Alchemy Journal

Bruce Wilson
bruce.wilson@uvu.edu

quick-send

Apr 2020 –

3 Symbols
5 Timeline of Modern Science
7 Salts of Alkahest Magnus
8 Development of Scientific Method
10 Rolf Timeline
11 Hermeticism + Gnosticism
13 Strickland, Big Picture of alchemy
14 Golden Chain
20 Geoffroy's table of Compounds
21 McLean's The Process
23 Roger Bacon
24 Artephius
25 Symbology of Alchemy
30 Gnosis of LIGHT
31 Corpus Hermeticum / Pimander
33 Corpus Hermeticum / Asclepius
38 Medicine (Wikipedia)
39 Secrets of Alchemy, Principe
44 Paracelsus / Kuhn: Boyle + Structural Chemistry
46 Symbolism (Mostly 1951 articles)
52 Connections Season 1 Joseph Burke

record pause stop

Symbols in Alchemy

Aug 2020

Planets ☿
- ♄ Saturn (Pb)
- ♃ Jupiter (Sn)
- ♂ Mars (Fe)
- ☉ Sun (Au)
- ♀ Venus (Cu)
- ☿ Mercury (Hg)
- ☽ Luna (Ag)

Elements:
- 🜁 air
- 🜂 Fire
- 🜄 Water
- 🜃 earth

Metals Primes
- ☿ mercury (mind, feminine)
- ⊖ Salt (body, matter)
- ☤ Sulfur (spirit, male)

Processes; Time of year important
- ♈ Aries Calcination
- ♉ Taurus Congelation
- ♊ Gemini Fixation
- ♋ Cancer Dissolution
- ♌ Leo Digestion
- ♍ Virgo Distillation
- ♎ Libra Sublimation

Units:
- ℥ hour
- ℨ Dram
- ℥ ounce
- ℥ℬ half-ounce

Making Gold:
- Blackening (Crow, Raven, Toad)
- Whitening (White Swan, Eagle, Skeleton)
- Greening (Green Lion)
- Iridescence (Peacock
- White stone (Unicorn)
- Reddening (Pelican feeding young with own blood, Cockerel)
- Final Transformation (Phoenix reborn)

Mundane Elements:
- ♁ Sb ⊛ Mg ☥ S ⚹
- ⚹⚹ As ☽⊙ Pt ♄ ♁ # Zn
- ♃ Bi ⛱ stone ⊕ vitriol (SO_4^{2-})
- ∇ aqua fortis (NH_4Cl) ∇R aqua regia ($HCl + HNO_3$)

- ♏ Scorpio Separation
- ♐ Sagittarius Incineration
- ♑ Capricorn Fermentation
- ♒ Aquarius Multiplication
- ♓ Pisces Projection
- ♒ Precipitation

Chemical Compounds

white copper - H_g-Cu mix?
Asem - alloy imitating Au, A_g
Misy - $Fe + CuSO_4$
Alum - $KAl(SO_4)_2 \cdot 12H_2O$
Cadmia -
physic -
Mina - weight of Egypt o Greek
lime - CaO, roasted Limestone ($CaCO_3$)
alkanet - Red dye from European root
Woad - Blue dye from yellow
Kermes - Red dye from beetle

The Legacy of The Atom
Democritus (et al) Proposed the smallest unit of matter = "atom". 600 BC, -500 BC. In 1905 Ludwig Boltzmann committed suicide because he could not convince anyone that atoms made up all matter. This was 60 years after atomic theory was accepted by everyone.

Timeline of Modern Science

July 2020

1536 Petrus Ramus (de La Ramée) Publishes thesis "Everything Aristotle said was false (inconsistent)" started the movement against Aristotle as ultimate authority.

1250? Roger Bacon "Law of Refraction" First Natural Law

1609 Kepler's Law of Planetary Motion ((1) ellipse (2) equal area in equal time (3) period² - (mid-axis of ellipse)³ all unprovable

1632 Galileo Dialog concerning the Great World System + Telescope use heliocentri-

1638 Galileo Two new sciences (motion Physics) 1637 Descartes Algebra & Geometry

1661 Boyle Skeptical Chymist

1662 Boyles Law of Gasses

1665 Boyle starts Philosophical Transactions peer review! + Royal Society

1625 Snellius Finds Roger Bacon's Law of Refraction

1643 Torricelli mercury Barometer

1669 Steno stratigraphic column

1673 Huygens Pendulum Clock + oscillating systems

1675 Leeuwenhoek: microscope

1675 Leibniz Calculus + Mathematical "Laws"

1676 Romer tries to measure the speed of Light

1687 Newton 3 Laws ① Inertia ② F=ma ③ opposing forces $F=\frac{Gm_1m_2}{r^2}$

1717 Stahl - phlogiston Theory (attempt to leave alchemy)

1735 Linnaeus - Binomial nomenclature for plants & animals

1745 ~~Black - latent heat~~ Gorgiven Kleist - Leyden Jar

1750 Black - latent heat

1751 Franklin - lightning = electricity

1755 Kant - Universal Natural History, new cosmology

1763 Bayes theorem - statistical test for Probability of event

1767 Denham-Stewarts' Law of Supply and Demand

1776 Smith's Economics

1778 Lavoisier & Priestly discover Oxygen., Lavoisier ends Phlogiston theory; Law of Conservation of Mass

1787 Charles Law of Gases $\frac{V}{T}$ = constant

1794 Proust Law of Definite Proportions

1802 Lamarke Teleological Evolution

1800 Volta - electrochemical cells

1805 Dalton - Atomic Theory

1820 ~~Ohm~~ Orsted - electric currents disturb magnets

1824 Ohm - Electrical measurements

1827 Avogadro - concept of the Mole

The Salts of Albertus Magnus

Dec 2020

Sal communis	NaCl
Sal Alkali	NaOH
Sal Nitrum	$NaNO_3$
Sal Borax	$Na_2B_4O_7$
Roman Alum	$KAl(SO_4)_2 \cdot 12H_2O$
Yemen Alum	same
Tartar	KH Tartrate, from wine deposits
Atramentum	Iron black (Fe-tannins) or carbon black
Green Copper	Verdigris CuC_3
Copperas (Green Vitriol)	$FeSO_4$
Cinnabar	HgS
minium	Red Lead Pb_3O_4
cerusa	White Lead $PbCO_3$
hens egg	Protein
egg shell	$CaCO_3$
Vinegar	acetic acid
urine	Urea, $(NH_4)_2CO$
Cadmia	$ZnCO_3$
Marchasita	
Magnesia	MgO

Development of Scientific Theory Aug 2020

Before 500 BC myths and oral tradition

500 BC – 1000 AD Reason Rules, empirical observation suspect

1000 Arabic Alchemy brings Experimentation To The Front
Alhazen argues against Aristotles Reason. Was Religious and sought Absolute Truth.

1270 Europe Roger Bacon's Opus Magus (1265) identifies Errors (1) Authority (2) Custom (3) opinions of the unskilled many (4) conceiting ignorance behind Pretense
2 sources of Knowledge: Reason & Experiment
Experiment wins by verification of direct Experiment
Locke: Aristotle in check because he could not use his ideas well

1580 skepticism of Remer, Sanches: "Nothing is known" because of circular reasoning and unclear logic

1600 Francis Bacon "New method" (Novum Organum)
Poor version of Observation → law → Axiom

1637 Tycho → Kepler → Galileo Screwed Western method

1661 Boyle – law + theory ("do it yourself", "Publish what you see")

1687 Newtons Demonstrable laws of Physics (mostly)

1763 Bayes Statistical Treatment of Data

1800 all fundamental Chemical laws known
LAW: General Statement of what we observe, no counterexamples known.
During the 1800s many attempts were made to define the scientific method. most dealt with deductive vs Inductive reasonings, as though Reason

record pause stop

were still a good way to find 'truth'. We're still using it!

1934 Karl Popper defines a version of the scientific method critical of Rationalism, depending on Observation

observe → question → Data → Model → hypothesis

(Experiment)

importantly, he said all experiments should attempt to falsify the model (called the null hypothesis, the hypothesis you would believe if not for the one you are trying to prove). Any hypothesis which withstands all attempts to prove it wrong survives to become part of a Theory. Pure skepticism = good science

1962 Thomas Kuhn proposes scientific Revolution Theory New insight to any science comes from a new generation using a new idea. Since there are so many models a scientist must accept to operate, it becomes difficult to chose exactly what to test in an experiment to falsify everything supporting an hypothesis. Most experiments only test 1 hypothesis, or maybe 2 or 3, out of the hundreds on which the hypothesis stands.

* Laws on observations
* Theories or long-lived Models

Roots of Knowledge timeline

Aug 2020

quick-send

4 Egyptian creation myths
Thales
Empedocles
Plato Timaeus
Diogenes
Aristotle categories
Alexander the Great
Plague flees
Galen 4 humors ?? Gnosticism
Alchemy in Alexandria
Libraries of Alexandria
Arabic Golden Age
Jabir / Avicenna / Albertus Magnus / Roger Bacon / Philosopher's Stone
Golden age of Alchemy (Renaissance Gnosticism / chemistry)
1661 Boyle & invisible College / Royal Society / Philosophical transactions
1778 Lavoisier & measurements
1525 Paracelsus destroyed Humors
1539 Vesalius said anatomy didn't match
1628 Wm Harvey did anatomy properly
Diogenes - was he correct? where is he now?
Who are the Modern Diogenes?

Arabic → European transfer
Spanish (Moorish) universities in 1200 - 1300
Byzantium → Italy transfer in Renaissance (de Medici) 1500 1600

record pause stop

Francis Yates: Giordano Bruno + Hermetic Tradition, 1964 Routledge

quick-send

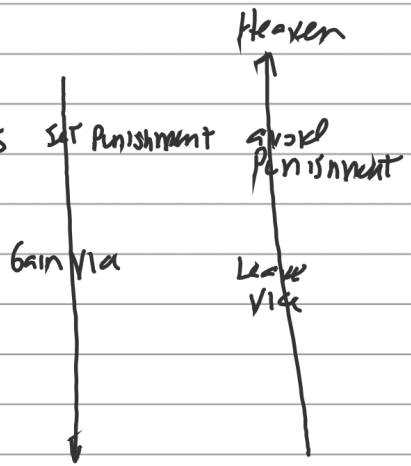
Hermeticism

Optomistic Gnosis: World is Good, and by contemplating it we can arrive at a Gnosis of God, where we become equal and can understand The All

Pessimistic Gnosis: all the World is evil, There is no good in it, and we have been corrupted by our passage thru the planetary spheres. Gnosis comes from freeing ourselves from the world. When we pass up through by freeing ourselves from each worldly vice can we pass beyond each Planet, then we will be like God.

God/Divine Sphere
Demigod/Divine Maker

Stars + Zodiac			= 12 Punishments
Saturn	Pb	♄	Avarice
Jupiter	Sn	♃	Gluttony
Mars	Fe	♂	Anger
Sun	Au	☉	Pride
Venus	Cu	♀	lust
Mercury	Hg	☿	envy/Lies
Moon	Ag	☽	Sloth
Earth		⊕	



Corpus Hermeticus

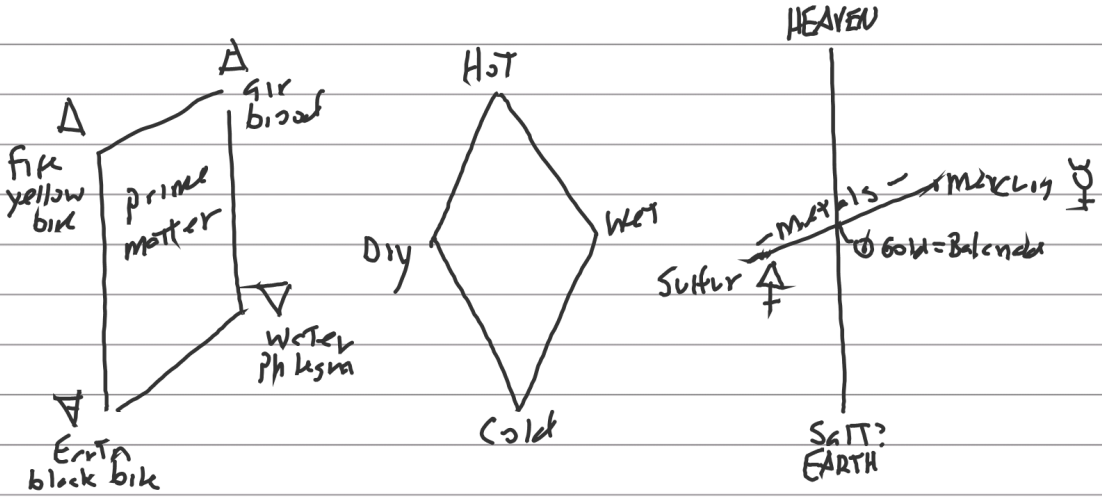
I Pimander "Egyptian" Genesis Story
XIII Secret Discourse on Mountain "Egyptian" Regeneration
XI Mind to Hermes "Egyptian" Reflection of the Universe & the Mind
XII Hermes to Tat "Egyptian" Philosophy of Man + Nature
Asclepius (The Perfect Work) "Egyptian" Religion

star flag tag

Egyptian Religion (via Hermes)
1 God above all
1 demi-god who created all in disobedience
36 Decans (10°) Rule 20-min intervals, associated with constellations (the sphere of the stars)
7 Governors, the 7 Planets
God creates man, then man creates Gods (statues) and animates them using spells, enchantments, offerings and service; Invocations, Rites.
Talismans are objects (Decans) imbued with Powers from certain Gods to moderate the negative effects from other Decans.

