SCIENTIFIC PRIZES MCKINSEY & COMPANY 2018

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Gone are the days when scientists only busied themselves with research and the business world was the exclusive domain of managers and slick city boys. While the interest in companies for scientific research is growing, PhD graduates are increasingly trading in their lab jacket for a pinstripe suit. One of the companies focusing more and more attention on scientists and including these various ‘doctors’ in its workforce, is McKinsey & Company.

Thanks to the patronage of McKinsey & Company, the F.R.S. - FNRS and the FWO are able to award 2 annual scientific Prizes to young researchers in recognition of their PhD thesis in the Exact or Applied Sciences, Social, Economical or Management Sciences, or Biomedical Sciences. The candidates need to demonstrate the social and economical relevance or possible implementation of their PhD thesis.


For the F.R.S. – FNRS, the Prize is awarded to:

Catherine SABATEL
PhD in Veterinary Sciences - ULiège (F.R.S.-FNRS’ Research Fellow)
Master in Cellular and Molecular Biology and Biochemistry - ULiège
Postdoctoral Researcher - University of Lausanne, France

for her PhD thesis:

**Ontogenic, phenotypic and functional characterization of lung interstitial macrophages after exposure to bacterial compounds.**

Living in a microbe-rich environment reduces the risk of developing asthma. However the underlying mechanisms are poorly understood. In this study, we showed that synthetic bacterial DNA rich in unmethylated CpG motifs (CpG) has the unique ability to significantly increase the population of lung interstitial regulatory macrophages (IM) with a hypersuppressive profile from lung and splenic CCR2-independent monocytes. Using mice models of airway allergy we showed that the transfer of IM isolated from CpG-treated mice protected from asthma development when administered before allergen sensitization or challenge. These results provide a possible mechanism by which exposure to environmental microbes protects from asthma and could be used as therapeutic strategy to help control asthma.
For the FWO, the Prize is awarded to:

Nik STOOP
PhD in Economics and Development Studies - KU Leuven / UAntwerpen
Master in Advanced Studies in Economics - KU Leuven
Master in Development Economics and International Cooperation - Università di Roma
Master in Communication Management - KU Leuven
Senior Researcher - KU Leuven

for his PhD thesis:

*Essays in development economics: case studies from Benin and the Democratic Republic of the Congo.*

The thesis consists of four essays that empirically study various dimensions of human development in Benin and the Democratic Republic of Congo.

Essay one provides the first quantitative analysis to scrutinize the ample ethnographic evidence that magico-religious beliefs affect the demand for conventional healthcare in Sub-Saharan Africa.

The second essay studies the impact of natural resource degradation on income diversification in Beninese fishing communities.

The third essay exploits variation in mineral prices and the granting of industrial mining concessions to investigate how the mode of extraction affects conflict in Eastern Congo.

The fourth essay studies the intention to fight among a high-risk population of miners in Eastern Congo.
MEMBERS OF THE JURY
F.R.S. - FNRS 2018

AGRELL Per
Professor at UCL
Louvain School of Management
Center for Operations Research and Econometrics

DUMOUTIER Laure
F.R.S.-FNRS’ Research Associate at UCL
de Dude Institute
Experimental Medicine

GEUZAINE Christophe
Professor at ULiège
Montefiore Institute
Electrical Engineering and Computer Science

PLATTEAU Jean-Philippe
Professor at UNamur
Department of Economics
Centre of Research in the Economics of Development

RASKIN Jean-François
Professor at ULB
Department of Computer Science
Verification and Formal Methods
MEMBERS OF THE JURY
FWO 2018

OPDENAKKER Ghislain, Chair
KU Leuven

VALCKE Martin, Vice-Chair
UGent

DANCKAERT Jan
VUB

DE GRAEF Ortwin
KU Leuven

FERREIRA Afonso
CNRS – Toulouse

HABIBOVIC Pamela
Universiteit Twente

JACOBS Nathalie
ULiège

ROTUNDO Giulia
Sapienza University Rome

VAN de VELDE Hans
Fryske Akademy

VAN LIERDE Kristiane
UGent

WALGRAVE Stefaan
UAntwerpen
Catherine SABATEL
ULiège

“Ontogenic, phenotypic and functional characterization of lung interstitial macrophages after exposure to bacterial compounds”
Summary

Asthma is a heterogeneous disease characterized by variable airflow obstruction, bronchial hyperresponsiveness and chronic inflammation. This leads to repeated periods of shortness of breath, wheezing and chest tightness. Various treatments enable the control of asthmatic symptoms. However despite the availability of a wide range of controller and reliever therapies, numerous asthmatic patients suffer of uncontrolled asthma. Currently, asthma affects 300 million people worldwide and its prevalence is estimated to increase by 50% every 10 years. This increasing incidence and prevalence in many parts of the world makes it a global health concern.

