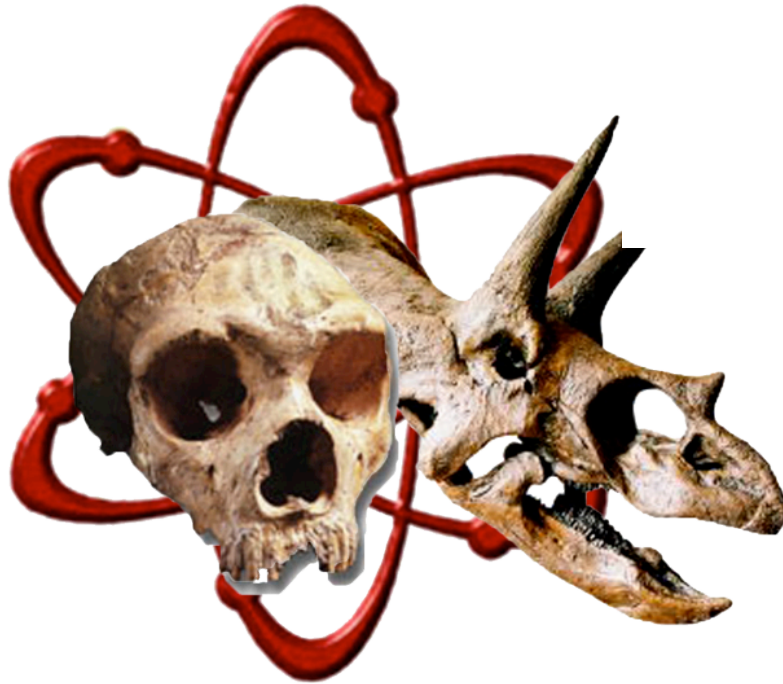


EBERHARD KARLS  
UNIVERSITÄT  
TÜBINGEN



# StEve

MEETING  
2 - 3 december  
2011

For Students in Evolution and Ecology

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VENUE: S320



**INSTITUT FÜR GEOLOGIE UND PALÄONTOLOGIE**  
**Holderlinstr. 12, Tübingen**



*evolution and ecology forum Tübingen*



## StEvE meeting 2011

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The Evolution and Ecology Forum Tübingen (EvE) promotes the interdisciplinary exchange between groups involved in evolutionary and ecological research in Tübingen. The meeting of Students in Evolution and Ecologie (StEvE meeting) was initiated as a yearly opportunity for postgraduate students to present and exchange their ideas and research results.

More information can be found on the following website:

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## Meeting Program

Friday 2<sup>nd</sup> Dec.

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**8:45 Registration**

**9:15 Welcome**

**9:30** Márton Rabi

An exceptionally complete skeleton of the Cretaceous giant protostegid turtle, *Archelon*: phylogenetic and ecologic implications

**9:50** Wolfgang Siewert & Katja Tielbörger

To be or not to be – demographic response of annual plants to climate change

**10:10** Manuel Weinkauf, Tobias Moller, Mirjam Koch, and Michal Kučera

Morphological response of foraminifera to environmental stress

**10:30** Sabine Hänel

Response of annual plants to longtime rain manipulation experiment in the field

**10:50 Coffee**

**11:20** Martin Vallon

Why daddy eats his own young: Personality-dependent filial cannibalism in *Pomatoschistus microps*

**11:40** Julia Hildebrandt

Multiple males contribute to the progeny of one *Onchocerca ochengi* female

**12:00** Karla Dietrich

Behavioural monitoring of the alpine newt (*Mesotriton alpestris*) from the perspective of animal personality

**12:20** Julius Braun, Manuela Gradl, Tim Nicholson, Klaus Albert, and Oliver Betz

Morphological and chemical analyses of adhesive tarsus structures in insects

**12:40 Lunch Break – Mensa**

**14:00 Poster Session**

**15:00** Michael Francken

Family Business – Kinship groups and the beginning heredity of social status in the early Neolithic of Southwest-Germany

**15:20** Mareike Stahlschmidt

Micromorphological analysis of the site formation processes at Schöningen 13 II-4 and their archaeological implications

**15:40** Astrid Slizewski

The strength of Neanderthals revisited

**16:00** Michaela Ecker

Stable isotope analyses on the fauna from Payre (Ardèche, France)

Friday 2<sup>nd</sup> Dec. continued

16:20 Coffee

17:00

Keynote speaker

David Lordkipanidze

The hominins from Dmanisi and the earliest peopling of Eurasia

19:00

**StEvE Get-together**  
at the Marquardtei Restaurant



**Meeting Program Saturday 3<sup>rd</sup> Dec.**

9:20

Anja Kries, Ralf Eilbracht, and Michael Weiß

Biodiversity information systems – Possible solutions taking a topic map on Myxogastria as an example

9:50

Sven Hanoteaux, Eva-Maria Hoch, Katja Tielbörger, and Merav Seifan

Density and spatial distribution of an attractive species: effects on plant-pollinator interaction structure in grasslands

