



AIAS FELLOWS SPRING 2015



AARHUS
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AARHUS INSTITUTE OF ADVANCED STUDIES

AIAS Fellows Spring 2015
Version: January 2015
Editor: Lena Bering

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Alexander Panayotov

Postdoc

AIAS and previously University of Cambridge,
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Fellowship: 01 Oct 2014 – 30 Sep 2017

Project title

Minority status and identity: A case study of the Jewish minority in Byzantium

Project description

The project aims to investigate the social and economic relations in the Byzantine empire that influenced the communal life of the Jewish communities. The scope of the project is defined temporally and spatially. It is proposed to begin in the fourth century and end in the seventh century CE. This will allow the inclusion of the widest possible selection of epigraphical, literary and archaeological sources. Geographically, the project will include the areas of the Balkans, the Aegean, Asia Minor and Cyprus.

Panayotov's overall aim is to establish the place Jews occupied in the stratigraphy of Byzantine society and how the social and political changes in this society influenced their communal life. This will require a study of Jewish everyday life and he will focus on the communal organisation and leadership of the Jewish community, the social status, occupation and cultural concerns of its members. His innovative idea is that Byzantine legislation has actually influenced the use of Greco-Roman civic terminology within the Jewish communities in the areas concerned, thus helping to preserve their communal structure. This facilitated the involvement of the Jewish minority in the public life of the Byzantine empire and relations to Christians, the wider Jewish world and other minority groups like the Samaritans.

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Project title

Cell modulation and stimulation through laser photodynamic treatments at single cell level

Project description

The main objective of this research project is to implement a methodology that allows the modulation of physiological cell responses at the single cell level by means of a photodynamic approach. The photodynamic effect produces Reactive Oxygen Species (ROS) when a photosensitizing compound is optically excited in the presence of molecular oxygen. ROS at low concentrations are produced by the cells themselves as physiological signaling agents, so a low-dose photodynamic treatment activates the same cell signaling pathways that rely on endogenous ROS generation. Making use of this photodynamic methodology it is anticipated that a whole range of cell responses (e.g. proliferation, differentiation, reprogramming, etc.) will be elicited on in vitro studies depending on the photodynamic dose. The specific objectives of this proposal will be the study of multiple cell responses induced by the photodynamic treatment. The project goals will be achieved by making use of a femtosecond pulsed laser microscopic system that allows the photodynamic treatment of a single cell at a time. The laser setup provides with submicron spatial accuracy and very fine tuning of the delivered light dose. Different assessment methodologies, ranging from bright field imaging to fluorescence microscopy and biochemical analysis to cite a few, will be employed to study cell behaviour during and after the treatments. The obtained results will be most relevant as previous studies on physiological responses to photodynamic ROS exposure are very scarce and none has been done at the single cell level. Also a reliable methodology to induce cell proliferation or modulation on a desired cell will be of utmost importance in the Biomedical field.

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Amy Iler

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Fellowship: 01 Oct 2014 – 30 Sep 2016

Project title

Mechanisms underlying interspecific variation in flowering responses to climate change: the roles of abiotic drivers and phenotypic plasticity

Project description

Climate change is rapidly reshaping the biological world. One of the most prominent biological indicators of climate change is phenology – the timing of biological events – such as flowering. Phenology is intimately tied to the survival and reproduction of organisms, and thus is critical for their long-term persistence. Across the world, phenology is shifting earlier on average, but there is substantial variation in phenological responses across species and ecosystems.

The overarching objective of my research is to provide increased mechanistic insight into the ecological and evolutionary factors that underlie this variation in species' phenological responses to climate change. To address this, I will use two uniquely comprehensive datasets of flowering phenology and climate from snow-dominated ecosystems (Greenland and Colorado, USA), areas where the most extreme changes in climate and phenology are observed. In addition, records of long-term changes in floral abundance are available at one site, providing a measure of long-term performance of species and rare insight into the consequences of climate change. I will use novel analytical techniques to investigate key factors, and interactions among these factors, that are likely to underlie variation in flowering responses across species: (i) sensitivity of flowering to climate, (ii) plasticity in flowering time, and (iii) seasonality (spring vs. summer-flowering species). My research aims to create a more generalized framework of plant responses to climate change in snow-dominated ecosystems, which will help to predict these responses under future climate scenarios.

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Anja Kamp

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Fellowship: 01 Oct 2014 – 30 Sep 2017

Project title

Diatoms in Darkness and Anoxia

Project description

This research project aims on revealing the eco-physiology and the environmental significance of anaerobic nitrate respiration by diatoms, eukaryotic microorganisms that are highly abundant in the oceans. Nitrate respiration by microbial eukaryotes is severely understudied and until recently only foraminifera, gromiida, and fungi were known to respire nitrate when oxygen is absent. The discovery that also the most important phototrophic group of microbial eukaryotes, the diatoms, has an anaerobic nitrate metabolism came absolutely unexpected. First, it was proved that the benthic diatom *Amphora coffeaeformis* uses intracellularly stored nitrate for Dissimilatory Nitrate Reduction to Ammonium (DNRA). Meanwhile, DNRA was also discovered in the ubiquitous pelagic diatom *Thalassiosira weissflogii*. These are the so far only records of nitrate respiration by phototrophic eukaryotes, and *T. weissflogii* is the first marine pelagic eukaryote shown to have an anaerobic nitrate metabolism. It is still unclear whether these species represent isolated cases or the tip of the iceberg.

The main objectives of this research project are thus (A) to screen for more diatoms that respire nitrate in oxygen-depleted marine (micro)habitats, (B) to identify the functional genes involved in eukaryotic nitrate respiration, and (C) to evaluate the impact of this so far overlooked scenario on the marine nitrogen cycle. Eco-physiological experiments with nitrate-storing diatom isolates will be combined with modern molecular approaches and field studies to arrive at a comprehensive understanding of anaerobic nitrate respiration by diatoms. Diatoms might be of much greater importance for the marine nitrogen cycle than expected, especially in the light of the spreading anoxic and hypoxic zones of our oceans.

