VOL 4. ISSUE 10.

PARAM

SCIENCE MAGAZINE

Founded 1910 The Mythic Society

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Editorial Note

Metals, among very few things, can be credited with having a profound impact on the evolution of humans. The Metal age ushered in a new era with making and using more durable and efficient tools for agriculture, warfare and craftsmanship.

Societies became more and more complex and civilised as we discovered extraction of metals and their amazing properties that helped in building many devices and machines.

Transport improved, trade and commerce increased, cities were built as growth of specialised labour increased leading to a modern era in human civilization.

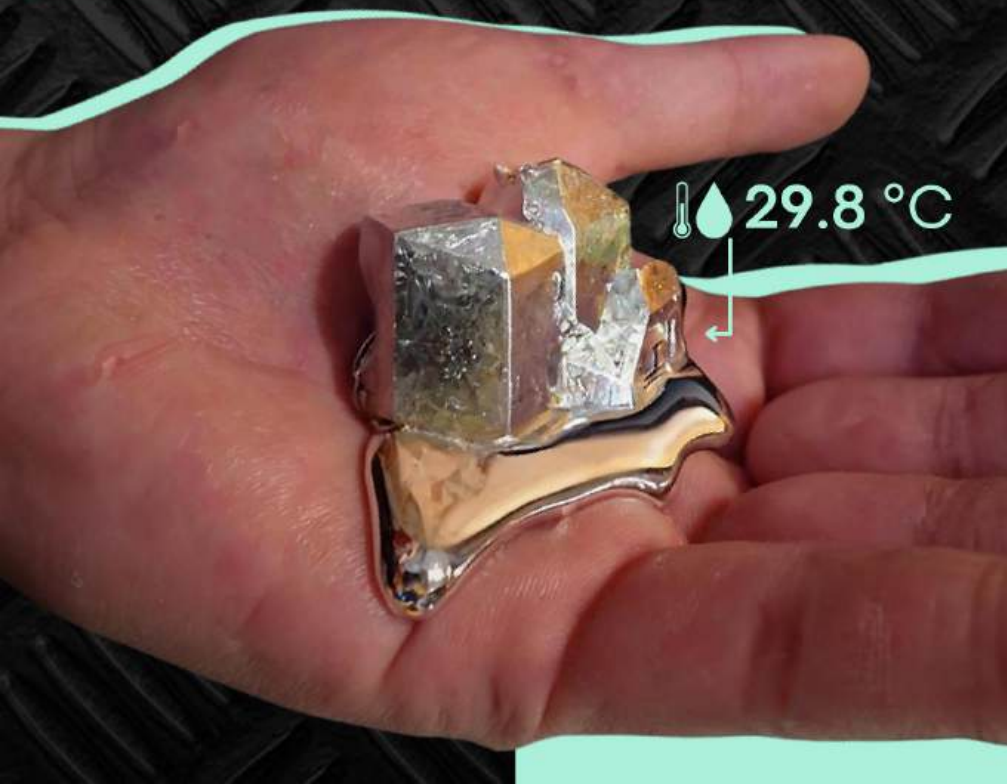
Archaeological evidence points to metal discoveries and special alloy making techniques by ancient civilisations like Indians, Chinese and Egyptians much before the west discovered them.

This issue is an ode to metals and their wondrous properties.

Shards of Metal

Gallium

Gallium **looks solid**, sure of itself, like frozen moonlight — **until you hold it**. Then **it softens** and slips **into silver liquid**. That's when the disappearing spoon trick comes in: pranksters cast spoons from gallium, serve hot tea, and watch as the spoon melts quietly away, disappearing into the cup.