Dating of Hermes (from F. Yates)
no evidence before 200 A.D.
Ancient origin supported by Early Church Fathers:
Lactantius thought Hermes was contemporary with Moses or before, was Egyptian, and was a non-christian Prophet who predicted christianity
Augustine thought Hermes was real, later than Moses, was Egyptian, was a Pagan was clever but deluded by worldly philosophy

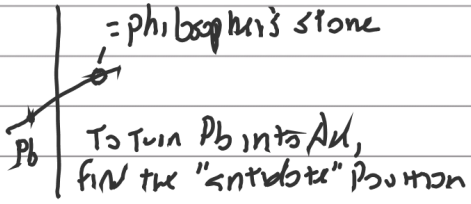
Alchemy. Starkey's expansion of Ripley letter to the King Stage X



PLATO'S Elements (Transformable)

ARISTOTLE'S Properties (Transforming)

JABIR metal as Axis Mundi?



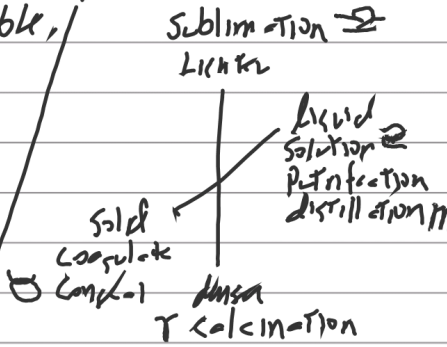
To turn Pb into Au, find the "antidote" position

when the stone is cast onto metal, then heated, it will combine to make Gold

The stone is treated by turning Pb into Au. Then it does its real job of extending Life & freeing the alchemist from vices → contemplate God possible.

Making the stone requires the alchemist to make himself ready for the climb

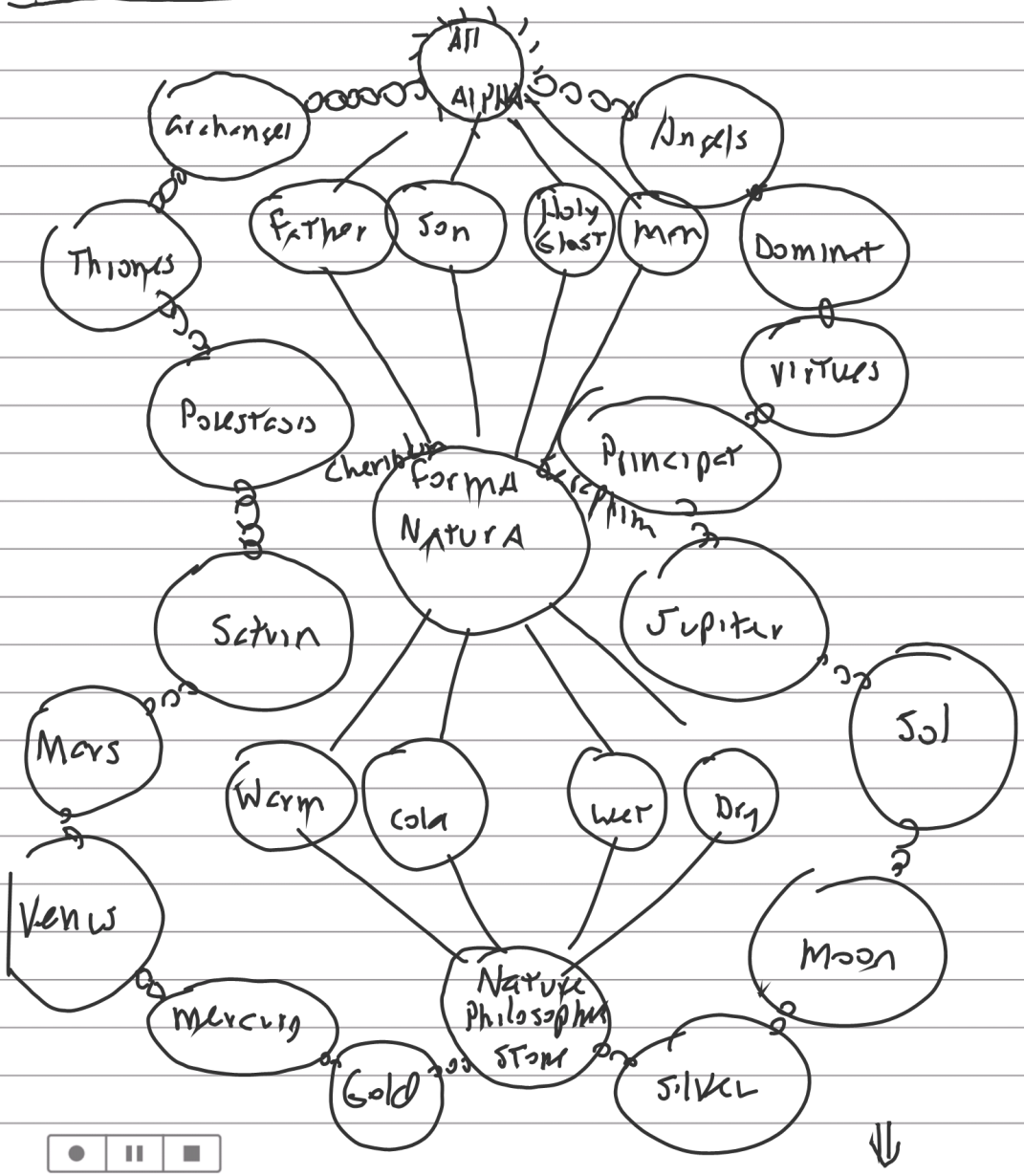
How to modify material →



star flag tag

Arabic Alchemy

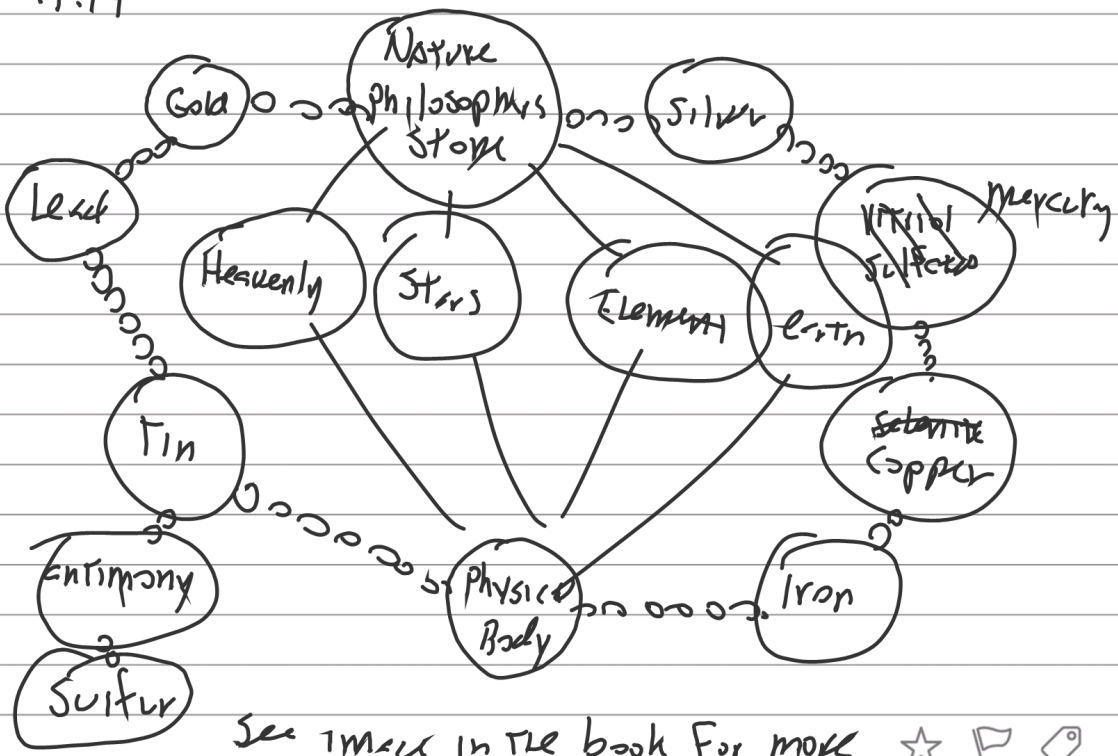
Jabir ibn Hayyan (Geber) — make diagrams, thermometers
Abu Ibn Sina (Avicinna) — notes
Abu Ibn al Razi (al-Razi) — Letter



record pause stop

Notes on the Golden Chain of Homer, 1723
by Dr Anton Josef Kirchweger — Very Late Alchemy

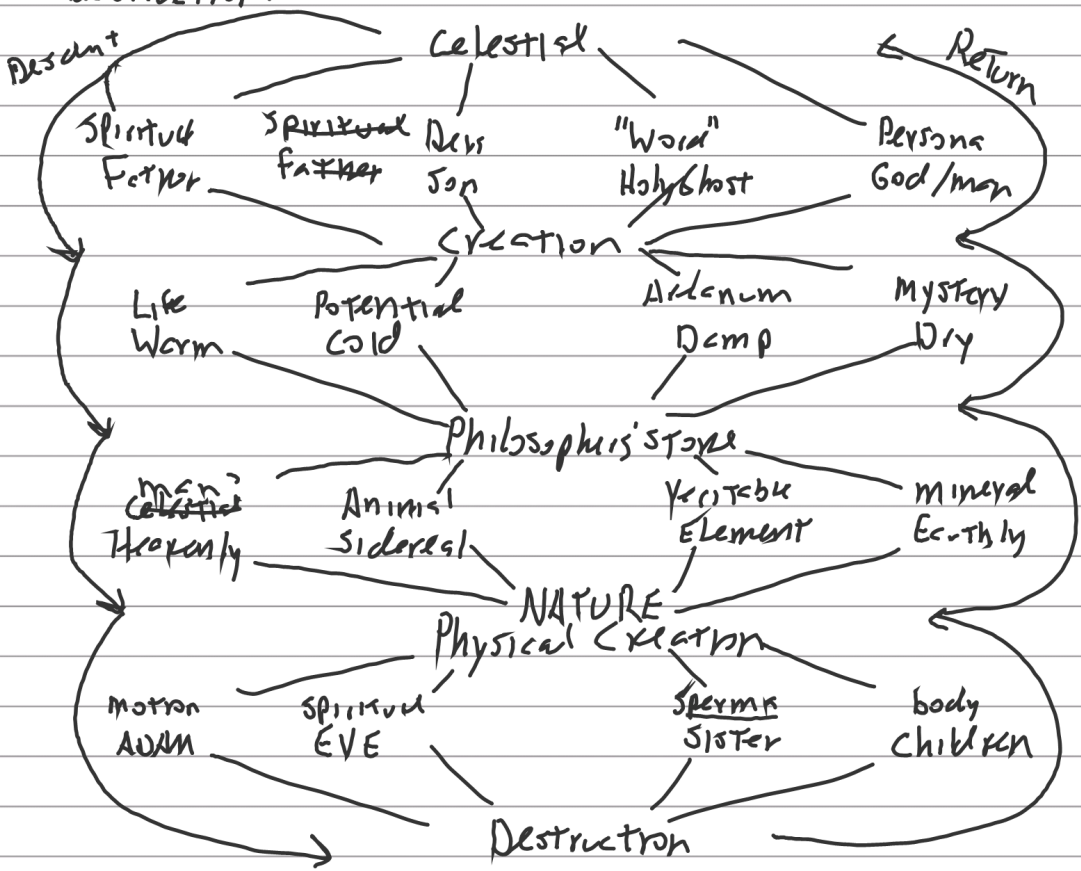
Symbols used
△ air ▽ fire △ water ▽ earth
☉ chaos ☿ acid + ☾ salt = ☉ materia Primum — Prime matter
⊖ Living matter, Ruling Animal ☿ spirit? Water from atmosph
⊕ Vegitable matter ⊖ mineral matter ☿ ? Volatile unfermented
☉ philosophers stone, fermented & "specifics with ☿" Gold
☽ mundi: Dew, hail, Rain, Snow, all from the atmosphere
☿ nitric acid, can Fabricate all things, known to the whole world. ▽ subject to it, △ cannot be without it.
☿ "Noble Sperm of the world" which has been fixed, From Vapor and Fix Converted to Fixed Earth → Philosopher's Stone
↑p.14



See image in the book for more

Golden chain of Homer 1723

The Golden Chain is an expression of Axis Mundi with the Celestial/Divine at the top, then the Creation/formation, then the Philosophers Stone, then the physical world, then the end times and Destruction



Chapter 1: Nature comprehends visible + invisible creatures of the universe. = universal Δ (spirit?) or anima Mundi. Filling the whole of the universe = universal Agent using unerring instinct, manifests as spirit Δ and Light

Chapter 2: 3 states of Δ 1) original state is Cola

Golden Chain of Homer 1723

1) Invisible, immaterial, occupies no space. Tranquil and of no use to us.

