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I. PURPOSE & BACKGROUND
The Velux Stiftung is an independent charitable foundation supporting research projects in the areas of daylight, healthy aging and ophthalmology. The foundation is active worldwide, and supports innovative projects which generate lasting progress for the benefit of mankind.

The Velux Stiftung was founded 1980 by Villum Kann Rasmussen, a Danish engineer. He developed a novel window construction that could be installed in sloping roofs, which he named “VELUX” (“Ve” for ventilation, and “Lux” for light). In 1941 he started his own company, the V. KANN RASMUSSEN & CO. The company’s purpose is the development and manufacturing of efficient constructions for the exploitation of daylight in buildings.

II. BOARD AND OFFICE
a) Foundation Board
Since the first of January 2015 Ms Lykke Ogstrup Lunde, granddaughter of the founder, is Vice President of the board and Mr. Villum Ogstrup-Pedersen, grandson of the founder, took up his position as a new board member. Asger Høeg was elected in February 2015 as a new board member.

Members of the foundation board in 2015
Mr. Kurt Stutz, President
Ms Lykke Ogstrup Lunde, Vice President
Mr. Asger Høeg
Mr. Leif Jensen
Ms Lene Kann-Rasmussen
Mr. Villum Ogstrup-Pedersen
Mr. René Schürmann

b) Office
After the leave of Helene Guillong in January, Dr. Kirstin Kopp completed the team of the foundation office in March 2015. Kirstin Kopp is an evolutionary biologist with a track record as a scientist at Eawag and ETH and an education in scientific communication. She is responsible for the grant procedure and the foundation communication.

Office staff in 2015
Mr. Lukas von Orelli, Director
Ms Kirstin Kopp, Scientific Officer
Ms Beatrice Merkli, Back Office
III. OWN PROJECTS

The foundation is dedicated to support research in its primary scopes Daylight, Ophthalmology and Healthy Ageing with a high potential to initiate change and impact. Besides funding external project applications, the foundation also engages actively in own projects like interdisciplinary workshops, the Daylight Academy and the Daylight Award to identify research hotspot and create impact.

Workshops 2015

Two interdisciplinary workshops were organized by the foundation to stimulate discussions among researchers and identify the neglected hotspots in their respective research fields:

A successful Daylight & Nature workshop took place in February at the WSL, the Research Institute for Forest, Snow and Landscape in Birmensdorf near Zurich. Twenty-four scientists from three countries and over a dozen disciplines participated in inspiring discussions, and the audience was excited about the inputs they received. The workshop was excellently moderated to bring the disciplines together and resulted in a vibrant dialogue.

In April the workshop in Ophthalmology took place at the Collegium Helveticum in Zurich. Fourteen scientists from five countries discussed current issues in ophthalmology research. In spite or because of the low number of participants it was a very active and engaged workshop. The participants enjoyed the open exchange and the inspiring atmosphere.

In both workshops it became clear, that one day is very limited to carve out common hotspots in an interdisciplinary setting.

Interdisciplinary workshops are well-received in the scientific community and can create new ideas, new collaborations and innovative approaches. The challenging but inspiring task is to find a common language to discuss and identify the different perspectives.

Coffee break discussions at the workshop on Daylight and Nature.
Daylight Academy
As a result from a series of interdisciplinary workshops in various fields of daylight research (the last one in February 2015, described on p. 1) the foundation acknowledged the need for an interdisciplinary and international platform for the field of daylight research and will launch a daylight academy.

“The Daylight Academy aims to promote international, interdisciplinary and transdisciplinary cooperation and innovation among scientists, architects and other professionals within daylight research or with a strong interest in daylight related topics to create impact in the field of daylight research and its application for the benefit of humanity and nature.”

The year 2015 was dedicated to get the foundation’s initiative of the Daylight Academy rolling. The interdisciplinary platform dedicated to promote the exchange of knowledge, detect neglected hotspots and act as a catalyst for innovative ideas in daylight research was well received and experienced support in the diversified scientific community present at the kick-off event.

A two day kick-off event took place on 19–20 November, 2015 at the Swiss Federal Institute for Forest, Snow and Landscape Research WSL in Birmensdorf near Zurich. The 55 participants from ten countries were enthusiastic and engaged actively in tasks towards the establishment of the Academy. This resulted in the identification of four clusters of neglected hotspot topics in daylight research. Scientists and other professionals will work to clarify and summarize these topics in a publication that will appear as a manifesto for the Academy (“lightbook”) and as research articles. A working group was set up to draft the Academy’s statutes which will be presented to board in 2016.

