

08. Galen and Paracelsus

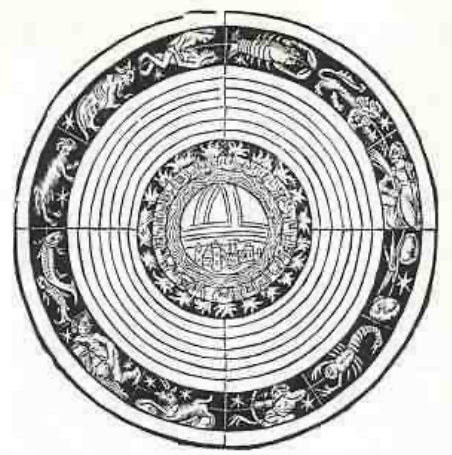
1. Three Traditions

Kearney, H. (1971) *Science and Change*

- 1. Three Traditions
- 2. Galen
- 3. Paracelsus
- 4. The Chemical Philosophy

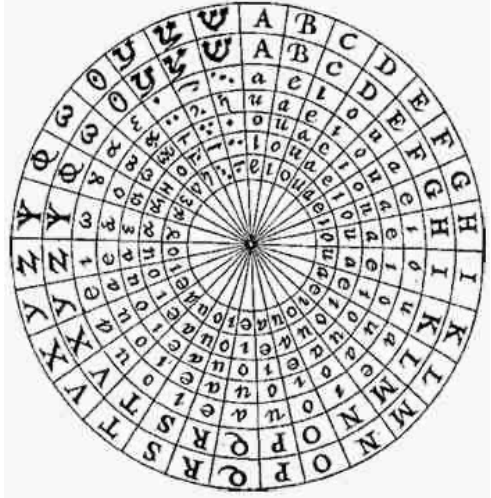
The Organic Tradition

- (a) Nature as *living organism*.
Characteristics: change, growth and decay, final causation, substantial forms.
- (b) God as rational first-mover.
- (c) Rational, organic representations.



The Magical Tradition

- (a) Nature as a *work of art*.
Characteristics: beauty, mystery, creativity, substantial forms and occult properties.
- (b) God as artist/magician.
- (c) Mathematical (numerological) complex, aesthetic representations.



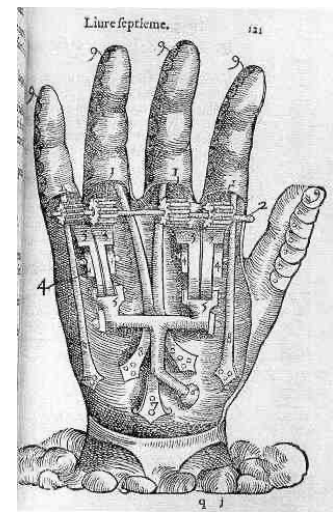
The Mechanical Tradition

(a) Nature as *machine*.

Characteristics: regularity, permanence, predictability, rejection of final causation and occult properties.

(b) God as engineer.

(c) Mathematical (geometric) simple representations.

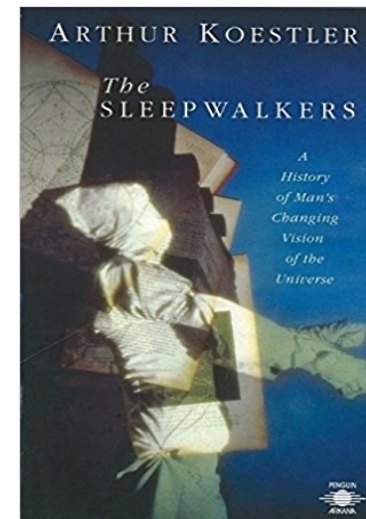


16th-17th cent: "Scientific revolution".

- Popularized "Whig history" account: Triumph of rational experiment-based world-view over irrational superstitious medieval views and out-dated ancient Greek metaphysics.

- Kearney's account:

- *Organic*: 12th-15th cent. recovery of Aristotle, Galen, Ptolemy.
- *Magical*: 15th cent. recovery of Plato, Plotinus.
- *Mechanical*: 16th cent. recovery of Greek atomists, Archimedes.
- 16th-17th cent. world-view as synthesis of all three.



2. Galen (129-~210 A.D.)

- Roman physician.
 - *Combination of Hippocratic and Aristotelian doctrines.*



(a) **Four Humour Theory of Disease**

<u>humours</u>	↔	<u>forms</u>	↔	<u>seasons</u>	↔	<u>elements</u>
yellow bile		hot/dry		summer		fire
black bile		cold/dry		fall		earth
phlegm		cold/wet		winter		water
blood		hot/wet		spring		air



Choleric:
Excess of yellow bile.
 Impetuous, deceitful,
 extravagant, bold.