2) motion or agitated state, separated out of chaos. Cold. When Gently moved = heat, as in friction or fermentation

3) Burning, manifests as light + heat as long as it is Agitated. Lightning, thunder, Earthquakes, Hurricanes, Gunpowder

All matter is ~~matter~~ fire, though it can manifest as air water, earth, Vapor, humidity.

4 Elements: burning △ fire, Vapor or humidity + cold △ = atmosphere, △ becomes ▽ when condensed, and ▽ fire when "impassated" (fixed?) becomes ∀. originally it was all △ fire,

so, △ → ▽ → light / humidity This is a creation story!

Something about △ = universal Ω (Rain)

When ∀ - △ = putrid, air animates Earth.

God ordained universal Ω by means of humidity should work all things because humidity mixes with Everything, to Soften, Penetrate, destroy, and Regenerate all Things.

▽ is the Body, the tool, but △ or Ω is the operator, The universal agent, Ω and the Power of God.

universal △ fills all space between heavenly bodies, universal △ causes a subtil Reaction to make Nitre ☉ (nitric acid water), outwardly cold, inwardly △. = second Principle of △ (The First being ∀ or Ω). This subtle ☉ approaches alkaline Planets to become Nitre ☉ (acid). This Solar rays of light are ☉, which becomes ☿ in earth, but ☽ (salt) in the oceans. This brings △ or life to the atmosphere ☽ to oceans,

Golden Chain of Homer, 1723

Electricity to ☿.

The firmament as "clouds & fogs", ascending like transpiration from the earth, Sublimed upwards by "central heat of the Earth"

Chapter III: 1) is simple humidity 2) ▽ containing ☊ 3) ↑ acid, anima ☊ ↓ alkali, corpus 4) divided into 4 Elements △ △ ▽ ☿ 5) by art, assisted by Nature, → ☿ quintessence

God has given to all things an Agent and Patient in order to cause a Reaction; this we see by humidity, and Evaporation of numberless subjects. This Evaporation when From above is called Influence, but when from Things below it is Effluvium.

God has given to all things their particular Sperm, which depend on Universal Sperm, as Ruler and Creator ☊,

Chapter IV

After, God devided (Light & dark, night & day) and Corporified the Anima ☊ Mundi (Spirit of the World;) the simple chaos into 4 Elements or Predominating leading Principles, he said "increase and multiply". The Heavens and the Air, both animated by Universal △ are The Father, The Male, The Agent. ▽ and ☿ are the Mother, Female, Passive principle, Generate → Preserve → destroy, → regenerate. 4 Elements fabricate the universal Sperm or regenerate Chaos as God ordained them. You cannot go from one extreme to the other without a medium, this ▽ cannot become ▽ without △, and ☿ cannot become △

Golden chain of Homer, 1723

without ▽ : if you unite △ with ▽ you cannot unite 1st ▽ with △ will unite, then add ▽, this can you unite △ + ▽ or vice versa turn ▽ into ○

△ is most subtil, ⧋ next most subtle, ▽ = degree more corporeal still, then ▽

Subtil Heaven
△
⧋
▽
▽
Earth corporeal

-ckl ▽ + ▽, let stand dilute until coarse a heavy ▽ settle, stir 3-4 times daily. ▽ will dissolve subtle ▽, which is its ⊖ (salt) = virgin ▽. when ⊖ is extracted from common ▽, no more can be extricated. Distill this ⊖ into spiritual ▽ until all the ⊖ has come over with the ▽. This ▽ has the power to dissolve again the next subtil ▽, and Repeat. the end Result is ⊕ universal sperm

Chapter V

~~form is ▽ and matter is ⧋ △~~

form is △ and matter is ▽

by fermentation △ becomes △ (air (loss of heat?)), ⧋ becomes ▽, and ▽ is become ▽. But when △ is fixed by art or Nature it becomes ▽ (volcanic sulfur?), and when ▽ is volatilized by ▽ it becomes ⧋ (hot) and △ (fluid? ~~heat~~? Gas producing?)

This is because Lebendes can be converted into another (Plato)

Condensation similar to "Inspissation"

Typing. Finish later.

Other things to work on:

Secrets of Alchemy by Larry Principe

Alchemy Ancient & Modern by W. Stanley Redgrove

Geoffroys Table, From Pierre Macquer 1764


acid spirits


Marine acid (HCl)


Nitrous acid (HNO_3)


Vitriolic acid (H_2SO_4)


Fixed alkali (MOH)


Volatile alkali (NH_3?)


absorbant Earths


Metallic Substances


Mercury (Hg)


Regulus of Antimony


Gold


Silver

levity.com/alchemy/animal.html
The Process ve Adam McLean

Grey Wolfe / Antimony, when molten, Alloys with Cu, Sn, Pb, in this way it behaves like Hg ☿. Later Sb (antimony) was popular as a cure for ills.

Whitening / a new integration of the polarities. White stone (unicorn), this is a spiritually higher whiteness, an inner whiteness rather than an outer whiteness of Calcination (oxidation). might be shown as Queen dressed in white Robes. The Alchemist brings the feminine into harmony with his soul to achieve a more perfect spirituality, often this sexual aspect is stressed, this coupling brings perfection. It is not using sex as a basis for working magic. This is an inner process, male and female copulating in a flask, not next to it, Representing Physical Substances. Alchemists saw metals, Plants, minerals as masculine & feminine. Hg was hermaphroditic capable of sustaining either role in a reaction. White stone is a unicorn in the unicorns can be Touched or Tamed by a pure Woman.

Reddening / Red stone formed, or solution Reddened, Pictured as Pelican feeding its young with blood from its own heart. (Self Sacrifice, akin to Christs sacrifice for all). The Red Tincture is enabled by the masculine forces in the Flask

The Process, cont. Adam McLean

of the Red King. In our Inner like these are the forces of Raw Energy, a knight brandishing the sword, Power & Force, Will & direction. The Symbols of the mass, bread & wine, relate by Spirituality of the souls of Partakers. Stags with White antlers also symbolize the Red Stone tincture.

Phoenix from flames / Resurrection from the Ashes of Fire. Allusions of Christ, Rising from the Tomb. Alchemists also ~~mad~~ meditated on The Process and experienced an inner rebirth, The Philosophers (interior) Stone.

Philosophers Stone / This Stone, inside the Alchemist, forms a solid foundation on which to Stand (This is a gnostic idea), Solid Ground so fear does not assail, firm FOOTING to Create, adventure, Risk.

Oroboros / Snake eating it's Tail, at the start we are unformed (mass = confusion) at the mercies of the polarities of our soul, Psychic Energies, Joy and despair, melancholy, light & Dark, and inertia. The snake Represents this duality; The Dragon at the beginning is ~~after~~ again at the end, Closing the Circle.

Alchemists pursued an inner Transformation while at the bench performing alchemical transformations.

Roger Bacon 1220-1292
"Doctor Mirabilis"
At his time almost all philosophy was conducted by appeal to Authority, that Authority being Aristotle. also Thomas Aquinas St Augustine. Bacon Became a Franciscan friar to get by after money at oxford college dried up. Things looked up when his friends became Pope and he got Permission to Publish without church oversight. Bacon Wrote That Authority should not constrain investigation; Collect facts first, Then use deduction to get the meaning behind facts. (This is an Aristotelian idea, but never Practiced). So why did alchemy last 400 more years?! Bacon was largely ignored by contemporaries, who looked instead to Albertus Magnus, Bonaventure, Thomas Aquinas, accepted the latter as a wise, subtle Professor of Secret Knowledge. ~~The Order~~ The Church was highly influential, and Ruled via authoritarian Aristotelianism.
Bacon was later restricted by the church. Worked on optics, based on newly-arrived Arabic Texts.
Francis Bacon (1561-1626) Rich, M.P. Lord chancellor under King James I once charged for Bribery, had to Pay £40,000 (Government. Probably needed the cash, Lots of chances). Novum Organum (New Work, 1623) argued for Revolution in teaching, use Induction + Experiments to check.

Deduction: start with Theorm, see where it can lead you.

Induction: start with facts/observations, conclude only what facts tell you, without dogma influencing conclusions. Be skeptical.

Artephius (1150)
Clevis ~~Set~~ Sapientiae (Key of Wisdom)
Liber Secretis (Secret Book)

multiple versions known. Those authored by "Artephius" and marginal classes (notes) from Earlier copies. The most original authored by Alphonsus Rex. look in Theatrum Chemicum (TC) and Bibliotheca Chemica Curiosa (BCC) for copies in Latin.
Very Aristotelian, and author is aware of Jabir's "Books".

Arabic → European transfer of Texts:
Moors in Spain were N. African Berbers. Egypt → Berbers → Spain, Berbers (Moors) in Spanish universities translated into latin.
A second transfer in Renaisance times, Byzantium → Italy transfer, Greek → latin → italian under Cosimo medici

NOTE: Berbers of N. Africa did not go to Spain. fighting people.

Symbology of Alchemy

from Sean Martin - Alchemy & Alchemists 2001 p30+
Alchemy in Europe after 1200 AD

Mercury - Hermes Trismegistus - ~~Guiding Principle of Alchemy, identified with Mother Nature~~
Personification of Successful Work
Lady Alchemica - Guiding Principles of Alchemy
Old King/young Prince - old king is matter to be worked upon, old state of consciousness that must be shattered during negredo (Blackening). young Prince is new matter emerging or struggling to emerge.
Sol + Luna - Sol = sulfur, king, Sun, masculine
Luna = quicksilver (or just silver) queen, moon, feminine. Put them in a flask = copulation / conjunction giving the Philosopher's stone.
Green Lion + Red Lion - beginning and end of the work.
Iron compound → Gold compound. Green Lion sometimes represented as a toad (in Ripley). $FeSO_4$ = Green.
The Egg - Retort or Alembic where prime Material is Placed. yoke = Gold waiting to be released, egg = Soul
Dragon & Oroboros - Guards the stone. Dragon must be overcome. Oroboros signifies the cyclical nature of the work where the alchemist gets the starting material at the end (until) unless he conquers the Dragon.
Tree - the world; tree of knowledge of Good & Evil. Ag Precip.

Symbology in Alchemy, Cont.

Best Illustrated Alchemical Texts:
Aurora, Rosarium Philosophicum, Petrus Bonus, Speculum Veritatis, Splendor Solis, Atlanta Fugiens, Philosophica Reformata
(some of these are emblem books)

Stages of the Work:
nigredo (Blackening) - Death's head, Raven,
albedo (Whitening) - King drowning, Pelican Piercing own heart To feed young,
Citrinas (Yellowing) Sawfer sowing fields.
Rubedo (Reddening) King & Queen wedding, Starry Lion, Golden Coins, Rose Garden, Ouroboros

Alchemical Maxims
"As above, so below"
"Dissolve and Coagulate"
"Fixing the volatile, Volatilizing the Fixed"
"You will find the Hidden Soul" in Latin V.I.T.R.I.O.L
"Go to the woman who washes the sheets in the River and do as she does"
"Play, work, Read, Read, and reread" Mutus Liber

The Language of Birds: Hiding a secret openly, initiates will understand, to all else it is ~~Jib~~ Gibberish (after Gebel) First by Farid un-din Attar 1100's The Conference of Birds shows spiritual Path, look for Riddles & Puns, so look for birds that don't make sense

Symbology in Alchemy Cont. p 36+

Numerology - all alchemists seem fascinated by numbers. Pythagoras' Legacy, all numbers have mystic qualities (Gnostic?) 1 2 3 4 7 9 are most significant units of creation, duality of Light/Dark, 3-fold nature of God, four Elements, 7 days of creation, +9. Maria the Jewess: "one becomes two, two: two becoming 3; three becoming the fourth that represents the One." Ancient beliefs that multiply from One created the world was the Alchemical Goal of the One thing that Represents the Unity of all creation, the Philosophers Stone,

Philosophers stone, Holy Grail - During the middle ages the Stone was equated with the Holy Grail of Christ Himself. Even the Authurian Legend described the Grail as a "Stone beyond Price," which Prolonged Life even when viewed. Alchemy and many Legends came to Europe through the universities of Spain and the Arabic filters of the Moors. And by contact with the Sufi Groups during the Crusades. Both Traditions are rich of the Divine feminine (Virgin Mary cults at the same time). Grail Legends, Authurian Corpus, cult of the Virgin, Songs of the Troubadours all share similarities and inform European Alchemy.

