International Meeting of Editors and Contributors
of Scientific Periodicals in the Field of Dentistry.

Salão Nobre da Faculdade de Odontologia de Bauru /USP

The Role of the Scientific Editor & the Impact Factor: An International Vision

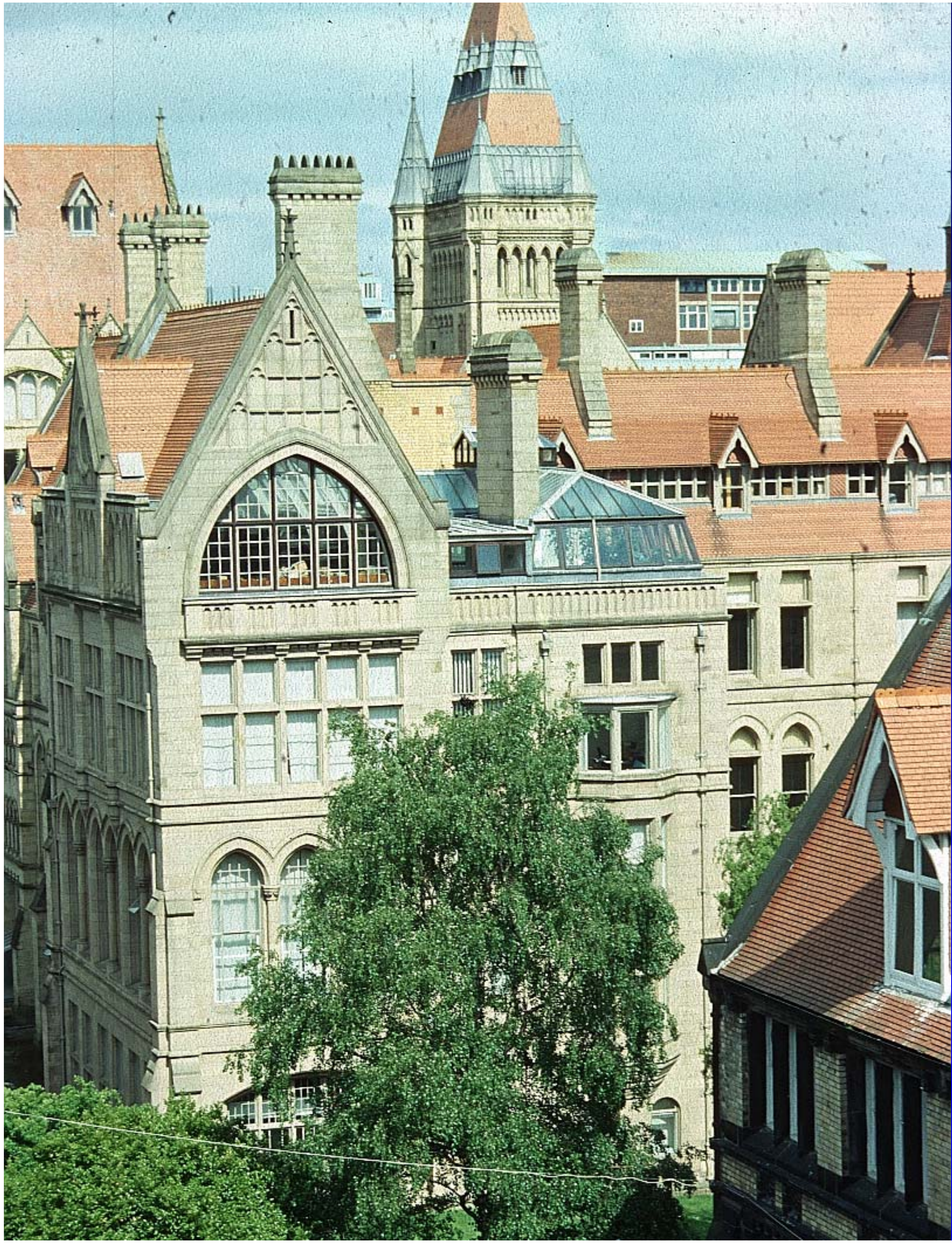
Prof. **David Watts**

The University of Manchester, UK

Editor-in-Chief: *Dental Materials* [Elsevier Science]

MANCHESTER
1824

Onde está Manchester?

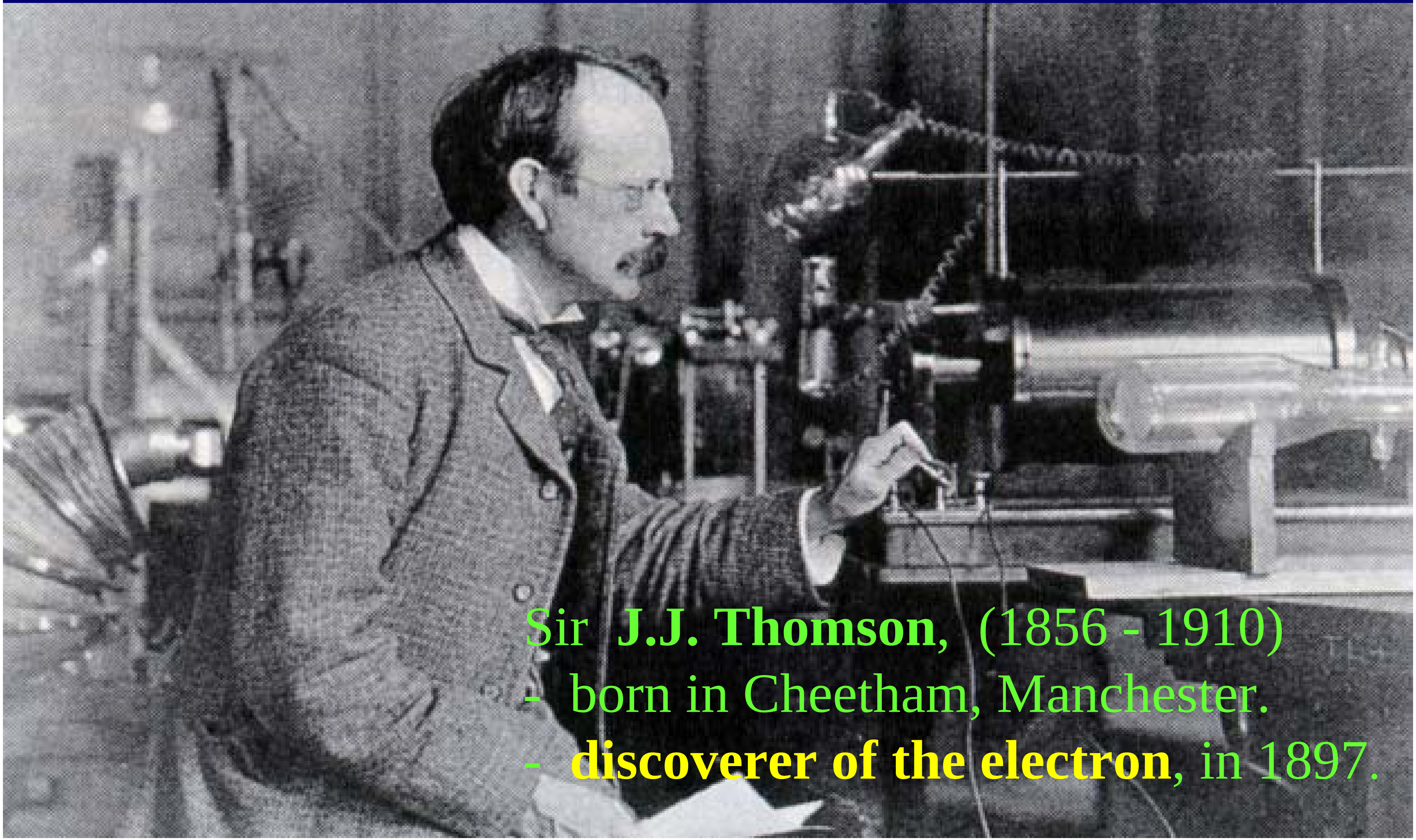


MANCHESTER
1824

Cumprimentos de Manchester

Molhado e ventoso em novembro

Um de nossos estudantes anteriores !



Sir **J.J. Thomson**, (1856 - 1910)
- born in Cheetham, Manchester.
- **discoverer of the electron**, in 1897.

Como podemos nós melhorar nossos jornais científicos?

- Consider first: the **impact factor [IF]**
- Then: the role of the **scientific editor & peer-review**
- Then: **What is scientific explanation?**
- & **Awareness of current research trends.**

The ISI® Journal Citation Reports (JCR®) impact factor has moved in recent years …

- *from* **an obscure bibliometric indicator**
- ***to become*** **the chief quantitative measure**
  - **of the quality of a journal**
  - **its research papers**
  - **the researchers who wrote those papers**
  - & even **the institution in which they work.**

Impact factor is <u>not</u> an absolute or fully reliable measure of quality.

But some agencies & individuals treat **IF**
...**as if** it were the only measure of quality ...

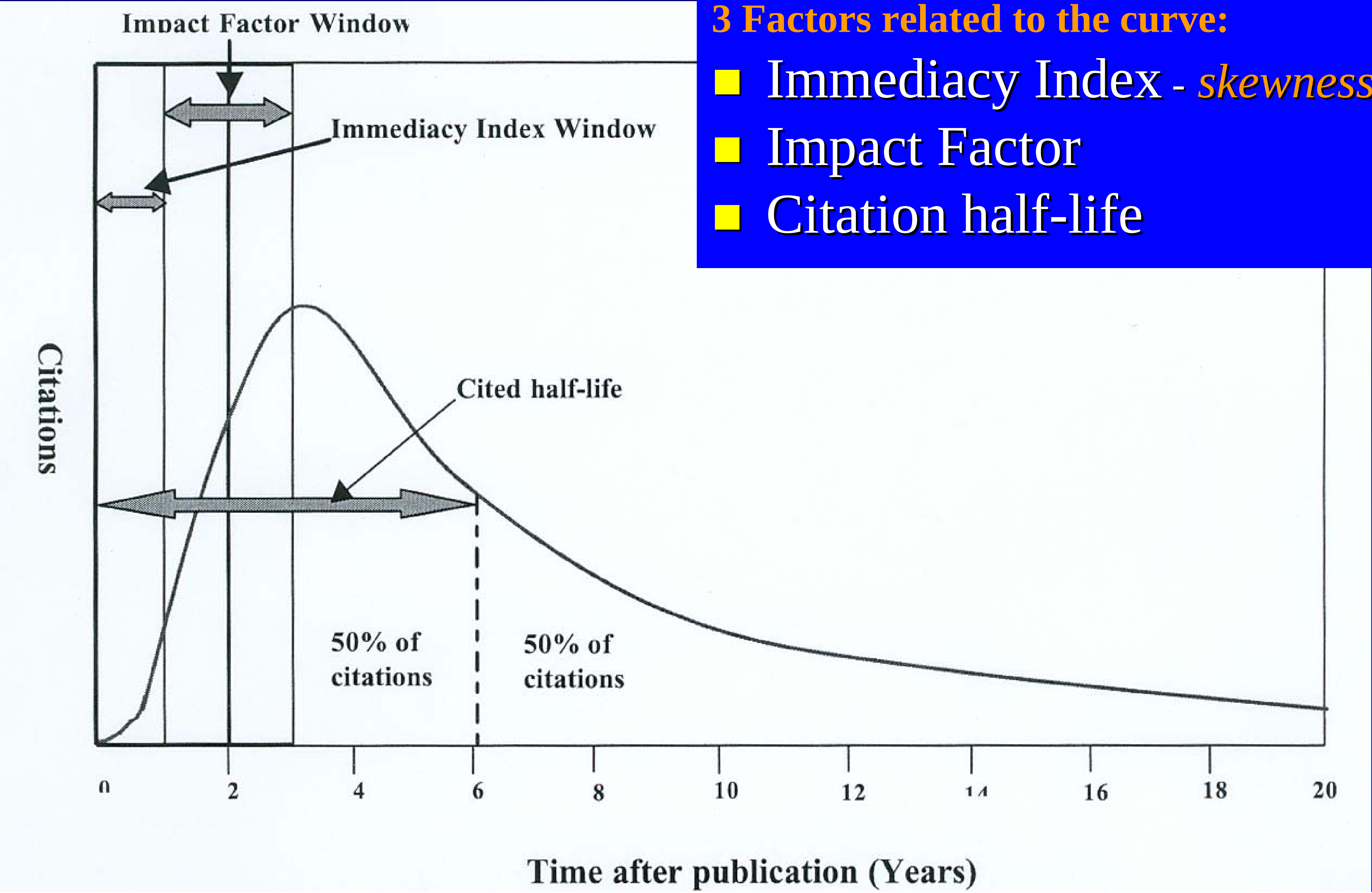
The definition of (JCR®) Impact Factor

- *For each journal*, it is a ratio: Numerator / Denominator
- Numerator = the frequency with which articles are quoted* *in the 2 years following their publication.*
- Denominator = the total number of articles published

* **Quoted** = **cited** in the reference list of a paper in any appropriate research journal.

