

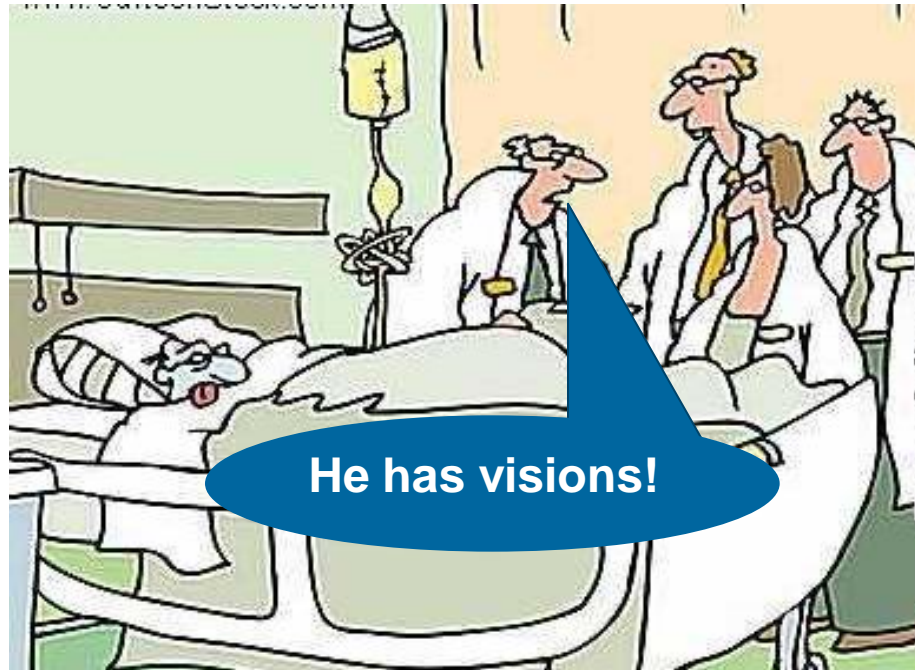


Innovative Medicines Initiative

VISIONS OF THE SCIENTIFIC COMMITTEE

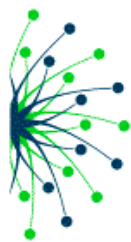
Christian R. Noe
University of Vienna
Chair of the IMI Scientific Committee





If somebody has visions, he needs a medical doctor!

Franz Vranitzky, Chancellor of Austria



On Views and Visions



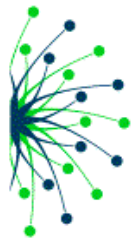
**A view on the fortune
of a scientist**