Early Alchemy - what we have are either Prosaic lists of Recipes, or impenetrable allegories. Book of Genesis revered by them.

Metallurgical Roots - early metallurgic + smithing were Probably the cornerstone of alchemy. All in Nature was Alive and had a Soul. Including metals which Grew in the Womb of the Earth. Smithing → Priesthood (Pre-Abrahamic). Smiths were seen as speeding up Nature's intent to Perfect metals, Thought to have Emerged at Alexander the Great's time. (Aristotle + Pneumon?)

Symbology In Alchemy Cont p45

Bolos of Mendes – 300–250 BC Follower of Democrites "On Nature and Initiatory Things" "Nature rejoices in nature. Nature conquers Nature. Nature masters Nature" Wrote on Magic, astrology, chemistry, ~~taste~~, heiroglyphics. Antipathy + sympathy between elements, like Empedoclese. Dyeing + Medicine.

Maria the Jewess – 0–100 AD invented some lab equipment (Bains Marie) and alembic, stressed color of the compounds in the Work

Zosimos of Panopolis – 300 AD Agriculture, history, warfare, philosophy, medicine, chemistry. Wrote Encyclopedia Cheirokmeta with his sister Theosebeia. Wrote in 24 letters of Greek + 4 letters from Coptic = 28 = length of lunar month. Goal was spiritual transformation of the alchemist. Probably a "Poimandres" Gnostic.

Gnosticism: (Pessimistic) World is evil, follow gnostic path to a knowledge of the Devine. Could not be taught by priests, is an internal emotional intuitive experience to find one's own true nature. Zosimos says the Great Work is to take our Adam into the Devine. Alchemy is the same, but with materials. Both live forever.

Both Alchemy and Gnostisism were Heresy to the Church. Library of Alexandria. Supported by Ptolemys. Ransacked by Christians in 387, destroyed by Muslims in 681. Arabic scholars benefitted when they got the remaining texts. (Oxyrhynchus Dump was likely a mission (remnant of a delta Library)

Symbology in Alchemy cont

Khalid ibn Yazid 660-704 son of the Calif
Withdrew from court intrigue to study, Taught by Morienus, a student of Stephanos of Alexandria (doctor Alch)
Book of Amulets, The Great and Small Books of the Scroll,
The Book of the Testament of the Arts, Paradise of Wisdom
Invited scholars to Damascus to translate Greek Texts,
including Nestorian Christians (who were made Heretical by the Council of Ephesus (431). Greek Fathers revered above all.

Jabir ibn Hayyan (Gerber) 721 - 815 Sufi from Babylon
Sufis were Islamic mystics (ascetic, Pray, extacy)
Wrote extensively on astronomy, Philosophy, logic, Medicine, Warfare, automata, magic squares, mirrors. Commentaries on Euclid, Ptolemy, Appolonius of Tyana. His writings do not show mystic ideas. Invented Hg-S metallic mix, 4 degrees of heat in a furnace, obsessed with numerology. Adhered to Astrological timings.

Arabic → latin translators Universities of Toledo, Barcelona, Segovia, Pamplona, open to all, Robert of Chester;
Morienus (1144) The Book of the Composition of Alchemy
Then over the next 100 years the bulk of Arabic writings were translated to latin. (Al Khwarizmi was translated.) Who?
Bishop of Toledo formed a Translation College/University.
Gerard of Cremona translated 76 Texts: Avicenna, Aristotle, Ptolemy, Jabir.
Jabir became Gerber (soft-G) who Published for 300 years after he died. Jabir (Real one) was obsessed with balance and numbers; Gerber was not,
Wikipedia: Toledo School of Translators

Gnosis of Light 1918 translation by Reverend F. Lamplugh

from the notes on the translation: This comes from the Codex Brucianus donated to Bodleian Library Oxford in 1769. collected by Bruce in upper Egypt. This is translation: Greek → Coptic → French → english. The title is "Untitled Apocalypse ~~and is~~ Schmidt claims it is from 2nd century AD and Represents Hellenistic Gnosis (more than Christian gnosis does) "Gnosis is immediate knowledge of God's mysteries Received from direct intercourse with the Diety (Reitzenstein), this is direct unveiled vision of God. not dogmatic theory, but incommunicable gnosis, Rebirth, apotheosis. Gotten in gnostic community, under a mentor, or through personal symbols & Sacraments.

Claims Gnosticism existed before the Christian era (but without evidence), existed as Gnosis, not faith. This is knowledge meant to change a man, not just influence him. Gnosis is a rebirth in which you become like God and then God Gives the Revelation to make you a God. Then you will know everything in an intuitive, vital way. This is Life and Light. Afterwards (huh?) you will study in a new way which seems madness to others, Divine Madness. Disciples are confronted with texts which do not yield ideas to reason or intellect, This is Ritual in words that initiate the intuition into Self knowledge, Texts are meant to Puzzle insider and outsider alike.

The Hermetica by Timothy Freke & Peter Gandy

sounds like the authors totally buy the story of an ancient Hermes → Pythagoras → Plato → Aristotle as one of the pathways of knowledge. They also admit that our Hermetica was written 100–300 AD in Greek and Coptic.

Corpus Hermeticum Notes, by verse

Pimander

1: Ecclesia Gnosis

4: Light & Dark decided. Darkness = Earth, water, fire, air

5 The Word (Logos) separates fire/air from Earth & Water

6 Mind = Father-God, elements = Darkness (Pessimist. Gnosis)
Word = Son of God, Pimander

7 Divine Realm extends beyond all

8 Elements come from Word (Son of God). Solves Problem of Evil

9 God-the-Mind creates 7 planet spheres (Guardians) to enclose the sensible cosmos.

10 Word atones with Mind (Redeems Devine)

11 Word atones with Reason (Demiurge who turns spheres)

12 Mind-father creates Man Co-equal to himself, loves him.

13 Man wanted a thing to control, was given permission to descent to Realm of Fire, penetrating the spheres.

14 So Man has authority over the Earth. He experiences envy (and presumably the other vices). Man & Nature are lovers

15 Man is two fold: Body & Eternal. Body subject to Fate above Harmony, male-female from his Sire

Corpis Hermeticum Pimandress cont

16 The 7 are disfigure in Man (vices)

17 spirit in Nature comes from ether (following Aristotle)
Nature creates bodies, Man (from Life + Light) changed into
Life = Soul & Light = mind

18 God loosed all male-females to separate into male and female
Multiply!

19 all things multiplied. To know thyself is to Reach God;
he who loves astray expends his love on his body & stays
in Darkness (Asceticism) (Definitely Pessimistic Gnosis)

20 "So what Great Fault do the have thy dying Rhapsody done?"
Because Mortality

21 Since you come from Light, when you understand the Light
you shall Return to it. [not really an answer]

22 To men who live piously and in purity the Mind
of God comes Gives Gnosis. Then before they die
they Give up sensations.

23 But the others, the Mind-less, the wicked, and
instead of Mind are Gnosis they Get a Demon & Avenging
Fire to torment, which brings greater wickedness.
The appetites conquer, insatiably striving in the Dark.

24 For the Good, the soul sheds body and appetites,

25 speeds upward, Giving up 1) Energy of Growth & Waning,
2) Deceit of Evils, 3) Guile of Desires, 4) Arrogance, 5) Dark
Rashness & Audacity, 6) striving for Wealth by evil means,
7) ensnaring falsehood.

26 8) Where those there-are sing hymns to the Father. They
surrender themselves to the Powers in God. And are
One with God

27 Pimander was freed to Preach to Men; some listen, some JEST.
Then he sings a hymn to Father.

Corpus Hermeticum cont.

Asclepius

note: the Asclepius in the Nag Hammadi Kodex VI is unlike the standard Asclepius. This is the Standard, Taken from HERMETICA by Brian P Copenhaver Author notes that Bolos Democritus of Mendes (300 BC) wrote first on chemistry (gold, silver dyes, gems). This is from the late 1st and 4th century.

2 Every human soul is immortal, but not in the same way. All in the creator before creation. Earth, water, air fall down from Heaven, only fire ascends. What descends is full of promise, what ascends feeds (Breeder + Feeder). Earth is the receptical and receiver of all that perish.

3 Elements then are 4. one matter, one God, one soul. God governs heaven & soul and all things. God made matter as a receptacle for all forms, by means of the four elements.

4 all [illegible] depend on Heaven. Below they are divided into forms/forms follow kinds (larger Group). So the Kind of Gods will Produce From itself the Form of Gods. Human kind breeds the Form of Humans. Birds etc, also Demons. There is another Kind with no Soul but with Senses (Plants) which finds joy in good treatment. Each Dwell where there are Forms, and the ~~Forms~~ Kinds are immortal. While all Kinds are immortal, not all Forms are immortal. a Human is mortal, but humanity immortal.

5 Demons (Jinii or Genies) who drop down into a form are considered Godlike, Jin's friendly to humans persist. If Human who joins himself to the Gods through Devine Reverence almost attains divinity, Join the Demons and attain their Condition.

Corpus Hermeticus. Asclepius, Cont Sept 2020
Humans are a wonder, we can change our forms.
He despises inwardly the Earthly part, trusting the Divine part.
[This is a very optomistic Gnosis for Man combined with a Pessimistic world], ~~the spirit that lives in everything~~ fills all all ways. The soul feeds on restless stirrings. The body feeds on water & Earth. In human consciousness is understanding. This comes from the Ether. Only humans possess consciousness.
7 Man is 2 parts: Divine & Earthly. The Earthly is 4 parts: Body, divinity of pure mind, thoughts of pure mind, and Peace with itself.
8 God made a god after himself, a God sensible to man. God then made Mankind to admire the second God. Then he made bodies for mankind. Man is equipped to wonder and worship, and take care of Earthly things.
[This is almost wholly Christian theology]
9 It takes constant assiduous service to cherish the God of Heaven. This delights the Gods. The Deity sends down choirs of Muses (Greek pantheon) to mankind. Some humans looked and are inspired, but most are weighed down by their bodies. Mankind is a living thing.
10 Master of Eternity = First God; World = Second God, mankind = third God.
11 Things the body owns are clients to the Divine inside. Man has a duty: worship God, order the physical world, as a reward we expect a release from worldly custody, and join the Divine
12 For the unfaithful, wandering into another body (Reincarnation)

Corpus Hermeticum. Asclepius, cont.

Some find this incredible, fictitious, laughable.

12&14 There is God and matter, and attending the matter is the spirit. (Spiritual creation or plan, followed by Physical Creation)

15 Matter's quality is to be created, according to the spirit,

16 (Problem of Evil) God provides against Evil by Giving Mankind consciousness, learning and understanding. (Not an answer)

17 Hades is the "bottom" of the sphere, because it cannot be seen.

18 Matter nourishes bodies, spirit nourishes souls. But Consciousness, for men alone, and not all men, (male men similar to God),

19 Many kinds of gods, some intelligible, some sensible. The Head of all the gods are sensible Gods, each can illuminate in his own work. Jupiter is God of Heaven, and Provides Life to all things. The Sun is the God of Light. The 36 Sidereal Gods (very Egyptian) are Ruled by Panmorphous or Omniform. The Head of the Planets is Fortune (astrology reference). All Gods use air to make things. And all are linked through the Messes, so all are one.

20 The whole name of God includes Meaning, Spirit, air, & everything. God is full of both sexes & never pregnant with his own will.

21 All things contain both Genders. (Talks about Sex being Private.)

22 Not many reverent People. Evil remains in those who lack Wisdom & Knowledge, Scorn. God made Gods, then Man, and took the corrupt part of matter & from the divine. So the Vices of matter remained coupled with bodies, along with bodily needs (Food). Hence Vice sinks into the Soul, then Gave man Consciousness, so as to rise above Mortality & Ascend to Piety

23 of the vice-ridden we say nothing. (very optomistic Gnosis) As man is Glorified, He glories in God. He advances to Lord God, and Make

Hermetica, Asclepius cont 29 Apr 2020

God strong. We deserve admiration. The statues we make of the Gods also are 2-fold: made of matter, contain the spirit.

24 Statues Represent Gods. Egypt Represents Heaven. But one day Egyptians will no longer Respect the Gods. and Gods will abandon Egypt. Foreigners will occupy the land, and instead of shrines & temples we will have only tombs & corpses.

25 (more Prophecy of the spiritual Fall of Egypt) only baleful Angels will remain to drive People into War, looting, Trickery

26 and the old age of the world will be like this.

