

MAPPING THE SOCIAL NETWORK OF AUGUST KROGH



DANISH CENTRE FOR STUDIES IN
RESEARCH AND RESEARCH POLICY
DEPARTMENT OF POLITICAL SCIENCE
AARHUS UNIVERSITY

27TH NORDIC MEDICAL HISTORY CONGRESS
24 MAY 2019

ALLAN RYE LYNGS
PHD STUDENT



INTRODUCTION

- Motivation
- August Krogh and physiology in Copenhagen
- Collected Papers
- Co-authorship network
- Conclusions and going forward

MOTIVATION

- Part of my PhD project on the significance of social networks between scientists
- Denmark has a high performing research community, outperforming countries with similar policy and funding structures
- The causes of this 'Danish Miracle' are not known/fully explained
- My PhD project is about determining whether social networks of Danish scientists in the past have an influence on the performance of the Danish scientists in the present

Past connections – Present performance

MOTIVATION

- Historical social networks can affect the present through several possible mechanisms
 - “Inheriting” connections and positions (editorships, funding boards) from mentors
 - Merton’s Matthew effect being used to amplify the next generation of scientists

- Physiology in the early 20th century as a case
 - Nobel Prize to August Krogh in 1920 and to Jens Chr. Skou in 1997 (in chemistry)
 - A formative period for Danish and international science community

AUGUST KROGH

- Schack August Steenberg Krogh (1874-1949)
- Born and raised in Grenaa
- Moved to Copenhagen in 1893
- Studied preliminary medicine, but continued with zoology, obtaining a master in 1899, and on to physiology, obtaining a dr. phil. in 1903
- Professor of animal physiology 1916-1945
- Known for
 - Nobel Prize 1920
 - Bringing production of insulin to Denmark
 - The professors' professor



PHYSIOLOGY IN COPENHAGEN

- At the outset of August Krogh's career there were four physiology research units
- Christian Bohr's laboratory of medical/human physiology at the Medical Faculty of University of Copenhagen
- Plant physiology at the Faculty of Science at University of Copenhagen
- Veterinary physiology at the Royal Veterinary and Agricultural College, from 1893 lead by Valdemar Henriques, student of Bohr and later his successor as professor
- Section for physiological research at the Carlsberg Laboratory

THE ZOOPHYSIOLOGICAL LABORATORY

Founded in 1911 as part of the Faculty of Science, University of Copenhagen

- Ny Vestergade 11 functioned as home of the Krogh family and as their laboratory
- The laboratory was underfunded, at least according to Krogh
- Slowly expanded the staff and the number of visitors

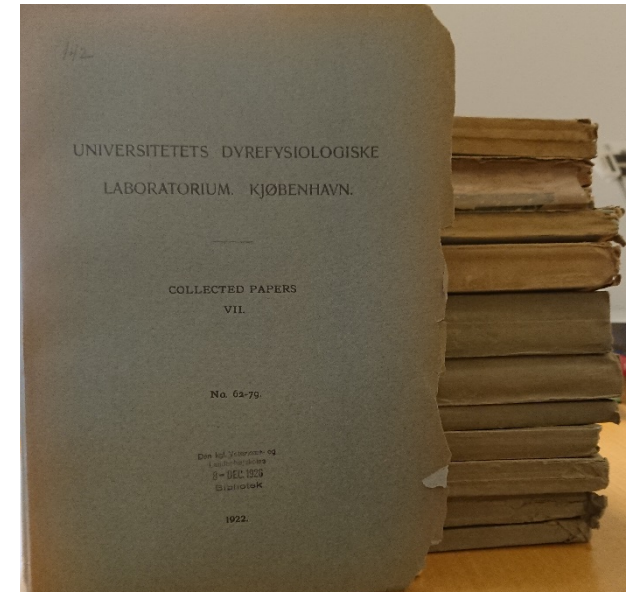
In 1927, the laboratory and four others moved to the Rockefeller Building

