

Scientific
Theories
Once Widely
Believed
Since Proven Wrong

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INTRODUCTION

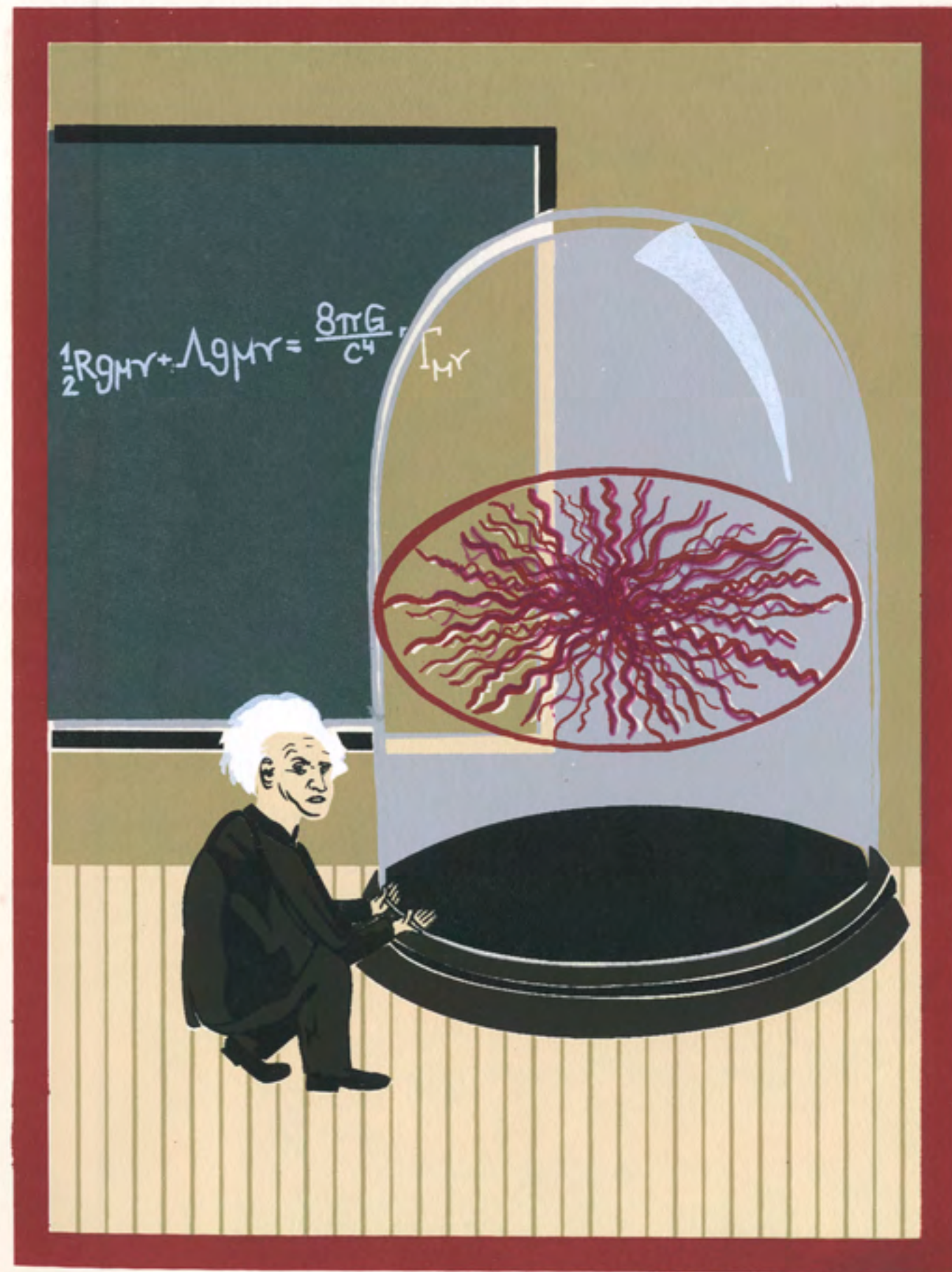
History does not follow a straight path, though, for the sake of simplicity, that's how we think about it, read about it, write about it, and talk about it. Historical events, people, and discoveries are not plot points or characters in a grand narrative of the world that slowly builds to its climax and inevitable conclusion.