“Daylight Academy” is now registered by the Velux Stiftung as an international brand to prevent commercial abuse.
International Daylight Award
The individual daylight awards of the Swiss and Danish Velux foundations have become two international prizes that will be jointly awarded by the three foundations. One prize will go to a person for their scientific work on daylight and one prize to a person for their work in art or architecture on the benefits of daylight. The 75-year anniversary celebration of VELUX A/S in Denmark will mark the first joint award ceremony that takes place in November 2016 in Copenhagen.

Similar to the previous approach of the Velux Stiftung there will be nominators and an independent jury to implement the selection procedure.

The Swiss and Danish Daylight Awards have been upgraded and will be awarded as two International Daylight Awards. In the future, two parties will be awarded for their work promoting the benefits of daylight in science, and in art or architecture.
IV. EXTERNAL PROJECTS – AN OVERVIEW

The foundation board meets three times a year to decide on applications based on the proposition of the foundation’s office. Each application is peer-reviewed by two scientific experts of whom at least one must be from outside of Switzerland. In 2015 the foundation engaged 82 reviewers from 15 countries.

The foundation received a total number of 63 external projects of which 16 applications were approved with a total amount of CHF 4’199’600.
### V. Funding Statistics

The contributions to external projects in the different fields of activity vary with the subjects of the incoming applications. It is therefore possible that a funding area was not supported in one year and received high support in the subsequent year.

Funding in the field of Ecology has been integrated in the funding area of Daylight research due to the new funding strategy adopted in 2013.

The foundation accepted no applications in the second half of 2013 while it was defining the new strategy. Therefore the contributions decreased during the years 2013 and 2014. In 2015 the original level of donations to external projects was achieved again.

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VI. FINANCIALS

Asset management
The asset management of the Velux Stiftung is organised in asset category mandates and supervised by the investment committee of the foundation. This consists of two independent investment professionals and three representatives of the foundation. The foundation board approves the investment policy as well as the investment strategy. The investment committee is responsible for the execution.

The main issue for Swiss investors in 2015 was the decision of the Swiss National bank to support the EUR/CHF relation and the following difficult markets. Thanks to the currency hedging introduced in November 2014 the portfolio value was not seriously affected. The total asset value of the foundation was MCHF 206.1 by the end of 2015. The performance of the asset management by end of the year was 0% with respect to a loss of the benchmark of -1.80%.

Implementation of ESG policy
According to the board’s decision in 2014 the foundation’s investments have to comply with the UN Global Compact. As a consequence the asset managers who were not able to comply have been exchanged during 2015: the Emerging Market Equity mandate and the Swiss Equity mandates.

A comprehensive monitoring and controlling of the portfolio has been established and a first screening took place in autumn.

The introduction of the ESG-policy of the Velux Stiftung had several interesting side effects with the managers: the US-equity manager subscribed the UN PRI and two new private equity general managers introduced corresponding rules in the side letter.

New Private Equity commitments
To ensure future return on investments the foundation increased its investments in illiquid forms like private equity and real estate.
VII. NETWORK ACTIVITIES
The Velux Stiftung is actively engaged in the SwissFoundations network as member of working groups in research and finance as well as in the board of directors.

Particularly, the Velux Stiftung supported the third edition of the Swiss Foundation Code; a governance code that is widely recognised as an instrument for self-regulation, also on an international level. The foundation’s financial support enabled the translation into English.

The Code offers recommendations for foundation governance and best practice guidelines. Although it has no jurisdictional quality, it provides advice based on longstanding experience for those cases where the law is incomplete. The third edition now includes that a foundation’s purpose or impact should also be reflected in their investment strategies. It is an important contribution to the whole sector, influencing grant making foundations to work more professionally.
The board approved the following external projects in 2015:

**VIII. DAYLIGHT RESEARCH**

1. Dawn simulation as a passive countermeasure to postural hypotension in healthy older adults
   - Prof. Dr. Jamie Zeitzer, Stanford Center for Sleep Sciences and Medicine, Stanford University, Palo Alto, USA
   - CHF 260'000 (ca. US$ 260'133)

   One of the most physiologically demanding things that older people do every day is to get up in the morning. After spending a night lying flat, where the blood distributes evenly across the body, when they stand in the morning and the blood rushes to their feet, their cardiovascular system may not be able to compensate and maintain blood flow to the brain. This phenomenon is known as orthostatic or postural hypotension. We have found in a group of young individuals that use of a dawn-simulation light that gradually wakes the brain is able to increase cardiovascular tone prior to arising. The goal of this experiment is to determine whether this dawn simulation light is able to increase cardiovascular tone in older adults such that they would have reduced or absent postural hypotension when they awaken in the morning. This would greatly reduce the risks of falls and their associated morbidities in older adults.