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Project title

Markets, Productivity, Long Term Risks, and Sustainability

Project description

Modern societies are facing severe challenges, including changing demographics, financial and economic instability, productivity and international pressures in a globalizing world, and the long run sustainability of current market structures.

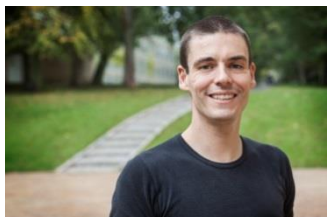
With longevity increasing faster than retirement ages, shrinking birth rates, and unemployment on the rise, the result is larger shares of the populations not contributing to production, and an older segment drawing on public health systems for more years, hence adding to the burden on public budgets. Financial crises can lead to real economic crises, with increasing unemployment and declining real wages, and these shocks spread internationally. Globalization implies that jobs are lost to lower cost producers abroad, and to maintain reasonable wages it is necessary to increase productivity. One possibility is reallocation of employees to the most productive employers.

Evaluating alternative policy suggestions requires making predictions under conditions quite different from past experience, and thus a model that will generate the future realizations. To identify this, it is necessary to have detailed, individual level data on the decision makers in society. Denmark has unique, detailed register data, and researchers are allowed to merge anonymized registers on wages, health, aging, retirement, unemployment, income, wealth, firm production, financial variables, etc. Using these data, the model is identified empirically, and the policy analysis conducted by resolving the model under new conditions. What is best policy, and will markets support it?

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Bjørn Panyella Pedersen

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USA Fellowship: 01 Oct 2014 – 30 Sep 2017

Project title

Molecular Mechanism of Sugar Uptake in Humans

Project description

The project supported by my AIAS fellowship addresses fundamental scientific questions pertaining to an essential membrane transport system in humans; namely facilitated sugar transport, where new insights will have immediate scientific impact.

Facilitated sugar transport is the process by which sugar-molecules are taken up from circulation into the individual cells of the body as an ubiquitous energy and carbon-source. Furthermore sugar uptake contributes to the generation of reducing power in the cell. Facilitated sugar transport in humans is made possible by sugar transporters called GLUTs and SWEETs located in the cellular membrane, and every cell possesses these sugar transport systems. For both GLUTs and SWEETs, structural information is sorely lacking to address important mechanistic questions to help elucidate the molecular mechanism by which they can move sugars across the cellular membrane in an efficient manner. I will address these systems using a complementary set of methods founded in macromolecular crystallography to elucidate 3-dimensional structure.

The proposed work will help to uncover general principles of facilitated diffusion systems. Furthermore an improved understanding of sugar homeostasis in humans has tremendous potential for improving general public health, and the proposed work will stimulate pharmacological efforts to identify and develop compounds of therapeutic value for e.g. obesity, diabetes and cancer.

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Cheryl Mattingly

Professor

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Fellowship: 01 June 2013 – 30 Sep 2016

Project title

Moral Epidemics and the Making of a "Good Family": Raising Children with Autism and ADHD in the United States and Denmark

Project description

The study is both conceptual and ethnographic. At the conceptual level, it involves a collaborative conversation between anthropologists and philosophers (at Aarhus University and internationally) concerning the moral life and the human condition. It has generated three interdisciplinary and international conferences held (and forthcoming) at AIAS, "Moral Experience," (Sept. 2013), "Moral Engines: Exploring the Ethical Drives in Human Life," (June 2014) and "The Human Condition: Reinventing Philosophical Anthropology," (June 2015). An edited book, *Moral Engines: Exploring the Ethical Drives in Human Life* (editors: Mattingly, Louw, Wentzer, Dyring) builds from these conferences and is under contract with Berghahn Press.

The ethnographic study explores the ethics of care, parental activism and the mediating influences of home and neighborhood environments on care practices. It examines the relationship between locally salient normative expectations of the "good family" and the lived experience of families who deviate from those expectations. It focuses especially on processes of moral transformation as parents struggle to acquire treatment services for their children, counter the stigmas attached to disability and give children "real childhoods" through participation in everyday childhood activities. *Moral Laboratories: Family Peril and the Struggle for a Good Life* (Mattingly 2014, University of California Press) elucidates some of these themes. The conceptual and ethnographic project furthers collaboration between Danish researchers at Aarhus University and the University of Southern California.

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Christian Ulrik Andersen

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Project title

Vector Space - The aesthetics of contemporary interface culture

Project description

This project lies within the area of software studies and addresses a current shift in computing popularly exemplified by “big data” and in the businesses of Apple, Amazon, Facebook and Google. The shift implies a specific spatial logic – a “vector space” – where any kind of data contributes to generalizable models of anticipation. A vector space allows for new insights into e.g., cognitive processes, the formation of social relations, or the nature of a climate crisis, but also suggests an interplay between technology and mental, social or environmental processes, and a “generalized” media ecology that binds such domains together.

The project’s outcome is an aesthetics and critique of contemporary interface culture, with a deeper reflection on how our media ecology is intertwined with our cultural practices. The main assumption is that the computational processes are over-layered by, and influence aesthetics: they affect what can be sensed and perceived, and as such, also our cultural forms and behaviors. The interplay between technological and cultural layers is also often addressed in the aesthetic practices themselves. Hence, the project’s suggested critique is based on an outline of contemporary software art practices within the domains of the mind, the social and the environmental. This includes projects that deal with language in social media, public interaction in “smart cities”, or how to represent a climate crisis.

