You're Human! Do You Know What That Means?

by Robert Ingraham

PART FOUR OF A SERIES

IV.—The Mind Masters the Biosphere

July 10—The question posed to the reader here is to reflect on one's own mind. Examine the manner in which you make decisions, how you ascertain the truth or falsehood of a proposition, or how you go about verifying new insights and discoveries. In this series, we have already discussed several of the important scientific and technological discoveries accomplished by the human species. In this chapter we shall discuss more of these. Yet, each of these breakthroughs was accomplished by a single individual. This is the nature of creativity, and it is the origin of all human progress: an individual, alone, reflecting on his or her own beliefs, uncompromisingly challenging the veracity of what one holds to be true.

The human mind—where our soul, our sense of identity resides—is always in a dialogue with itself.

"Along the River During the Qingming Festival," by Zhang Zeduan (12th Century).

The nature of that dialogue and the courage with which it is conducted will determine one's ability to arrive at truthful conclusions concerning the nature of the universe and the human identity. This defines the relationship between the creative capacity of the human mind and the creative nature of the universe. It is the human mind examining itself and striving for new lawful insights into universal principles which creates the only pathway to wisdom.

As has already been stated in earlier parts of this report, Lyndon LaRouche has specified the relative health of a physical-economic system—i.e., any specific form of human culture, properly defined—as to be found in an anti-entropic increase in the rate of growth in that culture's *potential relative population density*. However, let us be precisely clear about this: the phrase "potential relative population density" is not a number, a ratio, a goal, nor a statistic. Rather, an anti-entropic increase in a society's ability to support—and to require—a growing population defines the increasing *noëtic* energy of human culture, the potential that humanity possesses for further advancement, and an anti-entropic increase in Man's power over the biosphere. All of this is born inside of the individual human mind. This potential is what exists within your own mind.

Such cognitively-driven economic progress requires revolutions in science, technology, industry and all other forms of physical production—scientific and technological "leaps" which make an anti-entropic increase in humanity's power possible.

What we are looking at here is mankind taking increasing mastery over all biological and inorganic processes on the planet Earth—bending the resources of the planet to serve the increasingly advanced and beautiful mission of humanity. This defines actual willful human evolution.

In this portion of our inquiry, we shall look at China, and the way in which China, for most of the last three millennia, has spearheaded the creative breakthroughs that sparked human advancement. This is not to say that "all good things came from China." In science, industry and astronomy many discoveries came from India, particularly in the earliest phases of human civilization. Later, after 700 AD, the Arab and Islamic world made great contributions.[1] Yet, in China we see a clear picture of how a lawful understanding of the human identity together with great progress in the physical sciences advanced hand-in-hand. And, again, we see the courage of key individuals in challenging themselves, examining the basis for their own beliefs, and testing hypotheses as to the principles which underlie creation.

Ancient Chinese bronze bell, from c.500-450 BC, on exhibit at the Freer Gallery of Art, Washington, D.C.

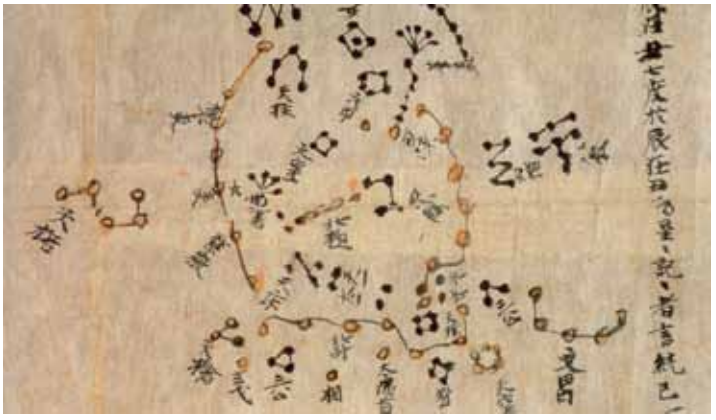
New Economic Platforms for Humanity

Below is a timeline. The purpose for its inclusion here is straightforward: to provide a bare-bones picture of Chinese advances which led humanity into the future.

- Before 1,000 BC—The widespread use of coal to smelt copper.
- 770-476 BC—The development of the blast furnace. This allowed the heating of ore above its melting point, in order to produce cast iron. Cast iron production would not enter Europe until 1380 AD, two millennia later.
- 550 BC—Construction of the first section of the Grand Canal. Today, almost 2,600 years later, the 1,104-mile Grand Canal is still the longest man-made waterway in the world.

