

# HELIIX



AMGEN'S MAGAZINE OF BIOTECHNOLOGY

AN INTERVIEW WITH DR. J. MICHAEL BISHOP  
EXPLORING THE MECHANISMS OF CANCER

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SPECIAL REPORT

HUMAN GENE THERAPY  
**PROSPECTS FOR THE FUTURE**

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PRINCIPLES OF BIOTECHNOLOGY  
RNA AND THE EVOLUTION OF LIFE

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AN INTERVIEW WITH DR. GEORGE LUNDBERG  
PROMOTING THE SCIENCE AND ART OF MEDICINE

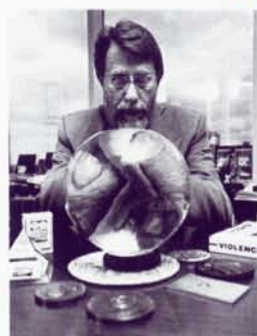
► PERSPECTIVES ◀



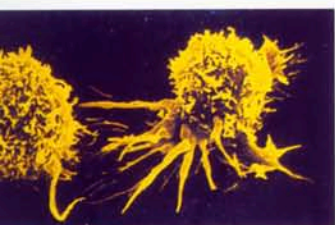
**THE TAO OF IMMORTALITY** According to ancient Chinese philosophy, there was no distinction between mind, or spirit, and matter. Given this philosophical background, the followers of Taoism, or the philosophy of the Way, believed that individuals could achieve immortality through the practice of certain physical exercises. Robert Temple explores the world of Taoist physiology. .... 36



**PROMOTING THE SCIENCE AND ART OF MEDICINE** Founded in 1883, the *Journal of the American Medical Association* (JAMA) is considered one of the top medical journals in the world. Dr. George Lundberg, JAMA's editor, discusses the art of caring and gives his prescription for health system reform in a conversation with Beverly Merz. .... 42



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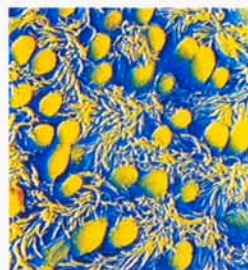
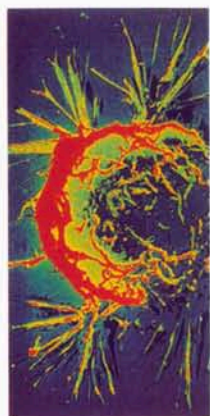


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# THE TAO OF IMMORTALITY

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IN ANCIENT CHINA, THE FOLLOWERS OF TAOISM, OR THE PHILOSOPHY OF THE WAY, DEvised A NUMBER OF UNUSUAL PHYSICAL PRACTICES IN THEIR PURSUIT OF IMMORTALITY. ROBERT TEMPLE EXPLORES THE FASCINATING WORLD OF TAOIST PHYSIOLOGY.

UNTIL THE TIME OF ROGER BACON in the Middle Ages, alchemy in the West was concerned primarily with the transmutation of base metals into gold. But Bacon introduced a new element into the practice of alchemy; namely, the search for elixirs of immortality. The attempt to discover or create a substance or substances which, if consumed, would enable one to live forever originally came from China. This is, in part, due to the fact that the Chinese espoused an entirely different view of the material world than that traditionally held in the West. In Chinese thought, there was no distinction between 'mind' and 'matter.' On the contrary, there was a single continuum, whereby matter

became more and more tenuous and rarefied. Therefore, ghosts and spirits were not immaterial beings but merely highly rarefied forms of matter, like mist or smoke.