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Consuelo Manetta

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AIAS and University of Rome "Tor Vergata", Italy
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Project title

The Different Faces of the Sky - decorative culture, floral, astral and mythological representations within figural coffered ceilings

Project description

The research focuses on ancient covering systems in Greek and Roman areas between the Late Archaic (500 BC) and the Late Antique periods (Fourth - Fifth century AD), and with specific reference to sculptured and/or painted figural coffered ceilings. The study aims to offer an iconographic and iconological reading of the decorative and figurative repertoire within the lacunars. It also points to reconstruct its decorative evolution during the long period of its use. Fundamentally, several figurative themes (prosopa, busts, and mythological representations) sculpted and/or painted within the coffers have not been identified up to now.

None of the existing studies has ever ventured to reconstruct the decorative and figurative repertoire depicted in ceilings. Furthermore, none has tried to follow the dynamics and developments of this repertoire. Nevertheless, the topic offers interesting research perspectives in view of: reconstructing a repertoire of decorative and figurative motives within coffered ceilings; decoding their meaning, with special reference to the sculpted and/or painted prosopa, their problematic identification, their relationship with decorative (such as floral and geometrical) and figurative (such as mythological) motives previously and/or contemporarily attested; the role effectively played by Pausias regarding coffered ceilings' decoration; the eventual relationship between the function of a building and its ceiling's decoration; recognizing, defining and understanding the role played by astral representations among the possible decorative motives sculpted or painted in the frame of ceilings.

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David Petrosyan

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Project title

Simulating dissipative dynamics of strongly interacting Rydberg atoms

Project description

Quantum optics deals with atoms and photons and it aims to explore fundamental quantum physics under well-defined conditions and to develop functional quantum devices for information processing, communication, simulations and precision measurements. Cold, trapped atoms interacting with laser fields represent a remarkably clean and controllable platform to simulate and study many-body physics. A crucial ingredient for realizing various phases of matter is availability of interactions with different range and strength. Neutral atoms excited to the high-lying Rydberg states can exhibit strong long-range interactions which make them uniquely suited for simulating strongly-interacting many-body systems and for implementing various quantum information processing tasks.

Most of the studies of Rydberg excitations of multi-atom systems so far neglected the relaxation processes, assuming either short excitation pulses or adiabatic population of the ground state of the corresponding many-body Hamiltonian. The lifetime of Rydberg states is long but finite, any excitation laser has certain linewidth, and the thermal motion of even cold atoms can lead to decoherence. This necessitates the studies of dissipative many-body systems, which are interesting on their own but are challenging computationally. In this project, Dr. Petrosyan investigates the influence of dissipation and relaxations on the Rydberg excitation and equilibration in few- and many-atom systems, and on the performance of quantum gates and interfaces between the atomic ensemble qubits and optical or microwave waveguides.

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Djuke Veldhuis

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UK Fellowship: 01 Oct 2014 – 30 Sep 2017

Project title

Stress in modern human populations: A bio-cultural approach to assessing the costs and limits of adaption

Project description

In her research, Veldhuis is passionate about understanding how humans adapt to our rapidly changing world. Her research spans the fields of anthropology, psychology and endocrinology. Using cross-cultural comparisons, physiological and psychological stress measures, she is examining the costs and limits of adaptation in Europe and African populations. She will build up a comprehensive picture of the human stress response in human populations in Northern Kenya and Denmark. Being frequently ranked as one of the happiest in the world, the Danish provide a good contrast with populations in the Turkana basin in Kenya who are currently undergoing rapid cultural change.

Extrapolating environmental from social influences is notoriously difficult. However, without interdisciplinary research to look at this bigger picture, we risk being like the doctor who puts a bandage over a wound without asking why it is bleeding in the first place. By understanding what attributes make individuals resilient to cultural and environmental changes, we are better placed to understand the human condition and minimize the impact of stressors in our lives.

This project will 1) build up a physiological profile of stress, via cortisol and blood pressure measurements; and 2) assess behavioural responses to and psychological indicators of stressors amongst populations in Denmark and Kenya. These data will be 3) evaluated to consider the evolutionary context in which the human stress response evolved.

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Jan Alber

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Fellowship: 01 Oct 2014 – 30 Sep 2017

Project title

Ideology and Form: The Experimentalism of Recent Australian and Indian-English Prose Narratives

Project description

This project concerns the ideological underpinnings of formal experiments in Australian and Indian-English prose narratives that were written between 1980 and 2010. As far as Australia is concerned, the project will concentrate on the conflict between indigenous and non-indigenous Australians. Unfortunately, negative stereotypes and constricting policies have continued to take their toll over the past decades; poverty is rife in indigenous communities, and movements to improve the situation of Aborigines have resulted in a huge polarisation in the public eye around questions of race, entitlement, and reparations for past injustices. With regard to the situation in India after 1947, the project will not only deal with the relationship between the British colonizers and the colonized but also address forms of oppression that have to do with class, caste, gender, religion, and ethnicity. In this context, the term 'form' denotes the idea of "an ordered whole defined by a grid of interrelations" (Margolin 2005: 182), while formal experiments draw attention to the used processes and materials. On the one hand, the term 'experiment' refers to the fact that some narratives make the "process of world-making" more difficult than others (McHale 2012: 146). On the other hand, formal experiments have to do with the fusing of "disparate elements [...], be it a mixing of genre (literary, autobiographical, historical, artistic) or of mode (words, drawings, sculptures, photographs)" (Gibbons 2012: 240). The experiments that will be discussed concern elements of the narrated world but also beginnings; endings; narrative embeddings; intertextual references to other genres; the use of satire or parody; issues of language and style; and the typographical representation of the narrative.

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Jessica Shadian

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Fellowship: 01 Oct 2014 – 30 Sep 2017

Project title

Transnational Legal Spaces and the Arctic: Inuit community-based monitoring and regional Arctic resource governance – shall the twain meet?