**Views provide
information!**

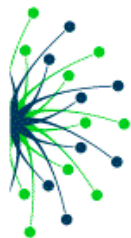
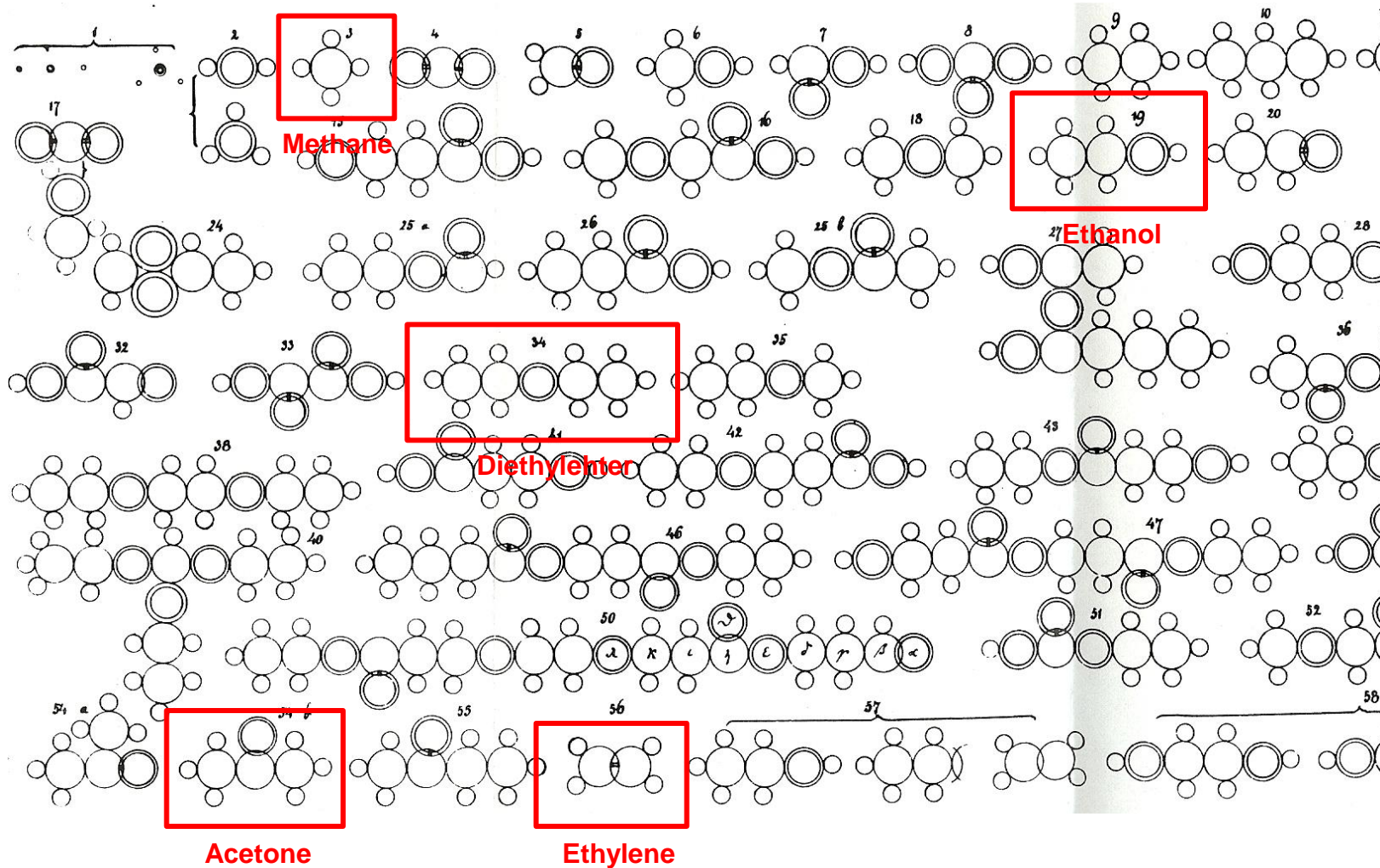


