

## THE CENTRAL NERVOUS SYSTEM OF VERTEBRATES DIFFERS FROM INVERTEBRATES

While the nervous systems of many annelids and arthropods show some centralization and cephalization, none show the extensive development of a brain that is characteristic of vertebrates. The vertebrate brain exerts far more dominance over the entire nervous system than does the brain of any other animal group. In short, the vertebrate brain is the master control center for all bodily functions. Nowhere is this more true than in humans, whose large cerebral cortex is the major coordinating center for sensory and motor functions involving all senses and all parts of the body, as well as having areas devoted to memory formation and storage.

The central nervous system (brain and spinal cord) of vertebrates differs in several other important ways from those of annelids and arthropods:

1. The vertebrate spinal cord is single, and found along the dorsal wall of the body. Recall that the nerve cord develops from the embryonic neural tube, which has a hollow central canal. A remnant of that central canal survives in the adult, so the nerve cord is said to be “hollow” (see Fig. 48.4 in your text and the spinal cord model in the demo). In comparison, the nerve cords of annelids and arthropods are double (two cords lying side by side and often partly fused); ventrally located, and solid (e.g., no central cavity or canal).
2. The vertebrate spinal cord is not so obviously organized into a series of alternating ganglia and connecting tracts as is seen in invertebrates such as the insect or earthworm.
3. Although many coordinating functions in vertebrates are still performed by the spinal cord, the enlarged brain exerts dominance over the entire nervous system.