Eg. $$2004\ IF = \frac{\text{Number of citations in 2004 to articles published in 2002 \& 2003}}{\text{Number of papers published in 2002 \& 2003}}$$

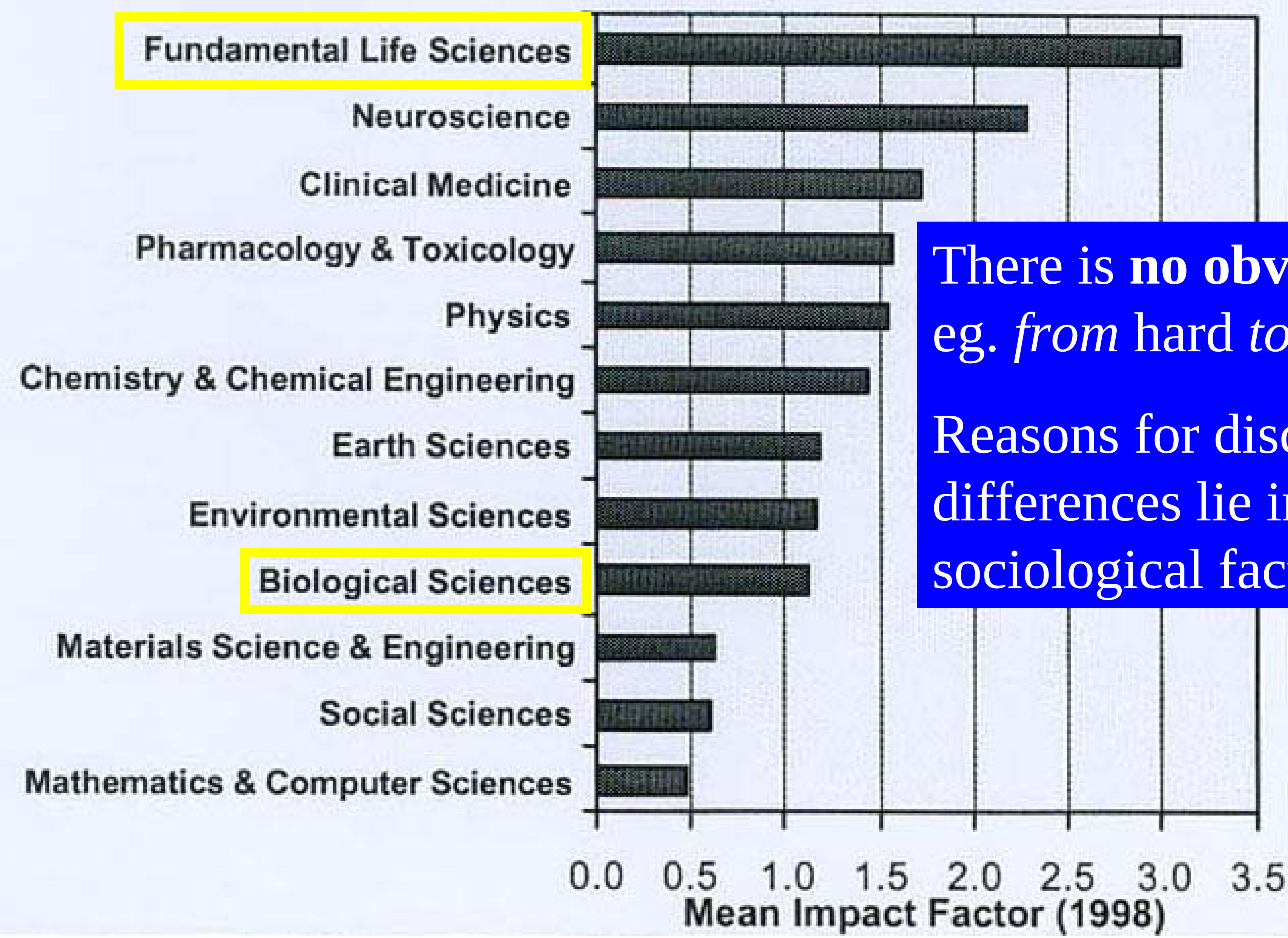
Generalised citation *versus* time curve
for a research paper



3 Factors related to the curve:

- Immediacy Index - *skewness*
- Impact Factor
- Citation half-life

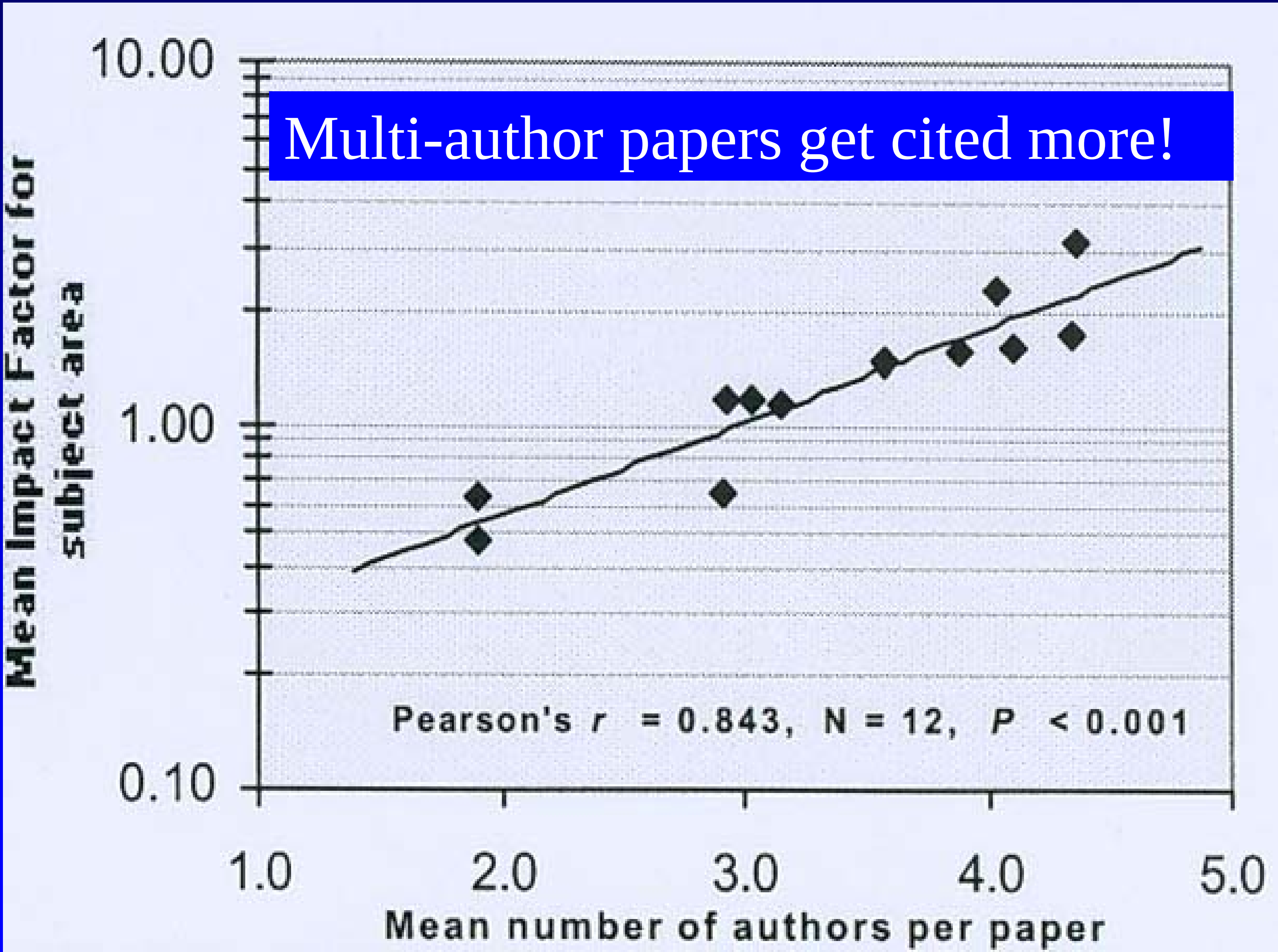
Subject variation in impact factors (*eg*. for 1998)



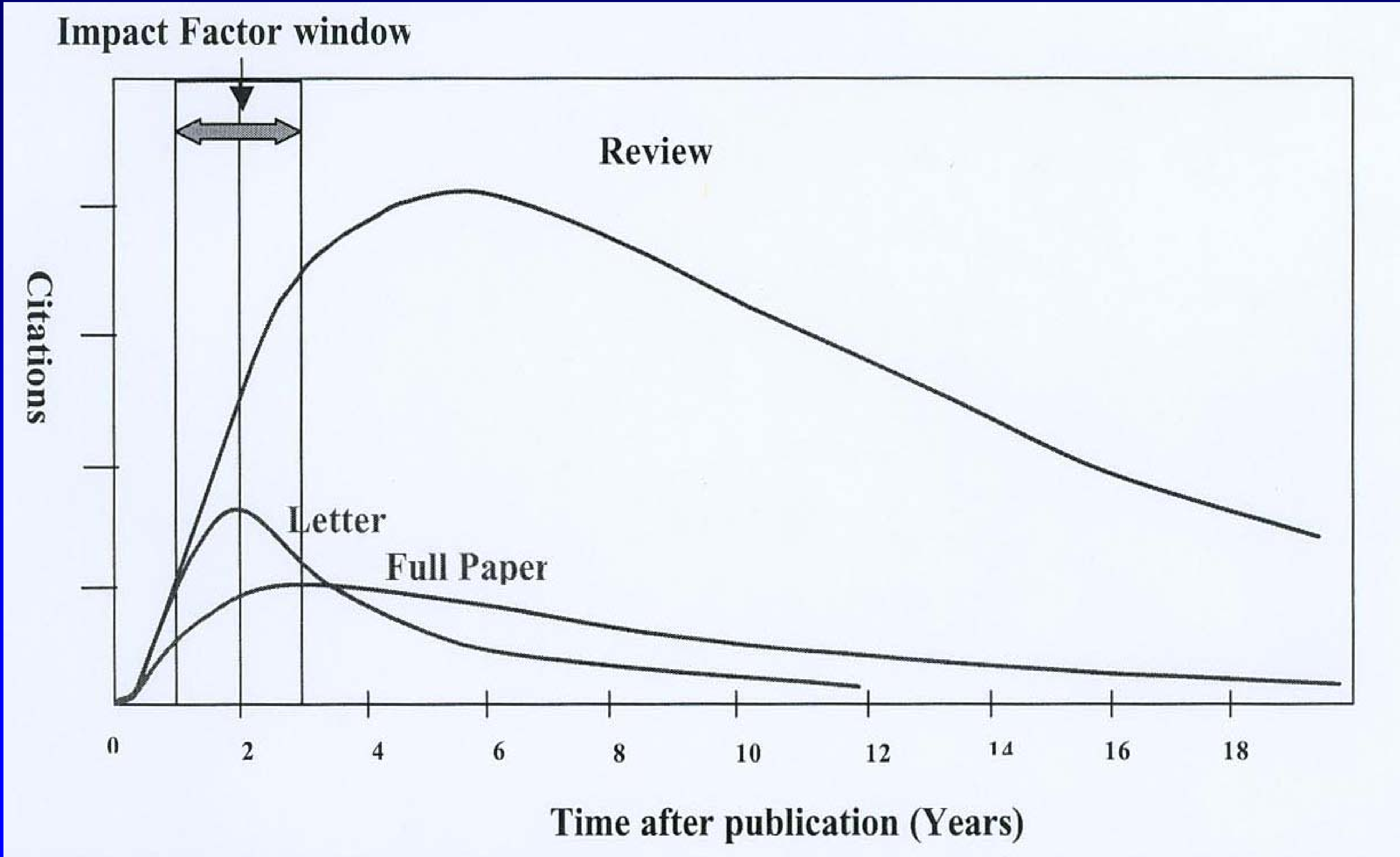
There is **no obvious trend**, eg. *from* hard *to* soft sciences.

Reasons for disciplinary differences lie in complex sociological factors.

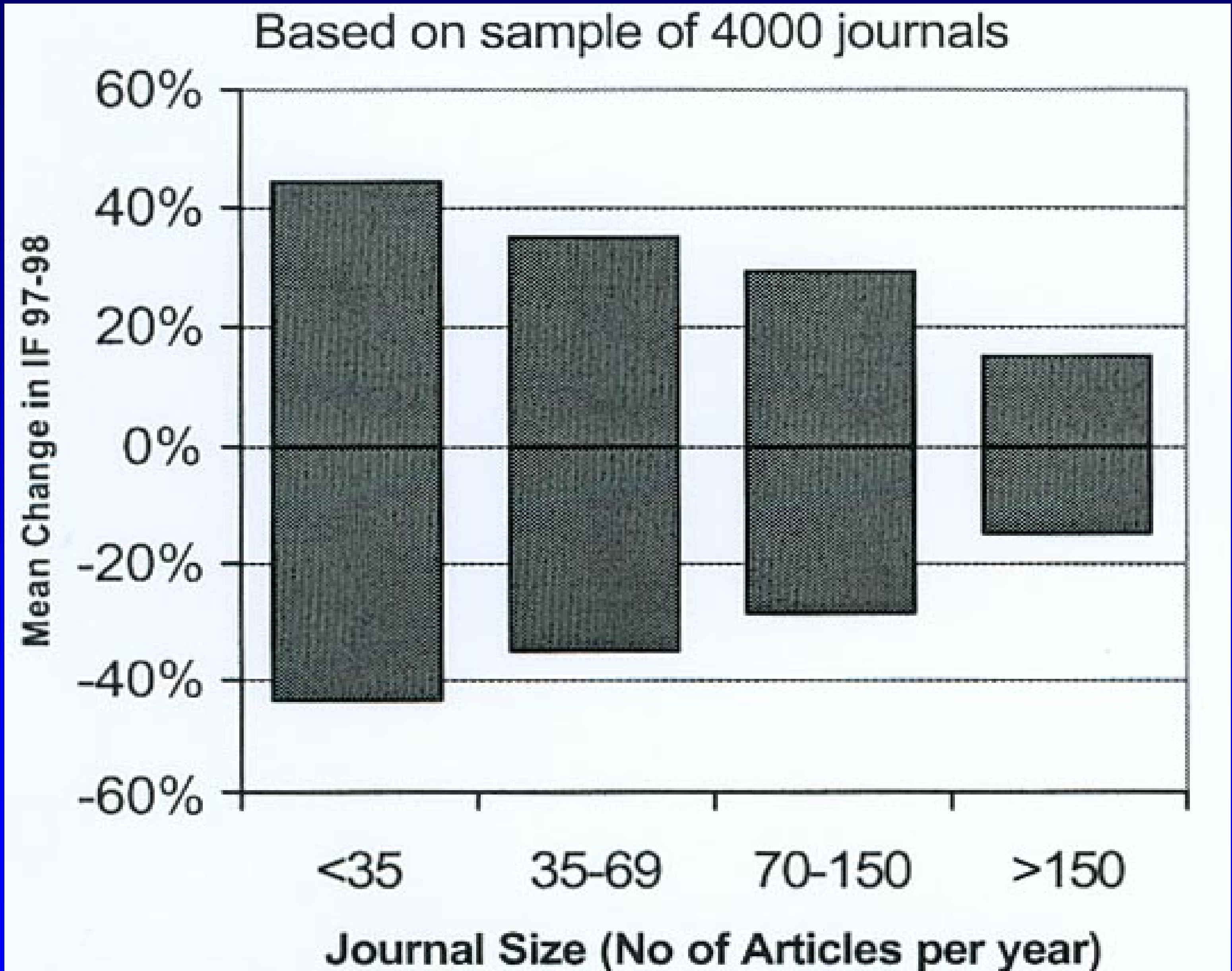
Impact factors & number of authors / paper