1. One example: As early as the Sixth Century, India developed very high quality "ukku" (or "wootz") steel. The famous "Damascus steel" was the forged steel used for the blades of swords smithed in the Near East from ingots of wootz steel from India.

China's Beijing-Hangzhou (Grand) Canal, the longest and oldest canal in the world.



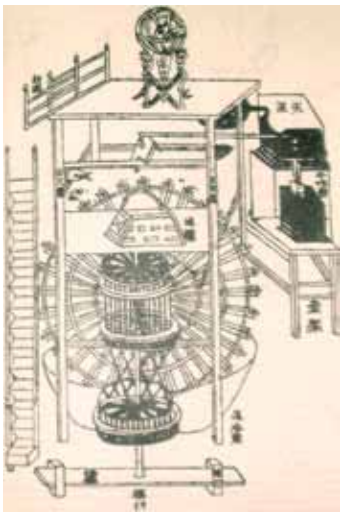
Star map of the celestial sphere, by Su Song (AD 1020-1101).

HAN DYNASTY (Western Han, 202 BC-9 AD; Eastern Han, 23-220 AD)

- 200 BC—The invention of steel, using what became known in the West (2,000 years later) as the Bessemer process. They converted cast iron into steel, by blowing air—through bellows—on the molten metal, which reduced the carbon content.
- 119 BC—The Han Dynasty took control of all cast-iron manufacture to ensure widely available, high-quality tools and implements. These included plowshares, hoes, axes, chisels, saws, etc. These superior tools led to a substantial advance in productivity throughout the entire economy.
- 100 BC—The earliest Chinese development of the armillary sphere, enabling the measurement of the north polar distance.[2]
- 60 BC—Invention of the first celestial globe by Geng Shou-chang.
- 25-50 AD—The use of waterwheels to operate the bellows of a blast furnace to make pig iron, and the cupola furnace to make cast iron. This process was invented by Du Shi.
- 50 AD (or earlier)—The invention of the rudder, which greatly enhanced the systematic exploration of the oceans. The rudder first appeared in Europe in 1180 AD.
- 100 AD—Mapping the ecliptic to an armillary sphere (showing the Earth's inclination) by Zhang Heng.
- 100 AD—Development of first "star map" by Zhang Heng, containing 2,500 stars and 100 constellations.
- 105 AD—Invention of paper. This aided in the transmission of knowledge throughout China.
- 150 AD—First recorded ocean voyage of a Chinese Junk, the most advanced sea-going ship on Earth until the emergence of the carrack in Renaissance Europe 1,300 years later.
- 185 AD—First recorded observation of a supernova, in the direction of Alpha Centauri, between the constellations Circinus and Centaurus. It remained visible in the night sky for eight months.

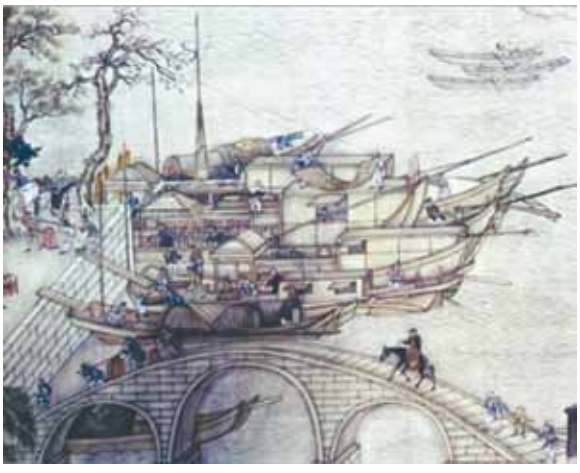
- 258 AD—The harnessing of water power for industrial purposes, including the introduction of water driven piston-rods, drive-belts and forge-hammers, vastly increasing the amount of work that could be performed per capita, from iron work, to grinding grain. Arrived in Europe in the 12th and 13th centuries.
- 400 AD—Perfection of the manufacture of steel, using coal as a high-temperature fuel, good refractory clays for the blast furnace walls, and phosphorus to reduce the temperature at which iron melts.
- 800-850 AD—First use of coke for heating and cooking. This led to the widespread use of coke in the iron industry.

2. The first armillary sphere was invented by the Greek astronomer Eratosthenes in 255 BC, during the period before Platonic/Hellenic culture was snuffed out by the rise of the Roman empire.



Clock tower diagram from Su Song's book of 1092.