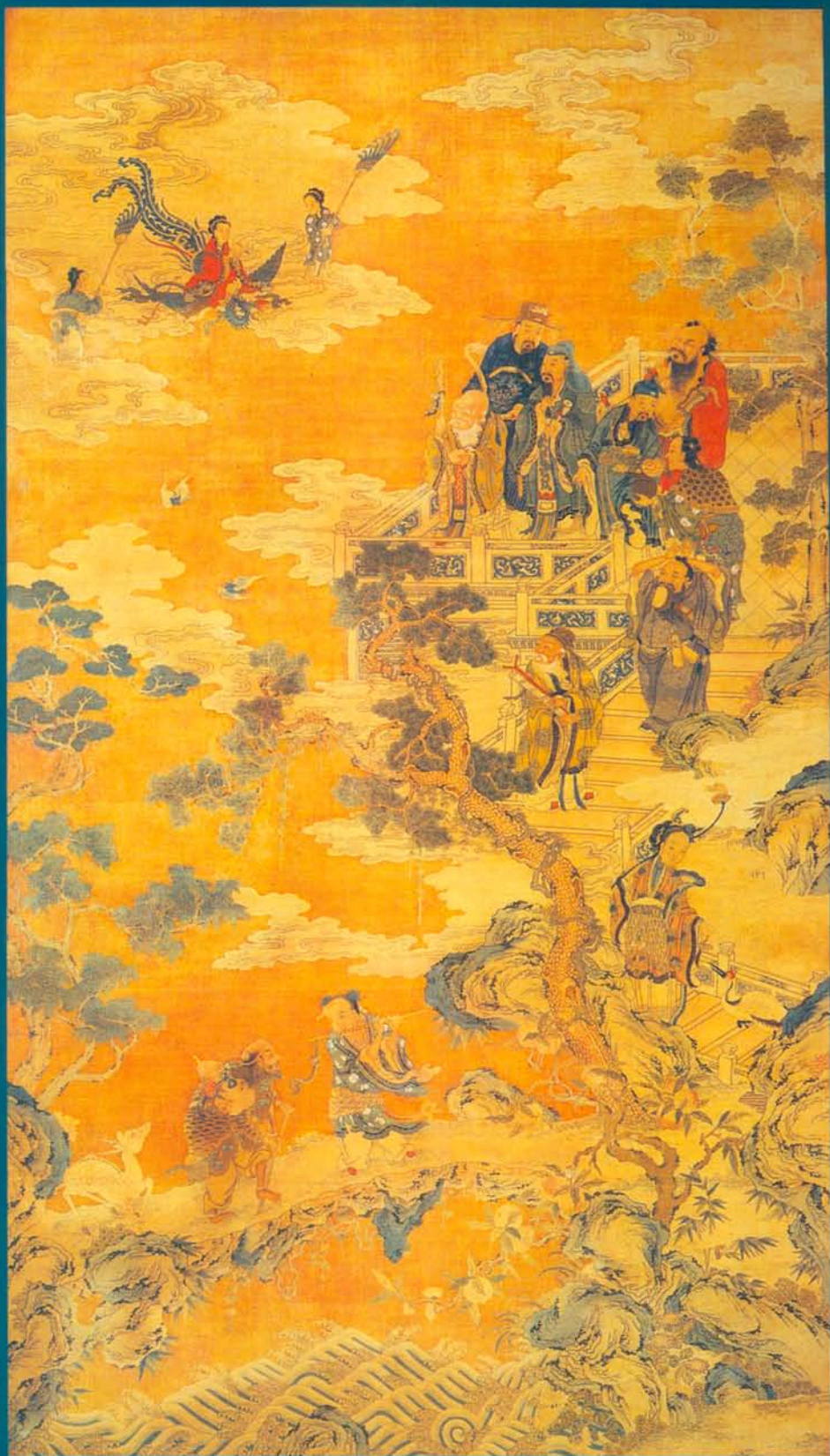
The ancient Chinese believed in a bewildering array of spirits, yet they were also convinced that no individual personality could exist without some bodily component. A ghost or spirit was therefore never conceived as being wholly immaterial. There was, in fact, no pure spirit as distinct from matter in Chinese philosophy. The continuum of nature progressed from gross earthly matter through the less dense water and air to culminate in 'the hard wind,' a rarefied form of air thought to exist above the atmosphere which in some respects resembles what we now call solar wind. But no matter how insubstantial a thing might be, no matter how thin or tenuous, that thing must still be material. Thus, for the ancient Chinese, there was simply no escape from the continuum of matter.

