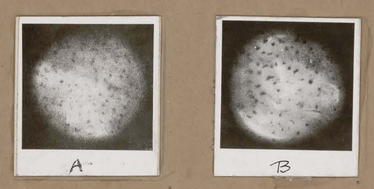
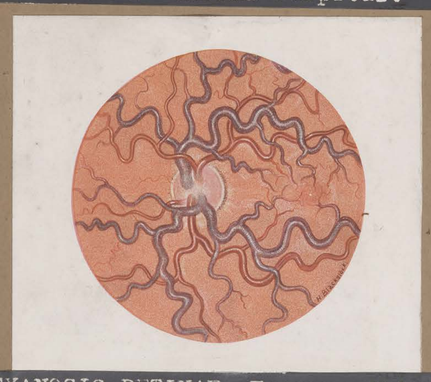
Congenital Cyanosis
Symptomatology

EXTREME CLUBBING OF TOES IN ADVANCED CONGENITAL CYANOSIS. TETRALOGY OF FALLOT
Male aged 23. Painting by Hortense Douglas, Montreal General Hospital.

CLUBBED FINGERS AND TOES IN A GIRL WITH CONGENITAL CYANOSIS.
Painting by Hortense Douglas, Montreal General Hospital.



MICROPHOTOGRAPHS OF SKIN CAPILLARIES
(A) in normal skin
(B) in reddened skin
(C) in congenital cyanosis



CYANOSIS RETINAE. Eyeground in a cyanotic child aged 3 1/2 yrs.
Painting by Harriet Blackstock
McGill University

DRAWINGS OF SKIN CAPILLARIES
A. in congenital cyanosis
B. in Decompensation.
(Redisch and Rösler,1929)

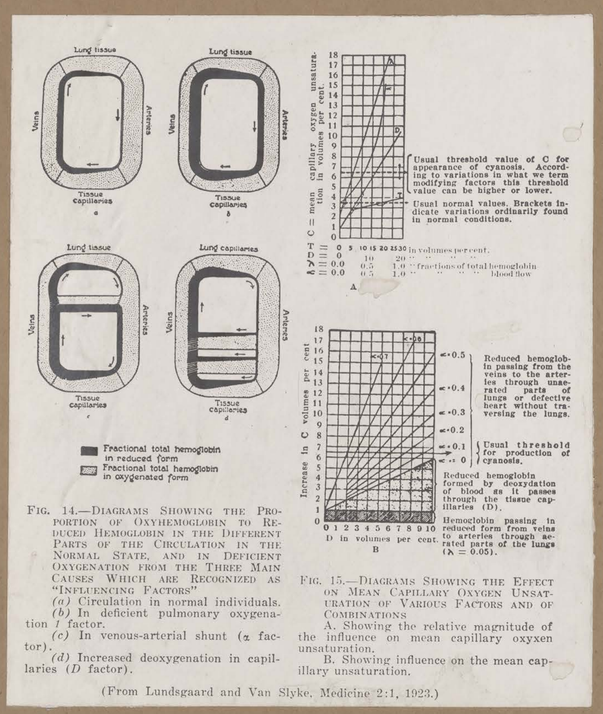


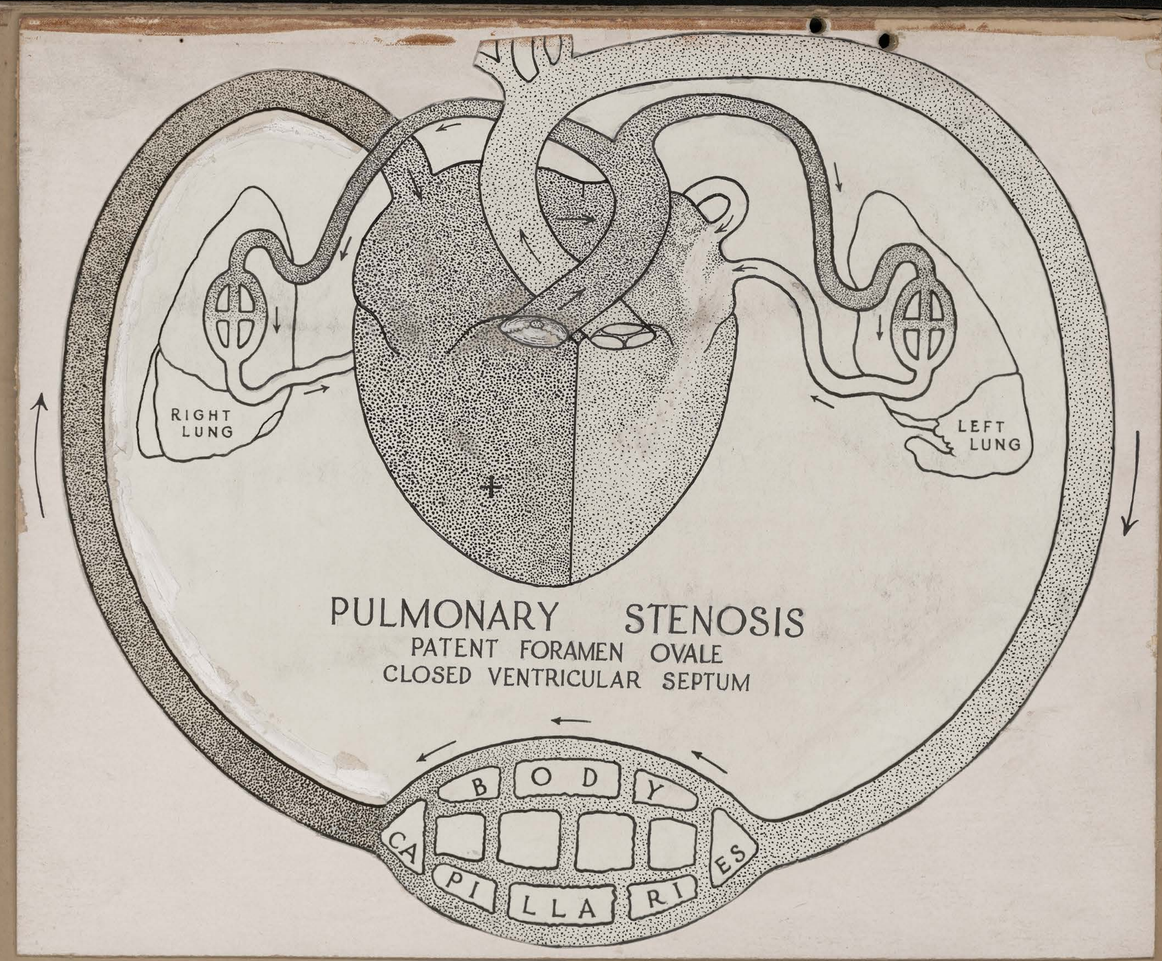
FIG. 14.—DIAGRAMS SHOWING THE PROPORTION OF OXYHEMOGLOBIN TO REDUCED HEMOGLOBIN IN THE DIFFERENT PARTS OF THE CIRCULATION IN THE NORMAL STATE, AND IN DEFICIENT OXYGENATION FROM THE THREE MAIN CAUSES WHICH ARE RECOGNIZED AS "INFLUENCING FACTORS"
(a) Circulation in normal individuals.
(b) In deficient pulmonary oxygenation *J* factor.
(c) In venous-arterial shunt (*s* factor).
(d) Increased deoxygenation in capillaries (*D* factor).

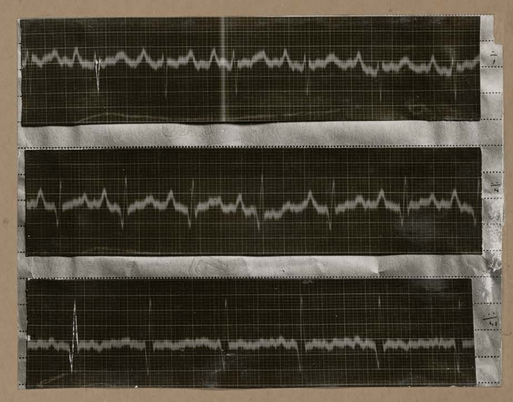
FIG. 15.—DIAGRAMS SHOWING THE EFFECT ON MEAN CAPILLARY OXYGEN UNSATURATION OF VARIOUS FACTORS AND OF COMBINATIONS
A. Showing the relative magnitude of the influence on mean capillary oxyxen unsaturation.
B. Showing influence on the mean capillary unsaturation.

(From Lundsgaard and Van Slyke, Medicine 2:1, 1923.)

