BY CHANCE OR BY MIRACLE?

The human frame is an engineering marvel. A baby is born with 305 bones, but some of these fuse together as the child grows, leaving just over 200, operated by 650 muscles and 100 joints, each one formed in such a way as to function in perfect harmony with all the others. The framework is also remarkably strong; the tendons that anchor the muscles to the bones could stand a stress of eight tons per square inch.

THE HAND

The human hand has been called "one of the finest, most delicate yet strong and most minutely adjusted tools ever conceived….the most perfect and precise instrument in a world bristling with the mechanical wonders of the atomic age." In his widely acclaimed book *The Human Body* first published in 1998, the British author Anthony Smith writes, "Next to its brain, the hand is probably Homo sapiens' greatest asset. Other species may run faster or have keener senses, but none comes even close to matching our manual skills."

Referring to the forms of manual grip that "outclass the capabilities of any other creature", he says that the strength and delicacy involved have 'permitted the human hand to be more gifted, more capable and more manipulative than any limb ever seen." Powerful enough to wield a pickaxe, yet precise enough to conduct microsurgery, the human hand is uniquely designed to perform thousands of different functions, a fact sometimes cleverly exploited by those promoting their products: for example, one advertisement for a particular brand of golf clubs asked, "Ever wondered why you were born with 652,497 nerve endings in your hands?"

THE EAR

Each human ear has a set of the smallest bones we possess—the malleus, the incus and the stapes. The malleus picks up sound vibrations from the eardrum, and by the time they have travelled to the incus and then the stapes they have increased twenty-fold. Whereas a grand piano has 240 strings and eighty-eight keys by which a gifted musician can produce beautiful sounds, the inner ear has 24,000 "strings" and 20,000 "keys", enabling us to hear an amazing variety and range of sounds. If an airwave moves one millionth of a second across the ear drum, that movement is immediately translated into intelligible sound by processes involving 30,000 nerve centres contained in an area a fraction of an inch long.

The ear canal has some 4,000 wax-producing glands to prevent insects, dust and other foreign bodies from reaching the delicate hearing mechanism, and also serves as an effective air-conditioning system, while the inner ear, deep within the skull, where it is one of the best-protected parts of the human body, contains the structures essential for maintaining balance. Small wonder that the complex construction of the ear has been said to make a computer look as crude as a concrete mixer!

THE EYE

The human eye is a truly amazing phenomenon. Although accounting for just one four-thousandth of an adult's weight, it is the medium that possesses some 80% of the information received by its owner from the outside world.

The tiny retina contains about 130 million rod-shaped cells that detect light intensity, and transmit impulses to the visual cortex of the brain by means of about one million nerve fibres, while nearly six million cone-shaped cells do the same job, but respond specifically to colour variation. The eyes can handle 500,000 messages simultaneously, and are kept clear by ducts producing just the right amount of fluid with which the lids clean both eyes simultaneously in one five-hundredth of a second.

THE HEART

If the outer organs of the body are amazing, the internal ones are equally so. Not much bigger than a clenched fist, and weighing just ten to eleven ounces, the heart automatically beats about 100,000 times a day, over 2,500 million times in an average life span. It pumps blood through the body's 80,000 miles of blood vessels at a rate which means that every day the blood cells travel an accumulated distance of 168 million miles, equivalent to 6,720 times the world's circumference.

The average person has a supply of 6 to 8.5 pints of blood, totalling roughly 7% of body weight. A single drop of blood contains more than 250 million separate blood cells, floating in a straw-coloured plasma composed of thousands of different substances, including proteins, glucose, salts, vitamins, hormones and antibodies.

There are three distinct types of blood cell. Some 250,000 million red cells carry oxygen from the lungs and drive it around the body, while 2,500 million so-called "white" cells (they are actually colourless) form a crucial part of the body's defence system, destroying dead and virtually infected cells, producing antibodies, detoxifying foreign substances and eating up bacteria. The smallest particles in the blood cells are the platelets. Whenever they are exposed to air, or any other foreign substance, they disintegrate, releasing an enzyme that causes the blood to clot, preventing the person concerned from bleeding to death.

Each blood cell passes through the body's massive mileage of arteries, veins and capillaries about 300,000 times during its lifespan of 120 days. The capillaries, tiny blood vessels which alone have a total area larger than a football field, are just five one-thousandth of a millimetre wide, so narrow that the red cells can only pass through in single file.

