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Aarhus Institute of Advanced Studies (AIAS)
Høegh-Guldbergs Gade 6B, Buildings 1630-32
DK-8000 Aarhus C
Denmark

Email: info@aias.au.dk
Phone: +45 871 53595
Web: www.aias.au.dk

Fellows

Alexander Panayotov

Postdoc
AIAS and previously University of Cambridge, UK
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.

Contact

Email: apanayotov@aias.au.dk
Phone: +45 87 15 30 27

Alfonso Blázquez-Castro

Postdoc
AIAS and previously University of Madrid, Spain
Fellowship: 01 Oct 2014 – 30 Sep 2016

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.

Contact

Email: alfonsoblazquez@aias.au.dk
Phone: +45 87 15 31 39

Amy Iler

Postdoc
AIAS and University of Maryland, USA
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.

Contact

Email: amyiler@aias.au.dk
Phone: +45 87 15 36 83

Anja Kamp

Principal Investigator
AIAS and previously Jacobs University, Germany
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.

Contact

Email: anjakamp@aias.au.dk
Phone: +45 87 15 30 05

Bjørn Panyella Pedersen

Assistant Professor
AIAS and previously University of California, 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.

Contact

Email: bjornpedersen@aias.au.dk
Phone: +45 87 15 36 87

Btihaj Ajana

Associate Professor
AIAS and King's College London, UK
Fellowship: 01 Oct 2015 – 30 Sep 2017

Project title

The Over-examined Life: Body Governance and the rise of the Quantified Self

Project description

Life in the 21st century is increasingly being quantified and datafied as societies are becoming ever more reliant on algorithms and data to manage all aspects of everyday activities. In recent years, we have witnessed an abundance of techniques and devices that enable routine forms of digital self-tracking and monitoring. Bodies and minds are turning into measurable machines and information dispensers in the quest for personal development, productivity and the extraction of value. This has given rise to the Quantified Self movement whose motto is "self knowledge through numbers". While this movement is often discussed in terms of positive trends towards health-management and self-improvement, it is also raising issues of potential surveillance (by self and others) and concerns with the ramifications of excessive self-involvement.

In this research, I aim to provide a thorough and critical discussion on the ontological and ethical dimensions of health management and self-tracking technologies, and on users' experiences of these technologies and the way they make sense of their datafied self and networked bodies. I draw on empirical research as well as a theoretical framework deriving from critiques of biopolitics and neoliberalism, and the Foucauldian notion of governmentality and technologies of the self.

Contact

Email: bajana@aias.au.dk
Phone: +45 87 15 37 75

Consuelo Manetta

Postdoc
AIAS and University of Rome "Tor Vergata", Italy
Fellowship: 01 Oct 2014 – 30 Sep 2017

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 contemporary 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.

Contact

Email: consuelomanetta@aias.au.dk
Phone: +45 87 15 32 62

Darin Stephanov

Postdoc
AIAS and University of Jyväskylä, Finland
Fellowship: 01 Feb 2016 – 31 Jan 2019

Project title

Monarchic Visibility, Public Space, and Collective Identities in the Romanov and Ottoman Empires (1825-1908). A Comparative Study of the Finnish and Bulgarian Trajectories of Communal-cum-national Consciousness

Project description

This project tests the hypothesis that multiplying and escalating public ruler celebrations (imperial tours, royal birthdays, accessions, etc.) across the late Russian and Ottoman Empires a) ushered in a new era of ruler visibility, forging direct vertical ties of subject loyalty to the Russian Emperor and the Ottoman sultan in the short run, and b) created a modern public space, stimulating the rise of the horizontal ties of ethno-nationalism in the long run. It traces the origins, nature and evolution of the direct relationship between a cross-section of Finns from the Grand Duchy of Finland and the Russian Emperor, on the one hand, and a cross-section of Bulgarians from the Ottoman province of Rumelia and the Ottoman sultan, on the other. It reconstructs key historical episodes and brings to light entire chapters in the history of Finnish and Bulgarian group belonging, which have so far been excluded from mainstream narratives and historical textbooks.

