

Motion, Dualism, and Modern Physics (part 1)

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Natural Philosophy – Physics
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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*)

Matter Discloses a Plurality of Substances

- Is nature one or many? Monistic or pluralistic?
 - William James, George Santayana, Bertrand Russell, Rudolf Carnap, Charles Marris thought empiriological spirit tends toward **pluralism**.
 - Humean reduction of substance to phenomena
 - Parmenides, Spinoza, Hegel, Marx, F. H. Bradley + dialectical materialists Samuel Alexander, Alfred North Whitehead: empiriological spirit tends toward **monism** (or pantheism, if monistic reality is God).
 - Relativity theory's space-time continuum made a philosophical certitude

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Matter Discloses a Plurality of Substances

- Are atoms and molecules substances?
 - If not, we live in a pluralistic cosmos.
 - If atoms and molecules are the one and only substance, we live in a monistic cosmos.
 - Realism holds there are many substances each with their own unity
 - a plural (not pluralistic) universe
- Bergson: “[M]atter has a tendency to constitute isolable systems.”
 - Man has a supremely imminent character.

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Matter Discloses a Plurality of Substances

- Although substantial character of man is most evident, it also exists in inorganic matter.
- Do we understand the inorganic world in terms of ourselves?
 - Psychophysicist Kurt Goldstein popularized this idea.
- Yet, we understand the more general before the specific.
 - We understand being first before knowing the specific type of being it is.

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Matter Discloses a Plurality of Substances

- Spinoza: “*Unumquodque in suo esse preserverari conatur.*”
 - “Everything endeavors to persist in its own being.”
- Aquinas opposed the Pythagorean spirit of using principles “extraneous to the natural.”
 - His reason: If a thing has a finite velocity, it cannot be moved completely from outside. (*In De Cælo et Mundo* III, cap. 3,4,7)
 - Thus “law” of inertia is not 100% true.
- Thus there are natures with inner principles.

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Matter Discloses a Plurality of Substances

- No natures implies infinitely fast motion or change.
 - Infinitely fast motion would be indeterminate, ∴ unknowable.
- Natures or substances are the results of limits to inertia.
 - A “brake” or “bottleneck” to inertia
- Plurality of substances results from there being multiple such “brakes” or “bottlenecks” to inertia.

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Matter Discloses a Plurality of Substances

- Aquinas: every nature a “prime mover” that moves by participating in God’s “Prime Movership.”
- Empirical physicist’s objection: “Resisting principles are themselves inertial.”
 - Reply: “The inert cannot be differentiated.”
 - ∴ ∃ “a plurality of non-inertias:” substances.
- Every divergence from inertia would constitute a new being.
 - Inertia + inertia ≠ less inertia.
 - Potential + potential ≠ act.

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Matter Discloses a Plurality of Substances

- Are the preceding arguments convincing to a monist?
- Spinoza: “the world is *natura naturata*”
- Alexander: Individuals are “pieces” of space-time.
- Monism implies motion impossible.
 - Proof: Monism means ∃ only one type of matter. But nothing can move itself. ∴, motion is impossible.

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Matter Discloses a Plurality of Substances

- Another disproof of monism: The living is more perfected than the non-living.
 - “A single [living] tree is greater than the entire mineral universe.”
 - Monism holds the converse: The whole universe is more perfected than even the living human beings in it.
 - The monistic matter’s unity that it seeks would be a greater good than even that of life.
 - Monistic matter becomes God. This is pantheism.

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Matter Discloses a Plurality of Substances

- Nature is neither many (pluralism) nor one (monism).
 - Nature is “one-in-many” (hylemorphism).
- A material substance
 - Cannot be its own passivity
 - It would be prime matter, moved with infinite velocity, and thus indeterminate.
 - Cannot be pure act
 - It could not move; “motion toward the new” impossible.
- Substance must be both active and passive.

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The Atom is a Substance

- Elements with atomic number $Z = 1$ (hydrogen, H) to $Z = 97$ (Berkelium, Bk) and beyond have a diversity of properties.