Copper plate for making paper money, from Jin Dynasty (AD 1115-1234).



Painting of Suzhou sailing vessels moored on the Grand Canal by Xu Yang (active c.1750-1776).

SONG DYNASTY (960-1279 AD)

- 1000 AD—Invention of movable type for printing by Bi Sheng.
- 1000-1279—The construction of huge astronomical observatories, resulting in a series of highly accurate star-maps.
- 1054 AD—Chinese astronomers observe and record the supernova which created the Crab Nebula.
- 1070 AD—Invention of the dry-dock to repair seagoing ships.
- 1100 AD—Invention of the mariner's compass by Shen Kuo, as well as the discovery and means of measuring one's true meridian (longitude) by measuring the distance between the pole star and true north as defined by Earth's axis of rotation. These discoveries were brought into Europe and were crucial to the European voyages of discovery in the 15th Century.
- 1100 AD—Song China was producing 127,000 tons of iron per year.[3] Waterwheels, windmills, advanced designs of bellows, and the use of bituminous coke[4] in industrial processes all became widespread. Great advances were made in shipbuilding and navigation, and it was under the Song, that paper currency was introduced and used to finance the nation's physical economic development. During the Song Dynasty, per capita iron output rose sixfold, and the population of China doubled in size during the 11th Century.

3. By comparison, in 1788, England's production of iron was around 50,000 tons.

4. Coal became a universal source of energy for virtually all purposes in China, something which would not be seen in Europe until the 18th and 19th centuries.

The Mind Moves the Universe

The list above describes two millennia of inventions, discoveries and actions through which mankind began to exert increasing control over the physical evolution of our planet and established an upward development of the human species. In military terms, a cognitive beachhead was seized, for the deployment of a permanent human role within the galaxy. Many of these Chinese discoveries and inventions made their way into Europe, the Islamic world, and other regions, particularly after the final collapse of the Roman Empire in the west.

A 1955 Chinese postage stamp depicting Zhang Heng (78-139 AD), Han Dynasty scientist and statesman.

If one looks at one of the individuals mentioned above, Zhang Heng, the scope and intent of this Chinese cognitive offensive begins to come into focus.

Zhang Heng (78-139 AD), was an astronomer, mathematician, scientist, engineer, geographer, cartographer, artist and poet who lived during the Han dynasty. Zhang invented the world's first water-powered armillary sphere to assist astronomical observation; he invented the world's first seismoscope, which discerned the direction of an earthquake 500 km away; he postulated the idea of the

Earth's ecliptic (the apparent path that the Sun follows over the Earth), calculating the Earth's axial tilt in relation to the ecliptic at 26°5′ (which is just 3° off the modern measurement of 23°27′). In his treatise *Ling Xian* (Mystical Laws), Zhang describes the nature of both solar and lunar eclipses, and he identifies both that the Moon moves around the Earth and that it is an illuminated body, i.e., that it reflects light from the Sun.

Zhang was part of a much larger scientific renaissance during the Han Dynasty; he was associated with a group of similar scholars, including the mathematician and calligrapher Cui Yuan (78-143 AD), the philosophical commentator Ma Rong (79-166), and the philosopher Wang Fu (78-163 AD), among others. The common thread which links these individuals together is that they were all leading Confucian scholars.

Earlier, during the reign of the Emperor Wu of Han (157-87 BC), the teachings of Confucius (551-479 BC) were adopted as the official state philosophy, and all government officials and members of the Han court were required to study and pass examinations in the teaching of Confucius. Despite many later dark periods of moral and economic decline in China, this Confucian outlook within Chinese culture has persisted to the present day, and if one looks at the two greatest cultural renaissances in subsequent Chinese history—the Song dynasty (960-1279 AD) and the present-day Belt and Road Initiative of President Xi Jinping—both are associated with a deliberate and willful effort to revive and advance the Confucian outlook.

Emperor Wu of Han (ruled from 141-87 BC).

In 1925, Sun Yat Sen, the founder of modern China, told an interviewer that his lifelong efforts toward effecting revolutionary change in China were all based on "a development and continuation of the ancient Chinese doctrines of Confucius." As a child, Sun read *The Great Learning*, the *Doctrine of the Mean*, the *Confucian Analects*, and the *Works of Mencius*—known collectively as the Four Books—as well as the Five Classics, including the *Spring and Autumn Annals*. It is often stated that Sun's "Three Principles of the People"—and particularly the third Principle, the "People's Livelihood" (*min sheng*)—were greatly influenced by the moral and political outlook of Abraham Lincoln, and there is truth in that assertion. Yet, Sun himself stated that the outlook upon which his revolutionary program was based—including his plans for the industrialization of China—was all to be found in Confucius and Mencius.

