Lab Report Comments 2014

Lab I: Bovine Heart & Lung Dissection

Grading of the Labs

Organization and Structure

Organization of Lab Reports

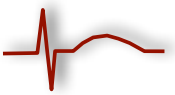
- Structure;
  - Intro/overview
  - Methods
  - Results and observations
  - Discussion
- Writing
  - Clear, concise, factual, precise
  - Careful wording for accuracy
  - Facts over opinion
  - Use this chance to develop your science writing style
  - Use your own words--do not use text from other sources!

Title/Introduction

- Include lab partners' names in title page
- Generate table of contents
- Include purpose of the lab
- Provide necessary background for what is to follow, e.g., overall organization of the heart in the same way it is presented in the Results section

Methods

- Do not repeat verbatim the description you received
- Summarize and then highlight deviations from description
- Avoid including results in this section



Results

- Must include some text and figures, organized in some clear way
- Each figure must have an associated reference and description in the text.
- Describe not just appearance, but also mechanical and visual features that you noticed
- Highlight functional relationships with structure as they arise, at least in brief terms

Comments Field?

5 Dissection Worksheet

Fill out as much of the form below as you can. Some boxes are not relevant (*e.g.*, wall thickness of chordae tendinae) and the choice of size parameters will depend on the structure, but provide reasonable estimates for all the values that you can. **In the comments section, describe briefly the notable characteristics of the structure that you observe.**

Cardiac Structure	Dimensions /Diameter(mm)	Wall Thickness(mm)	Comments
Whole Heart			
Superior Vena Cava			
Inferior Vena Cava			
Right Atrium			
Right Ventricle			
Left Atrium			

Discussion Section

- Purpose:
  - Summarize observations and attempt mechanistic explanations
- Approach:
  - Begin with a summary but do not provide additional (or repeated) general background.
  - Make statements, then back them up
  - Base statements on your data, backed up by the textbook
  - Speculation is acceptable, as long as the logic is sound and the data support the argument.
  - Be sure to pursue all reasonable possibilities and not just the first that comes to mind
  - End with a restatement

Discussion Section

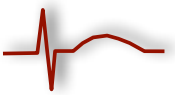
- Example: valves
  - Statement of how they might work given their structure
  - Compare valves with each other, are they all open at rest or are some closed at rest? When do they open and close and how much time do they spend in each position?
- Another example:
  - "The quantity of fatty deposits around the heart was not expected prior to dissection. The perpetual function and relative importance of the heart to the organism's survival suggest these fatty deposits serve as an energy source, as well as a protective layer to abrupt mechanical loading."
    - What are the consequences of such a function?
    - Is this the only reasonable explanation?

Implementing Organization

- Prior to write-up
  - Identify the lab purpose
  - Compile a list of major questions from the lab
  - Develop and outline
- The write-up
  - State the lab purpose
  - Answer all questions asked in the lab
  - Refer to your outline
- Post write-up
  - PROOF READ
  - Review 'lab comments'

Structure and Outlines

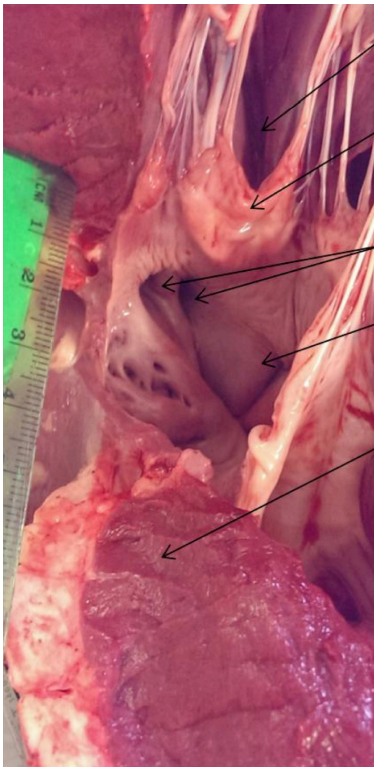
- Use outlines for structure:
  - to organize your thoughts BEFORE you write
  - and to analyze your flow AFTER you write
- Pay attention to what goes in each section.
  - Methods belongs in Methods, not Results.
  - Some discussion (better, interpretation) in Results section is fine.
  - Any point included in Introduction, should be addressed somewhere again in the report, usually Discussion section
  - But avoid explicit and pointless repetition



Figures

Perspective

Which way is up?
What is the perspective?