**A vision of a young scientist
on his future fortune**

**Visions provide
inspiration!**



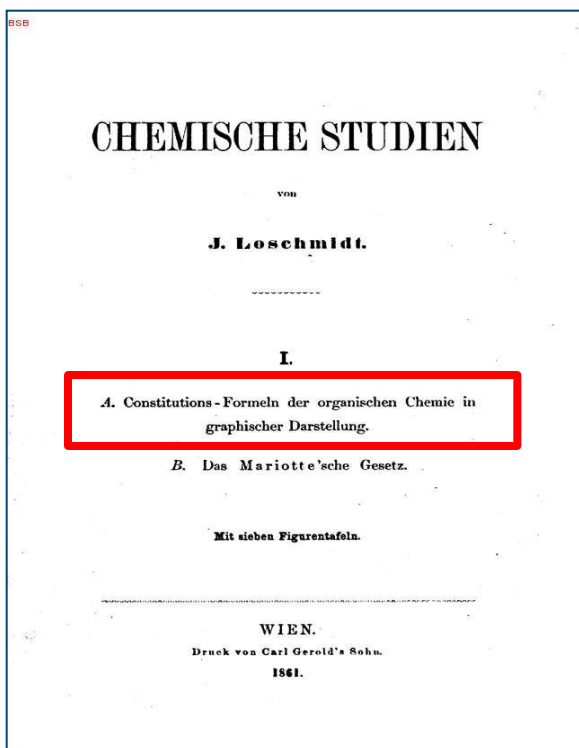
150th Anniversary of a Great Vision



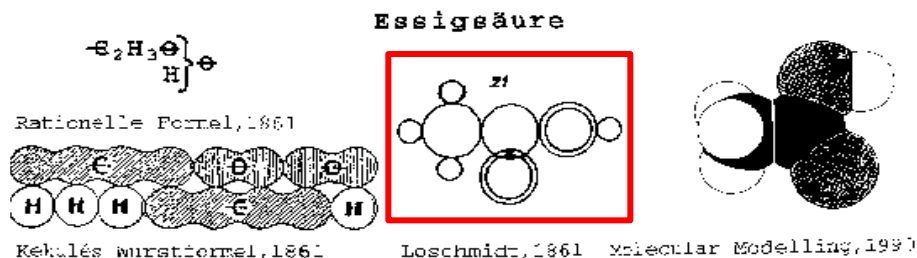
The Constitution of Matter



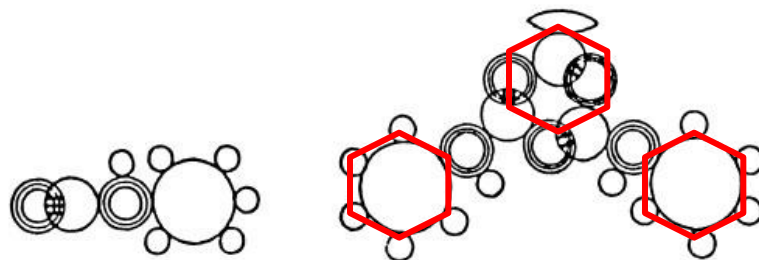
A vision on the shape of molecules



Josef Loschmidt



nylcyanamid sch. 238, und beim Einwirken von Chloreyanur $\text{C}_2\text{N}_3\text{Cl}_3$ auf zwei Äquivalente Anilin das Diphenylchlor-



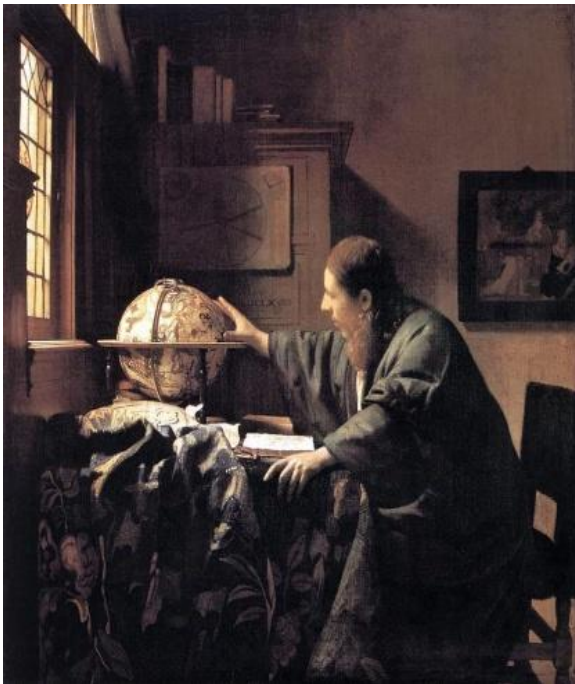
Schema 238, 239.

cyanurdiamin¹⁵⁴) $\text{C}_{15}\text{N}_5\text{H}_{12}\text{Cl}$, Sch. 239. Wirkt hingegen Chloreyan auf zwei Äquivalente Anilin, so erhält man Mela-