Sun would quote from Mencius, "If the people have a sure livelihood, they will have a fixed heart. If they have not a sure livelihood, they have not a fixed heart. And if they have not a fixed heart, there is nothing they will not do in the way of self-abandonment, of moral deflection, of depravity, and of wild license." This was the same Sun who, in the final months of his life, urged his young protégé Chiang Kai-shek to study the Confucian classics.

A Universe Based on Principle

A beautiful investigation into Confucian philosophy has recently been supplied by *EIR*, in the form of an article, "Toward the Ecumenical Unity of East and West: Confucianism, Christianity, and the Peace of Faith," by Michael Billington. No attempt will be made here to investigate in depth what Billington reports in that and others of his works.[5] We shall simply emphasize that the Confucian insistence that a universal human identity is based upon cognitive reason—and that this creative feature of the human identity is eternally linked to the moral virtue of what we in the West call *agapē*—has infused much of Chinese culture for more than 2,000 years, and it has supplied a *noëtic* power to the human species that has led the forward advance of human civilization throughout most of recorded history.

The heart of Confucianism is the principle of *Ren* (sometimes spelled *Jen*). One of the Confucian *Four Virtues*, *Ren* is often referred to as "benevolence," but this misses the full coherence of Ren with the Western term *agapē*—i.e., love of truth, love of the Creator, love

5. See also Billington's "The Taoist Perversion of Twentieth-Century Science," *Fidelio*, Fall, 1994, and "Toward the Ecumenical Unity of East and West," *Fidelio*, Summer, 1993.

of the creation, love of fellow man. The other three Virtues are Righteousness, Propriety (meaning behavior which benefits oneself and society), and Wisdom. All of these Virtues involve willful human action: *Ren* governs one's relations with others; Righteousness defines a morally sound character; Propriety defines one's actions as benefitting the Common Good; and Wisdom defines a development of one's cognitive abilities from whence all proper action flows. True Wisdom can only be approached through an investigation into the ordering of creation and Man's role within that creation.

Dr. Sun Yat-sen, founding father of the Republic of China, in London in 1911.

Centuries later, during the Song Dynasty, Zhu Xi (1130-1200 AD) further advanced the precepts of Confucian learning. Zhu developed the concept of *Li* or Principle. He puts forward the idea of Universal Principle, a Principle which contains within it all of the *Four Virtues* as one whole, and he asserts that this Universal Principle, as an active Principle, is the governing Principle of all of creation. He goes further, identifying the individual *Li* which exists in all individual created things, and he posits that the individual *Li* both reflects and participates in the Universal *Li.*

It is this outlook, as developed by Confucius, Mencius, Zhu Xi and others, which Gottfried Leibniz called the "natural philosophy" or "natural theology" of the Chinese, seeing in it a reflection of his own work, as exemplified in the *Theodicy* and the *Monadology*. This defines a human identity of *noëtic* power, linked directly to the ongoing universal process of lawful creation.

Man and the Galaxy

Reaching far back into recorded history, and continuing into the 21st Century with modern China's increasing role in space exploration, great individuals from within Chinese culture have always looked to the stars to discover the true nature of Man's role in the galaxy. During the Song Dynasty (960-1279), one of the key scientific leaders was Shen Kuo (1031-1095), an astronomer, meteorologist, geologist, botanist, archaeologist, cartographer, hydraulic engineer, and mathematician. He was also a diplomat, finance minister, poet and musician. He served as the head of the Imperial Department of Astronomy in the Song court.

Shen Kuo was a devout student of the works of Mencius (372 BC-289 BC), and he authored a commentary on the philosophy of Mencius. In it, he emphasizes the importance of following what one knows to be a true path. He states that the heart and mind can never attain full knowledge of truth through mere sensory experience, but only through an examination of higher lawful principles. The truth can not be attained through merely studying "things," but through the discovery of new lawful principles which define the nature of all existence. Shen wrote of an autonomous inner authority—which exists in every human being—that forms the basis for one's inclination toward moral choices.

