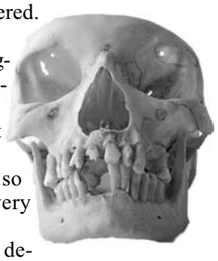
THE BRAIN

By Garry W. Johnson
MOUNTAIN REVIEW Staff

This complicated collection of cells is the control center of the human body. Responsible for control of movement, sensory input and a wide range of physiological processes, this small, soft, pinkish-gray mass acts as the organ of thought and the housing of the mind. With all the facts scientists know about the brain, what they do not know is often just as interesting.

STUDYING THE BRAIN

Neuroscience and neurobiology are both names for the study of the brain. This remarkable field of science has made great strides in our understanding of how the brain works. Yet despite all the progress, there remains much to be learned and discovered.



PRECIOUS CARGO

The brain is very fragile and resembles a walnut made of jello. Brain cells are almost never replaced when damaged or destroyed, so care of the brain is very important.

The human body is designed to give the brain three distinct layers of protection. First is a pool of jelly-like tissue, blood vessels and fluid which the brain floats in. This watery layer serves as a cushion to absorb shocks. Three tough membranes called meninges make up the next layer and also protect the spinal cord. The outermost and strongest of the membranes is called Dura mater, followed by the pia mater and the arachnoid. The last line of defense is the skull or cranium.

BIOLOGICAL HARD DRIVE

Powered by blood, oxygen, chemicals and electrical impulses, the complicated collection of cells that is the brain seems to work like a computer. Using less power than a hundred-watt light bulb, the brain consumes more than 25% of the body's required oxygen and 20% of the blood supply.

It would take just 15 seconds without blood flow to the brain to cause unconsciousness. Increase the time to four minutes and serious brain damage would occur. Permanent injury would also result from three to four minutes without oxygen.

Chemicals and drugs can also hurt the brain. Neurons that release serotonin are destroyed by the street drug Ecstacy, for example, and can result in mood swings, troubled thoughts, sleep and motivational difficulties and sometimes death. This is your brain on drugs ...

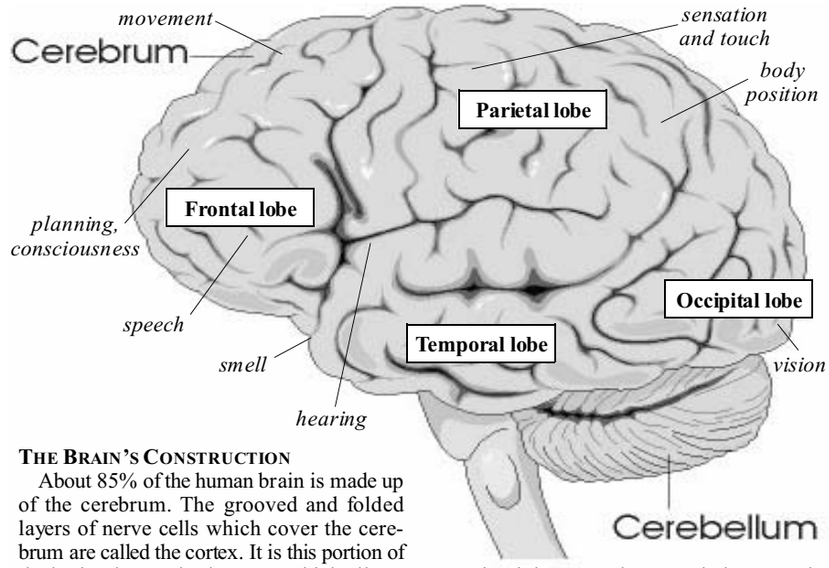
BRAIN DEVELOPMENT

According to medical experts, babies actually dream while in the womb. A baby's brain can grow incredibly quickly before it is born. There are periods of time during gestation when the brain increases its neurons by 250,000 every minute. At a child's birth its brain weighs less than 1 pound but has almost all the neurons it will ever have. The brain reaches its full weight of about 3.31 pounds (1.5 kg) by age 6, all but 10 ounces of which is water. The adult brain comprises roughly 2% of the bodies weight and is the second-heaviest organ in the human body (after the liver and ahead of the lungs and heart).

FOOD FOR THOUGHT

Eating fish can be important for the development of the brain. Decosahexaenoic acid is essential for the brain to develop and is found in oily fish. However, to keep the mind sharp, vegetables might be the key.

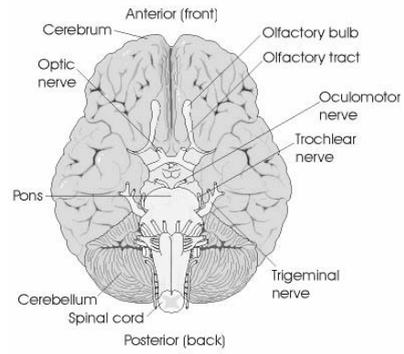
A recent study found that seniors who ate 2.8 servings of vegetables a day (about 1.5 cups) saw their rate of cognitive change slowed by 40%. The new study adds to scientific evidence suggesting a vegetable-laden diet might shore up the memory and protect against Alzheimer's. The Alzheimer's Association also recommends fish and dark-skinned vegetables thought to contain high levels of brain-protecting antioxidants.