Project description

My project focuses on the legal implications of Arctic indigenous sovereignty as it relates to the politics of Arctic extractive industries and Arctic governance. This includes relations between policy makers, private industry and indigenous communities. From a theoretical perspective this project uses transnational legal theory including legal pluralism, post-sovereign resource management, hybrid law, soft law and the legal intersection between public, private and collective authority in order to account for the legal inadequacies in accommodating for indigenous groups and indigenous communities in the formal parameters of Arctic governance and policy making. This includes the incorporation of emerging notions of indigenous peoples as 'rights holders' rather than stakeholders.

My aim is to find new approaches of non-renewable resource management in the Arctic which go beyond traditional top down, inter-state policy making. At the regional political level, the Arctic Council's 6 indigenous permanent participants further risk to lose their existing power to help govern the Arctic with the incorporation of China, India, Italy, Japan, and the Republic of Korea as new permanent observers to the Council. As an AIAS scholar, I will work with the Arctic Research Centre as well as legal scholars in the INTRALaw Center (AU) who focus their research on 'the New Legal Frontiers for the Arctic Regime'. Together we will examine Arctic governance and policy as an example of a pluralistic order characterized by a multi-level system of norms created by multiple actors beyond the traditional notion of a legal system.

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Project title

Consumption, Semiotics and Iconic Branding in Welfare States: A Latin American and Nordic Comparison

Project description

The product marketing mix in developing countries faces particular challenges. On the one hand, basic goods and services need to reach consumers through direct (the market) or indirect (subsidized) means. Increasingly, product placement through social media, print, popular culture, film, celebrities, and the Internet extol purported values of certain (foreign) goods and services. Rightly or wrongly, consumers perceive a value or certain cache when they associate with foreign brands, which often exude 'exotic' and better attributes. On the other hand, national products may serve equally as well and often at a lower price, or, perhaps, satisfy a cost-benefit assessment that consumers perform in choosing between national versus foreign brands.

National goods additionally convey messages and meanings (semiotics) that may trump foreign competitors. A guiding research question is: To what extent do national symbols embedded in local products connect with residents because they convey key messages about the homeland (la patria)? These branding messages include myriad elements such as color, symbols, storytelling, images, jingles, perceptions, local place names, nationalist elements (flag, country colors, national heroes/saints/places) and values.

To further explore how national brands shape consumption, I extend these questions to two other important Latin American nations: Chile and Argentina, as well as the original 'Nordic' welfare states (Denmark, Sweden, Finland and Norway). How do these three national models, anchored in strong social-welfare histories from the 20th century, message their national brands? How have they balanced aspirational consumer needs of price compared to status-enhancing foreign products?

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Project title

Sexual selection and the evolution of male and female reproductive protein

Project description

Male reproductive proteins (Acps), transferred to female at mating, have profound effects on female fecundity, female remating rate and mediate the sperm competition (SC) outcome. Acps are the primary target of postmating sexual selection (PSS) on males, a potent force that may drive rapid evolutionary change of Acps and female reproductive proteins (Frps) with consequences for speciation. Despite the vital role of PSS in the speciation has been documented, its role in Acps evolution is poorly understood. Acps were identified in few cases and our understanding of the selective forces responsible for their rapid evolution remains to be determined.

Compare the Acps between species with divergent mating system is ideal to study the effect of PSS on Acps diversification. Interlineage variation in the degree of polyandry and so, in SC intensity, might cause male reproductive gland (Ag) proteome divergence. Combining proteomics and phylogenetic comparative analysis this project will study the evolution of Ag-proteome on closely related species of beetles with different mating system. It will explore the interlineage changes in Ag-proteome and the potential for correlated evolution between Ag-proteome and female remating rate. The project will also investigate direct effects and causality of varying levels of SC on Ag-proteome using experimental evolution approach. This section will examine the Ag-proteome variation in relation with different levels of SC and identify the Acps and Frps that have evolved under different SC regimens.

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Jürgen Elvert

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AIAS and University of Cologne, Germany
Fellowship: 01 Oct 2014 – 31 Mar 2016

Project title

A Maritime History of European Civilization. A joint research-project

Project description

The project challenges two popular doctrines which have come up in cultural studies in the wake of two influential books: Said's *Orientalism* (1979) and Chakrabarty's *Provincializing Europe* (2000). Their approach to postcolonialism runs the risk of producing blurred results. Large sections of postcolonial studies have over-estimated the importance of non-European factors and ignored the complex process of Europe's embrace for the world which has always been marked by intense interaction between Europe and the non-European spheres. More suitable for a more reliable analysis seems to be the agency approach as introduced by Bhabha, Greenblatt and others. It will use European embrace for overseas territories as a mirror for the development of the European societies under the impact of contacts with non-Europeans.

The agency-approach stresses self-determined activities of individuals, groups and societies and rejects deterministic images. If we understand European expansion and contacts with non-European civilizations as a basically open system, it is evident that the self-organization powers of this open system have not only shaped Europe's relations with the "other" but also transformed Europeans and European civilizations. The project is designed to carve out the basic patterns of this mechanism and will try to explain how this interaction shaped both European civilization and today's world.

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Karen Ní Mheallaigh

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Project title

Discovering the ancient scientific imagination

Project description

The project will explore the dynamic interplay between scientific and imaginative thought in ancient Greek and Roman culture, where the categories of 'scientific' and 'imaginative' thought were less polarized than they tend to be now. Specific areas for analysis include: the interplay between ancient astronomy and ancient literature; the role of mechanical automation and architecture in generating and enhancing sensory and imaginative experience; overlaps between 'natural history' and fiction.

It is hoped that this study of the organic intertwining of scientific and imaginative thought will not only provide a new, deeper understanding of post-Classical culture in the ancient world, but also a provocative model for thinking about our modern context, especially in the light of the increasing emphasis on the value of academic interdisciplinarity.

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Karin Lykke Hartman

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Fellowship: 01 Feb 2015 – 31 Jan 2016

Project title

Modeling Early Development

Project description

The human oocyte is capable of differentiating into all cell types found in the human body. Inefficient or faulty differentiation will result in the death of the fetus and ultimately in infertility, a disease of the reproductive system. Numerous biological pathways are contributing to the maturation of the human oocyte, the fertilization event and the subsequent development of the embryo.