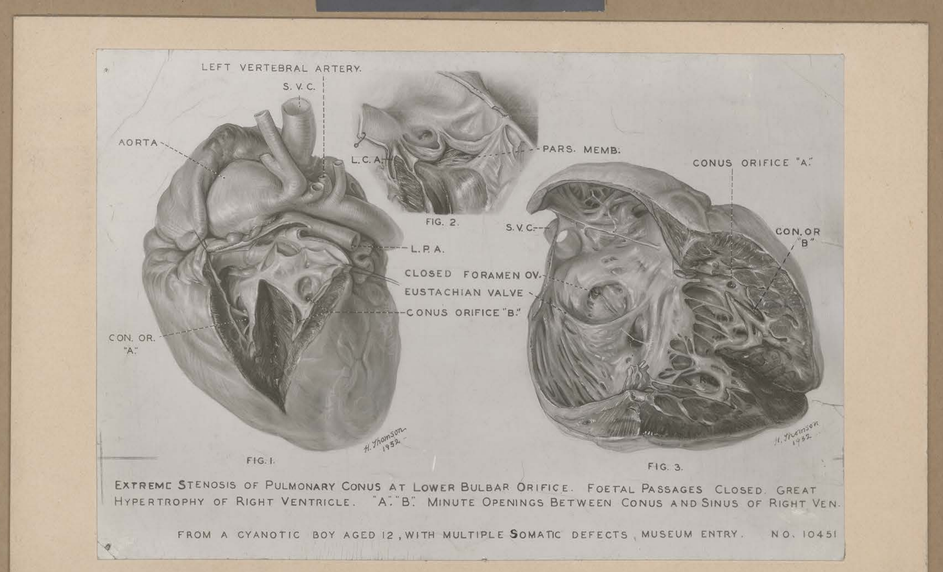
DIAGRAMS BY LUNDSGAARD AND VAN SLYKE SHOWING PROPORTION OF OXYHAEMOGLOBIN TO REDUCED HAEMOGLOBIN (a) in normal individuals; (b) in deficient pulmonary oxygenation; (c) in venous-arterial shunt; (d) increased deoxygenation in capillaries.

CYANOTIC FACIES WITH CLUBBING OF NOSE
In a girl of 19, diagnosed clinically as Tetralogy of Fallot.





Case of W.W. Eakin

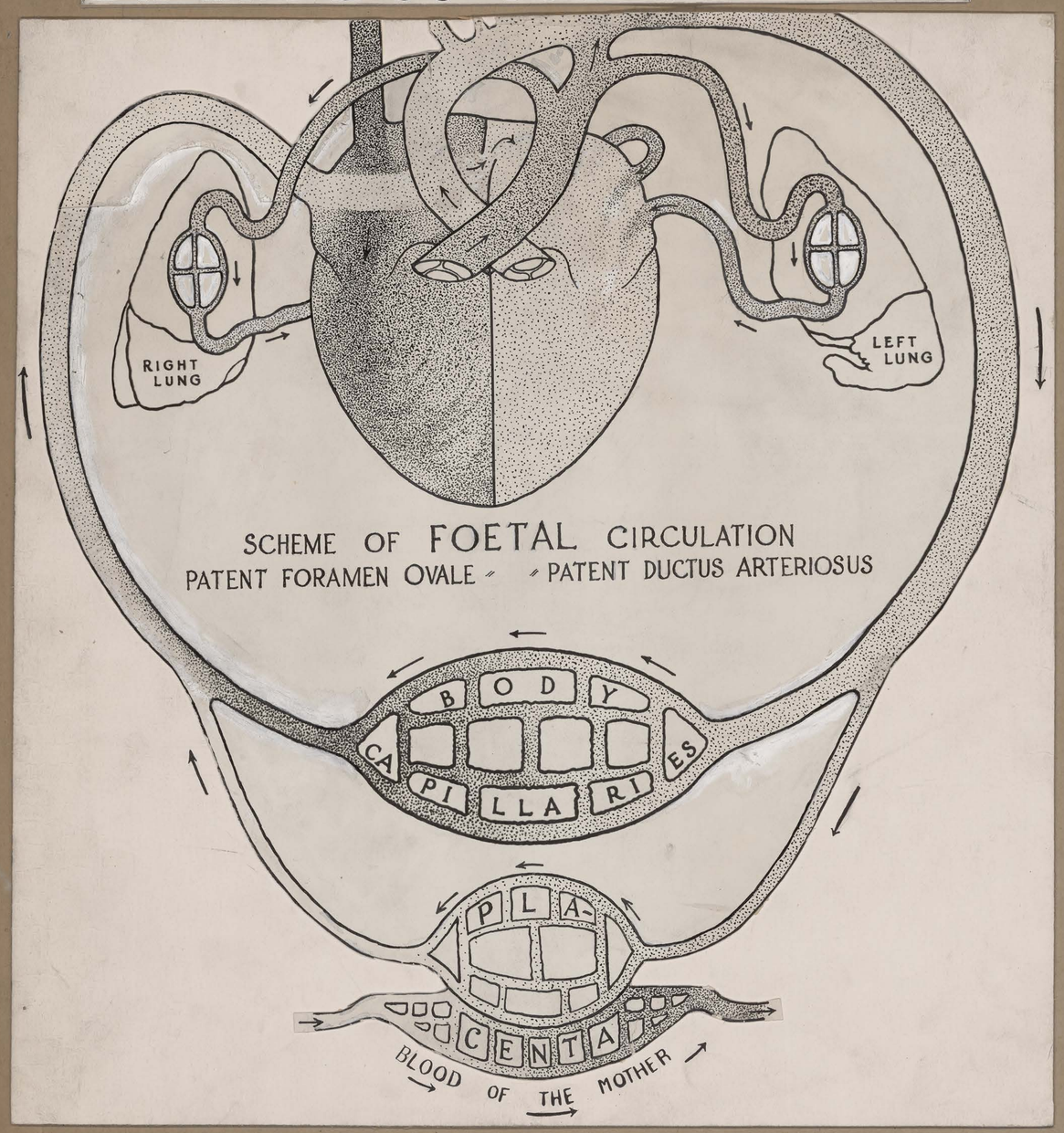


EXTREME STENOSIS OF PULMONARY CONUS AT LOWER BULBAR ORIFICE. FOETAL PASSAGES CLOSED. GREAT HYPERTROPHY OF RIGHT VENTRICLE. "A" "B" MINUTE OPENINGS BETWEEN CONUS AND SINUS OF RIGHT VEN.

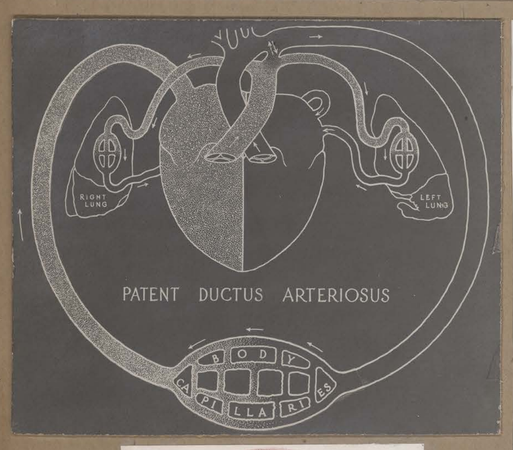
FROM A CYANOTIC BOY AGED 12, WITH MULTIPLE SOMATIC DEFECTS, MUSEUM ENTRY. NO. 10451

EXTREME STENOSIS OF PULMONARY CONUS AT LOWER BULBAR ORIFICE. FOETAL PASSAGES CLOSED.
In a cyanotic boy of 12 years, with cleft palate and rudimentary external ears, dying with extreme anasarca.
(a) whole figure showing cyanotic lips and peculiarly shaped mouth, enlarged abdomen. (b) Side view of head showing rudimentary external ear and low growth of hair. (c) X-Ray of heart. Extraordinary widening of transverse diameter. (d) Electrocardiogram. Right preponderance, high P waves and sinus arrhythmia.