10:10

Lisa N. Schuster and Ralf J. Sommer

Studies on cellulases in the nematode *Pristionchus pacificus*

10:30 Coffee

11:00

Katja Bader

Assessment of toxic potentials in the Erms river by means of biochemical and histological biomarkers in bullhead (*Cottus gobio*)

11:20

Leonie Marschner

Arresting mantle formation and re-directing embryonic shell gland tissue by platinum 2+ leads to body plan modifications in *Marisa cornuarietis* (Gastropoda, Ampullariidae)

11:40

Verena Schünemann

The genome of the Black Death

12:00 Closing Remarks





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## Abstracts - presentations Friday

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**9:30 An exceptionally complete skeleton of the Cretaceous giant protostegid turtle, *Archelon*: phylogenetic and ecologic implications**

Márton Rabi - *Geobiology, Institute of Geosciences, Universität Tübingen*

Remains of Cretaceous sea turtles (Chelonioida) are widespread with exemplars known from North and South America, Europe, North Africa, eastern Asia, and the Australasian region. Although members of the modern cheloniid and dermochelyid lineages were present by at least the Coniacian (Late Cretaceous), by far the most diverse group were the protostegids – a basal radiation that first appeared during the Aptian-Albian but went extinct by the early-middle Maastrichtian. Probably the most iconic protostegid is *Archelon ischyros* from the Campanian Pierre Shale of western North America (Western Interior Seaway), which is famous for its colossal body length of over 4 m and has been popularised as the largest turtle of all time. Several variably complete skeletons have been collected, the most spectacular of which was unearthed in South Dakota during the mid 1970's and eventually purchased by the Natural History Museum of Vienna. However, despite being on public display for over 30 years the fossil has never been studied in detail. A comprehensive assessment undertaken in 2011 obtained novel data on the osteology, diet, and evolutionary implications of *Archelon*. The results suggest some remarkable parallels with modern sea turtles, including durophagous habits and possibly advanced thermal physiology (indicated by flipper morphology and highly vascularised limb bones). Contrary to some recent phylogenies our cladistic analyses also clearly advocate chelonioid monophyly and imply that the decline of protostegids might have been linked to faunal turnover amongst benthic invertebrate prey species and extreme specialisation towards regionally endemic habitats.

**9:50 To be or not to be – demographic responses of annual plants to climate change**

Wolfgang Siewert, Katja Tielbörger

*Department of Plant Ecology, Institute of Evolution and Ecology, Universität Tübingen*

Species responses to climate change are mostly modeled using a type of ecological niche distribution models called “climate envelope” models. However, besides neglecting migration processes and species interactions, a major drawback of these models is that they do not incorporate the dynamics of populations which are also likely to influence a species response to climate change. We used matrix population models to analyze population dynamics of 20 annual plant species using 7 years of demographic data from 4 field sites along a steep climatic gradient in the Eastern Mediterranean. By coupling our models with regional climate models, we were able to forecast species' responses to climate change and to investigate the causes of their response. We found that while population dynamics in arid areas are driven by climatic factors (rainfall), they are driven by biotic factors (competition) in more humid areas. Furthermore, plant populations from arid sites seem to be able to cope with conditions much drier than the current climate and thus may be relatively resistant to climate change.



### **10:10 Morphological response of foraminifera to environmental stress**

Manuel Weinkauf, Tobias Moller, Mirjam Koch, and Michal Kučera

*Micropalaeontology, Institute of Geosciences, Universität Tübingen*

Planktonic foraminifera have a uniquely complete fossil record that enables high resolution analyses of how they reacted to past environmental change. 125,000 BP the Mediterranean Sea experienced a sharp change in ocean circulation, providing an excellent natural experiment to assess the ecophenotypic reaction of the local populations on that environmental stress. The unique potential of the studied material is given by high temporal resolution (less than 100 years), the lack of the possibility to respond by migration, and the observation of basin-wide local extinctions of several species in response to the environmental change. In this study two planktonic foraminifer species, *Orbulina universa* and *Globorotalia scitula*, were analysed for changes in calcification, size, and incidence of abnormal specimens, in a series of samples reaching their respective local extinctions. In *Orbulina universa* shell weight and roundness correlated with environmental trends, but showed no significant pattern immediately preceding the extinction. Shell diameter increased at times of decreasing abundance of the species, culminating before extinction. *Globorotalia scitula* shows decreasing shell weight and increasing shell size throughout the investigated time interval, with a stable morphology of the tests. The lack of a distinct morphological reaction to stress preceding their extinction suggests either that in these protists environmental stress is not associated with morphological reaction, or that the environmental stress acted too fast to trigger a morphological reaction observable in the present sampling resolution.

### **10:30 Response of annual plants to longtime rain manipulation experiment in the field**

Sabine Hänel

*Vegetation Ecology, Institute for Evolution and Ecology, Universität Tübingen*

A longtime rain manipulation experiment was conducted at two sites in Israel to simulate the predicted decrease of rain as a consequence of global warming. After 9 years a set of abundant annual plant species was studied and we detected significant differences in traits that are considered to be key traits of adaptation to drought.