The pursuit of knowledge, even the sorts of facts that seem indisputable in hindsight, is rarely direct.

Of course, a negative cannot be proven, so the title of this book is a misnomer*, which would more accurately read "Scientific Theories Once Widely Believed, Since Less Widely Believed."

*And, actually, for most of the span of time covered by these theories, science was not a field of inquiry under its own name. It was considered a branch of philosophy.

$$\Lambda g_{\mu\nu}$$



COSMOLOGICAL CONSTANT

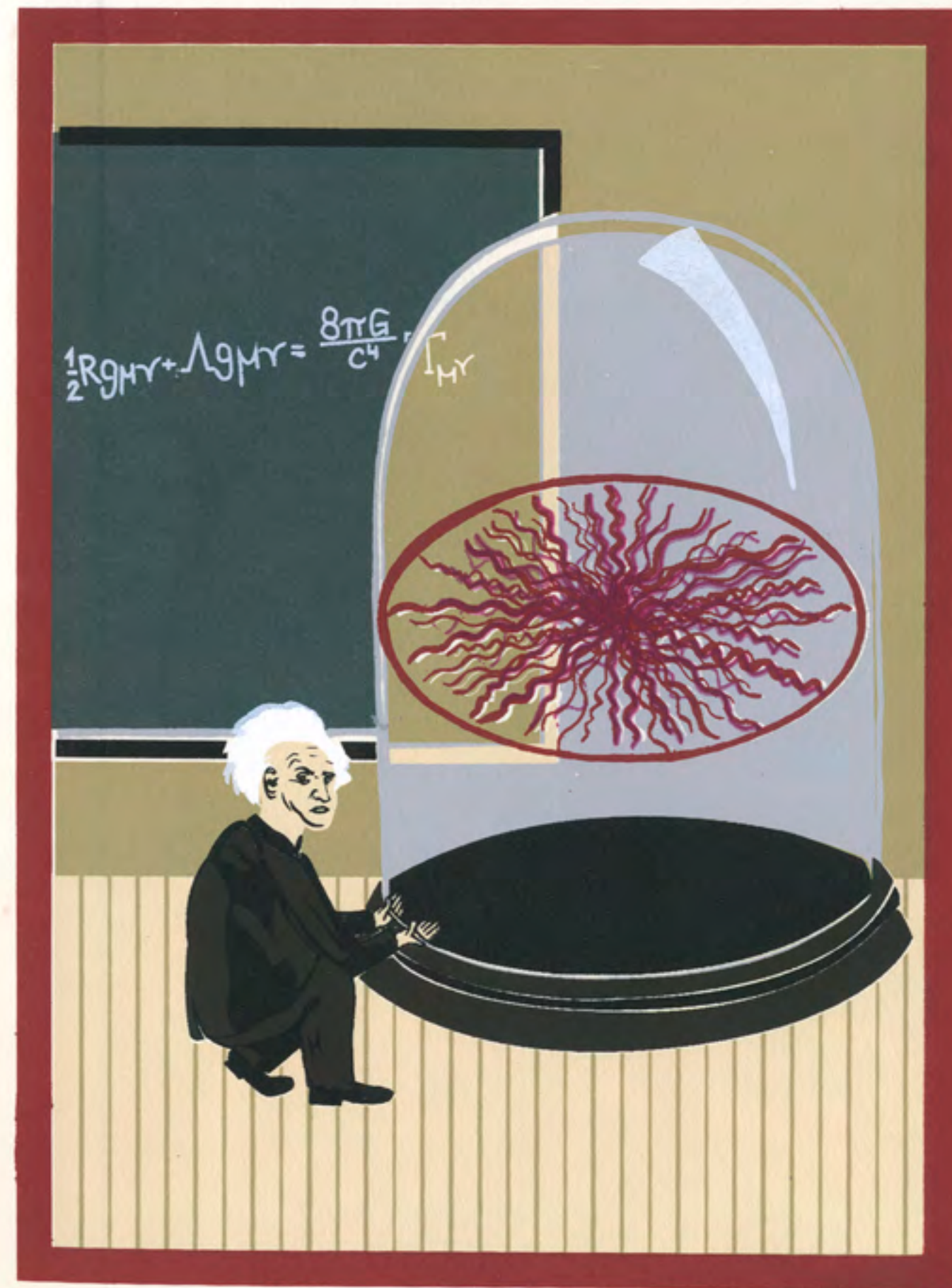
EINSTEIN WAS EITHER RIGHT ABOUT BEING
WRONG, OR WRONG ABOUT BEING RIGHT, OR
PARTIALLY RIGHT, OR RIGHT AT THE WRONG
TIME. HE CALLED HIS COSMOLOGICAL
CONSTANT THE "GREATEST BLUNDER"
OF HIS LIFE.