This project outlines the complex, syncretic modernity of late imperial regimes, which engaged in fascinating acts of ceremonial experimentation, but also exhibited many ominous sides of the looming modern state, with its unparalleled abilities to censor, discipline and control. Although drawing on the experiences of two late empires only, it has powerful implications for a broader study of the transition from imperial to ethno-national mindframes, and ultimately, for analyzing the constituent elements of modernity and ethno-nationalism themselves.

Contact

Email: dstephanov@aias.au.dk
Phone: +45 87 15 36 91

Djuke Veldhuis

Postdoc
AIAS and previously University of Cambridge, 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.

Contact

Email: djuke@aias.au.dk
Phone: +45 87 15 34 96

Dorothee Birke

Associate Professor
AIAS and University of Freiburg, Germany
Fellowship: 01 Oct 2015 – 30 Sep 2018

Project title

Situating Homelessness on the Contemporary British Stage

Project description

In the context of the so-called "Great Recession" around the end of the twenty-first century's first decade, discussions and anxieties about homelessness have gained a new momentum in European countries. My project charts the ways in which plays in Britain from the mid-1990s up to the present day have contributed to raising consciousness about the issue of homelessness by examining and subverting the divide between 'homeless' and 'housed'. The medium of the play is especially well-suited for such reflections. Not only has drama as a genre been a prime medium for engaging with social and political issues, but the stage also offers the opportunity to both perform and question the spatial relations that are at the heart of the 'homeless/ housed' dichotomy itself. Such relations are staged through the mise-en-scène as well as the characterization and interactions of the characters.

The project will furnish the first sustained and systematic discussion of the representation of the central trope of homelessness in British dramatic texts. It considers a corpus of plays from the 1990s to the present day, spanning a range of dramatic traditions, from in-yer-face to verbatim to variants that have been less frequently associated with political themes, such as metadrama. The close study of the plays' formal strategies is grounded in a theoretical framework which brings together new concepts from the emerging transdisciplinary fields of studies of home and poverty studies.

Contact

Email: dorotheebirke@aias.au.dk
Phone: +45 87 15 34 64

Frants H. Jensen

Postdoc
AIAS and Princeton University, USA
Fellowship: 01 Feb 2016 – 31 Jul 2018

Project title

Movement coordination, leadership and collective foraging in matrilineal toothed whales

Project description

This project investigates group decision-making processes, social foraging and emergent search patterns of a highly social model toothed whale species, the long-finned pilot whale. These large, deep-diving delphinids live in matrilineal social groups that are stable across decades and like many other social animals, they coordinate a wide variety of behaviors within their social group. Such coordination often requires that animals with different degrees of intrinsic information and differences in motivation come to a shared decision for the entire group.

The aim is to investigate individual and collective decision rules during travel and foraging periods using data from acoustic and movement tags deployed simultaneously on closely associated, free-moving individuals combined with models of collective behavior. I will seek to answer the following questions: a) how do heterogeneous groups of toothed whales coordinate movement and reach consensus decisions? b) are specific individuals within social groups important for shaping collective decisions such as the location or timing of foraging? c) how does social information that is available to individuals during coordinated foraging, such as the echolocation or prey capture signals of nearby conspecifics, affect individual search behavior, resulting prey encounter rates, and shape emergent foraging patterns? d) do acoustic signals contain information on the individual identity of whales that can be used to inform decisions of other group members during potential conflicts-of-interests, and provide a mechanistic basis for improving decision accuracy?