Given this philosophical background, the Chinese believed that individuals could achieve physical immortality in the rarefied sense, and became obsessed with finding elixirs which could bring about such immortality. Since many of those elixirs were concocted from chemicals which we now know to be poisonous, such as mercury and arsenic, ▶

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▶ *For the ancient Chinese, there was simply no escape from the continuum of matter.* ◀

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*Kesi tapestry, Qing dynasty, Qianlong reign (1736-1795), depicting a Taoist paradise scene.*

## ADEPTS BELIEVED THAT THE BODY'S AGING PROCESSES COULD BE REVERSED.

the adepts who ingested these potions quite naturally tended to become emaciated, pale and wan. But whereas one would assume that such people must be ill, the Chinese practitioners of this esoteric art instead took the view that such people were 'becoming tenuous' and 'ephemeralizing.' This meant that they were on the road to immortality; they were becoming rarefied spirits. When an adept 'died,' his body was preserved while his spirit was presumed to have wafted off to the mountains, though it might indeed return to his tomb now and then for sentimental reasons. Persons who had achieved immortality in this

way were believed to flit about in the forests and the hills enjoying eternal felicity, released from the grosser forms of matter which impeded mere mortals.

The adept's preoccupation with finding the perfect elixir of immortality eventually led to the idea that there were bodily elixirs,



*Ivory figurine of Shouxing (ca. 17th century), revered as the god of longevity, holding the peach of immortality.*

or 'elixirs within.' The early success of the Chinese in extracting bodily hormones sublimed as crystals, in comprehending as early as the 6th century BC the circulation of the blood, in recognizing deficiency diseases and hence developing the concept of vitamins, and in refining dietary concepts which we now know as macrobiotics, all contributed to the search for physiological elixirs. The resultant science of physiological alchemy was practiced in China for more than 2,000 years, and remnants of it survive to this day in *kung fu* and other physiological disciplines, as well as in special treatments given to China's present elderly lead-

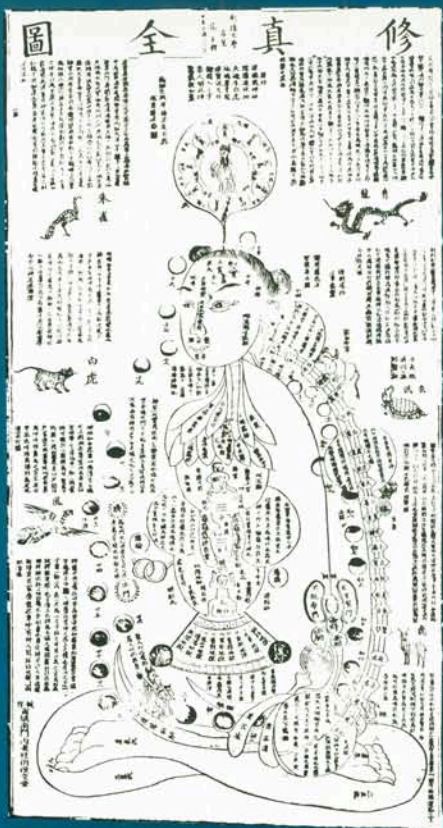
ership several times a week. In the beginning, the search for potions outside the body seems to have been looked upon as a temporary measure: the adept's life could be extended by such means so that he would have additional time to pursue his laboratory research for the perfect elixir. But this external quest gradually came to be seen as an inferior, even public quest. The truly secret and esoteric quest was that of physiological alchemy, in which the body itself was the laboratory in which the elixirs were to be discovered. These elixirs merely needed to be purified and processed for the purposes of bodily rejuvenation.

### TAOIST PHYSIOLOGY

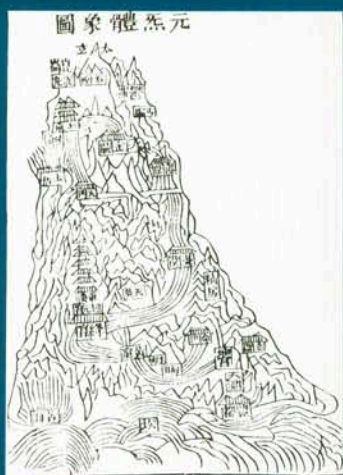
THE BODY'S AGING PROCESSES WERE THUS PROCESSES which the adepts believed could be reversed. Since this reversal of aging meant taking processes and somehow making them run backwards, the guiding motto was to 'become like an infant' again. The principle of 'the reversal of flow' of certain real or imaginary bodily fluids was adopted as the method by which to accomplish this. This reversal of flow also implied the conservation of bodily fluids other than waste products. Saliva, for example, was far too precious a substance to waste. Saliva was believed to possess powerful masculine (*yang*) properties, and adepts were thus advised never to spit. Saliva, also known as 'the precious jade fluid,' must always be swallowed and kept within. Spitting could mean a serious loss of the organism's vitality.