Basking in the triumph that was the Theory of Relativity, Einstein was bothered that the mathematical model required an expanding universe; though astrophysicists at the time thought its size was unchanging, or even shrinking a bit. Though he considered his formulae for relativity perfect, he tinkered with them to add the cosmological constant, a sort of antigravity force, symbolized by λ , which made his model consistent with a Universe that is static.

He was again stymied when Edwin Hubble, examining the phenomenon of red shift, showed that distant galaxies are moving apart from each other. Einstein retracted his Cosmological Constant, and was relieved that he was right the first time.

However, recent research does suggest that there is a force in the Universe like the Cosmological Constant that can account for the new observation that the rate of the Universe's expansion is increasing. The concept of the Constant may have been correct after all.

$\lambda \lambda$





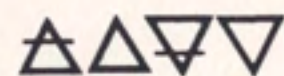
BLACK BILE

DISCOVERIES OF MODERN MEDICINE GRADUALLY SUPPLANTED THE BELIEF IN THE POWER OF THE FOUR HUMOURS TO REGULATE HEALTH. THOUGH THREE OF THE BODILY FLUIDS DO EXIST IN THE BODY, THE FOURTH, BLACK BILE, HAS NEVER BEEN FOUND.

The four humours, as first codified by Greek physician Hippocrates (and those many who wrote under his name) of Hippocratic Oath fame, and later canonized by Roman physician Galen, formed the basis of Western medicine for over 2,000 years.

The four humours are the four bodily fluids — blood, phlegm, yellow bile, and black bile, and these are aligned with the four elements of earth, air, water, fire, and earth, respectively. Health was achieved when all four humours were in balance within the body, and illness the result of one becoming too prevalent. Also, the dominance of one humour would determine an individual's basic personality types — sanguine, phlegmatic, choleric, and melancholic.

Health, physical or psychological, could be restored by bringing the four bodily fluids back into harmony. First, foods or herbs, or hot or cold baths, that could counterbalance the traits of the humour in excess were prescribed. Then, if additional treatment were needed, the bodily fluid itself would be purged, through blood letting, induced vomiting, or enemas.





PHRENOLOGY

THE HUMAN BRAIN IS A MYSTERY.
ONE THEORY FOR UNDERSTANDING THE
WORKINGS OF THE BRAIN WAS PHRENOLOGY,
WHICH HELD THAT DISCRETE REGIONS OF THE
BRAIN ARE RESPONSIBLE FOR EACH HUMAN
TENDENCY, IMPULSE, ABILITY, OR DEFICIENCY.

The prominence or lack thereof of any of these regions would be observable in the physiology of the brain itself and on the surface of the skull. The part of the brain devoted to "feeling of property," when underdeveloped, might result in a poor housekeeper. When overdeveloped, this region of the brain could create the impulse to steal. The phrenologist would "read" the subject's skull and be able to determine, by the evidence of bumps and craters, any propensity for specific types of crime or virtue.