Contact

Email: fjensen@aias.au.dk
Phone: +45 87 15 36 85

Iryna Mazhak

Associate Professor
AIAS and National University 'Kyiv Mohyla Academy' Kyiv, Ukraine
Fellowship: 01 Oct 2015 – 30 Sep 2018

Project title

The Social Determinants of Health and Health Inequities among Working-age Population in Ukraine

Project description

Health inequalities are one of the main challenges for public health policy. To reduce and eliminate health inequalities, we need to conduct an initial assessment of health inequalities, using appropriate indicators, and conduct systematic and long-term monitoring of health inequalities.

My research aims to analyze the social determinants of health and health inequities among working-age Ukrainian population; identify indicators for monitoring health inequities; and, develop an evidence-based model for a new approach to public health policy in Ukraine based on social determinants of health and illness. An explanatory sequential mixed methods design will be used. In the first quantitative phase of the research, I will conduct a secondary data analysis of existing Ukrainian data, as well as develop and implement a national survey of health inequalities. I will also conduct a secondary data analysis of an EU-database for analyzing country differences to compare population health outcomes in Ukraine vis-à-vis the EU. The second qualitative phase will involve in-depth interviews with people experiencing vulnerability in health. Also this phase includes developing case studies of good policy practices to tackle inequalities in health in the EU countries for potential adoption in Ukraine as well as developing a policy paper considering ways to tackle health inequalities in Ukraine. The proposed research is important not only for scientists but also useful for the national government as a base for developing strategies to reduce and eliminate health inequalities.

Contact

Email: irynamazhak@aias.au.dk
Phone: +45 87 15 37 76

Isabel Kusche

Associate Professor
AIAS and University of Osnabrück, Germany
Fellowship: 01 Oct 2015 – 30 Sep 2018

Project title

Non-programmatic Politics in Times of Fiscal Crisis

Project description

The project is based on the assumption that in times of fiscal crisis governments must turn to something else than programmatic politics when attempting to secure a level of popular support sufficient to remain in power. It shall answer the question to what extent political parties and personnel in countries severely affected by the recent European fiscal crisis react by intensifying non-programmatic linkages with voters or particular groups of voters respectively. Non-programmatic politics is based on strategies that do either not include public criteria for the distribution of resources or violate publicly stated criteria in actual practice in favor of partisan bias. The existence of a link between fiscal crisis and non-programmatic politics has been noted in the literature on neoliberal reforms in Latin American countries. In contrast, with regard to European parties the role of such strategies for mobilizing voters has been largely neglected or relegated to specialized analyses that do not feed back into our general conception of political processes in European countries.

The project aims to close this research gap using a systems-theoretical approach to politics, which focuses on the threefold relationship between the political public, party politics and public administration. It will compare four critical cases, which have been known for variants of non-programmatic politics in the past, namely Great Britain, Ireland, Spain and Greece.

Contact

Email: isabelkusche@aias.au.dk
Phone: +45 87 15 30 07

Jan Alber

Dr., Associate Professor
AIAS and University of Freiburg, Germany
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.

Contact

Email: janalber@aias.au.dk
Phone: +45 87 15 36 86

Jessica Barker

Postdoc
AIAS and University of Arizona, USA
Fellowship: 01 Feb 2016 – 31 Jan 2019

Project title

Inter-group environmental dilemmas: can we scale up from local to global cooperation?

Project description

Cooperation not only is the foundation of social behavior in humans and other organisms, but also underpins many urgent environmental and social problems resulting from over-consumption of or under-contribution to shared resources. Many of these issues, such as air pollution and overfishing, span regional or national boundaries. However, humans likely evolved to cooperate locally with members of small groups, at the expense of people in other groups. How can we overcome the limits of group favoritism to achieve cooperation on the inter-group, global scale needed to address these critical challenges?