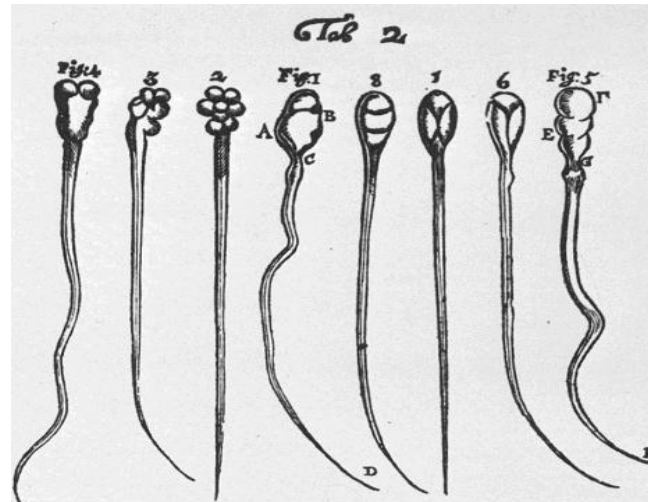
Expanding the Scale of Views



Antoni van Leeuwenhoek
1632 - 1723

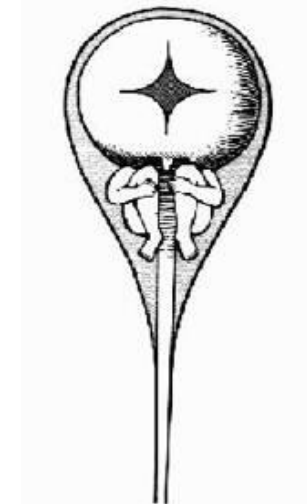


By Jan Vermeer

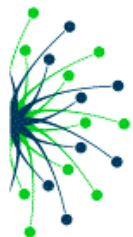


**A view on spermatozoa
under the microscope**

**A vision with
consequences**



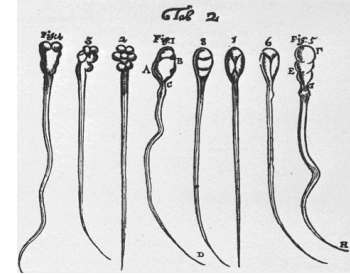
**Homunculus -
Nicolas Hartsoeker**
1656 - 1725



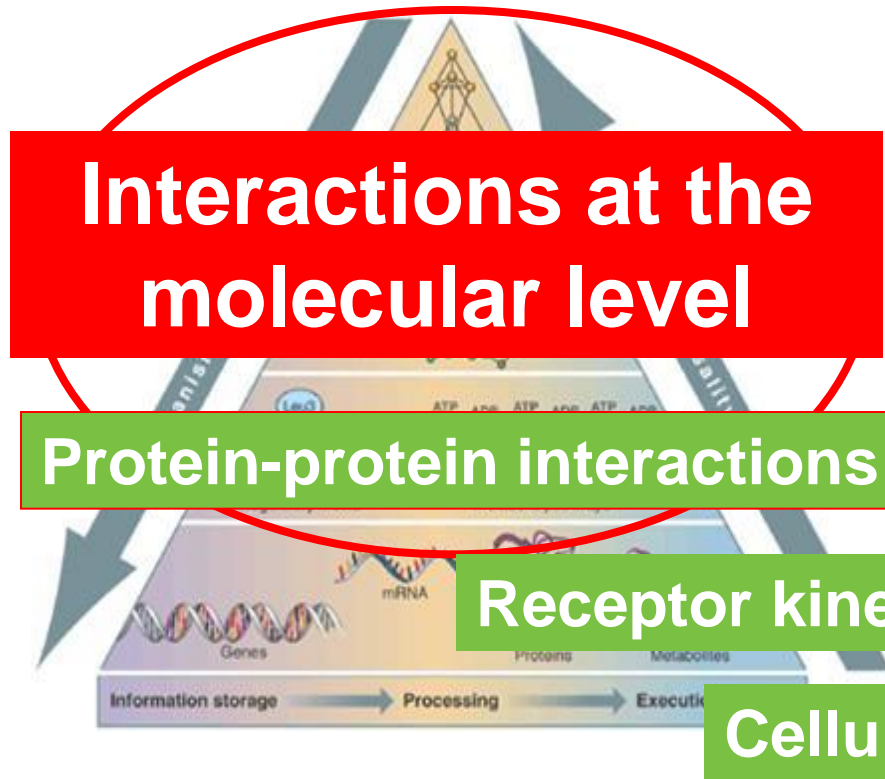
The “Nanoscalar Gap”



A lack of understanding of dynamics at subcellular levels



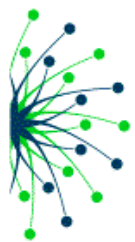
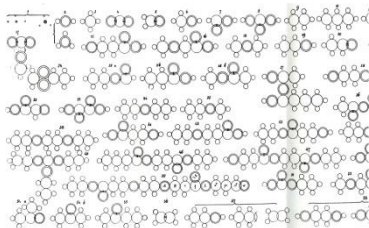
Upscaling
visions