These theories of physical immortality were held by adepts of a creed known as Taoism, or the followers of the *Tao* (pronounced 'dow'). The concept of *Tao*, which means 'road' or 'the Way,' represents the soul of Chinese philosophy. Lao Tzu, the founding sage of Taoism, described the *Tao* as 'that whereby all things are so, and with which all principles agree. *Tao* is that whereby all things become complete. *Tao* brings the principles of all things into single agreement.' Taoism viewed bodily process-

► *Proper circulation of the ch'i in the body was considered a prerequisite for health and longevity.* ◀



Engraving showing the complete chart of the regeneration of the primary vitalities and the circulation of *ch'i*.



The body symbolized as a mountain with small pagoda's as the different organs, and the *ch'i* that flows up and down like a river on a mountain slope.

es as cosmic processes in microcosm. As Lao Tzu wrote: 'Tao's actions are the actions of all things.' The human body was thus an integral part of the cosmos and participated in its nature by following processes guided by the universal *Tao*. Humans could, it was argued, emulate the cosmos by becoming eternal if the *Tao* were properly followed.

Fundamental to the concept of the *Tao*, and thus to all Chinese thought, were the principles of *yin* and *yang*. These were the two interacting principles from which all the natural phenomena of the universe emerged. The *yin* principle represented the feminine, dark, cold and moist characteristics of things, while the *yang* principle represented the masculine, light, warm and dry characteristics. The two principles could never be completely separated from one another. This is symbolized by the well-known *yin-yang* diagram in which the two principles are shown swirling around each other, each one containing the germ of the other. Every natural object in the universe was thus considered as having different quantitative proportions of *yin* and *yang* in its make-up. The Sun, for example, was considered primarily *yang*, while the Moon was primarily *yin*.

Another concept fundamental to the Taoists was that of *ch'i*. *Ch'i* is a complex word, containing within itself a combination of meanings which includes both material and non-material aspects. The original meaning of *ch'i* is 'air' but, in the human body, *ch'i* means 'breath' or 'energy' or what the ancient Greeks called *pneuma*. As such, *ch'i* was the focus of Taoist practices in meditation and attempts to achieve immortality. Currents of *ch'i* were envisaged as flowing around the body as a kind of parallel system to that of the blood. In fact, it is precisely these *ch'i* currents which are meant to be activated by the practice of acupuncture. *Ch'i* of a powerful nature was also thought to emanate from various cosmic bodies, and it was possible for the trained adept to tap into these sources. Proper and unimpeded circulation of the *ch'i* in the body was therefore a prerequisite for health and longevity. Taoist practices of physiological alchemy were thus meant to stimulate this most desirable of all conditions.

The Taoist adepts pursued many techniques in their quest for the internal elixirs. ►

## AN OLD MAN RETURNS TO YOUTH ONE DAY EVERY DAY.

For instance, the Taoists widely practiced sun- and moon-bathing, as well as star- and planet-bathing. This was done in an attempt to capture the *ch'i* of far-off things. Not only the *ch'i* of the planets was desirable, however. There are even cases of Taoists exposing themselves to the night sky in an attempt to capture the *ch'i* of the Great Bear constellation. But the most strenuous effort was devoted to capturing the *ch'i* of the Sun. There was even an entire book of directions written for this purpose, entitled *Explanation of the Method of Grasping the Central Luminary*. It recommended facing the sun either sitting in the lotus position or standing. An early form of colour therapy seems also to have been envisaged. In order to absorb the *yin* energy of the Moon, Taoist women were advised to stand in the moonlight, holding in their hands pieces of yellow paper on which the Chinese character for moon was written.