The goal of my AIAS-COFUND junior fellowship is to leverage interdisciplinary research on within-group cooperation to advance our knowledge of inter-group cooperation, as applied to environmental dilemmas. Taking an evolutionary perspective, I will investigate when and why people confer benefits on others versus acquire more resources for themselves. I will consider four factors known to affect within-group cooperation: 1) formation of cooperative reputations, 2) punishment of non-cooperators, 3) inequality in costs associated with cooperation, and 4) threats to group success. In lab and field experiments designed to capture real-life situations, I will investigate how these factors scale up to affect inter-group cooperation over environmental resources: for example, whether punishment can function effectively across group boundaries to enforce attainment of environmental targets. The findings will provide insight into the evolution of group-level interactions, and suggest solutions to current environmental concerns.

Contact

Email: jbarker@aias.au.dk
Phone: +45 87 15 36 81

Julieta Goenaga

Postdoc
AIAS and previously Uppsala University, Sweden
Fellowship: 01 Oct 2014 – 30 Sep 2016

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.

Contact

Email: julietagoenaga@aias.au.dk
Phone: +45 87 15 34 64

Jürgen Elvert

Dr., Professor
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 "Provicializing 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.

Contact

Email: jurgenelvert@aias.au.dk
Phone: +45 87 15 37 48

Karen ní Mheallaigh

Dr., Senior Lecturer
AIAS and University of Exeter, UK
Fellowship: 01 Oct 2014 – 30 Sep 2016

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.

Contact

Email: karenmheallaigh@aias.au.dk
Phone: +45 87 15 31 26

Kirill Postoutenko

Professor
AIAS and University of Helsinki, Finland
Fellowship: 01 Feb 2016 – 31 Aug 2017

Project title

"Beasts" vs. "Supermen": Asymmetrical Mapping of Conceptual Landscapes in Bolshevik Russia, Nazi Germany and 'New Deal'- United States

Project description

The proposed project for the first time tracks down the specific roles and functions of asymmetrical concepts, looking at both media messages and population feedbacks in two "totalitarian" (Soviet Union, Nazi Germany) and one "democratic" ('New Deal'-United States) countries in 1933-1939.

The special attention is paid to the links between asymmetrical concepts and socio-political asymmetries: the preliminary analysis shows that 20th century totalitarian regimes resort to the most drastic conceptual asymmetries - from 'Übermenschen' vs. 'Untermenschen' to 'Bolsheviks' vs. 'mad dogs' – in proportion to the ossification of their organizational and communicative hierarchies. Besides, the interplays between mainstream conceptual asymmetries and other forms of semantic manipulation (such as deictic references to time and space) are looked at closely: a sample of the late Nazi rhetoric shows how 'Jewish parasites' are steadily excluded from 'tomorrow' - year after year.

Contact

Email: kpostoutenko@aias.au.dk
Phone: +45 87 15 37 51

Lotte Philipsen

Postdoc
AIAS and Aarhus University, Denmark
Fellowship: 01 Jun 2013 – 31 May 2016

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?

Contact

Email: lottephillipsen@aias.au.dk
Phone: +45 87 15 36 85

Machteld Verzijden

Postdoc
AIAS and previously Lund University, Sweden
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.

Contact

Email: mactheldverzijden@aias.au.dk
Phone: +45 87 15 35 62

Mads Vaarby Sørensen

Associate Professor
AIAS and previously University of Zürich, Switzerland
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.

Contact

Email: madssorensen@aias.au.dk
Phone: +45 87 15 30 72

Magnus Kjærgaard

Assistant professor
AIAS and previously University of Cambridge, UK
Fellowship: 01 Feb 2016 – 31 Jan 2019

Project title

Can a cooked noodle store information? The mechanisms of disordered proteins in synaptic plasticity

Project description

Learning and memory depends on the ability to modulate the connections between neurons in the brain in a process called synaptic plasticity. An important mechanism in synaptic plasticity involves the proteins sensing chemical signals at synapses, neurotransmitter receptors. The NMDA receptor is a neurotransmitter receptor with a key role in learning, which depends on its large intracellular domains. The intracellular domains are intrinsically disordered, are the target of many kinases and bind to many other proteins. Despite its importance, we know little about how the intracellular domains regulate the receptor mechanistically, and little about how intrinsically disordered proteins can exert long-range regulatory effects in general. This is largely due to the almost complete lack of structural information on the intra-cellular domains.