Perspective

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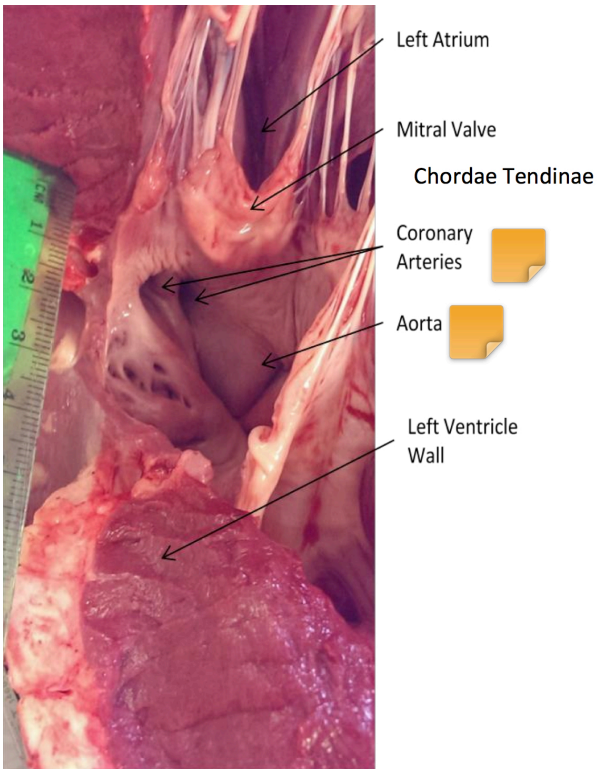
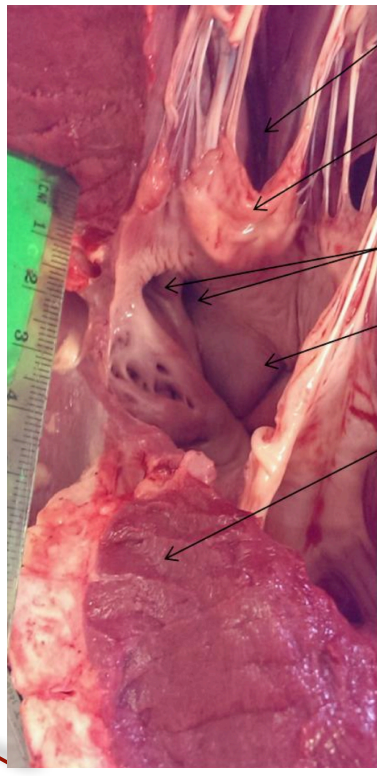
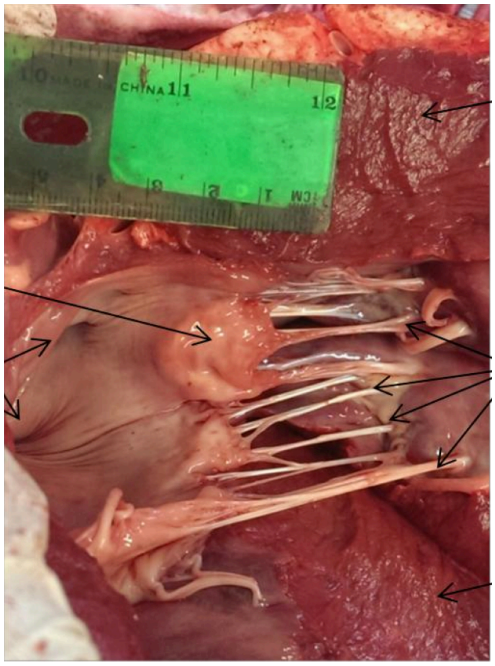
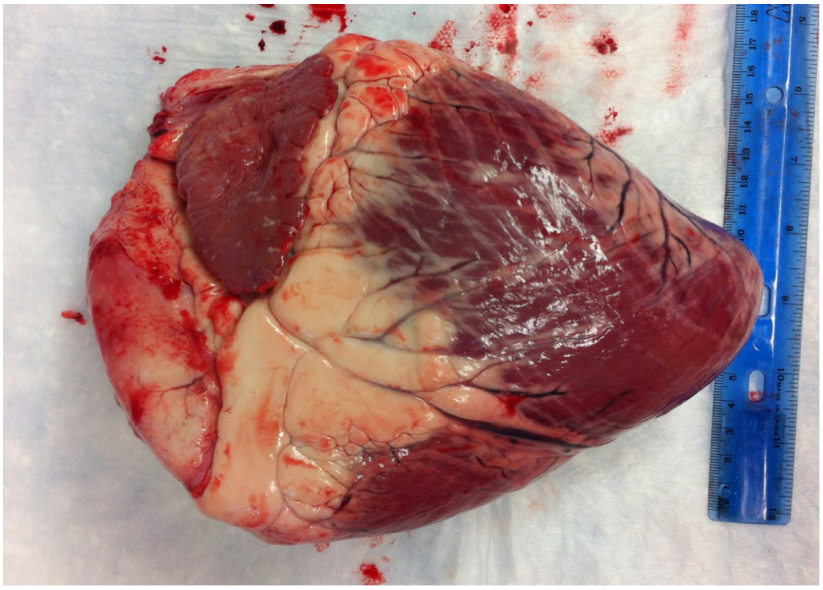