Allergic asthma, which occurs in >80% of children and in the majority of adults with asthma, arises from aberrant adaptive immune response against inhaled harmless molecules. The dramatic increase of allergic asthma observed last decades points towards an environmental alteration. The hygiene hypothesis postulates that decreased exposure to environmental microbes, partly due to changes associated with urban lifestyles, is responsible for this rise. In line with this hypothesis, epidemiological studies have shown that living in an environment rich in microbial components protects from airway allergy, implying the existence in the lung of suppressive mechanisms triggered by these immunogenic signals.

In 2009, the laboratory of cellular and molecular immunology of the professor Bureau identified, in mice, a population of lung regulatory macrophages, called interstitial macrophages (IM). These IM are located in the lung interstitium and prevent the development of Th2-allergic sensitization through their production of an immunosuppressive cytokine, the interleukine (IL)-10. However the immunosuppressive effects of IM are overwhelmed when the airways are exposed to high levels of allergens.

In this study, we investigated the phenotypic and functional plasticity of mouse lung IM upon exposure to several microbial components.

We observed that a bacterial component, the bacterial DNA, called CpG-DNA, has the unique ability to significantly increase the population of IM. These CpG-DNA-induced IM (IM\textsubscript{CpG-DNA}) demonstrated a hypersuppressive profile as they produced more IL-10 than their steady state counterparts.

Bacterial DNA is present in high amounts in dust from rural homes and treatment with synthetic CpG-DNA consistently protects from asthma development in animal models. So,
we investigated the role of IM\textsubscript{CpG-DNA} in murine asthma models. We showed that the transfer of IM\textsubscript{CpG-DNA} isolated from CpG-DNA-treated mice prevented allergic sensitization and reversed established asthma when administered before allergen sensitization or challenge, respectively. This protection was dependent from IL-10 production by the IM\textsubscript{CpG-DNA}.

Given the crucial contribution of IM\textsubscript{CpG-DNA} to asthma prevention and treatment in our models, we then analyzed the origin of these macrophages. Using different techniques, we showed that unexpectedly they arose from lung and splenic monocytes. These results support that IM\textsubscript{CpG-DNA} do not share the ontogeny of other population of macrophages and are consistent with a new model regarding macrophage ontogeny.

In conclusion, we have shown that IM substantially expanded from lung and splenic monocytes upon exposure to bacterial DNA in mice. These IM\textsubscript{CpG-DNA} were able, by producing high amount of IL-10, to prevent the development of allergic asthma. These results provide a possible mechanism, i.e. the induction of hypersuppressive IM\textsubscript{CpG-DNA}, by which exposure to environmental microbes protects from asthma. Moreover, they suggest the perspective of cellular therapy for the treatment of asthma.
Curriculum Vitae

SABATEL Catherine

Address: Avenue des Grottes 37
74500 Evian-les-Bains
France
Phone: +32 4 76 55 50 88
E-mail: catherine.sabatel@hotmail.com
Birth date: 23 Mars 1987
Birth place: Liege
Nationality: Belgian

Education

2010 – 2017 PhD in Veterinary Sciences, University of Liege
Title: Ontogenic, phenotypic and functional characterization of lung interstitial
macrophages after exposure to bacterial compounds
Place: University of Liege, GIGA-R center, Laboratory of Cellular and Molecular
Immunology, Professor F. Bureau

2008 – 2010 Master’s degree in Cellular and Molecular Biology and Biochemistry, University of Liege
(great distinction)

2005 – 2008 Bachelor’s degree in Biology; University of Liege (great distinction)

Professional experience

10/2018 – now Postdoctoral researcher at the University of Lausanne
Laboratory Lymphocyte function (Prof. W. Held)

11/2017 – 09/2018 Postdoctoral researcher - Graduate assistant at the University of Liege
Laboratory of Cellular and Molecular Immunology (Prof. F. Bureau)

10/2010 – 11/2017 PhD student - Research fellow (Aspirant) of the FNRS (National Fund for
Scientific Research) from 2010 to 2014 and graduate assistant at the
University of Liege from 2015 to 2018.
Laboratory of Cellular and Molecular Immunology (Prof. F. Bureau)

Teaching experience

• Supervision of Master and PhD students in research
• Organization and supervision of undergraduate students in biochemistry practical works and in
  tutorials of biochemistry.