Shen authored a work of 507 essays, known today as the *Dream Pool Essays*. It is here that many of his scientific investigations are reproduced. He describes the magnetic needle compass, which would be used for navigation. He discusses the use of the drydock to repair sea-going ships. He describes the functioning of the newly invented canal pound lock. He describes the *camera obscura*, and he writes extensively about printing with movable type, recently invented by Bi Sheng (990-1051).

Experimenting with suspended magnetic needles, Shen discovered that the magnetic north was not the true geographical north, and he was able to calculate a precise measurement of the magnetic declination. Shen also charted the rotation of the polar star, which together with the use of the compass, revolutionized Chinese navigation practices. He also made improved designs of the armillary sphere, the gnomon and the sighting tube.

Together with his colleague Wei Pu, Shen initiated a five-year project to map the orbital paths of the Moon and the planets, involving daily observations, but this project was never completed. Based on his initial studies, Shen hypothesized that the planets have retrograde motion in their orbits. He also proposed the theory that heavenly bodies were spheres, based on his observations of the waxing and waning of the Moon. He supported the hypothesis, proposed earlier by Zhang Heng, that the Moon was reflective, rather than producing light itself.

Shen devised a geological hypothesis for land formation, based upon findings of inland marine fossils, knowledge of soil erosion, and the deposition of silt. He

also put forward a theory of gradual climate change, after observing ancient petrified bamboos that were preserved in a dry northern habitat which would not support bamboo growth in his time.

The Song Economic Revolution

The era of the Song Dynasty was one of great human discovery and creation. At the center of it was the intervention of Zhu Xi (1130-1200 AD) and his admonition to "investigate the Principle in things to the utmost." Zhu insisted that a true understanding of Universal Principle (*Li*) was required to move China forward. As discussed above, Zhu's investigation into the relationship between Universal *Li* and individual *Li*, defined what we in the West might call a Promethean Identity for every human individual. This led to an explosion of scientific and technological discoveries, with each discovery rapidly disseminated throughout China, made possible by the 10th Century invention of printing with movable type.

Zhu Xi, Confucian scholar in the Song Dynasty.

Zhu Xi served the Song Court for nine years, during which time he initiated numerous projects on water management, canal building and education. He established public granaries to provide a reliable source of food for all Chinese. He proposed recruiting poor and unemployed Chinese to build needed infrastructure.

One of the greatest accomplishments of this era was the agricultural revolution. This was accomplished not by bringing more land into cultivation, but by applying scientific discoveries to revolutionize food production. These included new hydraulic techniques and irrigation networks; new seed strains, to increase yields and enhance the capability for double cropping; improved methods of soil preparation, utilizing fertilizers and tools; and a vast network of roads and canals. All of this was greatly aided by Chinese advances in metallurgy and industrial production. By the Thirteenth Century, China possessed the most advanced agriculture in the world. Potential population density exploded.

As stated above, by 1100 AD China was producing 127,000 tons of iron per year. Other industrial, hydraulic, power and related technologies were the most advanced in the world. Internal and foreign trade boomed. Shipbuilding became a major industry, producing thousands of inland and seagoing ships. The mariner's compass, invented about 1119, led to the charting of the sea and advanced navigation techniques.

During the Song era, the population of China more than doubled, and Chinese breakthroughs in science and technology—breakthroughs which gave mankind increased power in the universe—radiated throughout all of the human species.

Saving Europe

We shall reserve our discussion of oligarchic empire for the next installment of this serial. Here, we shall simply note that, following the conclusion of the Roman Empire's Third Punic War in 146 BC and the assassination of the brothers Gracchi in 133 BC and 123 BC, respectively, Europe entered into a prolonged Dark Age, one which lasted for 1,500 years.

There were breakthroughs and advances—the reign of Charlemagne in Europe and the scientific contributions of the Islamic world being the greatest interventions—yet, for centuries Europe was held back and driven down by oligarchical rule. It was in China that human culture advanced and prospered.

Through the activity conducted along the Silk Road trading route, as well as the maritime trade of India and the Islamic world, many Chinese scientific and technological breakthroughs made their way to the West. Also, during the Song and other dynasties, numerous foreign scientists and entrepreneurs took up residence in China, with Muslim astronomers being of particular note. China was not isolated; it was not a "hidden" Shangri-La. Throughout all of these centuries, China led and contributed to a great Dialogue of Civilizations.

Many Chinese discoveries were transmitted into Europe. These would help sustain the people of Europe during very difficult times, and provide a scientific and technological reservoir, one to be drawn on, as Europe began to move forward in the 15th Century.

To be continued.