Mixed perspectives

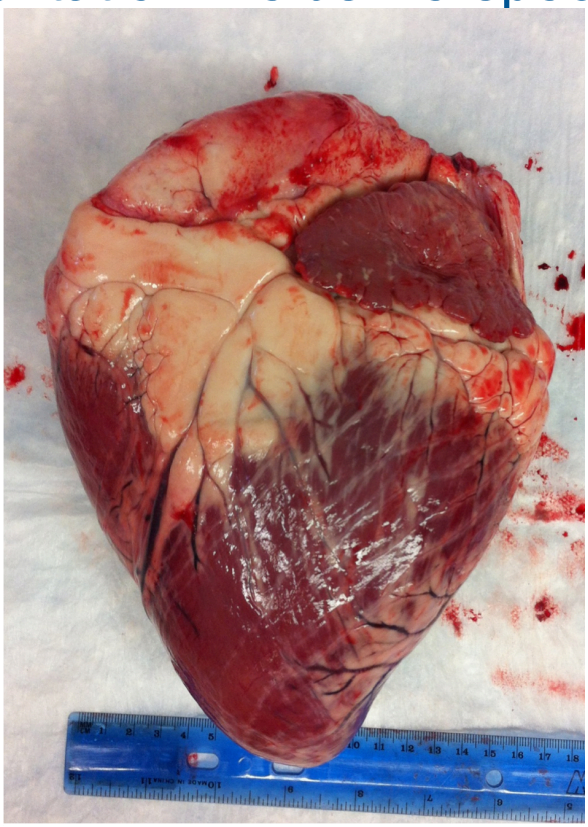




Orientation Yields Perspective



Orientation Yields Perspective



Bioengineering 6000 CV Physiology

Orientation Yields Perspective

Orientation Yields Perspective

Bioengineering 6000 CV Physiology

Nice Organization

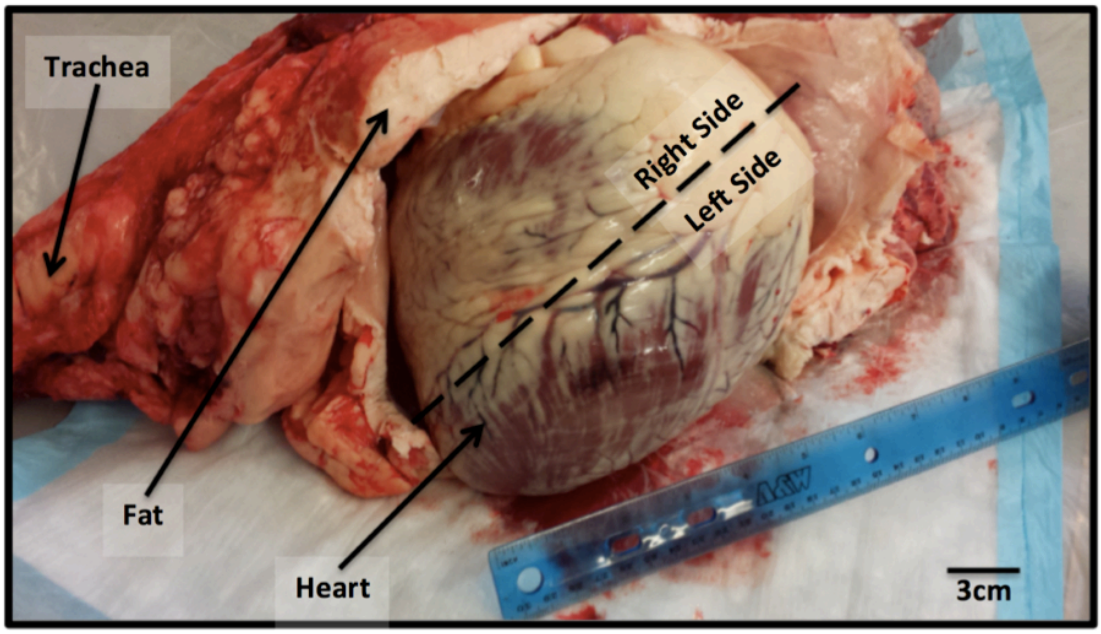


Figure 1: **Heart not severed from the pulmonary system (trachea, left and right lungs).** A thick layer of fat was removed from the right side of the lungs to uncover the left and right side of the heart as well as the aorta.

Nice Layout and Caption

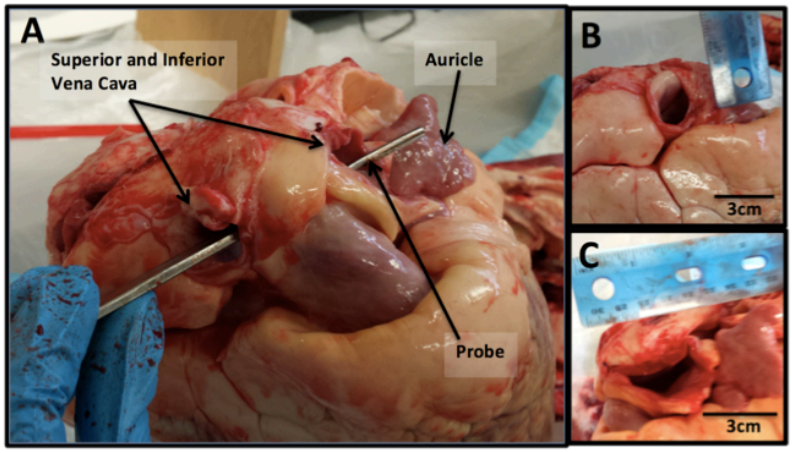
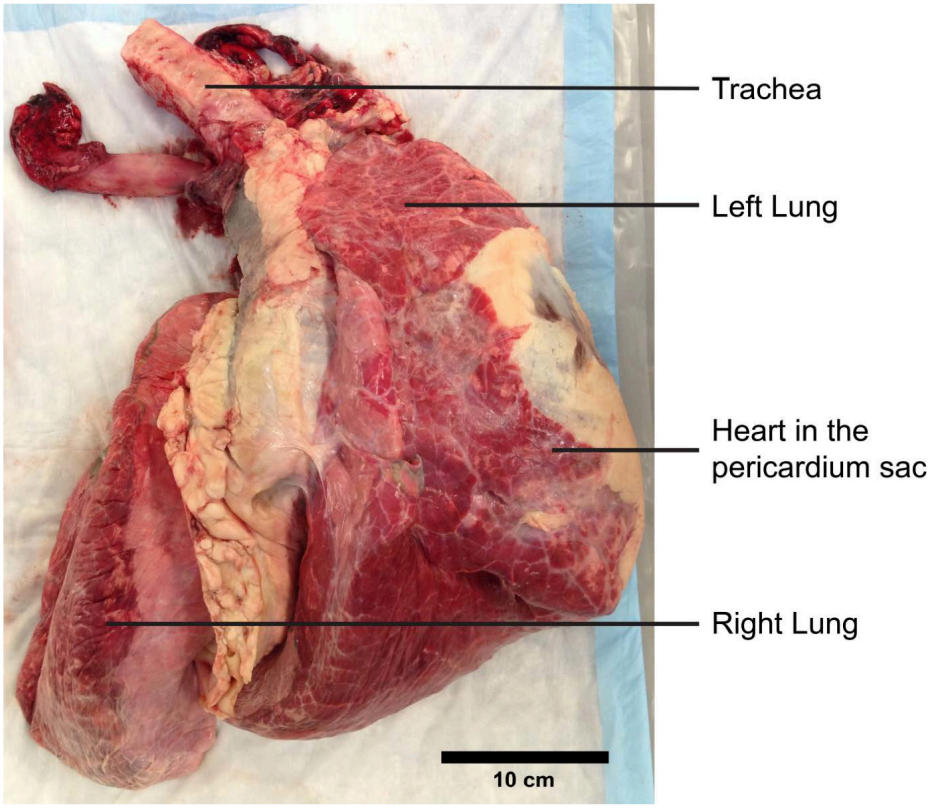


Figure 3: **Vena Cava by which blood returns to the right atrium.** A) A metal probe entering the superior vena cava and exiting the inferior vena cava from a posterior view of the heart with the base of the heart toward the top. B) Close up image of the superior vena cava opening. C) Close up image of the inferior vena cava opening.

Excellent Overview



logy

Figure Captioning

"Figure 2: Top of Heart"

- Figures captions:
  - Required
  - Located at bottom of figure on the same page as the figure
  - Start with **a brief title**, then include adequate details to understand content of the figure without needing to view text
  - For each panel in the figure, explain the contents