In this project, I will study the intracellular domains of the NMDA receptor using a combination of NMR spectroscopy and single molecule FRET. Structural experiments will be complemented by functional measurements using electrophysiology in Xenopus oocytes. The goal is to identify the mechanism by which the intra-cellular domains affect synaptic plasticity on short time-scales, and how this effect is modulated by phosphorylations and ligand interactions. This will provide another piece of the enigma of how the many wonderful functions of the brain emerge from chemical and physical processes.

Contact

Email: magnus@aias.au.dk
Phone: +45 87 15 37 73

Mari Hatavara

Professor
AIAS and University of Tampere, Finland
Fellowship: 01 Feb 2016 – 31 Jan 2017

Project title

Mediating Experience: Voices, Images and Narrative Self

Project description

It is a commonplace to see today's society involved in or even regulated by different media: social media, television or mobile communication. The radical claim of this research project is that mediation and media transpositions are and have always been essential in making sense both in art and in the everyday. Human interaction operates through signs and media: bodily gestures, verbal utterances and artistic expressions. This research studies the autobiographical processes of making sense and communicating experience by applying the notions of voice, image and narrative. The research materials will consist of case studies ranging from sophisticated intermedial autobiographies to the emergent narrative practices in narrative journalism and social media and to conversational storytelling in online interview archives. Bringing together the domains of art and the everyday, the project investigates how fictional and non-fictional intermedial narratives shape and determine experience and its shareability.

Focusing on visual and verbal storytelling in and across different media I will study, what are the culturally available stories and modes of narration for sharing our experience. How do different narrative techniques enable representing and communicating the experience of one's own and that of another? How is the narrative self constituted and negotiated in different mediatized environments? How do the prevailing modes for life narration change our understanding of narrative, experience, and the relationship between word and image?

Contact

Emai: mhatavara@aias.au.dk
Phone: +45 87 15 37 75

Martin Holmstrup

Professor
AIAS and Aarhus University, Denmark
Fellowship: 01 Feb 2015 – 30 Apr 2016

Project title

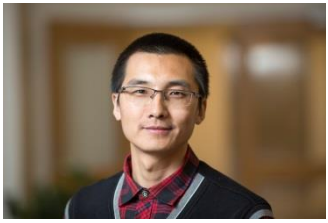
Evolutionary responses of soil invertebrates to global warming

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.

Contact

Email: mho@aias.au.dk
Phone: +45 87 15 36 84



Naicheng Wu

Postdoc
AIAS and Kiel University, Germany
Fellowship: 01 Feb 2016 – 31 Jan 2019

Project title

Developing a risk assessment system to evaluate the impacts of future land use and climate scenarios on aquatic ecosystems - an interdisciplinary model-based synthesis

Project description

Global changes (including land use and climate changes) have particular threats to aquatic biodiversity. To mitigate the further decline of aquatic biodiversity and develop adaptive strategies, it is necessary to develop a novel interdisciplinary modelling approach (linking future scenarios, catchment habitat properties and ecological responses) to evaluate the impacts of land use and climate changes on aquatic ecosystems. Two Danish catchments (Gudenå 2600 km2, SkjernÅ 2300 km2) with solid long-term hydrologic and ecological data are selected to test the integrated models. The risk assessment system includes a dynamic DSSI/R approach (driver – stressor – state - impact/response), coupling the processed-based ecohydrological and biological models. Major drivers (land use and climate changes) are the model input data, and main stressors on ecosystems (water balance, flow regime, nutrients, sedimentation) are included in the algorithms of the hydrological model. Based on the multiple stressors, the dynamic changes of the states (hydrologic processes and habitat conditions) will be defined and displayed in the model outputs. The interactions between states and aquatic ecosystems will be evaluated by comparing the base and predicted biological models. This novel combination between hydrology and ecology will help to understand how multiple stressors interact with aquatic organisms and evaluate the potential risks of future land use and climate scenarios, which is essential for developing adaptive strategies for aquatic ecosystems and future environmental policy.