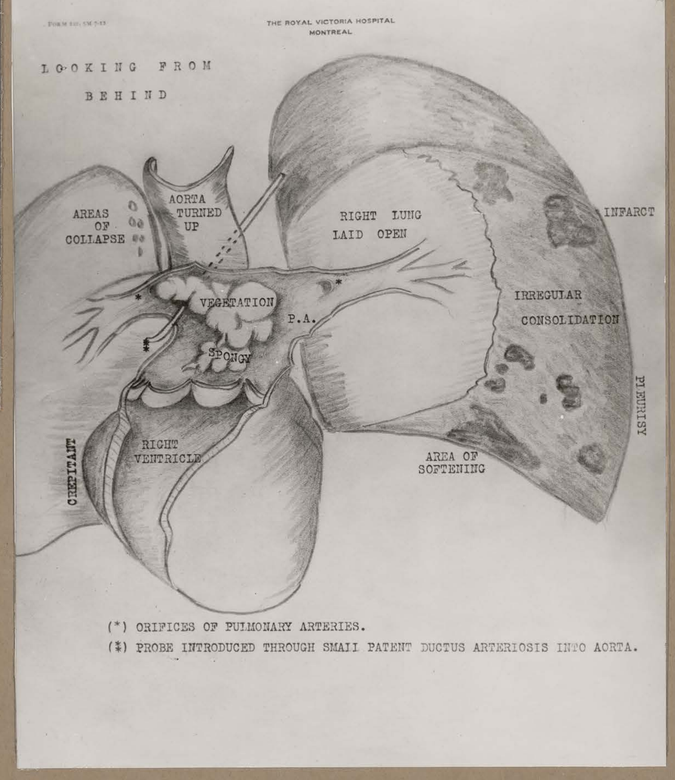
PATENT DUCTUS ARTERIOSUS



SCHEME OF FOETAL CIRCULATION
PATENT FORAMEN OVALE — PATENT DUCTUS ARTERIOSUS

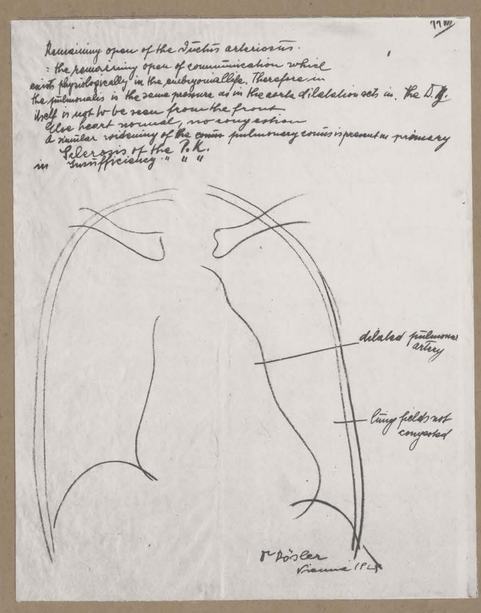


PATENT DUCTUS ARTERIOSUS WITH INFECTIVE PULMONARY ENDARTERITIS.
In a girl of 19. Pneumococcus septicaemia. No cyanosis.
A. Left (aortic) side. B. View from right side. Vegetations blocking pulmonary artery and embolic abscesses in lungs.
C. Microscopic examination of wall of ductus showing mitral lesion.

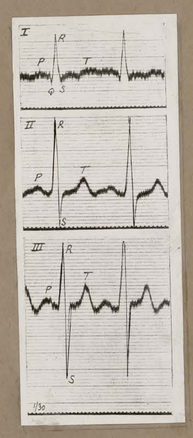


LARGE PULMONARY ARC IN X-Ray of patent ductus. Case of Dr. Kate Mead (1910)

LARGE PULMONARY ARC in heart silhouette of case of patent D.A. (Groedel,1911)

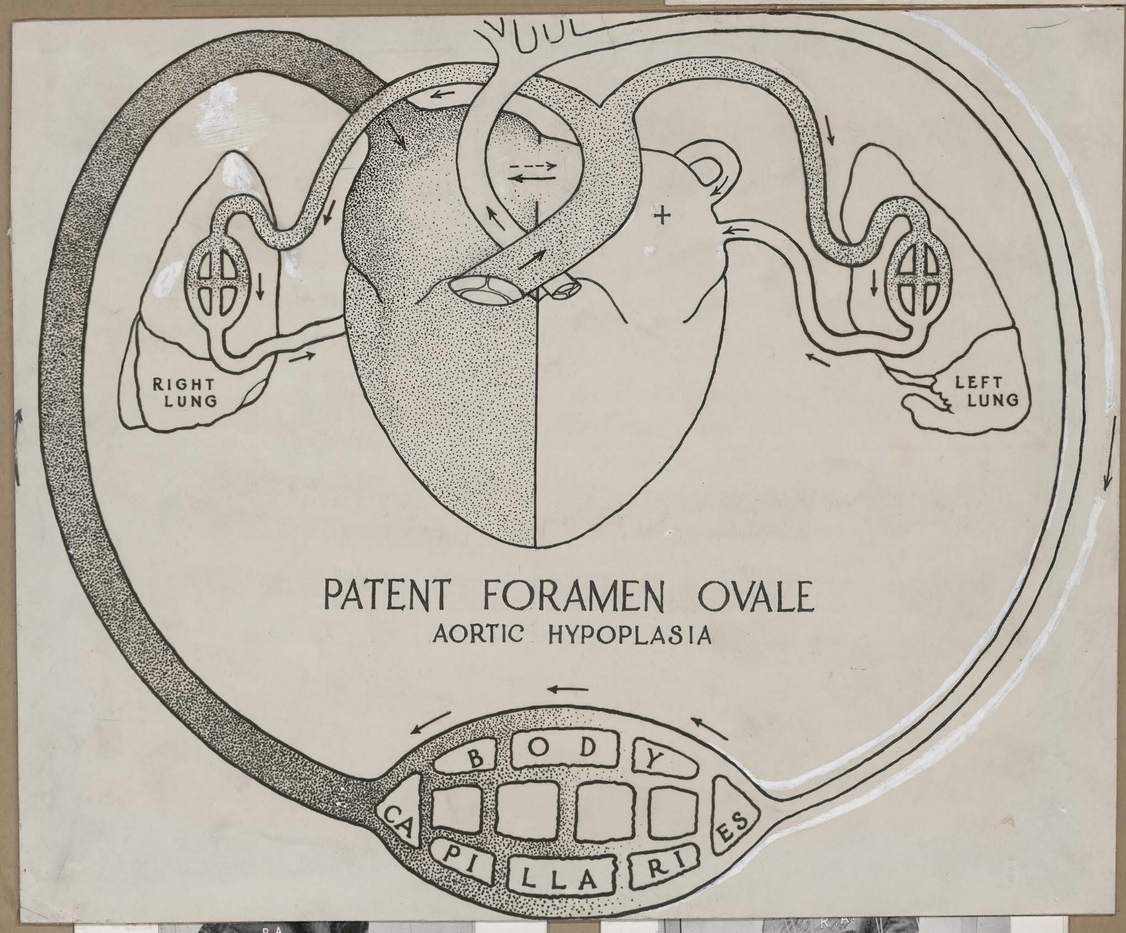


Orthodiagraphic tracing from a case of patent ductus. (H. Rösler)

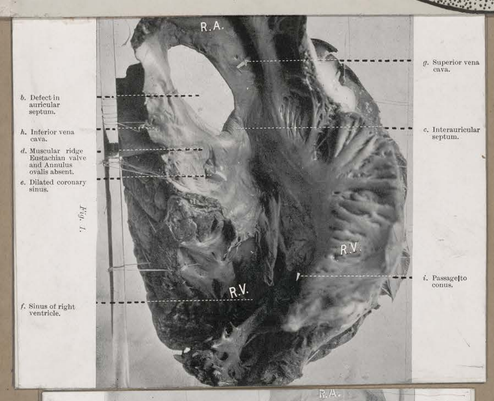


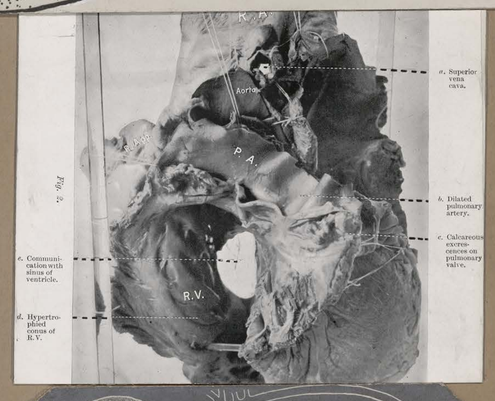
Extreme amplitude of leads and right preponderance. (Sir T. Lewis)

