

Motion, Dualism, and Modern Physics (part 2)

Regina Cœli Academy
Natural Philosophy – Physics
Lecturer: Mr. Alan Aversa

O Creator ineffable, who of the riches of Thy wisdom didst appoint three hierarchies of Angels and didst set them in wondrous order over the highest heavens, and who didst apportion the elements of the world most wisely: do Thou, who art in truth the fountain of light and wisdom, deign to shed upon the darkness of my understanding the rays of Thine infinite brightness, and remove far from me the twofold darkness in which I was born, namely, sin and ignorance. Do Thou, who givest speech to the tongues of little children, instruct my tongue and pour into my lips the grace of Thy benediction. Give me keenness of apprehension, capacity for remembering, method and ease in learning, insight in interpretation, and copious eloquence in speech. Instruct my beginning, direct my progress, and set Thy seal upon the finished work, Thou, who art true God and true Man, who livest and reignest world without end. Amen.

(St. Thomas Aquinas *Oratio ante studium*)

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Empiriological Physics Tends to the Logical Order

- Empiriological physics / philosophy is analogous to art/nature or logic/ontology dichotomies.
- Empiriological physics tends to pluralism; the “logical universe is likewise plural since the only unity studied is itself a category, the predicamental unity within the genus of quantity”; ∴, empiriological physics tends to the logical order.
- Logical positivism: reducing physics to logic makes empiriological physics lose contact “with objective changing being.”

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Subatomic Units are Logically General

- Both entities of logic and subatomic particles are “poor in their being.”
 - They are both passive and determinable.
 - An *ens rationis* (“being of reason” or logical being) is a *non ens*.
 - So do they explain the elements’ “riches and heterogeneity”?
- Non-inertial factors called forms.
 - Inertia cannot account for atoms’ heterogeneity.

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The Neutron is Powerful Because Potential

- **Neutrons** have no charge (neutral)
- Responsible for breaking atoms apart in nuclear fission
 - Atomic bombs
- Very inert
 - If they’re so inert, why are they so powerful?
 - Answer: physics can control them better because they have less nature of their own.
- Responsible for isotopes (elements of different mass but same chemical properties).

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Radioactivity Displays Nature’s Stabilities

- Radioactivity implies atoms instable?
 - Does the thesis “everything tends to preserve itself in being” not hold?
- Are atoms stabler than subatomic particles?
- Stability ≠ instability + more instability
- Uranium: 36 isotopes, 5 of which have half-life < 1 second
- Thorium-C’, with a half-life of 0.1 μs, is stable in the sense that no force can accelerate or retard its half-life.

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Simpler Forms are Somehow in Compounds

- How are subatomic particles present in atoms?
- Aquinas would say “virtually,” and Scotus thinks it is “a case of the formal-eminent status of the lower in the higher, like the presence of vegetation in man.”
- Virtual presence
 - Subatomic particles are not “raw potency” because they maintain some of what they had before combining to form an atom.
 - They’re “subordinately present” when in an atom.

Simpler Forms are Somehow in Compounds

- Humans, e.g., have different forms “virtually present” in a hierarchy: rational soul, vegetative soul, sensitive soul
- In a plant, the basic vegetative powers, “virtually present” are: homeostasis control (HC), metabolism control (MC), developmental power (DP), reproductive power (RP).
 - Following figures from W. A. Wallace’s *The Modeling of Nature*:

Simpler Forms are Somehow in Compounds

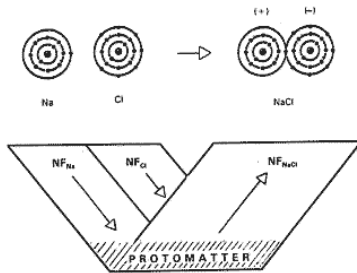


Fig.3.7 The Generation of a Compound: Sodium Chloride

Simpler Forms are Somehow in Compounds

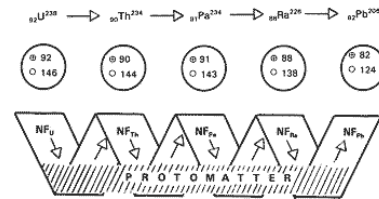


Fig. 3.8 Natural Radioactivity: From Uranium to Lead

Simpler Forms are Somehow in Compounds

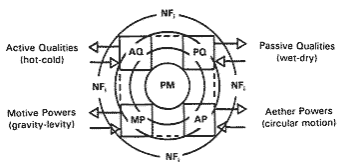


Fig. 3.3 Aristotle's Powers Model of an Inorganic Nature

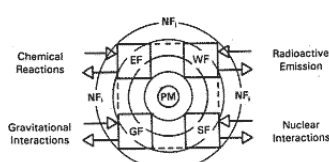


Fig. 3.4 An Improved Powers Model of an Inorganic Nature

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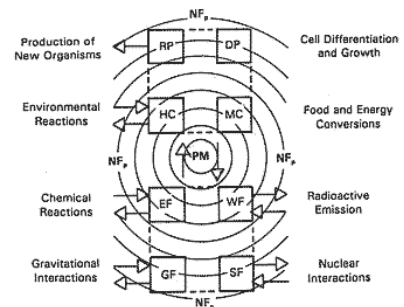


Fig. 4.1 A Powers Model of a Plant Nature

Simpler Forms are Somehow in Compounds

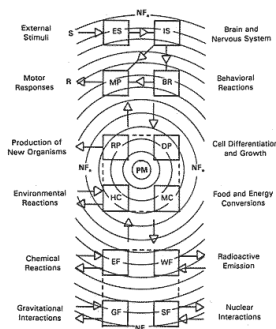


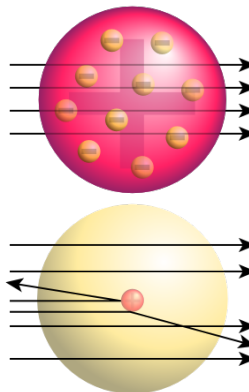
Fig. 4.2 A Powers Model of an Animal Nature

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Simpler Forms are Somehow in Compounds



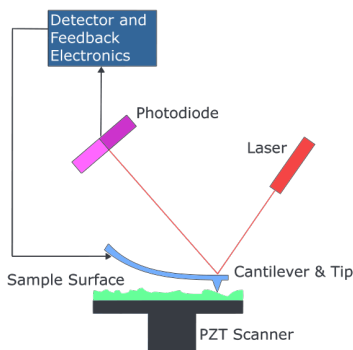
- Rutherford's gold foil experiment showed that atoms are "granular."
- Atomic forms are not as unified as plant forms, which are less unified than animal form.
- The most unified form being a human form

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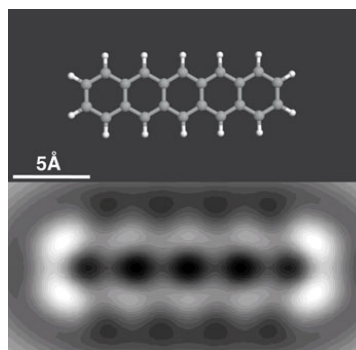
- Atomic Force Microscopy (AFM)
- Enables physicists to "see" atoms virtually present in molecules
- Atoms' granularity does not take away from their formal unity.

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Simpler Forms are Somehow in Compounds



- Ball and stick model of pentacene (above) and NC-AFM image of pentacene on a copper surface (below)
- Source: Science/IBM Research - Zurich

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The Law of Conservation Attests to Natures

- 1st Law of Thermodynamics: matter-energy conserved
- 2nd Law of Thermodynamics: amount of unusable energy increases, things tend to disorder
 - ∃ copious formulations of the 2nd Law.
- These laws are the fundamental, if not most fundamental, ideas in empiriological physics.
 - Pierre Duhem sought to deduce all of modern physics from thermodynamics first-principles.

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The Law of Conservation Attests to Natures

- The more general, the less conservative
- Electrons are general not because they are "rich" or versatile, but because they are "poor in reality."
- Empiriological physics cannot prove the law of conservation; however, the philosophy of nature can.
- "Stability, dependence, and conservatism are philosophical concepts."

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References

- V. E. Smith's *Philosophical Physics*
 - Please continue reading ch. 6 (Motion, Dualism, and Physics).
 - I will post PDF of the reading on the reginacoeli.box.com page.
 - Also, check out St. Thomas Aquinas's short work *On the Mixture of the Elements (De Mixtione Elementorum)*
 - It sheds light on how, e.g., subatomic particles are virtually present in atoms or how atoms are virtually present in molecules.