27 Gods now are in a great city on the side of a Libian Mountain. Death is the disintegration of the body worn out with work.

28 The soul withdraws & Passes into the Jurisdiction of the chief Demon (Sin) who weighs & judges its merit. If faithful, if stays in Places suitable, if not (dirty with Vice) the soul tumbles down to be buffeted by air, Fire, water endlessly, the unbelievers will be forced to believe by real Suffering & Punishments.

29 God protects the Righteous. The Good are those who work by Goodness experienced divinity already, they are enlightened by Fidelity, reverence, Wisdom & worship and respect of God.

30 Time on earth is told by the seasons. Time in heavens told by the stars movement (ages, 36 sidereal Gods). The Earth is time's receptacle.

31 God is stable & eternal, Eternity is stable. Age

32 and the beginning of all things are in God & Eternity total consciousness is holy, uncorrupted, everlasting. The Divine Consciousness reaches down as far as man.

Corpus Hermetica Asclepius. cont.

understanding is different from consciousness. Eg understanding grows & changes.

33 No such thing as void, the world is completely full. There is no "Beyond the world"

34 it is also full of "Place"

35 kinds & forms again

36 The world can change its forms and does continuously.

37 Mankind is wonderful.

38 Earthly Gods (statues) entertain many mixtures of plants, scents & spices (offerings), hymns, Picrit, sweet sounds. statues do not act aimlessly. statues Render aid as if through being kinship, looking after some things individually, foretelling some things through lots & divinations & even Planning ahead to give help

39 fates are bound to each other by links. So She can be the first God, or the second, or the ordering of things in heaven or in Earth. fate & necessity are both needed.

40 fate, Necessity & order Govern the world by Gods assent, Fate comes first. Necessity follows. order Presupposes the structure of the world.

41 the Participants Leave the sanctuary, Play & sing a few hymns.

Pseudo-Democritus (100-200/1) Describe many formulae and Procedures, seem almost Proto-scientific by Giving objectives, technical vocabulary, close observation. Almost told from the craftsmen perspective.

Medicine - from wikipedia

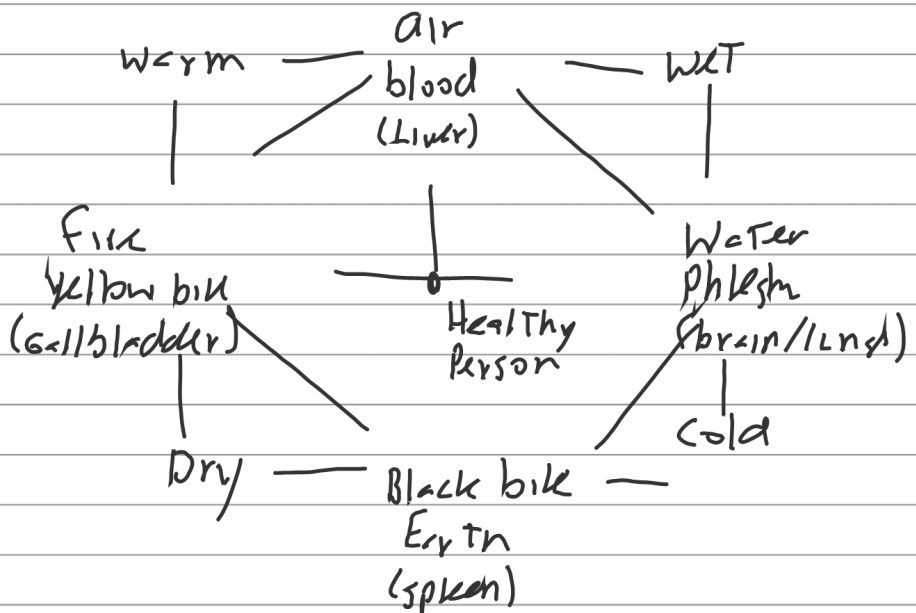
aristotelian Medicine / Platonic Medicine

Myth Asclepius, son of Apollo, People Treated at the Temple. Patients enter Dream-like State in which they Received Guidance from deity or Surgery. Dreams were important in diagnosis. Maybe use opium.

Ancient Greek physicians - Disease was supernatural origin, Gods or demons dissatisfied. The Patient was to blame. The Role of the Physician was to Reconcile the Gods with the Patient or Exorcise the Demon with Prayer, Sacrificial rituals

Hippocratic corpus & Humorism. 60 early Greek medical works uses the four humors (originally something Like 17 humors). The humors Got Linked quickly to the four Elements, though NOT by Hippocrates or Galen. Belana is Tired.

Galen (129-200 AD) popularized the four humor theory.



The Secrets of Alchemy by Lawrence Principe

The author is working to reproduce the Alchemists chemistry in the Lab.

Chapters: 1 origins: Greko-Egyptian Chemeia
2 Development: Arabic al-Kimyā
3 Maturity: Medieval latin Alchemia
4 Revivals: Renaissance? 18th - Modern
5 Golden Age: early Modern period 16th-18th century
6 unveiling the secrets - the real chemistry
7 wider worlds of Chymistry

Recommended Surveys of Alchemy: John Read's Prelude to Chemistry (1936) E.M. Holmyard's Alchemy Frank Sherwood Taylor (1957) The Alchemists (1949). The last is the Best,

this book has extensive endnotes directing Readers to deep treatments of the Topic.

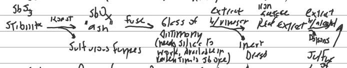
India & China also had (have) alchemies: these are devoted to longevity, eventually ~~eternity~~ or simply immortality. The links between Eastern & Western alchemies is uncertain, though (Aristotle) and Arabic alchemy are possible. (I think Aristotle is the link.) They

the typical method of study is to decode the language & symbols. But here Principe chose to unveil the symbols & Allegory in his Lab (ch 6). I will start with ch 6. Regardless, study of Alchemy is a lesson in diversity & Times, seen through the eyes of others.

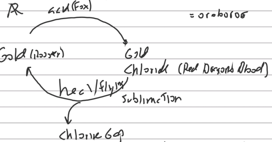
6 Unveiling the Secrets

Early Modern chemistry embraced chemistry, medicine, theology, Philosophy, Literature & the Arts. It's necessary to look at several at Parallel to make out what was happening.

, "Powerful King"
Basil Valentine, native of Upper Rhineland, Benedictine Monk, studied alchemy to make medicines, labeled a "Hermetic Philosopher" = alchemist. Several authors wrote under his name. One is almost certainly Johann Thölde (1565–1624) a salt maker in central Germany who published the first 5 Valentine books. 1624 The Triumphal Chariot of Antimony is his most famous — the book concentrated on converting antimony (Sb) in → pharmaceuticals.



This follows a Paracelsian Principle of Separation to remove the harmful parts (this looks familiar because plants can be treated this way, but not elements). The iron in the product was almost pure iron chloride, the iron from his lab utensils. Valentine discussed the cyclical part of the process: (3rd Key)



The sublimation step does not happen using pure chemicals. Only when ~~NH_4Cl is present (sal ammoniac) does the sublimation/decomposition reaction~~ occur. Cl_2 is present as

The Secrets of Alchemy, Principe, Cont.
The Aud Sublimes rather than decompose. The
Ug holds the decomposition Reaction back enough to
allow Aud to sublime. The high-flung language is used
to Reveal what the Alchemist observed, not to hide.
In Basil Valentine's Twelve Keys, it is likely he did
the First 3 Hided himself, and described accurately.
The Middle keys are likely the authors Reenactment of what
you should see, but he did not see them. The last Third
He quoted from other Texts.
George Starkey (American, moved to Europe) 1650 was also
Eirenaeus Philalethes ("peaceful lover of truth"), he Turned
Robert Boyle onto Alchemy. We have several of his lab
notebooks. Died in the Great Orbonic Plague of London, 1665.
Newton Read the Philalethes Manuscripts, which are some
of the most extravagant allegories on Literature.
Valentines 12 keys was the "Wet Way". Philalethes is the "Dry
Way", ("mercurialist"). This starts with Hg, then adds 'heat'
to counter the Coldness of the Hg to Give a new metal.
Some use Gold, some use quicklime (CaO), salts, or like Starkey,
antimony. He used a form of elemental antimony which
hardens to form a star on the surface. We have a letter
from Starky to Boyle told in plain chemical language,
and the same experiment described as allegory.
example, 'Fiery Dragon' (iron), "our Magnet (antimony), "Torrid
Vulcan" (fire), "Hyssle" (filter), (separate from slag), etc.
Boyle messed with it for 40 years, Newton had a copy of the
Philalethes letter. Why so much interest with "Philosophical
mercury?". The Dry way alchemists held it was the starting
+ Gold

The secrets of Alchemy, Principe cont.
material for the Work. it would react with Gold and
Display the expected color sequence: black, white, yellow, Red,
To produce the Elixer of life. These alchemists were
looking for the seed of Gold, from which Gold would Grow,
This seed of Gold can not act on other metals while locked into
the body of Gold; it must be liberated to become active.
Mercury dissolves Gold Gently, not violently like AR does.
This keeps the Power of Gold's seed intact, mercury nourishes
this seed, allows it to strengthen & multiply, and can
then transmute other metals. [This is Pre-Jabir thinking
Properly.]
Principe makes point that these alchemists did not believe
the metals were alive (contrary to Plato & Gnostics) It was to
them an apt analogy. Horticulture was familiar to all
so used it. So what drove these alchemists, despite failure?
Secrets of Starkey's notebooks. made "animated Philosophical
Mercury, which looked like the starting material. Mixed
a Gold + buttery mix, a sealed flask, heated for weeks. Mix
swelled slightly, then got covered with Warty excrescences.
then one night it changed, ~~became~~ Gray amorphous mass, which
Turned into a glittering tree (tree of silver) (tree of Hermes).
This Gnostic - tree works with the idea of a "seed" of Gold.
Philalethes called this the "mercury which Grows in the Form of a
tree." (Principe never says what it was).
Why were so many convinced the Philosophers Stone existed? it
fit into Prevailing Theories of Matter (from Aristotle & Jabir), and
especially from Plato's Prime Matter & Aristotle's Properties. And
they had eyewitness testimony in the Literature. Boyle saw 2

The Secrets of Alchemy, Principe, cont.

Projective Transmutations and believe them enough to argue before Parliament to have the King's 1404 Ban rescinded.
[But scientists are the most easily fooled] End of ch. 6

The Scientific Revolution #1 = Petrus Romus (1536)

Cosmology
- Copernicus (1543)
- Tycho Brahe (1604)
- Kepler (1610)
- (Galileo) (1632)
- Newton (1684)

Chemistry
- Paracelsus, Tycho
- Boyle (1661)(1662)
- Blundt - P
- Stahl - Phlogiston
- Cavendish
- Priestly
- Lavoisier (& Optics)

Medicine
- Vesalius (1543)
- (artists)
- Harvey (1628)

Physics (mechanical Philosophy)
- Newton (1687)
- Snellius (1621)

Marcia Kelleyer, Ed
The Scientific Revolution: The Essential Readings 2003 (1999) wiky
.Floris Cohen
The Scientific Revolution: A historiographic Inquiry 1994 Chicago

find: TLOGIS "Skeptical chymist" ISIS 8 p71 1926 ✓
Boas "establishment of Mechanical Philosophy" OSIRIS 10 1952 ✓

quick-send

Paracelsus

seemed to be a classic transmutationalist in some of his texts, but has a Reputation for Medicinal Chemistry. Based on his four Pillars of Medicine (Philosophy, Astronomy, Alchemy, Virtue) his Thinking looks entirely Alchemical/Aristotelian.
see Ambix V67 No.1 2020

answered in ISIS in 2014

Thomas Kuhn "Robert Boyle and Structural Chemistry in the 17th century" ISIS 43 Apr 1952
Aristotle (the Generation & Corruption) says that all combinations (compounds) of matter are non-permanent & unitary. Atomic theory is more than Corpuscularism. Boyle's Corpuscularism counts as impediments to a Proper Atomic theory. Boyle had trouble deciding if something was a Compound or an element.
After Boyle there was a decline in Chemistry for 100 years, until Lavoisier. The origins of the influence of Newton, with his non-mechanical (and now occult/explanatory) of Gravity
Why is there 100 yrs Between Boyle & Lavoisier? (1) Phlogiston. Many strains when it was destroyed, not many Coherents. (2) Newton's Gravity had no explanation it was occult. But he also made a mechanical universe, obeying Laws. (3) Metzger, and Metzger say that Boyle wasn't a break from Alchemy & Scholasticism, but the slow extension & Elaboration of Peripatetic and Iatrochemical concepts. This makes Boyle an unclear Precursor of Lavoisier, who failed only because the Time was not yet Ripe.
This paper will make the point that Boyle saw the Universe orderly as a clockwork mechanism; this idea bought much in Physics, but Remained sterile for chemistry. His failed Paradigm most influence was specific shortcomings of his Ideas. His idea of elements & compounds

record pause stop

find the Meyerson Reference. E. Meyerson *Identity & Reality* 1926
Early Atomic Theory: G.B. Stones, "The Atomic [illegible] . 15' [illegible] 77-[illegible]. 1930, 10 1928 ✓

were neither modern nor advanced enough to influence Chemistry.
Peripatetic = Aristotelian   iatrochemistry = chemical med. or (alchemical)
△ 🜁 ▽ 🜃 — Elements —   Paracelsus: ☿ 🜍 salt
Pre-Boyle atomists: Sennert, Basso, Magnen, [illegible] & Clem J. Jung,
in *Skeptical Chemist* Boyle differentiates the "Peripateticks (continuous matter) from chemists' (atomists). His corpuscular theory was different. Boyle has qualitative characteristics of matter (elements & compounds) coming from how corpuscles of matter are arranged & how they move. This is dynamical and explains phys. changes that atomism cannot. Atomists found properties in arrangement. Boyle (corpuscularists) found properties in the motions. [Like [illegible] difficulty: they have not yet found the difference between physical & chemical properties] [This difference could not appear until Dalton developed a simple atomic theory. Then the ~~Parts of~~ properties which [illegible] atomic theory could [illegible] separately, and the dynamic part of properties became thermochemistry] in classical atomism motion changed properties; in corpuscularism motion was the cause of properties. Even in Boyle's time philosophers were after the Laws of Motion. Galileo, Mersenne (& others except Hooke & Newton) influenced Boyle. Boyle published on "[illegible] & [illegible] Motion", a precursor to latent heat. He used motion to explain heat, electricity, magnetism. Boyle was onto latent heat in 1669 "of Absolute Rest in Bodies."