Downscaling
views



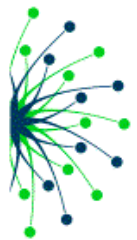
Cellular imaging



A View with a Hidden Message



René Margritte

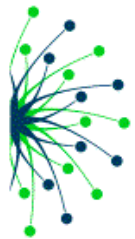
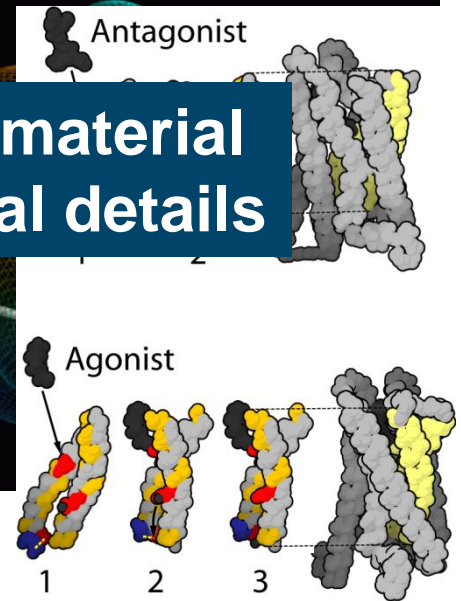


Science is reductionist!

The history of strong analgesics

From religion to recipe

From bulk material to structural details



Vision: Personalised Medicine



View: The attrition rate of the reductionist R&D process is too high!

Substance Library

HTS

**IMI Phase 1:
Drug Safety
Drug Efficacy
Biomarkers**

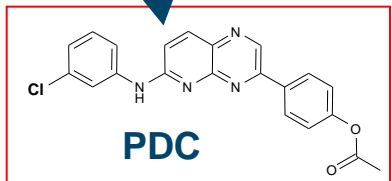
- *in silico*
- *in vivo*
- *in vitro*

Coping with regulatory and legal hurdles

Functional Genomics

The Patient

Medicine



Created to remove bottlenecks:



Beyond high throughput screening

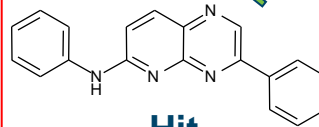
Mass

High odds ratio of hits

ADME in
ug
very:
Still far from perfect

Substance

Rare diseases and stratified therapies



Increasing regulatory demands drive costs.

Not enough validated preclinical and clinical biomarkers

in silico
in vivo
in vitro

Targets

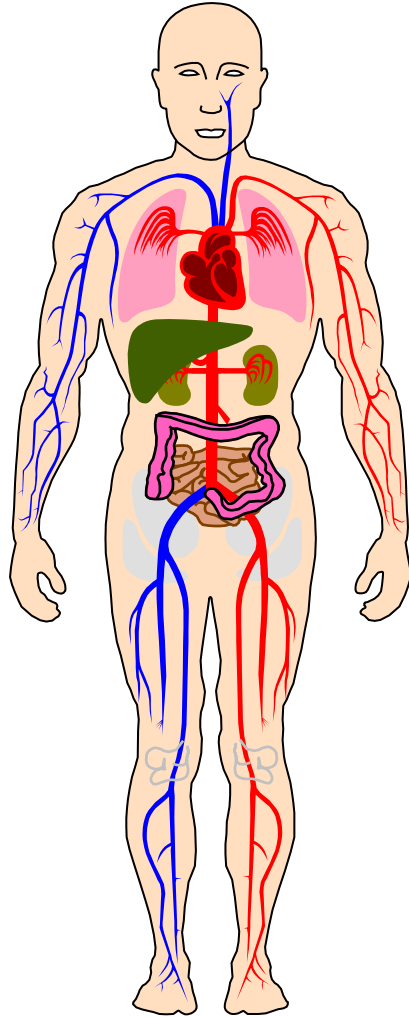
Most diseases are of multigenetic origin

