

ANNUAL REPORT 2015



15
16

KEY FIGURES 2011-2015

	2015	2014	2013	2012	2011
Grants and distributions					
Total grants at year-end, centers, and Niels Bohr professors	66	57	59	64	58
Annual distribution, million DKK	424.5	435.9	423.0	391.0	358.8
Return on investment					
Bonds and cash, million DKK	-44.0	182.7	-38.1	182.4	261.4
Equities, million DKK	1.1	153.8	256.1	207.7	-71.3
Total return, million DKK	-42.9	336.5	218.0	390.1	190.1
Administrative costs					
Administrative costs including depreciation, million DKK	11.5	12.1	12.7	11.6	12.2
Administrative costs compared to distributions, %	2.7	2.8	3.0	3.0	3.4
Administrative costs per grant, million DKK	0.2	0.2	0.2	0.2	0.2
Capital					
Net capital at year-end, million DKK	6,051.8	3,535.4	3,650.6	3,871.5	3,881.5

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NEW IN 2015

ENDOWMENT

In March 2015 the Danish National Research Foundation received an endowment of 3 billion DKK from the state budget. With this funding, the independence of the foundation has been ensured for many years, and new Centers of Excellence and Niels Bohr professorships can be initiated until 2026

CENTERS

Twelve new Centers of Excellence started operating in 2015. They are all off to a very good start with groundbreaking scientific findings

CALLS

Two new calls were announced in 2015; the third call for Niels Bohr Professorships, and the ninth call for Centers of Excellence

DIRECTOR

Professor Søren-Peter Olesen became the new DNRF director in September 2015

BOARD

At the end of 2015 the Board of the Danish National Research Foundation thanked outgoing board members Professor and Deputy chairman Bo Honoré, Professor Kirsten Hastrup, Professor Birgitte Possing, and Professor Svend Erik Larsen for their invaluable contributions as board members over the past years

New Centers of Excellence

In 2015, 12 new Centers of Excellence of the 8th application round were launched:



- **Center for Personalized Medicine Managing Infectious Complications in Immune Deficiency (PERSIMUNE)**
Center leader: Jens Lundgren



- **Center for Autophagy, Recycling and Disease (CARD)**
Center leader: Marja Jäättelä



- **Center for Hyperpolarization in Magnetic Resonance (HYPERMAG)**
Center leader: Jan Henrik Ardenkjær-Larsen



- **Center for Silicon Photonics for Optical Communications (SPOC)**
Center leader: Leif Katsuo Oxenløwe



- **Center for Intelligent Oral Drug Delivery Using Nano and Microfabricated Containers (IDUN)**
Center leader: Anja Boisen



- **Center for Neuroplasticity and Pain (CNAP)**
Center leader: Thomas Graven-Nielsen



- **Center for Bacterial Stress Response and Persistence (BASP)**
Center leader: Kenn Gerdes



- **Center for Urban Network Evolutions (UrbNet)**
Center leader: Rubina Raja



- **Center for Carbon Dioxide Activation (CADIAC)**
Center leader: Troels Skrydstrup



- **Center for Music in the Brain (MIB)**
Center leader: Peter Vuust



- **Center for Stem Cell Decision Making (STEMPHYS)**
Center leader: Lene Oddershede



- **Center for Chromosome Stability (CCS)**
Center leader: Ian D. Hickson

NEW BEGINNINGS – EXCELLENCE CONTINUED

New beginnings

In March 2015 the Danish National Research Foundation received an endowment of 3 billion DKK from the state budget 2015. With this funding, the independence of the foundation has been secured for many years, and new Centers of Excellence and Niels Bohr professorships can be initiated until 2026. In the foundation we will do our utmost to ensure that this large sum of public money is invested in the best curiosity-driven research within all scientific fields and from all academic institutions in Denmark.

In 2015, we initiated 12 new Centers of Excellence as described on the left side.

Research benefits society and is a public good. The best basic research has a significant impact on our society by discovering new knowledge for innovation and evidence-based decision-making and by securing academic education from the bachelor's and master's level to the Ph.D. and post-doc level. This transfer of highly educated people from academia to society is the fuel of the knowledge-based Danish industry. It is old fashioned to look upon basic research as an exercise in an ivory tower: basic research at the highest level is our most important generator of wealth and wisdom for societies.

The year 2015 was “a new beginning” as we welcomed Professor Søren-Peter Olesen as the new director of the foundation. From the board and the team on Holbergsgade and the research community in Denmark, we all warmly welcome Søren-Peter, professor and previous Center of Excellence leader.

Our previous and renowned director for nine years, Professor Thomas Sinkjær, was recruited for the Villum Foundation. Again, from the board of the Danish National Research Foundation and the secretariat on Holbergsgade, and from the scientific community in Denmark and around the world we express a sincere thank you for the im-

pressive, positive, and significant job Thomas has done for the foundation over the last nine years.

The post-doc challenge

Each year, the board of the Danish National Research Foundation visits all the Centers of Excellence for the annual follow-up meeting. At these meetings, we have the privilege of talking to the brilliant minds who work at the centers. We enjoy the open debate with the Ph.D.'s and post-docs about pertinent subjects for research strategy and policy, everyday organizational matters, scientific integrity, philosophy, and gender issues. Over the last year, our debate has been focused on the post-doc challenge. Post-docs represent a massive talent pool that produces outstanding research, transfer expertise between laboratories, and promote internationalization. They make breakthrough discoveries, and consequently, their work benefits their respective fields of research immensely. At present, there is a growing mismatch between the low number of permanent academic positions and the ten-fold larger number of post-docs aspiring to obtain these positions. After interviews with our young researchers at follow-up meetings throughout the past year, we conducted a survey among the post-docs to further elucidate the area. You can read more about this on page 10. Based on our interviews and the survey, we recommend to scientific leaders, potential employers outside academia, individual post-docs, and to the legislature how to alleviate the post-doc challenge.

At the Danish National Research Foundation's annual meeting on October 30, the post-doc challenge was further discussed with key stakeholders and in an interactive dialogue with the members of the audience. This year we extended invitations to the Center of Excellence leaders and their post-docs and young researchers, and we had 250 people in the auditorium and a very fruitful debate. The main message was that there is also a life outside academia and universities, and it is a good life.

New calls

In 2015 we announced a new call for Niels Bohr Professorships. We received 39 applications, and after a thorough evaluation, 14 were sent for international peer review. The foundation always encourages people from all fields to apply for DNRF funding as long as their proposals are strong and original and have a clear potential for significant breakthroughs.

The 9th application round for Centers of Excellence was announced at our annual meeting in October. The deadline for outline proposals is June 6, 2016. To all those busy with the applications: There is a lot to live up to. The foundation has, until now, established 100 Centers of Excellence. When the foundation was evaluated in 2013, it was demonstrated that its centers' level of research is the same as that of the best universities and research organizations worldwide: Harvard, MIT, Stanford, Max Planck, Oxford, and Cambridge.

Due to the cuts at universities and in research budgets in Denmark for 2016, we know that our money will be more needed than ever and that the competition will get even tougher. You are welcome to apply if you are:

1. An excellent researcher and research leader at the highest level internationally or have the potential to become one
2. If you have an excellent, original new idea for your "dream project"
3. If you are in an environment where you have a research group that is also top level

Director Søren-Peter Olesen has been informing rectors, deans, heads of departments, and researchers at all the universities and research institutes in Denmark about our funding instruments, and we look very much forward to receiving the applications. To quote Louis Pasteur, "Success is favored by preparedness", and we look forward to receiving well-prepared expressions of interest on June 6, 2016 from **all** research areas.

New beginnings for outgoing centers

In this annual report, we highlight major achievements of the 4th generation of Centers of Excellence. The foundation's *raison d'être* is the researchers, and the Center of Excellence leaders themselves report on their major achievements through their ten years as center leaders. We hope you will enjoy reading about their achievements, enthusiasm, and creativity. The research has a high output in terms of publications and impact on society with new knowledge and innovation and as a basis for decision making. The Centers of Excellence have produced highly specialized Danish and international candidates, and they will continue in Denmark and internationally, both in academia and in industry. We should do our utmost to retain the best international talents in Denmark.

New composition of the DNRF board

The board of the Danish National Research Foundation says thank you very much to outgoing board members: Professor Bo Honoré, Deputy chairman, Professor and President of the Danish Royal Society of Science and Letters Kirsten Hastrup, Professor Birgitte Possing, and Professor Svend Erik Larsen. We would like to express our gratitude for serving on the DNRF board, and for a dedicated and important effort for the DNRF and Danish research. Also, thank you to Bo Honoré for serving as Deputy chairman.

We welcome 4 new members to the board: Professor Anne Scott Sørensen, Professor Jesper Ryberg, Professor Morten Overgaard Ravn and Professor Minik Rosing. We look forward to the continuing collaboration with the present board members: Professor Bart de Moor, Belgium; Professor Eero Vuorio, Finland; Professor and President of the Royal Swedish Academy of Sciences Christina Moberg, Sweden; and Professor Eivind Hauge, previously rector in NTNU Trondheim, Norway. Thank you for serving the Danish National Research Foundation this past year. To all board members in 2015: It has been a great help to have professional, dedicated and hard-working members on the board.

The DNRF secretariat

Thank you to the professional secretariat on Holbergsgade and we welcome Thomas Trøst Hansen and Steen Marcus to the team. Steen Marcus has been appointed deputy director of the foundation effective January 1, 2016.

Thank you very much to our previous deputy director Mogens Klostergaard Jensen, who retired this fall after 15 years of excellent service to the Danish National Research Foundation.

Danish Research in 2015-2016

From the Danish National Research Foundation, we would like to express our concerns for the future of Danish research, and urge each and every one of you with responsibility – be it in research, in policy making, or in decision making – to think thoroughly about the harmful consequences of reductions in funding. We have had a successful and growing scientific community in Denmark in terms of both quality and quantity over the last 15 years due to a dedicated effort from every one out there with a responsibility for research. The politicians and decision makers

in Denmark are usually very good friends of research, since they know that research is an investment, not an expenditure. The Danish National Research Foundation funds 2% of the public research in Denmark. We foster curiosity-driven basic research of the highest quality. However, it is very important that the whole landscape of research be balanced and that the young and talented be supported, so that they can develop and make their own contributions on the highest level. It is important to balance top-down research strategy with researcher-driven bottom-up research. Large and very complex and sensitive ecosystems like the Danish research community should be strengthened – and not the opposite – for the sake of Denmark's future.

Professor Søren-Peter Olesen

Director at the Danish National Research Foundation

Professor Liselotte Højgaard

Chair of the Board of the Danish National Research Foundation





CHANGE OF DIRECTOR - REPORT FROM THE CARLSBERG ACADEMY



“ Today is “quarter day.” The foundation’s director over the last nearly nine years, Professor Thomas Sinkjær, will henceforth be research director at the Villum Foundation. We can celebrate the fact that Thomas has been an excellent director for the Danish National Research Foundation, and at the same time, we can celebrate that the baton has been passed to Professor Søren-Peter Fuchs Olesen – it is a win-win situation.

To Thomas, on behalf of the DNRF, I would like to say: you have been an outstanding director for the foundation, and you are highly appreciated by the board, your employees, all center leaders and researchers at the centers, and the surrounding research community of universities, foundations, the Ministry and the Danish Agency for Science, Technology and Innovation (DASTI).

On behalf of the board, I want to express a heartfelt thank you for the tremendously good working relationship, your competency and your professionalism as the foundation’s director, and your kindness toward all. Your effort has had enormous importance for Danish research. After nine years, I suppose that if you had to try one more thing, it is natural that you would choose something as exclusive as the Villum Foundation. We congratulate Villum and look forward to future cooperation between private and public foundations. Denmark has a unique and privileged situation having private foundations with large funds for research. Denmark holds 3rd place in the international research rankings, and the private foundations are very important to the success of Danish research.

There were many highly qualified applicants for the position of director, and we are privileged that Professor Søren-Peter Olesen applied for and accepted the position as the new director of the DNRF.

Søren-Peter has an M.Sc. in electrical engineering from DTU and an MD from the University of Copenhagen, he has been center leader of the DNRF Danish Arrhythmia Research Center, and since 1998, he has been a member of the Royal Danish Academy of Science and Letters. We look forward to working with you, and a heartfelt welcome.

”

Professor Liselotte Højgaard, Chair DNRF

August 26, 2015



Professor **Thomas Sinkjær** conveyed three important messages: First, we shall continue to trust the researchers and give them the necessary freedom to carry out the best research within their fields. Second, transparency in the foundation's work is crucial. Finally, the foundation's independence must be maintained.



Professor **Peter Vuust**, center leader at the DNRF Center for Music in the Brain played at the reception with pianist **Henrik Gunde** and vocalist **Veronica Mortensen**.



Having been in the position as DNRF director for a few weeks, Professor **Søren-Peter Olesen** was able to confirm that transparency and consistency are, in fact, characteristics of the foundation's work. At the reception, he told about his own experience: The DNRF is the same whether you see it from the outside as a center leader or from the inside as director.



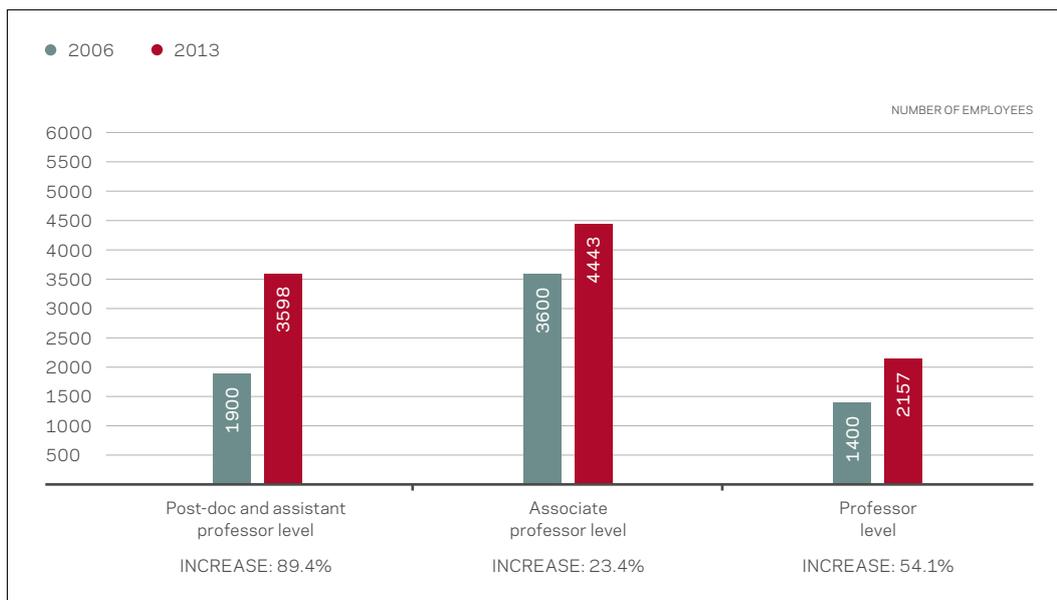
THE POST-DOC CHALLENGE

The number of Ph.D.'s in Denmark nearly doubled between 2006 and 2010, and as a result, the number of post-docs and assistant professors doubled between 2006 and 2013. The number of associate professor positions is not increasing at the same rate.

This mismatch has caused the so-called “post-doc challenge,” which has escaped the attention of many Danish scientists. Thus, the Danish National Research Foundation focused on the problem and possible solutions to this at our annual meeting 2015 with center leaders, post-docs, Niels Bohr professors, representatives from the political system, and other research councils and foundations.



FIGURE 1
EMPLOYEES AT DANISH UNIVERSITIES



“ Post-docs represent a massive talent pool; they produce outstanding research, transfer expertise between laboratories, and increase the internationalization of Danish research. Their discoveries lead to ground-breaking research that benefits us all, and they deserve dignified careers with systematic guidance and clear career counseling.

Professor Liselotte Højgaard, Chair DNRF

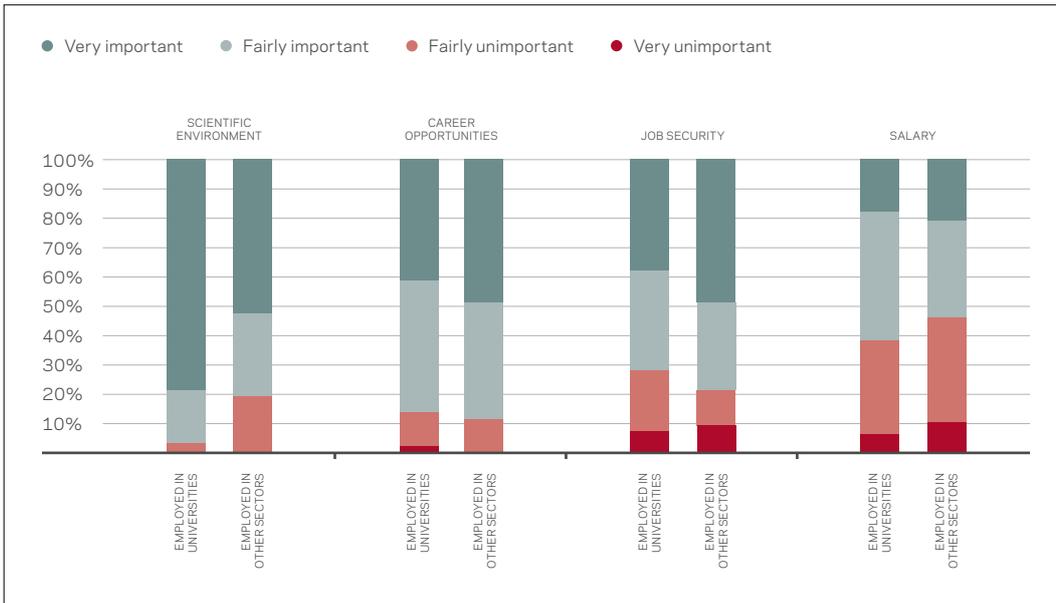
Ahead of the annual meeting, the DNRF Chair, board members and Director had addressed the post-doc challenge at the annual follow-up meetings with the DNRF Centers of Excellence by talking to approximately 300 post-docs. Moreover the DNRF conducted a written survey of 253 post-docs affiliated with DNRF CoEs between 2007 and 2014.