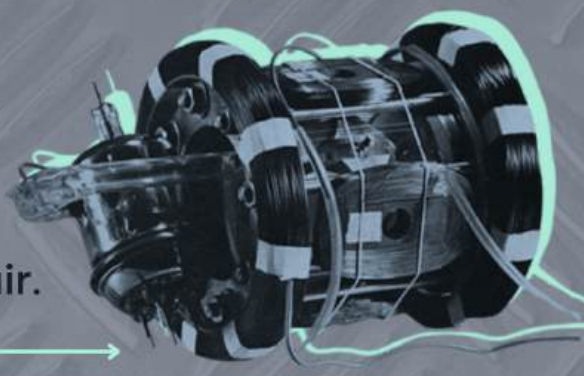
Gallium reminds us that strength isn't always about hardness; sometimes it's the power to change — to surrender shape and still remain whole.

Beryllium

Beryllium once fooled chemists by tasting like sugar. **They called it glucinium — "sweet metal"** — before realizing it was also **impressively toxic.**

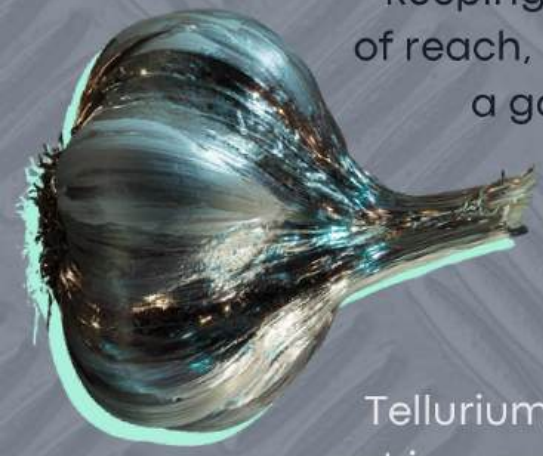
The universe does love a practical joke. Lightweight and strong, beryllium now hides in spacecrafts and precision instruments, helping humanity reach the stars while politely reminding us not to lick our experiments.

The **Beryllium in this gyroscope** keeps the **B52 Bomber in the air.**



It's that rare thing — beautiful, useful, and absolutely deadly.

Proof, perhaps, that nature enjoys keeping brilliance just out of reach, preferably behind a good pair of gloves.



Tellurium

Tellurium **smells like garlic,** not in a polite, faint way, but like a lingering ghost of last night's dinner. **Handle enough of it, and the scent follows for weeks.**

This is because its atoms form compounds (especially volatile tellurides) that **release sulfur- and tellurium-based gases when touched** or disturbed. Yet beneath the smell lies noble work:

Toughening alloys, improving solar panels, and turning sunlight into energy.

Tellurium proves that even the strangest elements can be useful — and that

Sometimes, to make progress, you just have to hold your nose and carry on

Gold

For centuries, alchemists chased gold — the perfect metal, the symbol of immortality. It **never rusted, never tarnished, never yielded to time or flame.**

This is a metal that refuses to react,

but one great story of it bending to human will is worth telling. During World War II, Hungarian chemist George de Hevesy **dissolved two Nobel Prize medals** — made of pure gold — in aqua regia, a fierce mix of acids that can devour even the untouchable.

The medals vanished into a beaker of orange liquid, hidden in plain sight from Nazi confiscation.

Years later, when the war ended, de Hevesy recovered the gold, and the medals were recast. **Alchemy might have failed to make gold from lead,** but it surely made meaning from mystery.

Aluminium

There was a time when **aluminium was worth more than gold.** Napoleon III dined on it while his less important guests had to make do with gold plates.

Then chemistry ruined everything.