Pharmacogenetics and taxonomy of human diseases

The Patient

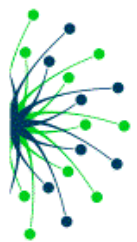
PDC

Vision: The Patient in the Focus

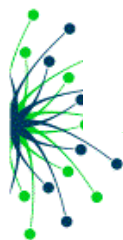
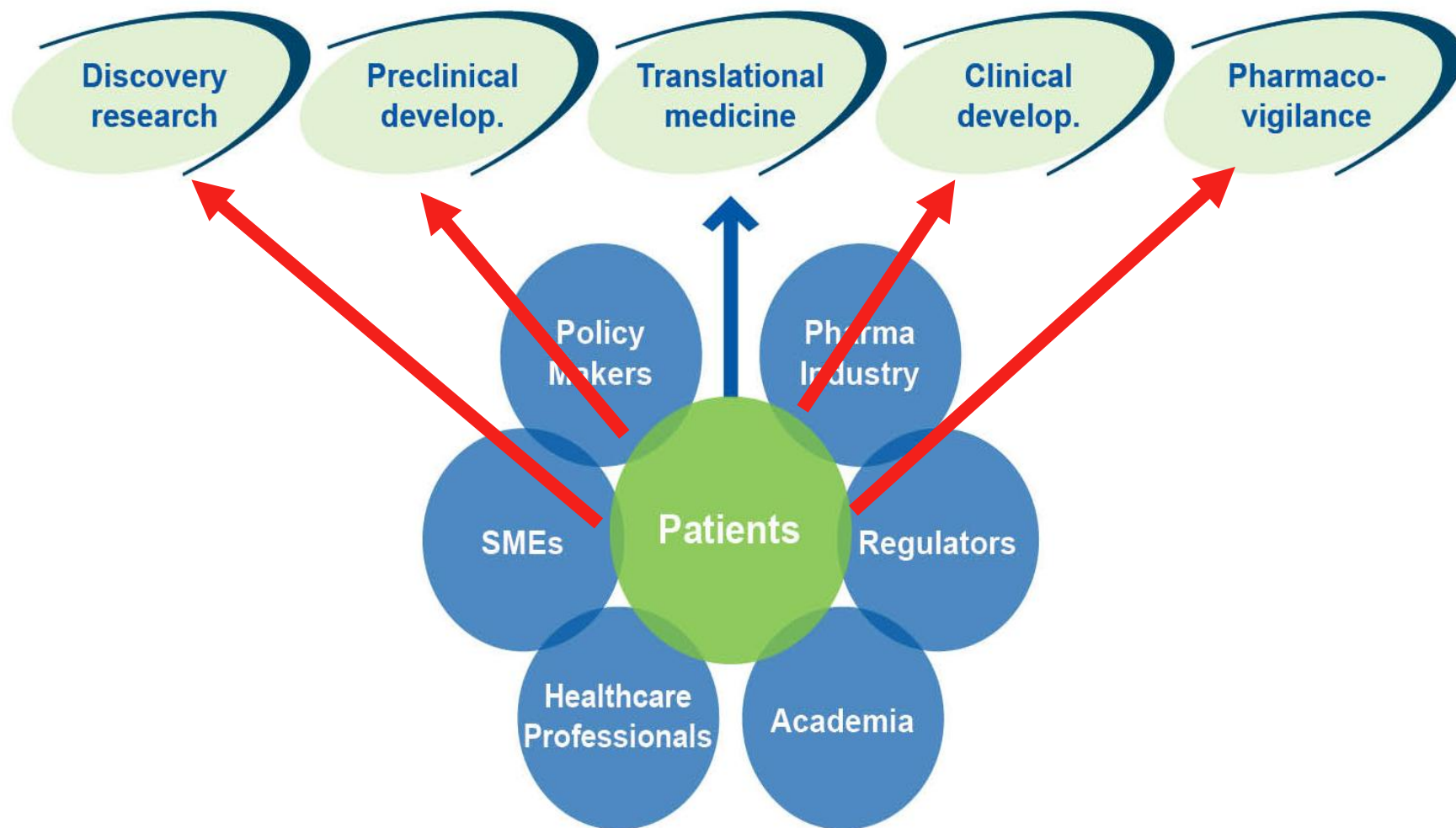


The focus of drug research
1860 – 1960 Drugs
1960 – 2010 Targets
from 2010 Patients

Brain diseases
Inflammatory diseases
Cancer
Metabolic diseases
Infectious diseases



Translational Sciences: Wider Scope

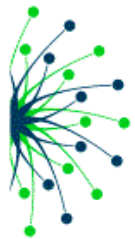


Vision: Post-industrial Europe



„Globalised translation“

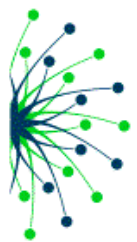
Trade routes in the 9th century



View: The World Today



Trade routes in the 9th century



From synthesis to industrial process



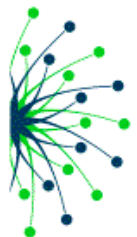
Translational sciences needs an industrial environment