Franz-Joseph Gall identified the original 27 "organs" of the brain. Orson Squire Fowler popularized phrenology, publishing a journal and giving lectures explaining its practice. These led to a phrenology "craze" in the 19th century.

Phrenological evidence was introduced at the murder trial of the infamous Nathan Leopold and Richard Loeb, in 1924. The evidence pointed out that Loeb had proclivities toward vanity, secretiveness, excitement, and love of sex, and that Leopold had a destructive instinct, a lack of reason, moral, and benevolent power, as well as keen perspicacity.

While phrenology did influence later ideas about human psychology, such as the view that the brain is the seat of human character, it is no longer widely believed that physical examination of the skull's surface features reveals anything about personality.





PLANET VULCAN

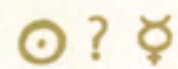
URBAIN JEAN JOSEPH LE VERRIER WENT TO
HIS GRAVE ASSURED THAT HE HAD
DISCOVERED TWO PLANETS.

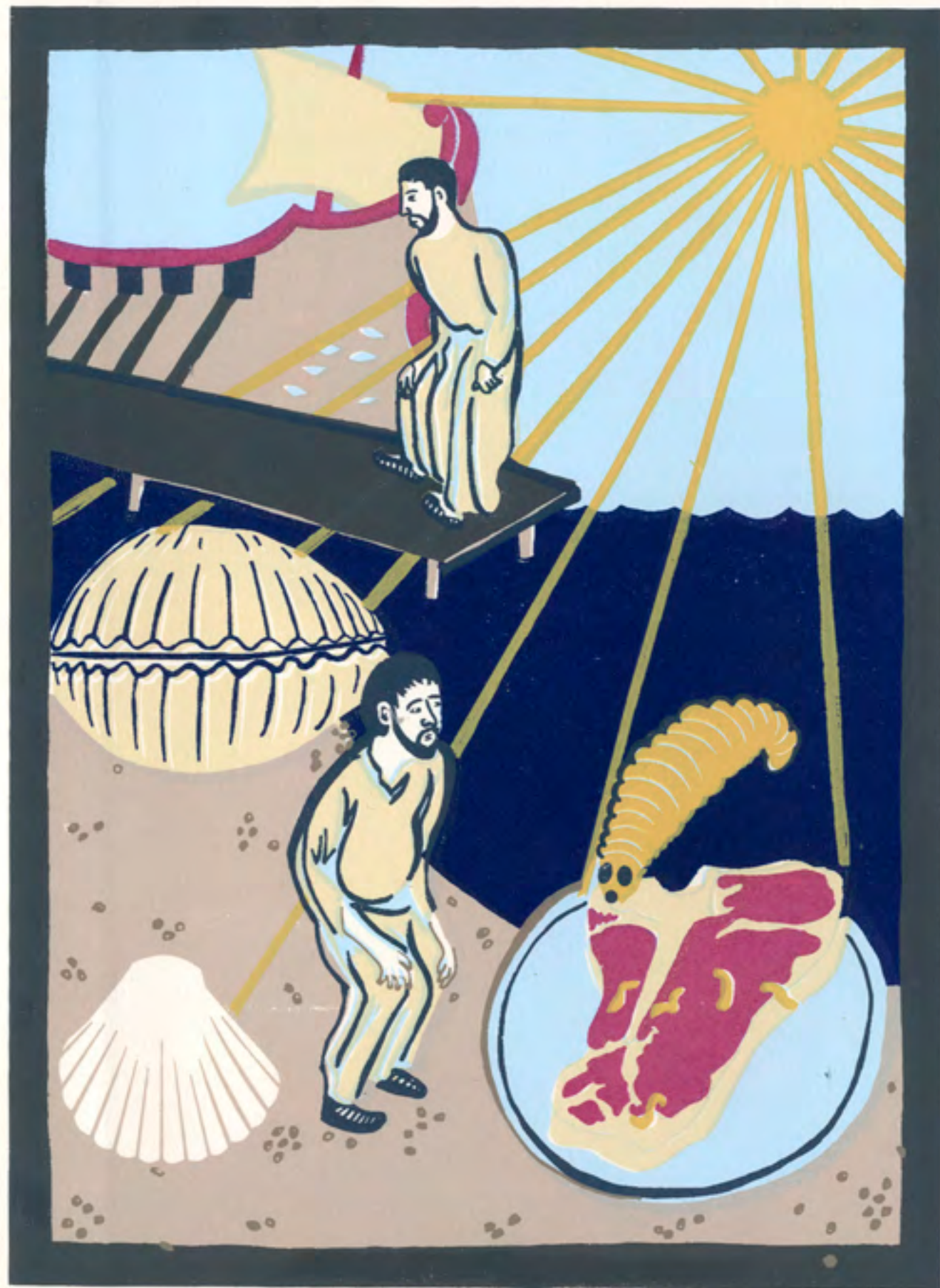
He predicted the existence of Neptune, a planet now widely accepted as actually existing, by observing Uranus and using mathematical calculations.