- Funded by the Rockefeller, Carlsberg and Rask-Ørsted foundations
- Larger and better, both laboratory and home
- Expansion needed to receive more guests



COLLECTED PAPERS

- Collection of papers based on research done at the Zoophysiological Laboratory
- Sent to various universities, unfortunately unknown
- 104 papers in 1911-1926
- 172 papers in 1927-1939
- 276 papers published in total in 1911-1939



COLLECTED PAPERS - METHOD

- Author(s), title, journal, volume and year noted for each paper
- Inclusion in “Collected Papers” is only requirement for being part of the analysis, but papers (and persons) outside this collection could be relevant
 - Some can be missing by accident
 - Others are missing by design. Not all of Marie Krogh’s work was done as part of the Zoophysiological Laboratory, but she was clearly part of August Krogh’s network for the entire period
 - Some scientists may have visited without making a paper
- Calculations done with BibExcel, a program by Olle Persson, prof. em. Umeå University
- Network graphs made in VOSviewer, van Eck and Waltman, CWTS, Leiden University

COLLECTED PAPERS – PREVIOUS WORK

- C. Barker Jørgensen (1979) analyzed the Collected Papers 1911-1945, 327 papers
- 59% of the articles were based on research on human physiology or zoophysiology with the purpose of studying humans
- 16% were within zoophysiology
- 18% were about methods
- 7% were within general physiology, incl. biochemistry

COLLECTED PAPERS – AUTHOR STATISTICS

	1911-1926	1927-1939	1911-1939
Articles	104	172	276
Authors	25	67	83
Authorships	132	278	410
Authors per article	1,27	1,62	1,49

August Krogh	54
P. Brandt Rehberg	12
J. Lindhard	10
K. L. Gad-Andresen	8
Marie Krogh	8

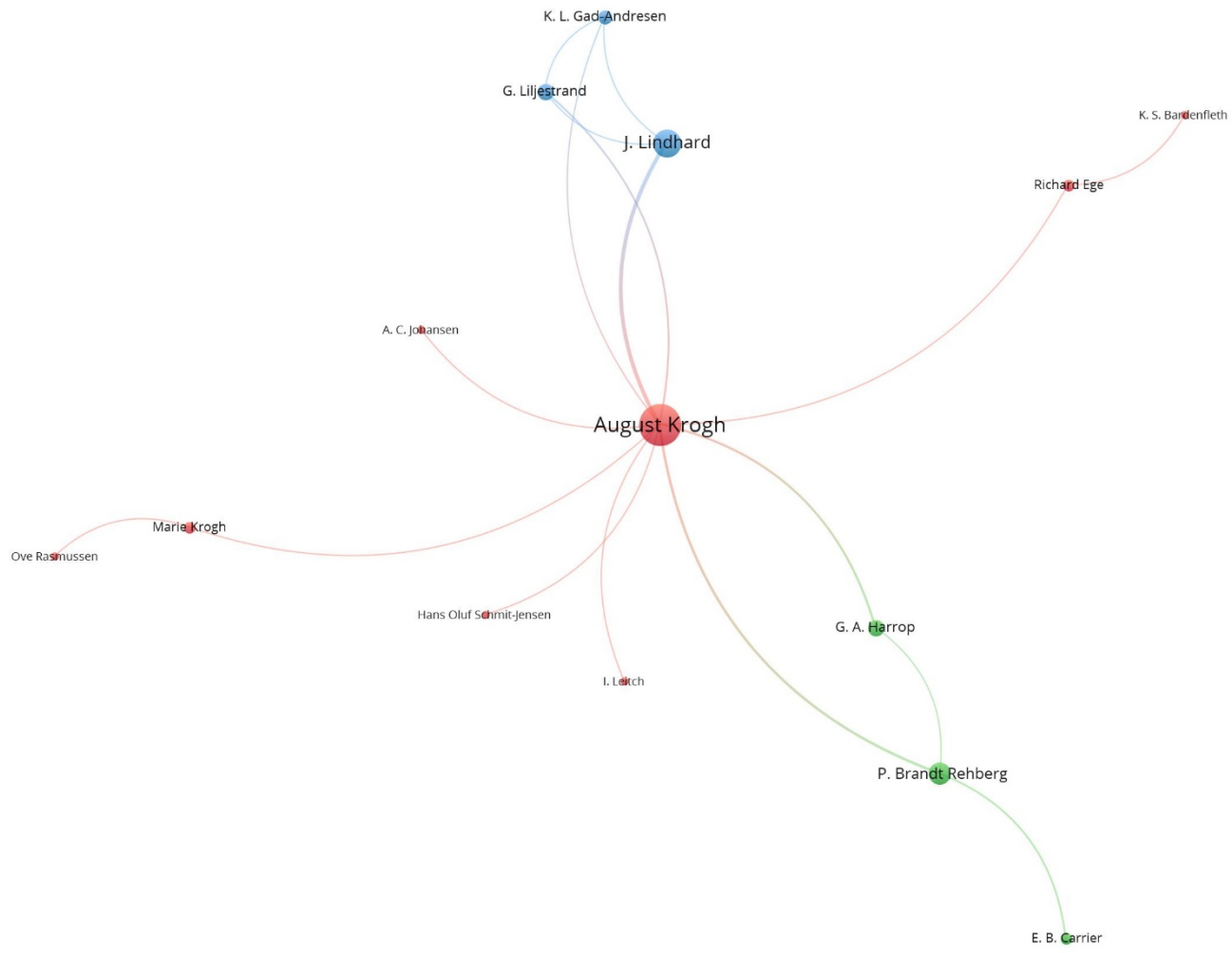
August Krogh	58
E. Hohwü Christensen	28
P. Brandt Rehberg	16
Marie Krogh	13
Marius Nielsen	12