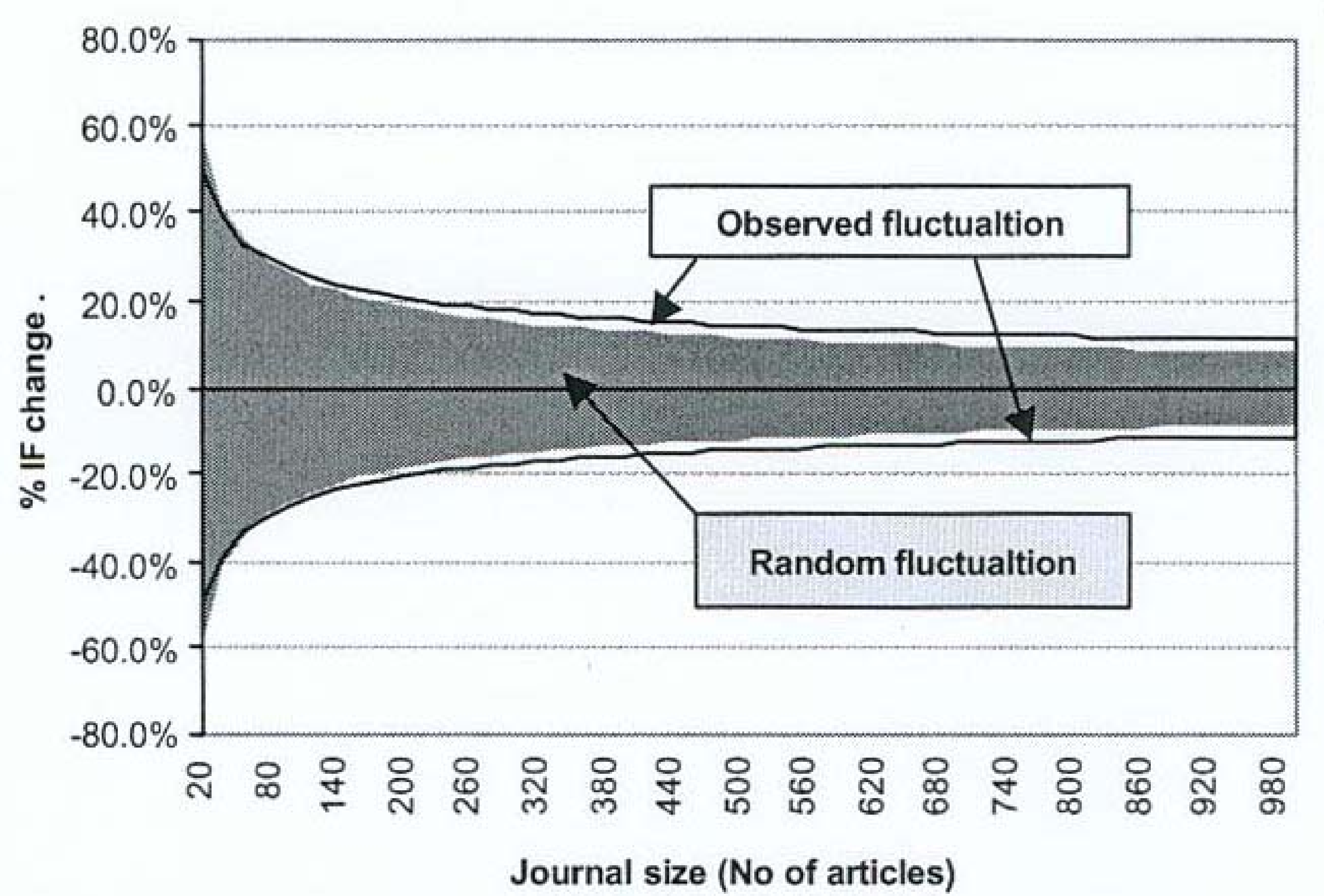
Impact Factors & type of journal /paper



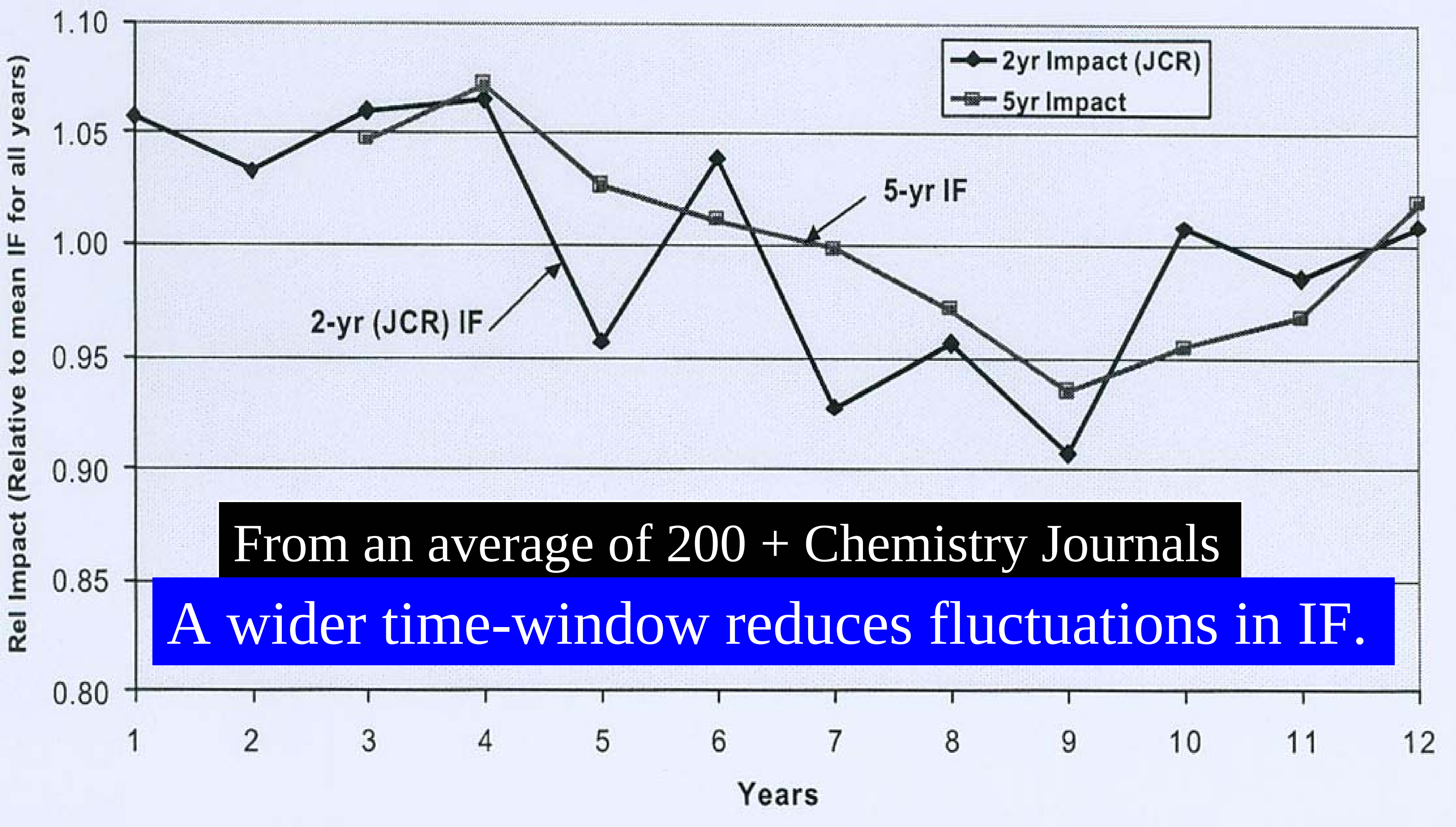
Impact factor fluctuation *vs.* Journal Size



Impact factor fluctuation *vs.* Journal Size



Impact factor fluctuations
due to the **measurement window**

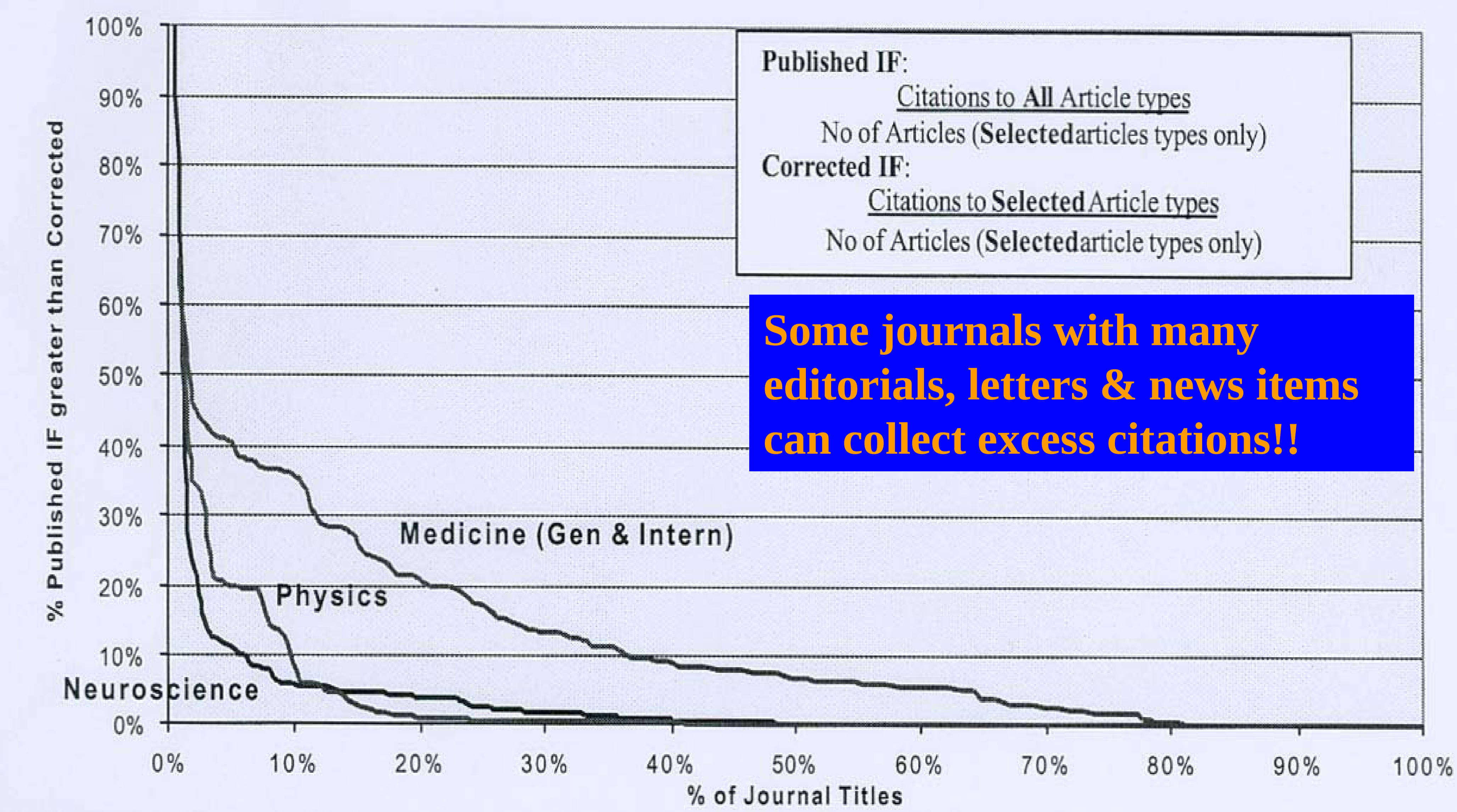


From an average of 200 + Chemistry Journals

A wider time-window reduces fluctuations in IF.

Published *vs.* Corrected Impact Factors

% published IF ***greater than*** corrected IF



Limitations of Impact Factors

Linde, A (1998): On the pitfalls of journal ranking by impact factors. *Eur J. Oral Sci* **106**, 525-526

IFs do not count the influences of research on:

- clinical practice
- Health care programmes
- Industrial applications
- Contributions to other areas of science

2. The role of the scientific editor

& the Peer-Review Process

Key factors for scientific editors of Dental Journals

- **The breadth & depth of his/her scientific knowledge**
  - Understanding the language & concepts of different disciplines.
  - Familiarity with inter-disciplinary & cross-disciplinary research.
  - Understanding the overall structure of scientific knowledge.
  - Self-awareness of major gaps in his /her knowledge.
  - Research experience inside & outside dental schools.
- The **breadth & depth** of his/her past & current **contribution to scientific research**.
- **Personal qualities**
- **Organisational ability**
- **Range of contacts**

"If I have seen further than others, it is by standing on the shoulders of giants."

— Isaac Newton

Composition of the Editorial Board

- People that the Editor(s) can work with, & *vice versa*.
- People that contribute a breadth & depth of specialist knowledge.
- People who have a range of contacts.
- An international distribution.
- An age /experience distribution.

The Peer Review Process*

*The assessment by an expert of material submitted for publication.

- A method of evaluation since the time of Aristotle.
- The *Philosophical Transactions of the Royal Society* was the first journal to formalise the process.

The Peer Review Process

- The referee is at the heart of science: "…the linchpin about which the whole business of science is pivoted".
- Scientific hypotheses or statements are largely ignored until published in a peer-reviewed journal.

“Peer review is to science what democracy is to politics. It’s not the most efficient mechanism, but it’s the least corruptible”.

Sir Peter Lachmann (2002)

President:
The Academy of Medical Sciences

Peer review cannot guarantee the correctness of results

The Aims of Peer-Reviewing

- To prevent an author making unjustified or incorrect claims based on minimal results.
- To identify instances of plagiarism, where feasible.
- To ensure that:
  - a consistent and appropriate methodology is used. &
  - recent, reputable work in the area is correctly referenced & acknowledged.

Problems identified by reviewers & editors

- Authors using multiple submissions.
- Fragmenting studies into ‘minimum publishable units’.
- Plagiarism (is it increasing?)
- Fraud (a rare phenomenon?)

Pre-reviewing (pre-screening) of manuscripts.

- An initial reading of incoming manuscripts (by the Editorial team) can identify unsuitable manuscripts:
  - Those outside the scope of the journal.
  - More suitable for a different journal.
  - Where the scientific quality /originality is low.
- A swift return of the paper is more helpful for authors.
- It saves the energies of reviewers.

The main motivations & influences of reviewers

- Considered to be an academic duty.
- A general interest in the subject
- A desire to know latest developments.
- Perceived as a honour by younger scientists & confirmation of their standing.

Obstacles identified by reviewers

- Difficult to understand badly written papers.

Encouraging participation of reviewers

- Ask referees to review only relevant papers.
  - Maintain a suitable database
- Set limits on the number of times they will be asked to review.
- Share referee reports among reviewer-pairs.
- Provide a personalised service.
- Allow flexibility of response.
- Give the referee recognition.

Online reviewing

- This requires printing PDF files (or reading on-screen).
- Creating detailed comments is difficult.
- Easier to give an overall assessment.
- Easier to ignore email requests!

Blind, Double-Blind & Open Refereeing.

- Double-blind reviewing does not really work!

Editors as mentors to authors?

- Good when this can happen!
- But cannot do this for all!

What is the # 1 reason why some biomaterials papers are *rejected* by journals?

- There is no **scientific hypothesis** formulated & tested.
- NB Theory is very important.

Other Reasons

- The scientific methodology is flawed.
- The writing is unclear and/or incomplete.
- The English grammar & style has many flaws.
- The paper is just a "product comparison" – not related to chemical /structural differences between test groups.
- The work is **not sufficiently original** – *or* does not interact with previous work (poor scholarship).

Challenges for new researchers

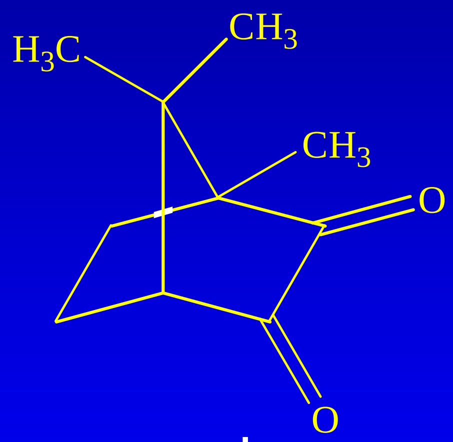
- Appreciation of what has already been achieved
  - In the dental research literature
  - In the basic science literature
- Focus upon an original research hypothesis
- Value of model systems.