Not resting on his laurels, he then noticed unexplained motion in Mercury's orbit, which he attributed, as he did with Uranus and Neptune, to the gravitational influences of a planet situated between Mercury and the Sun. He named this planet Vulcan.

Soon thereafter, Edmond Lescarbault corroborated the existence of Vulcan, claiming he spotted it during a transit. Other astronomers continued to report sightings in the years to follow. Meanwhile, Le Verrier died, and the search went on, though with diminished enthusiasm due to the emergence of nagging doubts related to the great probability that Vulcan does not exist.

Finally, Mercury's seemingly erratic orbit was explained by Einstein's Theory of Relativity.





SPONTANEOUS GENERATION

SPONTANEOUS GENERATION IS THE THEORY
THAT LIVING BEINGS CAN ORIGINATE FROM
NON-LIVING MATTER.

This was a way to explain the first origin of life, as well as the existence of specific organisms that were "observed" to arise from unlike sources: the "birth" of maggots from rotting meat, barnacles from ships, clams from mud, and even mice from corn.

Aristotle got a lot right, and was so influential that even when he got something wrong, it remained accepted as fact for a long time. He discussed the idea of Spontaneous Generation in his book *On the History of Animals*, describing how putrefying matter and a "vital heat" in a wet environment could produce new life.

Only in 1859 did Louis Pasteur definitively disprove the theory which had first been proposed by Aristotle some 2,000 years before.