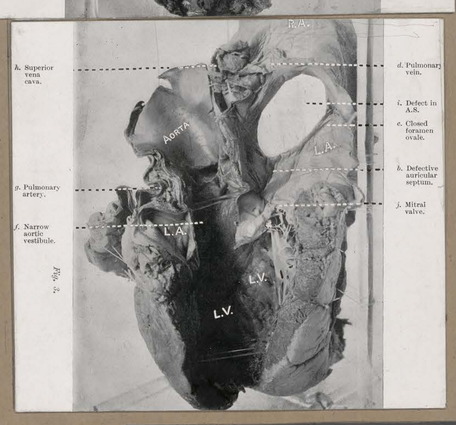
DEFECTS AURIC

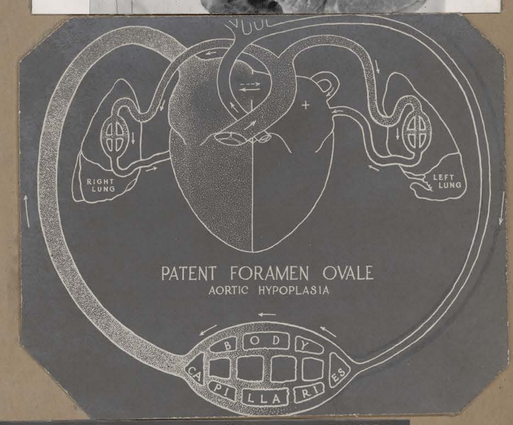


PATENT FORAMEN OVALE
AORTIC HYPOPLASIA



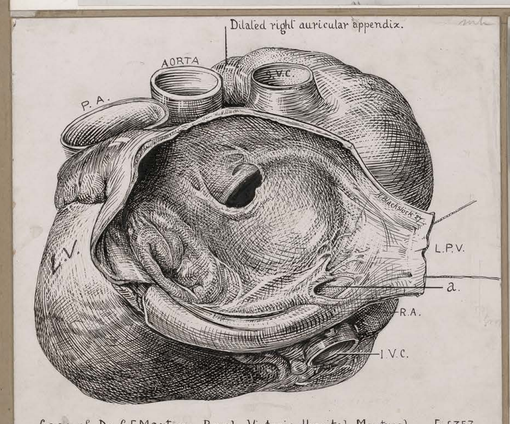




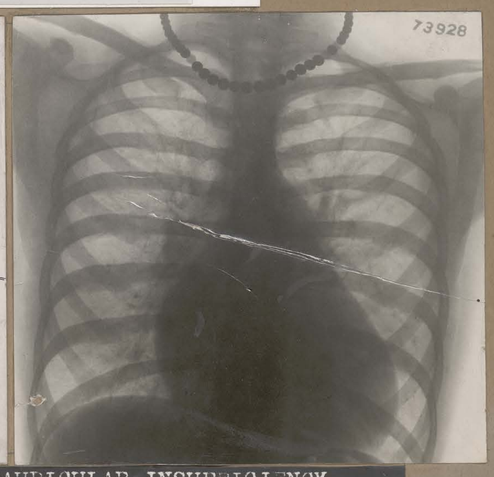


LARGE DEFECT AT UPPER PART OF INTERAURICULAR SEPTUM. Dilatation of pulmonary artery and calcification of cusps. Hypoplasia of aorta. Terminal cyanosis.

Orthodiagram in Rösler's case of Interauricular Insufficiency

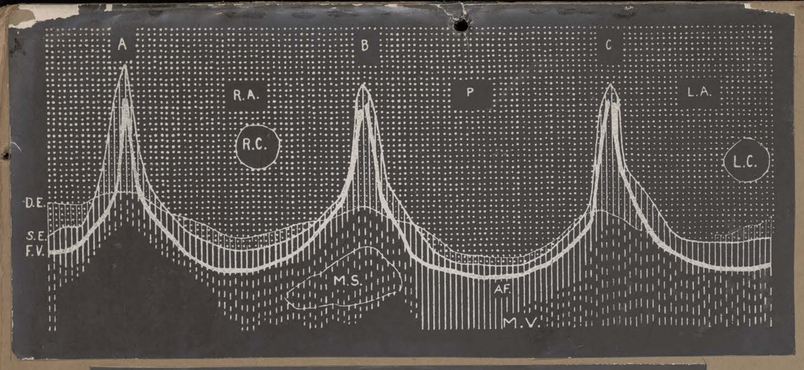


Case of Dr. C.F. Martin Royal Victoria Hospital, Montreal. E.5353.
Rept. by Dr. M.E. Abbott Bull. Inter. Assoc. Med. Mus. V. 1915.



MITRAL STENOSIS WITH INTERAURICULAR INSUFFICIENCY
(LUTEMBACHER'S DISEASE)
(a) Drawing of heart showing view of right chambers. Widely patent foramen ovale with calcified border.
(b) The same. View from left auricle.
(c) X-Ray of heart in another case.

BICUSPID AORTIC VALVE



STRUCTURES SUPPORTING THE NORMAL AORTIC VALVE. Enlargement of diagram drawn by reconstruction from serial section by Sir Thos. Lewis and R.T.Grant. A.F.-annulus fibrosus. F.V.-fibrous layer of valve. D.E. and S.E.-deep and superficial ending of the aortic media. M.S.-membranaceous septum.

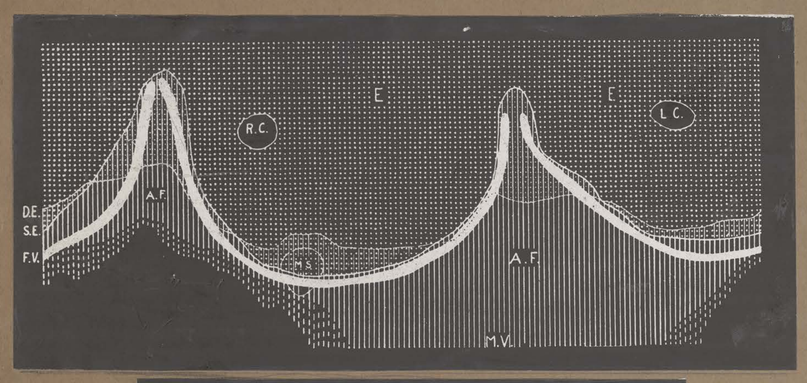
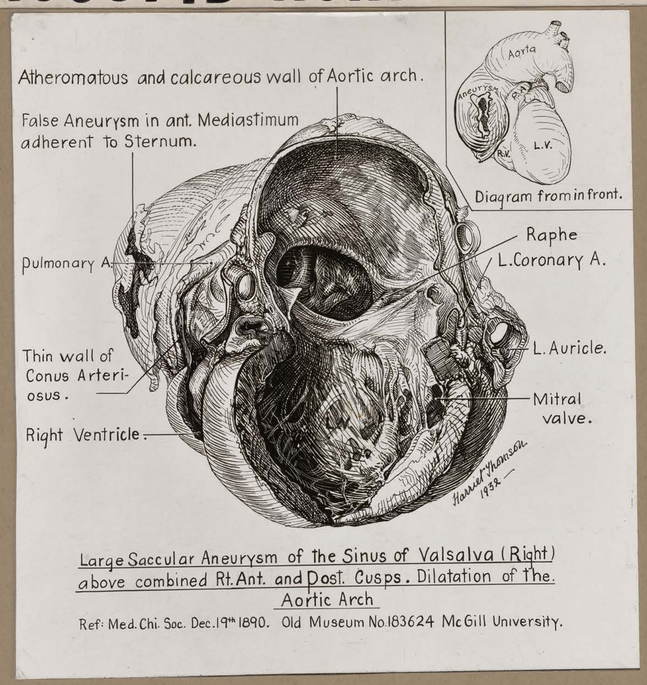


DIAGRAM OF STRUCTURES SUPPORTING A CONGENITALLY BICUSPID AORTIC VALVE DRAWN BY RECONSTRUCTION. From the article by Lewis and Grant in Heart, 1923, x, pp. 23 and 35.

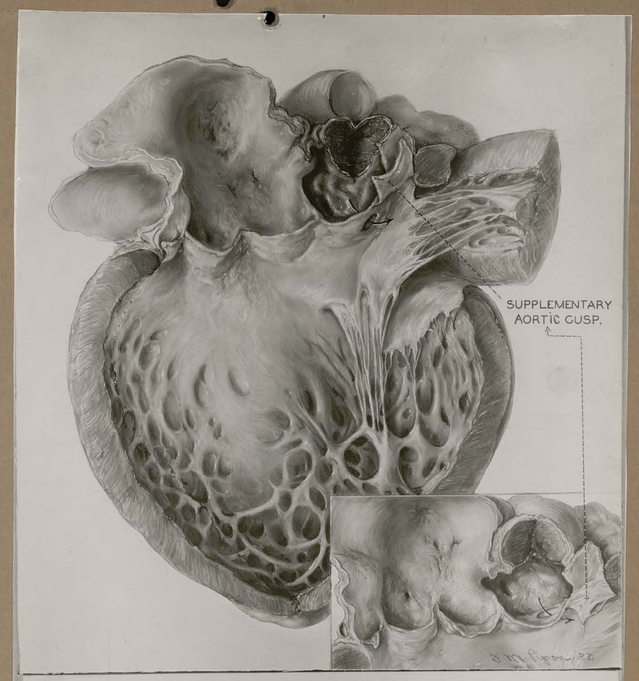
PEACOCK'S CASE, (1866). Infant, aged 10 weeks. Photograph and histological study of raphe by Lewis and Grant

OSLER'S CASES OF BICUSPID AORTIC VALVE. Showing low raphe and infective endocarditis. From the Montreal General Hospital Reports, 1880. Specimens in McGill Museum.