Joined-up interdisciplinary science: *for example*:

Visible Light Polymerisation

Physics * Chemistry * Biomaterials Science

Light → activation → Photoinitiator



↓ activation

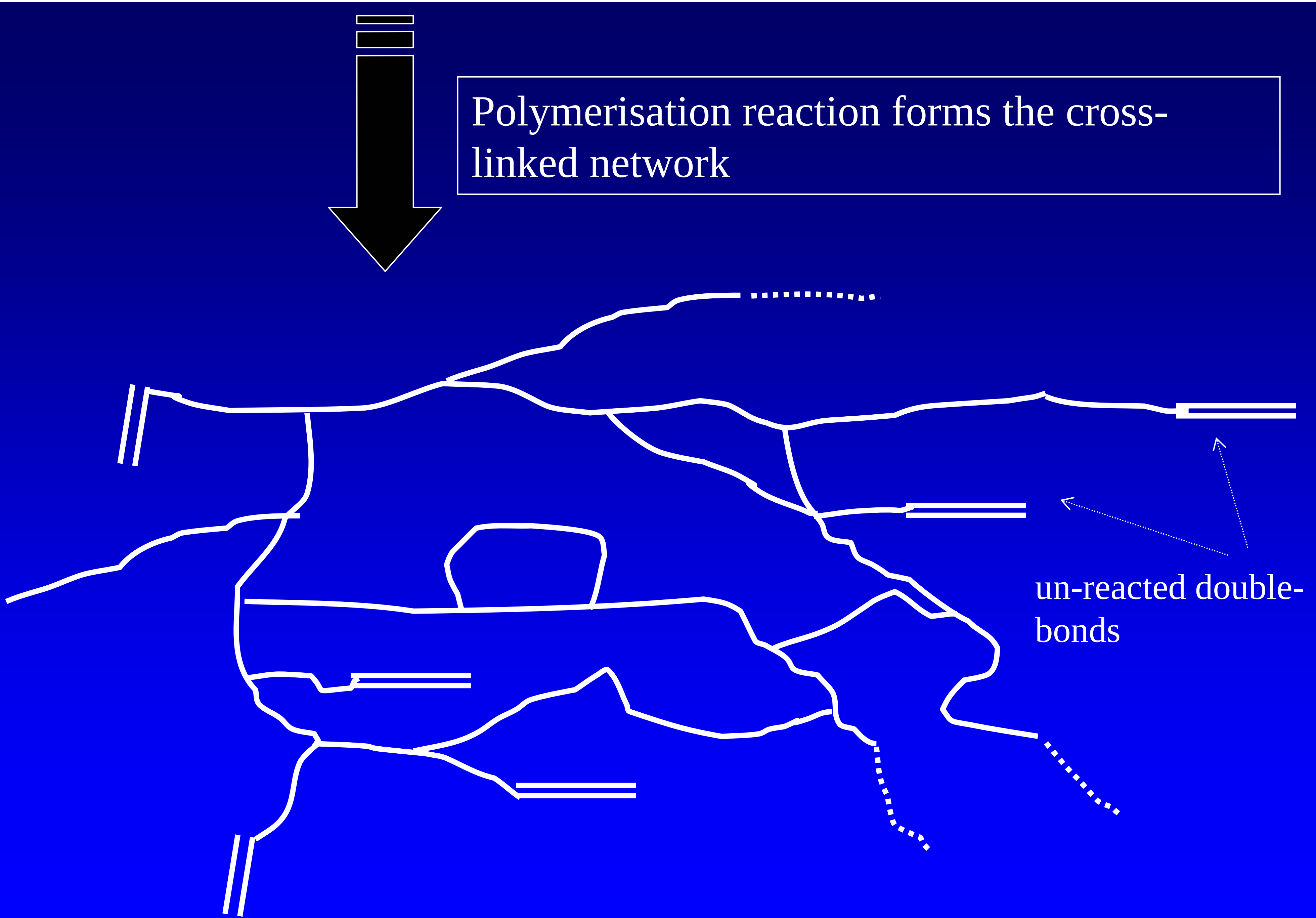
Monomer

Polymerisation-Process

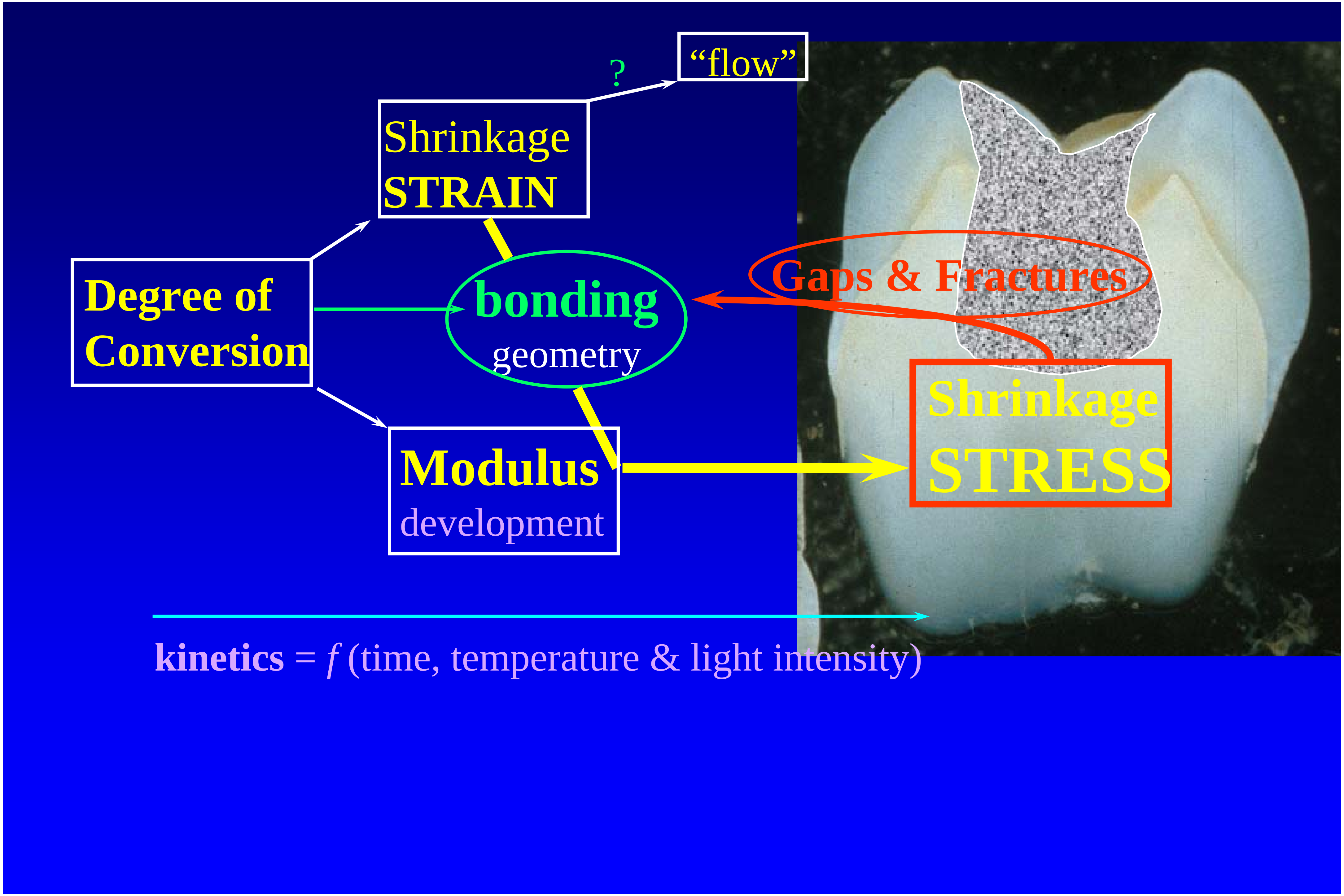
↓

Light-cured Composite material

Clinical deployment



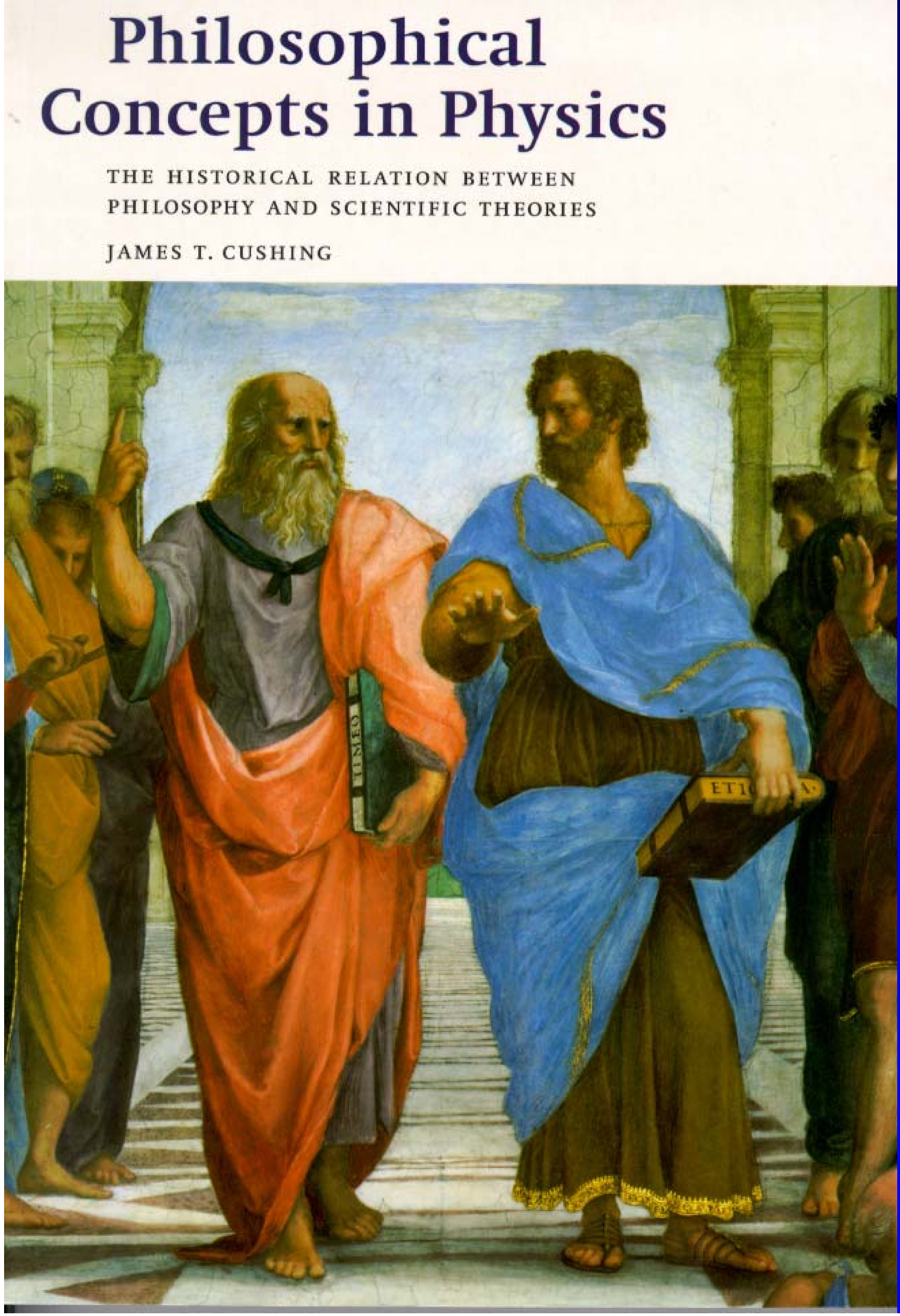
***Di*-methacrylate network**


"flow"
?
Shrinkage
STRAIN
Degree of
Conversion
bonding
geometry
Gaps & Fractures
Modulus
development
Shrinkage
STRESS
kinetics = f (time, temperature & light intensity)

3. What is “scientific explanation” ?

With special reference to biomaterials science & biomechanics in dentistry...

The importance of physico-chemical theory for hypothesis formation …



There are different types of explanations -
answering different kinds of questions –
about life, the universe and everything …

- Religious explanations…
[ultimate causes & reasons]

- Scientific explanations…
[secondary /proximate causes]

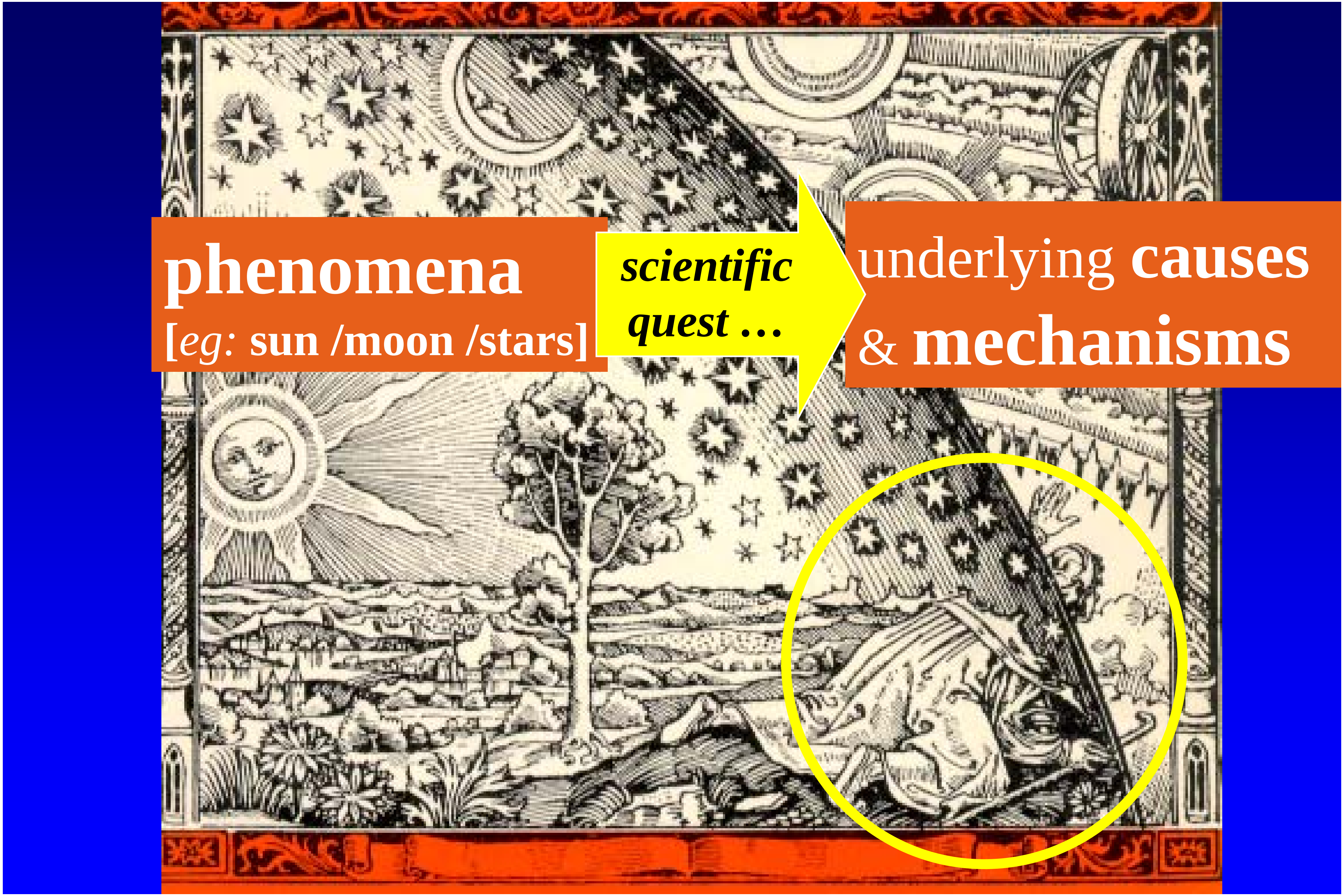
One kind of explanation does not *logically* exclude another kind.