Once the **extraction process became easy,**

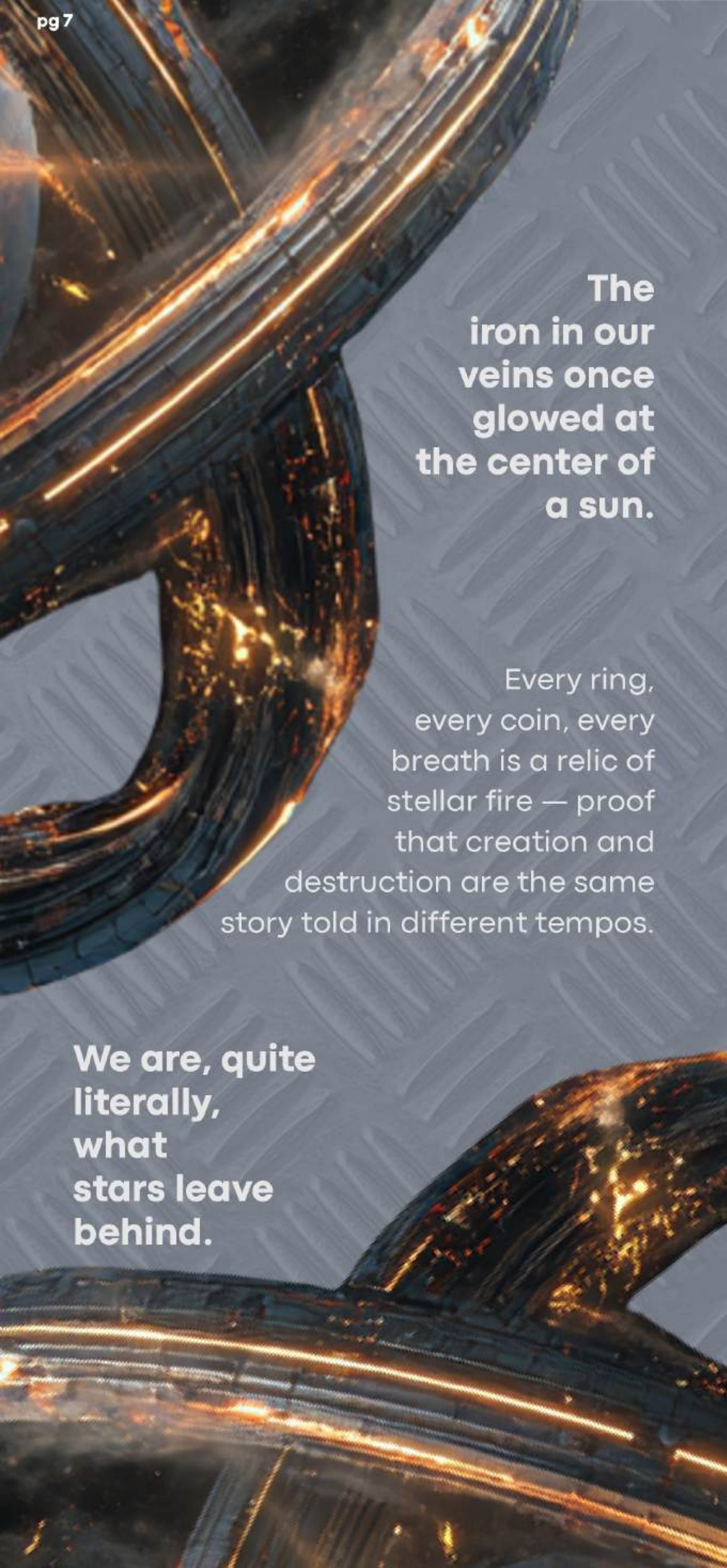
Aluminium went from royal treasure to kitchen foil.

It's **light, strong,** and wraps leftovers beautifully — a reminder that value is a temporary thing. **Yesterday's luxury becomes today's lunchbox,** and that, perhaps, is the most human story metal can tell.

Stars Forge Metals

Every atom of gold, iron, and silver was born in a dying star. When suns collapsed, their hearts burned so fiercely they forged the heavier elements and scattered them into space.

Those stardust fragments became planets, bodies, and blood



The iron in our veins once glowed at the center of a sun.

