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University of Minnesota Hospitals and Minnesota Medical Foundation



Bronchopulmonary Segments

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INDEX

	<u>PAGE</u>
I. MINNESOTA STUDIES ON THE ANATOMY OF THE BRONCHOPULMONARY SEGMENTS	543 - 550
EDWARD A. BOYDEN, Ph.D., Professor and Head, Department of Anatomy, University of Minnesota Medical School	
II. MEDICAL SCHOOL NEWS	551 - 554
III. CALENDAR OF EVENTS	555 - 560

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acknowledge.

It is fitting that we have asked Dr. E. A. Boyden to present today's hospital staff meeting report for, as we all know, his retirement will become effective at the end of this month. It is not our purpose here to recount the details of his distinguished career, for this has been eloquently and completely done in a recent issue of the Anatomical Record and again at a recent dinner at which more than 150 of Dr. Boyden's friends honored him. Speaking for all members of the Medical School Faculty, however, we wish to tell Dr. Boyden once again that we shall miss him greatly during the coming years. His inspired teaching, his outstanding research work, and his erudition have set an example to which all of us may aspire but which few will equal.

It is fitting, too, that Dr. Boyden has chosen as today's topic the studies on the broncho-pulmonary segments, for his contributions in this field have received wide acclaim. His studies of the gall-bladder and biliary tract have, of course, received similar acclaim.

We are happy to know that Dr. Boyden will join the faculty of the University of Washington Medical School later this year where he will be able to continue his teaching and research activities. Naturally our best wishes go with him along with the hope that he will have many happy and rewarding years in the Pacific Northwest.

R.P.H.

I. MINNESOTA STUDIES ON THE ANATOMY
OF THE BRONCHOPULMONARY SEGMENTS

1. Development of bronchial tree

Primary lung sacs (27-29 days ovulation age); Five lobar bronchi (30-33 days); Rapid and variable budding of segmental and subsegmental bronchi (34-40 days)²⁰. Variations arise at this time. "Normal" adult lung often has 20-25 variations³.

2. Congenital anomalies

Agenesis of lungs¹⁷

Agenesis, aplasia, and hypoplasia (Schneider, 1912).

Condition inherited or due to faulty chemical metabolism.

(Vitamin A deficiency studies of Wilson and Warkany, 1949)

Unilateral agenesis characterized by symmetrical thorax and marked displacement of heart and mediastinum to affected side.

Left eparterial bronchus (5 cases seen at Minnesota)^{11,14,17}

Consists of B¹⁺³ and often a part of B²

Lobe of the azygos vein⁷

Segregated portion of apical or of apical and posterior segments.

Usually occurs in right lung but has been recorded in left apex.

Cysts⁴

Embryologic evidence does not support theory of Pryce that "sequestration" is caused by accessory pulmonary artery.

3. Prevailing pattern of tree in adult lungs (Fig. 1)²

Right lobe: 10 segmental bronchi (B¹ - B¹⁰)

Left lobe: 9 segmental bronchi (B¹⁺³ - B¹⁰)

(Subsegmental rami indicated by letters a and b: viz. B¹a, B¹b)

4. Method of designating arteries and veins of segments^{1,4}

Arteries: same enumeration as corresponding bronchi; viz., A¹a, A¹b, etc.

