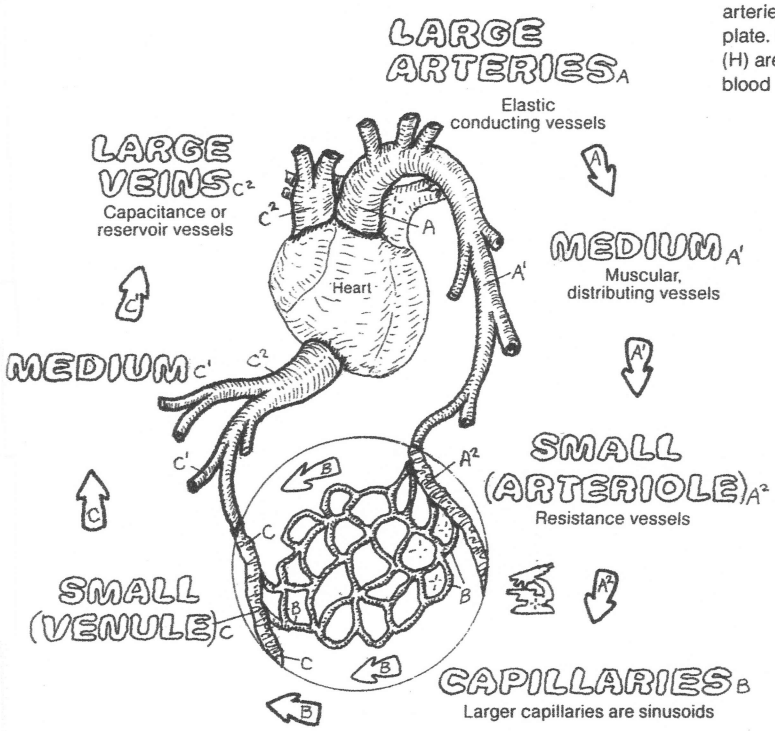
BLOOD VESSELS

CN: Use red for A, purple for B, blue for C, and very light colors for D, F, and H. (1) Complete the upper left diagram, beginning with the large arteries. (2) Color the blood vessels and their titles at the bottom of the plate. Note that the vas and nervus vasorum in the fibrous tissue layer (H) are not colored. (3) In the diagram of venous valve action, the blood in both vein and artery is colored gray.



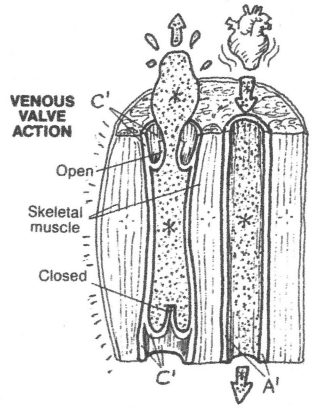
Large arteries (elastic or conducting arteries), such as the aorta or common carotid, contain multiple layers of elastic tissue. They are roughly the size of a finger. *Medium arteries* (muscular, distributing arteries), averaging the size of a pencil, are generally named (e.g., brachial). Diminutive branches of medium arteries are called small arteries (*arterioles*); unnamed, they control the flow of blood into capillary beds (resistance vessels). *Capillaries* are unnamed simple endothelial tubes supported by thin fibrous tissue. Microscopic in dimension, some capillaries are larger (sinusolds) or more specialized than others.

Veins get progressively larger as they get closer to the heart. Veins have tributaries; except in portal circulations, they do not have branches. Venules (small veins) are formed by the merging of capillaries and are basically of the same construction. *Venules* merge to form *medium veins*, and these are the tributaries of *large veins* (capacitance or reservoir vessels). Certain specialized large veins, as in the skull, are called sinuses. The walls of these veins are thinner than those of their arterial counterparts, and their lumens are generally larger. Large veins can stretch significantly, becoming virtual reservoirs of blood.

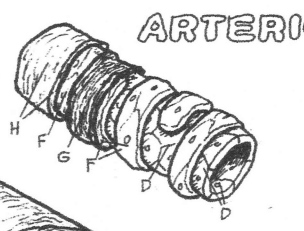
All vessels demonstrate a simple squamous epithelial (endothelial) lining (tunica interna) supported by a thin layer of fibrous tissue (not shown). Most medium veins of the neck and extremities have a series of small pockets formed from the endothelial layer. These valves are paired and point in the direction of blood flow. Though offering no resistance to blood flow, they will bend into and close off the lumen of the vein when the flow of blood is reversed. Valves resist gravity-induced blood pooling, especially in the lower limb vessels. Venous flow here is enhanced by the contraction of skeletal muscles, whose bulges give an anti-gravity boost to the movement of blood. The *internal elastic lamina*, a discrete layer only in medium-sized arteries, assists in maintaining blood pressure; this tissue is more diffuse in other vessels. The *tunica media* consists of concentrically arranged smooth muscle fibers. It is well developed in medium arteries, least developed in veins. Medium arteries use this layer in distributing blood from one field to another. In arterioles, reduced to only one or two layers, the smooth muscle can literally block blood flow into capillary fields. The *external elastic lamina* exists as a discrete layer only in muscular arteries. The *tunica externa* (adventitia) is fibrous tissue contiguous with the fascial layer in which the vessel is located; within this tunica, much smaller nutrient vessels (vasa vasorum) and motor nerves (nervi vasorum) are found. In very specialized situations, the structure of small vessels may be specially adapted—e.g., the glomerulus, in Plate 149.

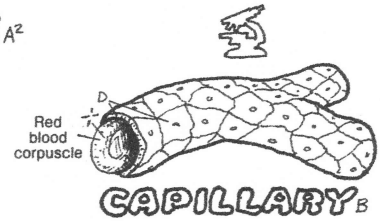
VESSEL STRUCTURE *

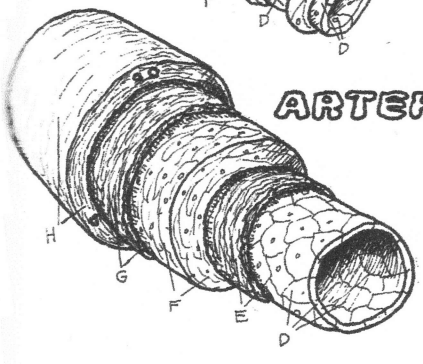
- TUNICA INTERNA
  - ENDOTHELIUM D
  - INTERNAL ELASTIC LAMINA E
- TUNICA MEDIA
  - SMOOTH MUSCLE F
  - EXTERNAL ELASTIC LAMINA G
- TUNICA EXTERNA
  - FIBROUS TISSUE H

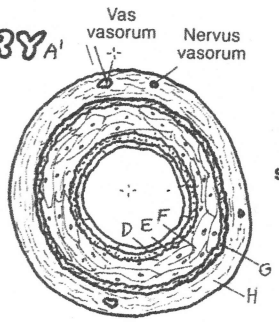


BLOOD FLOW *









CROSS SECTIONAL VIEW