Part 2 **BIOLOGICAL PSYCHOLOGY**

**4 The biological basis of mind and behaviour**

Where is my mind?

* The mind remains a somewhat mysterious entity. Materialism defines the mind as consisting of physical matter, whereas dualism maintains that it consists of something else. Brain imaging and related techniques raise intriguing questions about how the mind can function in the absence of normal brain activity or conscious awareness.

The nervous system

* The human nervous system is composed of specialized cells—principally, neurons— which allow communication to take place among the various structures of the body. The nervous system also includes glia—cells that assist neurons in their work. Most neurons are composed of dendrites, cell body, axon, and terminal.
* Neurotransmitters such as serotonin, dopamine, and GABA affect many aspects of mental life. Some drugs (agonists) may increase the effects of neurotransmitters, while others (antagonists) may decrease neurotransmitter effects.

The organization of the central nervous system

* The nervous system is organized into the central nervous system, consisting of the brain and spinal cord; and the peripheral nervous system.
* The spinal cord is a bundle of nerve tracts organized into segments that act as a communication pathway between the brain and the rest of the body. The spinal cord is composed of grey matter and white matter. The spinal cord also controls spinal reflexes and is responsible for central pattern generators.
* The peripheral nervous system, which is organized into somatic and autonomic nervous systems, makes communication possible between brain and body. The autonomic nervous system is subdivided in turn into the sympathetic and parasympathetic nervous systems.

The brain

* The brain is a network of integrated clusters of neurons that form neural circuits. On a basic level, the brain can be divided into three parts: hindbrain, midbrain, and forebrain. The hindbrain consists of the cerebellum, medulla, pons, and reticular formation. The midbrain includes the inferior and superior colliculi.
* The forebrain is the seat of thought, emotion, personality, memory, intelligence, language, and consciousness. The forebrain is divided into two nearly symmetrical cerebral hemispheres, connected by a bundle of over 200 million axons known as the corpus callosum. The major structures of each cerebral hemisphere of the forebrain are the limbic system, the thalamus, and the cerebral cortex. The limbic system is composed of the hypothalamus, the hippocampus, the amygdalae, and clusters of nerves called nuclei—including the basal ganglia and nucleus accumbens. The cerebral cortex is the centre of higher cognitive processes, such as problem-solving, learning, memory, and language.
* The areas of the cerebral cortex can be grouped into four large regions: the occipital lobe, parietal lobe, temporal lobe, and frontal lobe. The frontal lobe includes the prefrontal cortex, which appears to receive and integrate information from all bodily systems and brain regions to assist in decision-making, organizing information, and planning actions.
* Experiments with patients who have undergone split-brain surgery have shown that each cerebral hemisphere is specialized to a certain extent; however, the hemispheres are also at least to some degree plastic.

The endocrine system

* The endocrine system consists of glands and the hormones they synthesize. The endocrine system partially overlaps the nervous system.

Brain function and human experience

Neuroscience and psychology

Neuroscience is the multidisciplinary study of the central and peripheral nervous systems. Neuroscience can be divided into sub-disciplines, including behavioural neuroscience and cognitive neuroscience. Neuroscience has advanced dramatically through the use of contemporary imaging technologies such as MRI and fMRI.