**Being a post-doc is like riding a bike
- a burning bike**

Post-doc Réka Forrai, from the DNRF *Center for Medieval Literature*, speaker at the annual meeting 2015, is an excellent example of the enormous talent and commitment that characterizes the group of post-docs at the foundation's Centers of Excellence. With a bicycle as the recurring metaphor, Forrai illustrated the post-doc's position factually - post-docs are the most mobile cohort in the academic spectrum; historically - she compared post-docs to "the wandering scholar" who causes trouble; and humorously - saying that being a post-doc is like riding a bike - a burning bike, that is.



FIGURE 2
MOTIVES FOR TAKING CURRENT POSITION



Motives for taking current position

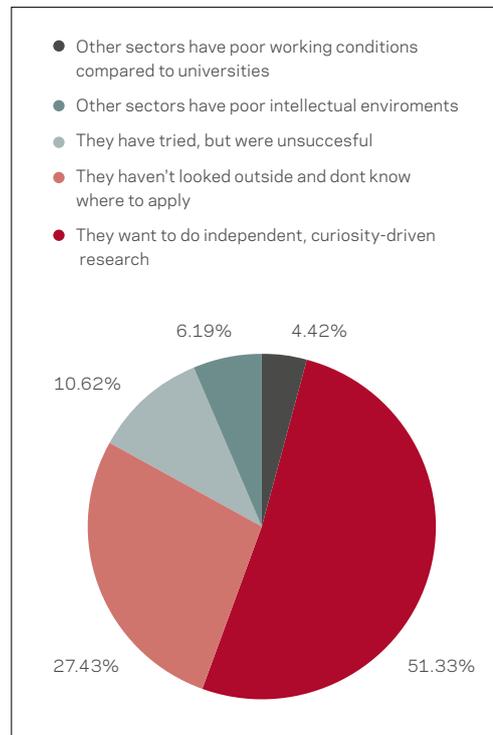
The majority of post-docs want to continue their careers at a university. There are various reasons for this. One reason is the scientific environment and ability to conduct curiosity-driven research at universities, another reason is that post-docs, in many cases, do not believe they have the right skills to take jobs in other sectors. Therefore, it was interesting that the survey results indicated that the satisfaction ratings with current positions were very similar for post-docs who remained in universities and those who had taken jobs in other sectors.

However, the belief that jobs outside of universities can be equally satisfying along the mentioned parameters is not strong. At any rate it is not as strong as the desire to do curiosity-driven research at a university. That was also clear at the annual meeting 2015 when the participants were asked to answer the question: Why do so few of DNRf post-docs move to other sectors than universities?

More than 51% answered that they wished to do curiosity-driven research. That result just confirmed what we already knew. Surprisingly as much as 27% had not looked outside universities and did not know where to apply. An additional 10% had applied for jobs outside academia but without success. Hence, the interactive survey

at the annual meeting 2015 indicated that there is great potential for helping post-docs continue onto better and more diverse career paths.

FIGURE 3
WHY DOES SO FEW OF DNRf POST-DOCS MOVE TO OTHER SECTORS THAN UNIVERSITIES?



Mentoring

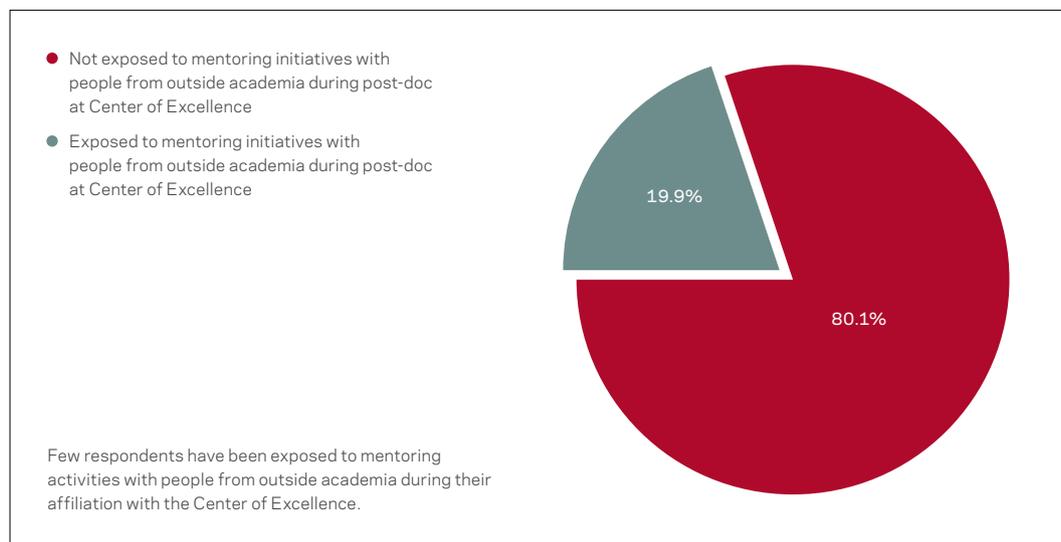
Research both in and outside universities often addresses concrete problems and in this way is connected to the surrounding society and in a productive relationship with industry. Then why is it that 27% answered that they do not know where to look for jobs in other sectors?

Part of the reason probably lies in the lack of systematic mentoring through which post-docs are exposed to mentors both from universities and from other sectors.

Mentoring is the byword for talent development in research. Yet when it comes to post-docs, it is surprisingly unclear what mentoring is, how mentoring should be implemented, and what the post-doc should gain from it. More often than not, post-doc mentoring is non-systematic or non-existent.

Mentoring could be divided into scientific mentoring and career mentoring, including role models from industry and other job markets outside academia. Mentoring could also facilitate a link between academic and other types of jobs, making the transition more obvious and thereby broadening the post-doc's career horizons. This should be seen as part of a reality where probably more than 90% of current post-docs will have to find jobs outside academia.

FIGURE 4
EXPOSURE TO MENTORING ACTIVITIES





The magnitude of the problem

The director of the Danish Agency for Science, Technology and Innovation, Hans Müller Pedersen, was invited to the annual meeting 2015 to speak about "How Denmark uses its research talents." Müller Pedersen recognized the appropriateness of addressing the issue now, at a time when the growing group of post-docs could be on the way to become a post-doc proletariat.

Career tracking

As Müller Pedersen also mentioned in his talk, it is necessary to start gathering knowledge about the post-docs' career paths. In the publication *The Post-doc Challenge*, the foundation suggests that the legislature track information such as where post-docs go after their contracts at a Danish institution expire. Do they continue in academia? Do they leave the country? Have they been exposed to the private labor market in Denmark? We need this knowledge to handle the many challenges we are facing in the right way.

Balanced funding system

Additionally, it is important that the legislative system strives to achieve a balance between funding instruments for researchers at various levels of their careers. The DNRF believes it is of key importance for the Danish system that grants be available for promising younger researchers. For outstanding post-docs, these grants should be the stepping-stones to permanent or tenure-track positions.



Talent development

Associate Professor Christian Broberger from the Swedish Karolinska Institute underlined that the challenge with the many post-docs is natural; the employment structure in the universities is such that there are relatively few professors, slightly more associate professors, and many Ph.D.'s and post-docs. The challenge is to attract the best of the best and develop their talent, and talent development requires more than just putting together a solid list of publications. The scope needs to be broader.

What can the individual principal investigator do?

The individual PI can play a significant role in this aspect. In *The Post-doc Challenge*, the foundation emphasizes that a number of the DNRF center leaders have already launched initiatives for sharing experience between current post-docs and former post-docs who now have careers in cultural, innovative, advisory, and financial or research positions in industry. This is a very simple, concrete, and highly effective way to create closer ties between universities and the outside job market, and this concept can easily be expanded.



What can universities do?

Rector Brian Bech Nielsen described the universities' obligation to post-docs in one sentence: "It is our job to let the post-docs go at the right time with the right skills." The message conveyed by Bech Nielsen was that job insecurity comes with the post-doc position, but universities have an obligation to limit unnecessary job insecurity. Further, he agreed with the comments and suggestions the DNRF poses in *The Post-Doc Challenge*: a change of culture is needed in order to ensure systematic career advice and mentoring for post-docs, and furthermore, universities should work more closely with industry to clarify in what ways the post-docs' skills are valuable to other sectors or job markets than universities.

Excellent academic environments are alpha and omega

Speakers Bo Brummerstedt and Jesper Nerlov shared a key message: we need to work towards opening the shutters between universities and other job sectors at an earlier stage than we do today.

When the DNRF encourages opening the shutters between universities and other job sectors at an early stage, the foundation does not mean that this should occur at the expense of developing candidates with strong subject knowledge.

It is exactly because of their strong, scientifically founded subject knowledge that candidates are valuable outside universities. This knowledge is the foundation for their creativity, their ability to think across fields, and their potential contribution to export and growth.

Global labor market

Post-docs operate in a global labor market with high demands on mobility. This can have negative consequences at a personal level, e.g., in relation to starting a family and securing pensions across borders. The legislative system should continuously try to ease the negative consequences of mobility, e.g., through the development of a common European Research Area, wherein European researchers cooperate across academic and national borders. The free movement of knowledge, people, and technology is the key to maximizing scientific discovery and minimizing the loss of talent.

The individual post-doc should take charge

When the odds of getting a permanent position in academia are one in ten, the individual post-doc should actively pursue opportunities outside academia. Post-docs should be aware of their own situations and ask for relevant mentoring. They should broaden their career horizons and look openly for inspiration as to how their talents can be used outside academia.

In conclusion

The post-doc challenge calls for action. We need systematic mentoring, clear career paths, and an increased focus on keeping the best talent in research, both the international and national candidates. Finally, we can benefit society as a whole by easing the way out of academia for the many skilled scientists who have to continue their careers in other sectors than the universities.

CENTRE FOR SOCIAL EVOLUTION (CSE)



Leader Professor Jacobus J. Boomsma	Location University of Copenhagen	Period 2005-2015	Grant 76.8 million DKK
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You have received a grant of 76.8 million DKK for the Centre for Social Evolution. What are your research-related highlights?

Over the 10 years of its existence, the Centre for Social Evolution pursued deep questions about the coherence and evolutionary stability of social systems that emerged by natural selection without the assistance of human culture. We used ants, bees, and termites as model societies, studying how their societies remain stable over evolutionary time, how their advanced chemical communication systems work, and how they manage challenges by infectious diseases, parasites, and cheats that exploit their societies.

Our work confirmed that kinship is of fundamental importance for the evolution of cooperative societies where some individuals sacrifice reproductive success to assist others – corroborating Hamiltonian inclusive fitness theory. We also added fundamental insights to the theory by showing that major evolutionary transitions towards superorganismality originate by strict life-time commitment of monogamous parents, and extended this concept to the evolutionary origins of multicellular organisms.

We contributed cutting-edge genomics studies unravelling the complexities of the independently evolved fungus-farming mutualisms of ants and termites, including their fungal and bacterial symbionts. We further obtained fundamental insights into the evolutionary stability of social life in ants and bees that evolved very large colonies with low relatedness, and evaluated the sophistication of their division of labor and disease defences.

CSE also applied insights from inclusive fitness theory to unresolved questions of human disease. Exploiting the large public health data bases of Denmark, we showed that disorders such as preeclampsia, may in part, be related to the expression of parent-offspring conflict in the womb, and that extensions of the same idea may explain why deviations from average birth size partly predict risks of autism- and schizophrenia-spectrum disorders later in life.

How does society as a whole benefit from your center's findings?

We made significant contributions to understanding disease pressure in honeybees and to evaluating key characteristics of invasive ant-



supercolonies that are global conservation problems. Our studies of large blue butterflies, whose caterpillars are social parasites of ants, made important contributions to the conservation of these rare butterflies in Denmark and Europe. Our public health program made pioneering contributions to the new interdisciplinary field of evolution, medicine, and public health.

How has the DNRF CoE instrument specifically stimulated your findings?

Long-term funding allowed us to embark on multi-year research projects that explored cutting-edge ideas of fundamental significance. These have had significant ramifications for how we understand the principles of social evolution, giving us a strong world-wide reputation among our peers. Few of these programs would have been possible in short-term funded projects. The applied contributions that we delivered achieved their significance because they were anchored in fundamental science.

What would you have done differently in your time as center leader with the knowledge that you have now?

Nothing.

How many Ph.D.'s and post-docs have you trained and in which areas have they primarily gotten jobs?

During the 10 year funding period, CSE trained 33 Ph.D. students (a number are still ongoing and 16 of them continued as post-docs at KU or elsewhere) and 44 post-docs. Twenty-five of the latter have obtained permanent positions (2 Full Professors, 8 Associate Professors, 9 Assistant Professors, 4 Managers/Staff Scientists, 2 Professional Journal Editors). Fourteen of our incoming post-docs were funded by EU Marie Curie individual postdoctoral fellowships. Four of our Ph.D. trainees went on to receive such EU Marie Curie fellowships and one was elected a Junior Fellow by the Harvard Society of Fellows.

NORDIC CENTER FOR EARTH EVOLUTION (NORDCEE)



Leader
Professor
Don Canfield

Location
University of
Southern Denmark

Period
2005-2015

Grant
89.4 million DKK

You have received a grant of 89.4 million DKK for the Nordic Center for Earth Evolution (NordCEE). What are your research-related highlights?

The whole 10 years has been a constant high, with a continuous series of fascinating and unexpected results. If I were to choose just some of these, I would say that we came far in understanding the evolution of Earth’s atmosphere and ocean chemistry through geologic time. We also made particular progress in understanding the history of multicellularity in life on Earth as well as the history of early animal evolution and its relationship to levels of atmospheric oxygen. We provided new insights into the history of early continental development on Earth, and we provided a completely new understanding as to the controls of early-Earth climate. We also made much progress in studying the nature of modern microbial ecosystems, and in particular, we discovered new processes involving the biological cycling of nitrogen and sulfur in low-oxygen marine environments called oxygen minimum zones. This work has caused a fundamental rethink of the processes controlling nutrient levels in the oceans as well as the complex interactions between microbial populations in nature.

How does society as a whole benefit from your center’s findings?

The public has proven to be very interested in our research findings, and we have actively engaged all forms of media and other outlets (public lectures, high school visits, newspapers, magazines, TV, radio, YouTube) to bring our work to a broad audience. There is a deep human curiosity as to our origins. This pertains not only to human origins, but also to the origins of all types of life on Earth, and the relationship of these origins to the changing chemistry of the planet. By exploring these relationships, we understand how life on Earth has attained its present state, and we appreciate how special the Earth is as a planet.



Sampling the anoxic waters of Golfo Dulce, Costa Rica.

1.4 billion year old sediments from China influenced by climate change.



How has the DNRf CoE instrument specifically stimulated your findings?

We simply could not have accomplished what we did without support from the Danish National Research Foundation. The center provided us with many things. It gave us a focus, a sense of mission and camaraderie, and as ours was a multi-node center, each node with a different expertise, we also benefited from a highly multidisciplinary approach to our research. The ample financing, of course, was also important, particularly in the flexibility with how the money was used. This allowed us to pursue new and unexpected directions quickly and efficiently.

What would you have done differently in your time as center leader with the knowledge that you have now?

Generally, the center performed better than I possibly could have imagined. However, if I were to do something differently, I would have paid much more attention to the startup phase. I would have better coordinated activities in the different nodes and made sure that our start was quicker and more focused.

How many Ph.D.'s and post-docs have you trained and in which areas have they primarily gotten jobs?

Overall we educated 36 post-docs and 34 Ph.D.'s, as well as a number of visiting Ph.D.'s, post-docs and newly graduated master students on their way to a Ph.D. Most of our students and post-docs are still engaged in academia. Our Ph.D.'s have mostly taken post-doc positions elsewhere, while most of our post-docs have found academic positions in various places throughout the world. Indeed, many of our earliest post-docs are building substantial research groups of their own. Some of our post-docs and students have also ended up in employment in both the private and public sectors.

CENTER FOR INDIVIDUAL NANOPARTICLE FUNCTIONALITY (CINF)


Leader

Professor
Ib Chorkendorff

Location

Technical University
of Denmark

Period

2005-2015

Grant

84.5 million DKK

You have received a grant of 84.5 million DKK for the Center for Individual Nanoparticle Functionality (CINF). What are your research-related highlights?

The overall goal for the CINF was to understand the fundamental correlation between atomic structure and activity especially nanoparticles, which are the active component in industrial catalysis. This goal has been reached to a great extent in that we have been able to understand and demonstrate the functionality of these correlations within a number of large-scale industrial reactions such as natural gas reformation and methanization. Furthermore, we have succeeded in finding completely new catalysts for manufacturing methanol, which has been suggested as a future energy source. The idea of using knowledge on the linkage between atomic structure and activity has been further developed to also include electrocatalysis, where we have initiated an entirely new field of research. In this field we explore completely new catalysts that can replace costly and rare noble metals such as platinum. Platinum is used for hydrogen development when trying to harvest energy from the sun and directly store the energy as chemical energy. We have likewise succeeded in finding completely new clusters of catalysts based on alloys, which can make the platinum catalyst in a fuel cell up to one order of magnitude more active. In this way we have had a

massive impact on the entire field of catalysis and contributed to establishing the principles that are now used in these research fields. Our impact is reflected in a large number of publications in leading international journals such as Science, Nature Materials and Nature Chemistry.

How does society as a whole benefit from your center's findings?