Another Excellent Example

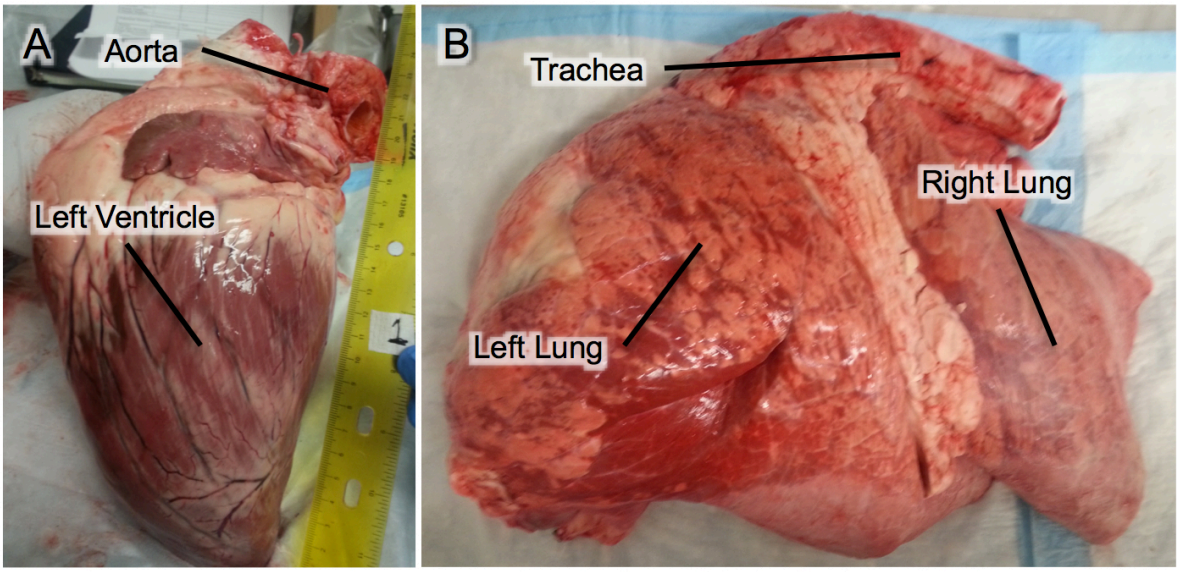


FIGURE 1. Whole Bovine Organs. Anterior face of the bovine heart (A) shows aorta and left ventricle and atrium. Full bovine preparation (B) shows both lungs and trachea structures. Notice that lungs are shown in reverse of anatomical orientation.

Caption of the Year Award

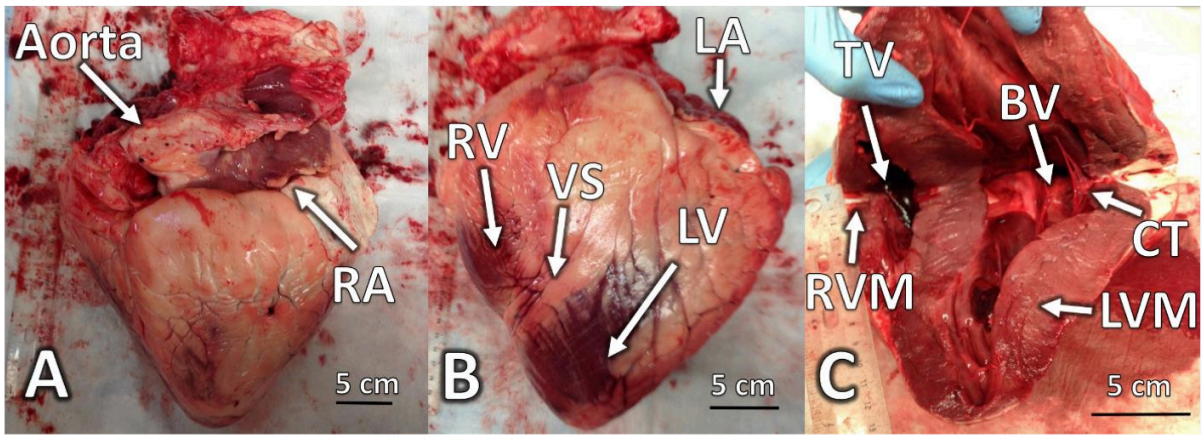
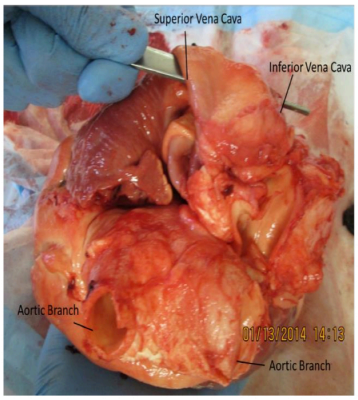


Figure 1- Major compartments of a bovine heart that highlight the pathway of blood during circulation. A- Posterior view of the bovine heart that shows the initial step of the blood entering the right atrium (RA) and exiting from the aorta. B- Anterior view of the bovine heart that shows the right ventricle (RV), the divisionary line between the RV and left ventricle (LV), called the ventricular septum (VS), and the re-introduction of the blood to the left atrium (LA) after being oxygenated from the lungs. C- Inner view of a bovine heart from the anterior side. This particular image shows the chordae tendinae (CT) that lead to the bicuspid valve (BV). The tricuspid valve (TV) is shown deep in the RV and relatively hard to see. Also, the picture highlights the size and shape of the left ventricular muscle (LVM) and the right ventricular muscle (LVM).

Captions Spanning Pages



3

Figure 2: The Aorta of the dissected heart was observed to branch into two aortic branches. The Vena Cava: Superior and the Inferior drain into the right atrium.

Attach the caption to the figure in a way that it cannot plots across pages.

File Size/Image Resolution

Which version is from the 27 times larger file?

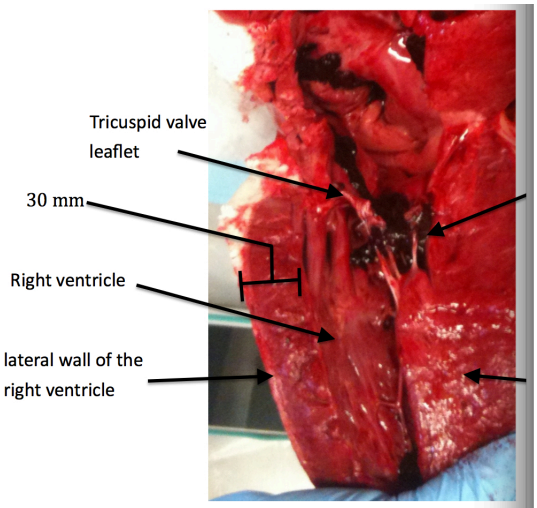


Figure 4: **Anterior view right ventricle and tricuspid valv**

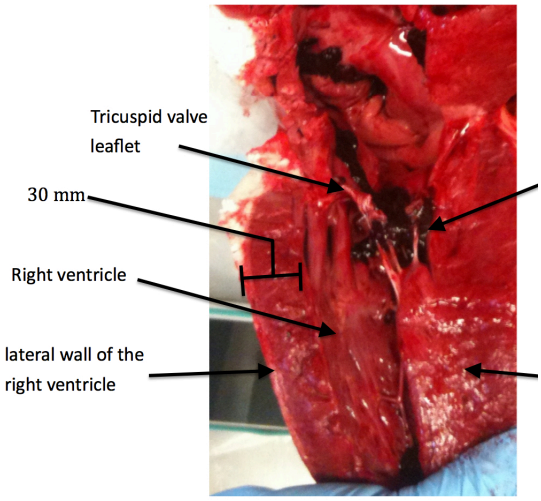


Figure 4: **Anterior view right ventricle and tricuspid valve**

17.2 MB

.64 MB (27:1)

