Circulatory System

Chapter 19

Circulatory System

- Purpose –
  - –Carries needed substances to cells and carries wastes away

- Cardiovascular system – heart, vessels & blood

Materials Transported by Blood

- Needed Materials:
  - Oxygen and Sugar
- Wastes:
  - Carbon Dioxide
- Disease fighers:
  - White blood cells.

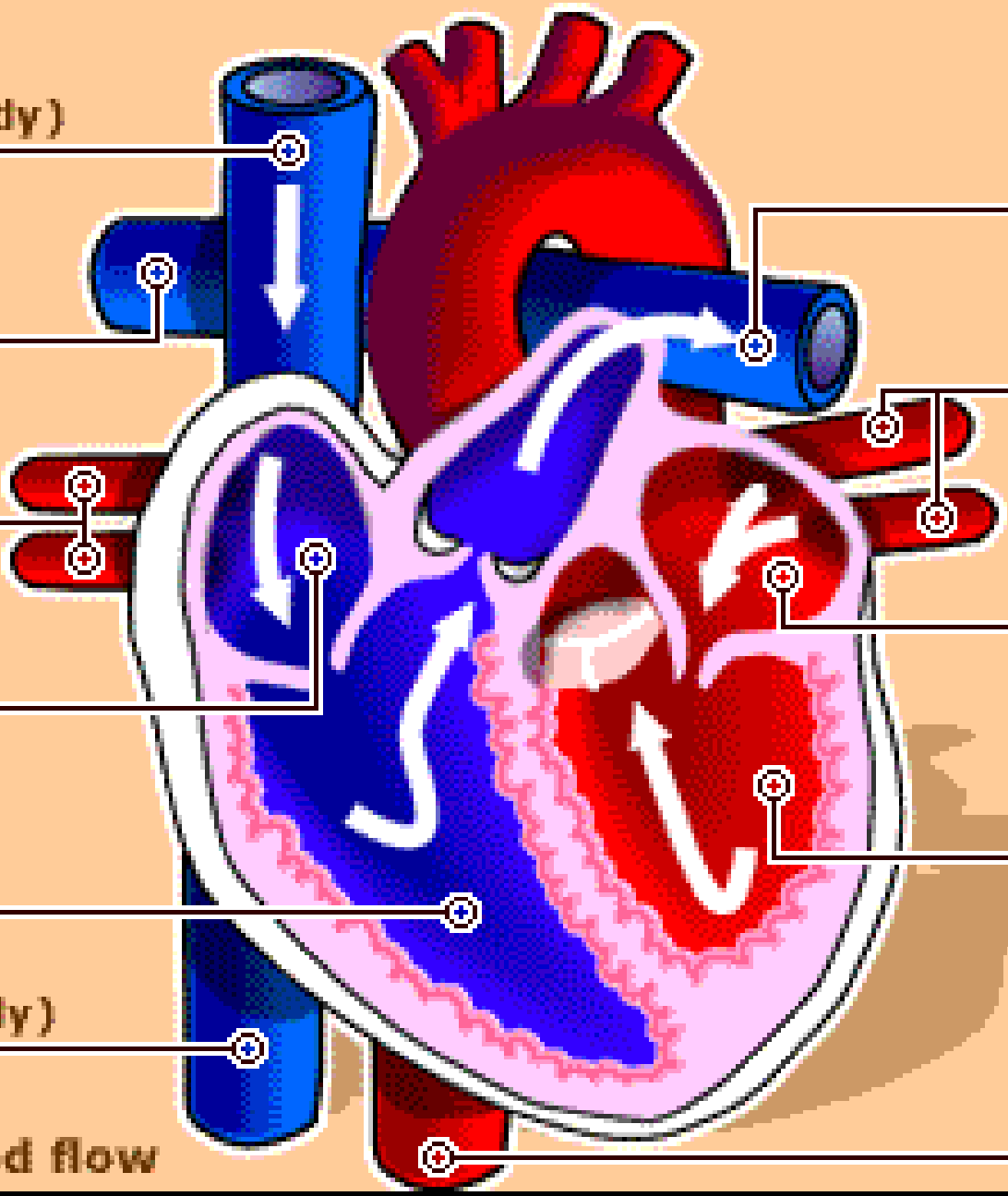
Heart

- Hollow muscle that pumps blood.
- Located in center of chest
- Each beat pushes blood through the Circ. System.

Heart Structure

- Two Chambers – Atrium & Ventricle
- Atria – Upper chamber – receives blood
- Ventricle – Lower chamber – pumps blood out
- Valve – prevents backward blood flow.

THE HEART



LARGE VEIN
(From upper body)

PULMONARY ARTERY
(To right lung)

PULMONARY VEINS
(From left lung)

RIGHT ATRIUM

RIGHT VENTRICLE

LARGE VEIN
(From lower body)

PULMONARY ARTERY
(To left lung)

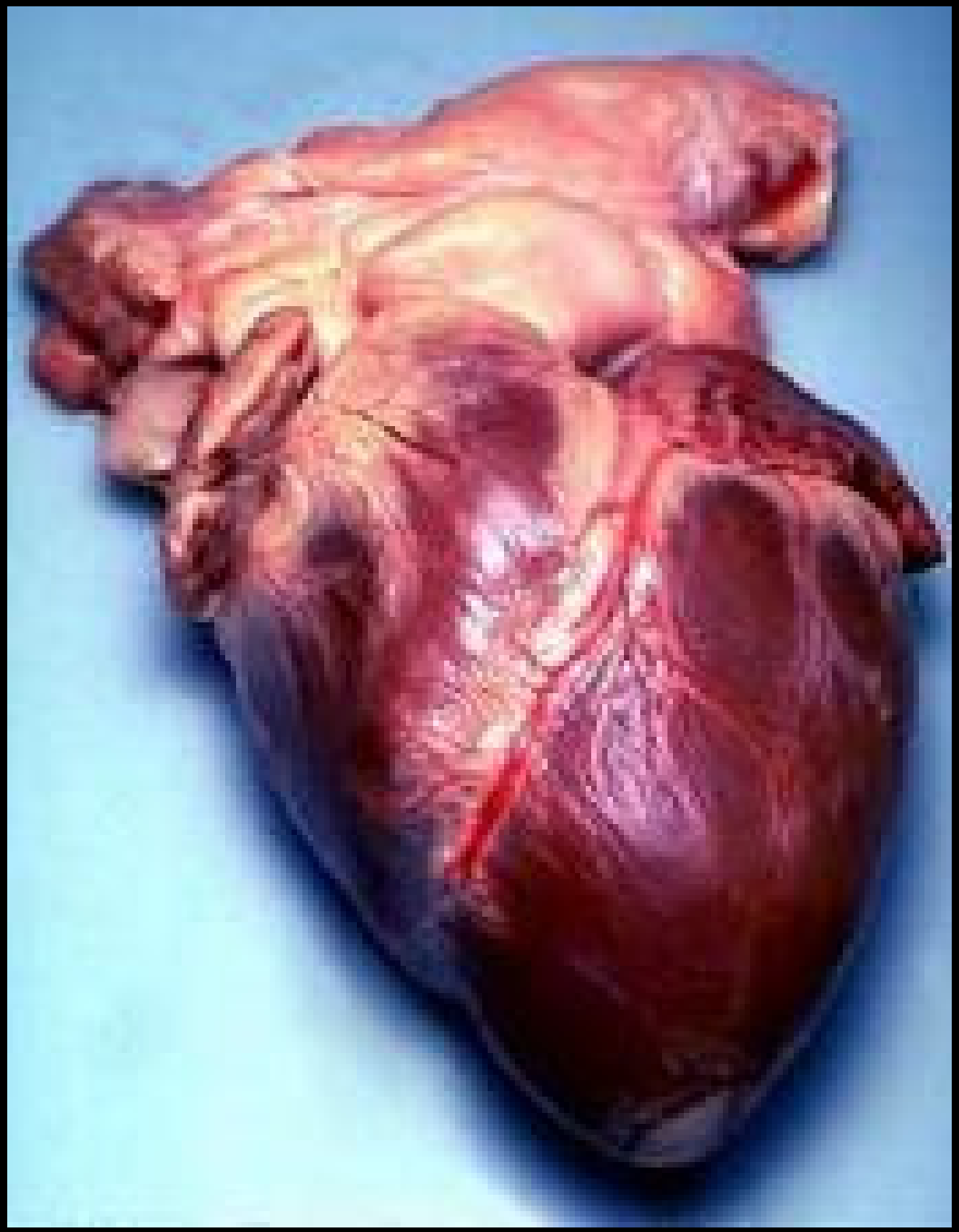
PULMONARY VEINS
(From left lung)

LEFT ATRIUM

LEFT VENTRICLE

AORTA
(To lower body)