For Boyle structure was more a relative position. Sarton "Boyle, Boyle the Skeptical chemist and the Skeptical Historian" *Chymia* 3 1950. Boyle didn't wholly abandon transmutation (neither did Newton) & both could use corpuscularism to explain transmutation, ~~[illegible]~~ in a letter to Glanvill he said most transmut. [illegible] behaviour, but some [illegible] corpuscularism, for it allows the [illegible] of matter to be based in part on its motion, allows transmutation of anything into anything; Plants, nourished by water alone, can distill into oils & charcoal = transmutation. Using transmutation

Symbolism

To refute others "chymists" is a theme of Boyle until 1682, the second period skeptical chymist relies on this refutation of transmutation. This attack was answered, ineptly, by Wm Newman, "Robert Boyle, Transmutation and the History of chemistry Before Lavoisier" Osiris 2014, 29

H.V. Sheppard "A Survey of Alchemical and Hermetic Symbolism" Isis 8 1960 35-41

Most symbolism is Religious. Of Alchemical Symbols, few works catalogued them encyclopedically: Dictionnaire Hermetique, Petrietys Dictionnaire Mytho Hermetique, Poisson's Theorie et Symbole des Alchemistes, with Le Symbolisme Hermetique. Poisson's has the most value. This symbolism was studied by Jung & other practitioners in the Interpretation of Dreams, etc. (See Article Bibliography)

Symbolism has difficulty when used as simile or metaphor - we do not always see what the comparison. Alchemical Symbols may be better called "Signs," where a sign substitutes for the Real thing. [The article follows Jungian idea of symbols being unconscious expressions, not purposefully created] Summary of Symbols Meanings

A) Literary
   1) Sign and Symbol synonymous: both alchemical
   2) Figures of speech; metaphor, allegory, Parable in Literal or Pictorial form (see Ether Mutus Liber)

B) Jungian System
   1) SIGN a) simple Representation b) facsimile of a Thing, Person
   2) consciously formed
   2) Symbol a) simple or Composite form b) object suggested

record pause stop

Symbols

c) Unconsciously formulated or archetypal d) The Notional components and figures of speech

2) ALLEAU System (R. Alleau, De la Nature des Symboles (1958)) is v. complex

1) Symbols confined exclusively to Religious Meanings

2) Synthemes (or Synthemata)

a) abbreviations ☉ Gold

b) didactic ie conventional signs, pictorial, often enigmatical, teaching concise fashion a number of philosophical or scientific ideas beliefs which are kept secret

Most signs are of Middle Eastern origin; Babylon 1600–1400 BC
See G. Heym 'Some Alchemical Picture Books' Ambix I, 1
The Renaissance used Classic Mythology as a Primary Symbol Source

** SYMBOLISM **

J.R. Partington (+ others) "Report of Discussion upon Chemical and Alchemical Symbols" in Ambix I 121

The use of symbols to represent metals goes back to Babylonian times, 1600–1400 BC. Perhaps back to Sumerian times; already held to be secret/sacred, not to be shown to the uninitiated, 60 symbols, including sun = gold, moon = silver, red = ~~Ninmen~~ Ninmen, Copper = Ea, association metals w. planets is found in Foundation Deposits, 2000 BC in Egypt, Nubia & Sudan, Best known is Sargon II (710 BC.) translated by Berthelot; probably of Babylonian origin.

Celsus (200 A.D.) talks about the "ladder of Mithra" of 7 gates/steps

1) lead = Saturn; 2) tin = Venus 3) copper = Zeus 4) iron – Hermes 5) mixed ~~tin~~ metal Ares 6) silver – Moon 7) Gold – Sun. Also Persian work of Bundahishn, limbs of Primeval Man = different metals "Gayomard"

Symbols

quick-send

Neoplatonic writers believed the Rays from each planet penetrated the earth & "drew" respective metals slowly.

Year	Saturn	Jupiter	Mars	Sun	Venus	Mercury	Moon
1500 BC	metal?	-	-	Gold	Lead	-	Silver
Babylonian	+	-	-	Gold	Copper	-	Silver
150 A.D.	Lead	Bronze	Mixed	Gold	Tin	Iron	Silver
200 AD	Lead	Tin	Iron	Gold	Copper	Electrum	Silver
Alexandrian	Lead	Electrum	Iron	Gold	Copper	Tin	Silver
300 A.D.	Lead	Electrum	Iron	Gold	Copper	Tin	Silver
700 AD	Iron	Electrum	Mixed	Gold	Tin	Lead	Silver
7th c AD Alchemistic	Lead	Tin	Iron	Gold	Copper	Mercury	Silver
800 AD Arabic	Lead	Steel	Iron	-	-	Electrum	Silver
1150 A.D.	Lead	Silver	Iron	Gold	Tin	Bronze	Crystal
Arabic	Lead	Tin	Iron	Gold	Copper	Mercury	Silver
1200 AD Syriac	Lead	Tin	Iron	Gold	Copper	Electrum	Silver
1400 AD	Lead	Tin	Iron	Gold	Copper	Mercury	Silver
Syriac Arabic	Lead	Tin	Iron	Gold	Brass/Copper	electrum	Silver

The symbols themselves were of Ancient origin: Sun (☉ ⊙ ☌), Moon (☾), names being contractions of Ancient names Saturn (Κρ from Κρονος "Chronos"), becoming ♄. Mars, from Θοωρας "Thoras", ♂. Venus, Φωσφορος Ιωφορος, ♀. Mercury Στιλβων "Stilbon", ☿ (this is changed).

F. Sherwood Taylor, "Symbols in Greek Alchemical Writings" Ambix 1, no. 1 (1937) Two forms of symbolism A) a shorthand notation, well defined, and B) shorthand for very complex ideas or processes. Alexandrian alchemy only knew A), and very simply

record pause stop

B). The Chrysopoeia of Kleopatra is the most complex. In the majority of Greek alchemy symbols appear in lists of symbols similar to our lists. The Leyden Papyrus contains symbols for gold and silver, and may date back to Alchemy's origins (300 BC?). Marcianus 299 is the oldest list; Parisinus 2327 the most complete, including some words not in use until 1500 AD (6-700) and some medical symbols. Signs come in 3 forms a) planetary metals, b) pictorial representations of things, c) the letters of the name of things.

Marcianus 299 example:

Gold [symbol] χρ γ υσ — to indicate metal + modification, eg.

Gold filings [symbol] χρ υσος PINHΛΛ

Gold leaf [symbol] χρ [symbol] πεταλ [symbol] etc.

Calcined gold [symbol]

Electrum (gold + silver) [symbol]

Chrysocolla (solder of gold) [symbol]

Malagma of gold (mixture of gold) [symbol]

Pictorial signs (b) were eggs, eye, rainwater, sea water all for purity. c) used letters, X for copper, Θ for sulfides, etc. d) some don't make sense! Cinnabar ⊙; Arsenic [symbol]?

Most of these do not pass into later alchemies without great modifications. There is a syriac manuscript where the symbols are clearly Greek (~1400 A.D.), but some are totally different. (Perhaps the author was reading only the Greek + 1 other?). Later European (Renaissance) symbols show little Greek influence. Maybe six symbols were retained (is this because of alchemy's pass through Arabic?). Symbols also move into medicine.

A.F. Titley, 'The Macrocosm and the Microcosm in Medieval Alchemy'

Symbols

Ambix 1, no. 1 (1937), Medieval & Renaissance Symbols are complex and obscure, perhaps because they got symbols from the Arabs, who got it from Gnostic & neo-Platonic sources who did not get into symbolism; the Arabs/Hermists were banned from human Representation. Symbols & allegories were fanciful, used to cloak ignorance, guarded Practical knowledge, guarded Theory. Some symbolism was from scientific ideas, some was from the environment of 1200 A.D. The Chief Theory was of Microcosm & Macrocosm ("as above, so below") [Cosmos/man: man: Elements] The Theory is complex, and Perfect for Pictorial Representation (Hildegarde of Bingen, Charles Singer Studies in the History and Philosophy of Science Vol. 1) done just before 1200 A.D. Plates at the end of the Document. ~~Plate 1-4 not in the PDF!~~ Sometimes the microcosm is the alchemists Furnace or Retort, the "Vessel/Hermes" or "Philosophical egg" (the egg is an old symbol in Alchemy) the Planetary Rings coming into the Earth, or the experiment, is common. Edward Heym, "Some Alchemical Picture Books Ambix 1 on Symbols & Pictures largely ignored in alchemical study. Symbols are present in all European Writing. Picture books appeared 50 years after Printing Press. a Picture & Description Text commonly used for fables & stories. 3000 books in the next hundred in Europe dominated, with only a few Asian India & Tibetan Examples known. Before Printing these books were known, but most were crude in the drawings. Examples Janitor Pansophicus, Splendor Solis, Cabala, Speculum der Kunst und Natur from 1600's. a few are only the pictures. ~~All~~ Atlanta Fugiens (1617) is so considered Plates with accompanying text. Michael Meier,

Symbols

In 1624 Lucas Jennis Published 107 Figures + Text, *Viridarium Chymicum* by Daniel Stolcius de Stolcenberg. Also by Stolcius is *Hortulus Hermeticus*. Both are Emblem-books.
These books by Stolcius are useful. But we don't know what underlies the order of the Pictures, and some Pictures still baffle the Reader. Reading these books is almost an unconscious Experience, Pulling toward the mystical, abandoning Reason.
Symbols were discarded in Europe with the industrial age (1750s).
It is the psychologists (Jung) who dug symbolism out & started using it again.

D. McKie Some Early Chemical Symbols *Ambix* I, no 1 (1937)
Oswald Croll (*Basilica Chymica* 1609); Robert Hooke (1672-1640, *Diaries*)
used chemical symbols earliest. Examples
Air 🜁 Allum ○, ⊡, Ink ⌑, Magnet ○⌒○, To Purify ○⌒○
See the wonderful chart in the article from Harris *Lexicon Technicum* 1704. The symbol for saltpetre ⦶ or nitre ($NaNO_3$) was used by John Dalton for "azote" or Nitrogen in 1808 *New System of Chemical Philosophy*. "Wheel fire" Ⓐ is the same as *Ignis Rotae* or fire covering the whole of the vessel; "Calcined Ashes" ⍭ are the lees of wine dried & burnt to ash, a kind of calcined Tartar. Combine the symbol for sublimation with mercury gives sublimed ~~mark~~ mercury sulfate (corrosive sublimate) ☿⫫, combine precipitation with mercury to give Calomel ☿⫫
⫫ ☿

Notes from James Burke "Connections" TV series, 1978 (US)
1978 Book, (Science History)

Series 1 Episode 1: Long bit on the Northeast Blackout, Nov 1965
Egypt, 3000 BC. Night soil ⇒ people ⇒ plow must be used to replenish soil each year. ⇒ surveyors to reestablish the boundaries. ⇒ Cities come from the plenty. [This was driven ~10,000 BC Drought] [This was the most recent Glacial Recovery, the 20k cycle]. The plow invented maybe 10,000 BC, Earliest examples 3500-3000 BC in check, India] Burke says Egypt, India, Central America, Syria, Physical land is productive ⇒ the population grows, villages spring up, Baskets weaving ⇒ Grain Results. Cooking becomes important. Grain storage (keeping track of who owns the part of grain) starts symbols. Around 2700 BC stone building starts. Irrigation ⇒ Surveying. Metals needed for War, Smelting ores ⇒ transferring metals became ships. ~~Currency with metal coins.~~ Bureaucrats in Egypt needed to know when flooding starts and found the Times in the Stars. This created the Calendar. Empire followed. Temple of Karnak in Thebes, center of Egyptian Religion, 80,000 workers. Technology of the Egyptians' wheels, irrigation, plow, writing, loom, glass metal, Taxes, Bureaucracy, Police, astronomy (simple version). Calendar, religion, Pen + ink, cutting tools.