August Krogh	112
E. Hohwü Christensen	28
P. Brandt Rehberg	28
Marie Krogh	21
J. Lindhard	12

COLLECTED PAPERS – JOURNAL STATISTICS

1911-1926 – 29 journals		1927-1939 – 49 journals		1911-1939 – 66 journals	
Journal of Physiology	19	Skand. Arch. Physiol.	52	Skand. Arch. Physiol.	67
Skand. Arch. Physiol.	15	Zeitschr. F. vergl. Physiol.	12	Journal of Physiology	24
The Biochem. Journal	11	Acta med. Scand.	9	The Biochem. Journal	17
Bioch. Zeitschr.	10	Bioch. Zeitschr.	6	Bioch. Zeitschr.	16
Physiological Papers dedicated to Prof. A. Krogh	6	The Biochem. Journal	6	Zeitschr. F. vergl. Physiol.	12
Pflügers Archiv	5	Acta path. Et microbiol. Scand.	5	Acta med. Scand.	10

CO-AUTHORSHIP NETWORK 1911-1926



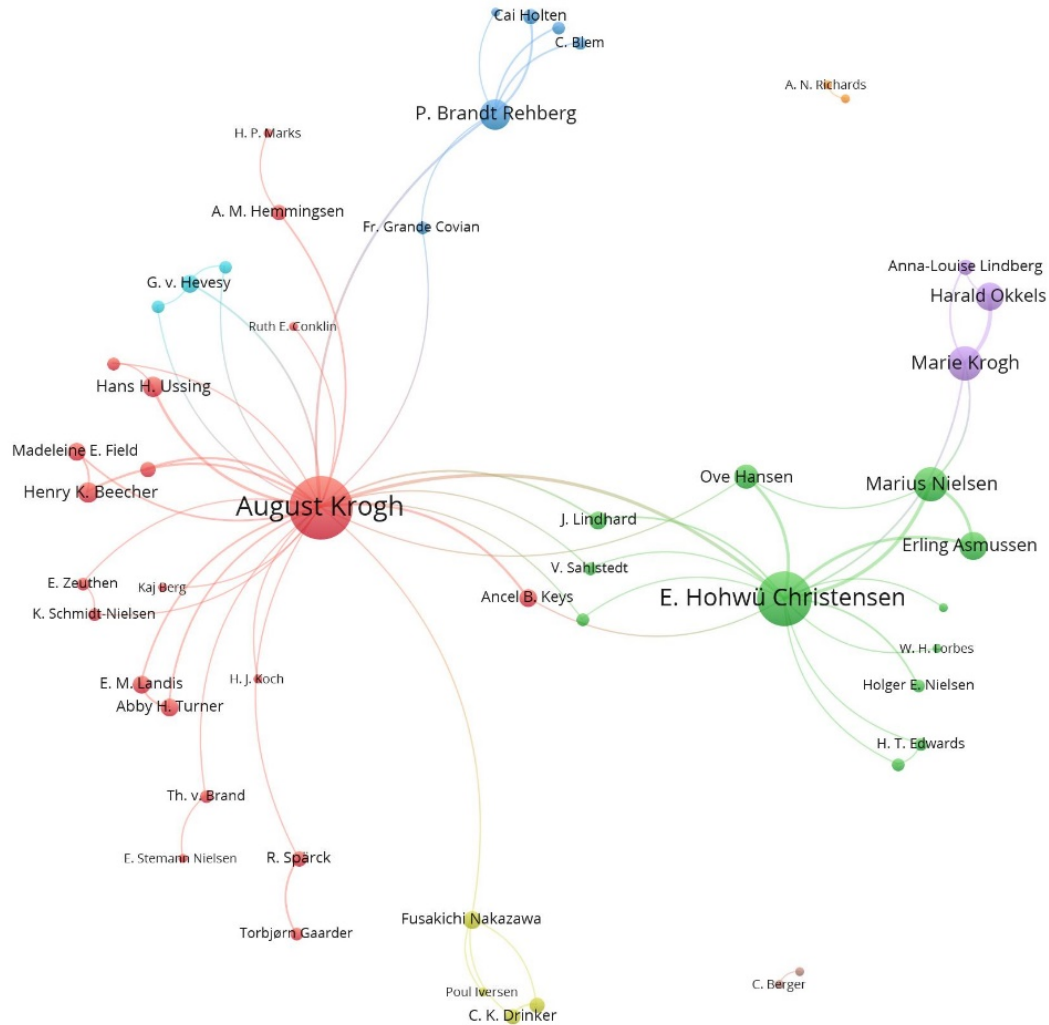
DANISH CENTRE FOR STUDIES IN
RESEARCH AND RESEARCH POLICY
DEPARTMENT OF POLITICAL SCIENCE
AARHUS UNIVERSITY