Key → Blood flow



Human Heart

Blood Vessels

- Arteries – main vessels carry blood from heart
- Capillaries – carry blood from arteries to body parts
- Veins – carry blood back to heart

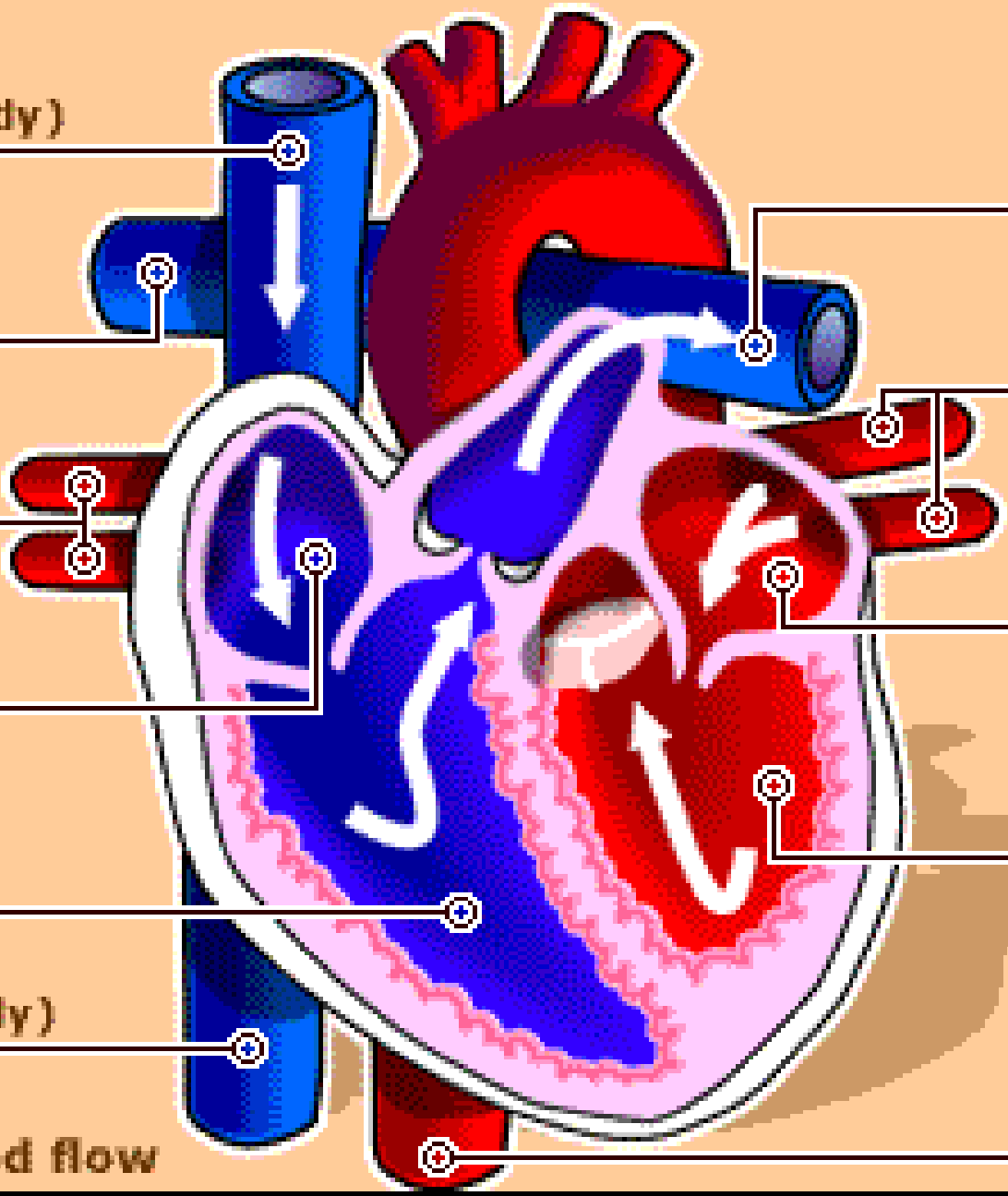
Heartbeat Regulation

- A **pacemaker** regulates the heartbeat.
  - –Located in Right Atrium.
  - –Sends signals for contraction to adjust to body activity.

Blood Loops -- Loop 1

- To the Lungs and Back
  - –Oxygen poor blood comes into the right atrium from body (dark red)
  - –Pumped into right ventricle
  - –Pumped to lungs
  - –Lungs pump in Oxygen and remove CO_2 blood is now bright red.

THE HEART



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(To left lung)

PULMONARY VEINS
(From left lung)

LEFT ATRIUM

LEFT VENTRICLE

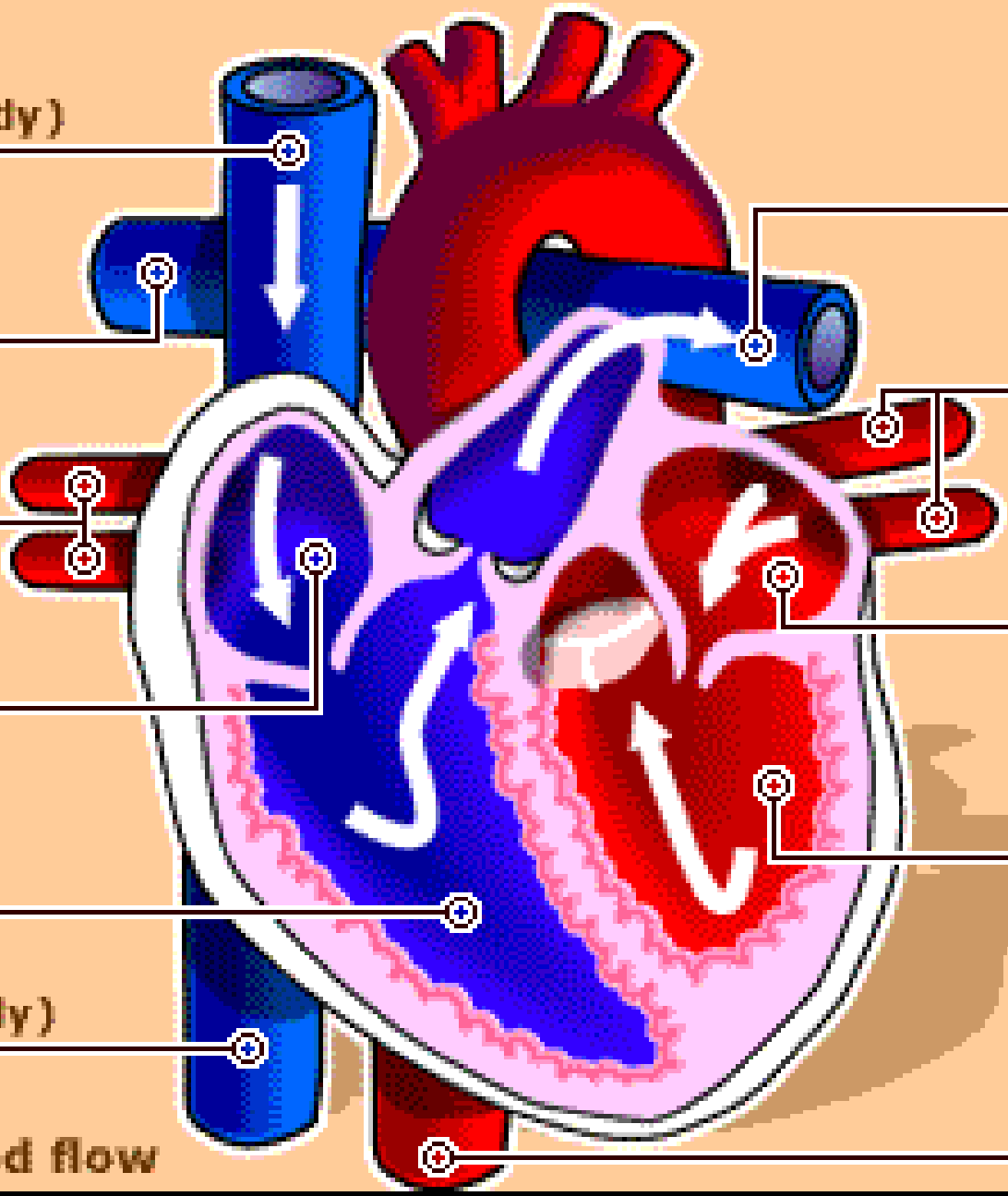
AORTA
(To lower body)

Key → Blood flow

Blood Loops – Loop 2

- Heart to Body
  - –Left Atrium fills with blood from lungs
  - –Pumped into Left Ventricle
  - –Pumped into Aorta – largest artery in body
  - –Blood pumped to rest of body
  - –Cycle continues