### **11:20 Why daddy eats his own young: Personality-dependent filial cannibalism in**

***Pomatoschistus microps***

Martin Vallon

*Animal Evolutionary Ecology, Institute for Evolution and Ecology, Universität Tübingen*

Many fish species show extensive brood care including the active ventilation of eggs with oxygenated water. But some fish also show filial cannibalism, i.e. they consume all or parts of their own eggs. This behaviour is well known and yet its adaptive benefit remains largely unclear. There are numerous empirical studies, but these mostly don't match the predictions of theoretical models. This discrepancy may be due to previous work focussing on environmental factors as explaining variables. Using the

common goby (*Pomatoschistus microps*) as a study species, here I investigate the hypothesis that individuals consistently differ in the amount of filial cannibalism they show, as well as in other brood care (egg fanning) and non-brood care behaviours (activity and aggression). Research on various animal species shows that there are consistent behavioural differences between individuals, so called animal personalities, and that these differences can have substantial fitness effects. Furthermore these behavioural traits might be correlated with each other, e.g. individuals with consistently high aggression levels could tend to cannibalise more eggs.

#### **11:40 Multiple males contribute to the progeny of one *Onchocerca ochengi* female**

Julia Hildebrandt

*Evolutionary Biology, Max Planck Institute for Developmental Biology, Tübingen*

*Onchocerca ochengi* is a filarial nematode parasite of cattle and is very closely related to *Onchocerca volvulus*, the causative agent of the riverblindness, a disease in humans. Females induce formation of nodules in the skin of the host and stay in these nodules for their lifetime (>15years). A fertilized female releases about 1000 microfilariae (first stage larvae) per day. Males are 2-4 cm long, only about a tenth of the size of a female. They do not adhere to the host's tissue and therefore, at least in principle, are free to move between females. However, it has been speculated that males tend to stay as territorial males in a nodule, thereby ensuring continuous access to a female but also limiting themselves to one mate. This would suggest an essentially monogamous reproductive strategy.

In order to investigate this further we developed a method to isolate DNA suitable for PCR amplification of single locus genomic DNA sequences from individual worms. This allows molecular genotyping of embryos, microfilariae and their putative parents. Our results demonstrate that females frequently carry offspring of different males at the same time. Sometimes some of the fathers of the progeny of females could not be found in the respective nodules suggesting that at least some of the males leave the nodules after mating.

#### **12:00 Behavioural monitoring of the alpine newt (*Mesotriton alpestris*) from the perspective of animal personality**

Karla Dietrich

*Comparative Zoology, Institute of Evolution and Ecology, Universität Tübingen*

Studying "behavioural syndromes" of individuals can be used to shed light on underlying mechanisms of microevolutionary processes. The term "behavioural syndrome" describes the frequently observed fact that individuals behave in a consistent way through time or across contexts. Different behavioural syndromes within populations reflect behavioural options that are each successful, allowing individuals to choose different strategies for survival and reproduction.

While the existence of behavioral syndromes is described for several bird, fish and mammal species, such studies are scars in amphibians. Especially for newts only few behavioural studies were carried out, and methods for behavioral assays are not established and tested.

In the context of a long term study on individual fitness differences in newts, wild caught alpine newts

from two forest populations close to Tübingen (Schönbuch and Rammert) were used to examine relationships among 4 behavioural measures: aggression, response to a novel object, open-field activity and latency to explore. Correlating these traits will show if behavioural syndromes in alpine newts exist and with the specific behavioural patterns it will be possible to classify individuals along a continuum of bold (risk-taking) and shy (risk-avoiding). Furthermore, correlations of these behavioral strategies with other measures indicating individual fitness can be assessed.

### **12:20 Morphological and chemical analyses of adhesive tarsus structures in insects**

Julius Braun<sup>1</sup>, Manuela Gradl<sup>2</sup>, Tim Nicholson<sup>2</sup>, Klaus Albert<sup>2</sup>, Oliver Betz<sup>1</sup>

<sup>1</sup> *Institut für Evolution und Ökologie*, <sup>2</sup> *Institut für Organische Chemie, Universität Tübingen*

Insects are able to adhere to even smooth surfaces during locomotion. The adhesive performance is provided by morphological features of the tarsal surface as well as the chemical properties of adhesive liquids. We conducted both morphological examinations of the tarsus structure and chemical analyses of tarsal liquids in several beetle species. We also measured the adhesive performance as a function of surface energy and roughness. To examine the chemical composition of the tarsal fluid we directly collected samples from the tarsal surfaces via both solid-phase microextraction and solvent extraction. Subsequent analyses of the secretion were conducted by means of hyphenation of gas-chromatography to mass-spectrometry (GC-MS). According to its high sensitivity in the microgram range, this method is well-suited to characterize small sample amounts of the tarsal liquids.