The Cavendish Physics Laboratory, Cambridge University

gateway inscription
of *Psalm* 111:2
by the first Cavendish Professor,
James Clerk Maxwell (1831-79)

"Magna opera Domini exquisita in omnes voluntates eius".

"Great are the works of the LORD; they are pondered by all who delight in them".

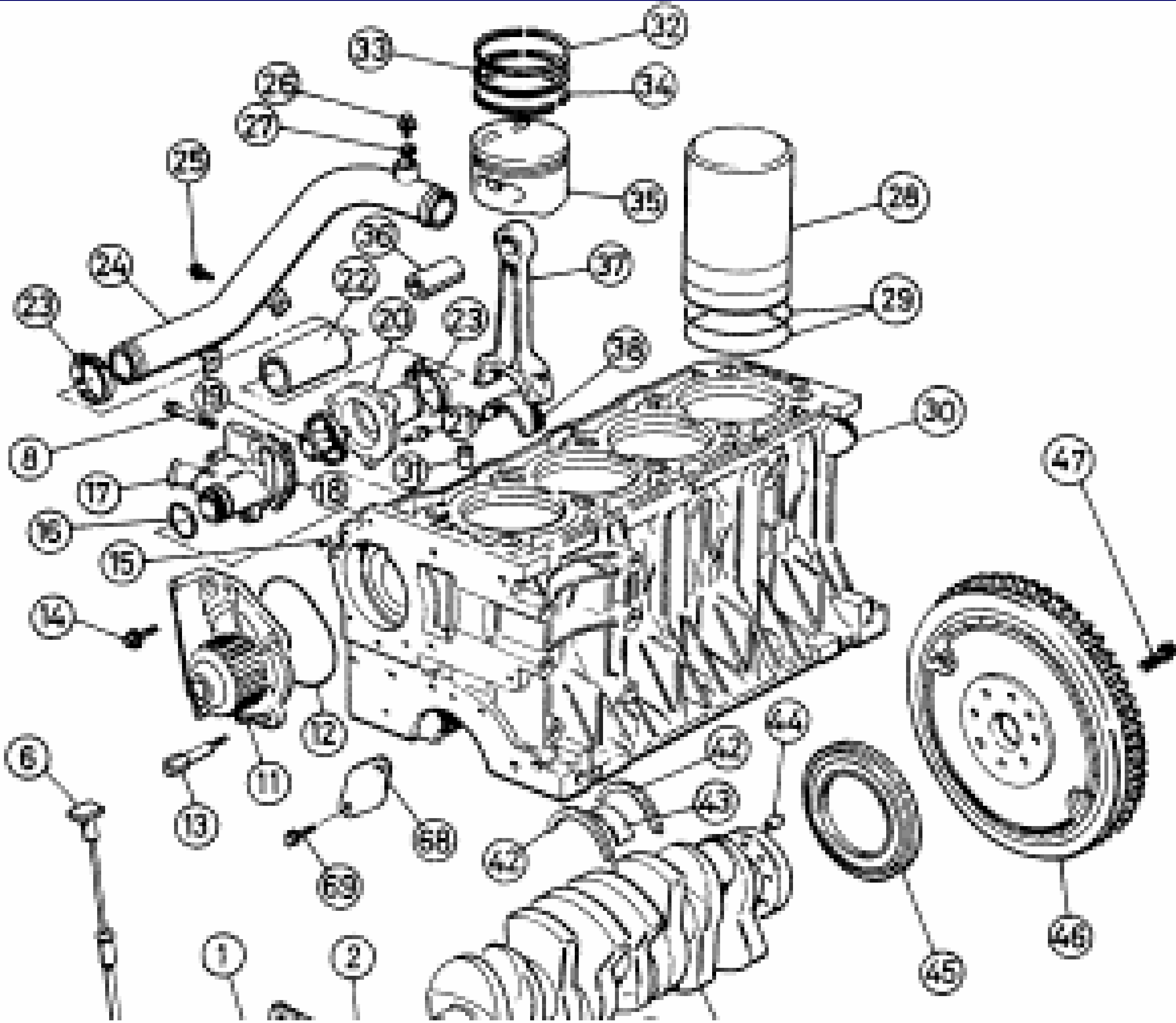


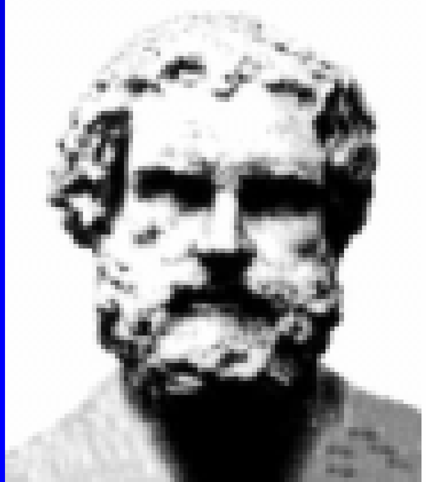
phenomena
[eg: sun /moon /stars]
scientific quest …
underlying causes
& mechanisms

Science – considered as:

Discovering Patterns in Complexity –

in material & molecular behaviour





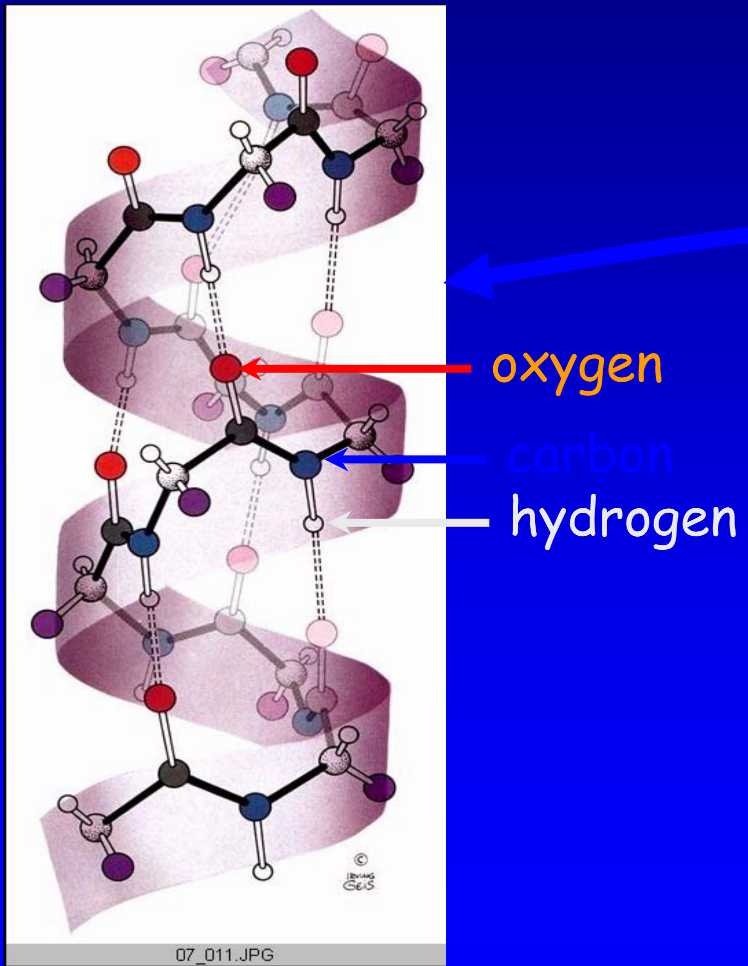
Reductionism – is seeking explanations by studying the component parts.

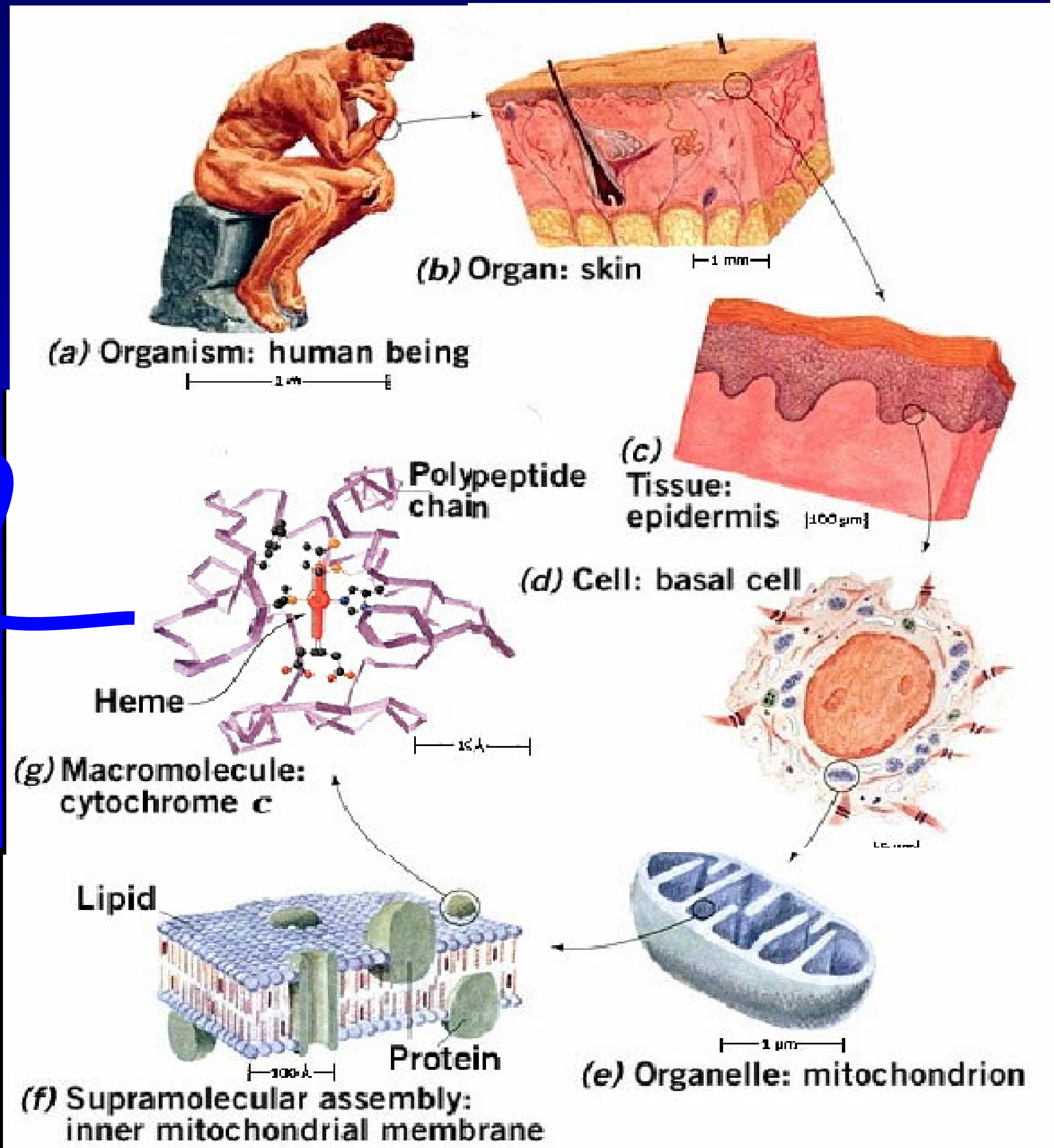
Explanation in terms of **a hierarchy of levels**

Complexity

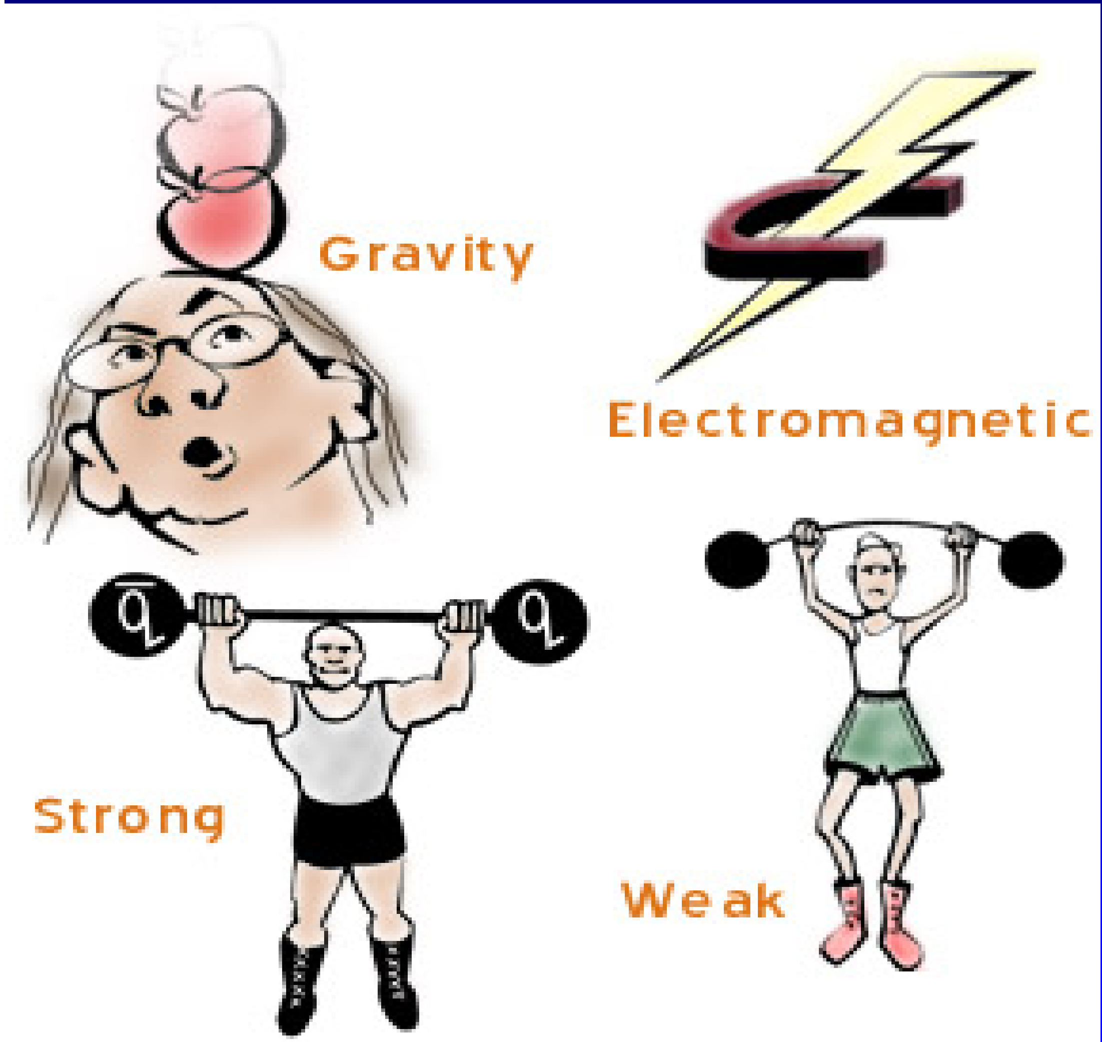
- **Social dynamics**: human population behaviour
- **Macroscopic** :clinical & experimental observations
- **Microscopic behaviour**:
  - Optical / confocal
  - SEM / TEM / Scanning probe AFM / 3D Tomography
- **Cellular-scale** phenomena
- **Meso-scale** behaviour & modelling: 1 - 1000 nm [*or* 1- 100 µm]. eg. random disordered materials
- **Nano-scale** imaging & modelling : 1-100 nm
- **Molecular** dynamics & spectroscopy : 0.1 nm
- **Atomic** & **Nuclear** behaviour