**API technology
(Drug compound development)**



Advanced formulations



A Paradigm Change

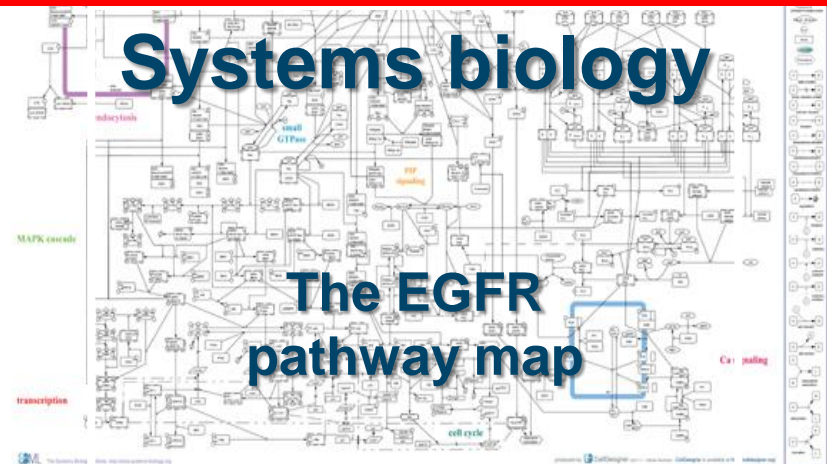


From reductionist concepts to systems approaches

Decoding of the human genome

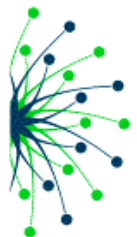
G. Venter, 2000

Milestone of great expectations and at the same time end of exaggerated expectations.



Contains a total of 219 reactions and 322 species.

Oda et al., Molecular Systems Biology
1 doi:10.1038/msb4100014 published
online: 25 May 2005



Vision: Individualised Drugs



Fundament:

Systems pharmacology

Disease understanding at cellular and molecular levels

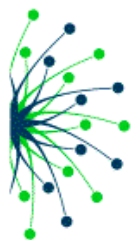


Approach:

Network based discovery

Combining reductionist and systems approaches

Receptor subtypes, pathways, multi target design,
systems of networks



Tools and Techniques



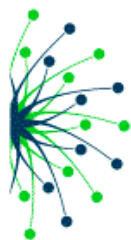
Stem cells for R&D and toxicity studies

Integration of imaging into drug R&D



Systems – Levels of description

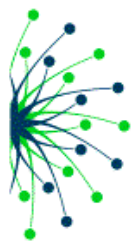
Genome, Transcriptome, Proteome, Metabolome, Physioime etc.