Mammals develop from a single cell. During the subsequent developmental stages, more than 200 distinct cell types are established and integrated within the living embryo. It is truly amazing that the newly formed organism knows how and when to form specific cell lineages. How the cells become polarized and make commitments as well as the transitions in potency are regulated at the molecular level remains a crucial and poorly understood question in developmental and stem cell biology. Along the line of that, the identity of cell fates regulates has important impacts on neurodevelopmental disorders, and several early onset diseases are associated with development failures.

Animal models have played crucial tools to evaluate functions and serve as systems to evaluate several aspects of both early development and adult symptoms.

The purpose of this project is to functionally dissect the roles of the molecular pathways contributing to early development; to evaluate how these contribute to the pathophysiology of specific developmental diseases.

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Karl-Erik Andersson

Professor, MD

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Project title

Aging Bladder Dysfunction

Project description

Aging-related bladder dysfunction and associated lower urinary tract symptoms (LUTS, e.g., urgency, frequency, nocturia, incontinence) represent an increasing problem in developed countries due to an increased life time expectancy. An estimated 45 % of the 2008 worldwide population (4.3 billion) was affected by at least one LUTS, reducing the quality of life. Aging is associated with an impairment of blood vessel function and changes may occur in the vasculature on the molecular, cellular, structural and functional levels. Vascular aging is characterized by endothelial dysfunction and starts already in young adults by slow and progressive vascular remodeling, and early signs of declining endothelial function may manifest before the fourth decade of life. Endothelial dysfunction leads to oxidative stress, and increased levels of pro-inflammatory cytokines, which represents an independent risk factor for development of atherosclerosis and hypertension. Recent evidence from epidemiologic, clinical and animal basic research suggests that aging-associated changes in the pelvic vasculature, resulting in atherosclerosis and vascular dysfunction, may be important factors in the generation of LUTS.

The project aims at testing the hypotheses that 1) aging-related reduced blood flow to the lower urinary tract (e.g., via atherosclerosis) and consequent ischemic changes are major factors leading to LUTS and bladder dysfunction in the elderly population, and that 2) the effects of lower urinary tract ischemia on LUTS, bladder function and structure can be prevented and/or improved by drugs.

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Lotte Philipsen

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Project title

Artistic use of new technologies and new media

Project description

This research project investigates the aesthetic use of new technologies and new media. New artistic practices constantly arise that seem to walk the line between the established scene of contemporary art and technical invention in a broader cultural sphere (like DNA manipulation, inventions based on nano-technology, cloud computing etc.) In such experimental practices the distinctions between work of art, everyday object and non-physical phenomena break down, just like the borderlines between art audience, everyday users and commercial prosumers often seem to be eroding.

Philipsen's research at the AIAS investigates such experimenting works from the point of view of aesthetics in order to qualify and develop ways within academia to comprehend and analyse the aesthetic dimensions and potentials of these phenomena. Questions of relevance to Philipsen's project are: How and to what extent are aesthetic practices in which advanced technology and science play pivotal roles able to convey aesthetic potentials to an audience that does not have full insight into advanced science or technology? How do aesthetic practices of crowd creation and organizational aesthetics challenge divisions in traditional aesthetic theory between creation and reception? Where is the object of aesthetic experience positioned in works that are based of advanced technology and presented to the public through textual and visual documentation only?

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Machteld Verzijden

Postdoc

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Fellowship: 01 Oct 2014 – 30 Sep 2016

Project title

The evolution of the ability to learn in choosing a mate

Project description

The ability to learn is important because it allows animals to cope with unpredictable environments. Animals can learn from experience to guide their future actions, and do so in many contexts, such as food finding, nesting and choosing a mate. Species differ in their ability to learn, which indicates that this trait can evolve. However, we don't know what factors drive the evolution of learning.

I propose to study how the ability to learn to choose a mate can evolve, by using laboratory populations of a fruit fly species as a model to mimic evolution experimentally. I will test if the learning ability can increase, if this makes individuals better over-all learners, and how energetically costly this is. With laboratory populations of better learners, I can then test if the social dynamics of mate choosing within groups changes. If we know how species can evolve to learn in the laboratory, this will help us understand under which natural circumstances species can evolve to learn and might also help us understand when species can better cope with novel circumstances in our rapidly changing world.

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Mads Vaarby Sørensen

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Fellowship: 01 Oct 2014 – 30 Sep 2017

Project title

The renal natriuretic response following an acute potassium intake

Project description

Hypertension is a common lifestyle related health problem. It is estimated that 40% of western world adults have hypertension. The condition is a major risk factor for a number of cardiovascular and renal diseases. Even moderate elevations in blood pressure are associated with shortened life expectancy. It has long been known that high dietary K⁺ intake is able to reduce blood pressure and protect against hypertension. The mechanism underlying the positive effect of high K⁺ intake is poorly understood. Interestingly, it has been shown that high K⁺ intake acutely increases Na⁺ excretion. Since Na⁺ is the main cation in the extracellular fluid, the total amount of body Na⁺ is the defining parameter of plasma volume and thereby blood pressure. Thus, dietary K⁺-triggered reduction of total body Na⁺ likely plays a part of the beneficial effects on blood pressure.

A central study, in my previous research identified, the molecular mechanism underlying the rapid increased urinary Na⁺ excretion following ingestion of a K⁺ rich meal. This new knowledge allows for investigations of a number of important questions including: 1) How is a K⁺ rich meal that enters the gastrointestinal tract sensed? How is the sensed signal transduced from the gastrointestinal tract to the kidneys allowing for molecular alteration in renal Na⁺ handling? 2) How is K⁺-induced Na⁺ excretion regulated as a function of dietary status prior to the ingestion of a K⁺ rich meal? This project aims to elucidate these specific questions to get a better understanding of the mechanism of how a K⁺ rich diet protect again hypertension.