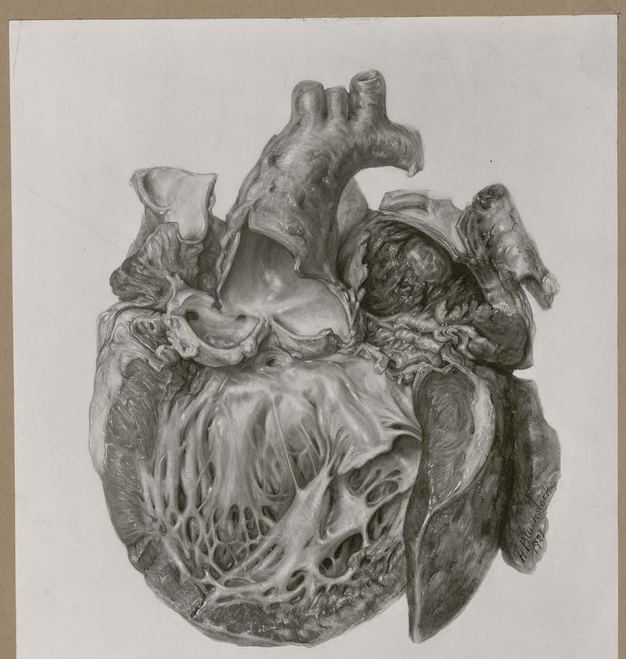
Large Saccular Aneurysm of the Sinus of Valsalva (Right) above combined Rt.Ant. and Post. Cusps. Dilatation of the Aortic Arch

Ref: Med.Chi. Soc. Dec.19th 1890. Old Museum No.183624 McGill University.



SUPPLEMENTARY FOURTH AORTIC CUSP COMBINED WITH LEFT ANTERIOR SEGMENT AND UNITED BY LOW RAPHE WITH LATTER. SACCULAR ANEURISM OF LEFT ANTERIOR SINUS OF VALSALVA. SYPHILITIC MESAORTITIS. AORTIC INSUFFICIENCY. MALE AGED 31 REF. NO. 196/06. M.G.H. MUSEUM NO. 2986. MAGILL.

Supplementary (fourth) aortic cusp united with left anterior segment by low raphe. Saccular aneurysm of left aortic sinus of Valsalva with impending rupture. Male aged 31. Specimen in McGill Museum



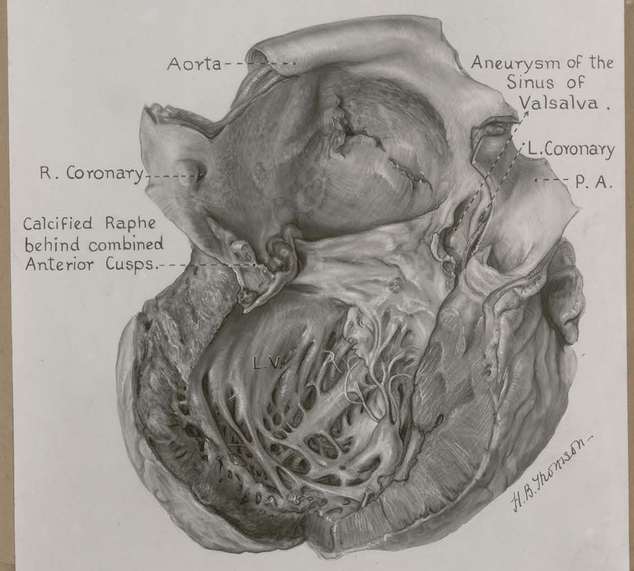
Bicuspid aortic valve with recent bacterial endocarditis and mycotic aneurysm of circumflex branch of left coronary rupturing into wall of left auricle and recent myocardial infarction.

BICUSPID AORTIC VALVE WITH INFECTIVE ENDOCARDITIS. Mycotic aneurysm of left coronary, myocardial infarction and ventricular septal defect. From a man aged 34. Reported by Abbott and Chase.

Microscopic sections of heart wall in above case showing cellular invasion of disintegrating myocardium, old and recent infarction (H. and E. stain).

CALCIFIED RAPHE BEHIND BICUSPID AORTIC VALVE (from case shown below). Microphotograph of section stained for elastic tissue.

BICUSPID AORTIC VALVE WITH RUPTURE AND DISSECTING..... ANEURYSM OF THE POSTERIOR WALL OF THE AORTA ABOVE A SINGLE CUSP.



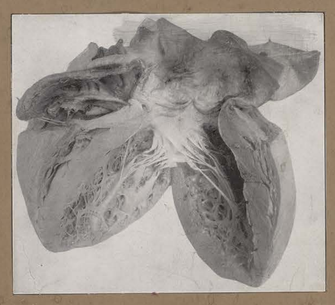
Entry No.3085 Medical Museum. McGill University. Feb. 1932

MISCELLANEOUS ANOMALIES

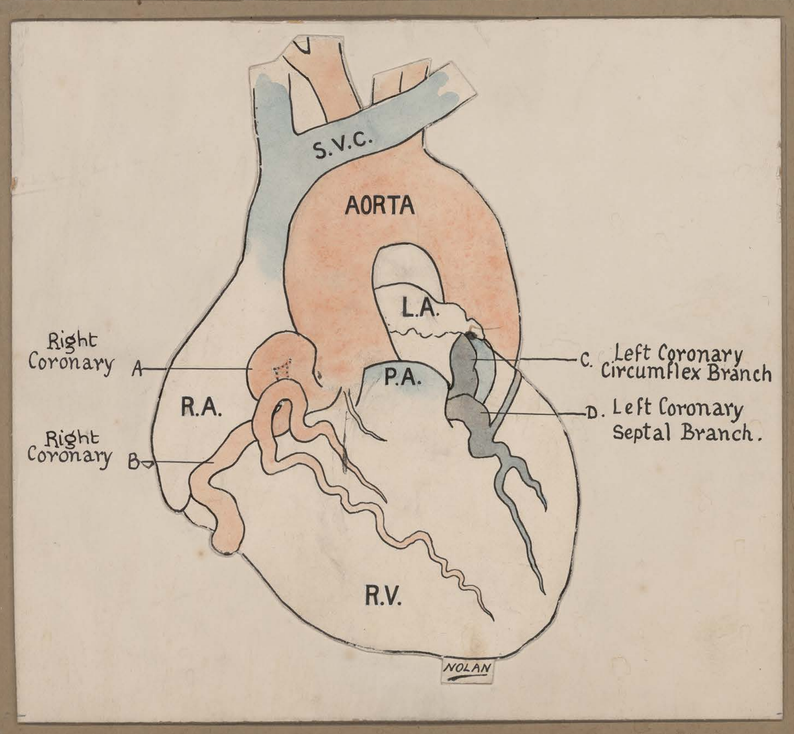
PENESTRATION OF AORTIC CUSPS.

CONGENITAL TRICUSPID INSUFFICIENCY

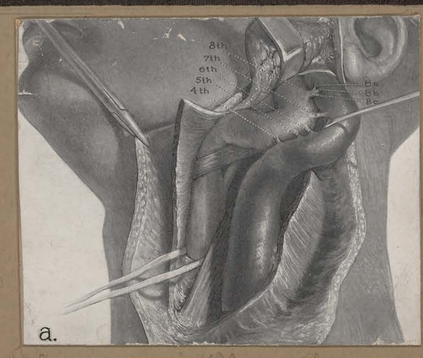
ANOMALOUS CHORDAE IN R.A. Network of Chiari



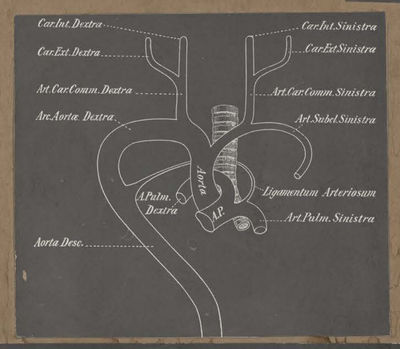
ANOMALOUS CHORDAE IN L.V. (W.F.Hamilton, 1899)



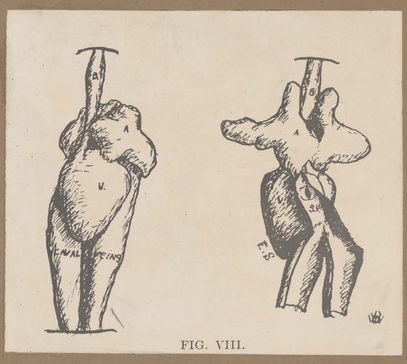
ANOMALOUS ORIGIN OF LEFT CORONARY FROM PULMONARY ARTERY. Circoid aneurysmal dilatation of branches of both coronaries. From a woman aged 60 . Specimen in the McGill Museum.