Melancholic:
Excess of black bile
 Vigilant, jealous,
 sad.



Phlegmatic:
Excess of phlegm
 Lazy, sleepy,
 languid.



Sanguine:
Excess of blood
 Merry, sociable,
 studious, peaceful.

- In a healthy body, the humours are balanced and in harmony.
- Disease is due to an *imbalance* of humours.
 - *Only one general type of disease: "distemper".*
 - *Disease is a global state of the body.*

Treatment

- Restore balance by treatment of opposites.
 - *Ex. Treat buildup of phlegm with yellow bile.*
- Practical form: Dietary restrictions, herbal remedies, purging (blood-letting, laxatives, *etc.*), some use of talismans.
- Some substances are effective by reason of their *occult* (hidden) properties.
 - *Properties of the "whole substance" (later referred to as "substantial forms").*

Similarities with magical tradition

- Occult properties/substantial forms.
- Microcosm/macrocosm doctrine:
 - *The human body (4 humours) is representative of the cosmos (4 elements).*

Note: Different correspondences in magical tradition: Aristotelian four elements are replaced by neo-Platonic three hierarchies.

(b) 3rd Century Debates on Medical Knowledge

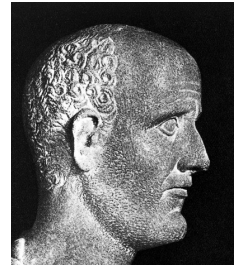
Galen "On the Sects for Beginners"

(i) *Rationalists*

- Claim: Experience does not provide explanations; just facts.
 - From observations one may infer the existence of unobservable features of reality (atoms, pores, the void, essences, forces, hidden causes, *etc.*).
 - Thus: General theories of disease that make reference to unobservable quantities are necessary.

Ex: Asclepiades of Bithynia (c.124-40 B.C.)

- Disease is due to constriction or dilation of orderly flow of (invisible) atoms through (invisible) pores in body.
- Treatment takes the form of either dilation or constriction.



(ii) *Empiricists*

- Claim: Explanations of disease that make reference to unobservable quantities are illegitimate.
 - General theories of disease based on unobservable things should be rejected.
 - Medical knowledge should be based only on *practical, personal* case histories and direct observations; not on *theoretical* speculation.

(iii) *Methodists*

- Claim: Theoretical explanations of disease that refer to unobservable quantities are legitimate; *but* they should be restricted to particular observational contexts.

Ex: Thessalus of Tralles (c.70-90 A.D.)

- Asclepiades' states of constriction and dilation are not unobservable; rather, one can be trained in the "Method" to detect them.
- Thus: Disease is a manifest state detected through observation, as opposed to a hidden state inferred by reason.
- But: Disease is explained through reference to theoretical things (atoms, pores).

Characteristics of Debate

- Philosophical dimension: Origin of terms "rationalism" and "empiricism" used in philosophical debates over nature of knowledge.
- Social dimension: Accomplished, educated physicians (rationalists) vs. uneducated, village medical practitioners (empiricists).



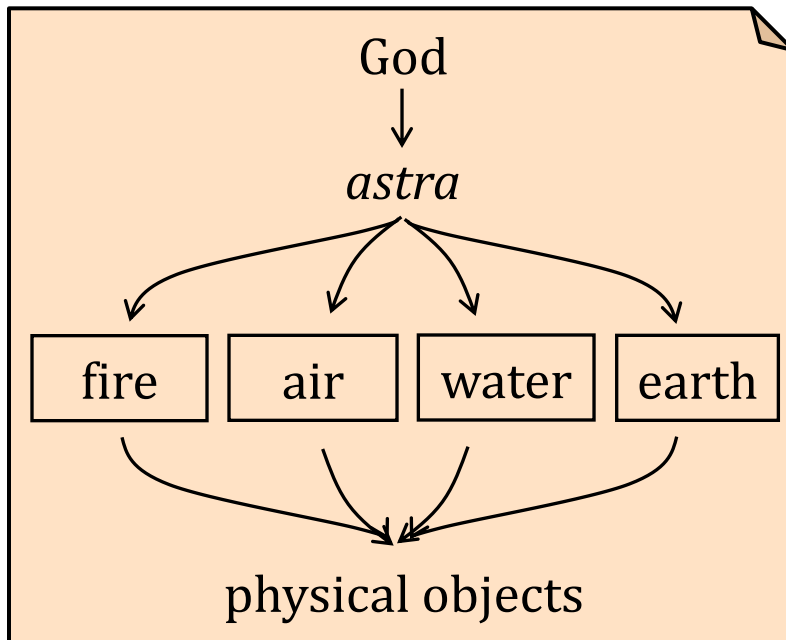
3. Paracelsus (1493-1541)

- Phillipus Aureolis Theophrastus Bombastus von Hohenheim.
 - German physician very much against institutionalized Galenic medicine.