### **15:00 Family Business – Kinship groups and the beginning heredity of social status in the early Neolithic of Southwest-Germany**

Michael Francken

*Paleoanthropology, Institut für Naturwissenschaftliche Archäologie, Universität Tübingen*

The Neolithic revolution is generally regarded as one of the periods when human society became more complex. Archaeological findings reflect this transition in many aspects of the material culture. Based on these findings a beginning heredity of social status is assumed for the early Neolithic phases, but unfortunately the value of archaeological artifacts for the analyses of social structures is limited. More significant information can be obtained by the reconstruction of kinship groups based on skeletal traits. The aim of this study is to further examine the hypothesis of beginning heredity by examining the relationship between archaeological findings and kinship groups in two populations of Neolithic individuals from the cemeteries of Schwetzingen and Stuttgart-Mühlhausen (Germany). The analyses of the kinship groups focuses mainly on the scoring of anatomical traits, supplemented by the examination of frontal sinus morphology and DNA-analyses. 175 individuals have been examined in Schwetzingen and 135 in Stuttgart-Mühlhausen, including a large number of well-preserved subadults in both cemeteries. The analysis is still ongoing but preliminary results will be presented in this talk.

## **15: 20 Micromorphological analysis of the site formation processes at Schöningen 13 II-4 and their archaeological implications**

Mareike Stahlschmidt

*Geoarcheology, Institut für Naturwissenschaftliche Archäologie, Universität Tübingen*

The middle pleistocene open-air site complex of Schöningen 13 II in northern Germany consists of numerous superimposed sites. The most famous site, 13 II-4, contains a concentration of horse remains, wooden spears and several purported fireplaces, represented by reddened sediments (Serangeli 2010, Thieme 2007). Being one of the oldest northern European sites, this site provides valuable information on early hominin behavior in colder latitudes.

The depositional context of any archaeological site, as revealed by study of the site formation processes, is key to the interpretation of its archaeological remains. In the case of Schöningen 13 II-4 it is vital to understand how the archaeological remains were deposited and how post-depositional processes influenced the preservation. Micromorphological analyses are being conducted to decipher the geogenic and anthropogenic processes that led to the formation of the site. These results will provide a contextual basis for the interpretation of the site including essential information for the faunal, botanical and lithic analyses. Serangeli, J., Böhner, U., Lehmann, J. (2010). *Rettungsgrabungen im Tagebau Schöningen. Die Untersuchung des DB-Pfeilers in den Jahren 2007 bis 2009. – Berichte zur Denkmalpflege 2010, 3, 85-88.* Thieme, H. (Hrsg.) (2007), *Die Schöninger Speere – Mensch und Jagd vor 400000 Jahren.*

## **15:40 The Strength of Neanderthals revisited**

Astrid Slizewski

*Paleoanthropology, Institut für Naturwissenschaftliche Archäologie, Universität Tübingen*

Since the first discoveries of Neanderthal bones during the 19th century, the Neanderthal man is said to have been an extraordinary robust human with short, because cold adapted, extremities and a very pronounced musculature. It is assumed that musculoskeletal markers are pronounced in relation to the thickness of the attached muscle. Still, the significance of muscle attachments and joint area for strength and muscularity are unknown. Therefore, estimations on muscle mass of archaeological individuals are generally not reliable. The assumed higher development of bone mass and musculature in Neanderthals are ascribed by some authors to genetic differences between anatomically modern humans and Neanderthals as they already see a crucial discrepancy between Neanderthal and modern children. Long term medical studies have proven a close relation between muscle cross sectional area and bone cross sectional area. Previous paleoanthropological studies on the cross section of Neanderthal bones arrived at the conclusion that their cortical bone was generally thicker than that of modern humans. The next step - a reconstruction of the factual strength of Neanderthals - has not been made yet.

This dissertation aims at a direct comparison of strength and muscle mass between Neanderthals and earliest modern humans in Europe. The cortical area of radii is measured directly with a mobile peripheral Quantative computed tomography. Calculation of muscle mass and strength also for non-adult Paleolithic individuals could reveal genetical differences in bone and/or muscle development between anatomical moderns and Neanderthals if existent.

**16:00 Stable isotope analyses on the fauna from Payre (Ardèche, France)**

Michaela Ecker

*Biogeology, Institut für Ur- und Frühgeschichte und Archäologie des Mittelalters, Universität  
Tübingen*

The site of Payre is located in Southern France, on the Rhone and Payre rivers. Archaeological excavations revealed lithics, faunal remains and hominid remains from the Middle Palaeolithic (dated to end of MIS 8 to beginning of MIS 5; approximately 125 000 to 250 000 years ago). Neanderthals used the site for several occupations. The different biotopes around the site provided access to diverse resources. Oxygen and Carbon stable isotope analyses were carried out on tooth enamel from various Herbivores, Carnivores and a Neanderthal. Diet, habitat reconstruction and influence of climatic change were investigated with this method. Another research question was to compare the results from stable isotope analyses to the results from dental wear analyses (mesowear and microwear) on the same teeth. A reconstruction of the ecology around Payre was possible, showing that the local topography is the largest influence.