Fig. 1

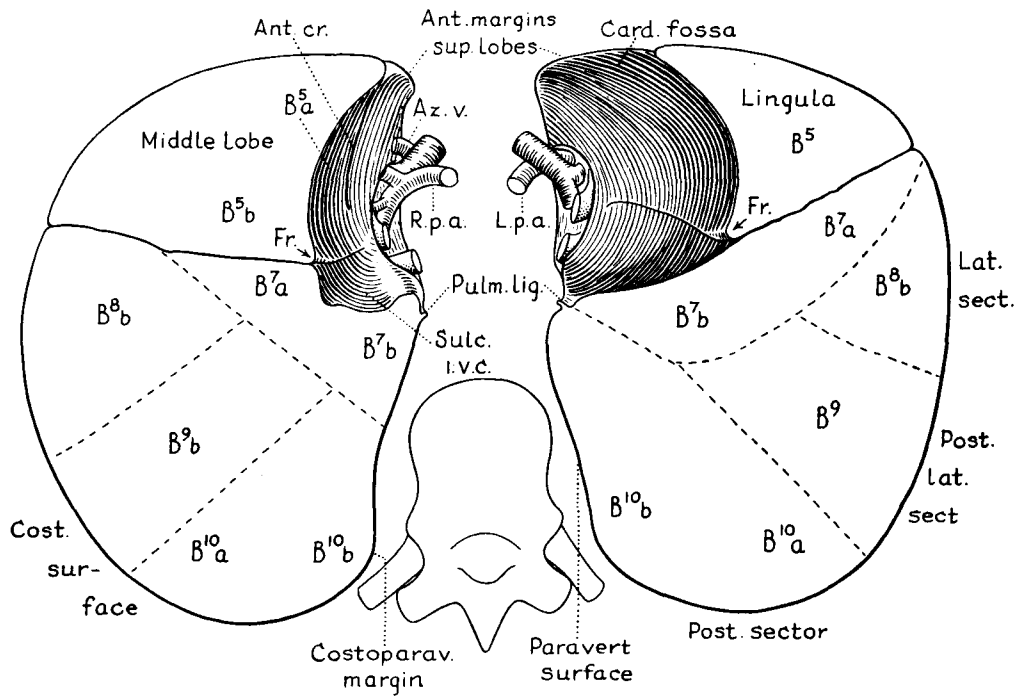
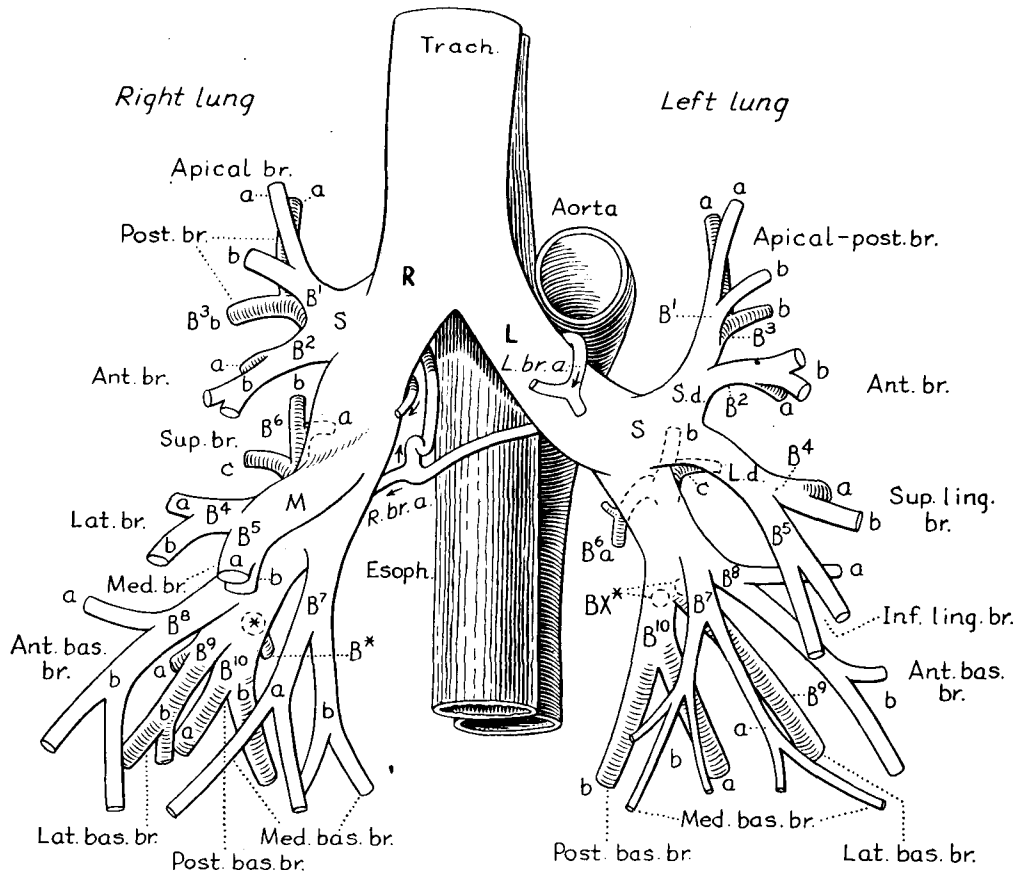


Fig. 2

Veins: same enumeration as corresponding bronchi: viz., \underline{V}^1_a , \underline{V}^1_b ;

lie on counter-clockwise side (right lung) or clockwise side (left lung) of \underline{B}^1_a and \underline{B}^1_b , as seen from mediastinal (or anterior) surface. (In anterior and posterior segments, venous rami are arbitrarily designated $\underline{V}^2_{a,b,c}$; $\underline{V}^3_{a,b,c,d}$.) A given vein usually has both intersegmental and segmental (i.e., intersubsegmental) rami.

5. Segments of right upper lobe (\underline{B}^1 , \underline{B}^2 , \underline{B}^3).

\underline{B}^3_a , usual site of Assmann's focus

\underline{B}^2_a , \underline{B}^3_a , \underline{B}^3_b , sites of lung abscess

Prevailing pattern is trifurcate (\underline{B}^1 , \underline{B}^2 , \underline{B}^3)--in 46% of the lobes⁵

Bifurcate pattern (4 types, about equally divided among remaining 54%)⁵

\underline{B}^1 and \underline{B}^2 arise together

\underline{B}^1 and \underline{B}^3 arise together

\underline{B}^2 and \underline{B}^3 arise together

Quadrivial pattern (virtually four segments)

\underline{B}^3 splits to give formula \underline{B}^{1+3}_a plus \underline{B}^{2+3}_b

The displaced anterior ramus of apical segment, \underline{BX}^1_b (28%).⁵

\underline{B}^1_b arises from \underline{B}^2 or one of its branches; thus an apical lesion may drain into an anterior segmental bronchus.