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Marie Braad Lund

Postdoc

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Fellowship: 01 Jun 2013 – 30 Jun 2015

Project title

Faithful but not enslaved: Drives of genome evolution in microbial symbionts

Project description

The evolution of earthworm nephridial symbionts

Symbiotic associations are widespread in nature and have been a major source of evolutionary innovation where symbionts have enabled hosts to conquer new niches by equipping them with novel functions. The transition from a free-living to a host-associated lifestyle has huge implications for the genome evolution of microbial symbionts. The textbook example is the extreme genome reduction in intracellular insect symbionts where the symbionts more resemble organelles than individual bacteria. Meanwhile, the genome evolution of extracellular symbionts is largely overlooked even though they are more widespread in nature.

Marie Braad Lund is studying the genome evolution of extracellular symbionts by using the nephridial (excretory organ) *Verminephrobacter* symbionts of earthworms as a model system. This research will provide novel insights into the factors driving the genome evolution of host-associated microbes – both beneficial and pathogenetic.

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**Martin Holmstrup**

Professor
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Fellowship: 01 Feb 2015 – 30 Apr 2016

Project title

Evolutionary responses of soil invertebrates to global warming

Project description

Can species adapt to climatic changes at a rate that matches the rate of climate change? This question is of fundamental importance for understanding the response of species and communities to current climatic changes and future distribution of biodiversity. The main goal of this project is to study evolutionary responses of soil animals to global warming in a natural field setting. In 2008 an earthquake in S-Iceland caused local changes of geothermal systems. This incidence caused previously “cool” areas within two ecosystems (forest and grassland) to suddenly experience geothermal warming resulting in a ~100 m gradient of soil temperatures from ambient to +50 °C. In addition, adjacent grassland also experienced such geothermal warming which has now lasted for a century. These sites provide a unique opportunity to examine if, and at what rate, soil invertebrate species can respond and adapt to rapid global warming in a natural ecosystem. In order to answer if species have rapidly adapted to warming at these sites, I will study genetic changes in common garden experiments and examine the phenotypic variation in thermal tolerance, desiccation tolerance, growth and reproduction as well as other fitness proxies such as energy reserves in species originating from benign (control) and heated areas. The project will also investigate central physiological traits and mechanisms including metabolic rate, membrane lipid chemistry and membrane fluidity which are directly related to thermal adaptation. I will ask if individuals originating from the heated areas, which have been evolving in increased temperature environments during six and ~100 years, respectively, display phenotypic differences relative to individuals originating from non-heated control areas.

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**Orietta Dora**

Associate Professor
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Fellowship: 01 Feb 2015 – 31 Jul 2016

Project title

Ancient Ecosystems. The Roman Frontier in Britain and North Africa

Project description

This research focuses on the Roman frontier in Britannia and Africa Proconsularis as a mosaic of lands of different legal statuses under the rule of the first European/Mediterranean territorial state. The concept of 'ecosystem' is meant in a broader sense than is common, especially in the natural sciences. Though the usage includes the scientific sense, it also encompasses socio-economic and political factors, i.e. 'socio-ecosystems'. By this, it involves all aspects of human interaction with a specific natural habitat, especially its socio-economic and cultural manipulation and transformation, and above all from a historical perspective. Going beyond the notion of 'linear' frontiers as political borders and 'buffer zones', the project will analyse the socio-economic, political, and cultural elements which characterise the inter-relations between human beings, environment, and political power in the frontier ecosystem of the above-mentioned provinces as case-studies of the impact and mechanisms of Roman imperialism. In both cases, the frontier areas and their hinterlands will be analysed with specific focus on the legal status of lands and their ecosystems in economic and social terms. The study will encompass the Roman use of land, exploitation of natural resources, dynamics of demography and migration-flows, the provincial road network, and the role of the fleet and its supply system. The main aim is to overcome traditional conceptualisations of the Roman frontier, especially the idea of the linear political border and the view of the ancient frontier as a buffer zone.

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Óscar José Martín García

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Fellowship: 01 Feb 2015 – 31 Jan 2017

Project title

United States Policy in 1960 – 1970s Spain and Portugal. Modernisation, education and the bumpy road to democracy.

Project description

This research is a multidisciplinary and transnational analysis of the United States (US) cultural diplomacy towards the Iberian dictatorships in the 1960s and 1970s to encourage various modernisation projects. One of the most important but least known elements regarding this issue is the US' assistance in the field of higher education reform. Thus, this project proposes to examine the American educational cooperation aimed at guiding through a cultural transformation which would reduce social conflict and smooth the way for regime change in southern Europe.

Yet the crux of the argument is that this top-down educational revolution did not succeed in reinforcing the social order in Spain and Portugal. Rather, it intensified the anti-authoritarian and anti-American student upheavals. Thus, this is a relevant research topic because it helps to explain – including a variety of aspects of Transnational Studies, History of Education and Social History – the limits of higher education reforms designed from above by international technocratic experts with imperfect knowledge of the political conditions of the countries they sought to develop. In addition, in analysing the reception and contestation of American modernising doctrine by Iberian students on the ground, this research calls for a new grassroots interpretation of development, which contributes to a broadening of the framework of who “counts” in an international history of modernisation.

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Paul Denton

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Fellowship: 01 Feb 2015 – 31 Jan 2016

Project title

HIV Latency in the Gastrointestinal Tract

Project description

The current standard of care for HIV patients is antiretroviral therapy (ART). ART is lifesaving and life improving, but ART is also a lifelong commitment. If ART is interrupted, then HIV disease resumes due to the latent HIV reservoir where latency is defined as a reversibly nonproductive state of infection of individual cells that retain the capacity to produce infectious virus particles. Currently, there is a major effort by scientists to develop HIV cure approaches also known as HIV eradication interventions designed to destroy the latent HIV reservoir. The latent HIV reservoir is challenging to eradicate because latent HIV persisting as replication competent, transcriptionally silent provirus must be activated before it can be targeted for destruction. This Jens Christian Skou Fellowship project is focused on HIV latency in the intestines. Because the intestines are a site of major HIV-induced pathologies, understanding the intestinal HIV reservoir is an essential prerequisite for the successful tissue of targeting latency activating agent such that HIV eradication can be achieved.