The first and maybe largest effect of the center from a societal perspective is that we have trained a large number of excellent candidates who are today employed in – primarily – Danish industry, where they are highly valuable because they use the training and knowledge they acquired at the CINF commercially. Furthermore, as mentioned above, we have established a solid basis for basic research in catalysts that can be used in energy conversion. This means that we are able to continue to train engineers and scientists with expertise in, e.g., how to store energy chemically. Concurrently with the increase in renewable energy from the sun and the wind, we have an increasing need to be able to store such forms of energy.

In addition, we have taken out a number of patents, started two spin-off companies (RenCAT & HP Now) and have two others in the pipeline, all companies that will be able to use these patents to create jobs and new technology in Denmark.

How has the DNRF CoE instrument specifically stimulated your findings?

It is not a question of whether the Center of Excellence instrument stimulated the results we achieved. The real question is whether we could have achieved these results without the center grant. The center grant made it possible to set higher goals and go beyond the three-year horizon that is the more typical time frame in research. We were able to establish a wide-ranging interdisciplinary approach, and to aim for results that couldn't be reached within the time frame of a Ph.D. project. Furthermore, the center grant made it possible to really follow through on various projects. For instance, we have established a large and costly facility that allows us to produce mass-selected nanoparticles and measure their catalytic activity. This makes it possible to establish the correlation between the size of nanoparticles and activity even from materials that we haven't yet succeeded in producing by "normal" chemical synthesis.

This breakthrough wouldn't have been possible without the center grant, and the potential is great: Once you have demonstrated that a specific material can exist, and that it is highly active, then a "normal" method for chemical synthesis suited for commercial production can undoubtedly be found.

What would you have done differently in your time as center leader with the knowledge that you have now?

We would have staked everything on the projects that yielded breakthrough results and left out the ones that didn't. Unfortunately, science is not that streamlined. I probably wouldn't/couldn't have done things much differently. It takes time to build up breakthrough research, and we did have projects that turned out not to have the potential we assumed they would have at the outset.

How many Ph.D.'s and post-docs have you trained and in which areas have they primarily gotten jobs?

The CINP has trained 55 Ph.D.'s and ~30 post-docs. The candidates have primarily been hired at Haldor Topsøe A/S, Danish Technological Institute, IRD Fuel Cells A/S and Danfysik A/S. Furthermore, a number of them have become associate professors at DTU (2), assistant professors (1) or the equivalent at foreign universities such as Stanford University, Technische Universität München, Chalmers Tekniska Högskola, Fuzhou University, and Université de Pau et des Pays de l'Adour.



CENTRE FOR VISCOUS LIQUID DYNAMICS (GLASS AND TIME)



Leader
Professor
Jeppe Dyre

Location
Roskilde University

Period
2005-2015

Grant
68.4 million DKK

You received a grant of 68.4 million DKK for the Centre for Viscous Liquid Dynamics (Glass and Time). What are your research highlights?

We have published unique experimental data for viscous liquid dynamics. But the highlight is probably the discovery of the so-called isomorph theory, which encompasses approximately half of all liquids and solids. According to this theory, all of these liquids and solids are simpler than previously known – and the theory explains why this is the case (the relevant liquids and solids are now sometimes referred to as “Roskilde-simple”). With this theory, a lot of pieces from experiments and computer simulations done during the last 50 years fell into place: we can now explain many well-known empirical rules, as well as their exceptions. The discovery led the center’s research away from the original narrow focus on viscous liquids and glasses, but eventually it led to a number of predictions even about these systems, predictions we subsequently demonstrated in our labs. In the end, it was all interconnected!

How does society as a whole benefit from your center’s findings?

Our focus was purely on basic research driven by curiosity. Basic research generates new knowledge, and usually one does not know how this in the course of time might benefit society. I find the comparison of new knowledge to a newborn baby beautiful and quite precise: who knows how society will benefit from the infant just after its birth? That said, Glass and Time has also hosted a large strategic research project that had the goal of reducing rolling resistance between tires and the road (2011-2015) in which we utilized our super-fast computer simulation facilities and general modeling expertise. Recently, a continuation of this project was funded by the Innovation Fund Denmark.



How has the D NRF CoE instrument specifically stimulated your findings?

I am convinced that without the center, there wouldn't be an isomorph theory today. Instead, it would have been discovered abroad – sometime in the future. Actually, the isomorph theory could have been made already in the 1970s and I think it is odd that all the experts in the field have overlooked it.

What would you have done differently in your time as center leader with the knowledge that you have now?

We surpassed our own expectations, and I don't think we made any serious mistake. The biggest challenge right now is to maintain as much as possible of this well-functioning and internationally acknowledged first class research environment.

How many Ph.D.'s and post-docs have you trained and in which areas have they primarily gotten jobs?

Our Ph.D.'s have primarily moved on to become post-docs, but some got jobs in the financial sector and in other places. In total, we have trained twenty Ph.D.'s and seven post-docs.

CENTRE FOR LANGUAGE CHANGE IN REAL TIME (LANCHART)



Leader
Professor
Frans Gregersen

Location
University of Copenhagen

Period
2005-2015

Grant
71.0 million DKK

You have received a grant of 71 million DKK for the Centre for Language Change in Real Time (LANCHART). What are your research-related highlights?

The legacy of LANCHART is its enormous, carefully transcribed and richly annotated corpus of Danish colloquial language. The corpus is searchable, and a specific software system has been developed to store and optimize it. It contains speech from many different places, generations, and social backgrounds, and in this way, it provides a picture of the variation that actually exists in the Danish language.

The corpus has now been expanded with recordings from areas in Denmark that have traditionally had strong dialects and also with a number of historical recordings of emigrants' Danish. The idea is to continuously expand the corpus with new recordings and transcripts.

At the moment, the corpus is among the best international everyday spoken language corpora, and it is the center's ambition to stay at the top of the field.

We have compiled the results from the center in the book *What do we know now? About Danish Spoken Language Varieties (Hvad ved vi nu - om danske talesprog)*, edited by Frans Gregersen and Tore Kristiansen.

The book is written for people without much previous knowledge, but who have a strong interest in the Danish language. The book chapters as well as the book itself may be downloaded from the center's web page.

Among the center's highlights I would like to emphasize the following:

- J. Normann Jørgensen and his group have put a theoretical debate about new language concepts ("languaging") on the agenda of this field, and we are continuing this debate in the Copenhagen Everyday Languaging group.
- We have set new standards in language attitude research and established a comprehensive network of researchers who carry out such investigations (SLICE with Tore Kristiansen and Nikolas Coupland as leaders).
- We have demonstrated that phonetic variation and change in real time does not happen as previously assumed: it is more unpredictable. But phonetic variation and change in Denmark has always had Copenhagen as its point of origin (this work was directed by Marie Maegaard and Nicolai Pharo).
- We, together with researchers from all over the world, have broken new ground for research in syntactical and semantic variation (Torben Juel Jensen and Tanya Karoli Christensen).

- We have initiated a new, functional focus on how individuals' language varies phonetically and syntactically both with situation and time with our *Discourse Context Analysis* (Frans Gregersen and others).
- We have established collaboration between language researchers who themselves have excellent credentials and who have a strong embedment in international frontline research in common.

How does society as a whole benefit from your center's findings?

In three ways: First, we have produced new knowledge about spoken Danish as documented in the book *What do we know now?* Second, this knowledge will hopefully be used in teaching Danish throughout the educational system. In my opinion, the knowledge available on everyday spoken Danish pre-LANCHART was insufficient and outdated. With support from the Ministry for Education, we have developed a game for the oldest students in Danish grade schools (SNAK), we have produced publicly available material of video and sound recordings with young people (the CLARIN files; for more information go to the LANCHART's website), and we have communicated our results in numerous contexts within the framework of our 'Spoken language store' (Talesprogsbutikken). Third, there is one applied linguistic issue for which I am convinced our data and methods will be pivotal within the next ten years, viz. the field of automatic speech recognition.

How has the D NRF CoE instrument specifically stimulated your findings?

The center grant was indisputably the decisive factor that allowed us to obtain the critical mass we needed for our international breakthrough, and it provided us with the freedom necessary to attain goals that emerged during the center's lifetime.

What would you have done differently in your time as center leader with the knowledge that you have now?

I would not have changed too many things. But if I could, I would have gone to great lengths to avoid the worst crisis in the center's lifetime, and in my time as center leader, and that was when we had to shut down transcription because of uncertainty as to whether the center would be allowed to continue.

How many Ph.D.'s and post-docs have you trained and in which areas have they primarily gotten jobs?

Having the center made it possible to hold on to doctoral students for a while until they went on to permanent positions. From the first generation, which includes nine doctoral students, all are now associate professors, except one who has become a high school teacher. The next generation of Ph.D. students numbers eight. Two of these are now in the educational sector, two are post-docs, and the remaining four are still Ph.D. students. These last four are all women, and three of them have had completion of their doctoral program delayed because of maternity leave. All senior staff at the center have been advisors for one or more Ph.D. students, also for other students than those affiliated with the center.



DARK COSMOLOGY CENTRE (DARK)



Leader
Professor
Jens Hjorth

Location
University of Copenhagen

Period
2005-2015

Grant
114.3 million DKK

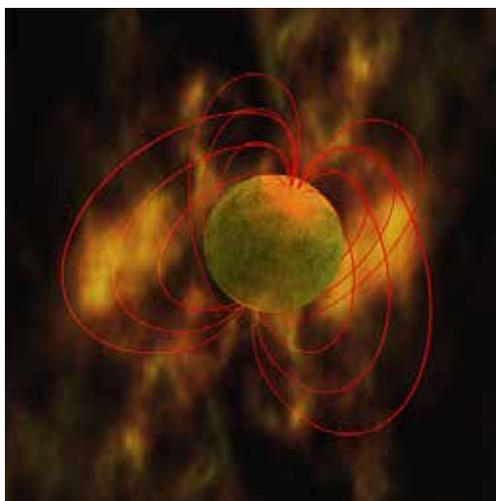
You have received a grant of 114.3 million DKK for the Dark Cosmology Centre (DARK). What are your research-related highlights?

One of the most intractable problems in astrophysics is the determination of distance. Nearly all of observational cosmology is taken up with it because the basic history of the universe is in its expansion. The darkness and sheer scale of the universe is what makes cosmology so challenging. We need bright beacons to illuminate the darkness. At DARK, we used gamma ray bursts, supernovae, quasars (black holes), and galaxies, all of which are 10 to 15 orders of magnitude more luminous than our sun, and can be discerned at enormous distances. Over the years, DARK has contributed to pushing back the cosmic frontier using these cosmic lighthouses. We can now observe galaxies and quasars that were formed in the first billion years of the history of the universe, which gives us a much better understanding of the universe than what we had ten years ago.

Over the past ten years, we have published approximately 900 research papers in international journals, 26 of them in Nature or Science. We have also published approximately 800 international electronic circulars or 'telegrams' (short notices giving information about astronomical phenomena requiring prompt dissemination).

Among the most interesting results is our discovery of the first "afterglow" of a short gamma ray burst back in 2005. In 2013, we went on to demonstrate that short gamma ray bursts come from the collision of neutron stars, causing an explosion now referred to as a 'kilonova'. It is now believed that the majority of gold and platinum in the universe is formed in these neutron-rich explosions. Kilonovae are also likely the sources of the light that will accompany gravitational waves (predicted 100 years ago by Einstein), which were detected for the first time in 2015.

We have also established that supernovae give rise to the formation of solids (cosmic dust) which our planet is made of. We have established new methods to determine cosmic distances and made a considerable contribution to the understanding of dark matter and energy in the universe. With computer simulations, in particular, we have investigated the physical properties of structures formed by dark matter. Simultaneously, we detected some of the most distant objects in the universe, among them the most distant gamma ray bursts, supernovae, and dusty galaxies.



Magnetars are some of the most extreme objects we know in the universe. They are extremely compact objects with masses like the Sun, but with radii of only 10-20 km. At the same time, magnetars are extremely powerful magnetic fields – the strongest magnetic fields we know in the universe. (Artists impression, NASA)

How does society as a whole benefit from your center's findings?

The center has consciously made a point of communicating its findings and the fascination of the universe. The researchers have given hundreds of talks at schools, student and amateur clubs, and amateur organizations, and they are often interviewed on radio and TV and quoted in printed and social media. Center scientists have also written books and participated in stage plays. Moreover, the center's researchers are responsible for teaching large parts of the curriculum in astrophysics at the University of Copenhagen.

Through a conscious strategy, the center has ensured a diverse distribution of international scientists from many countries and cultures, and has made a specific effort to improve the representation of and opportunities for women in frontline research. We have demonstrated practical approaches to ensuring high quality in research, a high share of women at all academic levels, and an open, respectful working environment.

How has the D NRF CoE instrument specifically stimulated your findings?

The center grant was essential to the research and societal activities mentioned above. In terms of research, the center grant allowed us to maintain positions of strength and, at the same time, cultivate new ones. This made it possible to continuously build up the prestige of the centre. The societal benefits would not have been possible without the high standing of the research and the size and sense of identity that the center grant helps to provide.

The center has become internationally renowned, which means we are able to attract top scientists at all levels of academia. The freedom to attract excellent researchers who carry out their own curiosity-driven research with no strings attached as to the project or with whom they collaborate has helped the DARK centre to be widely recognized as an attractive research environment for international researchers, both as a permanent work place and as an attractive place to visit as a guest researcher. This has made a significant difference in terms of raising the quality of the center's research.

What would you have done differently in your time as center leader with the knowledge that you have now?

Concurrently with building up excellence in research and commitment to societal outcomes, the center has had a specific focus on excellence in research supporting activities within administration and IT. It took 3-4 years to achieve the ambitions in the latter area. I would have pushed to reach these goals sooner had I known the difference outstanding research administration and IT support could make.

How many Ph.D.'s and post-docs have you trained and in which areas have they primarily gotten jobs?

We have trained approximately 25 Ph.D.'s and approximately 40 post-docs. About 80% of these have continued their careers in academia. The rest are working in industry (especially the financial sector or in "data science") or they are employed in high schools.

CENTER FOR MRNP BIOGENESIS AND METABOLISM (MRNP)


Leader

Professor
Torben Heick Jensen

Location

Aarhus University

Period

2005-2015

Grant

80.0 million DKK

You received a grant of 80 million DKK for the Center for mRNP Biogenesis and Metabolism (mRNP). What are your research-related highlights?

Employing a rich repertoire of different methods, the center has conducted research on several fronts in the field of RNA biology. In its lifetime, the center has published approximately 150 articles in international scientific journals, approximately half of which have been from the 'top shelf'. As a specific highlight, one can mention the identification of a new RNA class, the so-called "cryptic unstable transcripts (CUTs)," from backing yeast *Saccharomyces cerevisiae*, or "promoter upstream transcripts (PROMPTs)" from human cells. The discovery of these transcripts and the characterization of their turnover in eukaryotic cell nuclei have shed light on new mechanisms by which the transcription of cellular genes is initiated and terminated, and how RNA quality control is established in eukaryotic cells in an intimate interaction with the cell's productive RNA processes. Furthermore, these breakthrough discoveries have contributed to establishing a brand new research field in "pervasive transcription," which aims to describe and functionally characterize the surprisingly promiscuous production of RNA from eukaryotic cells. In parallel projects, the center has solved

the three-dimensional structure of several important RNA-protein complexes involved in RNA biogenesis and metabolism.

How does society as a whole benefit from your center's findings?

As center efforts have been dedicated to basic research of the finest quality, the most significant societal benefit in the short run is the training of highly educated scientists, who are ready to become tomorrow's academic leaders or drivers of industrial enterprises. The center's results have established the basis for a better understanding of how eukaryotic genomes are organized, and how they are regulated and quality controlled. These processes are essential to all life and the way it has evolved. Consequently, the center's research will have a major impact on both the biotechnological and medical sectors in the long run.

How has the D NRF CoE instrument specifically stimulated your findings?

That is very easy to answer: It has meant everything. The flexibility of the grant has made it possible to react immediately when new possibilities of research breakthroughs presented themselves and to also quickly re-direct dead-

end research into a more productive direction. These changes to the research plans did not have to be pre-approved in a slow administrative process or via new grant applications. Networking with other center leaders and affiliated staff at other centers has had significant professional and political impact, just as the center's results have given access to leading international scientists in our field.

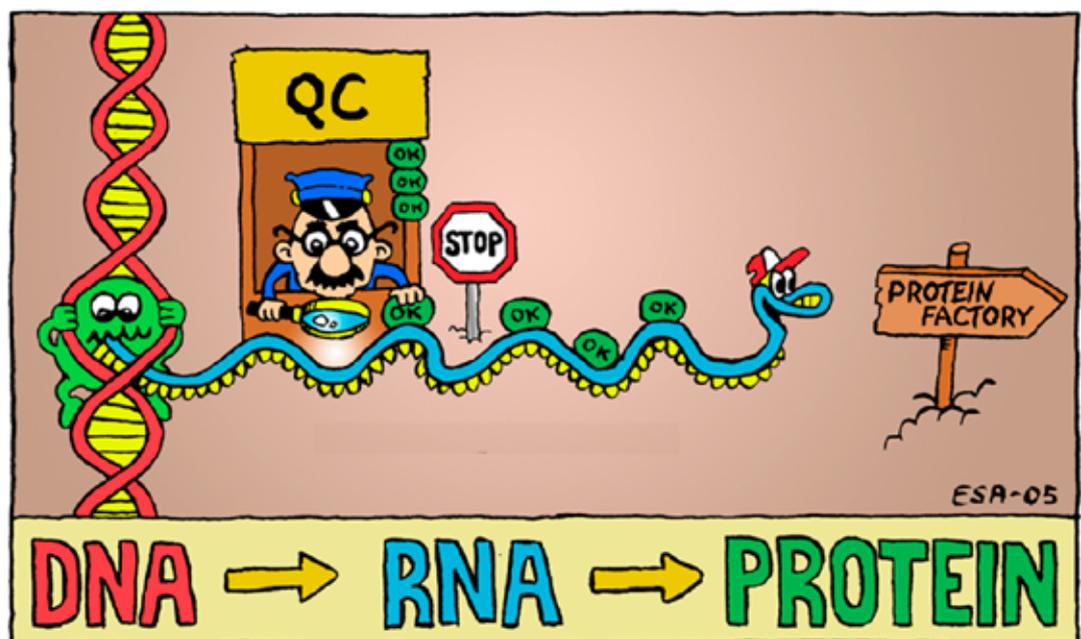
What would you have done differently in your time as center leader with the knowledge that you have now?