Scientific distinctions

• Award for the best abstract in GIGA Institute meeting (May 2012, Liege)
• Award for the best poster in Journées de Recherche Respiratoire meeting (October 2012,
  Lille)
• Award for the best poster in the Belgian Immunological Society meeting (November 2013,
  Liege)
• Graduate School of Immunology award in GIGA Institute meeting (January 2016, Liege)
• AstraZeneca funding from the Fonds Léon Frédéricq (January 2018)
• Henriette-Simont award from Académie Royale de Médecine de Belgique (April 2018)
• McKinsey and Company award for PhD research (May 2018)
Technical skills

**Experimental mouse models** (Félasa laboratory animal training (C level)): experimental asthma (Alum, House Dust Mite, OVA and Bone Marrow derived Dendritic Cells), respiratory immunological tolerance, viral infection (Influenza A virus), chimeric mice

**Cellular biology**: cell culture (cell lines and murine primary cells), flow cytometry and cell sorting (FACS Canto, FACS Verse (training), FACS Fortessa, FACS Aria (training)), cell purification (Magnetism-Activated Cell sorting), cell proliferation assays (CFSE, 3H-thymidine uptake), cell tracking (CFSE)

**Molecular biology**: DNA/RNA preparation, PCR, quantitative RT-PCR, ELISA, western blotting, immunofluorescence

**Virology**: Virus production and titration (influenza A virus), work in biosafety laboratory (level 2 and 3)

**Informatic tools**: Good knowledge of Microsoft software, Photoshop and Illustrator software, pubmed, GraphPad Prism and flow cytometry analysis software (FACSDiva, FlowJo)

**Languages**: French (mother tongue), English: written (reports, papers) and spoken (scientific presentations)

Publications

Publications in peer-reviewed journals


Abstracts from conferences (poster presentation)

- Resident non-inflammatory CD11b+ lung dendritic cells are responsible for allergic airway sensitization to house dust mite in mice. Mesnil C, Sabatel CM, Marichal T, Toussaint M, Cataldo D, Drion PV, Lekeux P, Bureau F, and Desmet CJ. Journées de Recherche Respiratoire, October 2012, Lille, France


- Resident CD11b+Ly6C− lung dendritic cells are responsible for allergic airway sensitization to house dust mite in mice. Mesnil C, Sabatel C, Marichal T, Toussaint M, Cataldo D, Drion PV, Lekeux P, Bureau F, Desmet CJ. International Congress of Immunology (ICI), August 2013, Milan, Italy


“Essays in development economics: case studies from Benin and the Democratic Republic of the Congo.”
Summary

The thesis consists of four essays that empirically study various dimensions of human development in Benin and the Democratic Republic of Congo.

Essay one provides the first quantitative analysis to scrutinize the ample ethnographic evidence that magico-religious beliefs affect the demand for conventional healthcare in Sub-Saharan Africa. We rely on the unique case of Benin, where Voodoo-adherence is freely reported, and varies greatly within villages and even within households, yet can be traced to historic events that are arguably exogenous to present-day healthcare behavior. These features allow us to account for confounding village- and household- factors, and address self-selection into Voodoo. We find that Voodoo adherence of the mother is associated with lower uptake of preventive healthcare measures and worse child health outcomes. Our results suggest that the uptake of preventive healthcare, and ultimately child health outcomes, may be improved by targeting Voodoo-adhering mothers.

The second essay studies the impact of natural resource degradation on income diversification in Beninese fishing communities. Using survey data and econometric analysis, we show that fishermen are more likely to diversify their income when the degradation of the fish stock is more severe. However, the level of income diversification that we find is surprisingly low and far from sufficient to relieve the stress on the lakes. The latter relates to low levels of formal education among fishermen and the unregulated use of highly productive, but damaging, fishing gear. These two factors result in a high return to fishing relative to non-fishing activities, even amidst degradation.