Pre-eparterial bronchus⁷

A displaced \underline{B}^1 or \underline{B}^1_a which arises from trachea or stem of upper lobe bronchus.

Post-eparterial bronchus⁸

A displaced \underline{B}^2 which arises from the middle lobe bronchus.

Arterial pattern (prevailing type)⁵

Truncus anterior supplies \underline{B}^1 and \underline{B}^2 , and a "recurrent" ramus to \underline{B}^3_a .

Pars interlobaris (of R. pulm. art.) supplies an "ascending" ramus to \underline{B}^3_b .

Venous patterns⁵

Posterior vein (\underline{V}^3), has central and interlobar divisions (prevailing pattern in half of the lobes)

Post. vein has central div. only ("arterial type")--1/4 of lobes.

Post. vein has interlobar div. only ("venous type")--1/5 of lobes.

Vein from superior segment of right lower lobe (VX⁶) drains into posterior vein in 54% of lobes.

6. Segments of middle lobe (B⁴, B⁵)⁸

Middle lobe bronchus. 12-26 mm. long, therefore subject to compression by infected nodes. (Middle lobe "syndrome".)

Prevailing lateral-medial pattern, B⁴ and B⁵ (62%)

Anomalies

Modified lateral-medial pattern (usually B⁴a and the rest--18%)

Superior-inferior patterns (18%)

Trifurcations (B⁴, B⁵a, B⁵b; or B⁴a, B⁴b, B⁵--2%)

Upward Displacement of middle lobe bronchus onto B² or onto upper lobe bronchus.

Arteries: half the lobes have two separate arteries; arteries cross inter-segmental planes in 45% of lobes.

Veins: half the lobes are drained by two to three separate veins.

7. Segments of right lower lobe^{9,10}

Superior segment (B⁶)--usually caps rest of lobe horizontally.⁹

Prevailing pattern, B⁶a+b and B⁶c (79%); trifurcation (5%).

B⁶ arises as two separate stems (6%): one orifice above, one orifice below middle lobe bronchus. A⁶ arises as two (or three) separate vessels in 20% of lobes.¹⁰

Subsuperior zone (interpolated posteriorly between superior and posterior basal segments)

Subsuperior bronchus (B*), present in 61% of 100 lobes.¹⁰

Its keel lies from 9 to 35 mm. below keel of B⁶ (collapsed lung)

Accessory subsuperior bronchus (BX*). It is a high branch of B¹⁰ in 84% of 100 lobes.¹⁰

Medial basal segment (B⁷)¹⁰

Type I (34%)--Bronchus distributes to both anterior and paravertebral surfaces. (Fig. 2)

Type II (22%)--distributes only to anterior surface of lobe.

Type III (24%)--a short B⁷ bifurcates around common basal vein (B^{7a} superficial, B^{7b} deep to vein; arteries correspond)

Type IV (20%)--B⁷ absent as such. BX^{7a} arises from B⁸; BX^{7b} from B^{*} or B¹⁰.

Arteries correspond.

Anterior basal segment (B⁸)--Frequently invades territory of B⁷ (20%) or territory of B⁹ (6%). Two arteries in 24%.

Lateral basal segment (B⁹)--Segmental bronchus absent as such in 8% of 100 lobes. Mode of branching of basal artery to basal segments is variable.

It terminates by bifurcating into A⁹ and A¹⁰ in only 44% of specimens.

Posterior basal segment (B¹⁰)--bronchial distribution constant.

Veins of right lower lobe¹⁰

Lobe drained by inferior pulmonary vein which is formed by confluence of superior vein (V⁶) and common basal vein. The latter has two tributaries, the superior basal and inferior basal veins. In the two commonest patterns, the superior basal is formed by V⁸ and V⁹.

8. Segments of left upper lobe^{11,14}

Prevailing bifurcate pattern (3/4 of lobes)

Superior division divides into B¹⁺³ and B²

Inferior (lingular) division divides into B⁴ and B⁵

Trifurcate pattern, B¹⁺³+BX², B², B⁴⁺⁵ (1/4 of lobes)

The displaced anterior ramus of apical segments, BX^{1b} (2/5 of lobes).¹⁴

B^{1b} arises from B² or BX². (In half of these an apical lesion may drain into an anterior segmental bronchus.)

The split anterior segmental bronchus (1/3 of lobes).¹⁴

Anterior segment supplied by two separate bronchi (BX^2 and B^2)

BX^2 always arises on superior division

B^2 may arise from superior division, may form central stem of trifurcate pattern, or may arise from proximal end of lingular division.