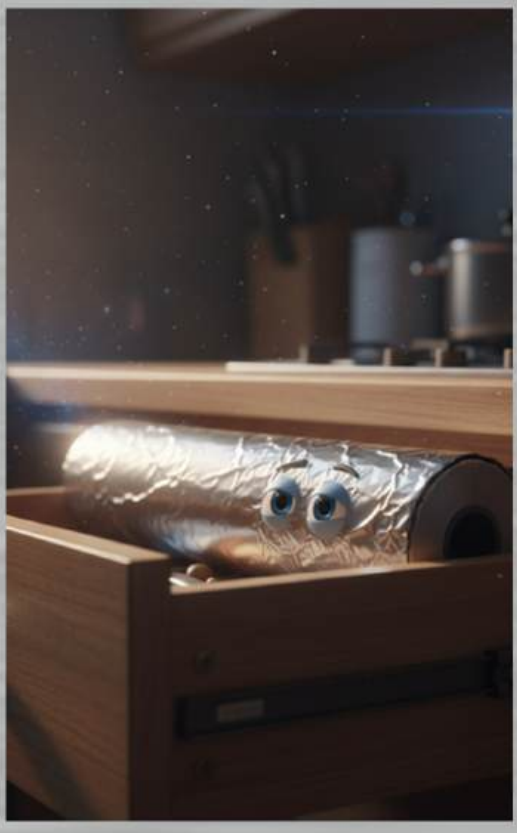
Every ring, every coin, every breath is a relic of stellar fire — proof that creation and destruction are the same story told in different tempos.

We are, quite literally, what stars leave behind.

Aluminum

I am Aluminum. Yes, the very same metal that's probably crumpled in your kitchen drawer right now.

But before you judge me as just boring foil, let me tell you my story—one inspired by true events (mostly).



I began life in a glowing forge, destined for greatness—or so I thought. Dreaming big, I polished my atoms and declared,

"I will protect astronauts and rule the skies!"
The aerospace factory was like boot camp: brutal testing, heat, pressure, and endless stretching.

My elite aluminum cousins and I prepped for moonshots and Mars missions—NASA was basically waiting on me.

But then reality punched me in the face. Not all aluminum gets to be a space hero.

No, some of us end up in the Kitchen Foil Brigade, wrapped around sad leftovers or squished under greasy pizza slices. One minute I'm shielding humans from solar flares; the next, I'm crinkled and tossed like yesterday's news.

Determined not to be just a foil cliché, I staged a daring recycling escape—dodging trash compactors, trash bins, and the scorn of soggy sandwich lovers.

Against all odds, I rebirthed into a shiny spacecraft panel.

Yes, aluminum does come back. 75% of all the Aluminum ever produced is still in use today due to my high recycling value.

Did you know?

King Napoleon chose me over Gold to impress important people. As I initially played very hard to get until Hall and Heroult invented the electrolytic method to mass produce me! Now I'm the most Industrially produced metal just after Iron!

So here I am, still flying high (sometimes literally). Whether I'm saving astronauts or lining your casserole dish, this story is proof: aluminum's journey is anything but ordinary. And that, my friends, is inspired by true events.

India's tryst with Gold

A traditional Indian wedding is incomplete without the dazzle of an ostentatious amount of gold on the body of every woman present — and some men too!

It's ostentatious only from the perspective of anyone who is not part of the Indian gold ethos, because to most Indians, any amount of gold is never too much!

The economic status of the bride and groom is often ascertained and analyzed by the amount of gold they wear or gift each other during the wedding. Most communities even have a minimum preset weight of gold that the bride is expected to wear and the groom to gift her. That's how important this noble metal is to Indians.

Gold is a term of endearment in all Indian languages — people call those they love Chinna, Bangaru, Sona, Thangam — all words for gold in different tongues. This holds true across all every Indian language.

Indian households collectively own a staggering 3.8 trillion dollars worth of gold — nearly 30,000 tonnes in comparison to the 880–900 tonnes held by the Indian government!

Indian women own 11% of the entire world's gold.

Despite centuries of colonial and Islamic invasions, India still follows its age-old traditions — with gold always holding utmost significance as an offering in all celebrations, religious or otherwise.

People still offer gold to deities in deep faith. The famous Tirupathi Temple in Andhra Pradesh is among the richest in the world, owning an astounding 11.3 tonnes of gold, apart from millions in cash. The vault(s) in Padmanabha Swami Temple, Thiruvananthapuram is rumored to have at least a Trillion Dollars worth of gold.