Maybe I would have appreciated to an even greater extent what a privileged situation it was to be part of such an excellent and forward-looking funding scheme.

How many Ph.D.'s and post-docs have you trained and in which areas have they primarily gotten jobs?

We have trained approximately 30 Ph.D. students, 10 of whom have left the center and carried on their careers as post-docs at foreign universities/research institutions (e.g., Oxford, Harvard, MIT, ETH Zurich, IMBA Vienna). Three are post-docs in Denmark and two work in the private sector.

Of about 20 post-docs at the center, who were primarily from abroad, half are now employed as post-docs, staff scientists or assistant professors abroad, and one is employed in the private sector. Among the other half, two are associate professors and three are assistant professors at Danish universities, while two are employed in the private sector, one teaches in high school, and one is on sick leave.



CENTRE FOR TEXTILE RESEARCH (CTR)



Leader Professor Marie-Louise Nosch	Location University of Copenhagen	Period 2005-2015	Grant 44.7 million DKK
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You received a grant of 44.7 million DKK for the Centre for Textile Research (CTR). What are your research-related highlights?

Through the existence of the DNRF Center for Textile Research (CTR) over the past 10 years (2005-2015), we have had a long series of research highlights.

The number one highlight for CTR is that we have established an entirely new discipline: textile research. This is now rooted in a permanent position in textile archaeology at the SAXO institute at the University of Copenhagen for Associate Professor Eva Andersson Strand. So textile archaeology has become an integrated part of the curriculum. Likewise, at the National Museum of Denmark two permanent positions have been established to carry out textile research.

In the discipline of textile studies, CTR has applied new methods from the natural sciences, such as aDNA analysis, strontium analysis, protein analysis and dye analysis, and worked across disciplines such as archaeology, history, art history, anthropology, ethnology, and philology. Among others, this is manifested by Karin Frei's new methods with strontium isotopes ("For Women in Science Award"), Ulla Mannering's

dye analyses of Iron Age textiles, and Luise Ørstad Brandt's aDNA and protein analysis.

The research conducted at our center, including my own work, has been awarded a number of research prizes, such as the Danish Association of Masters and Ph.D.s' research prize for path-breaking research, The Einar Hansen Research Foundation's award for outstanding research in the Humanities, the EliteForsk prize 2009 from the Danish Ministry of Higher Education & Science, and the Anneliese Maier Research Award from the Alexander von Humboldt Foundation in Germany.



Textile from Tiraz Widad Kawar Home for Arab Dress, Amman, Jordan. Photo: Camilla Ebert

How does society as a whole benefit from your center's findings?

Textiles have played a crucial role throughout humanity's existence, something which we have now validated through our center's research, thereby rendering visible and opening up a hitherto neglected area of knowledge to academia and the broader public. Furthermore, CTR has published a number of books in the Ancient Textiles Series, which is readily available to both academics and the general reader. CTR has also headed a vast number of conferences, which were also open to the general public, and CTR's results are communicated in exhibitions in Denmark and abroad, as well as in the media.

How has the DNRF CoE instrument specifically stimulated your findings?

Without the center of excellence funding, it would not have been possible to develop new methods and accomplish projects as large and ambitious as the ones we undertook. This funding provided the framework for the most optimal research. Furthermore, the center made it possible to create networks for the affiliated researchers and to attract new research funds, enter into cooperation agreements, and so forth. The center was always bigger than the sum of its affiliated individuals. Backed by CTR, it is easier for the individual researcher to make textile research visible, a particularly valuable feature, as textile research had been neglected for so many years, and in the past, the few individual textile researchers had worked mostly alone in isolated academic outposts, on the fringes of other academic disciplines throughout the world.

What would you have done differently in your time as center leader with the knowledge that you have now?

I would have enjoyed the freedom and flexibility more!

How many Ph.D.'s and post-docs have you trained and in which areas have they primarily gotten jobs?

CTR has trained 11 Ph.D.'s and 16 post-docs, of whom two-thirds were from abroad. After their stay at CTR, they have primarily obtained jobs at museums, universities, and other research units.

CENTER FOR OXYGEN MICROSCOPY AND IMAGING (COMI)


Leader

 Professor
Peter R. Ogilby

Location

Aarhus University

Period

2005-2015

Grant

50.3 million DKK

You received a grant of 50.3 million kroner for the Center for Oxygen Microscopy and Imaging (COMI). What are your research-related highlights?

Molecular oxygen is an important molecule in many processes that occur on Earth. It plays key roles in the maintenance of life and in mechanisms by which life is extinguished and materials destroyed. Despite all of this, the study of oxygen and oxygen-dependent processes continues to present challenging problems.

In COMI, we examined systems in which oxygen and so-called reactive oxygen species (ROS) play a role. Of particular interest is that many ROS can be produced upon exposure of a sample to light. On one hand, this is important given that we live in a world of light and oxygen. It is also important for (1) methods to exert experimental control in studies of ROS behavior, and (2) applications where light is used as a tool (e.g., selected cancer therapies).

In complex systems, ROS behavior is influenced by micro- and nano-scopic heterogeneities. To this end, we developed and employed time- and space-resolved techniques to investigate and control processes that involve ROS in dynamic heterogeneous systems. Much of our work has focused on events in single mammalian cells

where ROS act as signaling agents in processes that range from cell division to cell death.

COMI embodied a unique blend of experimental and computational chemistry, cell biology, materials science and physics, and this gave us a different perspective in the competitive world of modern science.

Perhaps the most significant things that came out of COMI were the tools and techniques to create and monitor selected ROS in imaging-based single-cell experiments. Although much information was gathered using these tools, one point arguably stands out: we uniquely established that an important ROS, singlet oxygen, lives longer and diffuses farther in a cell than originally believed. This has important ramifications with respect to the roles played by ROS as signaling agents, particularly in mammalian systems.

How does society as a whole benefit from your center's findings?

The "societal issue" is difficult to discuss given that we carried out basic research. Nevertheless, given ROS's roles as signaling agents, it is reasonable to think, for example, that our work will have an impact on the development of more efficient and selective drugs to treat diseases and to kill

undesired cells (e.g., cancer treatment) or that our work on cell stimulation could be of benefit in skin regeneration (e.g., burn treatments).

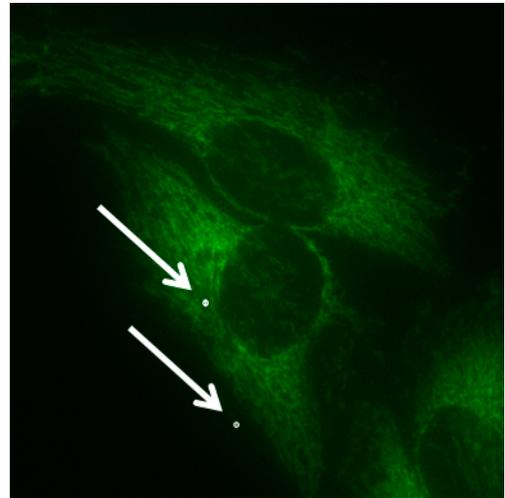
A successful basic research program also contributes through the education of a new generation of scientists. The “students” of COMI have certainly populated a number of academic institutions, industrial research facilities, as well as governmental and private organizations worldwide. It is also fair to say that we have had an impact on the international research community; the evidence indicates that our results have stimulated activity in other laboratories, spawning new ideas, techniques, and the education of more people.

How has the DNRF CoE instrument specifically stimulated your findings?

Support from the DNRF Center of Excellence program has certainly been a key component of our success; it gave us the opportunity to operate in a way that would otherwise be difficult, if not impossible, with a “conventional” research grant. Perhaps most importantly, the opportunity to receive funding for 10 years relieved many inhibitions with respect to tackling challenging problems. We were also able to explore tangential projects as they appeared through the daily research process. For example, if a new project or tangential effort required a person with a special skill set, we could go out and hire that person.

What would you have done differently in your time as center leader with the knowledge that you have now?

Nothing! I am proud of and satisfied with our accomplishments.



An image of three cells based on the fluorescence of a dye localized in the mitochondria. The white spots (indicated by arrows) illustrate the spatial and location control we can exert when using light to perturb a cell (e.g., create a reactive oxygen species).

How many Ph.D.'s and post-docs have you trained and in which areas have they primarily gotten jobs?

Over the period in which we received DNRF funding for COMI (2005-2015), a total of 25 post-docs and 28 Ph.D. students worked on projects relevant to the center. Although not all of these people were supported by DNRF funds, the work they did supported the program and goals of COMI in one way or another. As mentioned above, these people have since populated academic institutions (teaching and research), industrial research facilities, as well as governmental and private organizations worldwide. Although some have moved into administrative or management roles, most continue to use their science-based research skills in some way.

DANISH ARRHYTHMIA RESEARCH CENTRE (DARC)


Leader

Professor
Søren-Peter Olesen

Location

University of Copenhagen

Period

2005-2015

Grant

69.7 million DKK

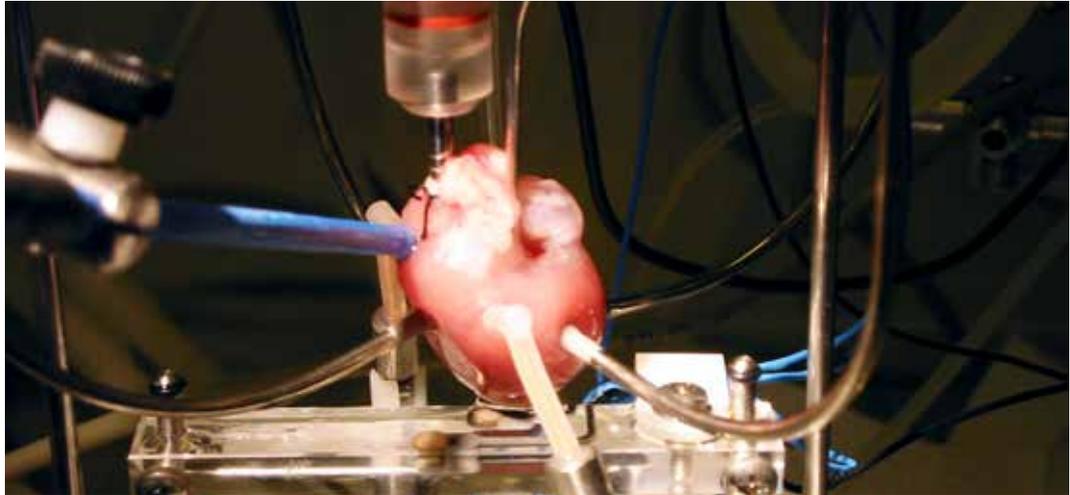
You have received a grant of 69.7 million DKK for the Danish Arrhythmia Research Centre (DARC). What are your research-related highlights?

The heart beats stably about 100.000 times each day, and one single irregularity during a lifetime can have serious consequences. It is hard to clarify the biological mechanisms behind phenomena this rare. We have studied arrhythmia in selected young patients that are otherwise healthy. The genetic variations we have identified in these patients have been reproduced in single cells and in animal models in our laboratories. Hereby we have achieved a fundamental understanding of the hereditary factors that stabilize and destabilize the heart beat. We have clarified the changed biological signal pathways in the heart both in the most common form of arrhythmia called atrial fibrillation, and in a number of very rare arrhythmias.

How does society as a whole benefit from your center's findings?

If you suffer from a disease that has a hereditary component, it is essential that the significance of this is understood in detail, as this knowledge may have consequences for the treatment of both you and symptom-free family members. Our studies have contributed to the identification of high-risk genetic variants on the one hand, and to the dismissal of risk related to other genetic variants.

The biological understanding of electrical currents that control the heart beat and especially the currents through potassium-permeable ion channels in the cardiac muscle has led to the discovery of an entirely new pharmacological principle for treatment of atrial fibrillation. The development of a drug with this novel mechanism of action is now supported by Innovation Fund Denmark and is expected to go into human trials within the next couple of years.



How has the DNRF CoE instrument specifically stimulated your findings?

Due to the significant resources from DNRF, new technology, and large patient cohorts we have been able to shift our research base from just examining specific genes in single patients during the first years to later being able to conduct large 'unbiased' studies of the entire genome and proteome in most Danes with severe familiar atrial fibrillation. Without the resources from the DNRF we would not have been able to drive this field. While maintaining a leading position in our initial core, and taking part in the largest international consortia, it has been possible to build up brand new high-risk research ventures with the CoE resources. Furthermore, the instrument made it possible to hire a number of excellent young scientists at a short notice and establish a school in cardiac research that trained more than 100 Ph.D. students and post-docs.

What would you have done differently in your time as center leader with the knowledge that you have now?

I would probably have spent more time on hiring processes for foreign scientists.

How many Ph.D.'s and post-docs have you trained and in which areas have they primarily gotten jobs?

We have trained 51 Ph.D.'s and have had 63 post-docs in the center. Half of the post-docs have later been employed in industry. A fourth have been employed in academia in Denmark and abroad, and the last fourth as medical doctors at Danish hospitals.

CENTRE FOR INFLAMMATION AND METABOLISM (CIM)



Leader Professor Bente Klarlund Pedersen	Location Rigshospitalet	Period 2005-2015	Grant 55.8 million DKK
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You have received a grant of 55.8 million DKK for the Centre for Inflammation and Metabolism (CIM). What are your research-related highlights?

CIM was established ten years ago on the innovative idea that muscle is an endocrine organ that produces hormone-like substances, the so-called myokines that affect muscle-muscle and muscle-organ cross talk. In the proposal to the DNRF in 2004, it was our vision that the myokine field would become as dominant as the earlier discovery that fat tissue produces the so-called adipokines. In late 2014, we published a review article with a status of our work and that of others in the field: Today several hundred myokines have been identified. Hence, our high-risk idea proved to be viable in every possible way.

How does society as a whole benefit from your center’s findings?

The finding that muscle is an endocrine organ forms the basis for a paradigm shift in the perception of the contributions of skeletal muscle as it provides an entirely new understanding of the mechanisms by which muscles communicate with, e.g., the liver, the pancreas, bones, the

brain, and actually fat too. Our findings contribute to the development of optimal regimens for physical activity training targeted at specific diseases (exercise as medicine), and the findings may impact a conceptual understanding of which areas are significant for the development of new drugs for, e.g., diabetes.

How has the DNRF CoE instrument specifically stimulated your findings?

The center grant made it possible to recruit exceptionally talented post-docs from both Denmark and abroad without having to await application procedures. We have been able to establish a strong infrastructure in terms of



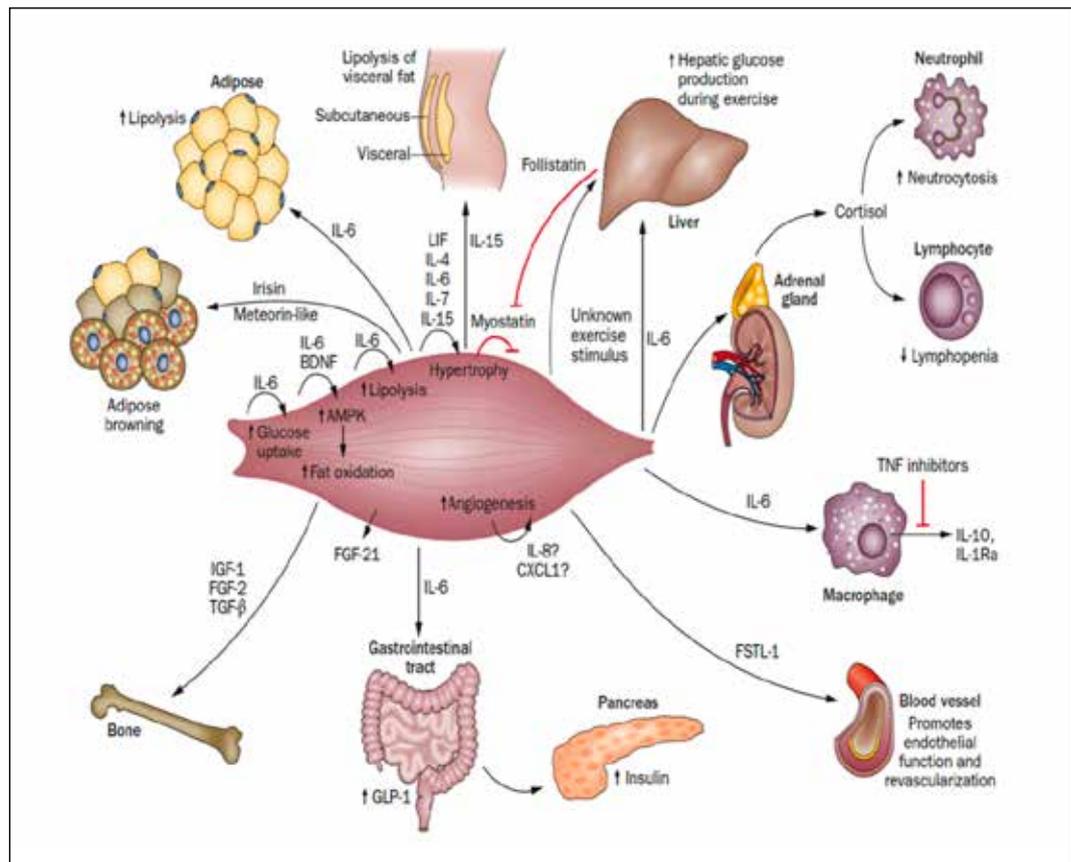
well-equipped labs with highly skilled technical and administrative staff. Altogether, this forms the backbone of the embedment of CIM as a new translational research center, the Center for Physical Activity Research, where the basic findings will be developed into physical training that may be used as “medicine” for people with specific chronic diseases. Furthermore, the Danish National Research Foundation has initiated and coordinated the formal and informal development of networks with other center leaders, which has been a great inspiration and support.