THE HEART



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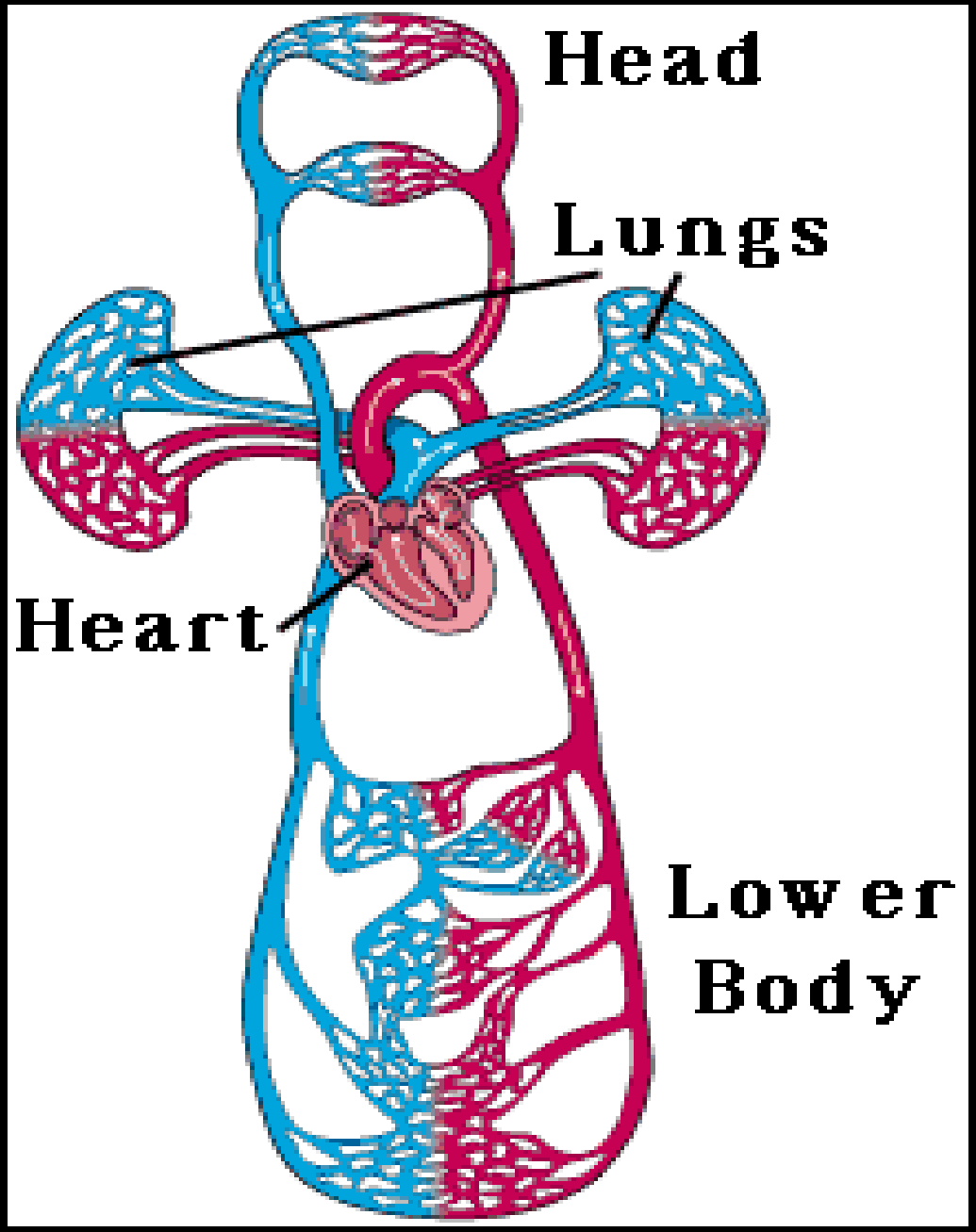
AORTA
(To lower body)

Key → Blood flow



Loop 1

Loop 2

Blood Loops

- Loop 1 –
  - –Blood comes from body to heart.
  - –Passed to lungs
  - –Gets rid of CO_2 gains O_2
- Loop 2
  - –Blood comes from lungs
  - –Pumped to Body
  - –Loses O_2 gains CO_2