27TH NORDIC MEDICAL HISTORY CONGRESS
24 MAY 2019

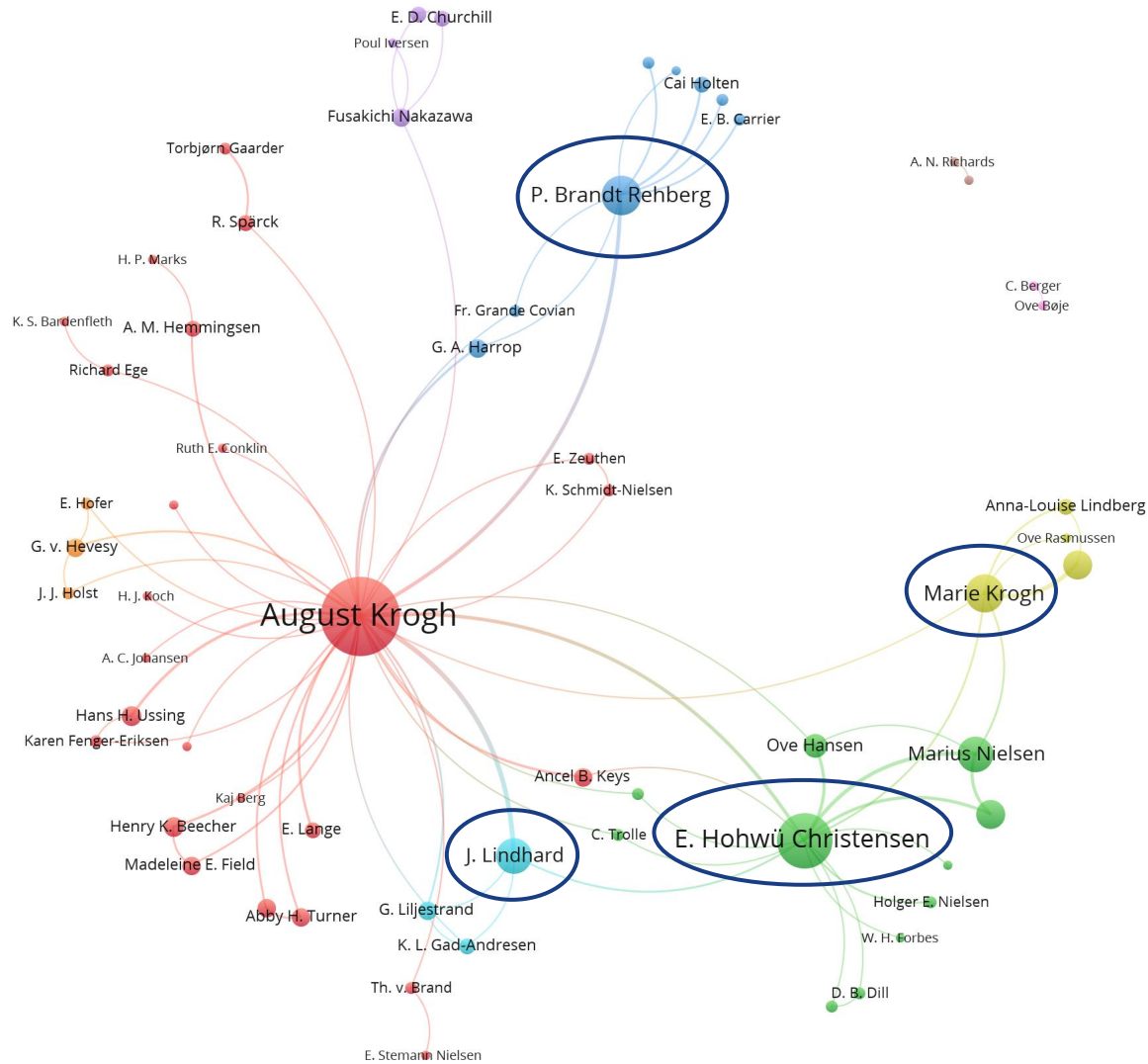
ALLAN RYE LYNGS
PHD STUDENT



CO-AUTHORSHIP NETWORK 1927-1939



CO-AUTHORSHIP NETWORK 1911-1939



OTHER NETWORK LINKS

- August Krogh's and others' visits to international laboratories, conferences etc.
- Correspondence with other internationally prominent physiologists
- Second-degree links – the links from the visitors to their department and collaborators
- For instance: The insulin connection was based on correspondence and visits
- How to incorporate it in a meaningful way?

PRELIMINARY CONCLUSIONS

- Clear differences between the network before and after the laboratory move / Rockefeller funding
- Krogh was the most prolific co-author of the laboratory, but others were also creating sub-networks
- So many visitors that they must have had an impact. The questions are then on the nature of the impact and how big and how lasting it was.

GOING FORWARD

- Expand analysis of Collected Papers to 1945 or 1965
- Add analysis of papers cited and acknowledgements in Collected Papers
- Find further information on the persons in the network and their influence
- Suggestions?



**DANISH CENTRE FOR STUDIES IN
RESEARCH AND RESEARCH POLICY**
DEPARTMENT OF POLITICAL SCIENCE
AARHUS UNIVERSITY