Existing research suggests a strong link between mining and local conflict but makes no distinction between artisanal and industrial mining. The third essay exploits variation in mineral prices and the granting of industrial mining concessions to investigate how the mode of extraction affects conflict in Eastern Congo. Rising mineral prices increase battles over artisanal mines, indicating competition between rebel groups. This effect is absent for industrial mining. The expansion of industrial mining decreases battles, suggesting that companies can secure their concessions. Such expansion does, however, trigger riots, and when it crowds-out artisanal mining, also increases violence against civilians and looting.

Why would an individual choose to take up arms and fight? Several decades of research on armed conflict have yielded relatively few quantitative analyses on the individual propensity to participate in collective violence, compared to a large number of ethnographic case studies and cross-country studies. The fourth essay studies the intention to fight among a high-risk population of miners in Eastern Congo. The majority of our respondents have been exposed to armed conflict in the past and some have participated in activities of armed groups. We inquire about their intention to fight at a time when their main income source is under threat because of the arrival of a large-scale mining company. We identify how their responses vary with four motivations that have been highlighted in the theoretical literature: grievances, material incentives, social incentives and previous exposure to conflict. The results suggest that all four motivations play a significant role.
Curriculum Vitae

Nik Stoop

Contact
Institute of Development Policy
IOB, University of Antwerp
Lange Sint Annastraat 7
Antwerp 2000, Belgium

Email: nik.stoop@uantwerp.be
nik.stoop@kuleuven.be

Website: www.nikstoop.com

Personal
Date of birth: 1 August 1986
Citizenship: Belgian
Languages: Dutch (native), English (proficient), French (fluent), Italian (basic)

Positions
Post-doctoral researcher (Oct. 2018 – present)
Institute of Development Policy (U. of Antwerp)

Senior Research Fellow (Oct. 2017 – present)
Centre for Institutions and Economic Performance (U. of Leuven)

Clever.org

Southern Africa Labour & Development Research Unit (U. of Cape Town)

Stoop Consulting bvba.

European Committee for Agriculture and Training (CEFA)

Education
PhD in economics (U. of Leuven)

PhD in development studies (U. of Antwerp)

Visiting PhD researcher (May 2017 – August 2017)
Southern Africa Labour & Development Research Unit (U. of Cape Town)

M. Sc. in Advanced Studies in Economics
University of Leuven, Oct. 2010 – Sept. 2011, magna cum laude

M.A. in Development Economics and International Cooperation
University of Rome, Tor Vergata, Oct. 2008 – Sept. 2009, summa cum laude

M.A. of Communication Sciences
B.A. of Communication Sciences

**Publications**


**Working Papers & Policy Briefs**


**Selected Work in Progress**

Would you fight? An inquiry among high-risk youth in eastern DRC. With M. Verpoorten

Artisanal or Industrial conflict minerals? Evidence from eastern DR Congo. With M. Verpoorten and P. van der Windt.
Risk, envy and magic in DRC’s artisanal mining sector: insights into the ‘Modernity of Witchcraft’. With M. Verpoorten

Exploring psychological well-being and poverty dynamics in South-Africa: evidence from NIDS waves 1-5. With M. Leibbrandt and R. Zizzamia

**Fellowships & Grants**

Global Minds (VLIR-UOS)
Grant for a visiting research stay at SALDRU, U. of Cape Town, Dec. 2017

Research Foundation Flanders (FWO)
Two-year PhD fellowship, Oct. 2013
Two-year renewal of PhD fellowship, Oct. 2015

IOB Research Fund
Grant to conduct fieldwork in the DRC, March 2013

University Research Fund (BOF)

U. of Leuven
Four-year PhD fellowship (taken up for one year), Oct. 2011

**Selected Presentations**


**Fieldwork & visiting research stays**

DRC, Upcoming fieldwork: Nov. 2018 & Feb. 2019
Pilot and baseline survey for the impact evaluation of an electrification project in North-Kivu.

South-Africa, May – August 2017 & Jan. – June 2018
Visiting research stays at the Southern Africa Labour & Development Research Unit of the University of Cape Town.

Benin, Dec. 2015
Presentation at a workshop on natural resource management of Benin’s southern lakes. Visit to fishing communities in preparation for the upscaling of a behavioral field experiment.
DRC, March – May 2015
Using tablets and CAPI-software, I organized a representative structured survey among 470 miners in an artisanal gold mining site in South-Kivu.