Variations of posterior ramus of anterior segment^{11,14}

B^2a absent as such (1/3 of lobes)

B^2a displaced to lingular division, as BX^2a (1/8 of lobes). This represents one of the hazards of lingulectomy.¹²

The lateral-medial pattern (1/7 of lobes)¹⁴

Due to upward displacement of B^4a (posterior ramus of superior lingular bronchus) onto main lingular stem, so that lingular stem divides into a lateral bronchus (BX^4a) and a medial bronchus (B^4b+B^5). The former may include a BX^2a .

The cleft left upper lobe (8% of lobes)¹⁴

Type 1 The true left middle lobe; A horizontal fissure separates upper and lower divisions of lobe.

Type 2 The compressed middle lobe: Lingular segments compressed or rudimentary, and are separated from upper division by descending fissure.

Type 3 The enlarged middle lobe: Lingular segments encroach on upper division of lobe and are separated from upper division by an ascending fissure.

Type 4 The ectopic arterial type: A left eparterial bronchus is separated from rest of lobe by a fissure extending to the displaced left pulmonary artery.

Arteries of left upper lobe¹¹

4 to 8, scattered along left pulmonary artery. A^6 usually arises above level of lingular arteries.

Veins of left upper lobe--all converge on mediastinal aspect of left superior pulmonary vein.¹¹

9. Segments of left lower lobe^{15,16}

Superior segment (B⁶) usually caps lobe obliquely (89%).

Prevailing pattern, B⁶a and B⁶b+c (43%). Segment supplied by two separate arteries in 34%.

Subsuperior zone (interpolated posteriorly and posterolaterally between superior and two basal segments (posterior basal and lateral basal).

Subsuperior bronchus (B*) distributes to posterolateral sector and present in only 27% of 110 lobes. Its keel lies from 11 to 36 mm. below keel of B⁶ (in collapsed lung)

Accessory subsuperior bronchi (high dorsal branches of B⁹ or B¹⁰.

BX*(9) present in 73% of 110 lobes

BX*(10) present in 85% of 110 lobes

Mode of division of basal trunk

Basal trunk bifurcates into B⁷⁺⁸ and B⁹⁺¹⁰ in 3/5 of lobes.

It trifurcates into B⁷⁺⁸, B⁹, and B¹⁰ in 1/5 of lobes. Other patterns bizarre.

Medial basal segment (B⁷) (Fig. 2)

Bronchus arises separately from basal trunk in 7%. Absent as such, 2%.

Anterior basal segment (B⁸)--variable and defective.

Bronchus arises separately from basal trunk in 9%.

Its two rami have typical arrangement in only 3/5 of lobes.

Lateral basal segment (B⁹)

Bronchus absent as such in 11%.

Posterior basal segment (B¹⁰)

Bronchus and subdivisions relatively constant.

Arteries to basal segments¹⁶

Basal artery divides into A¹⁰ and A⁷⁻⁹ in 46%.

A⁹ arises as deep branch of A⁷, A⁸a or A⁸b in 22%; in such lobes, resection of B⁷⁺⁸ can result in loss of blood supply to lateral basal segment.

Veins of left lower lobe¹⁶

Inferior pulmonary vein formed by union of superior (v⁶) and common basal veins.

In half of lobes, superior basal vein formed by v⁸; inferior basal vein by v⁹ and v¹⁰.

- - -

Minnesota studies on the anatomy and variations
of the bronchopulmonary segments

The whole lung

- 1) Boyden, E. A., 1945. Surgery, 18: 706-731
- 2) Boyden, E. A., 1949. Dis. Chest, 15: 657-668
- 3) Boyden, E. A., 1953. Radiology, 61: 183-188
- 4) Boyden, E. A., 1954. Blakiston Co. (in press)

Right upper lobe

- 5) Boyden and Scannell, 1948. Am. J. Anat., 82: 27-74
- 6) Scannell and Boyden, 1948. Jour. Thor. Surg., 17: 232-237
- 7) Boyden, 1952. (Azygos lobe and pre-eparterial bronchi). Radiology, 58:
797-807

Middle lobe

- 8) Boyden and Hamre, 1951. Jour. Thor. Surg., 21: 172-188

Right lower lobe

- 9) Smith and Boyden, 1949. Jour. Thor. Surg., 18: 195-215
- 10) Ferry and Boyden, 1951. Jour. Thor. Surg., 22: 188-201

Left upper lobe

- 11) Boyden and Hartmann, 1946. Am. J. Anat., 79: 321-360
- 12) Boyden, 1946. Surg., 20: 828-829
- 13) Scannell, 1947. Jour. Thor. Surg., 16: 530-537
- 14) Boyden, 1949. Surg., 26: 167-180

Left lower lobe

- 15) Berg, Boyden and Smith, 1949. Jour. Thor. Surg., 18: 216-236
- 16) Pitel and Boyden, 1953. Jour. Thor. Surg., 26: 633-653

Agenesis of right lung

- 17) Thomas and Boyden, 1952. Surg., 31: 429-435

Terminology

- 18) Boyden, 1953. Dis. Chest, 23: 266-269

Embryol. & fetal preparation of lung for respiration

- 19) Boyden, 1953. Journal-Lancet, Vol. 73: 509-512
- 20) Wells and Boyden, 1954. Anatom. Record, 118: 367 (abstract); Am. Jour. Anat. (in press).

