19th Century Foundations of Scientific Medicine: Diagnosis of disease

Historical Setting
France and Paris Hospitals
- Xavier Bichat (1771-1802)
- René Laennec (Treatise on the Diseases of the Chest (1821))
- Pierre Louis (1787-1872) “numerical method”

Influence of Paris: Britain
Germany and laboratory medicine
Pharmacology
Physiology: France and Claude Bernard
Later diagnosis and instrumentation
Roentgen and x-rays
19th Century Foundations of Scientific Medicine: Major new historical developments

- French and Industrial Revolutions
- Changes in 19th century
  - wealth
  - nationalism & growth of government
  - new technology
  - continuing scientific revolution
  - education (universities)

London Illustrated News (1897)

19th Century Foundations of Scientific Medicine

- Historical Developments
  - French and Industrial Revolutions
  - Changes in 19th century
    - Increased wealth
    - nationalism & growth of government
    - new technology
    - continuing scientific revolution
    - education (universities)

- Broader changes affecting medicine
  - more demand for care:
  - government regulation services
  - stimulation of demand
  - new discoveries
Paris hospitals in 1820

Bichat on traditional diagnosis

“You may takes notes for twenty years at the bedside of the sick, and all will be to you only a confusion of symptoms…a train of incoherent phenomena.”

--as quoted in Porter, p. 307
Medical Reform in French Revolution

The chemist Antoine Fourcroy announced to France’s new law-making body, the Convention in 1794 how medicine would be taught: “read little, see much and do much.” (“Peu lire, beaucoup faire et beaucoup voir”)

Bichat on studying tissues

“[organs] are themselves composed of several tissues of very different nature, which truly form the elements of these organs. Chemistry possesses its simple bodies, which by various combinations, form compound bodies…likewise anatomy has its simple tissues, which by combining…compose the organs.”

--as quoted in Simmons, Doctors & Discoveries, p. 59
### Application of the discovery

<table>
<thead>
<tr>
<th>New names of sounds</th>
<th>Diseases differentiated</th>
</tr>
</thead>
<tbody>
<tr>
<td>râles</td>
<td>bronchiectasis</td>
</tr>
<tr>
<td>bruits</td>
<td>pneumothorax</td>
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<tr>
<td>fremitus</td>
<td>hemorrhagic pleurisy</td>
</tr>
<tr>
<td>egophony</td>
<td>emphysema</td>
</tr>
<tr>
<td>pectoriloquy</td>
<td>lung abcess</td>
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<tr>
<td>bronchophony</td>
<td>pulmonary infarct</td>
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</table>
Laennec’s new vocabulary for sounds

**Pectoriloquy**: Vibrations produced by the sound of a voice through chest wall with a cavity of the lung.

**Bronchophony**: The sound of a voice heard from the roots of the lung. The sound is best heard between the scapula and the vertebral column (usually heard in cases of dense lobar pneumonia).

**Aegophony**: A sound that is a blend of bronchophony and pectoriloquy (heard in cases of massive pleural effusion).

**Rhonchus**: A sound produced by passage of air through fluids in the bronchus.

**Crepitations**: A sound like salt in a vessel exposed to heat (associated with wet lung).

**Sonorous rhonchus**: A sound like a loud snore of a person or the cooing of a wood pigeon (associated with bronchial fistula or dilated bronchus).

**Amphoric resonance**: A musical metallic tinkling attributed to a fistulous opening into a cavity partly filled with fluid; also known as bourdonnement amphorique.

**Rub**: Laennec called this the sound of the friction of ascent and descent (e.g., pleural rub).


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Pierre Louis, 1787-1872

“Numerical method”

“It is precisely because of the impossibility of judging each individual case with any sort of mathematical accuracy that it is necessary to count”
Louis, “Effect of Bloodletting in pleuropneumonia” (1836) Duration of disease & number of bleedings

<table>
<thead>
<tr>
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<th>3</th>
<th>4</th>
<th>5</th>
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<td>2</td>
<td>23</td>
<td>3</td>
<td>19</td>
<td>2</td>
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</tbody>
</table>

The figures upon the horizontal line above the columns indicate the day when the first bleeding was performed; the figures on the left in each column mark the duration of the disease; those on the right, the number of bleedings; and those on the horizontal line below, show the mean duration of the disease and the average number of bleedings.