## Keynote speaker - Friday

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Source: <http://rolexawards.com/>

**Prof. Dr. David Lordkipanidze** is a Georgian anthropologist and archaeologist. After defending his PhD in Russia, he returned to Georgia in 1991, and began an excavation at Dmanisi in southeastern Georgia. By the end of that year, human jawbone was found in the prehistoric layers containing the remains of saber-toothed cats. The site has since yielded skulls and partial skeletons from at least five individuals, including one adolescent. These have been dated to 1.8 million years ago, the oldest human remains ever found in Eurasia. These early *Homo* skeletons are recognized as the earliest-known human ancestors to venture out of Africa and occupy other continents.

**Prof. Dr. David Lordkipanidze** has received many awards, including the Georgia's Order of Honour (2000), Award of the Prince of Monaco (2001), the French Order of "Palme Académiques" (2002), the French Order of Honour (2006), and the Rolex Award for Enterprise (2004). He was appointed Director General of the Georgian National Museum in 2004. In 2007 he became both a Foreign Member of the United States National Academy of Sciences and a Fellow of the World Academy of Art and Science (U.S.). Since 2009, he is a member of the Georgian Academy of Sciences.

Location of Dmanisi, Georgia  
(Source: [http://en.wikipedia.org/wiki/Homo\\_georgicus](http://en.wikipedia.org/wiki/Homo_georgicus))





## Abstracts - posters Friday 14:00

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### Poster --- The Central Valleys of Oaxaca as a plant dispersal corridor in the early Holocene

Jonathan Baines

*Archaeobotany, Institut für Naturwissenschaftliche Archäologie, Universität Tübingen*

Identification of four plant taxa from Archaic horizons (8<sup>th</sup> and 7<sup>th</sup> millennium BC) no longer found at Early Formative sites, or later, in the Central Valleys, signal a possible route of contraction of the southern Mexican vegetation following the climatic oscillations of the last glacial maximum. Considering the lack of continuity of these species, calling the depression of Oaxaca a bottleneck to plant dispersal to higher latitudes seems less valid than an ecological margin interpretation. Primarily because the region is topographically enclosed by mountains from other surrounding ecosystems at the Pacific Ocean, Gulf and the cloud forested uplands of Chiapas. Second, because the same environment existed northwards along the valley complex into the Central Plateau. Recovery of bones from a single *Mastodon cf. americanum*, relatively dated by Palaeo-Indian era (before 9 500 BC) stone tools, in what was then likely a marsh near the Mitla Valley floor, reinforce the idea that the area represented a late disappearing ecotone of final Pleistocene taxa. Whilst the region's fossil pollen record did not reveal removed taxa, it is suggestive of altitudinal shifts both in *Quercus* and *Pinus* species; about 100 metres in the last 1 600 years and about the same during the Classical era. The Archaic pollen remains contrasted with the macro-fossils in reflecting a significantly different vegetation responding to the change towards cooler and more arid conditions. But both spectra concur that plant community composition remained little varied compared to that of today, with the vegetation responding to the changing environmental conditions then in similar ecological relationships as observable in the flora today.

### Poster --- Virtual dental tissue analysis of modern human upper first deciduous molars

Catherine C. Bauer<sup>1</sup>, Cinzia Fornai<sup>2</sup>, Stefano Benazzi<sup>2</sup>, Katerina Harvati<sup>1,3</sup> & Gerhard W. Weber<sup>2</sup>

<sup>1</sup>*Paleoanthropology, Institut für Naturwissenschaftliche Archäologie, Universität Tübingen*

<sup>2</sup>*Department of Anthropology, University of Vienna, Austria*

<sup>3</sup>*Senckenberg Center for Human Evolution and Paleoecology, Tübingen*

Deciduous dentition is generally ignored for taxonomic purposes, for example to distinguish between different human species, such as Neanderthals and anatomically modern humans (AMH). Currently available data are mostly restricted to 2D measurements, such as the bucco-lingual or mesio-distal diameter. For this study, in collaboration with the University of Vienna, micro-CT-scans of recent and upper palaeolithic first upper deciduous molars were made. These scans were then automatically segmented, using a watershed segmentation algorithm for their three different „materials“: the enamel cap, the dentine and the pulp chamber. Minor manual corrections on the segmented data were required to refine the boundaries between the different materials. This segmentation algorithm offers the

opportunity to analyse the different components, for example in terms of their volume and shape (geometric morphometrics). Given the fact that Neanderthal dental morphology is different from the AMH morphology (e. g. taurodontism), this method may prove to be a useful additional tool for future taxonomic investigations.

**Poster --- Assessing population differentiation in neighboring populations of the alpine newt (*Ichthyosaura alpestris*) using molecular markers**

Lisa Bolanz

*Comparative Zoology, Institute of Evolution and Ecology, Universität Tübingen*

Population differentiation can occur rapidly through the interaction of different forces. Geographic barriers, preventing migration between habitats, can play an important role. The present study examines populations of the alpine newt (*Ichthyosaura alpestris*) in two forests in the vicinity of Tübingen (to the North Schönbuch and to the South Rammert). Since amphibian populations are open systems in which individuals from other populations can migrate into, gene flow takes place. However, amphibians are characterized as having limited dispersal abilities, especially in fragmented habitats.