"Let me tell you this: every little hair on my neck knows more than you and all your scribes, and my shoe-buckles are more learned than your Galen and Avicenna, and my beard has more experience than all your high colleges."

(a) Metaphysics



- "Precipitation of *astra*" from God.
- *Astra* combine in the four "wombs" (fire, air, water, earth) with the *tria prima* (three principles).
- Physical objects are result:
 - *womb* = substratum in which object grows
 - *astrum* = seed
 - *tria prima* = nutrients

(i) *Astra (semina, archei)*

- *Astrum* = life-giving virtue or principle that makes an individual object unique.
 - *Similar to Plotinus' seminal reasons (astrum as seed).*
 - *Similar to neo-Platonic astral body: vehicle of the soul (intermediate between immaterial spirit and material body).*

(ii) *Four wombs*

- *Mysterium* ("matrix", "mother") = substrate in which an object is generated.

Ex: Milk is a mysterium of cheese and butter.
Cheese is a mysterium of maggots and worms.

- *Mysterium magnum* = the mother of all things; prime matter.
- Four wombs = the fundamental matrices created from the *mysterium magnum* through a process of differentiation and separation.

Womb	Characteristics
Firey	<ul style="list-style-type: none"> - <i>Activates growth.</i> - <i>Generates stars, planets, meterological phenomena.</i>
Airey	<ul style="list-style-type: none"> - <i>Nourishes.</i> - <i>Generates living, breathing creatures.</i> - <i>Primary source of "invisibles" like spirits, fates, witchcraft, dreams, visions.</i>
Watery	<ul style="list-style-type: none"> - <i>Consumes.</i> - <i>Generates metals, minerals, salts.</i> - <i>Primary source of watery things like fishes, coral, nymphs.</i>
Earthy	<ul style="list-style-type: none"> - <i>Fixes, solidifies.</i> - <i>Generates plants, vegetation.</i> - <i>Primary source of earthy things like trees, animals, stones.</i>

- Note: The wombs are *not* the same as the Greek elements:
 - *An object is not a composite of the 4 elements; rather, it is associated with just a single element.*
 - *The wombs are dynamic principles and not material substances.*

(iii) *The tria prima*

- Three principles constitutive of all things:

Mercury: transformative agent, fluidity, volatility.

Sulphur: binding agent, combustibility.

Salt: solidifying/sustantiating agent.

Ex: When a piece of wood is burnt, the products reflect its constitution:

smoke: mercury (chaotic quantity)

flame: sulphur (binding agent mediating between salt and mercury)

ash: salt (coagulant)

(iv) *Microcosm/Macrocosm*

- Neo-Platonic tripartate scheme of being reflects the Trinity: God has a single essence with three parts.
- Humans consist of three essences.
- The Trinity, and hence the human being, is reflected again in the *Tria Prima*.

Holy Spirit, Father, Son

spirit, soul, body

mercury, sulphur, salt

(b) **Ontological Theory of Disease**

- Diseases are due to "rogue" astrum: foreign agents invading the body.
 - *Different types of disease, one for every different type of rogue astrum.*
 - *Disease is a local state of the body: disease "grows" around foreign astrum in same way fruit grows on a tree and minerals grow in a mine.*

Treatment

- Erradicate foreign body (astrum) by treatment of *like with like*.
 - *Determine the tria prima principle that governs the growth of the disease and treat with substances that employ the same principle.*
- Chemical treatments ("iatrochemistry"):
 - *Mercury, arsenic, antimony, etc.*
 - *The poison that causes a disease should be used in proper dosage as its cure.*

4. The Chemical Philosophy

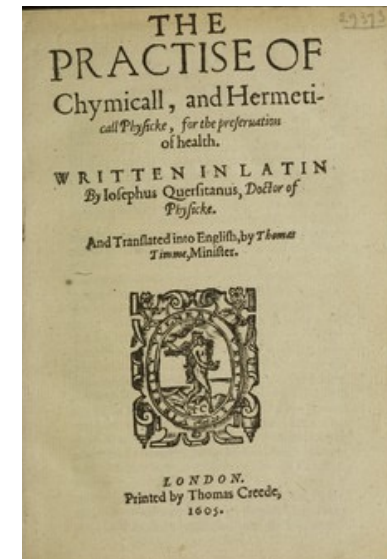
- Late 16th century: profusion of texts and translations by followers of Paracelsus.
 - Goal: To overturn the traditional Aristotelian-Galenic bias of the universities and replace it with a Christian neo-Platonic and Hermetic philosophy.