What would you have done differently in your time as center leader with the knowledge that you have now?

I would have put less emphasis on training Ph.D.'s, and more on recruiting post-docs and senior scientists.

How many Ph.D.'s and post-docs have you trained and in which areas have they primarily gotten jobs?

In total we have trained 33 Ph.D.'s and 26 post-docs. Those who moved on to new jobs are today evenly distributed between research positions in Denmark and abroad, and jobs in clinical hospital settings and industry.



CENTER FOR MODELS OF LIFE (CMOL)



Leader
Professor
Kim Sneppen

Location
University of Copenhagen

Period
2005-2015

Grant
52.0 million DKK

You have received a grant of 52 million DKK for the Center For Models of Life (CMOL). What are your research-related highlights?

The Center for Models of Life is a theoretical biology center, aimed at modeling life phenomena. The center activity was centered around uncovering key principles of regulation and self organization in living systems.

The center was relatively small, but in spite of a limited number of core members, I believe it made groundbreaking papers within several areas of biology.

In 2007, we invented a new type of quantitative approach to model and understand and quantify epigenetics in terms of a feedback involving read-write enzymes and histone modifications. In 2008, we pinpointed new classes of regulatory motifs at the interface between metabolic and regulatory networks - a type of motif that later has been taken up by leading scientists in metabolomics.

In 2009, we suggested a tool-based view of larger scale metabolic and regulatory network - an idea that for the first time aimed to integrate large-scale network topology with the functional tasks of the network. This work has since inspired new ways of comparing the evolution of functional cells with software development. In 2011, we suggested a new way of under-

standing bio-diversity, in terms of the interplay between species standoffs and transient predatory cycles that create spatial heterogeneties. This qualitatively new research direction inspired us to conduct further studies on the concept of diversity, and how it could self-organize in various biological systems. A last result of this adventure into the mathematics of sustainability was a recent paper on the interplay between sustainability, exponential growth, and disasters. This paper suggests a new way of understanding oscillations and fluctuations in natural ecosystems by connecting different populations through their common, but limited environment.

Finally we published a paper on Parkinson's disease at the single cell level, highlighting for the first time that it is the mechanisms counter-acting aggregation that controls how long it will take before the disease's onset. This is a highly speculative paper on an important and terrifying disease.

How does society as a whole benefit from your center's findings?

Other than the above mentioned promising research directions were initiated, including in particular an attempt to understand diabetes in terms of coordinated inflammation in pancreatic islands of beta cells. This study remains at

present a theoretical study, but if someone succeeds in detecting the crucial signaling molecule, then this single study could have an important medical and economic impact. Another applicable research direction is our expanding connection with Kenn Gerdes' Center for Bacterial Stress Response and Persistence. If our theoretical predictions about independent toxin-antitoxin systems prove correct, it will initiate new research directions of relevance to microbial drug-resistance.

How has the DNRF CoE instrument specifically stimulated your findings?

The DNRF has naturally had huge stimulating impacts on our activities, and has especially enabled us to initiate new research directions within epigenetics, gene-regulations in the interface between metabolism and transcription, and in recent years with an overall goal to understand evolution and maintenance of biological diversity in a broad perspective.

What would you have done differently in your time as center leader with the knowledge that you have now?

I am very satisfied with the way I used my options, and I am particularly happy to have been con-

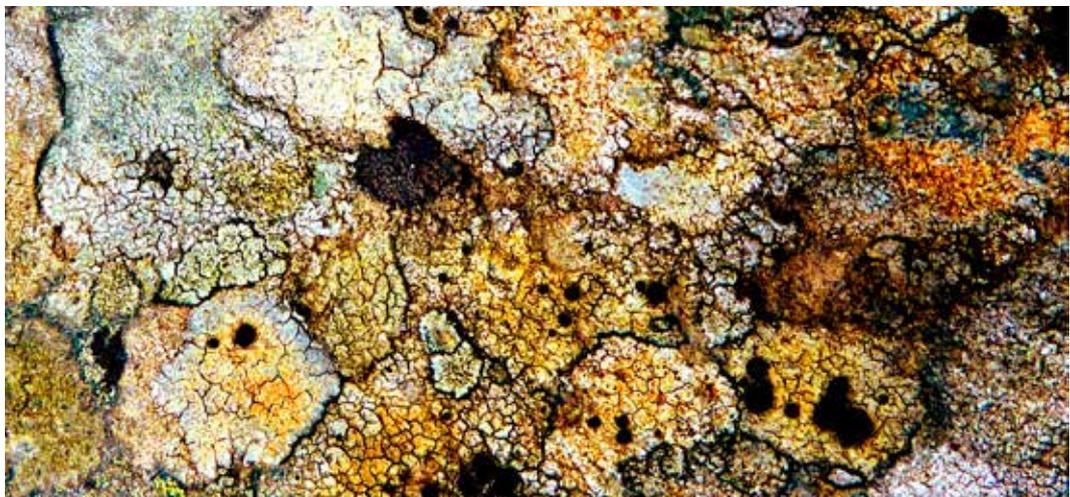
tinuously involved in specific ideas and projects through my time as center leader.

How many Ph.D.'s and post-docs have you trained and in which areas have they primarily gotten jobs?

Our center educated a number of students and post-docs, who subsequently continued either in science or obtained a job in industry. In particular, four of our students are now employed in Novo, one in La Roche in Denmark, two in financial companies in Copenhagen, one in a hospital in Denmark, and one in a consulting company in Stockholm. Other of our students/post docs are still part of the university world, with one in a tenured position at the top biological institute in Bangalore (NCBS), one tenured in Krakow, one post-doc at Harvard, one post-doc at Sloan Kettering (New York), one in Lausanne, and two post-docs in Barcelona.

Some of these latter post-docs will continue in academia, others will gain international training and perspectives that will help them to enter companies or jobs in industrial research/data handling/analysis or consulting.

Phage-bacteria interaction.



TOWARDS GENDER BALANCE IN RESEARCH

The number of women in Danish research has increased in recent years. However, women are still underrepresented among the academic staff at Danish research institutions. Although women make up 46% of those who earn Ph.D.'s, only 18% of professors are women. That is below the average for the EU and considerably below the average for the other Nordic countries.

Because of this, the former minister for Higher Education and Science, Sofie Carsten Nielsen, set up a task force with the DNRF's chair, Professor Liselotte Højgaard, as the chairperson.

The task force's job was to come up with suggestions for initiatives that could be immediately put into action. In addition, the task force was to help identify areas where a better knowledge base is needed in order to take effective action. The task force began its work in early 2015 and had released its report, *Recommendations from the Task Force for More Women in Research*, by the end of the first quarter of 2015.

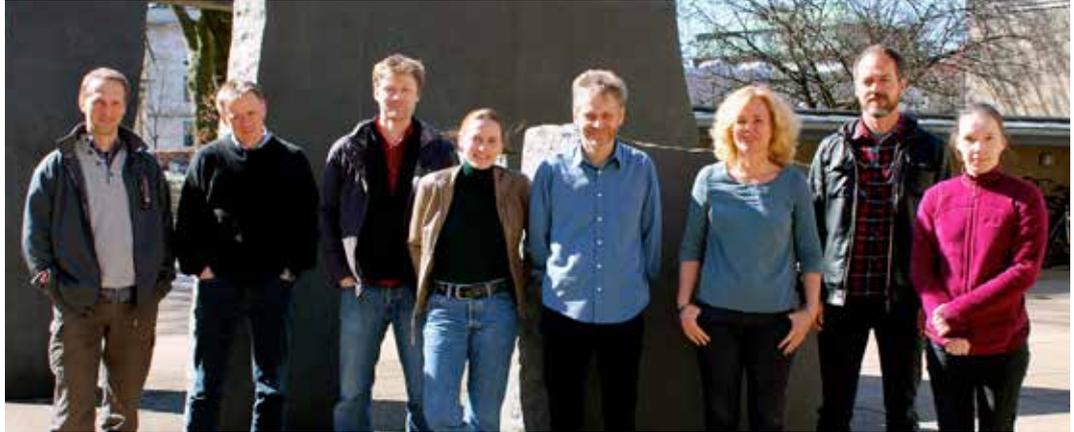
The task force recommends, among other things, that efforts to get more women in research be anchored at the management level of research institutions. It also recommends that an equal gender balance be achieved in appointment committees and assessment committees, that talent programs and mentoring be developed, and that efforts be made to improve the work culture, making it easier to have both a research career and a family life – for the benefit of men and women alike.

The Danish National Research Foundation regularly monitors the gender balance of the staff at its centers. An equal gender distribution will never be a criterion in the foundation's evaluation of proposals, but regular monitoring is important for continued attention to the problem.



Recommendations from the Taskforce for More Women in Research, April 2015
Published by Ministry of Higher Education and Science

Diversity is good for research because we humans and our society are characterized by diversity: different genders, different genetic compositions, different social and cultural backgrounds, etc. This is why we also react differently to medical treatment, such as vitamins and vaccines, and why we also have different perceptions of what constitutes a good society and a good life. Research used in decision making that affects us all must consider this diversity. Research that should benefit all of us must, of course, provide knowledge that can encompass all of us.



From the left: Steen Hansen, Johan Fynbo, Darach Watson, Marianne Vestergaard, Jens Hjorth, Anja Andersen, Sune Toft, Lise Christiansen

Center leader and professor Jens Hjorth, of the DNRF-funded Center for Cosmology (DARK) at the Niels Bohr Institute, Copenhagen University, is an excellent example of someone who has addressed the gender balance in research in a very direct and practical way.

Through deliberate attention to gender in the recruitment process, Hjorth has shown that it is possible to create a research group in physics where 40% of the research staff are women, and that this can produce a level of scientific research that is at least as high as that in groups dominated by men.

This can be seen very clearly in DARK's publication pattern. In 2015, the University of Copenhagen entered the Nature Index's top 50 institutions

for publications in *Nature* and *Science*. DARK's *Nature* and *Science* publications from 2014 represent 10% of the University of Copenhagen's total output of *Nature* and *Science* publications.

Very deservedly, Hjorth was awarded the Women in Physics, KIF prize 2015. He was awarded the prize in the category 'Woman or man who has done something special to make women more visible or advance women's opportunities in physics through, for example, mentorship or political action'. Hjorth's efforts extend far beyond Denmark's borders. For example, his and Darach Watson's *Nature* commentary, *Women's grants lost in inequality ocean*, was in [Nature's list of 2015 correspondence highlights](#).

MEMBERS OF THE TASK FORCE FOR MORE WOMEN IN RESEARCH:

- DNRF Chair, professor, Head of Department of Clinical Physiology, MD, DMSc **Liselotte Højgaard**, Rigshospitalet, University of Copenhagen and Technical University of Denmark (Chair)
- Chair for the Danish Council for Independent Research's board, Professor **Peter Munk Christiansen**, Aarhus University
- Rector **Per Holten-Andersen**, Copenhagen Business School
- Member of the Young Academy, Professor, MD **Tine Jess**, SSI and Aalborg University
- Director **Anne-Marie Levy Rasmussen**, GlaxoSmithKline A/S

SNAPSHOTS FROM 2015



After 15 years as the foundation's deputy director, Mogens Klostergaard Jensen retired in 2015. Through the years Mogens has been an invaluable pillar in the administrative tasks, handling everything to perfection. On January 1st, 2016, he was replaced by new deputy director Steen Marcus. Steen Marcus started working at the DNRF as the foundation's investment consultant in the spring of 2015.



Thomas Sinkjær and Gunnar Öquist on their way for an audience with HRH The Crown Prince to thank him for conferring on them the Order of Dannebrog's Knight's Cross for their excellent contributions to the Danish research community.



Søren-Peter Olesen started his job as DNRF director with a grand tour to the biggest private foundations on the East coast of the U.S. Among others, he visited the Howard Hughes Medical Institute (HHMI), where he discussed research foundation strategies with HHMI vice president and chief scientific officer, Harvard professor Erin K. O'Shea. Similarly to the DNRF, the HHMI also funds multi-year grants with a lot of freedom in using the funds because both foundations believe that this creates the best basis for scientific breakthroughs. Strategy, impact, and community involvement were discussed with the Rockefeller, Sloan, Simons, and Mellon Foundations.



DNRF Chair Professor Liselotte Højgaard and DNRF Director Professor Thomas Sinkjær were in Tokyo for the Global Research Council's annual meeting in May 2015. The meeting's two main themes were 'Research Funding for Scientific Breakthrough' and 'Building Research and Education Capacity', and as can be seen from the photo, the LEGO-brick is used as a metaphor for creative capacity building worldwide.



Bo Erno Honoré
Professor, Department of Economics
Princeton University



Svend Erik Larsen
Professor Emeritus, Department of Anthropology
University of Copenhagen

“ Thank you to our previous board members for their dedicated and impressive work.



Kirsten Hastrup
Professor, Department of Anthropology
University of Copenhagen



Birgitte Possing
Professor, the Danish State Archives

ONGOING ACTIVITIES

CENTERS OF EXCELLENCE ESTABLISHED IN 2005

Nordic Center for Earth Evolution (NordCEE)

Location:	University of Southern Denmark (and University of Copenhagen)
Center leader:	Professor Don Canfield
Total grant:	89.4 million DKK



Center for Individual Nanoparticle Functionality (CINF)

Location:	Technical University of Denmark
Center leader:	Professor Ib Chorkendorff
Total grant:	84.5 million DKK



Centre for Inflammation and Metabolism (CIM)

Location:	Rigshospitalet (and University of Copenhagen)
Center leader:	Professor Bente Klarlund Pedersen
Total grant:	55.8 million DKK



Centre for Social Evolution (CSE)

Location:	University of Copenhagen
Center leader:	Professor Jacobus J. Boomsma
Total grant:	77.0 million DKK



Center for mRNP Biogenesis and Metabolism (mRNP)

Location:	Aarhus University
Center leader:	Professor Torben Heick Jensen
Total grant:	80.0 million DKK



Centre for Insoluble Protein Structures (inSPIN)

Location:	Aarhus University
Total grant:	80.0 million DKK

Center for Oxygen Microscopy and Imaging (COMI)

Location:	Aarhus University
Center leader:	Professor Peter R. Ogilby
Total grant:	50.3 million DKK



Centre for Viscous Fluid Dynamics (Glass and Time)

Location: Roskilde University

Center leader: Professor Jeppe Dyre

Total grant: 68.4 million DKK

**Dark Cosmology Centre (DARK)**

Location: University of Copenhagen

Center leader: Professor Jens Hjorth

Total grant: 114.3 million DKK

**Centre for Language Change in Real Time (LANCHART)**

Location: University of Copenhagen

Center leader: Professor Frans Gregersen

Total grant: 71.0 million DKK

**Centre for Textile Research (CTR)**

Location: University of Copenhagen

Center leader: Professor Marie-Louise Nosch

Total grant: 44.7 million DKK

**Center for Models of Life (CMOL)**

Location: University of Copenhagen

Center leader: Professor Kim Sneppen

Total grant: 52.1 million DKK

**Danish Arrhythmia Research Centre (DARC)**

Location: University of Copenhagen (and Rigshospitalet)

Center leader: Professor Søren-Peter Olesen

Total grant: 69.7 million DKK



CENTERS OF EXCELLENCE ESTABLISHED IN 2007

Center for Research in Econometric Analysis of Time Series (CREATES)

Location: Aarhus University

Center leader: Professor Niels Haldrup

Total grant: 80.2 million DKK

**Centre for Carbohydrate Recognition and Signaling (CARB)**

Location: Aarhus University

Center leader: Professor Jens Stougaard

Total grant: 90.6 million DKK



Centre for DNA Nanotechnology (CDNA)

Location: Aarhus University
 Center leader: Professor Kurt Vesterager Gothelf
 Total grant: 94.5 million DKK



Centre for Epigenetics

Location: University of Copenhagen (and University of Southern Denmark)
 Center leader: Professor Kristian Helin
 Total grant: 111.0 million DKK



Centre for Ice and Climate

Location: University of Copenhagen
 Center leader: Professor Dorthe Dahl-Jensen
 Total grant: 116.0 million DKK



Center for Massive Data Algorithmics (MADALGO)

Location: Aarhus University
 Center leader: Professor Lars Arge
 Total grant: 72.5 million DKK



Centre for Membrane Pumps in Cells and Disease (PUMPkin)

Location: Aarhus University
 Center leader: Professor Poul Nissen
 Total grant: 106.6 million DKK



CENTERS OF EXCELLENCE ESTABLISHED IN 2009/2010

Center on Autobiographical Memory Research (Con Amore)

Location: Aarhus University
 Center leader: Professor Dorthe Berntsen
 Total grant: 84.1 million DKK



Center for Particle Physics Phenomenology (CP³ - Origins)

Location: University of Southern Denmark
 Center leader: Professor Francesco Sannino
 Total grant: 80.0 million DKK



Center for Particle Physics (Discovery)

Location: University of Copenhagen
 Center leader: Professor Peter H. Hansen
 Total grant: 80.0 million DKK



Centre for Symmetry and Deformation (SYM)

Location: University of Copenhagen
 Center leader: Professor Jesper Grodal
 Total grant: 90.1 million DKK



Center for Materials Crystallography (CMC)

Location: Aarhus University
 Center leader: Professor Bo Brummerstedt Iversen
 Total grant: 105.2 million DKK

**Centre for GeoGenetics**

Location: University of Copenhagen
 Center leader: Professor Eske Willerslev
 Total grant: 100.6 million DKK