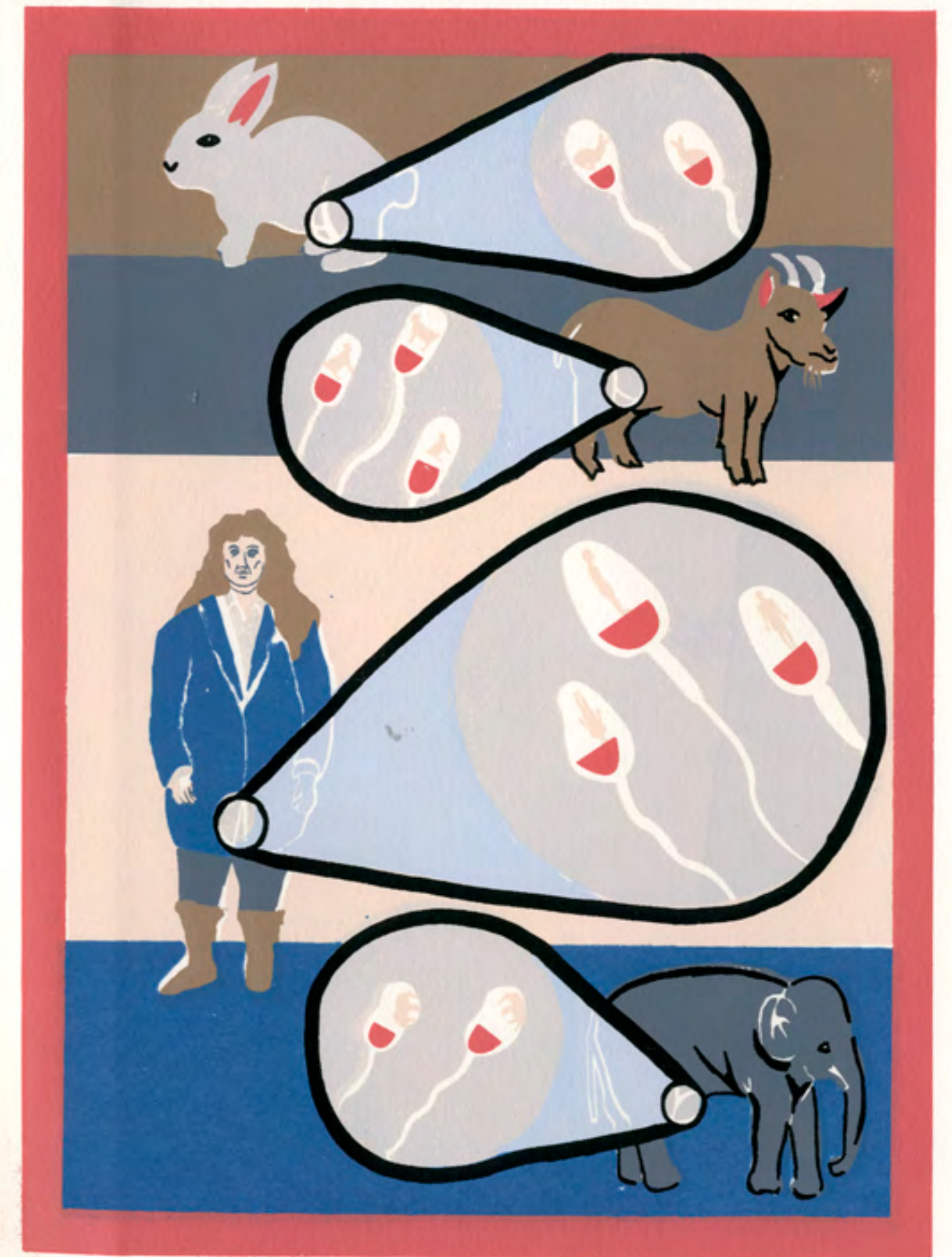
PREFORMATIONISM

HOW ARE BABIES MADE? WHAT IS THE ROLE
OF COPULATION IN REPRODUCTION?
THE ANSWERS TO THESE PRESSING BIOLOGICAL
QUESTIONS REMAINED VEILED IN MYSTERY
UNTIL RELATIVELY RECENTLY.

One explanation of reproduction was provided by the theory of Preformationism, wherein offspring exist as completely formed, micro-miniature adults, inside the sperm. For humans, this pre-determined individual is the homunculus, depicted by Nicolaas von Hartsoecker in a 1694 drawing. Believers in this theory were the aptly-called spermists. Other Preformationists thought that the homunculus resided in the egg. Both factions believed that the union of the sperm and egg through intercourse somehow allowed the tiny being to escape its encasement and begin to grow. This model supported the determinist view that all creatures existed since the time of creation, that nothing new can come into existence.

The Preformationist view was further girded when a sperm was first viewed under a microscope – how could humans in all their complexity come from such a primitive source?

Epigenists, taking the opposing view that form emerges over time and that new individuals can enter the system, won out in the end. As microscopy advanced, Preformationism died out when no evidence of a homunculus could be observed.





PHLOGISTON

FIRE, ONE OF THE ORIGINAL ELEMENTS OF THE UNIVERSE ALONG WITH AIR, EARTH, AND WATER, IS THE ODD ELEMENT OUT: WHILE OTHER ELEMENTS ARE COMPOSED OF MATTER, FIRE IS A CHEMICAL PROCESS, WE NOW KNOW.

Fire is also the most mysterious element, and is indispensable to human civilization while also being highly destructive.

Johann Joachim Becher offered an explanation of how fire works in 1667 with the concept of phlogiston, a substance or chemical present inside the types of materials that burn – the more phlogiston, the more flammable the material. The phlogiston caused the flame of fire, and was liberated through burning. The char or ash that remained was the state of the material without its phlogiston.