The overall project aim is to characterize the intestinal latent HIV reservoir in patients undergoing ART. To accomplish this goal, CD4+ T cell subsets isolated from intestinal biopsies will be assayed for the presence of replication competent latent HIV. Completing this project will fill a critical knowledge gap regarding the systemic nature of the latent HIV reservoir and progress the field towards a cure for HIV infection.

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Rikke Schmidt Kjærgaard

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Fellowship: 01 Jun 2013 – 31 Jan 2017

Project title

Interdisciplinary visual approaches to molecular and nanoscale data analysis

Project description

The rapid increase of molecular and nanoscale data in contemporary science has produced an urgent need for developing new visual frameworks and tools to explore, analyze and communicate data. The unprecedented scale, resolution, and variety of data pose new analytical challenges. New methods and design frameworks are needed to take on complex subjects such as dynamics and supramolecular assembly, and to accommodate a need of interacting with data from different sources and on different levels of time and scale. It is impossible to understand the functional mechanisms, internal motions, and how cellular signals affect the response of protein molecules from crystal structures at different static states only. While the field of integrating and improving visualization tools and experimental data is still very much in its infancy, this research project combines usability, multi-scale representation, design and visual analysis, exploring new ways of providing bio-nanoscience with integrated frameworks and improved visualizations from which scientists can gain insights into molecular processes.

Visualization research improves our analytical power and prepares for the tremendous riches of data being generated. The key objectives for this research project are to produce a new graphic standard framework for molecular and nanoscale science; and to develop exploratory 3D animations specific for bio-nanoscience data analysis using high-end 3D software initially developed for the art and entertainment industry.

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**Rima Obeid**

Associate Professor
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Fellowship: 01 Oct 2014 – 31 Mar 2017

Project title

Hidden milestones in the roadmap of shipping cobalamin from food into the cell

Project description

Cobalamin (Cbl, vitamin B12) was discovered in the first half of the 20th century. Recently, the breath-taking pace of development in scientific technologies (e.g., proteomics, metabolomics) has changed our understanding for the role of nutrients and the complex interaction between diet, environment and diseases. My concept is that knowledge gained during the first burst of Cbl research in the period around 1950-1970 needs revisiting in order to find hidden milestones and to question concepts that have been accepted without further proof.

Conditions like aging, diet and drugs increase the risk of developing Cbl deficiency, probably because of diminished ability to liberate, absorb or distribute the food-derived vitamin. Understanding of the transport and function of Cbl, may pave the road for using this system for drug delivery. My research stay in Aarhus has the following main goals:

- 1) Tracking the evolution of cobalamin science (e.g., by the Danish scientist Einar Meulengracht (1887-1976): this will help clarifying unexplored observations by employing modern technologies.
- 2) Study cobalamin trafficking, cellular distribution and interplay with energy metabolism: the role of cobalamin in mitochondrial energy metabolism and glucose output (this part will depend on using modern technologies in clinical and experimental models).
- 3) Dissemination of knowledge: scientific meetings, workshops at international conferences and scientific publications. For example editing a book and writing a chapter on "Cobalamin", CRC Press/ Taylor & Francis Group.

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Ronald Fischer

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Fellowship: 01 Feb 2015 – 31 Jul 2016

Project title

Why seek pain? An exploration of motivations and outcomes of seeking painful experiences in social settings

Project description

The avoidance of pain is one of the most central evolutionary principles, yet, humans routinely engage in social activities that involve suffering, pain and potential injury.

All known cultures around the world have some form of social activity that involves unpleasant experiences and pain, be it in the context of sports, public initiation rites or religious ceremonies.

Clinical research has focused on the negative aspects of pain experiences (e.g., chronic pain), but we do not know much about why people voluntarily seek out pain and what kinds of benefits and costs such experiences may have for individuals and groups. My research program aims to answer to what extent and through what mechanisms pain experiences may have positive outcomes for individuals and groups.

I will use a multi-method design to tackle these questions, following individuals and groups as they engage in these activities in their natural environment as well as conducting controlled laboratory experiments to understand the underlying cognitive and psychological processes. It is the first comprehensive investigation of pain seeking processes in non-clinical settings and will open up novel areas for future social, psychological, clinical and biological research.

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Sonia Coriani

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Project title

Response to challenge: Coupled Cluster Response methods for challenging light-matter interactions

Project description

To parallel and fully capitalize on the development of novel experimental installations for the detection of increasingly challenging light-matter interactions – as exemplified by the last generation synchrotron and (free-electron) laser facilities around the world – the general objective of my project is the development and consolidation of new, highly reliable quantum chemical methods and computational protocols to model the response of molecular systems when probed with electromagnetic fields in novel and challenging combinations, bridging experimental measurements, experimental design and theory at an hitherto unprecedented level of detail and accuracy.

To reach this goal, I specifically aim at combining the high flexibility and generality of (damped) response theory with the accuracy and systematic improvability of coupled cluster methods. For a meaningful comparison with experiment, also other factors that influence the observable response, beyond the electronic structure of the sample, will be considered, e.g. environmental and relativistic effects. To tackle the increased computational cost with system size, multi-scale extensions (in particular quantum-mechanic/molecular-mechanic (QM/MM) polarizable-embedding schemes and multi-level approaches) of the proposed procedures will be pursued.