Lesson Two

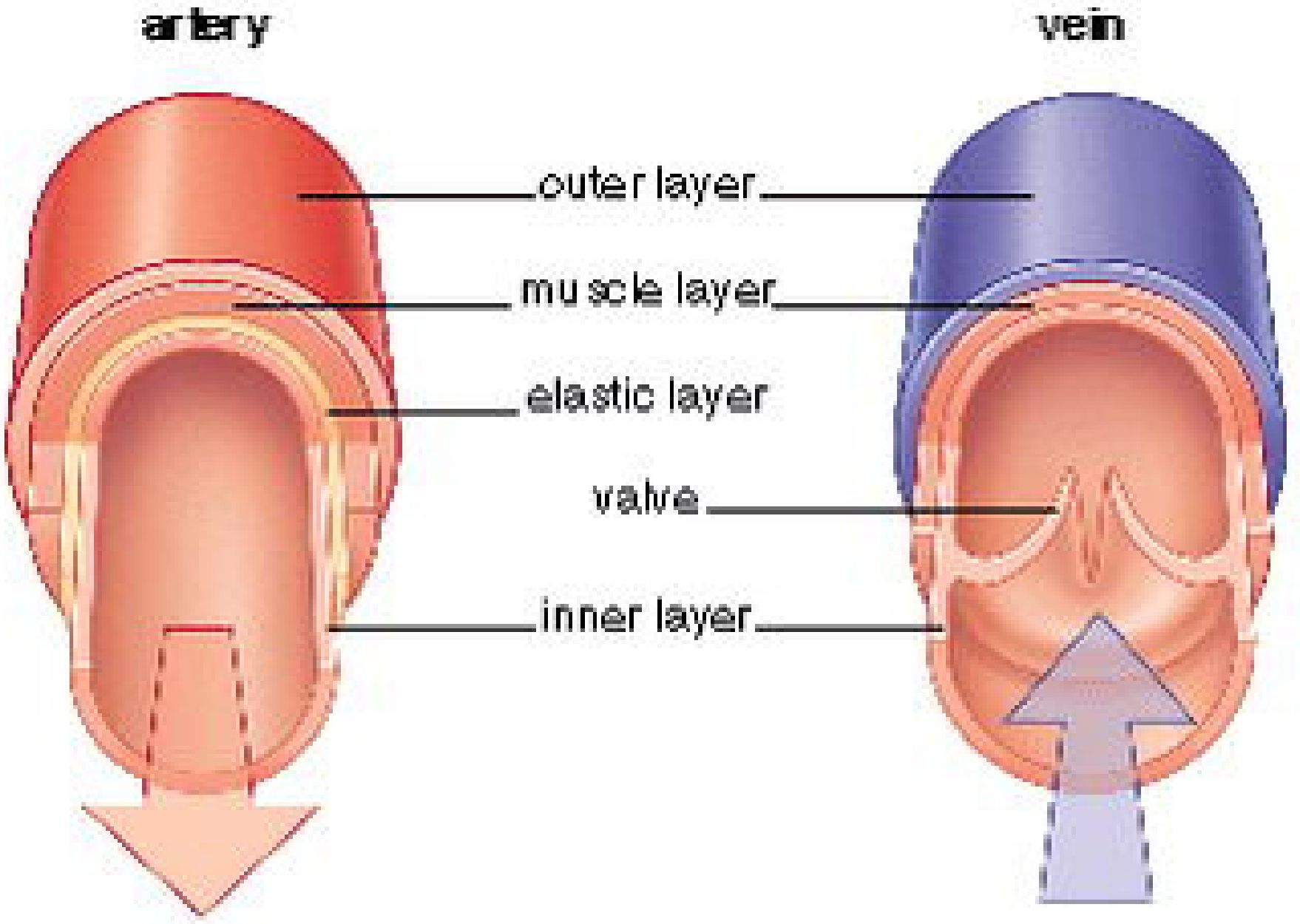
Blood Vessels

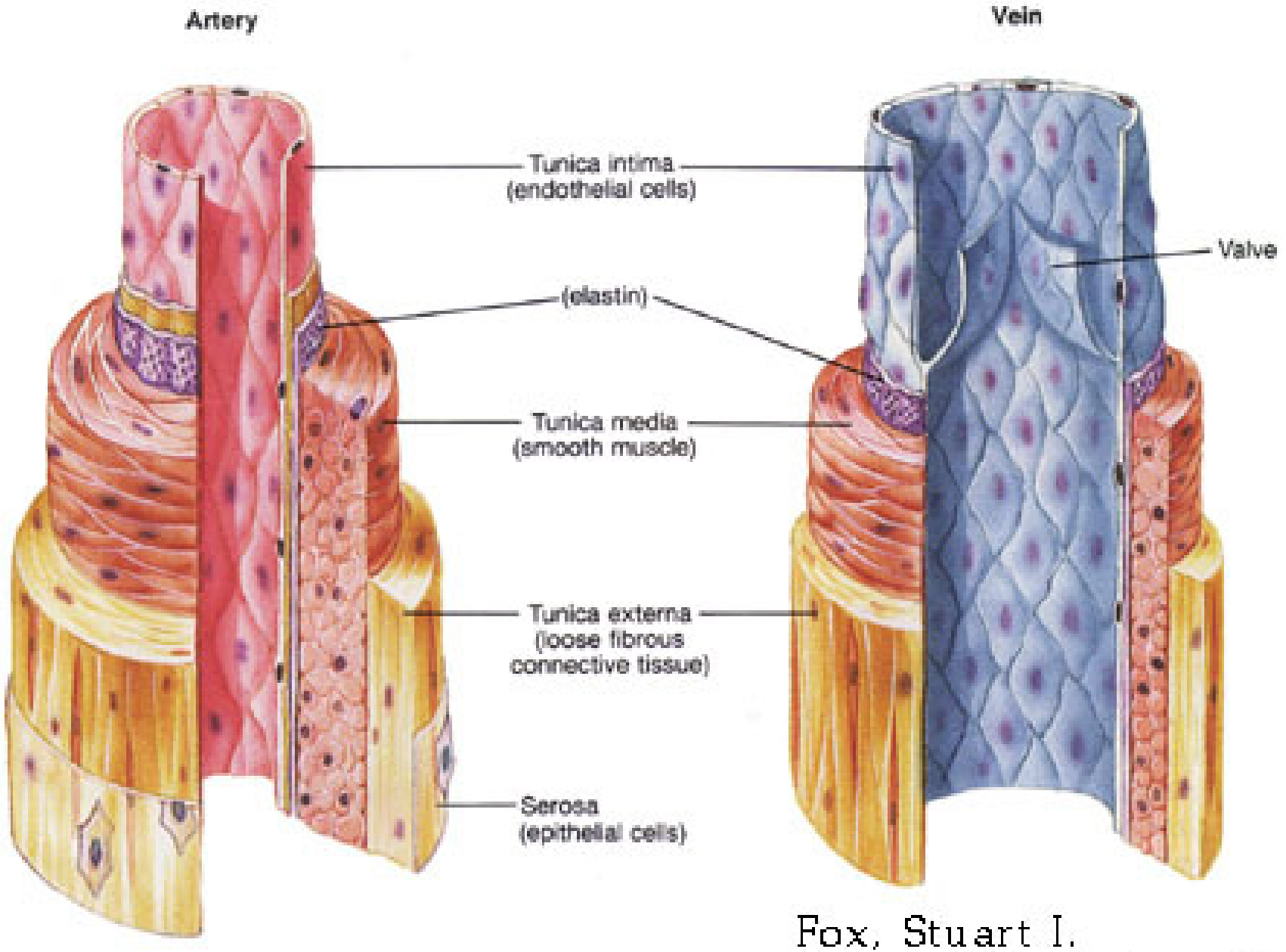
&

Blood

Blood Vessels -- Arteries

- Flow from heart to body.
- Have thick 3 wall structure.
  - –Allows arteries to be flexible and strong
  - –Rope example.