Contact

Email: nwu@aias.au.dk
Phone: +45 87 15 37 74

Orietta Dora Cordovana

Associate Professor
AIAS and previously University of Edinburgh, UK
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.

Contact

Email: ocordovana@aias.au.dk
Phone: +45 87 15 37 54

Óscar José Martín Gárcia

Postdoc
AIAS and previously University of Castilla-La Mancha. Spain
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.

Contact

Email: ogarcia@aias.au.dk
Phone: +45 87 15 37 76

Rikke Schmidt Kjærgaard

Associate Professor
AIAS and Aarhus University, Denmark
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.

Contact

Email: risk@aias.au.dk
Phone: +45 87 15 36 94

Rima Obeid

Associate Professor
AIAS and Hospital of the Saarland, Germany
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.

Contact

Email: rimaobeid@aias.au.dk
Phone: +45 87 15 36 52

Ronald Fischer

Associate Professor
AIAS and Victoria University Wellington,
New Zealand
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.

Contact

Email: rfischer@aias.au.dk
Phone: +45 87 15 37 49

Sonia Coriani

Associate Professor
AIAS and University of Trieste, Italy
Fellowship: 01 Feb 2015 – 31 Jul 2016

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.

Contact

Email: soniac@aias.au.dk
Phone: +45 87 15 36 91

Tomasz Wojdacz

Associate Professor
AIAS and Karolinska Institute, Sweden
Fellowship: 01 Oct 2015 – 30 Sep 2018

Project title

Novel methylation biomarkers for breast cancer clinical management

Project description

Breast carcinoma is the most common cancer in women. Denmark has the second highest and increasing age-standardized incidence of breast cancer in the world with 105 cases per 100,000 women. Currently, performed at diagnosis pathological examination of breast tumor tissues identifies a variety of prognostic and predictive factors. However, breast cancer patients with apparently similar clinical and pathological features often have a widely varying disease course. This emphasizes the urgent need to develop novel tests that can be used to improve the treatment by better patient selection for personalized therapy.

Various environmental and lifestyle factors (e.g. smoking or use of exercise) induce epigenetic changes to the cells' genetic material. Current research clearly shows that on the one hand those changes can contribute to disease development but at the same time can be used as targets for diagnostic tests. Those tests can potentially enable disease predisposition screening as well as early diagnosis and design of patient specific treatment. However, the use of epigenetic changes to facilitate disease diagnosis and guide treatment is still marginal.

As an AIAS fellow and in collaboration with leading internationally recognized experts in breast cancer, we aim to investigate the involvement of the epigenetic changes in breast cancer development. As well as identify and clinically validate a number of tests that can potentially be used in clinical breast cancer management.

Contact

Email: twojdacz@aias.au.dk
Phone: +45 87 15 21 36

Ümit 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.

Contact

Email: akbey@au.dk
Phone: +45 87 15 36 82

Xuhui Dong

Associate Professor
AIAS and Nanjing Institute of Geography and Limnology, China
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. δ18O) 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. Ilulisssat 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 δ18O technique and different trajectory and mechanism of lake environmental changes.

Contact

Email: xuhuidong@aias.au.dk
Phone: +45 87 15 34 35

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.

Both talented junior and senior researchers from all academic areas from around the world can apply for an AIAS Fellowship. Fellows are free to choose their research topic within all academic fields and are selected according to the criterion 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.

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The AIAS-COFUND fellowship programme, co-funded by Aarhus Research Foundation and the European Union's Seventh Framework Programme for Research, is 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 AIAS, our fellows and the application process at:

www.aias.au.dk

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