The developed methodologies will be implemented within freely available computer code and used to gain insight into the observed effects and unravel their fundamental information content; benchmark less accurate computational methods; guide and assist experimentalists in the design and calibration of novel experiments, hereby meeting the challenges and needs set forth by modern spectroscopy.

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**Toke Høye**

Senior Researcher
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Fellowship: 01 Feb 2014 – 31 Jan 2016

Project title

Ecological responses to rapid climate change in the Arctic

Project description

One consistent feature of climate change is that Arctic environments are and will be exposed to the greatest warming. Biological responses to warming at high northern latitudes are already outpacing those at lower latitudes. While unique insights can be derived from long-term ecological monitoring data, such time series are particularly scarce from the Arctic. A better integration of space and time is critical in order to reconcile the diverging ecological responses observed from single site studies across the Arctic.

This project brings together emerging data sets on species and community responses to climate change from multiple Arctic sites with an aim of providing spatial predictions. The taxonomic focus will be on terrestrial plant and arthropod species, since these organisms are particularly sensitive to climate change. Temporal variation in species distribution and key life history traits like phenology, body size and reproductive success will be used as indicators of ecological change at the population and species level, while species composition and richness will be used as indicator at the community level.

The project aims to 1) estimate how temporal variation in population- and sex-specific life history traits vary spatially and affect reproductive success and to 2) develop spatial models for community responses to future climate change in the Arctic. The project will be made possible through a combination of field campaigns, laboratory studies and synthesis of existing data.

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Umit Akbey

Assistant Professor

AIAS and Leibniz Institute für Molekulare, Germany

Fellowship: 01 Jan 2015 – 31 Jan 2018

Project title

Structural Biology of Bacterial Functional Amyloids: In Biofilms, Fibril Formation and Infection

Project description

Most bacteria form biofilms to survive under stress-inducing conditions by achieving a communal living. The biofilm associated pathogenic microbes are resistant to antimicrobial agents and host immune system, as a result they are more infectious and difficult to treat. Amyloid fibrils are the most crucial components supplying the structural integrity of biofilms, so the antimicrobial resistance. However, very little structural information is known on biofilms and their amyloid proteins. Understanding the structural features forming biofilm integrity, by focusing particularly on the amyloid proteins, is an important step towards development of successful therapeutics for infectious bacteria protected in robust biofilms.

The primary goal of my project is to determine the first atomic-resolution structures of biofilm forming functional amyloids from different bacteria, by using advanced solid-state Nuclear Magnetic Resonance (ssNMR) spectroscopy. Starting from these structural insights, I aim to understand fibril formation in function and disease, the role of amyloids in biofilms, ways of controlling or preventing biofilm formation in the associated chronic diseases, and finally, the structural switch of proteins between soluble, oligomeric and fibrillar states.

The results obtained from my research will be of great importance for understanding and treating functional amyloid related diseases caused by bacterial biofilms. As a result, clever design and optimization of anti-biofilm drugs targeting fibrils can be achieved.

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Xuhui Dong

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AIAS and Nanjing Institute of Geography and
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Fellowship: 01 Oct 2014 - 30 Sep 2017

Project title

Quantitative assessment on ecological changes and the contribution from climate in remote Greenland lakes: A multidisciplinary study

Project description

The Arctic is warming at what might be an unprecedented rate and ecosystems are undoubtedly changing. How they are changing is more moot and whether the Anthropocene will contain ecosystems unlike any that occurred over the Holocene is central to this proposed project. To answer this, I will develop and apply multidisciplinary methods to quantitatively track recent and more distant climate change and also track ecosystem response at these times based on lake sediments. The project will develop a novel method for inferring past climate change through the analysis of the stable isotopes of Oxygen (i.e. $\delta^{18}\text{O}$) preserved in biological remains. The technique will then be applied to sediment cores from areas of Greenland with different climate histories – in particular contrasting dynamics and speed of change of inland ice mass (e.g. Ilulissat vs Isua, Nuuk).

An assessment of ecosystem response independent of the inference of past climate change will be gained by diatom analysis, or cladoceran and algae pigments analysis where more appropriate. It will place the current change in the context of past change and inform on ecological regime shift and resilience for Arctic lakes. Furthermore, for a global implication, the research findings in this project will serve for comparison purpose with other aquatic ecosystems (i.e. strong human impacted Yangtze shallow lakes and unique alpine lakes in Yunnan Province in China) to understand how robust the $\delta^{18}\text{O}$ technique and different trajectory and mechanism of lake environmental changes.

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Photo: The AIAS Fellows Fall 2014 by Maria Randima.



Photo: The AIAS Fellows commencing 2 February 2015 by AU Communication.

Aarhus Institute of Advanced Studies, AIAS

An AIAS fellowship provides talented researchers from all academic disciplines with unique conditions for pursuing their own research interest for a period of up to three years, completely free from other obligations than exactly their core activity: researching. As an AIAS fellow you are part of a multidisciplinary environment in which you are given the opportunity to exchange projects, ideas and key points with other researchers of the same high level from diverse academic disciplines.

The AIAS Fellowship programme can be applied for by both talented junior and senior researchers from all academic areas from around the world. Fellows are free to choose their research topic within all academic fields of studies and are selected according to a criteria of excellence. Applicants must hold a PhD and have a minimum of two years of research experience after completion of a PhD in order to be an eligible fellowship applicant.

Two types of fellowships are offered at the AIAS:

The AIAS-COFUND fellowship programme, co-funded by the European Union's Seventh Framework Programme for Research, directed mainly at external researchers from around the world. The programme contains a mobility demand, comprising both incoming fellowships as well as reintegration fellowships.

The JCS (Jens Christian Skou) fellowship programme, supported by Aarhus University Research Foundation, can be applied for by local researchers with an existing affiliation to Aarhus University, i.e. researchers who are already employed at Aarhus University.

Read more about the AIAS, our fellows and the application process at:

www.aias.au.dk



Photo: Maria Randima