(a) The chemical interpretation of *Genesis*

- The creation as a chemical process in which the three principles and four elements are produced.

"Halchymie should have concurrence and antiquitie with Theologie... [Moses] tells us that the *Spirit of God mounted upon the water*: which was an indigested Chaos or masse created before by God, with confused Earth in mixture; yet by his Halchymicall Extraction, Separation, Sublimation, and Coniunction, so ordered and conoyned againe, as they are manifestly seene a part and sundered; in Earth, Fyer included, (which is a third Element) and Ayre, [and] (a fourth) in Water, howbeit inuisibly."*

*Thomas Tymme (d. 1620) in the dedication to Joseph Duchesne's 1605 *The Practise of Chymicall, and Hermeticall Physicke, for the preservation of health.*



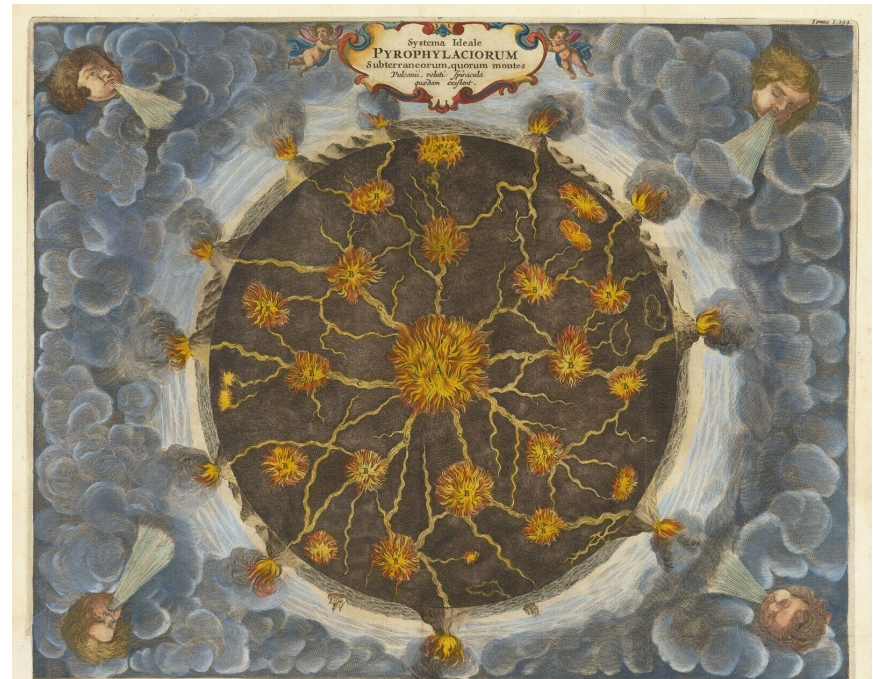
(b) The chemical geocosm

- Michael Sendivogius (1566-1636).
 - *Posits a central sun in the earth corresponding to the celestial sun.*
 - *Four elements in the earth distill a radical moisture that sublimes to the surface.*
 - *Combines with rays of central and celestial suns to produce living things.*

"Therefore when there is Rain made, it receives from the Air that power of life, and joyns it with the Salt-nitre of the Earth... and by how much the more abundantly the Beams of the Sun beat upon it, the greater quantity of Saltnitre is made, and by consequence the greater plenty of Corn grows, and is increased, and this is done daily."



- Volcanism as attributed to central fire.
- Mountain streams as products of distilling processes in the earth.
- Chemical analyses of mineral waters found at spas.



(c) **Parcelsian vs Galenic Practices**

- *Uroscopy*

Galenists: Key diagnostic method = inspection of urine.

- *Allows categorization of diseases: malaria, vertigo, alcoholism all due to same humorial imbalance (all give urine a white color).*

Paracelsians:

- *No information can be obtained from the urine except by chemical methods (distillation, extraction, coagulation).*



- *Bloodletting*

Galenists: Common treatment.

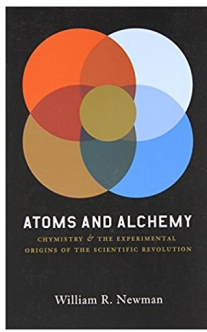
- *Prescribed for sanguine temperaments (excess of blood).*

Paracelsians: Prohibited!