### CALLISTHENICS

IN 1975, A GREAT DEAL MORE INFORMATION about ancient Taoist callisthenic practices came to light with the publication in Chinese of a study of a silk manuscript excavated from Tomb Number 3 at Ma-wang-tui near Ch'ang-sha in China. Dating from 168 BC, this manuscript discussed callisthenic exercises and portrayed them in a series of twenty-eight remarkable illustrations. Some of these exercises have such colourful names as 'the bear rambling' and 'the bird stretching,' as well as one known as 'getting in touch with the *yin* and the *yang* by the aid of a long pole.'

Another illustrated book of exercises, this one from the 8th century AD, is known as *Eight Elegant Exercises of Chungli Ch'üan*. Some descriptions of the exercises include directions such as these: 'Make the two hands like hooks, stretch the arms forward and take hold of the soles of the feet. Do this for each alternately 12 times, then return the feet and resume sitting cross-legged;' 'Twist the vertebral column looking at the shoulder to the right and to the left, each 24 times;' and 'With the two hands



Diagram of the internal structure of man, with the spine depicted as a snake.



Each organ is here symbolized by a different object, while the *ch'i* flows through the spinal channel.

joined in front of the body, make five *ho* exhalations, then interlace the hands above the head in the position of 'supporting the sky,' with palms upwards, then massage the vertex of the head. Repeat the cycle three or nine times.' Perhaps the oddest of all is the following instruction: 'Stir up the saliva to right and left with the tongue against the palate 36 times. Rinse the mouth with it and gargle 36 times. Separate it into three lots as if it was a hard thing, and swallow it. After this, one can walk through fire.'

Hua T'o, a famous Chinese physician of the 3rd century AD, had this to say on the subject of callisthenics: 'The body should be exercised in every part but this should not be overdone in any way. Exercise brings about good digestion and a free flow of the blood. Therefore the ancient sages engaged in *tao-yin* exercises, for example by moving the head in the manner of a bear, and looking back without turning the neck. By stretching at the waist and moving different joints to left and right one can make it difficult for people to grow old.' These Taoist exercises were intended to make the body more supple, thus eliminating block-

ages and facilitating the flow of *ch'i*. They also stimulated the blood flow, which was considered crucial for the proper functioning of all organs. They were also conceived of as expelling bad *ch'i*, possibly through perspiration. But the suppleness of muscles and tendons was the most important goal; stiff joints and muscles were signs of ageing and, as such, were not to be tolerated.

#### TO BREATHE LIKE AN EMBRYO

ADVANCED TECHNIQUES OF BREATH CONTROL were also frequently practiced by the Taoist adepts. A book dating from approximately 320 AD recommends: 'The most important thing is simply to know how to breathe like an embryo. He who can breathe like a foetus will respire as if still in the womb, without using nose or mouth; thus will the *Tao* be achieved. [...] One must inhale through the nose and then close up that breath. While it is thus hidden within, one counts up to 120 heartbeats, and then exhales it gently through the mouth. Neither during exhalation nor inhalation should one hear with one's ears the sound of the breathing, and one should make sure that more goes in than comes out. A wild goose feather may be placed in front of the nose and mouth, and during exhalation this should not show any movement. After continual practice one may very gradually increase the number of heartbeats during which breath is held to as much as 1,000, and when this proficiency is reached, an old man will be able to grow younger daily, returning to youth by one day every day.'

Some of the breath exercises were practiced in monasteries at high altitudes on mountains, resulting in prolonged induced anoxaemia. The loss of appetite and body weight resulting from this would bring about a thinning and 'ephemeralizing' of the adept which would encourage him and his colleagues to think he was well on the way towards immortality and the rarefied state. Hallucinogens were also used, including a fungus parasitic of pine tree roots. Meditation, trance, hypnosis, self-hypnosis, elaborate dietary regimens, exotic massages, extraordinarily elaborate gymnastic exercises – all these were ways in which the Taoists pursued the Way in order to achieve physical immortality, to restore to the body its primary vitalities. ◀

BY ROBERT TEMPLE

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Engravings from Joseph Needham's *Science and Civilisation in China*, Vol. V, Part 5.