Hierarchical organization of biological structures



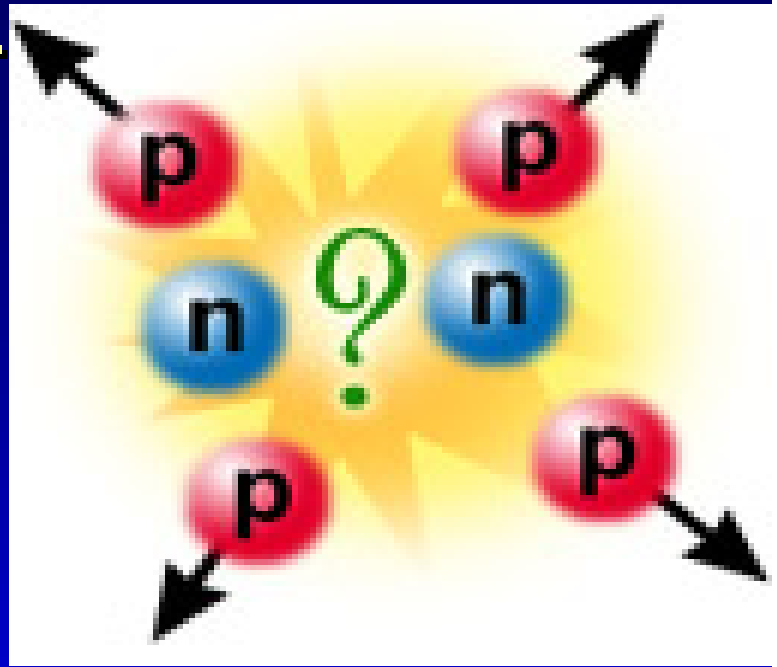


Four fundamental physical forces



This illustrates the importance of **scientific explanation in terms of a hierarchy of explanatory paradigms.**

What holds the nucleus together?



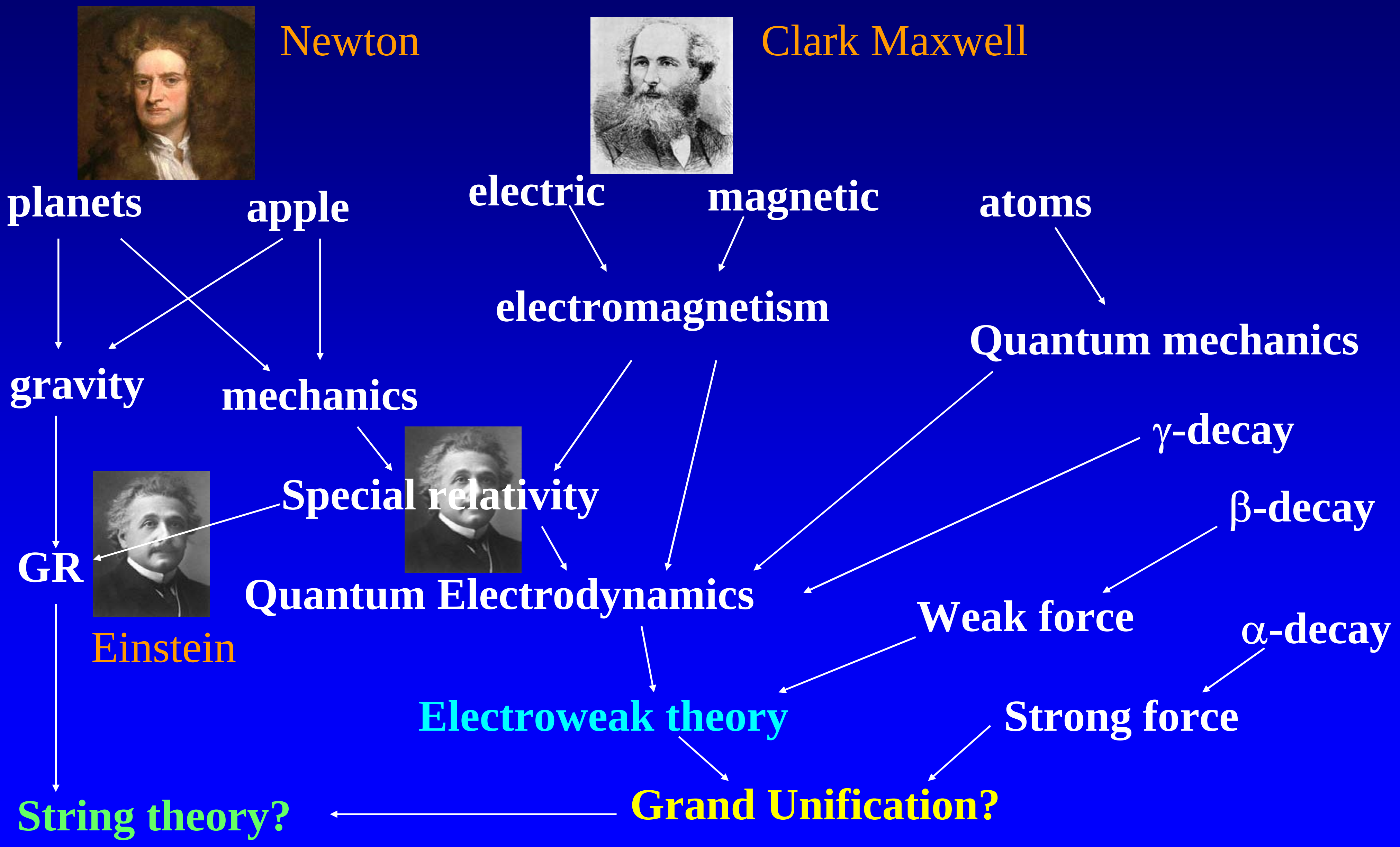
- protons: positive electric charge
- neutrons: no charge
- like charges *repel*
- what holds the nucleus together? **new force!**
- new force must be ***strong*** to overcome electrostatic repulsion, but short-ranged

What are the basic physical forces of nature?

These are *shrinking* in number …

- **Gravitation**
- **Electromagnetism**
- Weak nuclear force
- Strong nuclear force

History of Unification



Two principal theories of fundamental physics

- General relativity –
  explains gravity, & for rapidly moving objects.
- Quantum Mechanics –
  for atoms and fundamental particles

This may seem a long way from dentistry ...

The necessity of research collaboration

- Across disciplines
- Across national & linguistic frontiers
- Interactions made feasible by the internet & WWW
- Resources such as: *PubMed*, *Web of Science*, Elsevier’s *Science Direct* ...

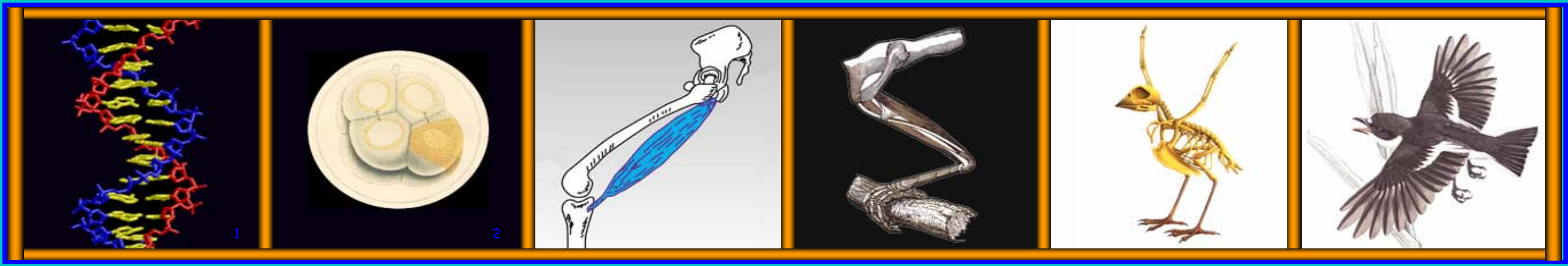
4. **Awareness of Current Research Trends:**

eg. **Nanotechnology Overview**

Biomimetics/Nanotechnology Overlap

Biological Hierarchy

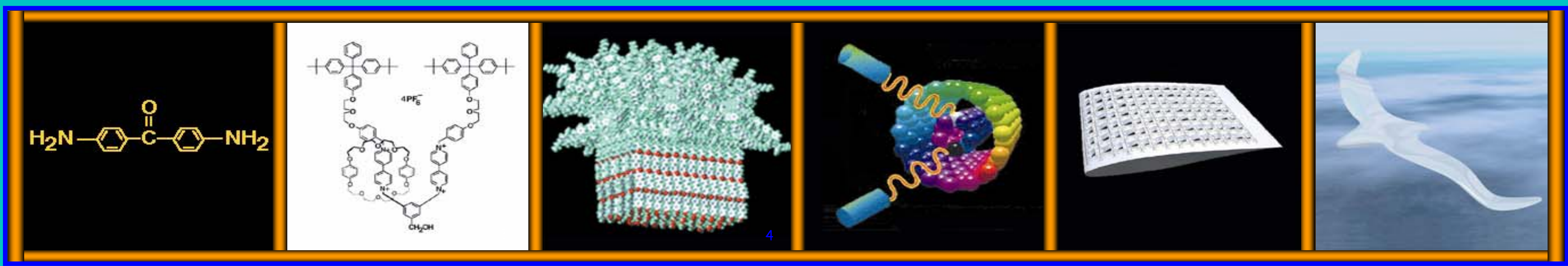
DNA | Cell | Tissue | Organ | System | Animal



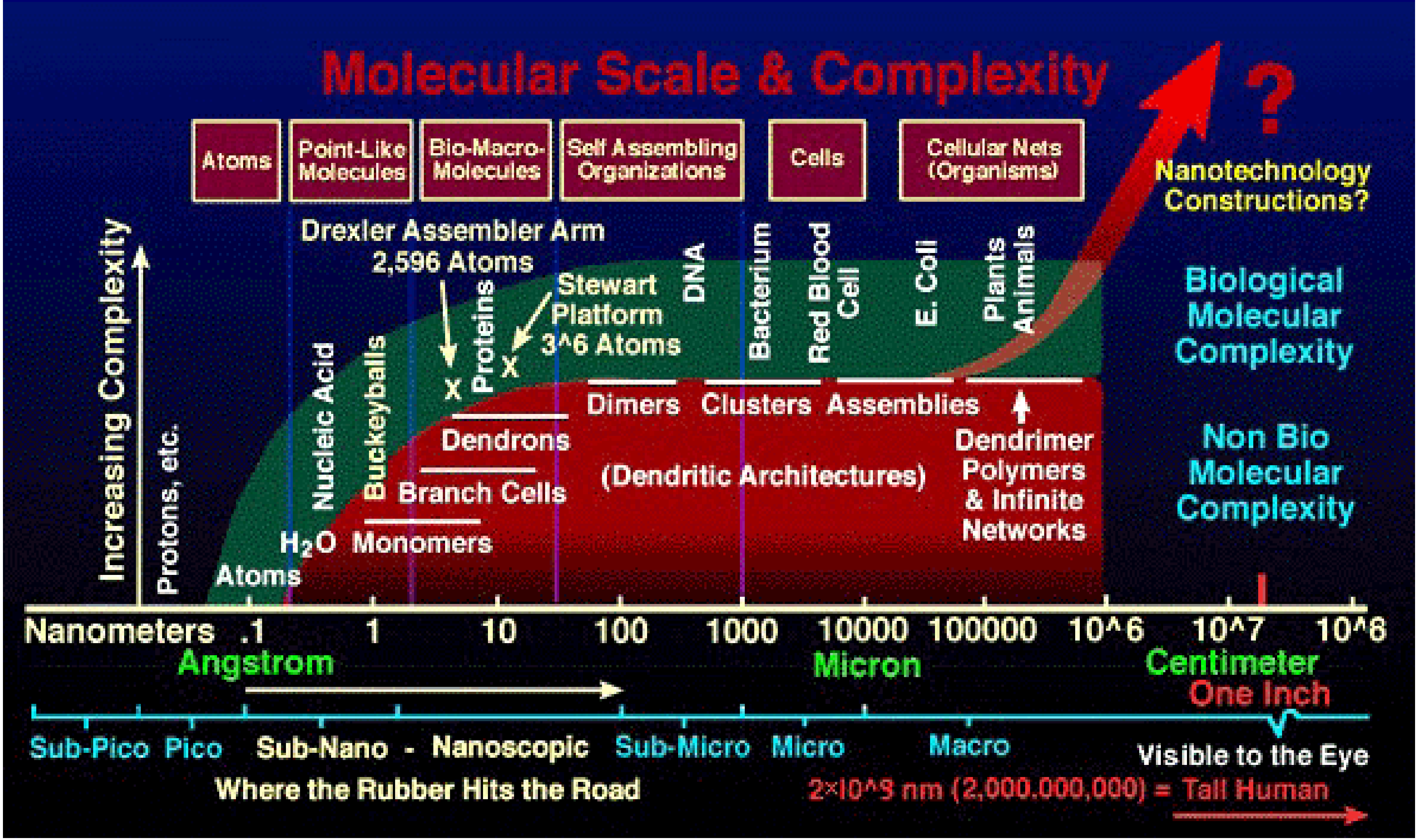
10^{-10} m ⟷ 10^{0} m

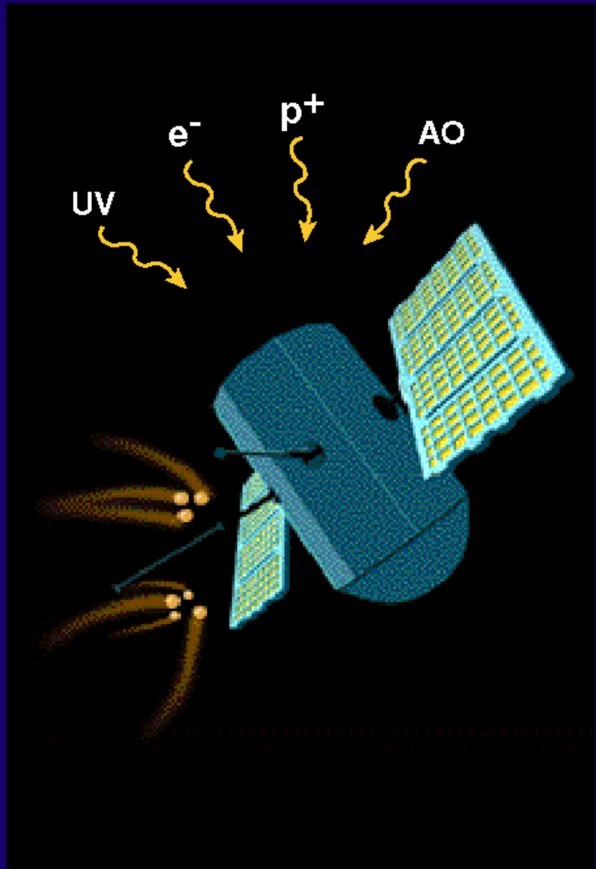
Synthetic Hierarchy

Monomers | Polymer | Supramolecular Structures | Nanodevices | Structural Components | Vehicle