THE BRAIN'S CONSTRUCTION

About 85% of the human brain is made up of the cerebrum. The grooved and folded layers of nerve cells which cover the cerebrum are called the cortex. It is this portion of the brain, the cerebral cortex, which allows us to think, speak and remember.

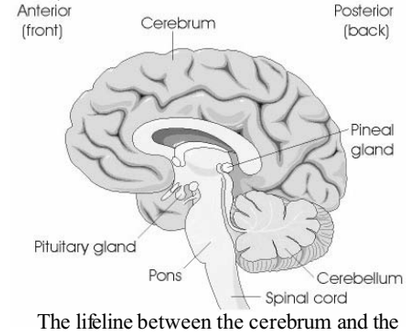
By dividing the brain into halves, scientists have designated left and right hemispheres. Deep groves or fissures in the cortex divide each hemisphere into four lobes.



One of the brain's primary functions is to coordinate all of the nervous activity in the body. The spinal cord and brain together make up the central nervous system. The functional unit of the nervous system is the nerve cell, or neuron. There are 46 miles of nerves in the adult human body, each made of many nerve fibers bound together. This nerve fiber called the axon, may range in length from only a fraction of an inch to many feet and may divide into many branches. The body's longest axon extends from the brain to the muscle controlling the big toe. When you stub your toe it takes 1/50 of a second for your brain to register the pain.

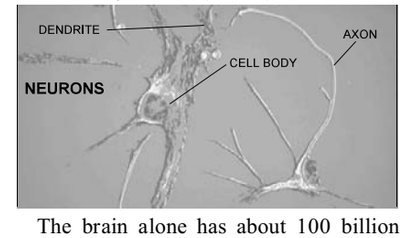
Neurons in the brain allow it to process information by transmitting chemical and electrical impulses. Sensitive fibers called dendrites transmit the signal to the cell body and along the axon. The axon has terminal branches specialized to carry the information to the dendrite of the next neuron.

Maintaining muscle tone, balance and coordinated movement are the primary functions of the cerebellum. Sometimes referred to as "the little brain," it contains a large mass of tightly knit nerve cells called folia, which look like leaves.



The lifeline between the cerebrum and the spinal cord is the brain stem. A set of nerves called the medulla—which controls breathing, heartbeat, and other essential functions—is located at the bottom of the brain stem. Connecting the brain stem to the cerebrum and cerebellum are the pons. The midbrain and the thalamus are located above the pons.

Cell bodies, dendrites, glia and axons compose the brain's grey matter. White matter is myelinated (coated) axons.



The brain alone has about 100 billion neurons. These cells, however, start to die daily after the age of 20. The brain will lose roughly 10% of it's neurons over a lifetime.

REMEMBERING SLEEP

Sleeping takes up about 2,920 hours or 122 days of the average person's year. Almost a third of our lives are spent asleep.

A new study shows people who are not getting enough sleep may be setting themselves up for attention lapses. The brain actively processes information during sleep, replaying memory during slow-wave sleep (often called deep sleep) in stages of non-rapid eye movement. The replay makes the memory stronger and people who do not get enough sleep (seven to eight hours) have more trouble retrieving the memory when they need the information. For long-term memory and good health sleep is essential. Lack of sleep causes anxiousness, irritability and an inability to concentrate. A person will actually die from a total lack of sleep more quickly than from starvation. About 10 days without sleep will kill you, starvation takes a few weeks longer.

THE ANIMAL BRAIN

Complex brains are not found in most invertebrates (animals without backbones). These animals use groups of nerve cells called ganglia to control their bodies. Two pairs of ganglia can be found in earthworms and three pairs in insects. The most complex brain of all the invertebrates belongs to the octopus.

Well-developed brains can be found in all vertebrates (animals with backbones). In simple vertebrates, the hindbrain or cerebellum is generally larger than the forebrain or cerebrum. In these animals the cerebrum is concerned with smell, the midbrain with vision and the cerebellum with balance and hearing.

Birds have the ability to learn new things. Their cerebrum is larger than those of fish, amphibians and reptiles. It is the bird's cerebellum, however, that controls flying and other motor skills. Comparatively speaking, the larger the cerebrum, the more advanced the design of the brain.

Mammals have the most complex brains. Highly-developed brains can be found in whales

and dolphins. Scientists recently discovered that humpback whales have a type of brain cell seen only in humans, the great apes, and other cetaceans such as dolphins. As in humans, the brain cell (called a spindle neuron) was located in the cortex area.

More than any other animal, the brains of chimpanzees are most like man's, only slightly smaller. That is likely due to the fact that 98% of their DNA is identical to humans.

THE HUMAN MIND

Elephants, whales and dolphins have much larger brains than humans do. The human brain is slightly superior in design, yet not enough to account for the vast difference in output. Although animals have a brain and are equipped with instinct, they have no intellect to understand and choose moral values or to develop godly character.

Could there be a *nonphysical* component in man that separates the human MIND from the animal BRAIN? To learn what scientists and psychologists do not know, please request a copy of *What Science Can't Discover About the Human Mind* and *The Incredible Human Potential*. Both books can be yours absolutely free by writing to the Philadelphia Church of God, P.O. Box 3700, Edmond, OK, 73083.