Phlogiston remained the dominant theory for more than a century, until it was discredited by the eventual understanding of combustion.





ALCHEMY

THE FIRST OF THE MODERN SCIENTISTS WERE ALSO THE LAST OF THE ALCHEMISTS. GIANTS UPON WHOSE SHOULDERS MODERN SCIENTISTS NOW STAND WERE ACTUALLY ALCHEMISTS, WHOSE METHODS LATER CAME TO BE CONSIDERED "SCIENCE" – THE FOUNDATIONS OF CHEMISTRY AND MEDICINE.

Alchemy was the search for a means of turning base metals into precious ones, a strand of a system of beliefs that merged metaphysics-philosophy-mysticism-mythology, with real-world applications. Alchemy's overarching goal was to change that which is less than ideal into a more perfect version. This idea led to the search for a rejuvenating "elixir of life," and the "panacea," the universal healer. All of these goals were thought possible through the discovery of the philosopher's stone, which the alchemists set about to uncover in their laboratories.

Robert Boyle, who gave us the aptly named Boyle's Law (that the pressure of a gas is inversely proportional to its volume when the temperature is constant), came upon such principles of what we now consider chemistry while conducting experiments for alchemical ends. Similarly, Isaac Newton devoted a great deal of his study to the Hermetic tradition, which posited a single theology from which all religions are derived, and claimed that the wisdom of the universe could be unlocked through astrology, theurgy, and alchemy. Boyle, Newton, and other alchemist-scientists are now remembered for techniques they used while attempting to engineer these ideal substances and for the scientific principles they observed while doing so.





GEOCENTRICISM

THE IDEA THAT THE EARTH IS THE CENTER OF THE UNIVERSE HAS BEEN ONE OF THE MOST CONTENTIOUS SCIENTIFIC THEORIES – THOSE WHO DARED TO CHALLENGE THE BELIEF OFTEN MET WITH UNPLEASANT RESULTS.

Anaximander, 2.5 millennia ago, proposed that the Sun and Moon were holes in wheels that encircle the Earth, allowing a glimpse at the fire behind. Later, Aristotle and his pupil Plato wrote about a model explaining that the other heavenly bodies were suspended in transparent spheres that rotated around the Earth. The theory continued to be honed over the centuries. Claudius Ptolemy helped to reconcile some of the inevitable discrepancies that arose by creating a more complicated model to explain such phenomena retrograde motion. The geocentric model of the solar system has also become known as the Ptolemaic system, in which the order of the other heavenly bodies outward from Earth was imagined in the following order: Moon, Mercury, Venus, Sun, Mars, Jupiter, Saturn, Fixed Stars.

One scientific reason the Geocentric theory made sense was that the constellations did not shift configurations, as would happen if the Earth were in orbit, it was thought. This is because the stars are much further away than originally believed.

Though many of their contemporaries were highly invested in it, Copernicus and Galileo brought serious challenges against Geocentricism. The view of Copernicus and Galileo has prevailed.

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FLAT EARTH

DEMOCRITUS, THE PHILOSOPHER WHO
FIRST DESCRIBED THE CONCEPT OF ATOMS
AS THE STUFF OF WHICH MATTER IS
COMPOSED AT ITS SMALLEST LEVEL,
THOUGH CORRECT REGARDING THE BUILDING
BLOCKS OF MATTER, DID BELIEVE THAT
THE EARTH IS FLAT.

It is not true that Columbus set out on his voyage believing that the Earth is flat — most scientifically-minded individuals and travellers had already been converted to this reality. The average peasant, however, probably did not have much reason to consider it at all. Of course, the conclusion that the Earth is round is not exactly intuitive to the average human simply treading upon it. Many cosmogonies, myths about the origin of the Earth, depict the Earth as flat or hemispheroid, so the concept was ingrained into the belief systems of many of the world's inhabitants and had to be overcome. By the early centuries AD, the model of a spherical Earth had dawned upon the Greek world, ancient Near East, and India.



COLOPHON

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