The Complex World of Nanotechnology





Structural Materials
- Polymers and Composites
- Refractory Ceramics
- Adhesives

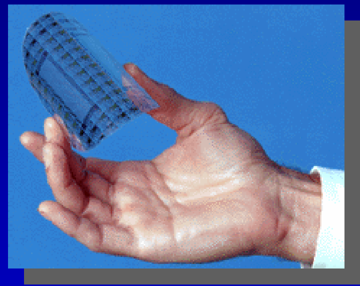
Spacecraft Materials
- Space Durable Polymers
- Shielding Materials
- MF composites

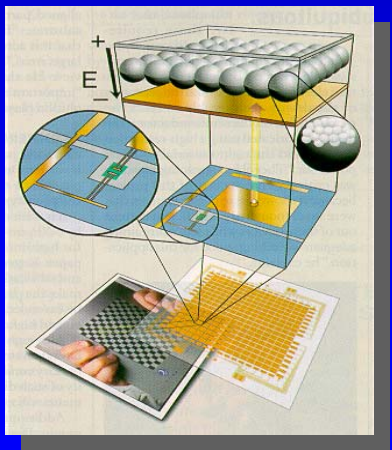
Advanced Materials
- Computational Research
- Smart Materials
- Nanotechnology

Applications of Nanotechnologies

Polymer Film Matrices:

- Flexible Flat Panel Displays
- 3-Dimensional Storage Devices
- Radiation Shields
- Remote Sensing Devices
- Reusable Paper

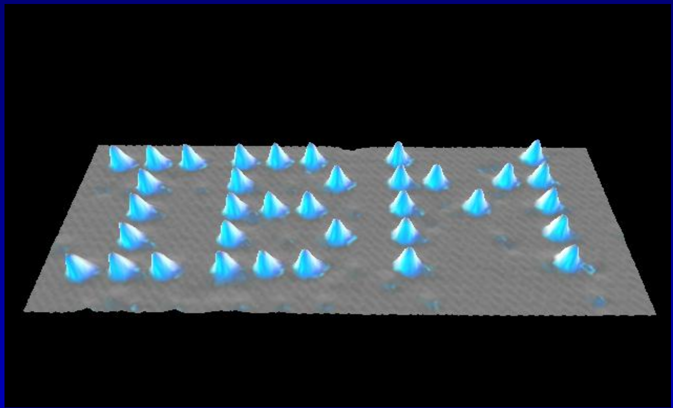




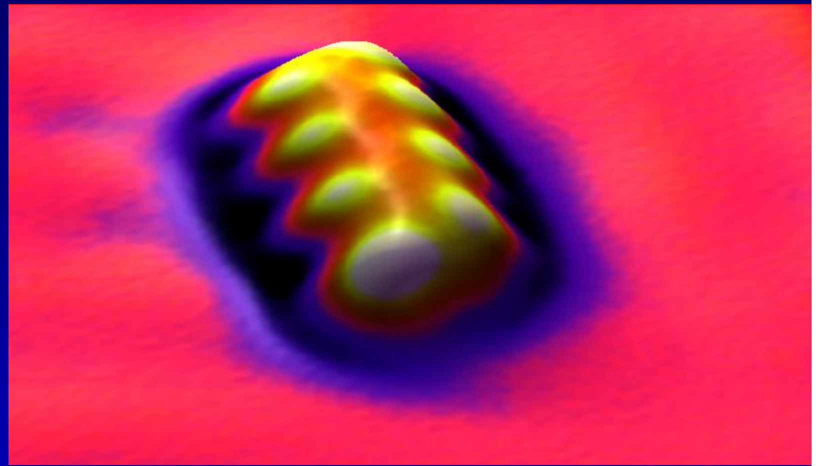
Polymer Fiber Matrices:

- Conducting Fabrics
- Infrared Radiation Protection
- UV-Sensors
- Computer Garments
- Reversible Coloration of Fabrics

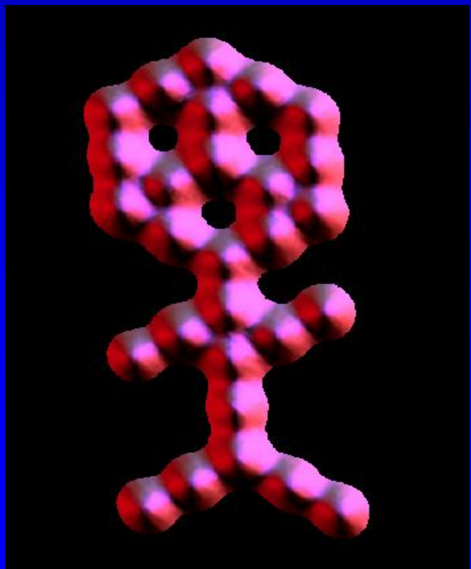
Limits of Nanotechnology



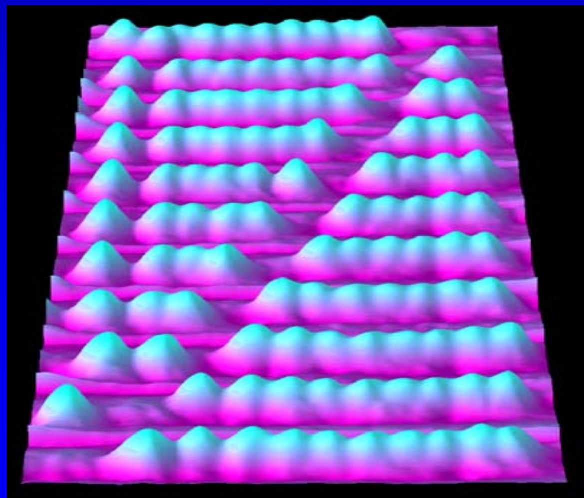
Xenon on Nickel (110)



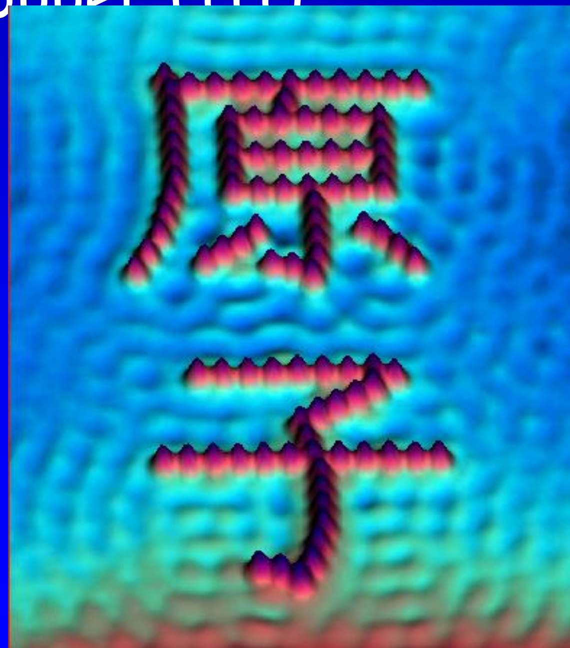
Cesium & Iodine on Copper (111)



Carbon Monoxide on Platinum (111)

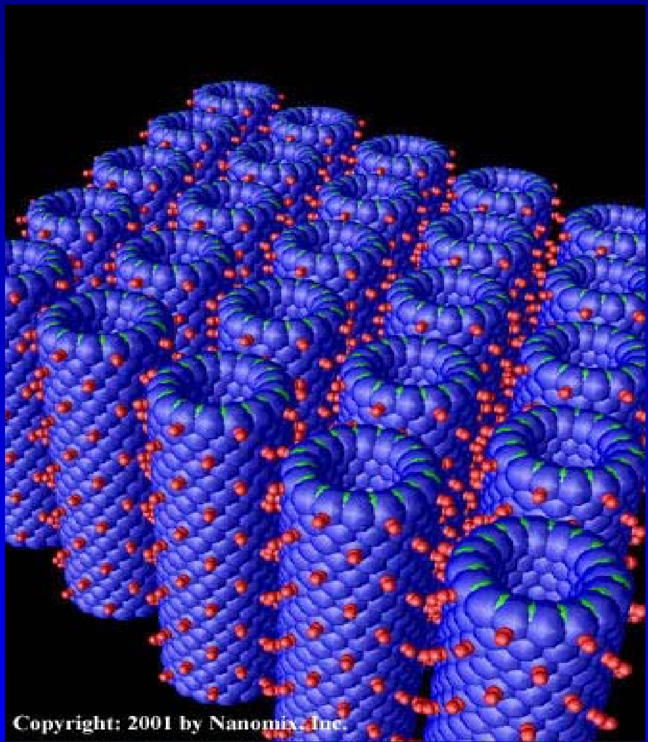


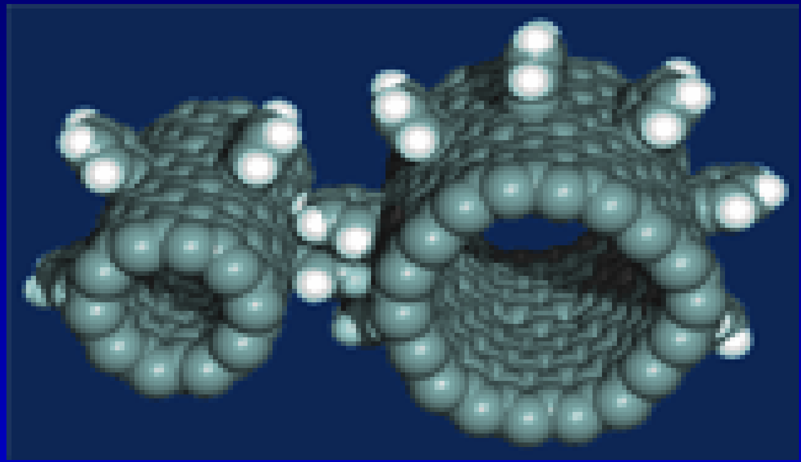
C_{60} on Copper

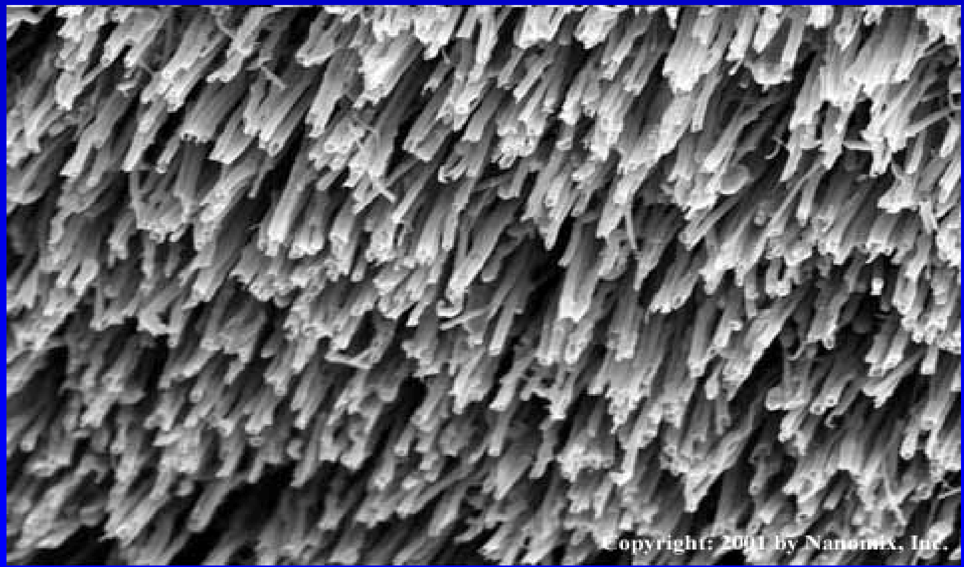


Iron on Copper (111)