**Centre for Quantum Geometry of Moduli Spaces (QGM)**

Location: Aarhus University
 Center leader: Professor Jørgen Ellegaard Andersen
 Total grant: 89.3 million DKK

**Center for Macroecology, Evolution and Climate (CMEC)**

Location: University of Copenhagen
 Center leader: Professor Carsten Rahbek
 Total grant: 111.8 million DKK

**Center for Star and Planet Formation (STARPLAN)**

Location: University of Copenhagen
 Center leader: Professor Martin Bizzarro
 Total grant: 82.4 million DKK



CENTERS OF EXCELLENCE ESTABLISHED IN 2012

Centre for Medieval Literature (CML)

Location: University of Southern Denmark
 Center leader: Professor Lars Boje Mortensen
 Total grant: 36.0 million DKK

**Center for Dynamic Molecular Interactions (DynaMo)**

Location: University of Copenhagen
 Center leader: Professor Barbara Halkier
 Total grant: 49.0 million DKK

**Center for Permafrost Dynamics in Greenland (CENPERM)**

Location: University of Copenhagen
 Center leader: Professor Bo Elberling
 Total grant: 60.2 million DKK

**Center for Quantum Devices (QDev)**

Location: University of Copenhagen
 Center leader: Professor Charles Marcus
 Total grant: 64.4 million DKK



Center for Financial Frictions (FRIC)

Location: Copenhagen Business School

Center leader: Professor David Lando

Total grant: 48.0 million DKK



Center for Nanostructured Graphene (CNG)

Location: Technical University of Denmark

Center leader: Professor Antti-Pekka Jauho

Total grant: 54.0 million DKK



Center for Geomicrobiology

Location: Aarhus University

Center leader: Professor Bo Barker Jørgensen

Total grant: 58.1 million DKK



Center for International Courts (iCourts)

Location: University of Copenhagen

Center leader: Professor Mikael Rask Madsen

Total grant: 42.0 million DKK



Stellar Astrophysics Centre (SAC)

Location: Aarhus University

Center leader: Professor Jørgen Christensen-Dalsgaard

Total grant: 55.0 million DKK



Copenhagen Center for Glycomics (CCG)

Location: University of Copenhagen

Center leader: Professor Henrik Clausen

Total grant: 62.0 million DKK



Center for Vitamins and Vaccines (CVIVA)

Location: Statens Serum Institut

Center leader: Professor Christine Stabell Benn

Total grant: 58.0 million DKK



CENTERS OF EXCELLENCE TO BE ESTABLISHED IN 2015

Center for Chromosome Stability (CCS)

Location: University of Copenhagen

Center leader: Professor Ian D. Hickson

Total grant: 65.0 million DKK



Center for Stem Cell Decision Making (StemPhys)

Location: University of Copenhagen

Center leader: Professor Lene Oddershede

Total grant: 60.0 million DKK



Center for Music in the Brain (MIB)

Location: Aarhus University

Center leader: Professor Peter Vuust

Total grant: 52.0 million DKK

**Carbon Dioxide Activation Center (CADIAC)**

Location: Aarhus University

Center leader: Professor Troels Skrydstrup

Total grant: 60.0 million DKK

**Center for Urban Network Evolutions (UrbNet)**

Location: Aarhus University

Center leader: Professor Rubina Raja

Total grant: 65.0 million DKK

**Center for Bacterial Stress Response and Persistence (BASP)**

Location: University of Copenhagen

Center leader: Professor Kenn Gerdes

Total grant: 50.0 million DKK

**Center for Neuroplasticity and Pain (CNAP)**

Location: Aalborg University

Center leader: Professor Thomas Graven-Nielsen

Total grant: 60.0 million DKK

**Center for Intelligent Oral Drug Delivery and Sensing using Microcontainers and Nanomechanics (IDUN)**

Location: Technical University of Denmark

Center leader: Professor Anja Boisen

Total grant: 56.0 million DKK

**Center for Silicon Photonics for Optical Communications (SPOC)**

Location: Technical University of Denmark

Center leader: Professor Leif Katsuo Oxenløwe

Total grant: 59.0 million DKK

**Center for Hyperpolarization in Magnetic Resonance (HYPERMAG)**

Location: Technical University of Denmark

Center leader: Professor Jan Henrik Ardenkjær-Larsen

Total grant: 55.0 million DKK

**Center for Autophagy, Recycling and Disease (CARD)**

Location: The Danish Cancer Society

Center leader: Professor Marja Jäättelä

Total grant: 50.0 million DKK

**Center for Personalized Medicine Managing Infectious Complications in Immune Deficiency (PRESIMUNE)**

Location: Rigshospitalet

Center leader: Professor Jens Lundgren

Total grant: 60.0 million DKK



JOINT FUNDING ACTIVITIES

**National Natural Science Foundation of China (NSFC),
Danish-Chinese Centre for Proteases and Cancer**

Location: Aarhus University

Leader: Professor Peter A. Andreasen

Total grant: 21.5 million DKK



**National Natural Science Foundation of China (NSFC),
Danish-Chinese Centre of Breast Cancer Research**

Location: University of Copenhagen

Leader: Professor Nils Brügger

Total grant: 24.5 million DKK



**National Natural Science Foundation of China (NSFC), Danish-Chinese Center for
Self-Assembly and Function of Molecular Nanostructures on Surfaces**

Location: Aarhus University

Leader: Professor Flemming Besenbacher

Total grant: 24.8 million DKK



**National Natural Science Foundation of China (NSFC),
Danish-Chinese Center for Molecular Nano-Electronics**

Location: University of Copenhagen

Leader: Professor Thomas Bjørnholm

Total grant: 24.5 million DKK



**National Natural Science Foundation of China (NSFC),
Danish-Chinese Center for Nanometals**

Location: Technical University of Denmark

Leader: Professor Dorte Juul Jensen

Total grant: 23.7 million DKK



**National Natural Science Foundation of China (NSFC),
Danish-Chinese Center for Organic-based Photovoltaic Cells with Morphology Control**

Location: Technical University of Denmark

Leader: Professor Frederik Christian Krebs

Total grant: 25.0 million DKK



**National Natural Science Foundation of China (NSFC), Danish-Chinese Center for
Applications of Algebraic Geometry in Coding Theory and Cryptography**

Location: Technical University of Denmark

Leader: Professor Tom Høholdt

Total grant: 13.1 million DKK



**National Natural Science Foundation of China (NSFC),
Danish-Chinese Center for the Theory of Interactive Computation**

Location: Aarhus University

Leader: Professor Peter Bro Miltersen

Total grant: 24.9 million DKK



**National Natural Science Foundation of China (NSFC),
Danish-Chinese Center for IDEA4CPS: Foundations for Cyber-Physical Systems**

Location: Aalborg University
 Leader: Professor Kim Guldstrand Larsen
 Total grant: 24.4 million DKK



Centre National de la Recherche Scientifique (CNRS)

Total grant: (1.7 million DKK, included in the above mentioned center grants).

National Science Foundation (NSF)

Total grant: (6.8 million DKK, included in the above mentioned center grants).

DNRF'S NIELS BOHR PROFESSORSHIPS ESTABLISHED IN 2013

Professor Anna Lowenhaupt Tsing, University of California, Santa Cruz

Location: Department of Culture and Society, Aarhus University
 Total grant: 29.0 million DKK



Professor David Needham, Duke University

Location: Department of Physics, Chemistry and Pharmacy,
 University of Southern Denmark
 Total grant: 29.0 million DKK



Professor Lars Hesselholt, Nagoya University

Location: Department of Mathematical Sciences, University of Copenhagen
 Total grant: 30.0 million DKK



Professor Charles Lesher, University of California, Davis

Location: Department for Geoscience, Aarhus University
 Total grant: 30.0 million DKK



Professor Jaan Valsiner, Clark University

Location: Department of Communication and Psychology, Aalborg University
 Total grant: 20.0 million DKK



Professor Subir Sarkar, University of Oxford

Location: Niels Bohr Institute, University of Copenhagen
 Total grant: 29.0 million DKK



**COURSE ACTIVITIES FOR CENTER LEADERS/OUTREACH
PROGRAM FOR CENTERS**

Total grant: 6.2 million DKK

TOTAL ASSETS AND RETURN ON INVESTMENT

The foundation's total assets at the end of 2015 were 6,055 million DKK, compared to total assets of 3,538 million DKK at the end of 2014. The foundation distributed 425 million DKK in 2015, which is a bit lower than the maximum distribution level, according to regulations, of 444 million DKK (in 2015 prices).

In March 2015, the foundation received a capital injection of 3,000 million DKK. Because of this capital injection, the expected life span of the funds has been extended to 2036. The longer time horizon led to a revision of the investment strategy in 2015: The initiated reduction of the allocation to equities was cancelled, and after an official tender, high yield bonds were included in the foundation's portfolio. The strategic allocation to bonds and equities is, respectively, 65% and 35%.

Total return

Total return on investment was negative 43 million DKK. Broken down into asset classes, return on equities amounted to 1 million DKK and return on bonds amounted to minus 44 million DKK. Administrative and financial expenses amounted to 16.5 million DKK.

Calculated as a time-weighted return, the total return on investment in 2015 was 1.5%, which was 0.4-percentage point behind the benchmark return of 1.9% for the total portfolio. The reason the return in percentage is positive and the result in DKK is negative is that the return in percentage is calculated on a time-weighted basis. The foundation had a positive return at the beginning of the year before the injection of the 3,000 million DKK and a negative return after the capital injection.

From the 5-year perspective from 2011 to 2015, the foundation's return of 6.4% was higher than the annual benchmark return of 6.2%.

Return on equities

The foundation's equity portfolio consists of a combination of equities in developed and emerging market countries. The split between the developed and emerging countries in the portfolio follows the breakdown in MSCI's benchmark for global equities (MSCI ACWI).

The developed markets equity portfolio is invested in three passive Deutsche Bank x-trackers (about 29% of total assets) and an investment in Danske Invest Global index, which is also a passive mandate (about 2% of total assets). The 10.8% return on the x-trackers in 2015 is a bit higher than the benchmark of 10.7%. The Danske Invest Global index was behind the benchmark by 1 percentage point, mainly due to trading costs and management fees. Of the exposure to USD and JPY in the developed markets equity portfolio, 80% is hedged to DKK. The strengthening of both the USD and the JPY against the DKK in 2015 resulted in a lower return on the equity portfolio after the currency hedge. The return on the developed markets equity portfolio after the currency hedge was 4.5%.

To comply with the expected change in the ministerial order, two-thirds of the exposure to the db x-tracker Custom Global Equity was transferred to two similar global db x-tracker mutual funds, but without a socially responsible investment policy. This is an interim solution until the tender to find two mutual funds with a social responsible investment policy has been completed.

The emerging markets equity portfolio totaled about 3.4% of total assets during the year. This investment takes place through the mutual fund Danske Invest Global Emerging Markets I. This emerging markets equity portfolio had a return of negative 3.2%, outperforming the benchmark (MSCI emerging markets) by 1.8 percentage points.

Return on investment	2015	2014	2013	2012	2011
Bonds and cash, million DKK	-44.0	182.7	-38.1	182.4	261.4
Equities, million DKK	1.1	153.8	256.1	207.7	-71.3
Total return, million DKK	-42.9	336.5	218.0	390.1	190.1
Foundation return, % ¹⁾	1.5	9.3	5.6	10.7	5.2
Benchmark, %	1.9	8.7	5.6	10.1	4.9
Foundation 5 years p.a. return, % ²⁾	6.4	7.9	8.7	5.3	3.7
Benchmark 5 years p.a. return, % ²⁾	6.2	7.6	8.5	5.2	3.8

1) The annual return of the total investment is a weighted average of each portfolio's time-weighted return.

2) The geometric mean.

Return on bonds

Danish government and mortgage bonds represent the largest part of the fund's asset and 37% of the strategic allocation. Nykredit Asset Management (Nykredit) manages the portfolio and the portfolio had a negative return of 1%, which is somewhat lower than the benchmark return of +0.9%. The foundation's benchmark for Danish bonds consists exclusively of government bonds (Nordea Danish government bonds benchmark with a constant duration of 5 years, tightened up with a 0.50% outperformance requirement).

The strong decline in interest rates at the beginning of the year resulted in high redemptions, which led to callable mortgage bonds performing somewhat worse than government bonds. Since Nykredit's portfolio consists predominantly of callable mortgage bonds, this led to a lower return than the benchmark in 2015.

The strategic allocation to global inflation-linked bond was reduced during 2015 from 20% of

total assets to 11%. The portfolio's performance in 2015 was in line with the benchmark return of negative 1.4%. The benchmark is a combination of a customized Barclays benchmark (60%) and 40% Barclays Global Inflation-Linked Bond Index 1-10Y (hedged to DKK).

The performance of the Danske Capital European corporate bond portfolio was negative 1% versus the benchmark return of negative 1.1%. The benchmark is Barclays Capital Euro Major Corporate Index.

A US high yield bond portfolio was included in the total portfolio in late September 2015, with a strategic allocation of 7% of the assets. During 2015, the high yield market was characterized by rising credit spreads due to greater uncertainty in the financial markets. The portfolio manager (Columbia Threadneedle) outperformed the benchmark with a return of negative 2.3% compared to the benchmark return of negative 2.7%.

Donation of DKK 500,000 from J. H. Schultz Foundation

For the second year in a row, the board of the J. H. Schultz Foundation has decided to donate half a million DKK to the DNRF. The J. H. Schultz Foundation's donation from 2014 represents the DNRF's first private donation. The Schultz Foundation was established in 1988 when Ole Trock-Jansen donated 95% of the Schultz company's stocks to the newly established foundation.

THE BOARD

In 2015, the board conducted five regular meetings and was represented at 32 follow-up meetings with the centers. The composition of the board in 2015 was as follows:



Liselotte Højgaard (Chair)

Professor, University of Copenhagen, Head of Department, Rigshospitalet
Nominated by the Minister for Higher Education and Science
(01.01.13-31.12.18)



Christina Moberg

Professor, Royal Institute of Technology, KTH, Stockholm. Nominated by the Danish Council for Strategic Research
(01.11.13-31.10.17)



Bo Erno Honoré (Deputy Chair)

Professor, Department of Economics, Princeton University. Nominated by Danish Rectors' Conference
(01.01.08-31.12.15)



Bart De Moor

Professor, KU Leuven
Nominated by the Minister for Higher Education and Science
(01.11.13-31.10.17)



Kirsten Hastrup

Professor, Department of Anthropology, University of Copenhagen. Nominated by the Royal Danish Academy of Sciences and Letters
(01.01.08-31.12.15)



Birgitte Possing

Professor, the Danish State Archives. Nominated by the Joint Committee of Directors at the Governmental Research Institutes
(01.01.12-31.12.15)



Eivind Hiis Hauge

Professor Emeritus, Department of Physics, Norwegian University of Science and Technology. Nominated by the Danish Academy of Technical Sciences
(01.11.09-31.10.17)



Eero Vuorio

Director, professor, Biocenter Finland, University of Helsinki, Finland. Nominated by the Danish Council for Independent Research
(01.11.13-31.10.17)



Svend Erik Larsen

Professor Emeritus, Department of Aesthetics and Communication - Comparative Literature, Aarhus University. Nominated by the Danish Council for Independent Research
(01.01.12-31.12.15)

NEW MEMBERS OF THE BOARD FROM 2016



Morten Overgaard Ravn (Deputy Chair from 2016)

Professor, Department of Economics, University College London. Nominated by the Danish Rectors' Conference
(01.01.16-31.12.19)



Jesper Ryberg

Professor of Ethics and Philosophy of Law, Roskilde University. Nominated by the Royal Danish Academy of Sciences and Letters
(01.01.16-31.12.19)



Minik Thorleif Rosing

Professor, Natural History Museum of Denmark, University of Copenhagen. Nominated by the Joint Committee of Directors at the Governmental Research Institutes
(01.01.16-31.12.19)



Anne Scott Sørensen

Professor, Department for the Study of Culture, University of Southern Denmark. Nominated by the Danish Council for Independent Research
(01.01.16-31.12.19)

STATEMENT BY MANAGEMENT ON THE ANNUAL REPORT

The board and the director have today considered and approved the annual report of the Danish National Research Foundation for the fiscal year 2015.

The annual report is presented in accordance with the Consolidated Act on the Danish National Research Foundation, the Danish Executive Order on the Administration of the Funds of the Danish National Research Foundation, the Royal Decree on the Charter of the Danish National Research Foundation and the provisions of the Danish Financial Statements Act with the adjustments resulting from the special nature of the Danish National Research Foundation.

In our opinion, the annual accounts give a true and fair view of the foundation's financial position at December 31, 2015 and of the results of its operations for the financial year January 1 - to December 31, 2015. In addition, we believe that the management commentary contains a fair review of the affairs and conditions referred to therein.

Finally, it is our opinion that the established administrative procedures and internal controls, covered by the annual accounts, are in accordance with grants given, laws and other regulations, and also agreements entered into and normal practice.

Copenhagen, April 25, 2016

Søren-Peter Olesen
Director

Board members:

Liselotte Højgaard
Chair

Morten Overgaard Ravn
Deputy Chairman

Eivind Hiis Hauge

Christina Moberg

Bart De Moor

Minik Thorleif Rosing

Jesper Ryberg

Anne Scott Sørensen

Eero Vuorio

INDEPENDENT AUDITOR'S REPORT

TO THE BOARD OF THE DANISH
NATIONAL RESEARCH FOUNDATION

Report on the financial statements

We have audited the financial statements of the Danish National Research Foundation for the financial year 1 January to 31 December 2015, which comprise the accounting policies, income statement, balance sheet, and notes. The financial statements are prepared in accordance with the provisions of the Danish Financial Statements Act subject to the adjustments caused by the special nature of the Foundation.

