scanning provides us with three-dimensional documentation: this technology is complex, but it is increasingly used. Nowadays, the core of the coins is also analysed. Chemical analyses for example provide information about the composition and the origin of the metal. Meanwhile, coins are catalogued in digital databases. The Romano-Germanic Commission has participated in the development of the web database system ‘Ancient Coin Finds in Europe’ (AFE-WEB).

All the details necessary for the description and identification of a coin are registered there in addition to information related to the site, the circumstances of discovery and the archaeological context. The data are registered in standardised form. The standardisation of the data and their descriptive criteria (standard data) enables exchange with other projects. The incorporation of numismatic data into international web resources such as Online Coins of the Roman Empire (OCRE) is therefore facilitated.

As a collaboration project of the DAG’s Romano-Germanic Commission, the Department for Databases and Information Systems (DBIS) of the Goethe University Frankfurt/Main and the Archaeological Institute of Warsaw University, Poland, the database system AFE-WEB makes some 30,000 ancient coins, which were found in an area stretching from the North Sea to Ukraine digitally accessible. Antike Fundmünzen in Europa (AFE): http://afe.fundmuenzen.eu/

COINS ARE SOMETIMES WELL-PRESERVED, SOMETIMES BADLY PRESERVED: The coins of the Late Antique hoard found at Smihthu/Chemtou are in an excellent state of preservation. They were published in 2014 in a German-Tunisian collaboration. The numismatic study was carried out by Dr. Hans Roland Baldus (DAG) and Pirro Academia (DBM).
DIGITAL RESEARCH PROCESSES

Providing access to research infrastructures such as libraries and archives for international science is one of the issues of the German Archaeological Institute. Today this is performed more and more on a digital basis. Library collections are searchable online, and the abundant analogue archives and photo collections are being progressively digitised. Books and journals are published not only in analogue form but also digitally and are free to access. These services are part of the newly established Central Scientific Services. They unite all the DAI’s research data infrastructures. A special homepage was launched in May 2019 in order to make this visible externally and to ensure the accessibility of all the interconnected digital services of iDAI.world.

The DAI’s research data environment goes back to the early 1990s when at the Research Archive for Ancient Sculpture in Cologne the central object database Arachne was initiated. Since then the digital services of the DAI have undergone rapid development in line with the significance of IT for modern archaeology. New modules have been constantly evolved, more particularly since the launch of the DAI’s online services in 2011. Over the last few years Arachne, the online literature catalogue Zenon, the digital place index Gazetteer and other services have become intensively used and successful systems within an infrastructure resulting in iDAI.world. Numerous additional systems are planned or already under construction.

From a user’s point of view the flipside of this dynamic development with its characteristic modularity has been the necessity to know the structures of individual systems very well to find data in different places. By providing access via one central landing page entering the iDAI.world is fundamentally simplified and better explained. With the three crucial questions “What?”, “How?” and “Why?” users are provided with structured informative texts and illustration. The three main categories are further subdivided into smaller sections that explain the iDAI.world’s fields of use in a more detailed fashion. Here, one can also get access to projects that the DAI is or was involved in. All the texts are written in English.

Although searching data through the respective systems will still be possible, a new search bar which encompasses all of the DAI’s online systems is going to allow for an easier and more integrated approach to finding the data you need. Thus the foundation stone has been laid in order to improve the iDAI.world platform further on as an open digital research data infrastructure on the basis of the DAI’s data policy.

IDAI.WORLD is a digital research environment based on tools and repositories that enable researchers to collect, analyse, visualise, publish and store research data and creative output: https://www.idai.world

A NEW APPROACH TO ARCHAEOLOGY ONLINE:
With its digital services, DAI promotes digital research processes.
It conducts and supports the practical application, development and integration of digital tools into the research process as well as their theoretical and methodological discussion.

Read more about IDAI.world in the interview with Dr. Benjamin Ducke, Head of Scientific Computing at the DAI.
http://forschungslizenzen.de/ducke_idaiworld_open-science/

Since 2012 DR. REINHARD FORTSCH has been Director of Information Technologies at the German Archaeological Institute.
Photo: Groß

https://www.idai.world
Looking eastwards

The Eurasia Department

The political upheavals and the opening of the Iron Curtain in 1989 offered archaeology new perspectives. Since that time a lot of international cooperation projects developed. At the DAI collaborative research on the Eurasian continent is concentrated at the Eurasia department. Its foundation in 1995 with the Tehran Branch Office (since 1996) and the Beijing Branch Office (2009) was a pioneering decision taken by the DAI. To date there is not a single comparable research institute in Europe or the USA. The department’s huge study area stretching from the Black Sea to the Pacific Ocean offers the opportunity to coherently analyse historical processes in a large temporal and geographical dimension. Most of the projects focus on interactions between technical innovations and social processes. Many significant technical innovations – such as the domestication of animals and the manufacture of pottery – spread across Eurasia through rapid knowledge transfer.