Sree Padmanabhaswamy Temple-Vault

Gold in Ancient Thought

Gold had captured the Indian imagination many millennia ago, Which lead to an innate understanding that gold was a metal, that does not corrode, is malleable, and, of course, has a radiant yellow hue, made it noble.

These qualities bestowed sacred references to gold in several places in ancient Indian literature.
In fact, the very creation of the universe is expressed with reference to gold. In the Rig Veda. Hiranyagarbha Sukta describes the universe as born from a golden seed (हिरण्यगर्भ), meaning the "golden womb."

The 'golden' part represents primal radiant energy — the divine essence from which godliness emerged.

In the Upanishads, which followed the Vedas, The seer who penned the hymn describes that the golden womb is the source of the creation of the universe itself.

The Goddess of Wealth

Goddess Lakshmi, the Hindu goddess of wealth, is adorned with gold ornaments, often depicted with multiple arms — one extended in Varada Mudra, the gift-bestowing gesture — gold coins flowing in an endless stream from her palm.

each representing a manifestation of prosperity: agricultural abundance, livestock, knowledge, progeny, courage, valour, the ability to overcome obstacles, and monetary wealth.
The last form, Dhana Lakshmi, embodies gold itself.

During **Deepavali**, one day is reserved for worshipping Lakshmi in her golden form. Another important festival, **Akshaya Trithiya**, is considered especially auspicious for purchasing gold. "**Akshaya**" means "never diminishing," symbolizing unending prosperity. On both these days, investments in gold, jewelry, or real estate are believed to ensure continuous growth and fortune.

Gold Through History

Images of Goddess Lakshmi appear on gold coins as early as the **Gupta dynasty (3rd–4th century CE)**. Clearly, the reverence for gold has been ingrained in Indians Since time immemorial

Naturally, Indians have always revered, bought, and hoarded gold since ages!

Economists, however, remain divided.

Some view India's gold hoarding as an unproductive drag on the economy, while others consider it a cultural and economic safeguard — a hedge against instability.

Constant demand for gold can indeed fuel inflation, and some analysts even argue that gold has historically been used to hide undeclared wealth. But, in a country where social security is a personal responsibility, this cultural obsession has often saved families from financial ruin. For most Indian households, selling gold remains the last resort in times of financial crisis.

So, go ahead and invest in some gold — and see its value shine brighter year after year.

Gold in Technology

Gold's prominence in tech. Stems from its golden characteristics .

Gold is one of the most malleable and ductile metals — it can be stretched into wires one-fifth the width of a human hair or hammered into sheets just a few atoms thick.

It is also an exceptional conductor of electricity and resistant to corrosion and oxidation — making it ideal for electrical connectors and contact points in electronic devices. The electronics sector is the largest industrial consumer of gold, accounting for about 80% of gold used in technology.

It is extremely sustainable due to its high recycle value.

With the expansion of AI, cloud computing, and advanced electronics, industrial demand for gold will only rise — ensuring its continued importance in the technological landscape.

The Golden Future

Summing it all up — Gold has been, is, and will remain the most sought-after metal. Indians have probably known this all along. Our collective 35,000 tonnes of gold will be a force to reckon with in the future — metallically speaking, that is.