artery
vein
outer layer
muscle layer
elastic layer
valve
inner layer



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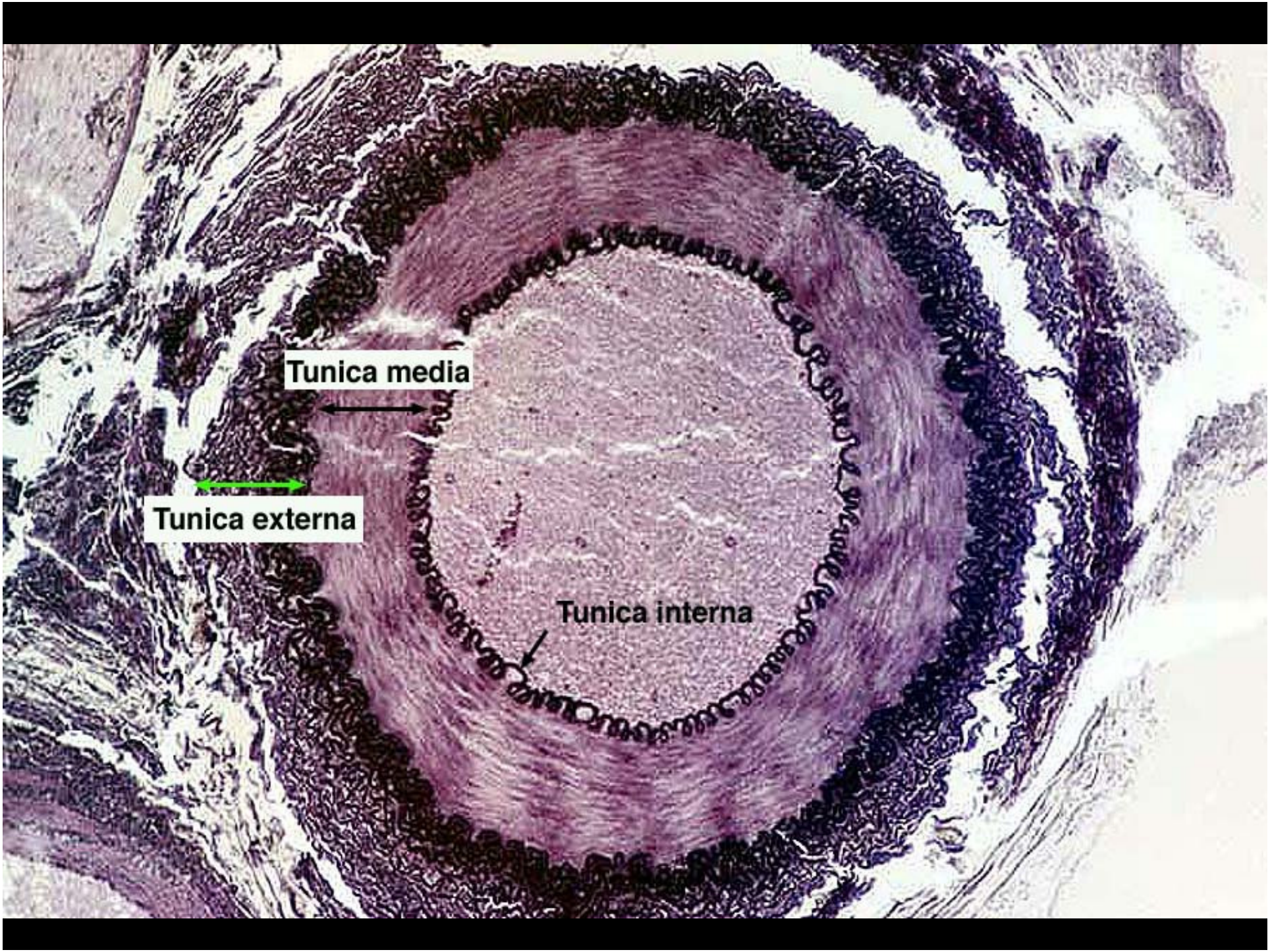
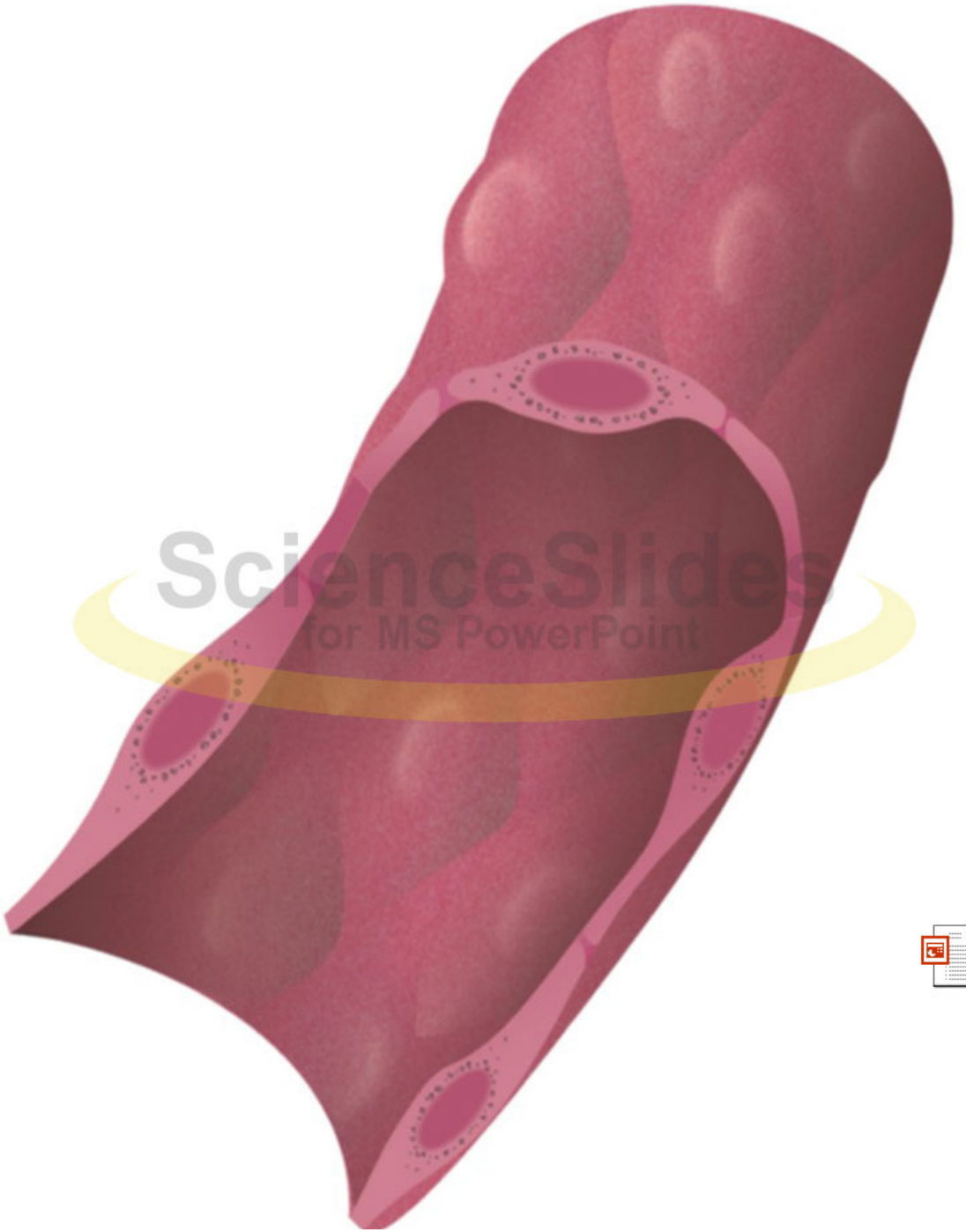
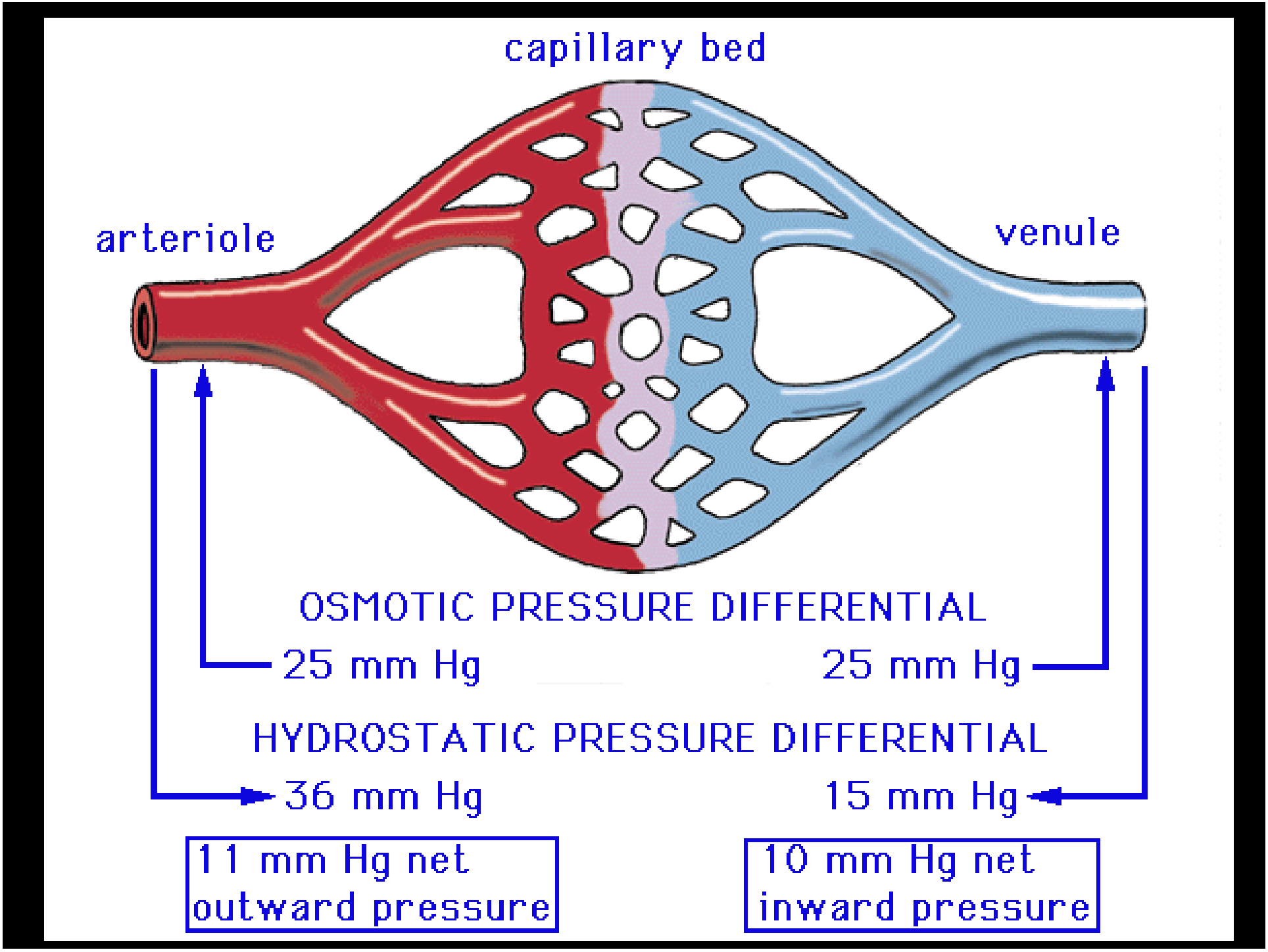
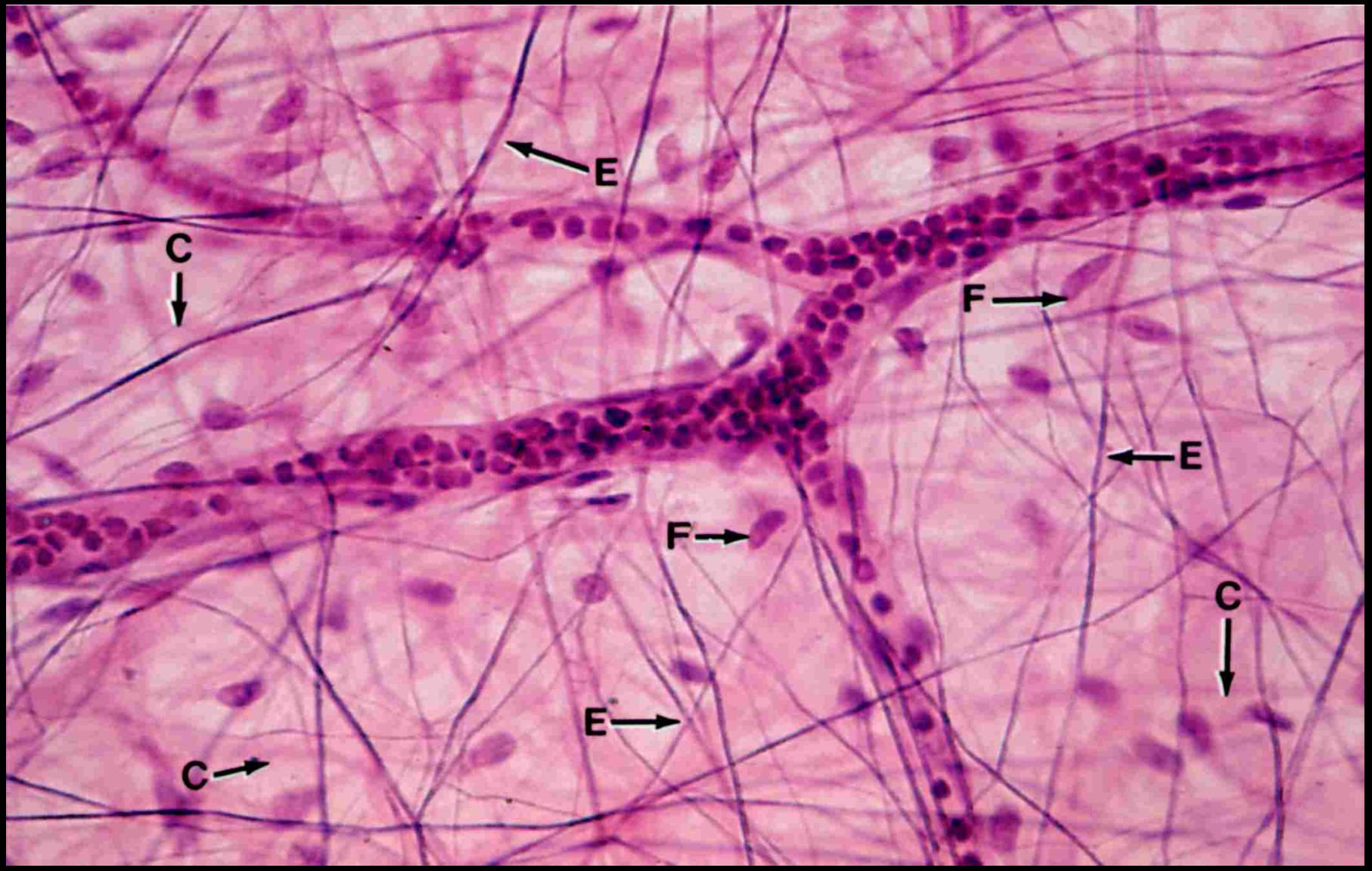