Fast evolving, neutral molecular markers such as nuclear microsatellites, can be used to determine interpopulation genetic diversity and the amount of gene flow in systems which are thought to be separated only for a relatively short time. Furthermore, mitochondrial markers (mtDNA) give insight into the history of a population. For this study, genetic variation at several microsatellite loci is surveyed for the two populations and genetic divergence is estimated. Additionally, three mtDNA fragments are sequenced in order to find out whether the two populations originate from a single founder population.

The results will contribute to the question how efficient geographic barriers like the Neckar valley and the city of Tübingen act on alpine newt populations. Moreover, it will contribute to the knowledge on population dynamics and determine microsatellite loci suitable for population genetic studies of the alpine newt, a poorly studied species.

**Poster --- Individual identification from natural marks – pattern mapping of ventral spots in alpine newts (*Ichthyosaura alpestris*)**

Andrea Buchholz

*Comparative Zoology, Institute for Ecology and Evolution, Universität Tübingen*

Investigations of populations often request the identification of individuals in the course of the experiment. Several marking techniques are used in field studies. For newts, the most common methods are toe clipping, tattooing and PIT-tagging. These methods have different disadvantages, especially due to the regeneration ability of urodolians. Moreover it is of major importance to avoid an influence of the integrity of the organism, however all the above-mentioned methods are invasive. In the framework of a long term population study of two alpine newt populations from forests in the vicinity of Tübingen (Schönbuch and Rammert), I used a non invasive method, based on computer aided photographic identification, using the software I<sup>3</sup>S. I established methods to take photos of the ventral spot pattern in a standardized manner to produce images which are used to create fingerprint files needed for the computer aided matching



process. Finally, I tested the reliability of individual matching for females and males of the two study populations. This study contributes to the establishment of non-invasive marking methods for field studies on urodelians. It identifies the requirements for a reliable photographic identification and determines its limitations. By using individuals of two populations, it also contributes to the question whether population specific patterns in the alpine newts can be expected.

**Poster --- The effect of East Asian Monsoon climate on flux and assemblage of planktic foraminifera in sediment traps in the South China Sea**

Sofie Jehle\*, Hartmut Schulz\*, Martin Wiesner#, Niko Lahajnar#, Michal Kucera\*

\* *Micropaleontology Group, Department Geosciences, University of Tübingen*

# *Institute for Biogeochemistry and Marine Chemistr, University of Hamburg*

The East Asian Monsoon and the linked El-Nino Southern-Oscillation system are two important factors determining the tropical oceanography of the South China Sea (SCS). One of the main changes during annual seasons is the position and strength of upwelling induced by the SCS monsoon regime.

In this work, we target to identify effects of fluctuations in planktic foraminiferal productivity and faunal assemblage variability occurring off the Vietnamese coast. Planktic foraminiferal flux (pFF) was investigated in two sediment trap stations, one ca. 80 km east off the Vietnamese coast (SCS-SW), the second ca. 80 km off the Sunda Shelf (SCS-S) at 1200 m below water surface. Three trap series from 2004-2005 and 2006-2007 in 49 samples were analysed in different size fractions of 125 µm to 1 mm.

Most abundant species were *Globigerinoides sacculifer*, *Globigerinoides ruber*, *Globigerinella siphonifera*, *Neogloboquadrina dutertrei*, *Globigerinoides ruber* (platys), *Puleniatina obliquiloculata*, *Globorotalita rubescens*, *Globigerina bulloides*, *Globigerinina glutinata* and *Globorotalia scitula*. Since most of them are symbiont-bearing and dwell in the euphotic zone, their changes in relative abundance can be linked to variations in Chlorophyll a concentration. The abundances of *G. rubescens* and *G. scitula* were less correlated to Chlorophyll a levels presumably since they are barren of photosynthetic symbionts and completely depend on a diet of planktonic organisms. Results from remote sensing (sea surface height, SST, Chlorophyll a, wind strength/direction) and planktic foraminifera faunal assemblages point to a particular upwelling event in June 2006 and to a distinct fauna over the period May 2006 - April 2007.

**Poster --- Individual egg wrapping behaviour in the alpine newt (*Ichthyosaura alpestris*) and the influence of predator presence and different densities of conspecifics**

Deike Lüdtkke

*Comparative Zoology, Institute of Evolution and Ecology, Universität Tübingen*

Specific reproductive strategies are described for many species and are often shown to be adaptive. Individual differences in this behaviour and plasticity according to different conditions present an opportunity to investigate how these traits influence fitness. Females of the alpine newt wrap their eggs into leaves during oviposition, and by this protect them against predation and UV radiation. In the framework of a long term study on fitness traits in the alpine newt, it was tested whether individual differences of egg wrapping behaviour exist and how different conditions influence this behaviour. Wild

females were caught and brought into the laboratory during the breeding season. They were divided into three experimental groups with different treatments: presence of few conspecifics, simulated high density of conspecifics and presence of predators (three-spined sticklebacks). Females were placed into aquariums with plastic strips, simulating plant leaves for oviposition.