All the Eurasia department’s research projects are carried out in collaboration with the scientific institutions of the corresponding host countries and jointly with various scientific fields. The time period and thematic range investigated by the Eurasia department’s archaeologists are large. Early Neolithic settlements are studied at Aruchlo (Georgia) and Kamiltepe (Azerbaijan). Excavations carried out in Pietrele (Romania) and Orlovka (Republic of Moldova) investigate the dawn of the use of metal tools. The Bronze Age oasis town Gonurdepe in Turkmenistan and contemporary complexes in Tajikistan deal with the Bronze Age transfer of knowledge and technology towards Central Asia. Favourable preservation conditions in China made it possible to discover the earliest trousers. Excavations carried out on the Taman peninsula and in the Lower Kuban region provided insights into the transfer of knowledge from Greece to the Black Sea region from the 6th century BC on. The followers of Alexander the Great brought new cults to central Asia as is shown by the excavations carried out at Torbulok (Tajikistan).

Common research is the basis for lively scientific exchange with host countries. In many countries the Eurasia department actively supports the development of archaeological research and cultural heritage preservation structures, restorative actions and the education of young scientists. The department’s library with over 90,000 volumes has become an Eurasia-wide centre for international researchers.

Information about research at the Eurasia department:
www.dainst.org/publikationen/broschueren

EURASIEN-ABTEILUNG
Im Dol 2-6, Haus II
14195 Berlin
www.dainst.org/standort/eurasien

www.dainst.org/standort/eurasien
Archaeological documentation nowadays is digital, replacing traditional pen-and-paper techniques. The radical change in technical resources over the last few decades has fundamentally transformed archaeological practices and created space for new perspectives and scientific issues. But digitalisation also faces us with new challenges. Sustainable scientific documentation must follow distinct rules in order to ensure that research results will be comprehensible and re-usable. In order to guarantee this the DAI has been developing and operating i.DAI.field, a documentation system for field projects, for over ten years.
"Crucial factors in the decision to fundamentally redevelop the system in 2016 were technological change and the new requirements involved, comparatively large obstacles regarding its use and last but not least increasing license fees for the underlying software," summarises Sebastian Cuy, one of the developers of iDAI.field 2.0. The Division of Information Technologies at the DAI Head Office took the decision to develop the software internally on the basis of open-source technologies. The creation of completely new software also offered the opportunity to take into account the specific requirements of completely differently oriented archaeological projects.

STANDARDISATION AND INDIVIDUAL USABILITY

One of the requirements was the possibility of synchronising data between different equipment without access to the Internet. Moreover the simple connection of heterogeneous sources, for example survey, image and text data, was a declared objective. In order to ensure that the software meets the real needs of future users the development process was structured according to flexible methods. This means that, right from the start, prototypes were tested regularly by archaeologists. Their feedback was directly incorporated into the next development step. "One of the greatest challenges for the development team was to find a suitable balance between the individual requirements of different archaeological projects and the establishment of common standards which are mandatory for comparability, re-usability and long-term availability," says Sebastian Cuy in retrospect. The positive feedback from the various departments and projects shows that the balancing act was achieved. The application will be implemented on a test basis during the next excavation season in different field campaigns.

REAPPRAISAL OF "EARLIER EXCAVATIONS"

The current development focuses on the migration of data sets from former documentation systems to iDAI.field 2.0. The new documentation system provides the basis to evaluate excavation data and to make them accessible online. The retrospective processing and publication of earlier excavations is also tested. The treasury terrace at Olympia is one of the projects, in which the reappraisal of "earlier" excavation data using iDAI.field 2.0 is being trialled. The sanctuary of Zeus at Olympia, one of the most important sanctuaries of Antiquity and a UNESCO World Heritage site today, has been explored by large-scale archaeological investigations since 1875. Every five years athletes and visitors from the entire Greek world met here for athletic competitions. Over the centuries the sanctuary was sumptuously developed and endowed with magnificent statues and large quantities of offerings for the gods by visitors. Many of the buildings and certain categories of findings such as captured weapons, which were dedicated to Zeus as the highest god of war, are now published in detailed monographs. However, most of the findings and also several significant buildings have not yet been published or are available only in outdated publications. Among these buildings are the so-called treasuries, small temple-like buildings, which were erected by various cities of the entire Greek settlement area for the protection of their precious offerings and as a sign of particular attachment to the sanctuary. These are currently undergoing detailed reappraisal. "Within this context it will be possible to consider the treasury terrace as an overall complex. All the documents, such as plans, excavation diaries and inventory lists as well as drawings and photographs, have been digitised and will be incorporated into iDAI.field 2.0 to enable subsequent study using the new research tool," says Reinhard Senn, who heads the excavations at Olympia.