File Size/Image Resolution

1 MB	Portab...(PDF)
32.3 MB	Portab...(PDF)
1.1 MB	Portab...(PDF)
1.7 MB	Portab...(PDF)
18 MB	Portab...(PDF)
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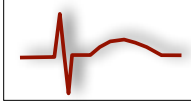
520 KB	Portab...(PDF)
601 KB	Portab...(PDF)
6.4 MB	Portab...(PDF)

Winner of abuse-of-pixels award

Compressed equivalent
Original

Referring to Figures

- All figures must have a reference in the text
- Refer to figures by number and not, for example, “as seen below”



Scientific Writing

Dissect vs. Resect

Resection:

(Surgery) surgery excision of part of a bone, organ, or other part

Collins English Dictionary

Dissection:

To cut (a plant or dead animal) into separate parts in order to study it

Merriam-Webster Dictionary

General Writing Rules I

- Never use contractions (e.g,. “haven’t, don’t, didn’t”).
- Avoid possessives, e.g., “all of the body’s other functions” should be “all of the other functions of the body”.
- Verb tense:
  - In general, use past tense to report methods and results, anything actually performed or measured.
  - Use present tense only for statements of general truth.
- Avoid excessive use of first person (I, we, us, our).
- Avoid any use of the second person (you).
- Avoid colloquialisms
  - “You can kind of visually see the difference between the pulmonary artery in figure 5, as I pulled on it, it resisted that pull and kept its shape.”

General Writing Rules II

- Use Active over Passive Voice:
  - “Through dissection, it could be speculated how each aspect of the heart and lung could contribute to their functions such as…” (Passive)
  - “Dissection allows speculation regarding how each aspect of the heart contributes to its respective function.” (Active)
- Take your report seriously
  - Avoid colloquial or conversational language
  - Humor and jokes do not belong in your report
- Avoid broad generalization, hyperbole
  - Keep statements to what you know. Be careful what you infer to “all”, “every”, etc.

General Writing Rules III

- Use technical words precisely, e.g., significant, efficient.
- Include quantification or modifying words
- Describe objectively rather than subjectively.
  - e.g., Explain why it was difficult to find a structure rather than your impression that it was difficult, or why something was surprising rather than the impression of surprise
- Complete comparisons: e.g., "more potent" (than what?)
- Avoid ambiguous "this" references; to avoid confusion complete with a noun. "this vessel, this idea, …"

Discher** Dumbbell of Shame:

- Do not use the same word repetitively when in close proximity:
- Examples
  - "To finish up the dissection of the heart, the aortic valve was dissected."

    Replace with:
  - "Detailed examination of the aortic valve concluded the dissection of the heart."

2014 DDS Award!

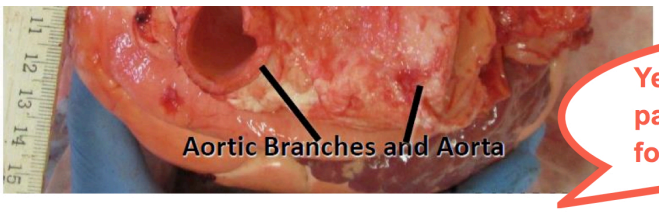
chamber locations are. The wall tissue when cut this direction was not uniform in direction, but rather changed direction as you went from epi-cardium to endo-cardium as well as from apex to base of the heart. Because muscle fiber shortens when contracted, because all of the fibers seem

**In honor of Mr. Kevin Discher, who graded Brian's (former TA) high school American Lit. Honors papers far more belligerently then anything he ever graded our students.

Superfluous Information:

- Avoid uninformative statements (especially those related to personal experience):
  - "We then took a few moments to identify what each of the vessels were."
  - "This lab was unique because it was the first the preparer had ever done on heart and lungs."
  - "This valve has an obvious structure that is not so obvious from the picture."

Winner of the Best Typo Competition



Yes, I know it can be painful but please check for typos. (-:

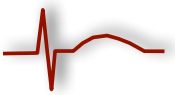
Figure 3: Oxygenated blood returns to the hurt via the pulmonary vein. After passing through the left atrium and aorta it is pumped to the rest of the body through the aorta.

Proof that English is a confusing and frustrating language

Specific Critiques 2014

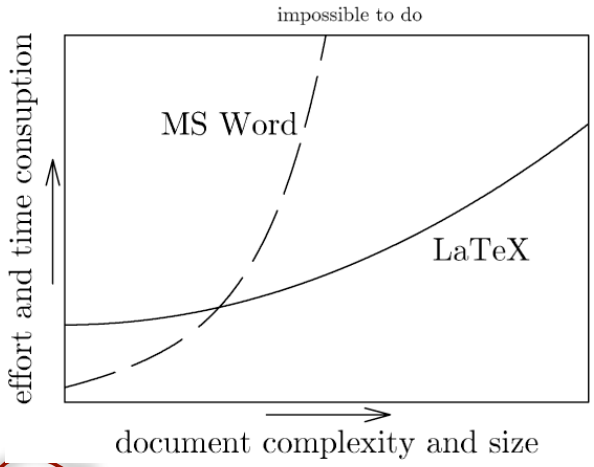
- Overall, quality was good to excellent! (3-9.5/10)
- Figure labels were inconsistent.
- Some figures cropped so much they lost context.
- Many cases for which composite figures would improve look and layout.
- Language sometimes too indirect and passive.
- “Too colloquial” or “Clumsy” were regular complaints.
- The comments field in data table was often missing.

Document Prepation



LaTeX Experience?