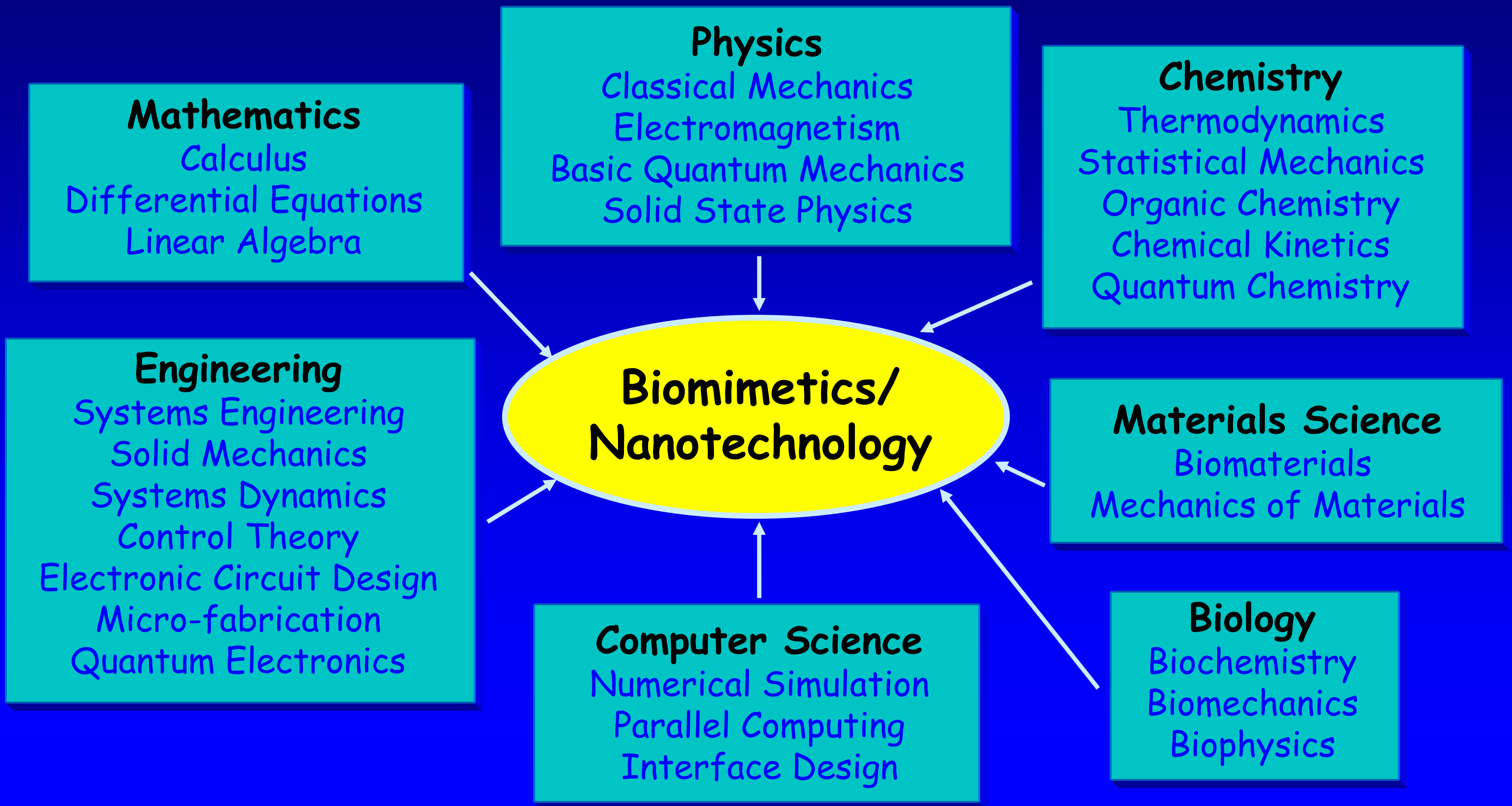
Carbon Nanotube Technology



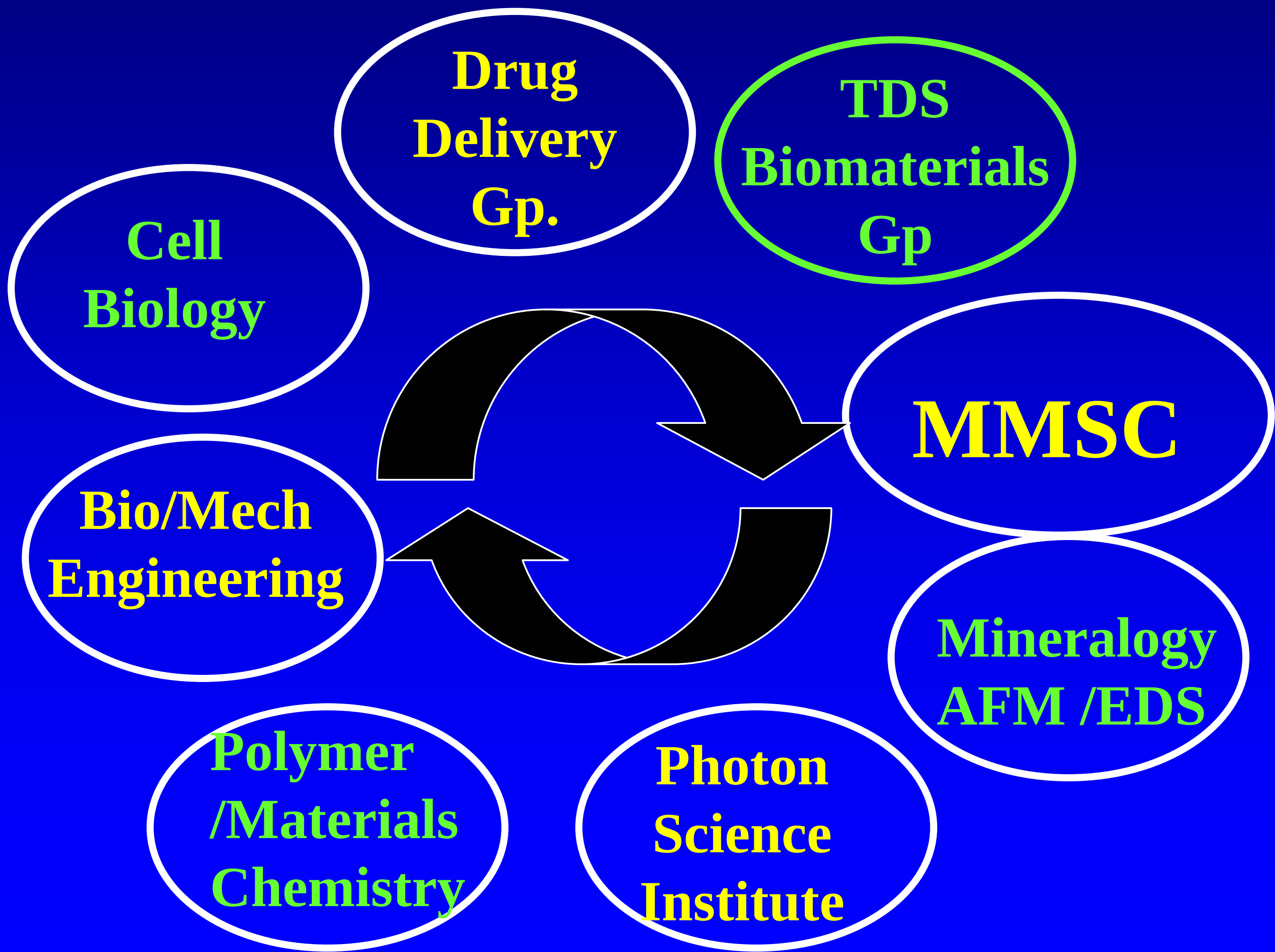




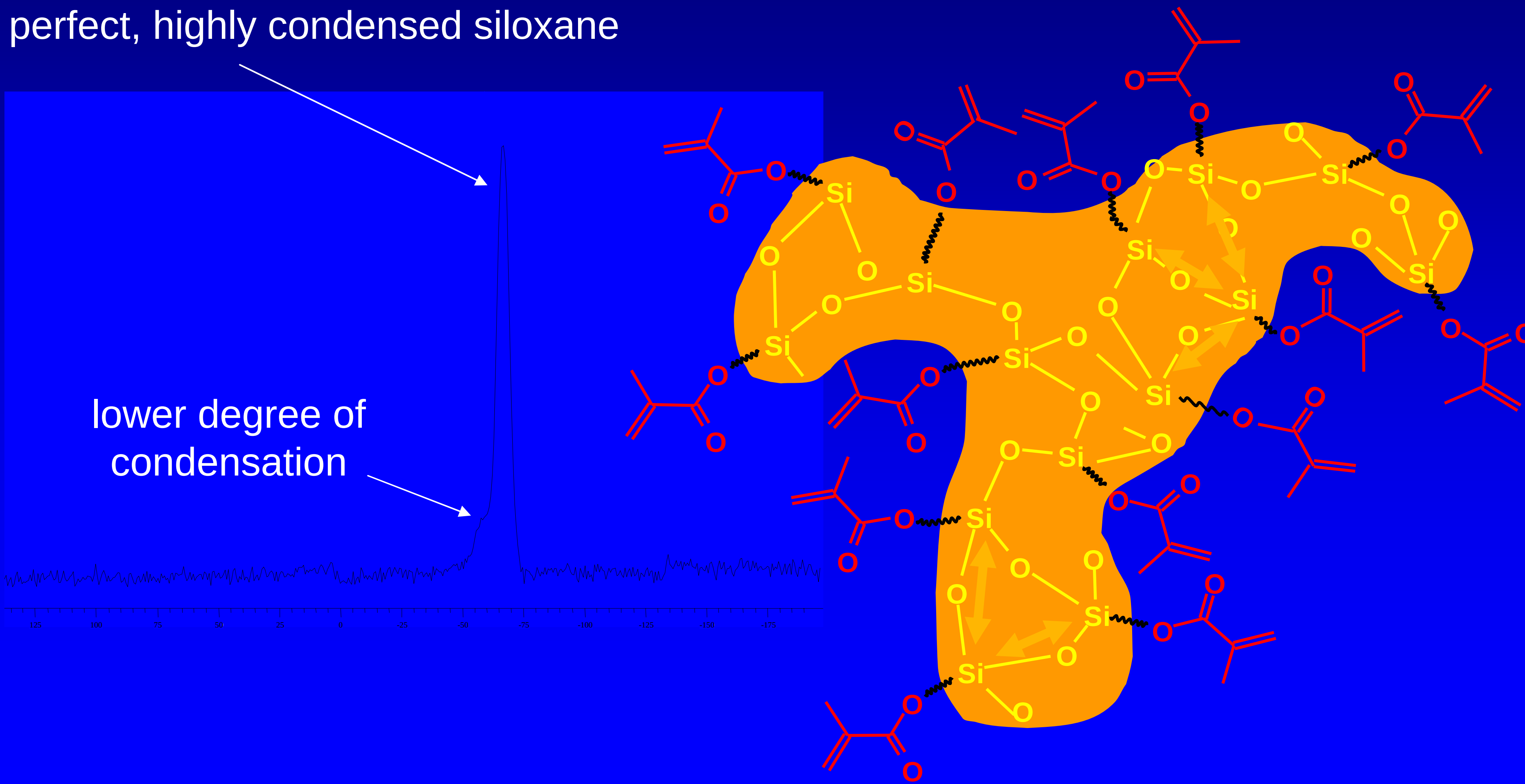
Biomimetics/Nanotechnology Disciplines



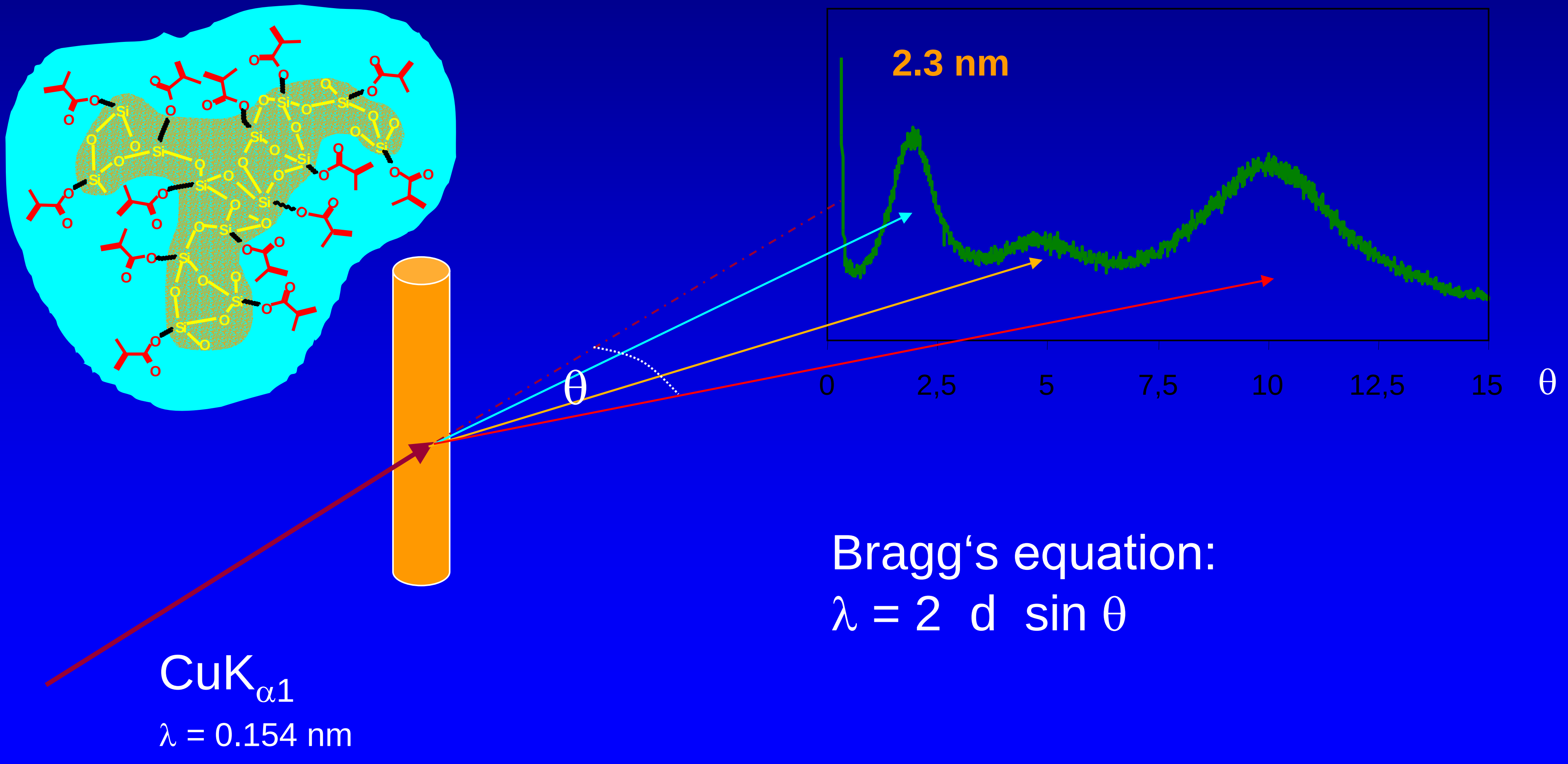
Some Bio-Materials /Science & Engineering Research Groups in MANCHESTER 1824



Nano Particles ^{29}Si-NMR analysis



Size of Nano Particles by X-ray diffraction



Bragg's equation:

$\lambda = 2\ d\ \sin\theta$

Obrigado para sua atenção ...

Appendix

Scientific Writing

some suggestions for beginning scientific authors ...

Writing – overview of topics

- Style
- Perfectionism is your enemy not your friend
- Getting started
- There is no such thing as writing-up
- Bibliography and technical issues

Which style do scientific readers prefer?

- Aim: to transmit information accurately and economically
- Why do so many scientists make their writing so unreadable?
- There are many excuses, but a formal or “correct” style does not have to be unreadable

Excuses for ghastly writing

- ‘It would be thrown straight back’
- ‘My boss wouldn't have it’
- ‘Editors insist that you write passively and impersonally’
- ‘You must make your work sound impressive’

Owning a good style

- **Read books on the subject, eg**
  - Kirkman, John (1992). Good Style
  - Luey, Beth (1987). Handbook for Academic Authors
  - O'Connor, Maeve (1991). Writing Successfully in Science
- **Self-consciously imitate the style of good papers you have read.**

Style as choice

- Good journalists can write for both serious and popular newspapers.
- Choose an appropriate style within the thesis/paper genre
- Sloppiness is never appropriate
- Clarity and informality are not equivalent

Choices and variety: review

- **Sentences:**
  - short vs long
  - simple vs complex
- **Vocabulary:**
  - short/long
  - familiar/unfamiliar
  - non-technical/technical
- **Phrasing:**
  - idiomatic vs "scientific"
  - direct vs verbose
- **Verb forms**
  - active vs passive
  - personal vs impersonal
  - imperative vs indicative
- **Paragraphing**
  - headed sections vs paragraphs

Choices and variety

- **Sentence length and complexity**
- **Weight and familiarity of vocabulary**
- **Jargon: a mathematical issue?**
- **Excessive pre-modification:**
  - "…can be configured to meet a wide range of user data communication requirements" (Kirkman, p 39)
- **Tense and voice**

- Mathematics is still English: punctuate formulas as if they were text
- Consider carefully the use of “I”, “we” and “you”
- If you are a native English speaker, remember that your readers may not be
- If you are not a native English speaker, it is probably best to draft and write in English, rather than translating
- Variety is good!

Perfectionism

- The major reason for not completing a thesis
- Not the same thing as aiming to do well
- Insecurity and personal commitment to success are normal and natural
- Good enough is good enough!

Getting started

- Do a quick draft or section headings
- Very easy to do in WORD
- Perhaps write bullet point slides first

Finishing on time

- There is no such thing as writing-up, only writing
- Start writing your thesis on day 1
- Little and often
- Stop in the middle of a sentence
- Accept writing blocks as normal and don't get into a vicious circle of anxiety

Bibliography

- Good bibliography is part of good scholarship
- Put every paper that you read into your bibliography
- Keep careful bibliographic details of papers read and get them right
- Use *Endnote*

Conclusion

- Writing is difficult
- Writing takes time
- When done well, writing is fun
- Whatever you do next, writing is useful