Episode 2: No one ever knew what a new change would bring ⇒ end, what might be brought about - 500 BC Money. The early Greek city-states bartered for everything. There was no cash 700 BC in Lydia a River Washed Placer Gold, made into Religious artifacts. Touchstone was invented to quickly assay Gold. By 500 BC metal (Gold) as cash used, and trade ~~flowed~~ flourished. By 300 BC Alexandria the Great had the most Reliable money. Alexandria was the center of Trade and Scholarship.

record pause stop

Connections, Season 1 James Burke 1978

quick-send

(Story of Book Burning in Alexandria [Probably Myth,] Some books preserved. Scrolls made of Papyrus/Lion Gall ink. Law: If you arrived with a book you had to get IT copied for the Library. Ptolemy (150 AD) Published a star chart, used for navigation on West Coast Oceans) (1022 Stars Listed), Sailing! Early Sails were square, and could only run before the Wind, so had to Know the Winds of the Coast to Navigate. No ocean Sailing: you could not get Back. ~~You DO the Triangular sail allowed the Ships to sail into the~~ Wind. Arab Pirates Caused Goods to be Transported in smaller Ships, which could use (by 900 AD) a triangular Sail, which Could sail against the wind. This meant ocean sailing was Possible. ("Lateral Sail") No more waiting for the Right Wind (or paying Rude Crew to do all the Rowing. By 1200 AD the ships were bigger, & steering became a Problem, the Chinese were using the Stern-Post Rudder & Mediterranean Sailors used it. In the 16th century voyages of Discovery Mariners needed Those Problems & Star charts. Ships used Triangular sails to get into the Trade winds, where the Square sails were deployed. 1200 AD, Probably from China: the Compass. 1300 AD mounted on compass Card, Oceanic Travel now Possible, Sailing under overcast skies possible. By ~~1600~~ The magnetic Anomaly was a Problem. William Gilbert (Anatomist, Physician) studied the Compass in 1600 who concluded the earth was magnetic and where the Poles are. He used magnetism to explain Gravity. Otto Guericke in Germany Got excited about the magnetic explanation. ~~He experimented with a large ball of sulfur with a stick axis. Rotating the ball under his fingers.~~ He created a Vacuum-filled ball that two horses could not separate, when the Vacuum was

Guericke

star flag tag

Connections season 1 Episode 2 James Burke.

broken the hemispheres fell apart. He had invented the vacuum Pump from a fire extinguisher, in 1654. He also made a ball of sulfur on a stick, examining it for gravity, when spun on its axis & touched by the fingers, the ball would glow & ~~spark~~ crackle. ⊖ → weather, ~~Scotland~~, bell ringers got electrocuted by lightning strikes often. When lightning struck exploding gunpowder stores, Franklin invented lightning rods to get rid of atmospheric electricity. Weather tracking in 1861 began to predict the path of storms. Weather balloons caused some to experience symptoms of high altitude, others made atmospheric observations. weather predictions became possible, they needed high altitude stations: Scotland, Ben Nevis, 1883, weather station. The observer at the halo around a shadow in the clouds. (cloud also invented) = "Glory" The order of the colors is opposite to the Rainbow. 1894 Wilson saw a glory and wanted to create his own in the lab. His Cloud Chamber went on to provide an early view of radioactive particles. He went on to study bad weather & lightning. He told Appleton why he got bad static on aircraft, who found the ionosphere with radio. Watson Watt was trying to find storms using radio. The military asked Watt to make a death ray, but he invented radar instead. The cloud chamber was important to Ernest Rutherford who understood why the streaks were there, leading to controlled radioactive transmutation.

EPISODE 3

x-rays have given us the most detailed view of the human body. 1066AD Battle of Hastings, Saxons v. Wm the Conqueror. William(Norman) won. Normans had stirrups on their saddles, which allowed lances to be used on horseback, 3½ horses needed. This meant

Connections series 1 Episode 3

It was expensive to outfit an army, and costs to train. By 1250 the "nobles" who had enough to fight well to field needed shielding to fit themselves. by 1300's the knight was the only war machine. until the Battle of Agincourt 1415 AD. Henry V won with bows & arrows, Longbow could kill at 400 yd. But only 100 yrs later they could not field a company of archers.

At 700 AD the Plow was improved by adding a knife, board & wheels to the simple Egyptian Plow, farm was a pleasant & popular to Rose. Groups formed to form together, villages sprung up. End of 800's the horse collar made horse plowing possible, Population doubled. The horseshoe meant more work from horses, and Crop Rotation meant exportable food. People could have Leisure time, and no one needed to be a soldier. Some even bathed. From 1100 to 1150 the population Tripled. Bureaucracy, cities. Kids would live better than the parents.

1200's Gunpowder: China → Arabs → Europeans (The chinese invented lots, but didn't use them the way we did. They had so much & changed so little. The chinese has Tao, the use of the universe, a Philosophy of doing things the natural way, not exploitatively.) [chinese had compass, printing, paper, porcelain, etc. but didn't exploit them much. 1800's.] [The chinese did not pick out one thing to improve; They used system-wide considerations only.] [chinese philosophy - Shen the spirit of the universe could only be contemplated, not changed.] [China invented cannons 600 yrs ago on a huge scale, and that requires a bureaucracy and classes, and immobility - you stayed as you were born (see Eighth Branch stories), it was a non-interventionist society, no change.] Europeans took bellmaking → cannon-making, and ever escalated. 1327 cannon-balled ever changed landscape ever - no one wanted to face a cannon.

Connections — Season 1 Episode 3

quick-send

Joachim
1516 Silver strike in Yorkshire, Tollers were minted (134) Silver veins found, and Capetalists Funded the operations. 1556 mines bible Published.

Water in mines was a Problem, most effient was a Water wheel-driven Suction Pump, which could only work in 30' Rises. Galileo & his pupil Torricelli on the problem, who realized what air pressure was. He used a small model using Mercury to Represent the water. Sent the info to Ricci in Rome, the church had declared following Aristotle that there was no such thing as a Vacuum, Ricci Sended it to Mersenne (of Mersenne numbers) in Paris. He Mersenne was Known as the Postbox of Europe because he knew so many Scientists. He sent it to Pascal in Northern France. He Preformed the Barometer Experiment, and Created a Vacuum. Pascal agreed that air pressure Was a thing, and studied it in the mountains. 1620's

1675 Paris, French astronomer Picard. He saw that the Vacuum space of his barometer would Glow sometimes. His Reports started a century of Static electricity Study (with Franklin a Volt at the end). 1709 Gravitational attraction was attributed to Electrostatics. 1729 Grey created static Electricity "Wires" of thread. 1745 Leyden Jars, Much Experimenting on. 1780 temper of Electrical Health. 1783 Galvani observes frog legs moving, concluded that electricity was made by animals. Volta in 1800 made the electrical Pile. Early Pitch-bell Typewriters could communicate at a distance (poorly) (2c in. s) or electrolysis In 1820 ~~Oersted~~ Oersted observed electricity move a compass needle, → electromagnets, → sound recorder, → Phonograph.
→ Telephone (1875 Bell)
→ Radio
→ Radar

record pause stop

Connections Season 1 Episode 4

EPISODE 4 Telephones dominate us now. (demo of Early telegraph key system) Rome fell Apart 500 AD Taxes were too high. Only the Church held things together with it's network of Monks in monastery's. Medieval Industrial Revolution based on water wheels, → Grindstones. → Triphammers, → saws. These monks were self sufficient, so work was important. Monks in the Cistercian Abbey were the center of Technology, 600 of them. [Benedictine Black Monks started up ~~605 AD~~ → 1098 AD), spread in 1111-1152, Grew to 1200's, Maxed out in 1400's.] Sheep farming in 1200's Gave the best wool in Europe.

2 chinese Gifts: loom (it was so fast it used up all the yarn) and spinning wheel (Produced yarn fast enough). Created wealth, especially cottage industry (Father weaves, mother spins, kids card the wool.) In 1200's there was a surplus of cloth. Silk was the valuable commodity, 1275 Italian silk was the big Producer. Genoa started investments in shipments to markets. This spread the risk, which encouraged more Trade.

1400 the climate cooled, crops failed, society weakened by 1487 the Plague, lasted 4 years, 24 hour death. Wealth concentrated & they started over, and survivors partied. and started wearing underwear. Bone collectors began to collect linen, which drove the Paper-making industry. Paper became cheap. The cost of calligraphers was high (Black death), so printing became economical. Guttenberg 1457 invented movable type, which Produced lead characters for Printing. Became Popular ~1500. [Picture Books very Popular] [Encouraged accuracy because of being widely read.]

Many Refugees from Constantinople (1543) came to Venice, bringing Their Prized books (Greek books). Dictionaries & Grammar books

Cistercian Monks

Connections Season 1 Episode 4

In Greek first, there lots of ancient Greek texts that survived Alexandria, ⇒ Renaissance. Michelangelo other read these books. (Especially alchemists) 20 million books in 1500. He reinvented Italics.

Greek science become known. Heros of Alexandria, put science into the hands of craftsmen. The craftsmen invented Machines, animatronics, hydrological toys. Chinese fashion became the fashion, and more complex looms were needed, using punch cards. Jacquard loom, using cards (not paper), 1750 the entire process was automated - no more weaver. after 1800 this was improved again, and they had the supplies to run looms in England. By 1850's the cards were controlling Riveting machines, Big ships to carry Irish Emigrants were built.

The National Census needed to account for Empire. 1880 card helped with the tally. Hollerith. Tabulator, He had a Puncher, a Tabulator, a Sorter. → computers.

Episode 5 Computers are important & Astrology. circa 1000 BC [Explained by Aristotle 1000 BC] by 500 BC most Constellations + stars had names, the "Planets" Included Ground, Sun, moon. 150 AD Ptolemy had a star tabu. By 700 AD Folks thought they had a good sense of Astrology. Earth-centered, under Giant crystal spheres (after Aristotle). [Note: the Scroll Dump at Oxyrhynchus(?) had no Aristotle, no Alchemy, no Astrology; The Arabs kept them + passed them.] Astrolabe used by Arabs to figure direction of Mecca. [Star, Horizon, Date, Time] [From sighting a known star.] Astrology was important in Baghdad, Arabs found Greek manuscripts in Baghdad (+ elsewhere Alexandrian Libraries Existed.) 1200 AD Arab translations come to Europe (maybe earlier in Eclipse [Italy]), New Universities studied Medicine & Astronomy.

record pause stop

↑ Oxyrhynchus Papyri

Connections Season 1 Episode 5

The church was not so impressed with the new science (natural Philosophy) [Here Aristotle Plato shows up: The church defended Reason, the new philosophers sort of didn't]. [Here Burke puts into the minutes of the Natural philosophers idea of "Proof" Technicians exist for another 400 years.] from the church comes the Inquisition. Monk in 1198, fire in a local abbey. they set Ron to the clock, a water clock (demonstrated), 1280 use no water, only weights & escapement. By 1400 the clocks take proper hours to work, not just when monks pray. Town clocks, production went up. 1450-1460 spring-powered pocket small clocks. Most come from Nuremberg Germany, in a mining district. They also produce instruments, like Astronomical ones. and Problems with the Astronomical model was not right. 1603 telescope invented, 1609 Galileo had one. He saw the Jupiter systems, confirming the copernican model. (Simplistic View of Galileo Presented.) Galileo also invented the Pendulum & its Properties → Clock eventually. Huygens 1680 pendulum clock, Navigators needed Good clocks to find latitude. Sheffield steel spring worked well for consistent escapement. Huntsmen saw Glass furnaces were not enough (mud pots, adding steel) which was Good for clock springs. Ramsden, London, could make very exact scales or sextants (1774) by using a screw to create the increments. By 1797 all ingredients Ready for Harrison Maudsley could make very accurate instruments Boswell had Maudsley made other industrial instruments driven by water wheel, these industrial step by step construction made making things economic. Americans grabbed the factory system & made Cannons etc, to fight Britain. LeBlanc told Jefferson about Pattern construction. Eli Whitney, Hall, & North. Created interchangeable Parts! Weapons kept working after they Broke. Guns → Sewing machines → Bicycles → Cars. Gilbreth studied workers to design efficiency. (cheaper by the dozen) → Taylorism leads to a form of Equality, Everyone has the same stuff, identical except S/N.