LaTeX VS



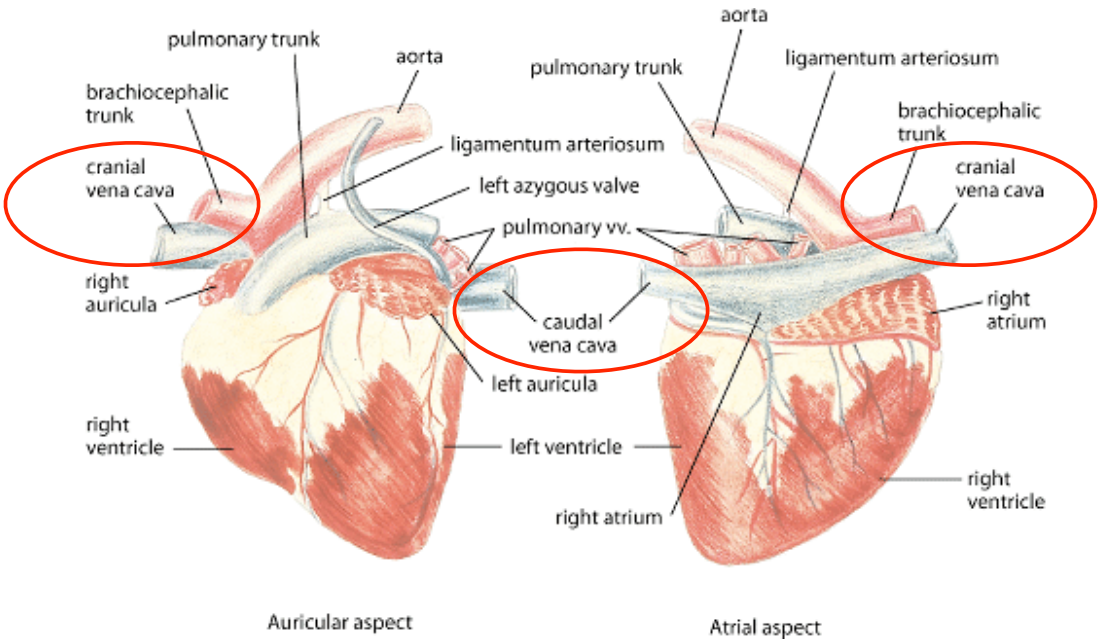
Conceptions and Popular Misconceptions

The Joys of Latin

1 “vena cava” and 2 “venae cavae”

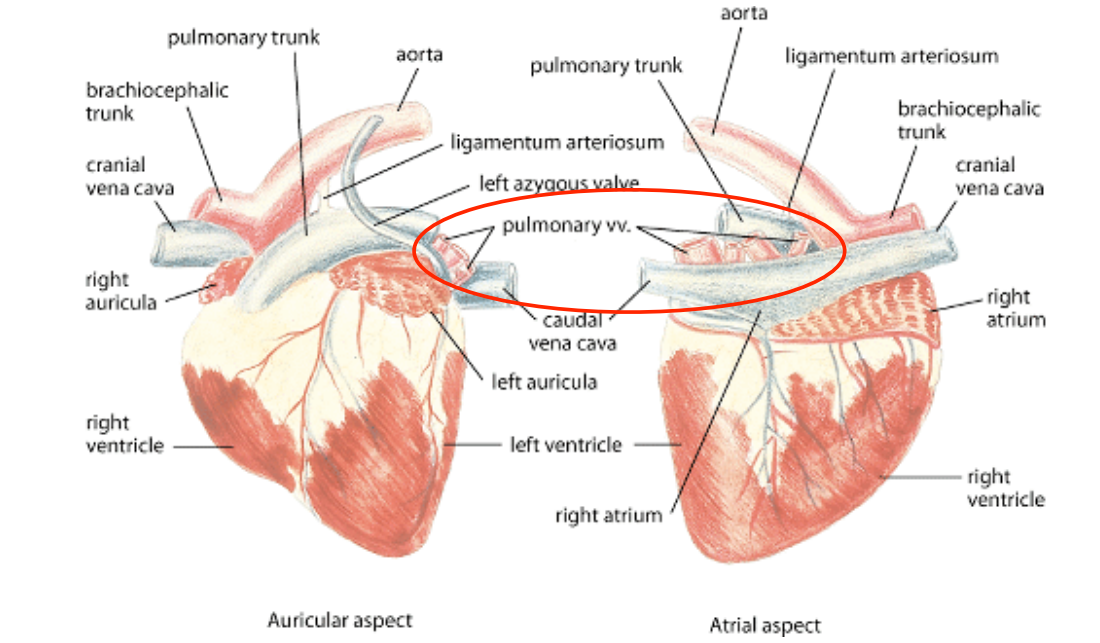
The Joys of Vena Cava

The Cow Venae Cavae



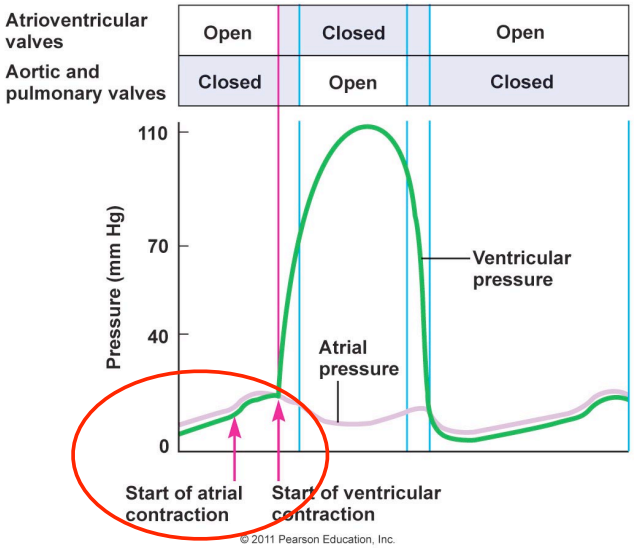
http://www.merckmanuals.com/vet/circulatory_system/cardiovascular_system_introduction/overview_of_cardiovascular_system.html

The Cow Pulmonary Veins

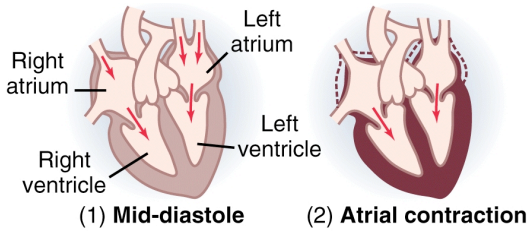


Role of the Atria

"Blood coming from the body enters the right atrium, is pumped into the right ventricle, then its pumped to the lung."