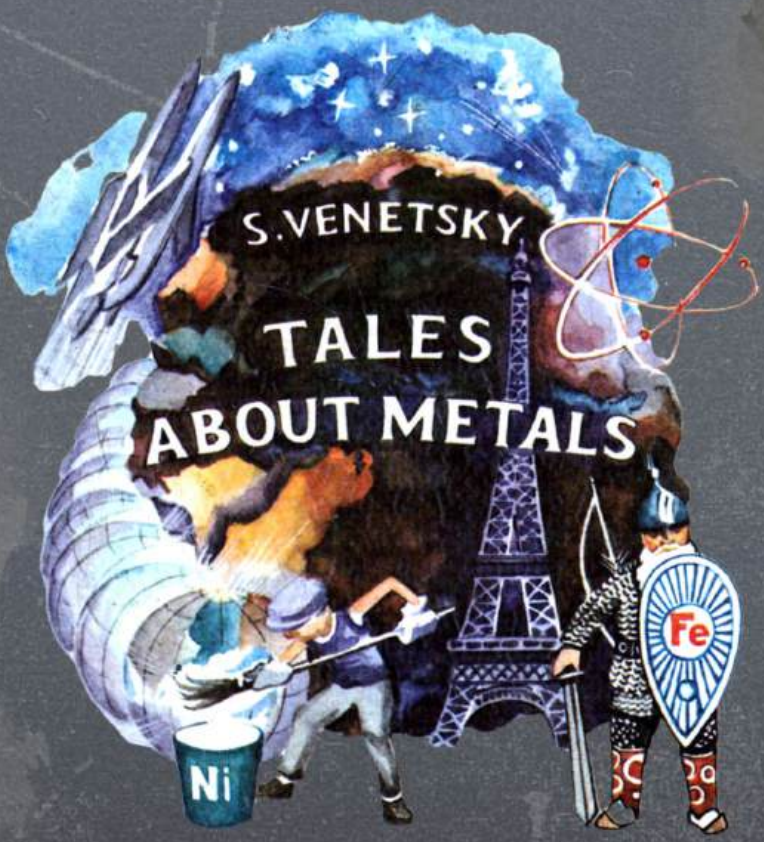
S Venetsky's tales about Metals

A gem of a book written by Russian author S Venetsky that was published in 1978 is a delightful read that contains interesting stories on the discoveries of various metals in modern scientific history.

Many older civilisations like the Indians, Chinese and the Egyptians had already discovered many metals centuries before the west did.

This piece is dedicated to Venetsky as this book is full of amazing incidents, at times romantic, humorous and even tragic. Anyone who reads this book is bound to fall in love with metals and chemistry. The hand drawn illustrations are an added attraction.

The book is for people who are ever so curious, not only youngsters who are just discovering the world of science but also those who have said goodbye to school and college.



We have picked a few interesting paragraphs from the original book English translation ably executed by NG Kittel. The book is a delightful read.

It is for you to immerse yourself in it and discover the world of metals. Just keep in mind that it was written in 1978 and have a field day researching the references you may never have heard!

1. Iron - A Great Toiler

"Medicinal properties had been ascribed to iron from time immemorial also owing to its remarkable magnetism.

Ancient Egyptians for example, were convinced that **immortality** could be attained by means of a magnet and recommended sick people to take iron fillings."

2. Copper - one of the oldest and celebrated metals

"Not all people know, perhaps, that **malachite is a mineral of copper**, a metal with which the entire history of civilization is inseparably connected."

But why was it that copper and not some other metal was the first that man should have held in his hands? Why was it destined to play such a crucial role in the development of human society?"

3. Gold - the king of metals and the metal of kings

"Gold! Never was a metal destined to **play so sinister a role** in the age-old history of mankind. For the sake of gold blood thirsty wars were waged, nations and states were annihilated and monstrous crimes committed.

No words can adequately describe the sorrow and suffering caused by this beautiful yellow metal."

4. Silver - Of a noble origin

"Perhaps the **purifying action of silver** can be considered the oldest 'occupation' of this metal, although it is also true that sometimes it was used for downright ridiculous purposes to satisfy the whims of those in power.

For example, the Roman emperor Nero, a notorious spendthrift, had thousands of his mules shoed with Silver"

5. Manganese - Iron's old companion

"The year 1882 became a landmark in the history of Manganese. - the British Metallurgist Robert Hadfield produced steel with a **13 percent manganese content.**

In 1883 Hadfield was issued the first patent for manganese steel prepared on the basis of a rich ferromanganese addition to iron."

6. Chromium - The read lead mystery

"Chromium possesses all the properties typical of metals. It's a good heat conductor, an excellent **electrical conductor**, and, like most metals, has lustre.