II. MEDICAL SCHOOL NEWS

Dr. Larsell to Retire

At the end of the current school year, the Department of Anatomy is losing by retirement one of its most honored members. Although Professor Olof Larsell has been with us for only two years, we have come to value highly his good fellowship, integrity, judgment, and professional ability.

Soon after securing his Ph.D. in neuroanatomy at Northwestern University in 1918, Dr. Larsell became Professor and Head of the Department of Anatomy at the University of Oregon, holding this position from 1921 to 1952. For eight of these years he served as Dean of the Graduate Division of the Oregon State System of Higher Education. To anatomists he is known as a world authority on the structure of the cerebellum. The importance of this work has been aptly appraised by one of his students, Dr. Joseph C. Hinsey, himself a neuroanatomist and Director of the New York Hospital-Cornell Medical Center. Referring to Dr. Larsell as the "father of the riddles of the cerebellum," he writes, "The thoroughness, the brilliance of his attack, and the lucid presentation of his findings, make his investigative work in the field of the nervous system one of the milestones of our present time." The University and Medical School will miss this able teacher and investigator.

* * *

Dr. Downey Honored

On May 27 to 29 a three-day "Conference on Leukocytic Functions" was held in New York and dedicated to Doctor Hal Downey, Professor Emeritus of Anatomy. Dr. Downey, often referred to as the "Father of Hematology in this country" retired in 1946, but has continued active in research. Five of his Minnesota students were on the same program--Dr. R. Dorothy Sundberg, Dr. F. J. Heck of the Mayo Clinic, Dr. John W. Rebeck of the Henry Ford Hospital, Dr. Oliver P. Jones of the University of Buffalo, and Dr. Thomas F. Dougherty of the University of Utah.

* * *

Faculty News

Dr. Harold N. Wright, Professor, Department of Pharmacology, addressed the Lake Superior Section of the American Chemical Society at the Duluth Branch of the University of Minnesota May 20 on the topic "Tobacco and Lung Cancer."

Dr. Donn G. Mosser, Instructor, Department of Radiology, attended the annual meeting of the Radiation Research Society on May 19 and the Conference on the Irradiation of Primates under the auspices of the Committee on Radiation Studies of the Division of Research Grants, National Institutes of Health, on May 20. Both meetings were held in Cleveland, Ohio.

The following members of the Department of Bacteriology and Immunology attended the Society of American Bacteriologists Meeting in Pittsburgh from May 1 to 7: Jerome T. Syverton, Dennis W. Watson, E. L. Schmidt, K. R. Johansson, Frank J. Roth, Richard Berk, Elliot Dick, Ollie Eylar, George Gifford, Jurij Melnykowycz, and Josephine Smith. Dr. Syverton and Dr. W. F. Scherer also attended the meetings of the American Society for Clinical Investigation on May 3.

* * *

Publications of the Medical School Faculty

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- Gifford, G. E., Robertson, H. E., and Syverton, J. T.: A Manometric Procedure for the Study of Inhibition of Viral Replication in Strain HeLa Tissue Culture. *Bact. Proc.*, p. 91, May 2-7, 1954.
- Irvine, H. G.: The Changing Problem of Syphilis. Fifth Cook Memorial Lecture, 35th International Convention of Alpha Kappa Kappa, San Francisco, Aug. 19, 1953.
- Knapp, M. E.: Rehabilitation in Severe Poliomyelitis. *Iowa State Medical Soc. J.*, 43: 361, 1953.
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- Kremen, A. J.: Cancer of Tongue. *Minn. Med.*, 36: 828, 1953.
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III.