2. Establishing the novel environmental DNA (eDNA) technology to monitor biodiversity in river ecosystems
   - Prof. Dr. Florian Altermatt, Department of Aquatic Ecology, Eawag – Swiss Federal Institute of Aquatic Science and Technology, Dübendorf, Switzerland
   - CHF 80'000 (project on the influence of daylight)

   Biodiversity estimates represent one of the main pillars of information for nature conservation management. The study will evaluate how the novel environmental DNA (eDNA) technology can be used to measure biodiversity in whole river catchments, and conduct field and laboratory experiments on how the light-based degradation of eDNA is affecting its possible use and application as a biomonitoring technique. All organisms shed DNA into the environment, and this DNA extracted from an environmental sample (e.g., water or soil) can be used to detect the occurrence and spatial distribution of species. However, eDNA is constantly degraded by daylight (especially the UV component of it), thus counteracting detectability. Knowing the effect of daylight on eDNA is critical as eDNA technology will revolutionize the way biodiversity monitoring is done.
3. Morning and Evening Clocks:  
Neural populations that anticipate daylight changes  
Prof. Dr. Steven Brown, Institute for Pharmacology and Toxicology,  
University of Zurich, Switzerland  
CHF 210'000

Internal circadian clocks are set by light, allowing organisms to anticipate dawn and dusk. The project will measure how altering light:dark cycles in mice effect electrical activity of clock neurons in the master clock of the brain, the Suprachiasmatic Nucleus (SCN). Then subsets of SCN neurons will be manipulated and the effect on behaviour recorded. This will reveal how light regulates neuronal activity to encode time of day information, and how clock neurons drive anticipation of daily light/dark transitions.

4. Influence of light on brain clocks and mood related behaviour  
Prof. Dr. Urs Albrecht, Biochemistry, Department of Biology,  
University of Fribourg, Switzerland  
CHF 250'000

Daylength has a profound effect on mood status in humans. Short winter days are often associated with seasonal affective disorder (SAD), which is a form of depression. Light therapy can alleviate the symptoms of SAD via unknown mechanisms. The aim of this study is to identify how light affects gene expression and production of neurotransmitters in various brain structures relevant for mood regulation. Mice are used as a model system; because light has been shown have a similar beneficial effect in mice as observed in humans.

5. Prevention of hypocalcemia in dairy cows:  
The importance of daylight  
Prof. Dr. Rupert Bruckmaier, Veterinary Physiology,  
University of Bern, Switzerland  
CHF 188'800

Hypocalcemia is one of the most common metabolic diseases of dairy cattle, in which homeostatic mechanisms fail to maintain normal calcium levels in blood. Light exposition increases the amount of available serotonin and therefore can regulate blood serotonin concentration. The relation between serotonin and the regulation of parathyroid hormone-related protein and hence calcium homeostasis has been described. This project aims to show how high daylight exposition during the transition period can reduce the incidence of hypocalcemia in cows from barn systems with poor lighting.
IX. HEALTHY AGEING

6. Individualized real-life technologies laboratory for healthy aging research

Prof. Dr. Mike Martin, Gerontology Center, University of Zürich, Switzerland

CHF 200’000 for a feasibility study.

In this project, gerontologists, psychologists, geo-information scientists and engineers collaborate to develop and evaluate novel measurement tools for the assessment and visualization of health-related activities in the everyday lives of older adults. From the collected data, individual health-activity profiles of a given person can be generated and made visible. The activity profiles can then be linked with physical, cognitive, social and emotional health with the aim to provide individual decision-support-information for the future. In the long term, within already established interdisciplinary collaborations, additional health-related measurement and interpretation tools will be developed.

