Hector Fellow Academy

The Role of Individuals Versus Teams in Transformative Scientific Breakthroughs

- Doctoral project supervised by Prof. Dr. med. Dr. h.c. Matthias H. Tschöp -

Project Description:

The planned doctoral project investigates whether groundbreaking scientific breakthroughs in the STEM disciplines are primarily attributable to the genius of individual visionary figures or rather to synergetic team efforts.

Through a systematic analysis of at least 50 key examples from the history of science – ranging from antibiotics to the DNA structure, CRISPR-Cas9, and modern pharmacotherapies – the project examines the contexts of emergence, participation structures, and the "moment of creative breakthrough."

The methodology combines detailed case studies, comparative pattern analyses, and quantitative data evaluation with interdisciplinary perspectives from medicine, biology, chemistry, pharmacology, physiology, and the history of science.

The project aims both to develop a new understanding of the dynamics between individuality and teamwork in scientific progress and to derive practical implications for research funding, team organization, and innovation policy.

PROJECT:

Scientific discoveries and technological breakthroughs have shaped the development of humanity for centuries – from the discovery of antibiotics to the structure of DNA, the gene-editing tool CRISPR-Cas9, and modern pharmacotherapies such as GLP-1-based drugs. Yet one fundamental question remains unanswered: Do such transformative insights arise primarily from the genius and perseverance of individual visionary figures, or are they the result of synergetic team efforts that pool collective knowledge and creativity?

The planned doctoral project seeks to address this question through an interdisciplinary approach that combines methods and perspectives from medicine, biology, chemistry, pharmacology, physiology, and the history of science. Its aim is a systematic analysis of several dozen key breakthroughs in the STEM fields – from the early modern period to the present. Primary sources, historical documents, biographies, and studies in the history of science will be examined to trace the contexts of origin, structures of participation, and decisive impulses behind each discovery.

Methodological Key Points:

- **Case Study Analysis:** In-depth reconstruction of selected scientific breakthroughs based on publications, archives, and biographies.
- **Comparative Pattern Recognition:** Identification of similarities and differences in the conditions of emergence (individual vs. team achievements).
- **Quantitative Evaluation:** Development of a systematic database of at least 50 central examples from the history of STEM sciences.
- **Interdisciplinary Perspective:** Integration of historical and analytical approaches with modern concepts from innovation and team research.

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The study places particular emphasis on the *"moment of creative breakthrough"*: Was it attributable to an extraordinary individual, or did it result from the intensive interaction of several researchers? The findings could not only provide a new understanding of the history of science but also yield highly relevant implications for contemporary research funding, team organization, and innovation policy.

The project promises a scientifically rigorous yet broadly accessible examination of a topic that captivates not only the academic community but also the wider public: the dynamics of individuality and teamwork in the advancement of science.

Keywords
History of Science, Technological Breakthroughs in STEM, Dynamics of Individuality vs. Teamwork, Innovation, Transformational Processes

Entry requirements
Master's degree in the relevant field

Location
Faculty of Medicine /Ludwig Maximilan University/Munich

Starting date
TBD

Funding
Four years of funding (3+1, three years with the possibility to extend for one year)

How to apply
Please apply via the HFA application portal.

The Hector Fellows will arrange interviews (via skype or if feasible in-person) with the most promising applicants. The final candidates will be invited to give an online presentation. The final decisions will be announced in the following days after the presentation.

Application Deadline
October 15, 2025

Enquiries

For questions related to your application, please contact Hector Fellow Academy Office:
application@hector-fellow-academy.de or www.hector-fellow-academy.de

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