UNIVERSITY OF MINNESOTA MEDICAL SCHOOL

WEEKLY CALENDAR OF EVENTS

Physicians Welcome

June 7 - 12, 1954

Monday, June 7

Medical School and University Hospitals

- 9:00 - 9:50 Roentgenology-Medicine Conference, L. G. Rigler, C. J. Watson and Staff; Todd Amphitheater, U. H.
- 9:00 - 10:50 Obstetrics and Gynecology Conference; J. L. McKelvey and Staff; W-612, U. H.
- 10:00 - 12:00 Neurology Rounds; A. B. Baker and Staff; Station 50, U. H.
- 11:30 - Tumor Conference; Doctors Hitchcock, Zimmermann, and Stenstrom; Todd Amphitheater, U. H.
- 12:15 - Obstetrics and Gynecology Journal Club; Staff Dining Room, U. H.
- 1:30 - 2:30 Pediatric-Neurological Rounds; R. Jensen, A. B. Baker and Staff; U. H.
- 1:30 - 3:30 Dermatology Hospital Rounds; H. E. Michelson and Staff; Dermatology-Histopathology Room, M-434, U. H.
- 4:30 - Infectious Disease Rounds; Station 43, U. H.
- 5:00 - 6:00 Physiology-Surgery Conference; Todd Amphitheater, U. H.
- 5:00 - 6:00 Urology-Roentgenology Conference; C. D. Creevy, O. J. Baggenstoss, and Staff; Eustis Amphitheater.

Ancker Hospital

- 8:30 - 10:00 Tuberculosis and Chest Conference; Auditorium.
- 2:00 - 3:00 Surgery Journal Club; Classroom.

Minneapolis General Hospital

- 9:30 - Pediatric Rounds; Richard Raile; Station K.
- 10:30 - 12:00 Medicine Rounds; Thomas Lowry; Station F.
- 11:00 - Orthopedic and Fracture Rounds; Drs. John Moe and Arthur Zierold; Station B.
- 11:00 - Pediatric Seminar; Erling Platou; Classroom, Station M.
- 12:30 - Surgery Grand Rounds; Dr. Zierold; Station E.

Monday, June 7 (Cont.)

Minneapolis General Hospital (Cont.)

- 1:30 - 2:30 Tuberculosis Conference; J. A. Myers; Station M.
2:00 - Pediatric Rounds; Stations I and J.

Veterans Administration Hospital

- 9:30 - Infectious Disease Rounds; Drs. Hall, Zinneman, Lubin and Sherman.
1:30 - Cardiac Conference; Drs. Berman, Smith, Hoseth, Simonson, and Wexler; Conference Room, Bldg. I; Rounds immediately following conference.

Tuesday, June 8

Medical School and University Hospitals

- 9:00 - 9:50 Roentgenology-Pediatric Conference; L. G. Rigler, Irvine McQuarrie and Staffs; Eustis Amphitheater, U. H.
12:30 - 1:20 Pathology Conference; Autopsies; J. R. Dawson and Staff; 102 Institute of Anatomy.
3:30 - Biophysics-General Physiology Seminar; 323 Zoology Building.
4:00 - 5:00 Pediatric Rounds on Wards; Irvine McQuarrie and Staff; U. H.
4:30 - 5:30 Clinical-Medical Pathological Conference; Todd Amphitheater, U. H.
5:00 - 6:00 X-ray Conference; Presentation of Cases by University Hospitals Staff; Eustis Amphitheater, U. H.

Ancker Hospital

- 8:00 - 9:00 Fracture Conference; Auditorium.
9:00 - 10:00 Medical X-ray Conference; Auditorium.

Minneapolis General Hospital

- 9:30 - Pediatric Rounds; Elizabeth Lowry; Station J.
10:00 - Cardiac Rounds; Paul F. Dwan; Classroom, Station I.
10:00 - Psychiatry Grand Rounds; R. W. Anderson; Station H.
11:00 - 12:00 Medicine-Surgery Conference; Classroom, Station M.
12:30 - 2:30 Dermatology Rounds on Clinic; Carl W. Laymon and Staff.
12:30 - ECG Conference; Royd Thomes and Staff; 302 Harrington Hall.
1:00 - Tumor Clinic; Drs. Eder, Coe, and Lipschultz; Classroom.
3:30 - Pediatric-Psychiatry Rounds; Jack Wallinga; Station I.

Tuesday, June 8 (Cont.)

Veterans Administration Hospital

- 7:30 - Anesthesiology Conference; Conference Room, Bldg. I.
8:30 - Surgery Staff Seminar; Conference Room, Bldg. I.
9:30 - Surgery-Pathology Conference; Conference Room, Bldg. I.
10:30 - Surgery-Tumor Conference; L. J. Hay, J. Jorgens and Donn Mosser;
Conference Room, Bldg. I.
1:00 - Review of Pathology, Pulmonary Tuberculosis; Conference Room, Bldg. I.
1:30 - Combined Medical-Surgical Chest Conference; Conference Room, Bldg. I.
2:00 - 2:50 Dermatology and Syphilology Conference; H. E. Michelson and Staff;
Bldg. III.
4:00 - Thoracic Surgery Problems; Conference Room, Bldg. I.