By categorizing the eggs of individual females according to the degree of wrapping (unwrapped, attached between two strips and wrapped up in one strip), it was examined whether individual differences of wrapping behaviour can be observed, and whether the different conditions influence the behaviour. This study contributes to the question whether specific adaptive traits vary individually and with different external conditions. In the framework of the long term study, it will be possible to correlate the individual egg wrapping behaviour with other traits potentially influencing individual fitness.

### **Poster --- Animal Physiological Ecology – Environmental Stressors and Responses**

Diana Maier

*Animal Physiological Ecology, Institute for Evolution and Ecology, Universität Tübingen*

Research in the Animal Physiological Ecology focuses on the mechanisms of cellular, subcellular and physiological responses of invertebrates and fish to anthropogenic and natural stress factors in their environments, and on the ecological, ecotoxicological and evolutionary implications of these mechanisms.

Current projects include:

- The Hot Snail Project investigates mechanisms of heat tolerance in Mediterranean land snails and implications on phenotypic variance. This is accomplished by collaboration with Esslingen University of Applied Sciences in the frame of a “twinning project”.
- SchussenAktiv is a ‘before and after’ study. The sewage treatment plant Langwiese located at the Schussen stream which empties into the Lake Constance will be equipped with an additional cleaning stage using an activated carbon filter. For this purpose, fish, gammarids, sediment and water are analysed for toxic potential and action.
- In the NOMIRACLE project (Novel Methods for Integrated Risk Assessment of Cumulative Stressors in Europe) the impact of chemicals and chemical mixtures in combination with natural abiotic stressors on development, behaviour, organ integrity and stress protein induction in early life stages of the zebrafish, *Danio rerio*, is tested.
- In a series of PhD projects, epigenetically induced body plan modifications in gastropods and the sensitivity of the embryonic development in *Marisa cornuarietis* is investigated.
- Furthermore, impact assessment of environmental chemicals is examined by different biomarkers and biotest applications in the field and lab, considering microevolutionary processes like the development of tolerance.
- Other aspects of research are the effects of pharmaceuticals in fish and the biology and genetic diversity of bats as a requisite for conservation strategies.
- In addition, the implementation of ecotoxicological theories in practical application is evaluated in collaboration with a spin-off enterprise, the Steinbeis-Transfer Center for Ecotoxicology and Ecophysiology Rottenburg.



# Abstracts - presentations Saturday

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## **9:20 Biodiversity Information Systems – Possible Solutions taking a Topic Map on Myxogastria as an Example**

Anja Kries \*, Ralf Eilbracht §, Michael Weiß \*

\* *Organismic Botany Group, University of Tübingen*, § *Nexxor GmbH, Stuttgart*

The number of species in the world is still uncounted, and the speed of extinction competes the speed of species description. Moreover, much information is hardly accessible because it is published in small journals, exotic data formats or expansive books that are subject to copyright restrictions. A number of internet databases have been started, but information is still scattered. Many projects are hampered by financing problems. MyxoMap is an experiment on using Topic Maps for morphological description. Currently, about 100 species of Myxogastria common in Germany are included to use it for identification. A number of other applications seem possible. Topic Maps are an ISO-standardized, semantic technology. They can be described as a knowledge network. Basic topic maps can be generated from structured data such as spreadsheet tables or databases. The resulting structure is extremely flexible. Multiple character states can be added as new topics at any time. Different opinions can be presented by scoping names. Topics within the map are interconnected by associations. Following associations allows intuitive data handling and creating numerous different views presenting maximum clarity. This might also improve displaying other complex data as ecological associations or biochemical and signaling pathways. Topic Maps holding corresponding topics can be fused – finally, they might add up to a Map of Life.

## **9:50 Density and spatial distribution of an attractive species: effects on plant-pollinator interaction structure in grasslands.**

Sven Hanoteaux\*, Eva-Maria Hoch\*, Katja Tielbörger\* & Merav Seifan\*

\* *Department of Plant Ecology, Institute for Evolution and Ecology, University of Tübingen*

A majority of plant species in grasslands are dependent on insects for their pollination. The major pollinator functional groups are known to be polylectic. As such, the reproductive success of grasslands species might be affected, not only by the plant species' own traits but also by the presence and identity of its neighbors. Driven by the pollinator's abundance and preferences, the pollination success of grassland species is likely to be affected by the abundance and spatial distribution of attractive plant species. In order to test for these potential effects, we constructed a field experiment in which *Centaurea cyanus* was introduced in grasslands at two density levels and using two different spatial distributions, aiming at investigating its effects on the plant pollinator interaction structure in two grasslands of the Swabian Alb (Germany). By comparing different network metrics (at the network and species level) among treatments, we discuss the potential implications of the introduction of attractive species in European grasslands such as shifts in competition and changes in recorded specialization indices.

### **10:10 Studies on cellulases in the nematode *Pristionchus pacificus***

Lisa N. Schuster and Ralf J. Sommer

*Evolutionary Biology, Max Planck Institute for Developmental Biology, Tübingen*

The beetle associated nematode *Pristionchus pacificus* has seven cellulase gene predictions in its genome. These genes (*Ppa-cel-1* – *Ppa-cel-7*) are not closely related with the ones from plant parasitic nematodes, indicating an independent horizontal gene transfer event.