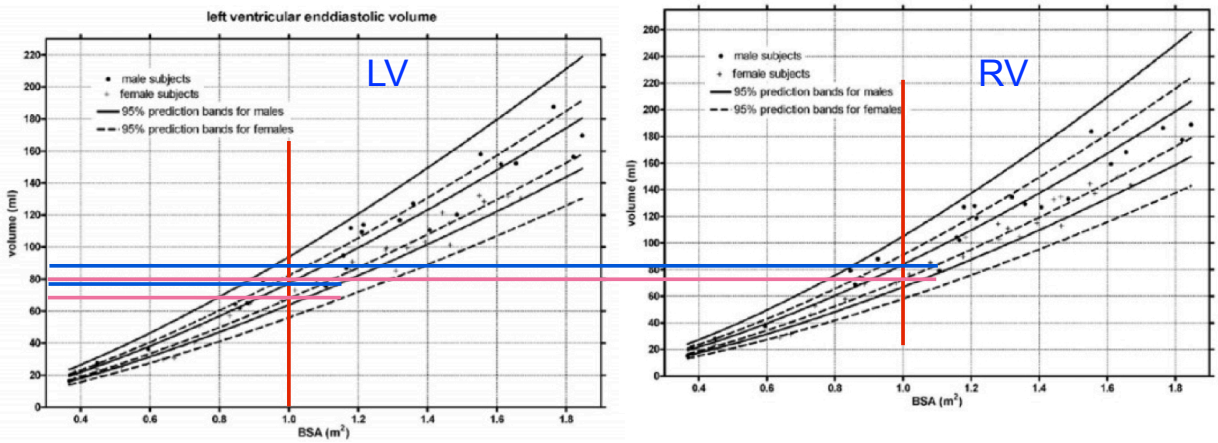


The atria are flow-through chambers with only modest flow from the contractions: "atrial kick"



Misconceptions

- Cardiac volumes
  - How do ventricular volumes compare?
    - LVEDV approx equal to RVEDV
  - What about atrial volumes?
  - How do ventricular outputs compare?



Normal right- and left ventricular volumes and myocardial mass in children measured by steady state free precession cardiovascular magnetic resonance
Buechel et al. Journal of Cardiovascular Magnetic Resonance 2009, 11:19

Another Source

Table 2. LV and RV measurements in 108 healthy volunteers

	Mean ± SD (n = 108)	Male (n = 63)	Female (n = 45)	p value
LV ejection fraction (%)	69 ± 6	69 ± 6 (57–81)	69 ± 6 (57–81)	.80
LV mass (g)	112 ± 27	123 ± 21 (81–165)	96 ± 27 (42–150)	< .001
LV mass index (g/m^2)	59.2 ± 11	62.5 ± 9.0 (45–81)	54.6 ± 12 (31–79)	< .001
LV end-diastolic volume (mL)	150 ± 31	160 ± 29 (102–218)	135 ± 26 (83–187)	< .001
LV end-diastolic volume index (mL/m^2)	80 ± 13	82 ± 13 (56–108)	78 ± 12 (54–102)	.16
LV end-systolic volume (mL)	47 ± 15	50 ± 16 (18–82)	42 ± 12 (18–66)	.007
LV end-systolic volume index (mL/m^2)	25 ± 7	25 ± 8 (9–41)	24 ± 6 (12–36)	.53
LV stroke volume (mL)	104 ± 21	112 ± 19 (74–150)	91 ± 17 (57–125)	< .001
LV stroke volume index (mL/m^2)	55 ± 8	56 ± 8 (40–72)	54 ± 9 (36–72)	.12
RV ejection fraction (%)	61 ± 6	59 ± 6 (47–71)	63 ± 5 (53–73)	.002
RV mass (g)	38 ± 8	41 ± 8 (25–57)	35 ± 7 (21–49)	< .001
RV mass index (g/m^2)	20.3 ± 3.6	20.6 ± 3.7 (13–28)	20.0 ± 3.5 (13–27)	.371
RV end-diastolic volume (mL)	173 ± 39	190 ± 33 (124–256)	148 ± 35 (78–218)	< .001
RV end-diastolic volume index (mL/m^2)	91 ± 16	96 ± 15 (66–126)	84 ± 17 (50–118)	< .001
RV end-systolic volume (mL)	69 ± 22	78 ± 20 (38–118)	56 ± 18 (20–92)	< .001
RV end-systolic volume index (mL/m^2)	36 ± 10	39 ± 10 (19–59)	32 ± 10 (12–52)	< .001
RV stroke volume (mL)	104 ± 21	113 ± 19 (75–151)	90 ± 19 (52–128)	< .001
RV stroke volume index (mL/m^2)	55 ± 9	57 ± 8 (41–73)	53 ± 9 (35–71)	.02

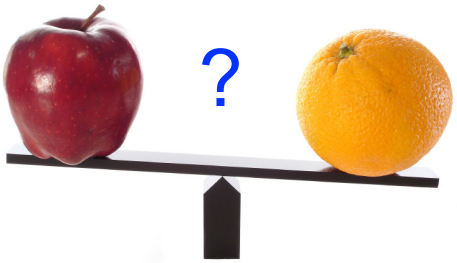
Values are given as mean ± SD; reference ranges in brackets, calculated as ± 2SD of the mean.