Connections Season 1 Episode 6

quick-send

Episode 6 The Production line has given us ubiquity in our world experience. And we are all similarly dependent on energy. 1100 yrs ago, Ice age (mini) (either solar cycle or volcanic activity) (1200's) the freeze started moving south across Europe. To survive, farms, fireplace (chimney), and European classes, staircases, tapestries on the wall, knitting, buttons, wainscotting, plasterwork, more games, music, reading, individual bedrooms, privacy, cleanliness, hot baths, indoor plumbing, utensils, turbine-driven spits, and glass windows. Wood was being used at a tremendous rate, so industries looked to America (= pilgrims + funded colonization). To help the economy some copper mining started up (→ bronze), and coal started to replace wood used industrially. Bristol builds up as industry. Iron gets made from coal coke, pure, valuable → iron boats. Mines flooded, Newcomen made a vacuum-operated steam pump to get the water out. Invented a reciprocal → straight-line motion beam. → chn. stays straight. James Watt improved it by pressurized stroke, not vacuum stroke; high pressure, two-cylinder engine. Watt used a good cannon-boring system to make the cylinders. → Industrial Revolution.

Joseph Priestly invented CO_2 ("fixed air") used to make fizzy drinks. Volta, who communicated with Priestly, looked into gasses in air, found methane in marsh gas, inflammable air. "Bad air" exploded, so ignition was used to detect malaria for a while. Exploding gasses in a cylinder (Daimler) invented internal combustion engine (valve system, carburetor, piston, crankshaft). The carburetor was a version of the Bernoulli sprayer. Spark ignition was the ~~capstone~~ capstone of the engine. "Mercedes" was the name of the ~~dealer~~'s daughter who suggested the spark.

EPISODE 7 Like the 747 freighter, the Dutch "Flight" sailing freighter trade worldwide followed. To make cargo delivery pay, they needed small crews, using block + tackle to control the sails. Dutch East India Company, + British Comp-

record pause stop

1 Connections Season 1 Episode 7

quick-send

xtition. The British dealt in slaves → America, tobacco → England, Goods → Africa. Lloyds of London was a consequence. Lloyds classified ships by hull soundness and equipment. Hulls Protected by Pitch & Tar, coming from America. Until 1776 British efforts to make coal Tar Produced Water Gas. Copper-bottomed ships came at the same time. Cotton mills were looking for better night Lighting. Windsor wanted to Gassify Britain. His equipment wasn't ready. But in 6 years most cities had Gas. (H_2 + CO). The excess Tar was dumped (smelly) The ammonia in tar from high-temp combustion of coal to make Coke + Tar + Gas) He took the Tar, got ammonia + Naptha, Rubberized cloth (McIntosh cloth) Rubber Goods Popular (Latex from South America). Quinine from the bark, became Gin + Tonic, New Geologists were looking for a Quinine like that could grow in India. Who's Perkin Worked on Quinine Synthesis. Made Violet Dye instead. Made, 1862, Training Chemists Weren't Training. Britain didn't follow up, but Germany did. Bayer, BASF, etc, Synthesizing Synthetic Dyes. By 1870's the Germans had a Rainbow of Dyes + Painkillers (Aspirin). McCormick combine harvester (America) Produces excess but not to Germany, who exported Rye for money. Germany Ran out of Food + needed to Grow own wheat, but no fertilizers around. Haber formula way to make ammonia using iron catalysts. The Haber-Bosch Process never got Going in Peru. Calcium Carbide Invented $CaC_2 + H_2O \rightarrow H_2C_2 + Ca(OH)_2$(s), acetylene Gas light Popular. (→ welding). Cyanide + Frank Caro N_2 to hot CaC_2 to make fertilizer $CaCN_2$ calcium cyanamide. Germany improve Infrastructure (steel), ammonia, and Nationalistic emotion to stock wheat, H_2C_2 later becomes Plastic. Fritz from the coal tar, Nylon.

Episode 8 It's a Plastic World. Almost everything is made of plastic. including money. Credit has been around for 600 yrs. 1300's Dukes borrowed to fund social life, building many castles. One wanted to be Emperor. The Medici's funded them. One Bought fully-armored Mercenaries, who lost. to the Pike Square. always Pointy, Runs instantly. Impregnable to direct battle. Gun in 1503 changed

star flag tag

...with again. Shooting into a pike square very effective. Battle became several ranks of 30 musketeers firing then stepping back to reload. In 200 yrs they had bayonettes to mimic pikes. Guns were faster to Load. [illegible] by 1800 in France. 1797 Napoleon was running an army of more than 1 million. Napoleon needed to feed a fleet army (not enough food, wrong type of money in foreign countries. [This is becomming more tech than science][Ending here][Might carry on with Bronowski's The Ascent of Man about civilization (chronologically done)]

Chinese Alchemy (from Holmyard Alchemy Dover, Press) .957

Chinese Alchemy was built on 5, not 4

Wood	blue	East	Lead (Pb)	Jupiter
Fire	red	South	Copper (Cu)	Mars
Earth	yellow	Center	Gold (Au)	Saturn
Metal	white	West	Silver (Ag)	Venus
Water	Black	North	Iron (Fe)	Mercury

↳ Buddhist Prayer flags — where is tin? — ↳ moon & sun absent.

2	7	6	-15
9	5	1	-15
4	3	8	-15
15	15	15	15

15

yin - female, water, heavy, passive, earthly (negative) ☽ Hg

yang - male, fiery, light, active (positive) ☉ Sulfur

The idea of transmutation of base metals to Gold was practiced in China 1st century B.C.. Holmyard posits that the [illegible] alchemists don't mention it, and perhaps the idea was brought into Islam by Chinese travellers. Conversely Chinese Alchemy concerned itself with longevity, which doesn't enter Western alchemy until the Islam era etc. China - each ticket [illegible] 714 AD. By 1000 AD Alchemy was dead in China.

How to explain the 100 yr gap between Boyle & Lavoisier?
Kuhn says Boyle did a poor job. I don't think. I think, maybe, that it took 2-3 academic generations to get away from Alchemy, to "wash the bad taste of Alchemy out of everyone's mouths" as it were. Need to find support for this idea. See Wm Newman & Lawrence Principe "Some with the Historiography of Alchemy in Secrets of Nature: Astrology and Alchemy in Early Modern Europe Grafton & Newman (Cambridge) MIT Press 2006 385-433, on p. 386

Terms invented by Paracelsus (via Holmyard / Alchemy)
Alcohol (from al-kohl, black eye-paint)
Zinc
alkahest (imaginary universal solvent)
Spagyric (medicinal alchemy, iatrochemistry)
Sylph (supposed soul-less creatures, like water-nymphs, salamanders (fire))

~~Thales~~ Milesian school — Water → earth, air, fire
~~Paracelsus~~ Jabir — metals ← Mercury + Sulfur
Paracelsus — everything ← Mercury, Sulfur, Salt
Flood (read as Genesis) — Light, Dark, Water (or humidity), air
- Light → Planets made by God
- Dark → Matter
- Water → Earth, Heavens → Plants & wildlife → Domestic creatures; → animals
- air → Separates Light & Dark

Philosophy at the Time of Boyle:
Authoritarianism: the church — what I say is truth
Rationalism: Descartes, Leibnitz, Spinoza — think your way through life
Empiricism: Locke, Hobbes, Berkeley, Hume — observation → truth

Early
Histories of Chemistry

Hermann Kopp (1873) Die Entwicklung der Chemie in der neuen Zeit
(Sidgwick Electronic Theory of Valency)
Edward Thorpe (1910 & 1921)
Ernst von Meyer (1881) (Eng in 1891)
Tilden lectures to Working men in 1879: A Short History of the Progress of Scientific Chemistry in our Own Times
Vitalism?
German Scientific Proponents: Synthetic organic chemistry was the result of intellectual power, not Greek or anti-intellectual ideology. Ostwald
How did Wilhelm Ostwald expand Physical Chemistry to General Chemistry?

The First Inventions

[Bronowski] Plow 8000 BC
[Writing]
Language (written)
Numbers
Medicine
Astronomy

Mathematics (Egypt) - include Algebra, 1800 BC. Rhind & Golenishchev Papyri
Glassmaking - sand + mineral Natron (sodium carbonate)
Papyrus + ink - [illegible] by [illegible]
Glazes - [illegible] [illegible] [illegible] yellow, [illegible] metal oxides. (no blown glass)
Fabrics - woven 7000 BC
Metallurgy - Mining - copper [illegible], [illegible] smelting - by 1800 BC
Tin (Bronze) [illegible] (Tin from Byblos - Europe)
Iron from Western Asia, brought west 2000 BC. Made 1200 BC
Egyptian Medicine - Imhotep [illegible] - [illegible] Physician.
Dentistry by 2700 BC, [illegible] 2000 BC, Papyri date from 2000 BC [illegible]. Smith & Ebers Papyri, 1800 BC are important, containing Medicinal Recipes & some Spells, Surgical Instructions. Mummification did not contribute to anatomical knowledge. Knew the Relations between Pulse & heart, but not circulation. Confused blood vessels [illegible].
"Is this Egyptian [illegible]?" [illegible]? They made a good start and [illegible] for [illegible]. (maybe experiments of discovery, & expectations, but no Theory)

Lawrence M. Principe & William R. Newman "Some Problems With The Historiography of Chemistry" in *Secrets of Nature: Astrology and Alchemy in Early Modern Europe* eds William R. Newman and Anthony Grafton 2001 MIT Press

This is an important paper, it details how Alchemy was seen at different times. Resume: Alchemy from 100–1660 A.D. was the Realm of Philosophy, though later was European Chicanery and fraud ~~Rexetol~~ Repelling it. 18th century view: The Rejection of alchemy is well-known. "Old Alchemy" vs "Enlightened Chemistry." Early 18th century Alchemy = "Gold Making" & fraud. Mid 18th century Alchemy in disrepute by all writers except in Germany. This ~~AA~~ 1750's view still dominates Alchemy discussions by chemists. Very Black & White, no intersection. The Symbolism persisted in the occult and in Rosicrucianism.

By 1800 the only mention of Alchemy was associated with Magic & Soothsayers; the occult; and Astrology. The 1800s spawned a 'Spiritual' interpretation of Alchemy. This spiritual or Esoteric ~~AA~~ school held that Alchemy wasn't about the materials, it was a metaphor for the spiritual progress of the Alchemist. Alchemy was the art of internal meditation and illumination (Gnosis). This brought a massive transformation of what Alchemy was thought to be, and in acceptability in society. Many Historians still hold this "spiritual" view of Alchemy. By the 1850s this spiritual Alchemy, plus Hermetic arts (Astrology & Magic) was popular in Victorian England. ~~a~~ Thomas South & Mary Anne Atwood. The spiritual interpretation extended through 1910, and is now the predominant form of Alchemy as practised today. 1875 → Hermetic Societies formed, some still extant.

A.E. Waite was a left expander. Avoid him at all costs!

Principe & Newman, "Some Problems," cont.

Carl Jung (1950's) was a great fan of Alchemy as a type of Dreams symbology. Alchemy as phychology. Jung studied Dreams, occult, spiritualism to find commonalities that explain our inner experienced life on earth. Jung pointedly rejects alchemy as Protochemistry, as did the spiritualists. Jung claimed that secrecy in ~~chemist~~ alchemy, (even Dragons, King eating son, copulating couple, etc) were actually unconscious projections of the alchemist onto [unnatural] matter [illegible] before him, in [illegible] used to explain the stone = Christ ~~Parallel~~ Parallel as present in European alchemy. Genuine Alchemy, by definition, cannot be decoded. Even the alchemists, to Jung, were busy interpreting their personalities.

1940, Mircea [illegible] P[illegible] Alchemy. This was a reli[illegible] spiritual [illegible], to [illegible] mechanism science had become. Followers of [illegible] The Alchemist is busy protecting himself.

But neither is Alchemy the forerunner of Science & the scientific method. [illegible] [inherent] is Real). Presentism is to take the work of the Alchemists, ignoring anything we don't like, & try to represent alchemy as an early step of chemistry.

All these views are incorrect. One must take each era of alchemy for what it was, and the Historians must not make any more of it than what is given us by the Authors.

[I keep Aristotle very much in mind when I read alchemy. Alchemy is a philosophy first and foremost, a Philosophy of four transmutable elements combined in various Ratios to build all matter. Alchemists considered themselves ~~as~~ to be Philosophers, and that's how to consider them from whatever distance of time has past. Alchemy is not a Protoscience of any kind; it is the echo of one very tempting but utterly wrong Philosophy.]