Wednesday, June 9

Medical School and University Hospitals

- 8:00 - 9:00 Roentgenology-Surgical-Pathological Conference; Paul Lober and L. G.
Rigler; Todd Amphitheater, U. H.
11:00 - 12:00 Pathology-Medicine-Surgery-Pediatrics Conference; Todd Amphitheater,
U. H.
12:30 - 1:20 Radioisotope Seminar; Underground Cobalt Unit, U. H.
12:30 - 1:30 Physiology 114C--Respiration; E. B. Brown; 214 Millard Hall.
1:00 - 2:00 Dermatology Clinical Seminar; F. W. Lynch; 300 North Clinic.
1:30 - 2:30 Physiology 114B--Transport Seminar; Nathan Lifson and M. B. Visscher;
271 Lyon Laboratories.
1:30 - 3:00 Pediatric Allergy Clinic; Albert V. Stoesser and Lloyd Nelson;
W-211, U. H.
3:30 - 4:30 Dermatology-Pharmacology Seminar; 3rd Floor Conference Room, Heart
Hospital.
4:30 - 5:50 Dermatology-Infectious Disease Seminar; J. D. Krafchuk; 3rd Floor,
Conference Room, Heart Hospital.
5:00 - 5:50 Urology-Pathological Conference; C. D. Creevy and Staff; Eustis
Amphitheater, U. H.
5:30 - 7:30 Dermatology Journal Club and Discussion Group; Hospital Dining Room.
7:30 - 9:30 Dermatology Seminar; Review of Interesting Slides of the Week; Robert
W. Goltz; Todd Amphitheater, U. H.

Ancker Hospital

- 8:30 - 9:30 Clinico-Pathological Conference; Auditorium.
12:30 - 1:30 Medical Journal Club; Library.

Minneapolis General Hospital

- 8:30 - 9:30 Obstetrical and Gynecological Grand Rounds; William P. Sadler and
Staff; Station C.

Wednesday, June 9 (Cont.)

Minneapolis General Hospital (Cont.)

- 9:30 - Pediatric Rounds; Henry Staub; Station I.
- 10:30 - 12:00 Medicine Rounds; Thomas Lowry and Staff; Station D.
- 12:30 - Pediatric Staff Meeting; Classroom; Station I.
- 1:30 - Pediatric House Staff Seminar; Erling Platou; Station I.
- 1:30 - Pediatric Rounds; Erling Platou; Classroom, Station I.

Veterans Administration Hospital

- 8:30 - 10:00 Orthopedic X-ray Conference; E. T. Evans and Staff; Surgical Conference Room, Bldg. 43.
- 8:30 - 12:00 Neurology Rehabilitation and Case Conference; A. B. Baker.
- 9:00 - Gastro-Intestinal Rounds; Drs. Wilson, Zieve, Hay, Brakel, Nesbitt and O'Leary.
- 11:00 - Gastroenterology Conference; Conference Room, Bldg. I.
- 12:30 - Medical Journal Club; Doctors' Dining Room.
- 12:30 - X-ray Conference; J. Jorgens; Conference Room, Bldg. I.
- 1:30 - 3:00 Metabolic Disease Conference; Drs. Flink, Schultz and Brown.
- 3:30 - Urology Pathology Slide Conference; Dr. Gleason; Conference Room, Bldg. I.
- 7:00 - Lectures in Basic Science of Orthopedics; Conference Room, Bldg. I.

Thursday, June 10

Medical School and University Hospitals

- 9:00 - 11:50 Medicine Ward Rounds; C. J. Watson and Staff; E-221, U. H.
- 11:00 - 12:00 Cancer Clinic; K. Stenstrom, A. Kremen and B. Zimmermann; Todd Amphitheater, U. H.
- 12:30 - 1:30 Electrocardiography Conference; Ernst Simonson; Staff Room, Cardiac Clinic, Heart Hospital.
- 1:30 - 4:00 Cardiology X-ray Conference; Heart Hospital Theatre.
- 5:00 - 6:00 Radiology Seminar; Presentation of Cases from the Heart Hospital; Joseph Asta; Eustis Amphitheater, U. H.

Ancker Hospital

- 8:00 - 10:00 Medical Grand Rounds; Auditorium.

Minneapolis General Hospital

- 9:30 - Neurology Rounds; Heinz Bruhl; Station I.
- 9:30 - Pediatric Contagion Rounds; R. B. Raile; Station K.
- 10:00 - Psychiatry Grand Rounds; R. W. Anderson and Staff; Station H.
- 11:30 - 12:30 Clinical Pathological Conference; John I. Coe; Classroom.
- 12:30 - 2:30 Dermatology Rounds and Clinic; Carl W. Laymon and Staff.
- 1:00 - Fracture - X-ray Conference; Drs. Zierold and Moe; Classroom.
- 1:00 - House Staff Conference; Station I.

Thursday, June 10 (Cont.)

Veterans Administration Hospital

- 8:00 - Surgery Grand Rounds; Conference Room, Bldg. I.
- 8:00 - Surgery Ward Rounds; Lyle Hay and Staff; Ward 11.
- 8:30 - Hematology Rounds; Drs. Hagen and Fifer.
- 11:00 - Surgery-Roentgen Conference; J. Jorgens; Conference Room, Bldg. I.
- 1:00 - 3:00 Bacteriology Conference; Fungi; Wendell Hall; Conference Room, Bldg. I.
- 4:00 - Medical-Surgical Conference; Conference Room, Bldg. I.