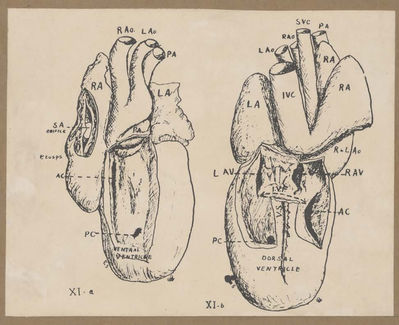
CONGENITAL ARTERIO-VENOUS ANEURYSM
(a) Dissection of neck showing multiple fistulae between carotid artery and jugular vein.
(b) Subclavian artery and veins in a 10 mm. pig embryo showing retiform anastomosis.
W.T. Rienhoff,



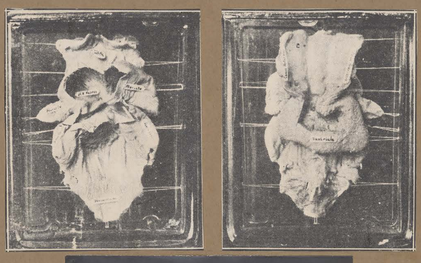
RIGHT AORTIC ARCH FORMING VASCULAR RING Drawing by J.G. Adami of Specimen 15.11



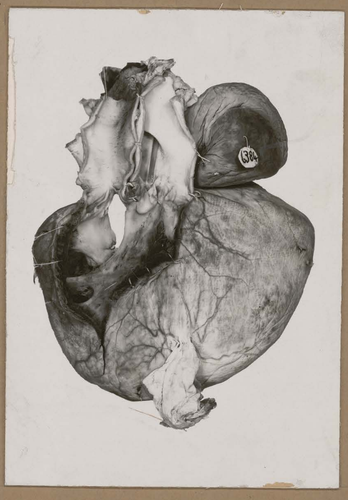
HEART OF MUD PUPPY
(Necturus)



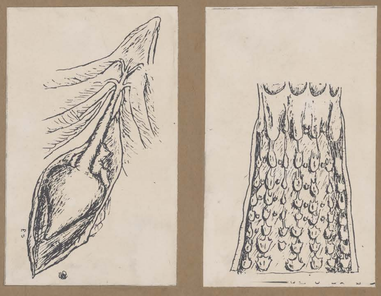
HEART OF PYTHON
A. Ventral. B. Dorsal
View



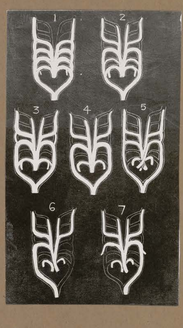
HEART OF SKATE
A. Dorsal. B. Ventral
View



HEART OF TURTLE, ANTERIOR VIEW, SHOWING PULMONARY ARTERY AND RIGHT AORTA, AND BULBAR SEPTAL DEFECT.



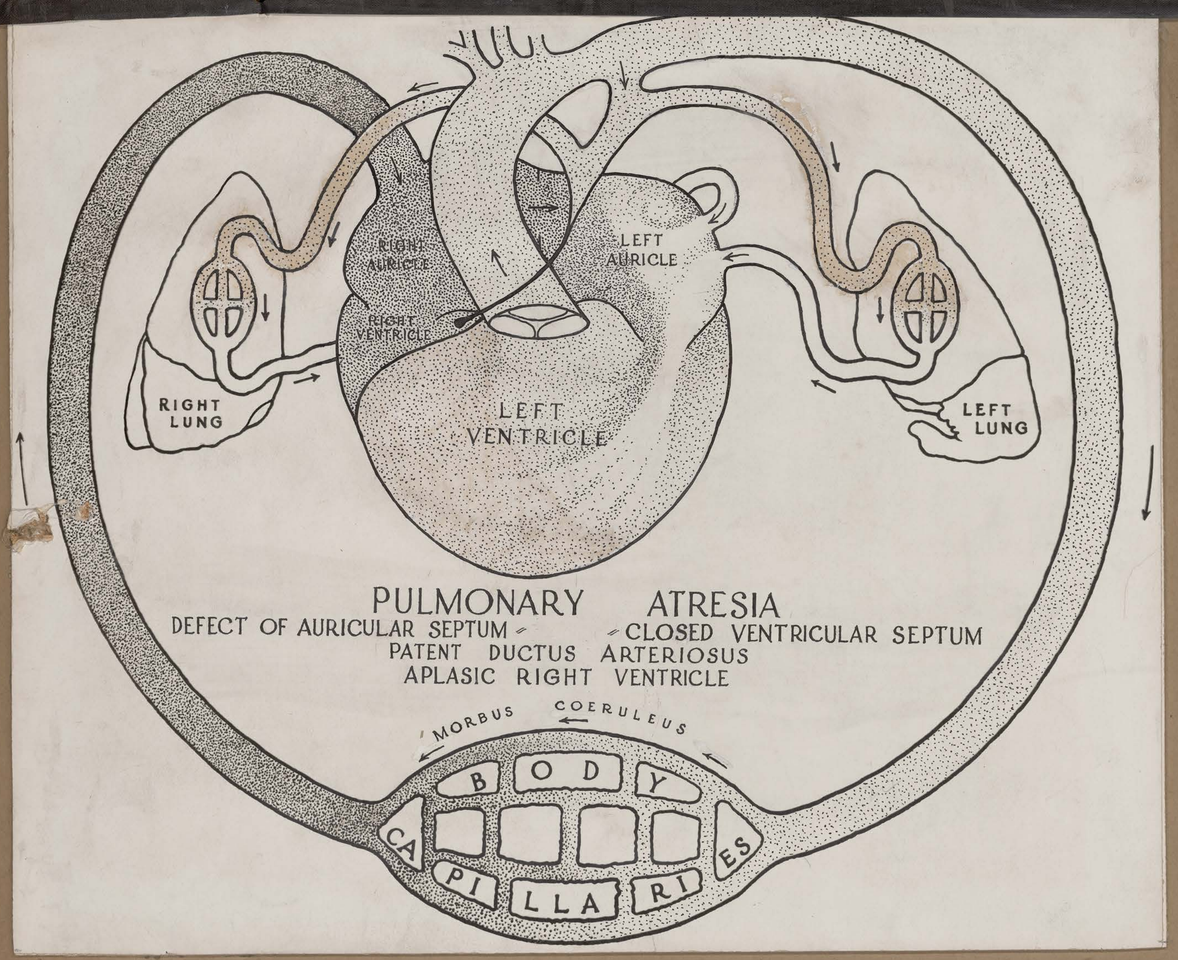
HEART OF GARPIKE
(Lepidosteus Osseus)



AORTIC ARCHES
1,ceratodus;
2,salamander;
3,triton;4,frog;
5,lizard;6,bird;
7,mammal.
H.A.Harris,(1922)