Group	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	1 H																	2 He
2	3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
3	11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
4	19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
5	37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
6	55 Cs	56 Ba		72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
7	87 Fr	88 Ra		104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Uut	114 Uuq	115 Uup	116 Uuh	117 Uus	118 Uuo
Lanthanides			57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu	
Actinides			89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr	

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The Atom is a Substance

- Does a single type of subatomic substance account for the differences of atoms?
 - That substance would have to be as immanent as life itself in order to explain the elements' diversity.
- If there are many types of subatomic substances, can they explain the heterogeneity of the various elements?
 - Philosophical physicist would have to say that the various combinations of them would not give rise to the various motions observed in the world.

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The Atom is a Substance

- Can man be reduced to a handful of subatomic particles?
- Charles Hartshorne: A dog is superior to a pillar because a dog can relate itself in more ways to the pillar than the pillar can to the dog.
- Aquinas: Perfection measured by the ability to receive accidents.
 - Subatomic particles do not have this perfection to the extent, e.g., we humans do.

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The Atom is a Substance

- Living domain higher than material domain.
 - Aquinas: "the less a thing is immersed in matter, the less it is finited." (*De natura accidentis*, cap. 1)
- Kierkegaard: greatness of a being measured by how well it can relate itself to itself
 - Man is the greatest of changing beings.
- The fewer "subatomic principles" there are, the greater their depth of being would have to be to explain the macroscopic world.

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Modern Research Argues to Hierarchy

"And therefore in the elements the matter is least perfect, because only one form of one element is actuated at a time: and if sometimes the form of another element is virtually present, there is no abiding of the first thing but a change, as for example when the heat of fire acts on air inducing the quality of fire. In compounds, indeed, matter is more perfect: for here, with the one form conferring actuality to the compound there are present all the forms of the elements, virtually however and not essentially because each of these requires its own determinate quantity...; hence since there is one substratum for the compound and once existence, its form is one. Some compounded substrata, however, are animated, and especially man whose form is not produced from matter predisposed by the quantity of the compound; hence it is fitting that in the animate world the essences of some forms should be without their full perfections; for this is the profoundest way in which animate things transcend simple compounds, namely by perfecting their matter through the acquisition of more than one form at a time, just as we see that in one way what is simple is resolved from compounds and in another way from prime matter in which prior to the becoming as such, there is nothing actual of the form to be produced..."
—Aquinas, *De natura materiæ* cap. 4

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Modern Research Argues to Hierarchy

"And hence it is that the forms of elements which are the most material of all are characterized by active and passive qualities, say hot, cold, humid, dry, and so on as befits the disposition of the matter. But the forms of compounds, namely of inanimate bodies such as stones, metals, minerals, besides the powers and activities which they participate from the elements of which they are composed, have some other more noble powers and activities characterizing the forms specific to them... and thus in a constant ascension, the nobler the specific form, the more excellent the powers and operations proceeding from it; so far forth that the noblest form which is the rational soul has the intellectual power and operation, that not only transcend the power and action of elements but all corporeal power and action."

—Aquinas, *De occultis operibus materiæ*

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Modern Research Argues to Hierarchy

- Einstein's relativity mechanics: Matter *is* energy ($E=mc^2$), so even energy is inert.
- Subatomic particles have meaning only in relation to something extrinsic to them:
 - According to empiriological physics, a single atom has no temperature; only a collection does.
 - An electron by itself only has meaning with respect to something else, e.g., a proton in a H atom.
 - An electron causes colored light, but it itself doesn't have a color.

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Modern Research Argues to Hierarchy

- Oxygen (O), e.g., has *more nature* than a subatomic particle because it has more being or act.
- It doesn't combine with other atoms as easily as an electron, e.g., combines with other subatomic particles.
- It is more "finited."

References

- V. E. Smith's *Philosophical Physics*
 - Please begin reading ch. 6 (Motion, Dualism, and Physics).
 - I will post PDF of the reading on the reginacoeli.box.com page.