Tunica media
Tunica externa
Tunica interna

Capillaries

- Capillaries have a single wall
  - In capillaries materials are exchanged between blood and body cells.
  - Moves by a process of diffusion (remember the egg??)




capillary bed
arteriole
venule
OSMOTIC PRESSURE DIFFERENTIAL
25 mm Hg
25 mm Hg
HYDROSTATIC PRESSURE DIFFERENTIAL
36 mm Hg
15 mm Hg
11 mm Hg net outward pressure
10 mm Hg net inward pressure


E
C
F
E
F
C
E
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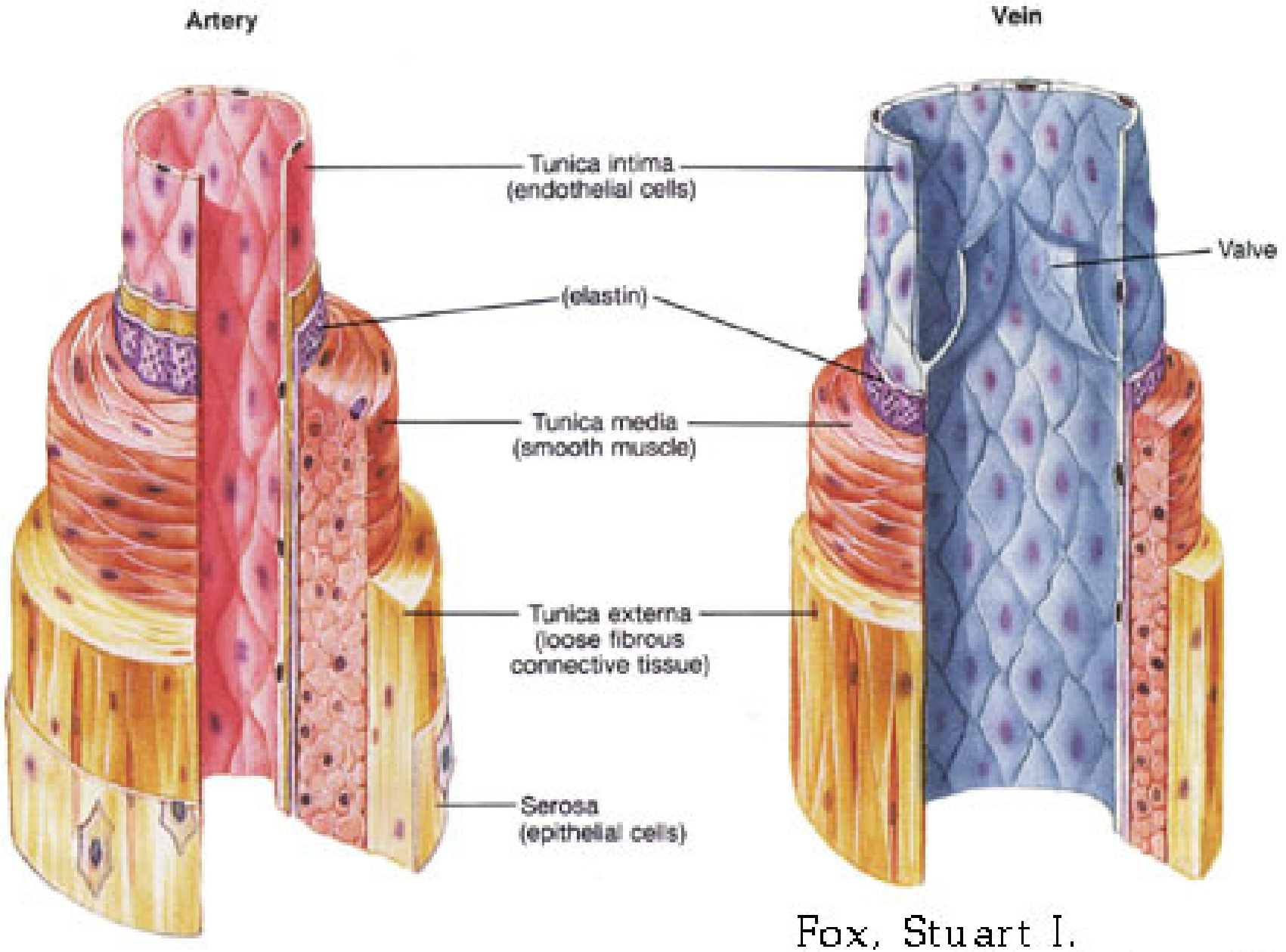
Veins

- Carry blood back to heart
- Have 3 wall structure like artery.
- Rely on skeletal muscles, breathing and valves for blood flow.



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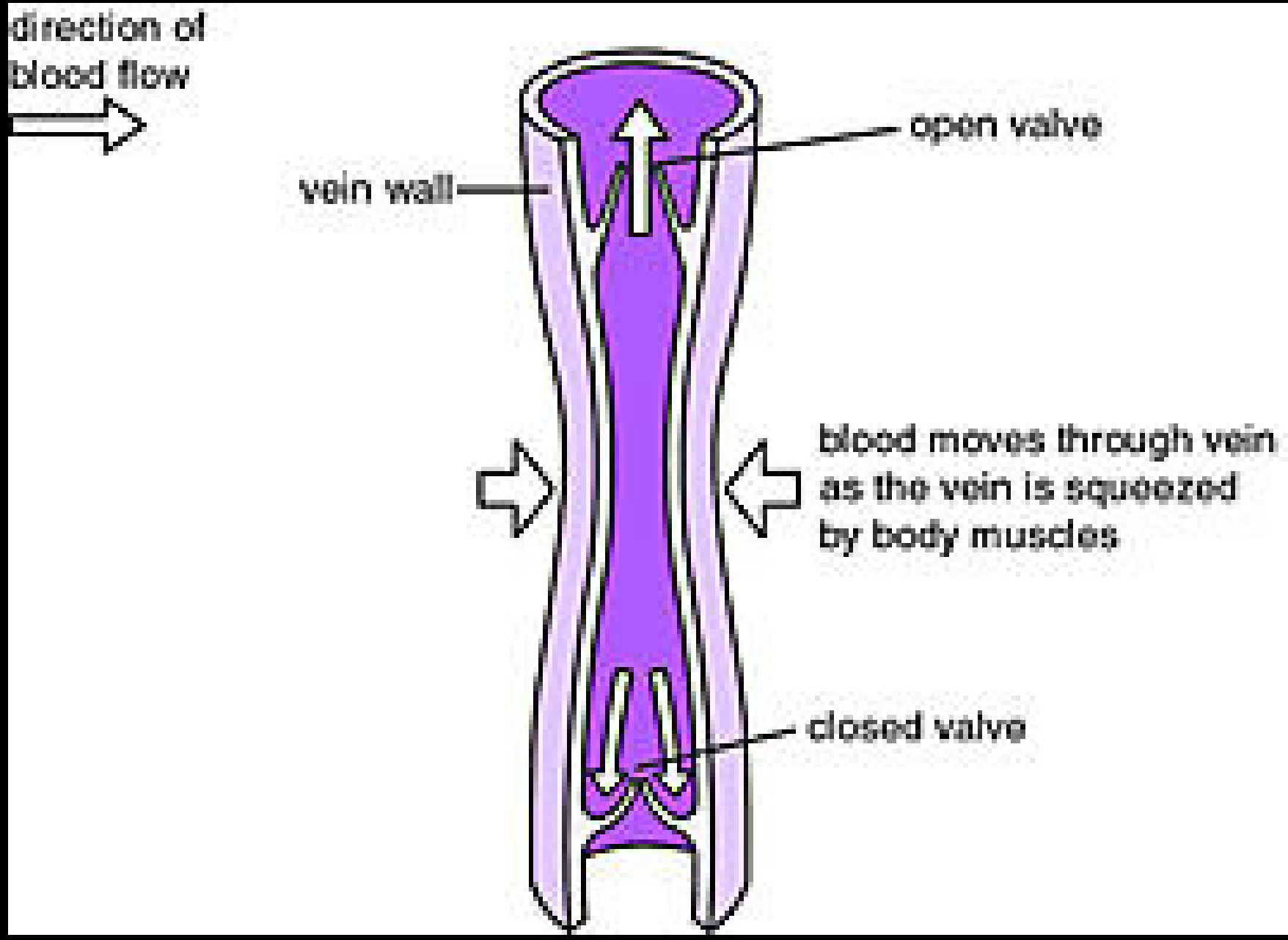

direction of
blood flow
open valve
vein wall
blood moves through vein
as the vein is squeezed
by body muscles
closed valve