Management's responsibility for the financial statements

The Board of Trustees is responsible for the preparation of financial statements that give a true and fair view in accordance with the Danish Financial Statements Act subject to the adjustments caused by the special nature of the Foundation, and for such internal control as the Board of Trustees determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error, as well as for electing and applying appropriate accounting policies, and making accounting estimates that are reasonable in the circumstances.

Furthermore, the Board of Trustees is responsible for transactions covered by the financial statements complying with the appropriations granted, statutes, other regulations, agreements and usual practice.

Auditor's responsibility

Our responsibility is to express an opinion on the financial statements based on our audit. We conducted our audit in accordance with International Standards on Auditing and additional requirements under Danish audit regulation as well as generally accepted government auditing standards, see the Danish Act on the auditing of the government accounts, and the contract of the Danish National Research Foundation pursuant to S 9(2) Danish Auditor General's Act. This requires that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing audit procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgement, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the Foundation's preparation of financial statements that give a true and fair view in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Foundation's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by the Board of Trustees, as well as the overall presentation of the financial statements.

The audit also involves assessing whether business processes and internal controls have been established, supporting that the transactions covered by the financial statements comply with the appropriations granted, statutes, other regulations, agreements, and usual practice.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Our audit has not resulted in any qualification.

Opinion

In our opinion, the financial statements give a true and fair view of the Foundation's financial position on 31 December 2015 and of the results of its operations for the financial year 1 January to 31 December 2015 in accordance with the Danish Financial Statements Act subject to the adjustments caused by the special

nature of the Foundation. It is also our opinion that business processes and internal controls have been established, supporting that the transactions covered by the financial statements comply with the appropriations granted, statutes, other regulations, agreements, and usual practice.

Statement on the management commentary

Pursuant to the Danish Financial Statements Act, we have read the management commentary. We have not performed any further procedures in addition to the audit of the financial statements.

On this basis, it is our opinion that the information provided in the management commentary is consistent with the financial statements.

Copenhagen, April 25, 2016

Deloitte

Statsautoriseret Revisionspartnerselskab

Jens Sejer Pedersen
State Authorised
Public Accountant

CVR.nr. 33963556

ACCOUNTING POLICIES

The annual report is presented in accordance with the Consolidated Act on the Danish National Research Foundation, the Danish Executive Order on the Administration of the Funds of the Danish National Research Foundation, the Royal Decree on the Charter of the Danish National Research Foundation and the provisions of the Danish Financial Statements Act governing reporting class C enterprises (large) with the adjustments resulting from the special nature of the foundation.

The provisions of the Danish Financial Statements Act governing reporting class C enterprises (large) prescribe preparation of a cash flow statement. Due to the nature of the foundation's activities, the cash flows cannot reasonably be broken down by cash flows from operating, investing and financing activities, for which reason the cash flow statement has been omitted, referring to Section 11(3) of the Danish Financial Statements Act. In addition, the foundation has decided to derogate from the format requirements laid down by the Danish Financial Statements Act for the income statement in order to illustrate the special nature of the foundation.

The accounting policies applied are consistent with those applied last year.

INCOME STATEMENT

Interest income

Interest income from bonds and bank deposits are accrued so it relates to the financial year under audit.

Dividend

Dividend received on shares is included in the income statement at the time of distribution.

Realized capital gains and losses on and market value adjustments of securities

Realized capital gains and losses on and market value adjustments of securities (bonds and equities) are included in the income statement.

Other income

Under the Danish Appropriation Act, more funds have been made available to the foundation for distribution. The funds are recognized when transferred to the foundation.

Distribution

Funds distributed are expensed in the financial year in which they are distributed. Funds are distributed as research plans are implemented; see note 16b. Time lags may exist to a limited extent.

External expenses for the scientific activities of the Foundation

Such expenses comprise expenses for the foundation's scientific activities, including expenses for the consideration of applications and evaluation of grants.

BALANCE SHEET

Fixed assets

Leasehold improvements are recognized in the balance sheet at cost less accumulated depreciation. Fixed assets are depreciated straight-line over their estimated useful lives of five years.

Office equipment and furniture are recognized at cost less accumulated depreciation. Office equipment and furniture are depreciated straight-line over their estimated useful lives, meaning three years for IT hardware and software and five years for other office equipment.

Assets costing less than DKK 15,000 per unit are expensed in the year of acquisition.

Securities

Listed securities (bonds and equities) are measured at fair value (quoted price) at the balance sheet date.

Bonds redeemed at the time of presentation of the annual accounts are recognized at par value.

Other investments are measured at the lower of the value at the date of acquisition and fair value.

Distribution obligations

Distributions by the foundation mainly take the form of multiannual total grants awarded over a number of years as research projects are completed; however, grants usually are not awarded for more than a six-year period.

The distribution obligations that can be accommodated by equity and budgeted earnings are not provided for in the balance sheet. Instead, distribution obligations are disclosed in notes 16a and 16b stating estimated residual amounts to be distributed.

Income tax

The foundation is not liable to tax.

Foreign currency translation

Foreign currency transactions are translated into Danish kroner applying the exchange rate at the transaction date.

Realized and unrealized gains and losses are recognized in capital income in the income statement.

Bank deposits and securities denominated in foreign currencies are translated into DKK applying the balance sheet date exchange rate. Realized and unrealized foreign exchange gains and losses are recognized in capital income in the income statement.

Derivative financial instruments

The Danish National Research Foundation only applies derivative financial instruments to hedge the currency and interest rate risks involved in the portfolio of securities.

Changes in the fair value of derivative financial instruments classified as and complying with the requirement for hedging the fair value of a recognized asset or a recognized liability are recorded in the income statement together with changes in the value of the hedged asset or the hedged liability. In doing so, symmetrical recognition of gains and losses on the item hedged and the hedging instrument, respectively, is ensured.

Premiums received or paid as well as forward premiums and discounts are recognized in the income statement over the terms of the instruments.

The fair value of derivative financial statements classified as and qualifying for hedging of an instrument to hedge a recognized asset or liability is recognized in the balance sheet along with the asset or liability to which hedging relates.

INCOME STATEMENT

JANUARY 1 - DECEMBER 31

	Note	2015	2014
Return on investment			
Realized gains and losses, bonds		27,683,448	79,339,626
Unrealized gains and losses, bonds		-67,649,597	103,319,986
Realized gains and losses, equities		-127,127,457	-42,911,333
Unrealized gains and losses, equities		128,243,240	196,692,508
Interest, bank deposits		-4,067,108	16,643
Return on investment, total		-42,917,474	336,457,430
Other receipts, net	1	501,220	518,225
Costs			
Distributions	16	-424,511,555	-435,943,624
Custody and bank fees etc.	2	-5,132,139	-4,221,098
Salaries etc.	3	-7,272,550	-7,573,660
Office expenses	4	-681,655	-497,603
Premises	5	-957,744	-890,287
Accountant/attorney remuneration etc.	6	-730,401	-873,874
External expenses, external research activities	7	-626,622	-1,253,931
Other costs	8	-1,123,908	-891,754
Costs, total		-441,036,574	-452,145,831
Loss before depreciation		-483,452,828	-115,170,176
Depreciation	9	-139,932	-112,209
Loss for the year		-483,592,760	-115,282,385

BALANCE SHEET AS OF DECEMBER 31

	Note	2015	2014
ASSETS			
Fixed assets			
Tangible fixed assets			
	10		
Leasehold improvements		320,127	267,019
Office equipment and furniture		22,993	16,749
		343,120	283,768
Fixed asset investments			
	11		
Other investments		67,472	69,453
Deposits		223,004	215,516
		290,476	284,969
Fixed assets, total		633,596	568,737
Current assets			
Receivables			
Accrued interest		25,180,163	18,373,040
Other receivables		1,044,673	108,251
Deferred charges		136,099	93,517
		26,360,935	18,574,808
Liquid assets			
Securities, bonds	12	3,906,385,673	2,249,393,592
Securities, equities	13	2,091,393,135	1,245,055,462
Bank deposits	14	30,192,603	24,507,737
		6,027,971,411	3,518,956,791
Current assets, total		6,054,332,346	3,537,531,599
ASSETS, TOTAL		6,054,965,942	3,538,100,336
EQUITY AND LIABILITIES			
Net capital	15	6,051,761,400	3,535,354,160
Payables			
Short-term payables			
Payables and back costs		3,204,542	2,746,176
Payables, total		3,204,542	2,746,176
EQUITY AND LIABILITIES, TOTAL		6,054,965,942	3,538,100,336
Distribution obligations	16		
Contingent liabilities	17		

NOTES

	2015	2014
1 OTHER RECEIPTS, NET		
Private donation	500,000	500,000
Receipts, intellectual property rights	3,201	0
Market value adjustment, other investments, see note 11	-1,981	18,225
Other receipts, total	501,220	518,225
2 CUSTODY AND BANK FEES, ETC.		
Bonds	3,722,726	2,864,668
Equities	729,652	662,080
Fees, portfolio managers	4,452,378	3,526,748
Remuneration regarding investment of capital injection	654,997	673,250
Bank	13,712	9,610
Other	11,052	11,490
Custody and bank fees, total	5,132,139	4,221,098
3 SALARIES ETC.		
Director and board members	2,543,443	2,509,439
Salaries, other employees	4,106,442	4,360,736
Wage reimbursement	-12,909	-146,700
Pension costs	630,350	655,659
Holiday allowance	-35,163	150,808
Danish Labor Market Supplementary Pension Scheme (ATP)	40,387	43,718
Salaries etc., foundation staff, total	7,272,550	7,573,660
Average staff number, accounting year	10	10
4 OFFICE EXPENSES		
Office supplies	61,920	42,917
Postage and freight	3,084	16,351
Telephone, internet	157,648	114,841
Minor acquisitions	128,497	59,433
Journal, books, etc.	29,359	19,318
Servicing contracts etc.	301,147	244,743
Office expenses, total	681,655	497,603

	2015	2014
5 PREMISES		
Rent of office	669,012	644,548
Electricity, heating	77,489	84,465
Cleaning	137,636	155,349
Repairs and maintenance	73,607	5,925
Premises, total	957,744	890,287
6 ACCOUNTANT/ATTORNEY REMUNERATION ETC.		
Accountant remuneration, Deloitte	215,625	203,750
Accountancy consultation, Deloitte	25,000	10,625
Attorney's remuneration	103,412	65,000
Other consultancy services	386,364	594,499
Accountant/attorney remuneration etc., total	730,401	873,874
7 EXTERNAL EXPENSES, RESEARCH ACTIVITIES		
Peer review expenses	0	492,743
Preparation of publications	286,196	184,581
Research presentations, meetings etc.	294,649	436,438
European Science Foundation, Science Europe membership fee	45,777	140,169
External expenses, research activities, total	626,622	1,253,931
8 OTHER EXPENSES		
Travelling and accomodation	575,992	627,314
Advertising	272,142	52,474
Entertainment expenses, gifts	41,734	12,412
Courses	15,781	9,621
Insurance	99,266	99,768
Cost of staff and board	118,993	90,165
Other expenses, total	1,123,908	891,754
9 DEPRECIATION		
Leasehold improvements, see note 10	127,902	91,700
Office furniture and equipment, see note 10	12,030	20,509
Depreciation, total	139,932	112,209

	Leasehold improvements	Office equipment and furniture	Total
10 TANGIBLE FIXED ASSETS			
Acquisition cost, January 1, 2015	1,837,932	1,009,388	2,847,320
Additions	181,010	18,274	199,284
Disposals	0	0	0
Acquisition cost, December 31, 2015	2,018,942	1,027,662	3,046,604
Depreciation, accumulated, January 1, 2015	-1,570,913	-992,639	-2,563,552
Depreciation for the year			
Reversed depreciation, disposals for the year	-127,902	-12,030	-139,932
Depreciation, accumulated, December 31, 2015	-1,698,815	-1,004,669	-2,703,484
Book value at year-end	320,127	22,993	343,120

	Other investments	Deposits	Total
11 FIXED ASSET INVESTMENTS			
Acquisition cost, January 1, 2015	1,773,954	215,516	1,989,470
Additions	0	7,488	7,488
Disposals	0	0	0
Acquisition cost, December 31, 2015	1,773,954	223,004	1,996,958
Value adjustments, accumulated, January 1, 2015	-1,704,501	0	-1,704,501
Value adjustment for the year	-1,981	0	-1,981
Reversed value adjustments, disposals for the year	0	0	0
Value adjustments, accumulated, December 31, 2015	-1,706,482	0	-1,706,482
Book value at year-end	67,472	223,004	290,476

Other investments include 0.0026% of the capital stock of a listed research- and development company, previously received as remuneration for intellectual property rights. The value of the investment is the listed value as of December 31.

	2015	2014
--	------	------

12 SECURITIES, BONDS

Asset classes

Danish bonds	2,238,713,430	1,299,433,298
European corporate bonds	592,764,857	355,798,488
Global inflation-linked bonds	654,809,723	594,161,806
US high yield bonds*	420,097,663	0
Bonds, total	3,906,385,673	2,249,393,592

* Effective duration, December 31, 2015: 4.44

Danish bonds

Distribution by type of security:

Mortgage bonds	2,021,894,130	997,922,558
Government bonds	216,819,300	301,510,740
	2,238,713,430	1,299,433,298

Option adjusted duration December 31, 2015: 5.03 (December 31, 2014: 4.58)

European corporate bonds**Distribution by rating category and forward currency contract:**

	2015	2014
AA	25,209,548	19,232,579
A	159,205,711	120,870,181
BBB	408,750,415	215,397,611
Forward currency contracts, EUR	-442,901	-99,929
Forward currency contracts, USD	17,445	-68,958
Forward currency contracts, GBP	137,712	0
Interest-rate futures, EUR	-117,982	462,843
Interest-rate futures, USD	4,909	4,161
	<u>592,764,857</u>	<u>355,798,488</u>

Rating category according to Standard & Poor's Long-Term Credit Rating.
Option adjusted duration, December 31, 2015: 4.78 (December 31, 2014: 4.75).

Global inflation-linked bonds**Distribution by country and forward currency contract:**

	2015	2014
Denmark	27,203,003	10,459,744
Canada	6,625,665	9,395,412
Germany	34,149,062	82,509,795
France	123,086,194	100,065,938
Great Britain	164,892,549	145,324,322
Japan	0	0
Sweden	6,373,577	16,950,498
USA	272,121,658	226,846,786
New Zealand	7,102,013	2,466,031
Australia	688,484	4,908,536
Forward currency contracts, CAD	430,383	-123,380
Forward currency contracts, EUR	74,040	-96,906
Forward currency contracts, GBP	4,917,636	-1,395,151
Forward currency contracts, JPY	0	0
Forward currency contracts, SEK	-36,850	84,258
Forward currency contracts, USD	7,178,973	-3,120,458
Forward currency contracts, NZD	-17,810	-58,389
Forward currency contracts, AUD	21,146	-55,230
	<u>654,809,723</u>	<u>594,161,806</u>

Duration, December 31, 2015: 4.72 (December 31, 2014: 4.67).

	2015	2014
13 SECURITIES, EQUITIES		
Distribution by type of security and forward currency contract		
DB x-tracker, Custom Global Equity	586,342,814	1,069,094,918
DB x-trackers MSCI World Index UCITS ETF (Class 3C)	584,668,704	0
DB x-trackers MSCI World Index UCITS ETF (Class 1C)	586,221,077	0
Danske Invest Global Index	137,973,457	51,473,389
Danske Invest Global Emerging Markets I	204,530,294	131,525,500
Forward currency contracts, JPY	-3,160,876	-1,627,555
Forward currency contracts, USD	-5,182,335	-5,410,790
Equities, total	2,091,393,135	1,245,055,462
14 LIQUID ASSETS		
Cash	4,816	1,091
Current bank accounts	481,646	323,229
Portfolio accounts	29,706,141	24,183,417
Liquid funds, total	30,192,603	24,507,737
15 NET CAPITAL		
Net capital, January 1	3,535,354,160	3,650,636,545
Capital injection	3,000,000,000	
Loss for the year	-483,592,760	-115,282,385
Net capital, December 31, total	6,051,761,400	3,535,354,160

16A DISTRIBUTION OBLIGATIONS

2015 distributions and total grants, DKK thousand

Grant No		Ordinary grant period 1	Ordinary grant period 2	Embedment/ extension	Grants total	Disbursed 2015	Residual disbursement, expected
Centers established in 1993/94							
1.	Søren Kierkegaard Research Center	27,739	55,404	6,250	89,393		*
2.	The Danish Epidemiology Science Center	41,932	42,302	11,850	96,084		*
3.	Center for Labour Market and Social Research	25,127		1,293	26,420		*
4.	Theoretical Astrophysics Center	47,340	37,961	2,084	87,385		*
5.	Center for Atomic Physics	53,999	42,888	3,011	99,898		*
6.	Center for Atomic-Scale Materials Physics	39,595	48,335	1,804	89,734		*
7.	Center for Basic Research In Computer Science	32,608	15,925		48,533		*
8.	International Research Centre for Computational Hydrodynamics	43,950		4,586	48,536		*
9.	Danish Center for Remote Sensing	50,742			50,742		*
10.	Danish Lithosphere Center	71,874	77,853	23,800	173,527		*
11.	Danish Center for Experimental Parasitology	48,013	40,487	12,729	101,229		*
12.	Center for Biological Sequence Analysis	25,271	35,000		60,271		*
13.	Center for Biomolecular Recognition	35,080			35,080		*
14.	The Copenhagen Muscle Research Center	72,326	83,397	1,681	157,404		*
15.	Center for Sensory-Motor Interaction	25,000	42,958	21,371	89,329		*
16.	Center for Sound Communication	22,713	23,520	1,655	47,888		*
17.	Center for Crystallographic Studies	25,451	29,062	1,065	55,578		*
18.	Center for Enzyme Research	22,472		809	23,281		*
19.	Center for Gene Regulation and Plasticity of Neuro-Endocrine Network	37,571		2,442	40,013		*
20.	Center for Semiotic Research	12,741		5,000	17,741		*
21.	Copenhagen Polis Center	7,991	10,078	636	18,705		*
22.	Center for Maritime Archaeology	40,364	50,047		90,411		*
23.	Economic Policy Research Unit	17,921	14,654	5,020	37,595		*
To be carried forward		827,820	649,871	107,086	1,584,777	0	0