After this amazing itinerary, the red cells are replaced in the bone marrow at the rate of three million per second; 'white' cells have a much shorter life and are replaced every twelve hours. Haemoglobin, which consists of four polypeptide chains of atoms linked in a unique and precise way, picks up oxygen atoms at the lungs, where oxygen concentration is high, and drops them off in the tissues where it is low.

THE BRAIN

The human brain, shaped somewhat like an oversized walnut, and with the consistency of a mushroom, has been described by Isaac Asimov as "the most complex and orderly aggregation of matter in the universe", although it weighs just three pounds and accounts for only about 2% of a person's body weight. Of the major organs, only the heart, kidneys, spleen, pancreas and lungs weigh less.

In an article based on her 1994 Royal Institution Christmas Lectures, Oxford University neuro-chemist Susan Greenfield wrote, "If you were to prise the brain apart and strip it down to its most basic components, you would end up with about a hundred billion neurones, roughly as many trees as there are in the 2.7 million square miles of Amazonian rain forest. Even more astronomical are the connections that are formed between these cells: somewhere between 10,000 and 100,000 inputs from other neurones will in turn become one of tens of thousands of inputs stretching out to target neurones within a dense network."

According to experts in the field, a human brain processes ten terabytes of data over an eighty-year lifetime, the equivalent capacity of 7,142,857,142,860,000 floppy discs. How impressive is this! British Telecom's official futurologist projects, "If current trends in the miniaturization of computer memory continues at the same rate of the past twenty years, a factor of 100 every decade, today's eight megabyte memory chips will be able to store ten terabytes in thirty years time."

THE LIVER

The largest internal organ is the wedge-shaped liver, which weighs between three and four pounds and serves as the body's chemical processing factory. It has over 500 essential functions, including the production of bile, the storage of sugars, vitamins and minerals, the maintenance of hormone balance and the manufacture of over 1,000 different enzymes. The liver processes ten million degenerating red blood cells every second.

THE KIDNEYS

The kidneys are not much bigger than a standard bar of soap, and weigh just four ounces, yet they have over a million nephrons, filtering units that stretch for over fifty miles if they were uncoiled and laid end to end. The nephrons process about forty gallons of fluid every day, filtering poisons and other impurities from the blood, regulating its volume and adjusting its chemical composition, and recycling water, minerals and nutrients. The kidneys have the remarkable ability to extract only toxic material and surplus water, leaving the bloodstream's valuable constituents untouched.

THE LUNGS

The lungs are literally vital to a person's survival, as they take in oxygen and exhale carbon dioxide, the body's main waste product; this laundering is carried out by about 300,000 million capillaries that run in the walls of the alveoli, balloon-like structures found at the very end of the bronchial "tree". If these alveoli were spread out, they would cover an area the size of a tennis court. Filled and emptied like bellows by the action of a complex system of respiratory muscles, the lungs operate at a pace which means that the average person breathes just under twenty times every minute, something over 700 million times during his or her lifetime.

THE SKIN

The human body is encased in three layers of flexible waterproofing, the skin, the outer layer of which is unobtrusively and automatically replaced every few weeks. The body's first line of defence against harmful invaders such as microbes, the skin contains millions of nerve endings [up to 1,300 per square inch in sensitive areas such as the fingertips and lips] to detect pain, heat, cold, pressure and contact.

Its waterproofing is provided by the "stratum corneum", the topmost "dead" layer of skin, while a dark pigment called melanin protects the owner from the sun's potentially dangerous ultraviolet rays as well as determining the colour of skin and hair. The skin also houses a complex air-conditioning system comprising six miles of ducts one-fifth of an inch long. This system's membranes allow water to escape from the body in the form of sweat in order to prevent overheating, yet never allow water to enter the body. It has been calculated that the number of living organisms on the skin of one human being is roughly equivalent to the number of people currently living on our planet!' How amazing!

SUMMING UP

Do you believe in miracles? I assume you do now. Just think, you and I have always been told that everything you have just read appeared by an evolutionary process – in other words, by chance! Little wonder, "the fool has said in his heart, There is no God" (Psalm 14:1, 53:1; Romans 1:19-21).

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