In my thesis I study the function of the *P. pacificus* cellulases and their possible roles in the biology of the worm. There are differences in domain architecture, abundance, expression level and gene regulation among the seven *P. pacificus* cellulases:

A Pfam-domain search showed that some of the cellulases do not include all functional domains and active sites. Only *Ppa-CEL-2* and *Ppa-CEL-3* possess a cellulose binding module (CBM). Cellulase activity was detected in partially purified recombinant *Ppa-CEL-2* indicating that the nematode's cellulolytic activity *in vivo* is caused by at least one of its cellulases.

To test whether the seven cellulase genes are regulated independently from one another, qRT-PCR experiments were performed. I found that *Ppa-cel-1* and *Ppa-cel-2* have the highest expression levels whereas *Ppa-cel-3* is highly upregulated only in adult worms. All other cellulases are expressed at very low level, suggesting that they might even be pseudogenes

The question if the cellulase genes are regulated on response to food was also addressed by qRTPCR after feeding the worms with different carbohydrate containing substrates. Hardly any effect on cellulase gene expression was seen in this experiment.

In summary, my results show that different cellulases of the same endoglucanase family within a single nematode species might play different ecological and developmental roles in the worm's biology.

### **11:00 Assessment of toxic potentials in the Erms river by means of biochemical and histological biomarkers in bullhead (*Cottus gobio*)**

Katja Bader

*Animal Physiological Ecology, Institute for Evolution and Ecology, Universität Tübingen*

The study aims to evaluate the effects of contaminants present in the Erms river on the health status of feral fish by means of biochemical (hsp70) and histological biomarkers. At five different sampling sites located in the area of the Swabian Alb biosphere reserve, specimens of the benthic fish species *Cottus gobio*, were sampled by means of electrical fishing (passive monitoring), dissected in the field and prepared for microscopical and biochemical analyses.

Results of the histological investigations showed strong reactions in the tissue of the gill, liver and kidney of *C. gobio* at all five sampling sites.

In November 2008, approximately 3.500 L of light fuel oil entered this river. Following this accident, a higher stress protein level and a slightly increased amount of atrophic mucous cells in gills were observed in sampled bullheads. Eight months later, the kidneys of various test organisms showed severe lesions and necrosis.

**11:20 Arresting mantle formation and re-directing embryonic shell gland tissue by platinum<sup>2+</sup> leads to body plan modifications in *Marisa cornuarietis* (Gastropoda, Ampullariidae)**

Leonie Marschner

*Animal Physiological Ecology, Institute for Evolution and Ecology, Universität Tübingen*

In 2010, our group reported that high platinum concentrations cause body plan alterations in snails and prevent the formation of an external shell during *Marisa cornuarietis* embryogenesis. Now, this study presents SEM-images and histological sections of Pt-treated and untreated *M. cornuarietis* embryos and compares 'normally' developing and 'shell-less' embryos during embryogenesis, in order to enlighten the morphological prerequisites for this body plan shift. Both groups showed similar development until the onset of torsion 70 to 82 h postfertilization. In the platinum-exposed embryos, the rudimentary shell gland (which usually evaginates and, later, forms the mantle) does not spread across the visceral sac, but remains on the ventral side of the visceral sac where it secretes calcium carbonate. Without the excessive growth of the shell gland, a rotation of the visceral sac relative to head and foot does not occur, as being normal during the process of torsion. How signal transduction pathways regulating mantle growth are biochemically affected by platinum remains to be elucidated.

**11:40 The genome of the Black Death**

Verena Schünemann

*Paleogenetics, Institut für Naturwissenschaftliche Archäologie, Universität Tübingen*

The Black Death is considered to be one of the most devastating epidemics in human history. In the first five years, between 1347 and 1352, approximately 30% -50% of Europeans died. Until recently the causative agent of this epidemic was discussed highly controversial, several pathogens –*Bacillus anthracis*, *Yersinia pestis* or an unknown *Filovirus*- were taken into account as putative agents. Previous genetic studies were often criticized as possible contaminants of modern DNA or closely related soil bacteria. Novel methodical approaches to prove the authenticity of ancient DNA using characteristic damage patterns enabled us to show that *Yersinia pestis* was at least one of the causative agents of the Black Death. For this study DNA of skeletal remains from over 100 medieval plague victims buried in the East Smithfield cemetery in London were analyzed. In the next step the ancient genome of *Y. pestis* from four of the victims was reconstructed to 30-fold genomic coverage. Phylogenetic analysis revealed that the ancient pathogen is ancestral to most recent plague strains and very close to the root of all known human pathogenic *Y. pestis* strains. These findings indicate that the plague originated as a human pathogen in the late medieval age and suggests that all previous plague epidemics were caused by an extinct or so far not sequenced branch of *Y. pestis* or a different pathogen. Thus, the first genome of an ancient pathogen offers a novel opportunity to study the evolution of pathogens.



# Notes

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