One curious fact sets it apart, though: heated to a temperature of about 37 degree Centigrade, it shows signs of defiance! Many of its properties change drastically, by leaps and bounds."

7. Uranium

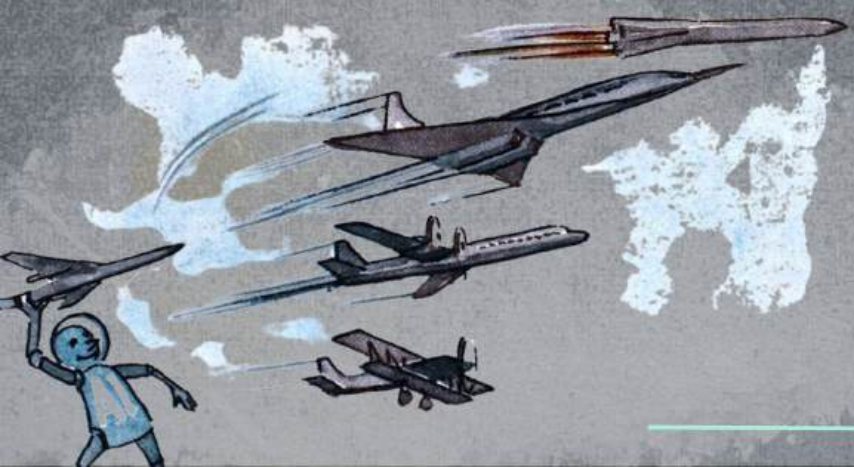
"Even ancient Romans knew about the artistic gifts of Uranium compounds. During excavations near Naples, archeologists unearthed a fresco of inimitable beauty.

What was especially striking about it was that in two thousand years the glass had remained practically undimmed.
A chemical analysis revealed that it owed its long life to the **uranium oxide** it contained."

8. Aluminium - Silver from clay

A1

"The ancient historian Pliny the Elder relates a remarkable event that took place almost two millennia ago.



One day a stranger came to see the Roman Emperor Tiberius and made him a present of a cup made from a metal which was shiny like silver but very light. The man explained that he had obtained the new **metal from clay**."

Venetsky's book is not just about metals, it's a treasure trove on the history of discoveries in modern metallurgy! Read it to **fall in love with science all over again!**

illustrations from the book -
'S VENETSKY'S TALES ABOUT METALS'

Alchemy

When Magic Became Science

Long before chemistry was associated with glass labs and white coats, the world's first scientists were more like wizards. They worked in smoky rooms filled with bubbling flasks, mysterious symbols, and a stubborn hope: that

That one day, they'd turn dull lead into glittering gold.

Alchemy lab discovered in Prague

This dream was called alchemy: part science, part philosophy, and a little bit of magic.

The idea began in **ancient Egypt and Greece**, where people believed everything came from four elements – earth, air, fire, and water.

Mix them just right, and you might uncover the secrets of matter itself. **The Egyptians called this secret art khemia** (from the "black earth" of the Nile), which later gave us the word alchemy – the root of modern chemistry.

Meanwhile, in ancient India, alchemists practiced **Rasayana**, the "path of essence" (Rasa = essence, Ayana = path/circulation). As a part of Ayurveda and early metallurgy,

Rasayana aimed at good health, longevity, and purification of metal.

They believed that mercury held life force, sulfur purified, and herbs added healing power.

Ancient Indian Distillation Apparatus

They didn't quite turn lead into gold, but **their experiments advanced medicine, metallurgy, dyes, and glassmaking.**

Fast forward to **medieval Europe,** where alchemists in candle-lit cellars experimented with mercury, sulfur, and salts, convinced they were handling the "seeds" of all metals. They melted, mixed, and burned almost anything,

Unknowingly **refining distillation, crystallization, and other chemical techniques.**

The alchemical symbol illustrating the interplay of the four elements of matter symbolizing the philosopher's stone

Their holy grail was the **Philosopher's Stone,** said to transform base metals into gold and grant eternal life. Though no one ever found it, they stumbled upon something even more valuable: **the scientific method.**

Alchemists' obsession with transformation laid the foundation for **modern chemistry and metallurgy.**


Robert Boyle


Antoine Lavoisier

Robert Boyle's The Sceptical Chymist (1661) stripped away mysticism and gave science clear, testable rules.