Blood

Blood Components

- Blood has four components

1. Plasma
2. Red Blood Cells
3. White Blood Cells
4. Platelets.

Plasma

- Carries most of the nutrients
- 90% water + 10% nutrients
- Protein is a vital nutrient in plasma.
  - –Regulates water in blood, fights disease and helps to clot.

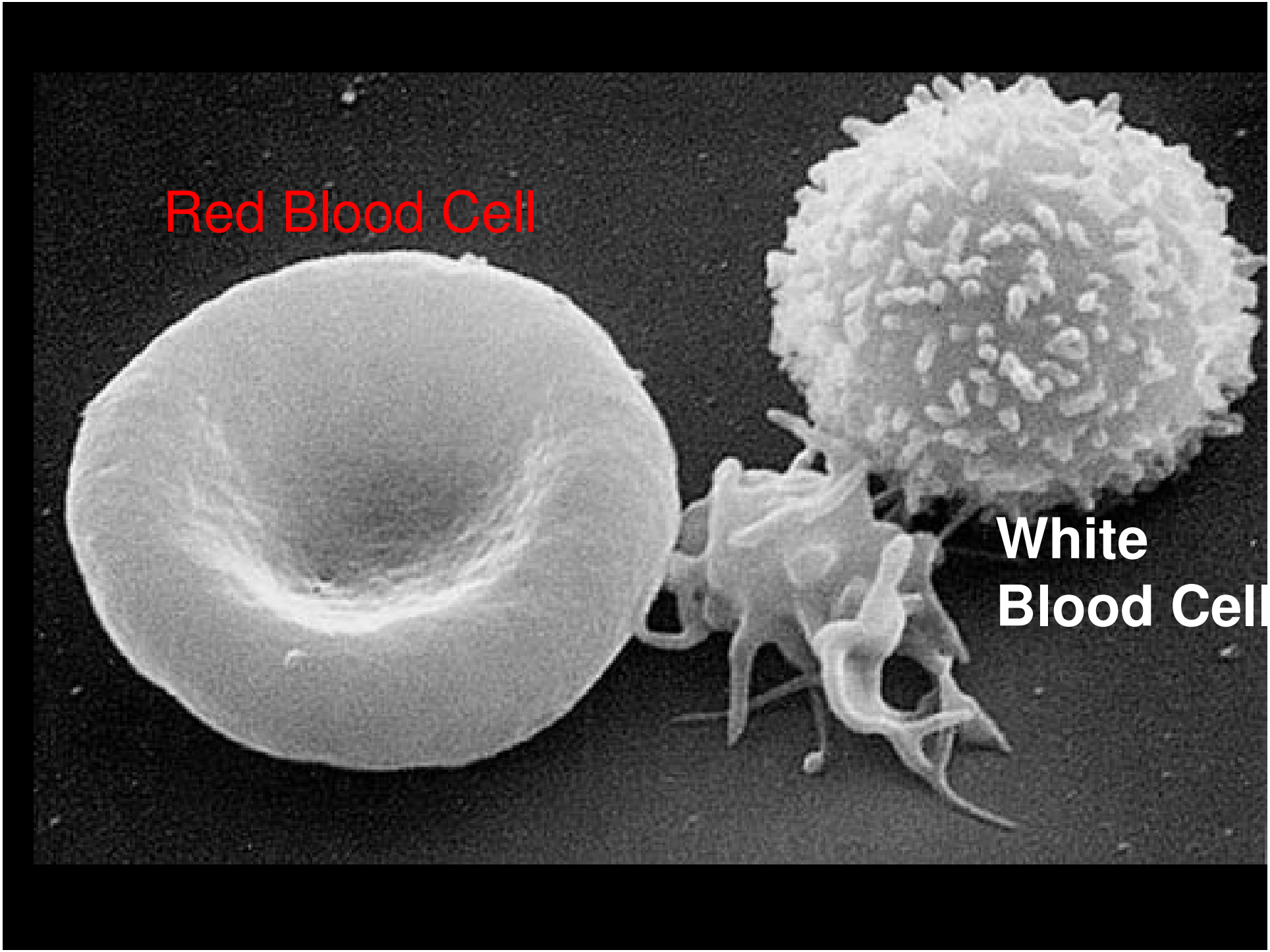
Protein gives plasma a yellow color.

Red Blood Cells

- Transport Oxygen in blood
- Made of Hemoglobin which attach to Oxygen.