Workflow of mobile daily life assessments
7. Individual neurofeedback intervention in elderly individuals suffering from chronic tinnitus
Prof. Dr. Martin Meyer, Psychological Institute, University of Zurich, Switzerland
CHF 312’800

The project seeks to develop an effective treatment that is meant to alleviate symptoms of chronic subjective tinnitus in the elderly. The experience of permanently hearing sounds and noise that are not generated by an external source can be seen as a maladaptive neuroplastic alteration that is often accompanied by enormous emotional distress and anxiety. The approach used is based on theoretical models which describe the generation and maintenance of tinnitus as a dysregulation of distinct neural circuits engendered by brain reorganization following age-related hearing loss. Neurofeedback is an established method that is based on the principle of operant conditioning. The project aims to develop and apply innovative, individually tailored, tomographic neurofeedback protocols and to evaluate their effectiveness when individuals with tinnitus undergo neurofeedback training.

8. Impact of Thyroid Hormone Replacement on Cardiac Function and Progression of Artherosclerosis in older adults with Subclinical Hypothyroidism
Prof. Dr. Nicolas Rodondi, Department of General Internal Medicine, Inselspital, University of Bern, Switzerland
CHF 150’000

The study aims to understand the effect of thyroid hormone medication on heart function and thickening of precerebral arteries (atherosclerosis) in older adults with a mildly underactive thyroid gland (subclinical hypothyroidism), a common finding among older adults. 220 patients over 65 years with subclinical hypothyroidism will be randomized in a treatment or control group to assess artherosclerosis and heart function with an ultrasound of the precerebral arteries and the heart. Together with analysis of blood markers, the results may change prevention, diagnostics and treatment procedures of both subclinical hypothyroidism and cardiovascular diseases in old people.
9. Motivating change, changing motivation: A neuroscientific examination of effort evaluation and engagement in healthy older adult
Prof. Dr. Philippe Tobler, Institute for Empirical Research in Economics, University of Zurich, Switzerland
CHF 510’000

Motivation is central to human behaviour, and is known to be important in healthy aging and in resilience to health challenges. Reduced motivation is very common in older age. Despite its health importance, remarkably little is known about the mechanisms that underlie motivation, how best to measure it, or how it might be intervened to improve it. This project aims to better the understanding of the brain basis of a specific component of motivation: the willingness to make an effort and to establish how to integrate this and related neuroscience insights into more effective clinical measures and interventions.

10. Innovative Aß34 Diagnostics to Discriminate Healthy Aging from Prodromal Cognitive Decline
Prof. Dr. Gerhard Multhaup, Department of Pharmacology & Therapeutics, McGill University, Montreal, Canada
CHF 405’000

The overarching objective of this proposal is to analyse a novel prognostic biomarker in individuals at risk for age-associated dementia. Given the significance of toxic amyloid proteins for the pathogenesis of Alzheimer disease (AD), this project will establish an amyloid-derived degradation product (Aß34) as a novel biomarker of age-related cognitive decline and will investigate its clinical application in the earliest (prodromal and preclinical) stages of AD. The anticipated results could advance the development of novel preventive treatments.

11. Cell-based therapy for Parkinson’s disease
Dr. Michael Röthlisberger, Department Research, Swiss Academy of Medical Sciences SAMW, Switzerland
CHF 180’000

The goal is to improve the survival, differentiation and maturation of human dopaminergic precursor neurons by cell co-culture and co-transplantation in the context of Parkinson’s Disease. And to deliver chemoattractants for axon outgrowth and guidance of human dopaminergic precursor neurons in the context of Parkinson’s Disease.
12. Experimental evolution of lifespan: the genetic link between nutrition, reproduction, fat metabolism and aging
Prof. Dr. Laurent Keller, Department of Ecology and Evolution, University of Lausanne, Switzerland
CHF 195’000

Reproduction and diet are the two main factors that affect aging in a wide range of animal species, including humans. Recent studies suggest that genes related to fat metabolism may link these three factors together and may therefore be key to understanding the principles of healthy aging. In this project, it is proposed to study experimentally evolved Drosophila melanogaster lines that have evolved an extended lifespan in response to (1) selection on postponed reproduction and/or (2) resistance to developmental malnutrition. Using genome sequencing the genetic basis of this variation in lifespan will be investigated, followed by RNAi to confirm an effect of candidate genes of lifespan. In addition, it will be studied how fat metabolism is involved in the observed variation in lifespan. The combination of these techniques will provide novel insights into an important evolutionary and biomedical question that is of interest to a broad scientific community: what is the link between fat and lifespan, and what are the genetic mechanisms that control this link?