DRC, Dec. 2014
Semi-structured interviews and survey pilot in two artisanal gold mining sites in South-Kivu.

DRC, May – June 2014
Semi-structured interviews and focus group discussions in Bukavu and an artisanal gold mining site in South Kivu.

Benin, March – Apr. 2013
Surveys and pilot of a behavioral field experiment in the framework of a study on natural resource management, social preferences and religion among fishing communities.

Tanzania, Aug. – Nov. 2009
As a Volunteer / Researcher with CEFA, I conducted household surveys in the Southern highlands of Tanzania to assess factors hindering the development of rural income generating activities.

Projects
As a Consultant with C- clever.org, I contributed to an analysis of the organization and management of the department that makes verbatim reports and transcripts of the proceedings in the Flemish parliament.

As a Junior Consultant with Stoop Consulting, I contributed to the following projects:
- IFC (International Finance Corporation) - GCGF (Global Corporate Governance Forum) assignment in support of the Malawi Country Action Plan on Corporate Governance.
- BTC (Belgian Technical Cooperation) reformulation of the Junior Program for the Belgian Development Cooperation.
- FICA (Flemish International Cooperation Agency) Evaluation of the project ‘Go North’, a project of Unizo International aimed at capacity enhancement of SME’s in Southern Africa and at promoting export from South Africa, Mozambique and Malawi.
- VLABEST (Flemish Advisory Council on Public Administration) facilitation of the ‘Working Group on External Audit of Local and Provincial Governments in the Flanders’.
- VVOB (Development Cooperation in the education sector) evaluation of the VVOB education programs in nine partner countries.

Teaching
Lecture on Common Pool Resources, the tragedy of the commons and collective action. Course: Topics in Development Studies, U. of Antwerp.
**REVIEWER**

Annuaire des grands lacs, International Journal of Conflict Management, Resources Policy

**SOFTWARE**

Microsoft Office, Stata, ArcGIS, QGIS, CSPro, Surveybe, CAPI-software

**REFERENCES**

Marijke Verpoorten. Associate Professor. Institute of Development Policy, University of Antwerp. marijke.verpoorten@uantwerp.be

Jo Swinnen. Full Professor. Centre for Institutions and Economic Performance, University of Leuven. jo.swinnen@kuleuven.be

Peter van der Windt. Assistant Professor. Division of Social Science, New York University – AD. petervanderwindt@nyu.edu

Dominic Parker. Assistant Professor. Department of Agricultural & Applied Economics, University of Wisconsin-Madison. dominic.parker@wisc.edu
Laureates of the Scientific Prizes McKinsey & Company

> 2003: Vincent LAMBERT, ULiège
    Birgit GIELEN, UAntwerpen

> 2004: Carine PEETERS, ULB
    Sebastiaan ENGELBORGH, UAntwerpen

> 2005: Hakim BOULARBAH, ULB
    Marijke HUYSMANS, KU Leuven

> 2006: Dimitri LEDERER, UCL
    Sam POSSEMIERS, UGent

> 2007: Christophe CAUCHETEUR, UMONS
    Wouter VANDENABEELE, KU Leuven
    Barbara WILLEMS, KU Leuven

> 2008: Jean-Michel LAFLEUR, ULiège
    Hélène SOYEURT, ULg-GxABT
    Lieve VAN den BLOCK, VUB
    Klaartje SOMERS, UHasselt

> 2009: Basile STAMATOPOULOS, ULB
    Peter MORTIER, UGent

> 2010: Gaétan de RASSENFOSSE, ULB
    Wouter ACHTEN, KU Leuven

> 2011: François KERGER, ULiège
    Nathalie LE BASTARD, UAntwerpen
2012 : Sylvain QUOILIN, ULiège  
            Abhishek GARG, KU Leuven

2013 : Thomas GERNAY, ULiège  
            Bart van GRINSVEN, UHasselt

2014 : Séverine HENRARD, UCL  
            Stijn BAERT, UGent

2015 : Fabrice KRIER, ULiège  
            Nico DE LEU, VUB  
            Jeroen LUYTEN, UAntwerpen

2016 : Benoît PARDOEN, UCL  
            Andy GIJBELS, KU Leuven

2017 : Sylvain DELAUNAY, ULiège  
            Jonathan DE ROO, UGent

2018 : Catherine SABATEL, ULiège  
            Nik STOOP, KU Leuven / UAntwerpen