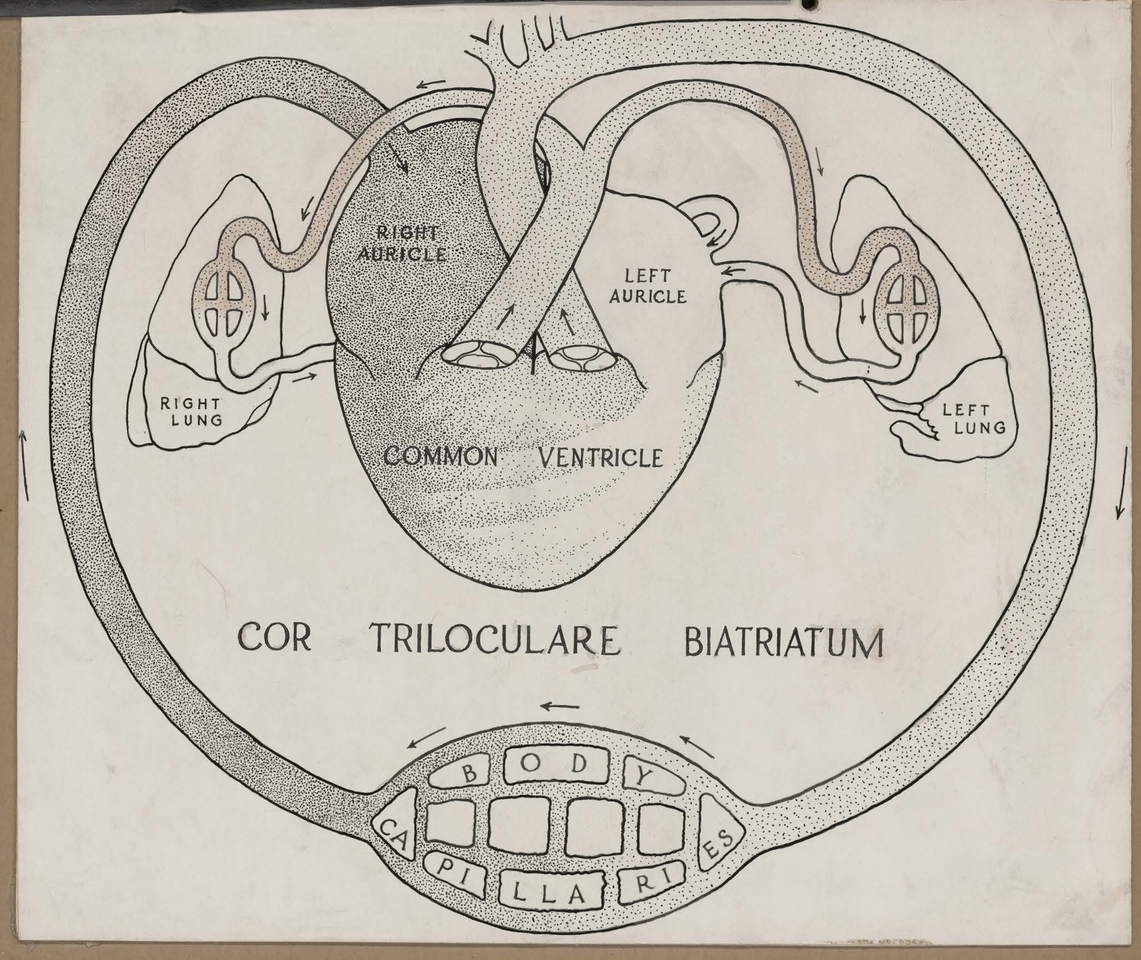
HEART OF ANGLER
(Teleost Fish)

HEART OF CROCODILE
(Alligator Mississippiensis)

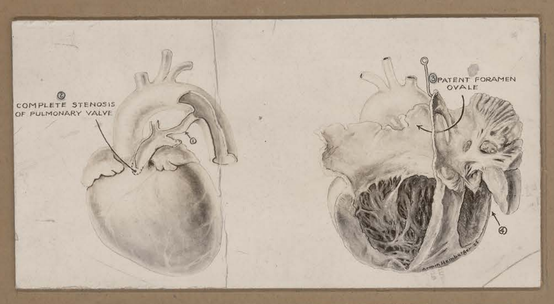


PULMONARY ATRESIA

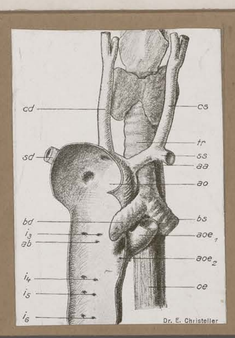
DEFECT OF AURICULAR SEPTUM — CLOSED VENTRICULAR SEPTUM
PATENT DUCTUS ARTERIOSUS
APLASIC RIGHT VENTRICLE



COR TRILOCULARE BIATRIATUM

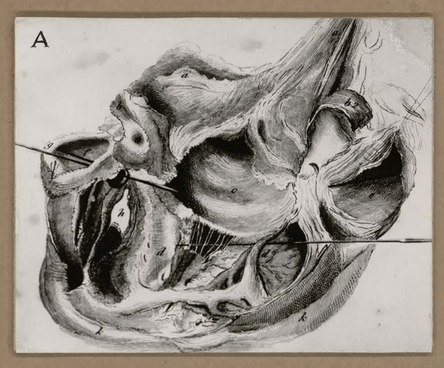


PULMONARY ATRESIA WITH CLOSED VENTRICULAR SEPTUM
D.A. and F.O. patent. Extreme morbus coeruleus. Infant, aged 9 days.

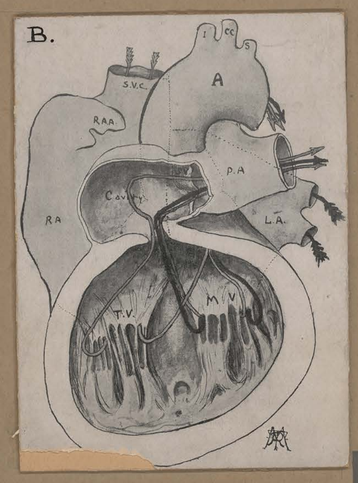


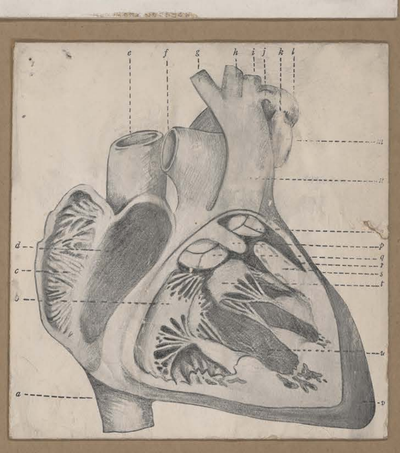
COLLATERAL CIRCULATION TO LUNGS IN PULMONARY ATRESIA. Dilated oesophageal artery (aoe.)
Case of Erwin Christeller (1917)

A



B.





COR TRILOCULARE BIATRIATUM WITH SMALL SEPARATE CHAMBER giving off pulmonary artery. From a cyanotic youth aged 24. Case of Dr. Andrew F. Holmes (1823)

A. Copperplate engraving of interior of left ventricle from Edin. Med. Jour., 1824.

B. Diagrammatic sketch of interior showing admixture of currents. By R. Tait Mackenzie, (1900).

COR TRILOCULARE BIATRIATUM WITH TRANSPOSED PULMONARY ARTERY from small separate chamber. Case of E.S. Mills

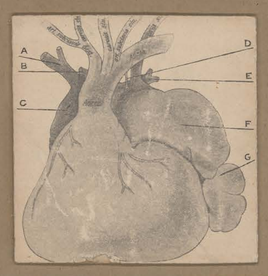
KEY TO EXHIBIT B. (Continued)

Group III. Cases of permanent venous-arterial shunt or delayed circulation in the capillaries (true morbus coeruleus).

Symptomatology. (a) Paintings showing clubbing of fingers and toes and cyanosis retinae. (b) Microphotographs and drawings of skin capillaries in congenital cyanosis. (c) Diagrams by Lundsgaard and van Slyke showing determining factors in production of cyanosis.

Illustrative Cases.

1. Pulmonary stenosis with closed ventricular septum: (a) Valvular; (b) at lower bulbar orifice.
2. Defect of interventricular septum with dextroposition of aorta and dilatation of pulmonary artery: 2 cases.
3. Pulmonary stenosis, ventricular septal defect and dextroposition of aorta: (Tetralogy of Fallot), 2 cases.
4. Pulmonary atresia: (a) with closed septum; (b) with ventricular septal defect.
5. Complete defect of cardiac septa: (a) cor triloculare biatriatum ; (b) cor biloculare.
6. Persistent Truncus: (complete defect of aortic septum) 2 cases, and Feller's diagrams.
7. Transposition of great trunks: (a) with closed septum; (b) with aortic atresia; (c) with ventricular septal defect.