16A DISTRIBUTION OBLIGATIONS

2015 distributions and total grants, DKK thousand

Grant No		Ordinary grant period 1	Ordinary grant period 2	Embedment/ extension	Grants total	Disbursed 2015	Residual disbursement, expected
Brought forward		827,820	649,871	107,086	1,584,777	0	0
Other activities							
24.	The National Center for Register-Based Research	11,573	15,000		26,573		*
25.	Statistics Denmark, Research Unit Aarhus	7,090	3,122		10,212		*
26.	Research Machine, Statistics Denmark	1,357			1,357		*
27.	ERAS (Danish Data Archives)	6,401			6,401		*
28.	Research School, Århus	74,913		20,161	95,074		*
29.	Research School, Aalborg	39,572			39,572		*
30.	Danish National Birth Cohort	17,990			17,990		*
Centers established in 1997/98							
31.	Center for Solid Phase Organic Combinatorial Chemistry	20,527	18,928	577	40,032		*
32.	Center for Catalysis	24,986	26,857	3,044	54,887		*
33.	Center for Plant-Microbe Symbiosis	22,799		1,320	24,119		*
34.	Center for Demographic Research	34,987			34,987		*
35.	The Danish Center for Earth System Science	49,718		9,569	59,287		*
36.	Network in Mathematical Physics and Stochastics	23,519	6,937	5,863	36,319		*
37.	Center for Molecular Plant Physiology	40,000	45,597	3,961	89,558		*
38.	Center for Experimental Bioinformatics	34,603	35,674		70,277		*
39.	Center for Human-Machine Interaction	25,027			25,027		*
Centers established in 2001							
40.	Center for Metal Structures in 4 Dimensions	36,572	32,525	1,300	70,397		*
41.	Center for Nucleic Acid (NAC)	34,307	32,550		66,857		*
42.	Center for Applied Microeconometrics	24,787		1,936	26,723		*
43.	Center for Biomembrane Physics	35,137	27,316	3,140	65,593		*
44.	Center for Quantum Optics	29,800	42,071	8,724	80,595		*
To be carried forward		1,423,485	936,448	166,681	2,526,614	0	0

16A DISTRIBUTION OBLIGATIONS

2015 distributions and total grants, DKK thousand

Grant No		Ordinary grant period 1	Ordinary grant period 2	Embedment/ extension	Grants total	Disbursed 2015	Residual disbursement, expected
	Brought forward	1,423,485	936,448	166,681	2,526,614	0	0
45.	The Water and Salt Research Center	32,503	19,379	14,001	65,883		*
46.	Quantum Protein Center	30,468		5,311	35,779		*
47.	Center of Functionally Integrative Neuroscience	33,765	40,864	1,334	75,963		*
48.	Wilhelm Johannsen Center for Functional Genome Research	30,226	29,453	144	59,823		*
Centers established in 2002							
49.	Center for the Study of Cultural Heritage of Medieval Rituals	15,209	10,813	1,393	27,415		*
50.	Center for Black Sea Studies	17,292	16,321	1,316	34,929		*
51.	Center for Subjectivity Research	17,416	14,691	4,271	36,378		*
Initiatives established in 2003							
52.	National Platform for Integrative Biology	17,909			17,909		*
Centers established in 2005							
53.	Nordic Center for Earth Evolution	43,954	45,440		89,394	7,569	312
54.	Center for Individual Nanoparticle Functionality	38,942	45,605		84,547	5,217	896
55.	Center for Inflammation and Metabolism	25,824	30,000	63	55,887	3,063	0
56.	Center for Genotoxic Stress	39,533	15,500	10,500	65,533		*
57.	Centre for Social Evolution	32,827	43,928	276	77,031	3,847	420
58.	Centre for mRNP Biogenesis and Metabolism	39,264	40,686		79,950	3,593	0
59.	Center for Insoluble Protein Structures	39,934	25,500	14,526	79,960	2,157	143
60.	Center for Oxygen Microscopy and Imaging	22,228	28,026		50,254	1,679	0
61.	Centre for Viscous Fluid Dynamics	38,391	30,001		68,392	6,800	0
	To be carried forward	1,939,170	1,372,655	219,816	3,531,641	33,925	1,771

16A DISTRIBUTION OBLIGATIONS

2015 distributions and total grants, DKK thousand

Grant No		Ordinary grant period 1	Ordinary grant period 2	Embedment/ extension	Grants total	Disbursed 2015	Residual disbursement, expected
Brought forward		1,939,170	1,372,655	219,816	3,531,641	33,925	1,771
62.	Dark Cosmology Centre	49,162	65,123		114,285	5,695	0
63.	Centre for Language Change in Real Time	29,757	41,202	104	71,063	3,419	104
64.	Centre for Textile Research	19,387	23,272	2,089	44,748	2,823	951
65.	Center for Models of Life	22,053	30,090		52,143	4,712	1,546
66.	Danish Arrhythmia Research Centre	29,692	40,000		69,692	5,436	0
67.	Center for Sustainable and Green Chemistry	18,320		6,477	24,797		*
68.	Center for Molecular Movies	29,606		5,813	35,419		*
Niels Bohr Professorships established in 2006							
69.	David Arnot, University of Copenhagen	18,915		1,093	20,008		*
70.	Dale T. Mortensen, Aarhus University	12,630			12,630		*
71.	Nikolai Reshetikhin, Aarhus University	21,118			21,118		*
72.	Christopher Frith, Aarhus University	12,136		897	13,033		*
73.	Cathie Martin, University of Copenhagen	11,044		5,779	16,823		*
74.	Hassan Aref, Technical University of Denmark	10,642		153	10,795		*
DNRF Professorships established in 2007							
75.	Steen Rasmussen, University of Southern Denmark	21,164		910	22,074		*
76.	Jørgen S. Nielsen, University of Copenhagen	18,872		218	19,090		*
77.	John Couchman, University of Copenhagen	19,811		2,106	21,917		*
Centers established in 2007							
78.	Center for Research in Econometric Analysis of Time Series	40,204	40,000		80,204	5,950	8,759
79.	Centre for Carbohydrate Recognition and Signalling	45,581	45,000		90,581	8,350	10,089
80.	Center for Comparative Genomics	6,363		10,126	16,489		*
81.	Centre for DNA Nanotechnology	44,501	50,000		94,501	10,697	8,406
82.	Centre for Epigenetics	61,029	50,000	-16	111,013	12,272	10,169
83.	Centre for Ice og Climate	60,985	55,000		115,985	11,393	15,912
84.	Center for Massive Data Algorithmics	32,541	40,000		72,541	6,660	12,074
85.	Centre for Membrane Pumps in Cell and Disease	56,296	50,000	311	106,607	9,819	8,515
To be carried forward		2.630.979	1.902,342	255,876	4,789,197	121,151	78,296

16A DISTRIBUTION OBLIGATIONS

2015 distributions and total grants, DKK thousand

Grant No	Ordinary grant period 1	Ordinary grant period 2	Embedment/extension	Grants total	Disbursed 2015	Residual disbursement, expected
Brought forward	2,630,979	1,902,342	255,876	4,789,197	121,151	78,296
Joint funding						
86.	National Natural Science Foundation of China (NSFC), seminars	641		641		*
86-1.	NSFC, Danish-Chinese Center for Proteases and Cancer	11,534	10,000	21,534	509	0
86-2.	NSFC, Danish-Chinese Center of Breast Cancer Research	12,681	9,864	22,545	-30	0
86-3.	NSFC, Danish-Chinese Center for Self-Assembly and Function of Molecular Nanostructures on Surfaces	14,755	10,000	24,755	3,053	154
86-4.	NSFC, Danish-Chinese Center for Molecular Nano-Electronics	14,536	10,000	24,536	3,401	0
86-5.	NSFC, Danish-Chinese Center for Nanometals	13,589	10,069	23,658	1,826	0
86-6.	NSFC, Danish-Chinese Center for Proton Conducting Systems	14,537		14,537		*
86-7.	NSFC, Danish-Chinese Center for Organic-based photovoltaic cells	15,000	10,000	25,000	4,459	1,515
86-8.	NSFC, Danish-Chinese Center for Applications of Algebraic Geometry	11,221		1,831	13,052	-2
86-9.	NSFC, Danish-Chinese Center for the Theory of Interactive Computation	14,908	10,000	24,908	3,225	4,293
86-10.	NSFC, Danish-Chinese Center for IDEA4CPS: Foundations for Cyper-Physical Systems	14,399	10,000	24,399	3,553	6,751
87.	Max Planck Society, Center for Geomicrobiology	24,029		24,029		*
Course activities for center leaders/outreach program						
88.	Management course/communication	3,550	2,600	6,150	557	2,634
Centers established in 2009/2010						
89.	Center on Autobiographical Memory Research	42,085	42,000	84,085	9,752	32,248
90.	Center for Cosmology and Particle Physics Phenomenology	40,000	40,000	80,000	7,032	32,336
91.	Centre for Particle Physics	40,000	40,000	80,000	6,568	33,432
92.	Center for Symmetry and Deformation	50,104	40,000	415	90,519	5,652
93.	Center for Materials and Crystallography	50,000	55,173	105,173	11,868	43,132
94.	Centre for GeoGenetics	50,210	50,207	156	100,573	13,714
95.	Centre for Quantum Geometry of Moduli Spaces	54,271	35,000	89,271	8,185	25,382
96.	Center for Macroecology, Evolution and Climate	60,487	50,536	795	111,818	12,355
97.	Center for Star and Planet Formation	38,400	44,000	82,400	7,482	27,372
To be carried forward	3,221,916	2,381,791	259,073	5,862,780	224,310	395,024

16A DISTRIBUTION OBLIGATIONS

2015 distributions and total grants, DKK thousand

Grant No		Ordinary grant period 1	Ordinary grant period 2	Embedment/ extension	Grants total	Disbursed 2015	Residual disbursement, expected
Brought forward		3,221,916	2,381,791	259,073	5,862,780	224,310	395,024
Centers established in 2012							
98.	Centre for Medieval Literature	36,000			36,000	8,099	13,722
99.	Center for Dynamic Molecular Interactions	49,000			49,000	11,162	18,179
100.	Center for Permafrost Dynamics in Greenland	60,000		242	60,242	10,324	15,711
101.	Center for Quantum Devices	64,415			64,415	9,024	25,561
102.	Center for Financial Frictions	48,000			48,000	9,406	23,286
103.	Center for Nanostructured Graphene	54,000			54,000	11,197	13,424
104.	Center for Geomicrobiology	58,149			58,149	12,939	21,139
105.	Center for International Courts	42,000			42,000	8,653	20,414
106.	Stellar Astrophysics Centre	55,000			55,000	12,034	23,904
107.	Copenhagen Center for Glycomics	62,000			62,000	10,464	20,736
108.	Center for Vitamins and Vaccines	58,000			58,000	10,931	24,087
Niels Bohr Professorships established in 2013							
109.	Anna Tsing, Aarhus University	29,000			29,000	6,407	16,828
110.	David Needham, University of Southern Denmark	29,000			29,000	5,381	14,327
111.	Lars Hesselholt, University of Copenhagen	30,000			30,000	6,498	16,973
112.	Charles Leshner, Aarhus University	29,952			29,952	9,876	16,389
113.	Jaan Valsiner, Aalborg University	20,000			20,000	4,275	10,024
114.	Subir Sarkar , University of Copenhagen	29,000			29,000	5,620	17,654
Centers established in 2015							
115.	Center for Chromosome Stability	65,000			65,000	6,451	58,549
116.	Center for Stem Cell Decision Making	60,000			60,000	4,401	55,599
117.	Center for Music in the Brain	52,000			52,000	1,856	50,144
118.	Center for Carbon Dioxide Activation	60,000			60,000	6,443	53,557
119.	Center for Urban Network Evolutions	65,000			65,000	2,139	62,861
120.	Center for Bacterial Stress Response and Persistence	50,000			50,000	1,626	48,374
121.	Center for Neuroplasticity and Pain	60,000			60,000	2,574	57,426
122.	Center for Intelligent Oral Drug Delivery and Sensing using Micro-containers and Nanomechanics	56,000			56,000	3,963	52,037
123.	Center for Silicon Photonics for Optical Communications	59,000			59,000	4,701	54,299
124.	Center for Hyperpolarization in Magnetic Resonance	55,000			55,000	1,868	53,132
125.	Center for Autophagy, Recycling and Disease	50,000			50,000	8,479	41,521
126.	Center for Personalized Medicine Managing Infectious Complications in Immune Deficiency	60,000			60,000	3,411	56,589
Grant and distribution, total		4,667,432	2,381,791	259,315	7,308,538	424,512	1,351,470

The number of grants listed in the key figures includes the Centers of Excellence, the joint funding activities and the Niels Bohr Professorships, listed on pages 44-51. Grants terminated before December 2014 are marked with a *.

All payments are subject to a contractual qualification that the foundation has to receive the expected and required revenue.

16B DISTRIBUTION OBLIGATIONS

Annual disbursements, DKK thousand:	Disbursed	Expected disbursements to activities listed above	Total
1993	19,133		
1994	141,708		
1995	154,509		
1996	176,194		
1997	200,876		
1998	247,751		
1999	243,346		
2000	224,484		
2001	228,789		
2002	256,877		
2003	239,916		
2004	173,489		
2005	195,185		
2006	195,225		
2007	242,803		
2008	321,277		
2009	274,998		
2010	387,270		
2011	358,754		
2012	390,990		
2013	423,038		
2014	435,944		
2015	424,512		
2016		450,687	
2017		370,955	
2018		246,941	
2019		167,254	
2020		94,083	
2021		21,550	
Disbursements and expected disbursements, total	5,957,068	1,351,470	7,308,538

The disbursements specified above are distributed according to the expected year of disbursement.

Disbursements are made on the basis of the grant holders' revised budgets. In consequence, the final presentation of accounts to the foundation may result in adjustments of the disbursements for the following years.

16C EXPECTED DISTRIBUTIONS 2016-2019

In addition to the distribution obligations listed in notes 16a and 16b, new Niels Bohr Professorships will be established in 2016 as a result of a call for proposals announced in 2015, and new centers will be established in 2017 as a result of the 9th application round, which was also announced in 2015. In the period 2016-2019, total distributions are expected to be as follows:

	million DKK
2016	463
2017	423
2018	434
2019	392
	<u>1,712</u>

17 CONTINGENT LIABILITIES

The foundation has to give six months' notice to terminate the tenancy agreement at December 31, 2019 at the earliest. The obligation amounts to DKK 2,773,344.

The foundation has entered into forward currency contracts for the purchase and sale of the following currencies (amounts calculated in the currencies in question):

Currency	2015	
	Purchase	Sale
AUD	1,000	139,000
USD	1,730,000	174,147,224
JPY	10,761,048	2,580,099,121
CAD	14,000	1,344,000
EUR	7,277,175	106,243,000
GBP	120,000	15,683,000
SEK	217,000	8,040,000
NZD	0	1,518,000

Currency	2014	
	Purchase	Sale
AUD	0	953,000
USD	19,055,245	126,489,952
JPY	6,139,991	1,494,002,608
CAD	0	1,781,000
EUR	0	72,780,000
GBP	224,000	15,300,000
SEK	0	20,000,000
NZD	0	506,000

The market price of the forward currency contracts as of December 31 is set at the value of the securities in question, see notes 12 and 13.

The foundation has entered into interest-rate futures for the purchase and sale of the following, calculated in the currencies in question:

		2015	
Currency	Purchase	Sale	
USD	0	200,000	
EUR	4,200,000	1,600,000	

		2014	
Currency	Purchase	Sale	
USD	0	500,000	
EUR	5,500,000	1,000,000	

The market price of the interest-rate futures as of December 31 is set at the value of the securities in question, see note 12.

SECRETARIAT



Søren-Peter Olesen
Director, professor, MD-Ph.D.
spo@dg.dk



Johanne Juhl
Special Adviser, M.Sc.
jj@dg.dk



Steen Marcus
Deputy director, M.Sc.
sm@dg.dk



Metha Nielsen
Accounting Officer, B.Sc.
mn@dg.dk



Connie Hansen
Bilingual secretary
ch@dg.dk



Ellen-Kristina Kock Rasmussen
Special Adviser, M.A.
ekr@dg.dk



Gitte Tofterup Hansen
Special Adviser, M.A.
gth@dg.dk



Mogens Henrik Sørensen
Special Adviser, M.Sc.
mhs@dg.dk



Thomas Trøst Hansen
Senior Consultant, M.Sc.
tth@dg.dk

ISBN: 978-87-989527-7-0

Audit

The Office of the Auditor General and a chartered accountant shall audit the foundation's annual accounts. The board appoints the chartered accountant for a three-year term and the chartered accountant has to be approved by the Minister for Higher Education and Science. Jens Sejer Pedersen (Deloitte), State Authorized Public Accountant is appointed for the period May 1, 2015 to April 30, 2016.

Editors

Gitte Tofterup Hansen
Steen Marcus
Søren-Peter Olesen
Liselotte Højgaard (in chief)

Cover photo

Magritte, René (1898-1967): La clairvoyance
Private Coll. Huile sur toile. © 2013. BI, ADAGP, Paris/Scala, Florence
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Design

Ineo Designlab / www.ineo.dk

Print

We Produce / www.weproduce.dk

Paper

Tom&Otto
Cover: 300 g. Pages: 150 g.
Printed by an ISO 14001 certified printer.



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Danish National Research Foundation
Holbergsgade 14, 1
DK-1057 Copenhagen K, Denmark

T +45 3318 1954
F +45 3315 0626
E dg@dg.dk

www.dg.dk