Friday, June 11

Medical School and University Hospitals

- 8:00 - 10:00 Neurology Grand Rounds; A. B. Baker and Staff; Station 50, U. H.
- 9:00 - 9:50 Medicine Grand Rounds; C. J. Watson and Staff; Todd Amphitheater, U.H.
- 10:30 - 11:50 Medicine Rounds; C. J. Watson and Staff; Todd Amphitheater, U. H.
- 10:30 - 1:50 Otolaryngology Case Studies; L. R. Boies and Staff; Out-Patient Department, U. H.
- 11:00 - 12:00 Vascular Rounds; Davitt Felder and Staff Members from the Departments of Medicine, Surgery, Physical Medicine, and Dermatology; Eustis Amphitheater, U. H.
- 11:45 - 12:50 University of Minnesota Hospitals Staff Meeting; Peritoneoscopy; James B. Carey, Jr.; Powell Hall Amphitheater.
- 1:00 - 2:50 Neurosurgery-Roentgenology Conference; W. T. Peyton, Harold O. Peterson and Staff; Todd Amphitheater, U. H.
- 1:30 - 2:30 Dermatology Grand Rounds; Presentation of Cases from Grouped Hospitals (University, Ancker, General and Veterans) and Private Offices; H. E. Michelson and Staff; Eustis Amphitheater, U. H.
- 2:30 - 4:00 Dermatology Hospital Rounds; H. E. Michelson and Staff; Begin at Dermatological Histopathology Room, M-434, U. H.
- 3:00 - 4:00 Neuropathological Conference; F. Tichy; Todd Amphitheater, U. H.
- 3:30 - 4:30 Dermatology-Physiology Seminar; 3rd Floor Conference Room, Heart Hospital.
- 4:00 - 5:00 124 Advanced Neurophysiology Lecture; Werner Koella and Ernst Gellhorn; 111 Owre Hall.
- 4:30 - 5:20 Ophthalmology Ward Rounds; Erling W. Hanson and Staff; E-534, U. H.
- 5:00 - Urology Seminar and X-ray Conference; Eustis Amphitheater, U. H.

Ancker Hospital

- 1:00 - 3:00 Pathology-Surgery Conference; Auditorium.

Minneapolis General Hospital

- 9:30 - Pediatric Rounds; Elizabeth Lowry; Station J.

Friday, June 11 (Cont.)

Minneapolis General Hospital (Cont.)

- 10:30 - Pediatric Surgical Conference; Tague Chisholm and B. Spencer; Classroom, Station I.
- 12:00 - Surgery-Pathology Conference; Dr. Zierold, Dr. Coe; Classroom.
- 1:00 - 3:00 Clinical-Medical Conference; Thomas Lowry; Classroom, Station M.
- 1:30 - Pediatric Contagion Rounds; L. Wannamaker; Station K.

Veterans Administration Hospital

- 10:30 - 11:20 Medicine Grand Rounds; Conference Room, Bldg. I.
- 1:00 - Chest Pathology Follow-up Conference; E. T. Bell; Conference Room, Bldg. I.
- 2:00 - Autopsy Conference; E. T. Bell; Conference Room, Bldg. I.

Saturday, June 12

Medical School and University Hospitals

- 7:45 - 8:50 Orthopedic X-ray Conference; W. H. Cole and Staff; M-109, U. H.
- 9:00 - 10:30 Pediatric Grand Rounds; Eustis Amphitheater, U. H.
- 9:00 - 11:50 Medicine Ward Rounds; C. J. Watson and Staff; Heart Hospital Amphitheater.
- 9:15 - 10:00 Surgery-Roentgenology Conference; L. G. Rigler, J. Friedman, Owen H. Wangenstein and Staff; Todd Amphitheater, U. H.
- 10:00 - 11:30 Surgery Conference; Todd Amphitheater, U. H.
- 10:00 - 12:50 Obstetrics and Gynecology Grand Rounds; J. L. McKelvey and Staff; Station 44, U. H.

Ancker Hospital

- 8:30 - 9:30 Surgery Conference; Auditorium.

Minneapolis General Hospital

- 8:00 - Urology Staff Conference; T. H. Sweetser; Main Classroom.
- 9:00 - Psychiatry Grand Rounds; R. W. Anderson; Station H.
- 9:30 - Pediatric Rounds on all Stations; R. B. Raile.
- 11:00 - 12:00 Medical - X-ray Conference; O. Lipschultz, Thomas Lowry and Staff; Main Classroom.

Veterans Administration Hospital

- 8:00 - Proctology Rounds; W. C. Bernstein and Staff; Bldg. III.
- 8:30 - Medical X-ray Conference; Conference Room, Bldg. I.