COR TRILOCULARE with malposed left auricle and transposition of trunks in pure dextrocardia. (Wenner's case)

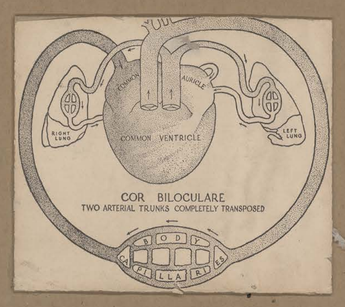
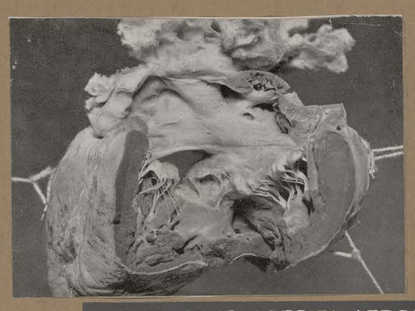
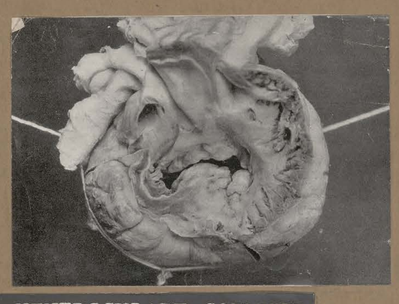


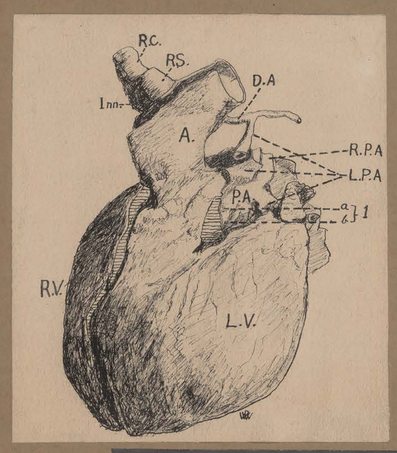
Diagram of Circulation in Case to Right.

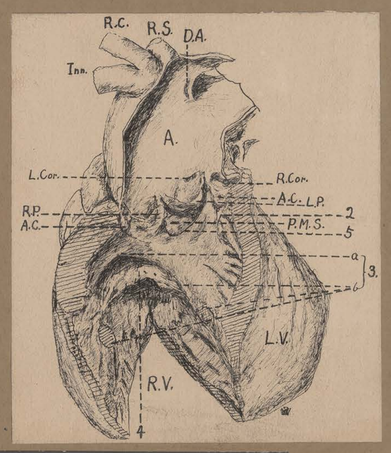
COR BILOCULARE in a case of partial situs inversus. (E. Weiss, 1928)





PERSISTENT OSTIUM ATRIO-VENTRICULARE COMMUNE with complete cleavage of A.V. segments in Mongolian idiocy. Female, aged 4 3/4 years.





PULMONARY ATRESIA WITH LARGE DEFECT OF INTERVENTRICULAR SEPTUM AND AORTA FROM RIGHT VENTRICLE AND PATENT D.A.
From a cyanotic boy aged 11 years.
Death from cerebral [illegible]

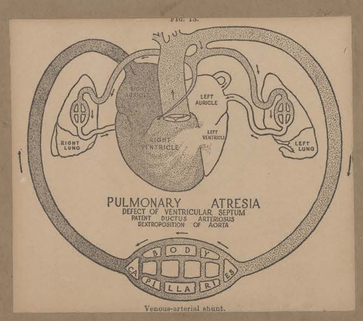
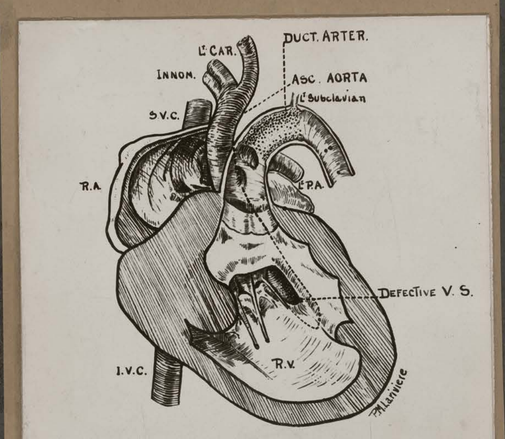
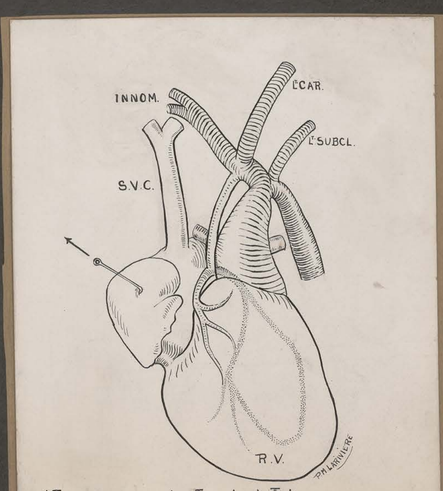


Diagram of circulation in Case to Left

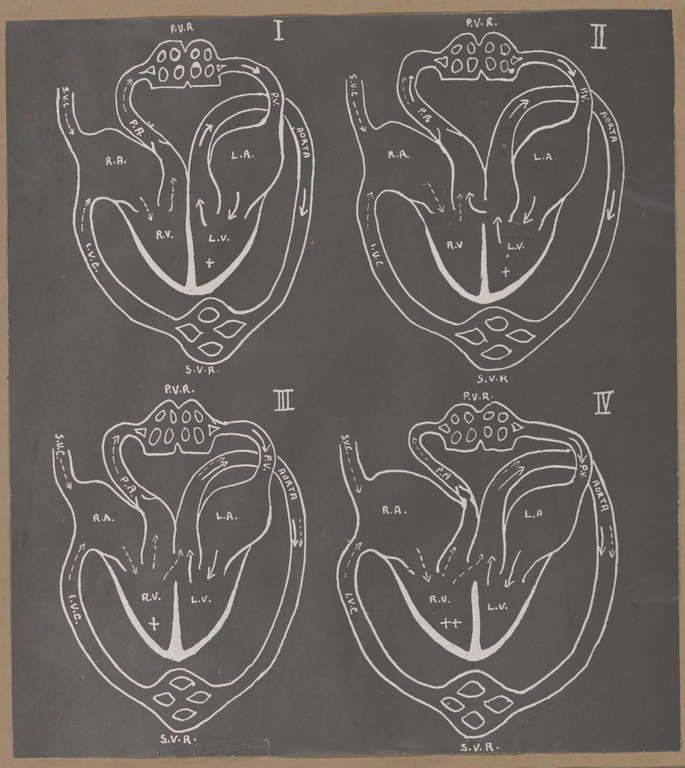


ABSENCE of AORTIC ARCH
P.A. FORMS DESCENDING AORTA THROUGH PATENT D.A.
MITRAL ATRESIA



ATresia of asc. AorTa which TakeS origin FROM CoronarieS. P.A. forms desc. AorTa PaTenT D.A. L. Subcl. [illegible] ductus.

CLINICAL CLASSIFICATION OF CONGENITAL CARDIAC DISEASE



DIAGRAMS SHOWING COURSE OF THE CIRCULATION:

I. Under normal conditions and in cases without abnormal communication between systemic and pulmonary streams.
II. In cases of arterial-venous shunt (compensated septal defects).
III. The same with terminal reversal of flow, producing cyanose tardive (decompensated septal defects).
IV. In Cyanotic group. Permanent venous-arterial shunt.

CLINICAL CLASSIFICATION OF CARDIAC DEFECTS.

I. A-CYANOTIC GROUP

Cases in which no abnormal communication between the two circulations exists but in which the defect may become the seat of strain or infective processes. Such are: pericardial defect; primary congenital hypertrophy, anomalous septa; anomalies of the semi-lunar cusps; coarctation of the aorta; anomalies of the aortic arch; of the coronary arteries; of the great veins or the pulmonary artery, etc.

II. CASES OF ARTERIAL-VENOUS SHUNT WITH POSSIBLE TERMINAL OR TRANSIENT REVERSAL OF FLOW (CYANOSE TARDIVE).

(a) Localized defects of interauricular septum; persistent ostium primum; persistent ostium secondum; patent foramen ovale; multiple defects.

(b) Localized defects of interventricular septum; defect at base (Maladie de Roger); elsewhere than at base; multiple.

(c) Localized defects of aortic septum; communication between A and P.A. just above aortic cusps; congenital aneurysm of right aortic Sinus of Valsalva.

(d) Patent ductus arteriosus.

III. CYANOTIC GROUP.

1. Cases of permanent venous-arterial shunt.

(a) Moderate cyanosis: Dextroposition of aorta with defect at base of ventricular septum; complete absence of ventricular septum (cor biatriatum triloculare); pulmonary stenosis with closed ventricular septum and patent foramen ovale; tricuspid atresia with interauricular septal defect and transposition of the great trunks.

(b) Marked cyanosis: Pulmonary stenosis or atresia with dextroposition of aorta and interventricular septal defect (tetralogy of Fallot); transposition of arterial trunks with ventricular septal defect.

(c) Extreme cyanosis: Complete absence of cardiac septa (cor biloculare); complete defect of aortic septum (persistent truncus); transposition of arterial trunks with closed interventricular septum; pulmonary atresia with closed ventricular septum; aortic and mitral atresia.

2. Cases of raised peripheral pressure. Right-sided valvular lesions with closed septa (pulmonary and tricuspid stenosis).