REMAINS OF THE TREASURIES AT OLYMPIA

Photo: Wolf

THE DAI IS DEVELOPING A DIGITAL RESEARCH ENVIRONMENT.

It promotes digital research processes for international science and for protection of cultural heritage. For international research and worldwide cultural preservation, IDAI.world is composed of different interconnected systems. IDAI.field 2.0 is part of IDAI.world.

The documentation system stands for the standardised collection of excavation data and ensures data quality.

https://www.idai.world
Lastly we will be able to publish the treasury terrace in an overall excavation in a digital form using iDAI.field 2.0. The work carried out on the treasury terrace serves as a test to end the focus is on the western part of Greece, where most of the excavation data to iDAI.field 2.0 and the recontextualisation of documentation of current excavations but also retrospectively, adds Veelia Boecker. She works on the migration of existing ascending architecture of the buildings, based on both preliminary are stored in situ and in various depots, then to reconstruct the provenance, the origin of the architecture. To this adds Velia Boecker. She says Velia Boecker. “The above-ground part by Markus Herrmann who died in 2015. “Once the reconstruction of the treasury architectures is complete, the last step will be to document and attribute all the architectural elements which are handled by building archaeologist Markus Wolf. His initial step was to carry out an architectural survey of the foundation of the treasuries and to create a new overall plan. The next step will be to document and attribute all the architectural elements which were stored in situ and in various depots, then to reconstruct the ascending architecture of the buildings, based on both preliminary work and the publications of articles by building archaeologist Klaus Herrmann who died in 2015. “Once the reconstruction of the treasury architectures is complete, the last step will be to analyse the provenance, the origin of the architecture. To this end the focus is on the western part of Greece, where most of the cities which donated the treasuries at Olympia were located, i.e. southern Italy, Sicily and Albania,” explains Markus Wolf.

“Lastly we will be able to publish the treasury terrace in an overall view,” says Velia Boecker. “The above-ground part by Markus Wolf and the archaeological contexts and the findings from the excavation in a digital form using iDAI.field 2.0.”

Dealing with death on a scientific basis is familiar to Egyptologists. Nonetheless the Cairo Department was severely affected by the death of its former director Rainer Stadelmann on 14th January 2019. Rainer Stadelmann was born on 24th October 1933 in Oettingen/ Bavaria. After studying Egyptology, Classical Archaeology and Near Eastern Archaeology in Munich and Heidelberg he earned his doctorate in 1960 with a doctoral thesis about the cults of near-eastern deities in Egypt at the University of Heidelberg. After a period as assistant professor and subsequent to his habilitation thesis in Heidelberg, Rainer Stadelmann was promoted to scientific director from 1967 and then executive director of the Cairo Department from 1989 to 1998. As an honorary professor he remained attached to the University of Heidelberg for a long time. Rainer Stadelmann was a highly renowned scholar on an international scale. His work on the royal funerary temples on the western bank at Luxor, based on the integrated approach of architects and historians resulted in the reconstruction of the sacred landscape of ancient Thebes. The second research field tackled by Rainer Stadelmann was the archaeology, art and history of the Old Kingdom. The great kings of the 4th dynasty were of particular interest to him and the excavation project initiated by Rainer Stadelmann in Dahshur, the pyramid necropolis of king Snofru, opened up fundamentally new insights in this field. As the director of the Cairo Department Rainer Stadelmann developed the research profile of the institute to include prestigious new projects. Dealing with the cooperation with Egyptian partners and supporting Egyptian archaeologists was always close to his heart. The deep consternation caused by Rainer Stadelmann's death among his Egyptian colleagues is a touching token of the deep friendship which connected him to Egypt. To honour Rainer Stadelmann's achievement the Federal Cross of Merit (Bundesverdienstkreuz), the Grand Officer of the order of the Republic of Egypt and the Egyptian Hathor-Medal were bestowed on him. Rainer Stadelmann was elected executive director of the Cairo Department which he remained until his retirement in 2008.