- *Air (life-giving principle) in the lungs forms arterial blood.*
- *Bloodletting thus results in a drain of the life-essence from a patient.*



(d) **Atoms and Alchemy** (Newman 2006)



- Claim: Alchemy provided corpuscular theories with the experimental means to debunk scholastic theories of perfect mixture and to demonstrate the retrievability of material ingredients.

Modern distinction:

- *mixture* = mechanical juxtaposition of particles.
- *compound* = chemically bond particles.

Aristotelian distinction:

- *mixture (mixis)* = homogeneous combining of ingredients.
- *compound (synthesis or compositio)* = mere juxtaposition of uncombined parts.

The "philosophers's stone":

Transmutation of a base metal into gold ("chrysopoeia").

- All metals composed of *mercury* and *sulfur* principles. Gold consists of perfect proportions of these principles.
- "*Mercury-alone*" theory: *chrysophoeia* as a process in which very small mercury particles penetrate the microstructure of the base metal (Geber 13th Cent.).



Thomas Erastus
(1524-1583)



- 1572. Erastus's *Disputationes de nova Phillippi Paracelsi medicina* ("Disputations concerning the New Medicine of Phillipus Paracelsus").
 - *A critique of alchemy and Paracelsus.*
- Erastus on cheese and worms:
 - Cheese and corpses aren't made of worms, even though they can be resolved into them.
 - Likewise, metals can be resolved in the lab into oils, waters, cinders, etc., but no thinking chymist would agree that they are composed of these.
- Erastus's "reditus principle":

"A return from habit or form to privation is not conceded: nor does nature proceed in reverse, but always continues forward, and by proceeding in a sort of circle she completes mutations from the elements by means of infinitely varied mixtures and temperations."

- So: When alchemists think they are demonstrating resolutions of metals into mercury and sulfur and then back into metals in their laboratories, they are not working with genuine mixtures.



Daniel Sennert
(1572-1637)

- 1619. Sennert's *De chymicorum cum Aristotelicis et Alenicis consensu ac dissensu*.
 - *Experimental demonstration of corpuscular theory of matter.*
 - *Paves way for mechanical philosophy of Robert Boyle and Descartes.*

"If gold and silver melt together, they are so thoroughly mixed *per minima* that the gold cannot in any way be detected by sight, but if *aqua fortis* is then poured on, the silver is so thoroughly dissolved that no metal can be detected in the water by sight. But since it is really present, it can emerge thence in segregated form, and certainly in such a way that both the gold and the silver retain their own nature; and it is in this fashion collected into the subtlest calx, which is nothing other than a heap of innumerable atoms, which is again reduced into the purest gold and silver by fusion."



1. Fuse gold and silver together to produce a seemingly homogeneous alloy.
2. Form a solution by dissolving the silver by means of *aqua fortis* (nitric acid).
3. Precipitate the silver out of the solution by means of salt of tartar (potassium carbonate).

"Transmutation" of Silver into Gold

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William R. Newman

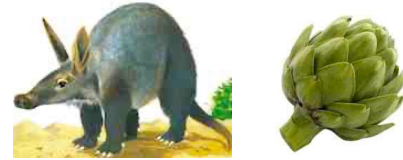
- Suppose: The initial alloy and the silver/nitric acid solution are both *mixts.*

General problem for Scholastic theories of mixture:

- The separation of the silver from the alloy suggests the forms of gold and silver remained intact in the alloy.
- And: The reacquisition of the silver from the acid suggests the forms of the silver and the acid remained intact in the solution.
- But: Genuine mixtures involve the elements, and not ingredients having higher forms.

Problem of recombination:

"Why should the elementary qualities or elements deriving from the acid-silver mixt recombine in the same proportions that they had possessed in the original ingredients, rather than forming some new substance or substances?" (Newman, pg. 113.)



"Why should armadillos or artichokes not emerge instead of a bright, heavy metal?" (Newman, pg. 114.)

Sennert's dilemma for Aristotelian theories of mixtures:

The dissolution of a metal in an acid must be either a mere *mixtio ad sensum* (a composition) or a mixture proper.

- It can't be a composition (not the same as a wheat/barley composition).
- It can't be a mixture proper.

- Sennert's claim: The silver is composed of minute, cohering particles, each of which retains the substantial form of silver within itself.
 - *Atomism plus occult Aristotelian forms!*

"The medical theory of 'seeds' endowed with occult qualities clearly provided the young Sennert with a model for a corpuscular theory also incorporating occult qualities to account for the sympathies and antipathies between different substances." (Newman, pg. 144.)