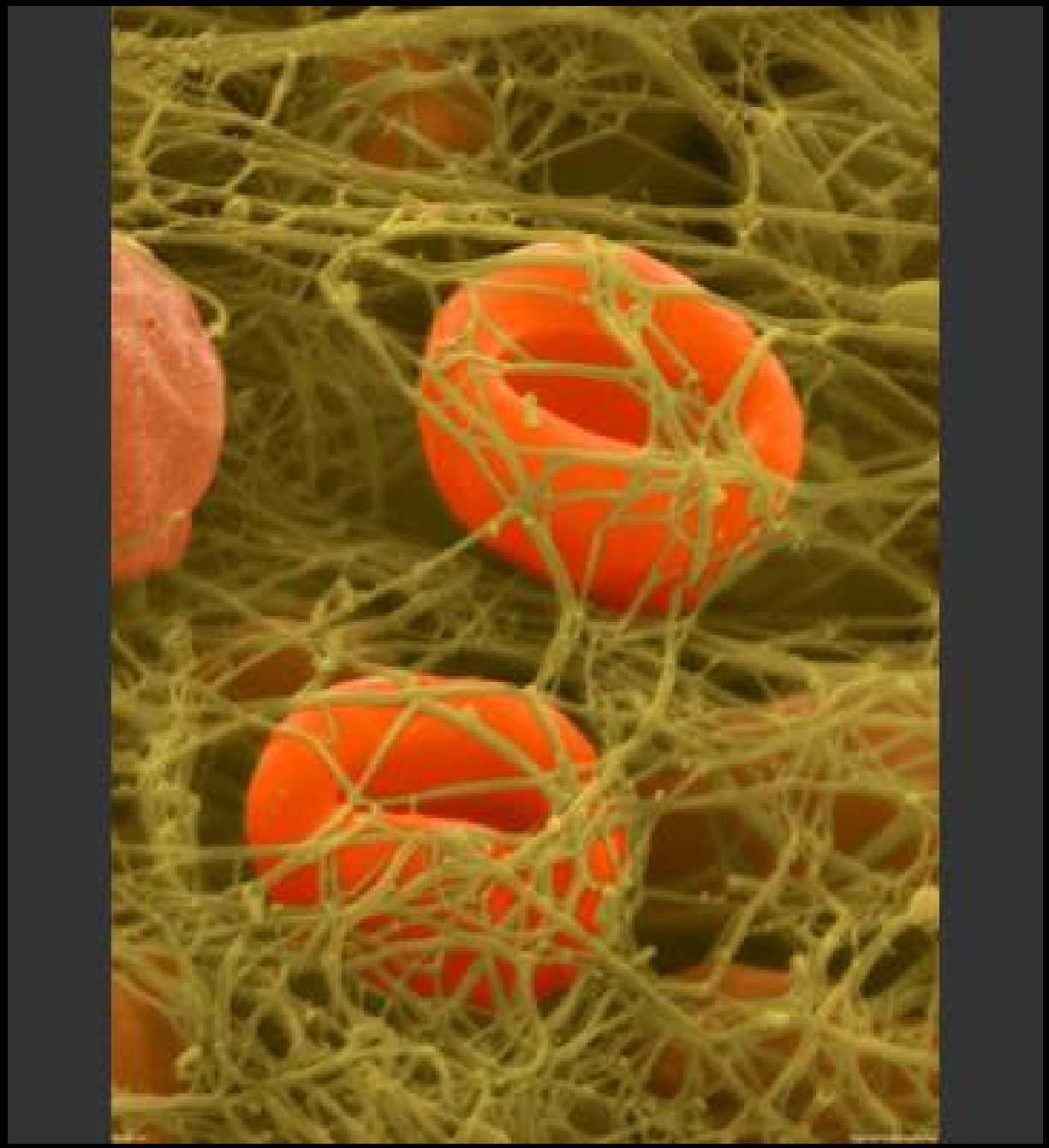
White Blood Cells

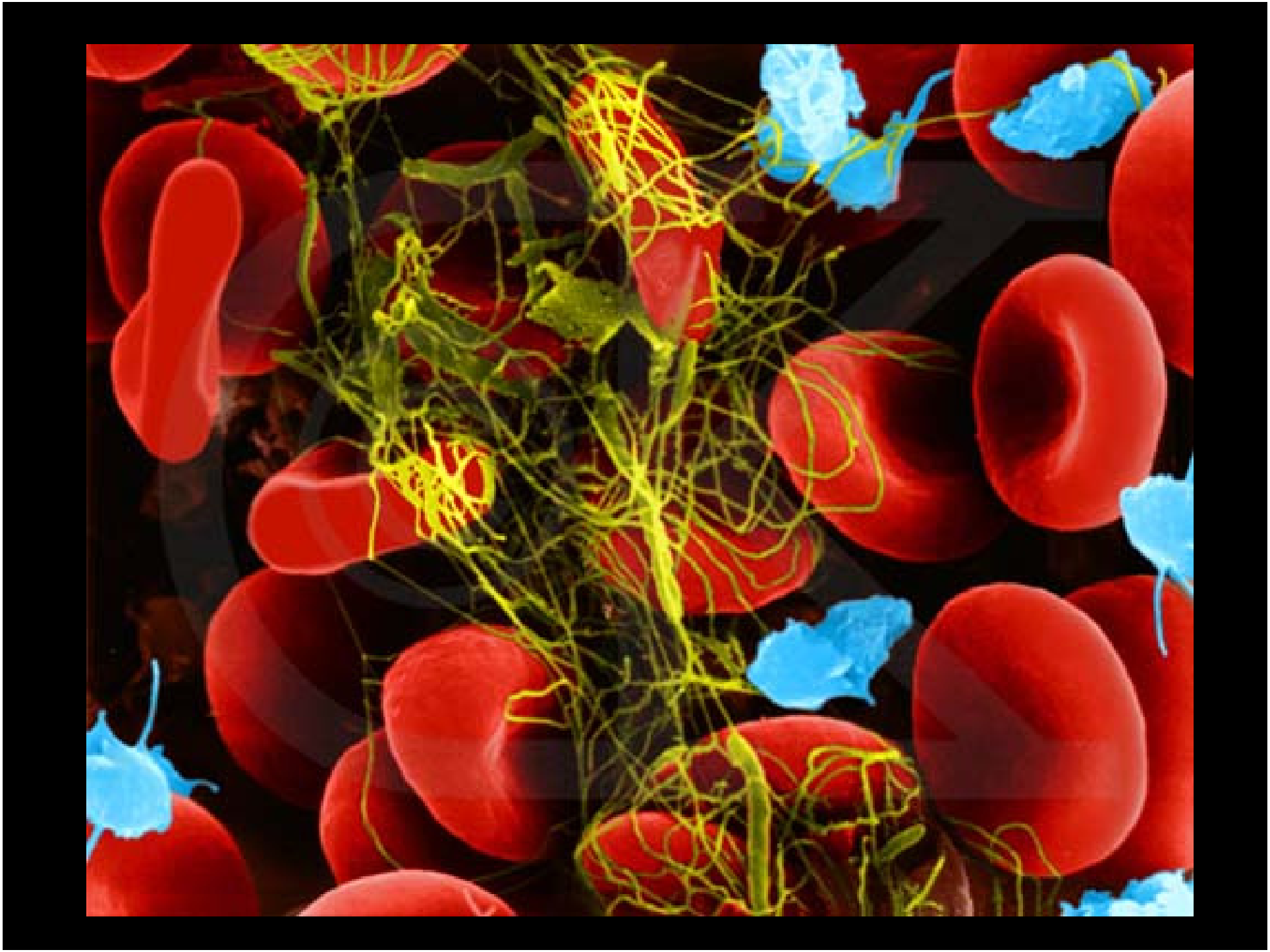
- Originate in bone marrow
- Are Disease Fighters
  - Can be a Paul Revere
  - Can be a rogue fighter
  - Can be a gang fighter.

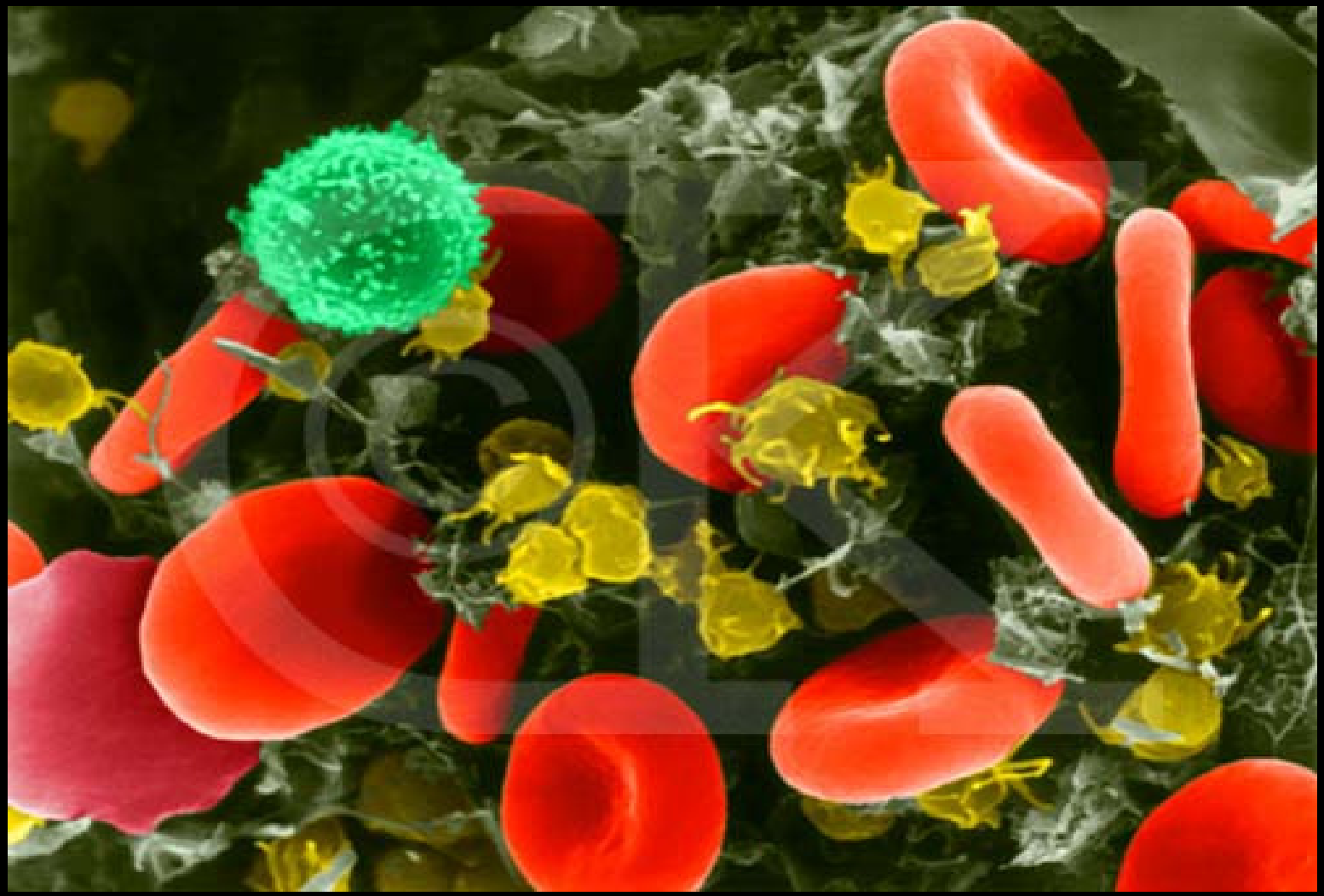

Red Blood Cell
White
Blood Cell

Platelets

- Form blood clots so you don’t bleed to death.
- Releases Fibrin which forms a net across a cut blood vessel.
- A scab is a dried clot.







Human Red Blood Cells, Platelets and T-lymphocyte (erythocytes = red; platelets = yellow; T-lymphocyte = light green)