Günter Dreyer’s research interests focused on follow-up investigations at the royal necropolises of Umm el-Qaab in Abydos over three decades and the issues related to the genesis of kingship and of the pharaonic state. These investigations resulted in a fundamental increase in our knowledge about one of the most dynamic periods of Egyptian history, the formation and development of Early Dynastic social structures, the emergence of Egyptian writing and the traditions of the later pharaonic world of ideas reaching far back into the past. Gifted with meticulousness and tenacity Günter Dreyer tried to obtain maximum information regarding the reconstruction of the past even from the smallest fragments of objects or architectural remains in his everyday archaeological work.

During extended discussions, Günter Dreyer also showed the ability to inspire younger colleagues and members of his team for topics centering around the early periods of Ancient Egyptian history and society. To all who knew him, Günter Dreyer will be remembered as a gifted teacher, a charming speaker, a meticulous scholar, and an amiable colleague.

Günter Dreyer was elected as scientific director of the Cairo Department of the DAI. He filled this position until 1999, when he was elected executive director of the Cairo department which he remained until his retirement in 2008.

Günter Dreyer was born on 5th October 1943 in Schwichteler/Lower Saxony. After an education and employment as chemical laboratory assistant he studied Egyptology, Assyriology and Near Eastern archaeology at the University of Hamburg and the Free University of Berlin from 1969 to 1978. At an early point during his graduate studies, Günter Dreyer participated in various excavations in the Near East and in Egypt, especially in the Temple of Sethi I on the West Bank of Luxor and on Elephanta Island. In 1978, he received his PhD degree from the Free University of Berlin with a thesis on “Tempelweihgaben der Frühzeit und des Alten Reiches”. In the same year, he joined the Cairo Department of the German Archaeological Institute as a scientific member and subsequently undertook excavations at Elephantine, in the Wadi Garawi, and since 1980 at Umm el-Qaab in Abydos, initially together with Werner Kaiser, and from 1985 as the project’s director. In 1989 he was elected as scientific director of the Cairo Department of the DAI. He held this position until 1999, when he was elected executive director of the Cairo department which he remained until his retirement in 2008.
German Federal Government open house day

Visit us at the Federal Foreign Office!

On 17th and 18th August 2019 the Federal Ministries will for the 21st time open their doors to all citizens. This year there will again be a wide range of information and entertainment on offer – with the focus being on personal contact.

The German Archaeological Institute will welcome you at the Federal Foreign Office on both days. We will have with us illustrative material and information about many interesting projects!

Follow us on Facebook and twitter for additional information.

TIME AND PLACE
17th and 18th August 2019
Auswärtiges Amt
Werderscher Markt 1
10117 Berlin

We look forward to meeting you on 17th and 18th August at our information stand at the Federal Foreign Office!
The cover picture was taken in 2018 35 kilometres east of Trinidad, the capital of the Beni department in the north-eastern part of Bolivia. As is the case for all the routes in the region this swathe across the rainforest was laid out ramrod straight, as there was almost no relief that had to be taken into account for road construction. Only fords across the numerous rivers led to a change in direction of these straight roads.

The photo was taken on the occasion of a project carried out by the Commission for Archaeology of Non-European Cultures (KAAK), the aim of which was to study pre-Hispanic settlement centres in the Bolivian Amazon region. Today these settlements have been absorbed by the rainforest. From page 57 on you can read how this could happen.

Photo: Priemers
If we want to preserve our cultural heritage, we need your support.

Ulrike Wulf-Rheidt endowment fund

The basis of any safeguarding and preservation measures of past buildings is their analysis. The field of building archaeology was developed with this in mind. The Ulrike Wulf-Rheidt endowment fund is dedicated to the future of building archaeology. In remembrance of building archaeologist Prof. Dr. Ulrike Wulf-Rheidt it supports young building archaeologists.

Ulrike Wulf-Rheidt’s projects and publications have significantly influenced the field of building archaeology with regard to contents and methods. Through her work as head of the Division of Building-Archaeology at the German Archaeological Institute, as a professor at the FU Berlin and as a mentor of numerous building archaeology and cultural preservation projects in Germany and abroad she has substantially contributed to the profiling of the discipline. One of her central concerns was the promotion of young academic talents.

In order to continue her work after her premature and tragic death, her parents and her husband founded the Ulrike Wulf-Rheidt endowment fund. With your donation you can support this endowment fund and thus contribute to the preservation of our cultural heritage, by investing in the future of young building archaeologists.

Additional information: www.twges.de/stiftungsfonds.html

Donations for the support of promotional actions by the Ulrike Wulf-Rheidt endowment fund can be deposited in the bank account of the Theodor-Wiegand Gesellschaft. Please state “Spende Ulrike Wulf-Rheidt Stiftungsfonds” as a payment reference. Your donations will be tax-deductible.

Thank you!