Hudsmith et al. Journal of Cardiovascular Magnetic Resonance 2005, 7:775-782

Additional Information

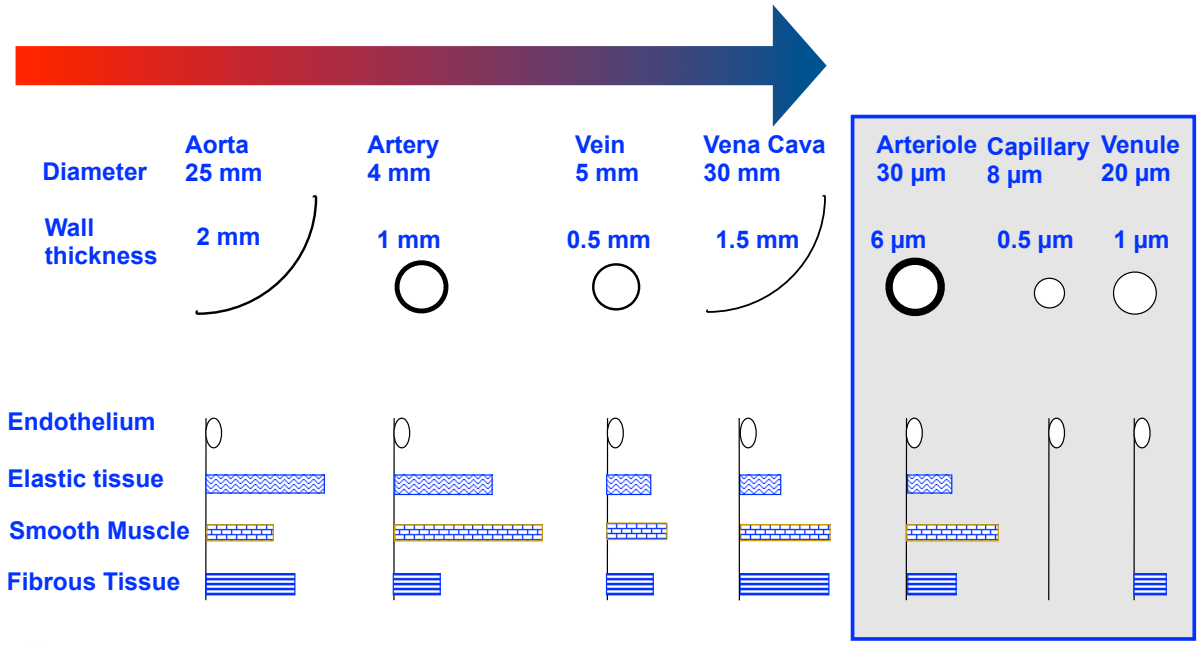
Variable	Cow	~~Man~~ Woman	Dog	Rabbit	Rat
Weight (kg)	414	70	20	4	0.6
Cardiac Output (ml/sec)	680	110	42	5.2	1.2
Heart rate (min^{-1})	71	76	99	288	349
Stroke Volume (ml)	570	87	25	1.1	0.21
Velocity in ascending aorta		16	18	32	22

Veins vs. Arteries

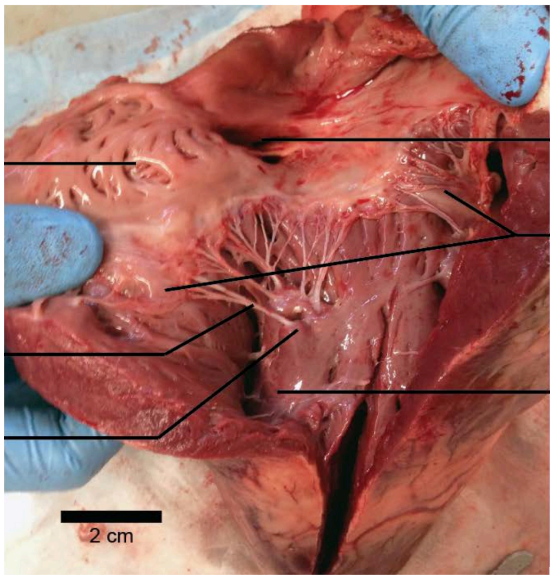


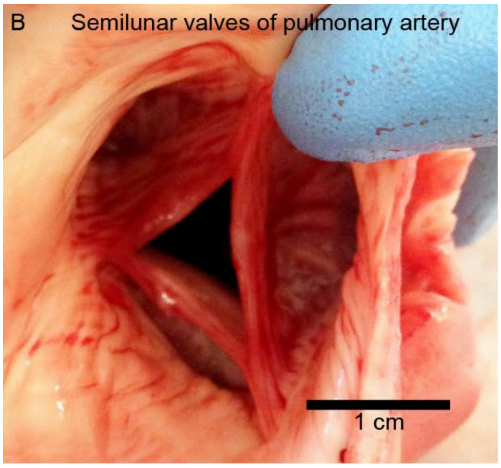
Veins	Arteries
Red	Yellow
Thin walled	Thick walled
Compliant	Elastic
Storage	Flow

Vessel Structure

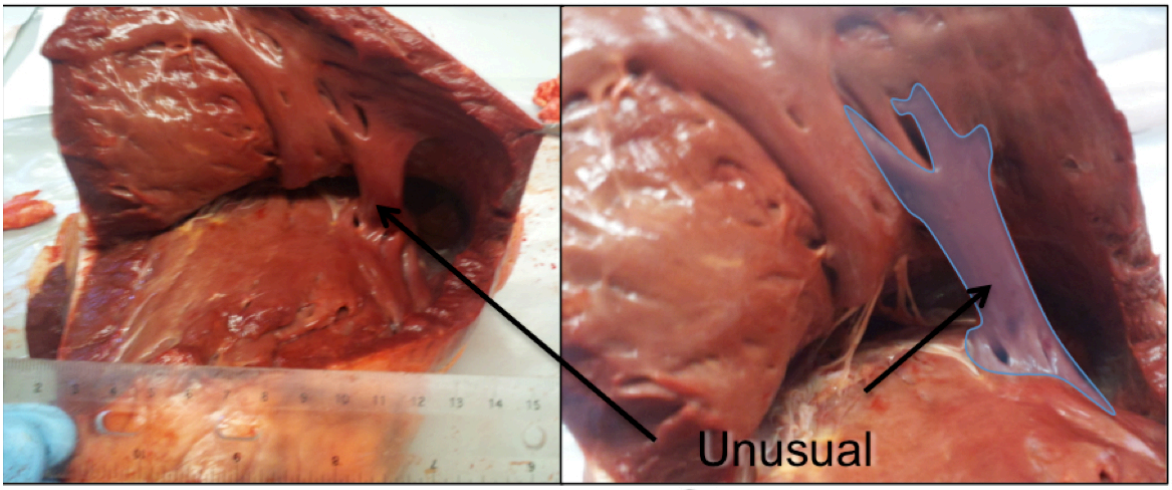


What explains the difference in valves?





"The Unusual Structure"



Structure?

Function?

Moderator Band in Humans?

ANOTHER HEART WITH MODERATOR BAND IN THE LEFT VENTRICLE. By Professor Sir WILLIAM TURNER, F.R.S.

IN February 1893 I exhibited and described to the Anatomical Society[1] a human heart, in the left ventricle of which three slender bands passed from the septal wall across the cavity to the posterior wall of the ventricle. From their attachments they would doubtless have exercised during life a moderating influence over distension of the left ventricle.

J Anat Physiol. 1896 July; 30(Pt 4): 568–569

The Moderator Band in Action

1962

2012

Local band of former OHSU medical students raises money for a good cause!