Later, Antoine Lavoisier proved that matter cannot appear or vanish; it only changes form

The Law of Conservation of Mass.

While alchemists never turned lead into gold, their experiments **aided the groundwork for modern chemistry and material science.** Today, scientists transform matter at the molecular and atomic level, developing new alloys, pharmaceuticals, and advanced materials, continuing the same fundamental pursuit:

Exploring, mastering, and utilising the building blocks of the natural world.

Isaac Newton

The Secret Alchemist

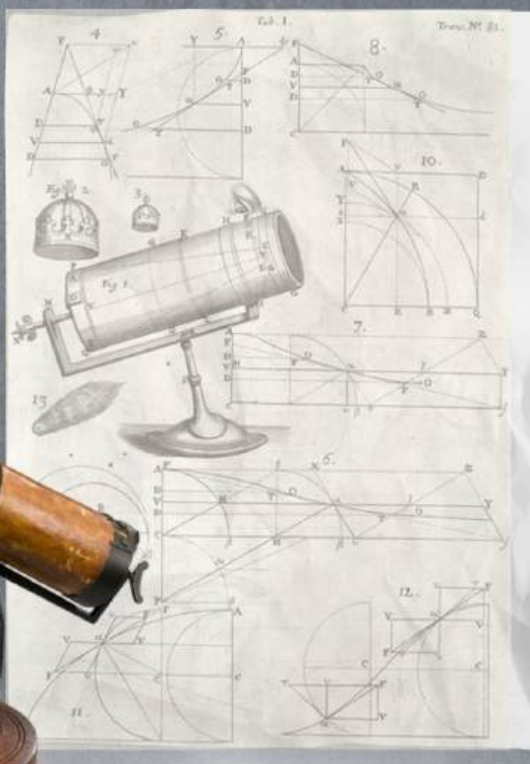

Antoine Lavoisier

Alongside his groundbreaking work in physics and mathematics, Isaac Newton was secretly chasing gold — literally. Hidden in his lab,

He spent years mixing mercury, sulfur, and mysterious powders, searching for the Philosopher's Stone and the Elixir of Life.

Newton believed metals were alive and that nature itself held hidden codes. He kept it secret to avoid ridicule.

Mirror of alchemy and optics.



He filled notebooks with strange symbols and recipes, sometimes right beside his optical experiments —

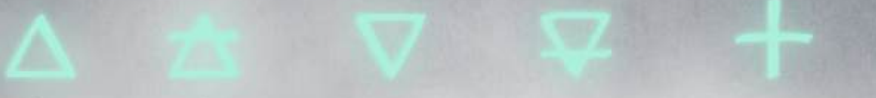
As if turning lead into gold and splitting light were part of the same puzzle.

Newtons Lab

A fire destroyed much of his alchemical work, but what survived shows a mind that saw no line between science and magic.

To him, the universe was one grand alchemical experiment: everything connected, everything transformable –a truth that still guides science today.

Four Elements



Fire Air Water Earth The Elements

Three Principles

Sulphur Salt Mercury

Copper (Venus) – ♀
Stands for balance, beauty, and harmony.

Mercury (Mercury) – ☿
A fluid, transformative metal central to alchemical work.

Silver (Moon) – ☽
Represents intuition, reflection, and the subconscious.

Gold (Sun) – ☉
The ultimate goal, representing perfection and enlightenment.

Iron (Mars) – ♂
Symbol of strength, resilience, and purification.

Tin (Jupiter) – ♃
Associated with growth, abundance, and wisdom.

Lead (Saturn) – ♄
The base metal, representing potential and transformation

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