X. OPHTHALMOLOGY
13. The inhibition of Nogo-A by gene therapy as a new treatment for glaucoma
Prof. Dr. Vincent Pernet, Department of Ophthalmology, University Laval, Québec, Canada
CHF 320’000

A molecular target has been identified that could be responsible for the visual deficits caused by glaucoma. Based on the neutralization of this molecule, the objective of this project will be to test a new gene therapy approach in an animal model of glaucoma. The experiments will consist of evaluating the anatomical and functional benefits of therapeutic virus injections on the visual system of mice affected by glaucoma. The in vivo data will serve as a preclinical evaluation for this new gene therapy to treat glaucoma in human patients.
14. Regenerating Photoreceptors in Retinitis Pigmentosa
Prof. Dr. Maria Pia Cosma, Center for Genomic Regulation (CRG), Barcelona, Spain
CHF 353’000

It has been shown that Wnt-mediated reprogramming of retinal neurons after cell fusion can induce regeneration of ganglion and amacrine neurons, and functional rescue in the retinas of transplanted mice. Retinitis Pigmentosa (RP) is a severe disease that affects 1 in 3,500 individuals, who undergo progressive loss of vision, and for which currently there is no cure. The aim of this project is to test cell fusion-mediated reprogramming as therapy in rd10 mice, a RP mouse model, with the final aim to regenerate photoreceptors and achieve functional rescue of vision.

15. Influence of higher-order thalamic nuclei on cortical visual processing
Prof. Dr. Sonja Hofer, Biozentrum, University of Basel, Switzerland
CHF 210’000

Vision is not a passive process. What we perceive strongly depends on our intentions, expectations and actions. This internal, non-visual information needs to be integrated with the visual information coming from the eyes, to allow its interpretation. How exactly this is achieved by the brain is still poorly understood. One prominent pathway potentially conveying internal information involves the pulvinar, a higher-order thalamic nucleus, but knowledge about its function is still very limited. Using a behavioural mouse model, the role of this nucleus in vision will be determined.

Lateral geniculon nucleus LGN, the main visual nucleus in the thalamus with differently coloured neurons projecting to different positions in the primary visual cortex.

Image of thalamic axons in the cortex and a trace of a calcium response of one thalamic axon.
Translocator protein (18kDa) (TSPO) as molecular target for retinal degeneration

Prof. Dr. Thomas Langmann, Laboratory for Experimental Immunology of the Eye, University Hospital of Cologne, Germany

CHF 375'000

Retinal degenerative diseases significantly contribute to visual impairment and often blindness where aging, light exposure and chronic immune processes are major risk factors. Preliminary pre-clinical data of this project show that the synthetic TSPO ligand XBD173 limits retinal inflammation (Figure 1) and preserves retinal structure (Figure 2) in conditions of light-induced retinal degeneration. This project specifically addresses the role of translocator protein (18kDa) (TSPO) as a novel marker of reactive retinal immune cells (microglia) and evaluates its relevance as a molecular target for immunomodulatory and neuroprotective therapies aimed to support the survival of photoreceptors and prevent vision loss in a mouse model. Future aspects of this project aim to identify the underlying molecular mechanisms as basis for future immunomodulatory and neuroprotective therapies to prevent vision loss in patients.

Immune activation in light-induced retinal degeneration.
Retinal immune cells (microglia, green) are highly reactive in white light exposure conditions (middle panel) compared to the healthy retina (left panel). Systemic therapy with a specific pharmacological ligand of TSPO (XBD173) strongly prevents retinal immune cell activity (right panel).

In vivo imaging of retinal integrity. Exposure to bright white light causes significant damage to the retinal structure (middle panel, blue colour indicates very thin central retina) as shown by non-invasive optical coherence tomography (OCT) of mouse eyes. Systemic therapy with a specific pharmacological ligand of TSPO (XBD173) preserves retinal integrity after light exposure (right panel, green colour indicates thicker central retina).

16. Translocator protein (18kDa) (TSPO) as molecular target for retinal degeneration
Prof. Dr. Thomas Langmann, Laboratory for Experimental Immunology of the Eye, University Hospital of Cologne, Germany

CHF 375'000

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