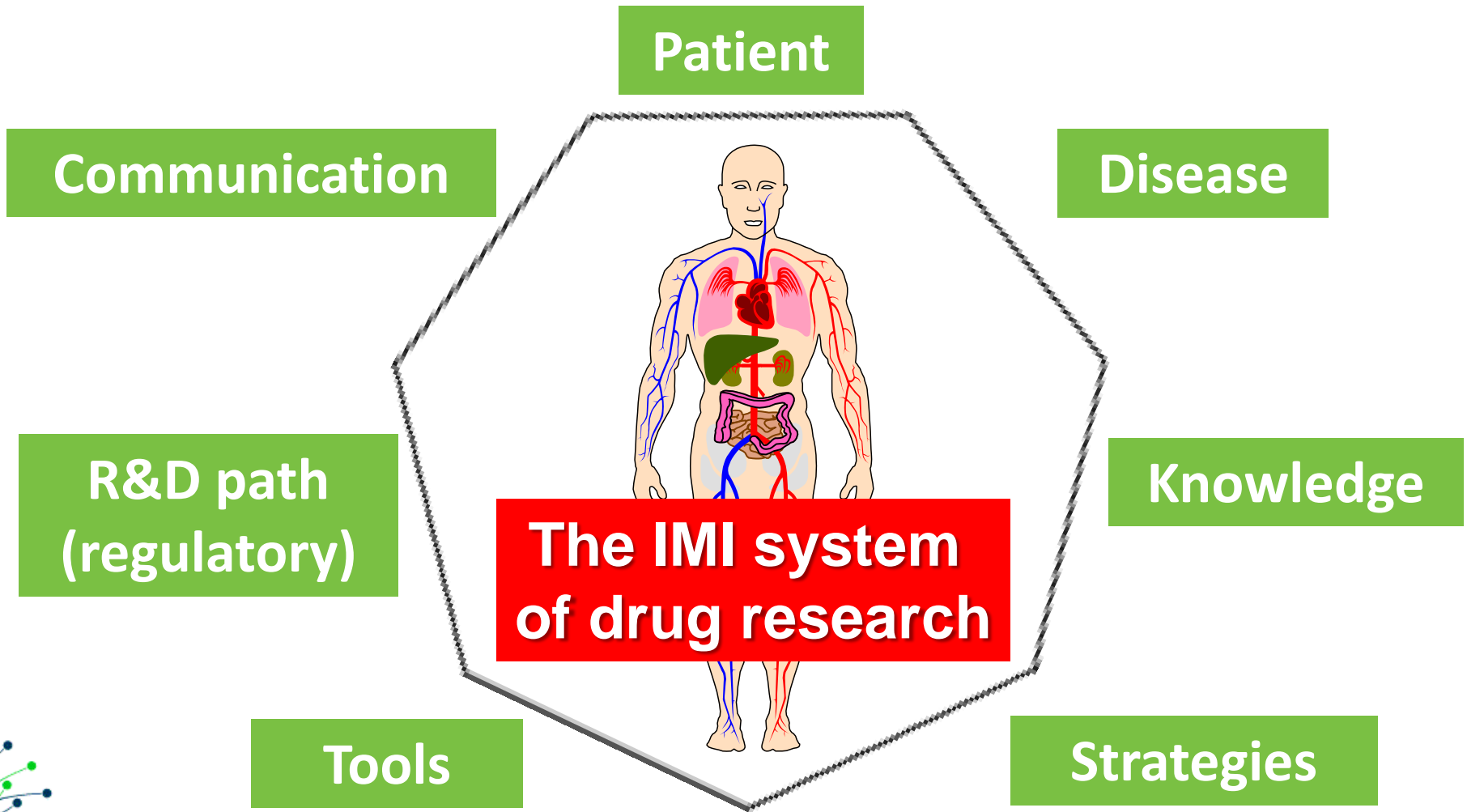
**The fittest systems survive.
Co-operation is the solution!**

**Formation of consortia,
knowledge management and
education and training are
central tasks of IMI.**

**An important aspect to overcome the
„translational crisis“**



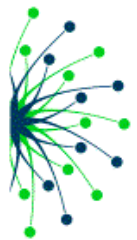
Areas of Research Interest



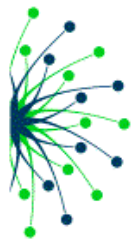
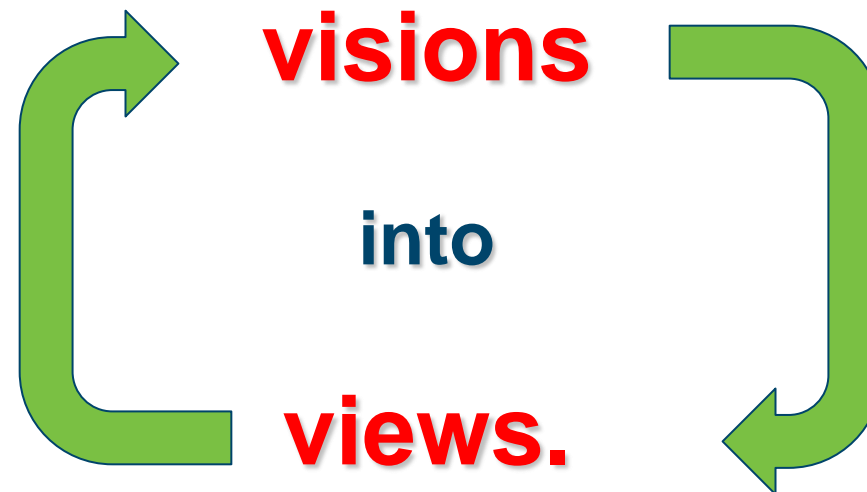
New Key Research Priorities



1. Pharmacogenetics and taxonomy of human diseases
2. Rare diseases and stratified therapies
3. Systems approaches in drug research
4. Pharmacological interactions at the molecular level
5. API technology
(Drug compound development)
6. Advanced formulations
7. Stem cells for drug development and toxicity screening
8. Integration of imaging techniques into drug research



An important task is to
transform



Thank you!

Christian.Noel@univie.ac.at