**Influence of Paris**

- Systematic, anatamo-pathology
- Stethoscope for diagnosis
- Numerical method (statistics)
- Education in hospitals (same reason IU Med school is in Indianapolis)
19th Century Foundations of Scientific Medicine

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Influence of Paris: Britain

Influence of Paris: Britain
Guy’s Hospital, London
- Stethoscope introduced in 1825 by Thomas Hodgkin (disease 1832), cancer of lymph
- Richard Bright (disease 1827), kidney disorder
- Thomas Addison (disease 1855), pernicious anemia
Robert Graves (Ireland) hyperthyroidism, 1834
19th Century Foundations of Scientific Medicine

Germany and Laboratory Medicine
- Microscopes and laboratory
- Justus Liebig (1803-1873)
- Schleiden, Schwann and the cell
- Rudolf Virchow (1821-1902)
  - Cellular pathology
  - “omnis cellula a cellula”

Later diagnosis and instrumentation
Wilhelm Conrad Roentgen (1845-1923)

19th Century Foundations of Scientific Medicine

Pharmacology
- Impact of chemical and industrial revolution
- Refinement of substances in plants strychnine, quinine, caffeine, nicotine
- commercial sale
- Entry into universities came later (1850)
19th Century Foundations of Scientific Medicine

- Physiology: France and Claude Bernard
  - William Beaumont (1785-1853), U.S.
  - Claude Bernard (1813-78), France
- Later diagnosis and instrumentation
- Wilhelm Conrad Roentgen (1845-1923)

Tables from Beaumont's experiments

<table>
<thead>
<tr>
<th>Articles of Diet</th>
<th>Mean time of digestion (B)</th>
<th>in Stomach</th>
<th>in Trunk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice, -</td>
<td>boiled 1.35 h.</td>
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<tr>
<td>Sago, -</td>
<td>boiled 1.10 h.</td>
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<tr>
<td>Tapioca, -</td>
<td>boiled 1.50 h.</td>
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<tr>
<td>Barley, -</td>
<td>boiled 1.50 h.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milk, -</td>
<td>boiled 2.30 h.</td>
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<tr>
<td>Do, -</td>
<td>boiled 2.30 h.</td>
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<tr>
<td>Galantine, -</td>
<td>boiled 2.30 h.</td>
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<td></td>
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<tr>
<td>Fig's, frozen,</td>
<td>boiled 1.50 h.</td>
<td></td>
<td></td>
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<tr>
<td>Figs,  -</td>
<td>boiled 1.50 h.</td>
<td></td>
<td></td>
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<tr>
<td>Braised, animal,</td>
<td>boiled 1.50 h.</td>
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<tr>
<td>Yeast,  -</td>
<td>boiled 1.50 h.</td>
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<tr>
<td>Sausage,  -</td>
<td>boiled 1.50 h.</td>
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<tr>
<td>Turkey, disintegr.</td>
<td>boiled 1.50 h.</td>
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<tr>
<td>Dried,  -</td>
<td>boiled 1.50 h.</td>
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<tr>
<td>Goose,  -</td>
<td>boiled 1.50 h.</td>
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<tr>
<td>Pig, sucking,  -</td>
<td>boiled 1.50 h.</td>
<td></td>
<td></td>
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<tr>
<td>Liver, beef &amp; fresh,</td>
<td>boiled 2.00 h.</td>
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<tr>
<td>Lamb, fresh,</td>
<td>boiled 2.00 h.</td>
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<tr>
<td>Chicken, full grown,</td>
<td>boiled 2.00 h.</td>
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<tr>
<td>Eggs, fresh,</td>
<td>boiled 2.00 h.</td>
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<tr>
<td>Duck,  -</td>
<td>boiled 2.00 h.</td>
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<tr>
<td>Chicken, fresh,</td>
<td>boiled 2.00 h.</td>
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<tr>
<td>Goose, fresh,</td>
<td>boiled 2.00 h.</td>
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<tr>
<td>Turkey, fresh,</td>
<td>boiled 2.00 h.</td>
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<tr>
<td>Lard, fresh,</td>
<td>boiled 2.00 h.</td>
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<tr>
<td>Custard, -</td>
<td>boiled 2.00 h.</td>
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<tr>
<td>Codfish, cured dry,</td>
<td>boiled 2.00 h.</td>
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</tbody>
</table>
Claude Bernard (1813-78)

- Importance of physiology
- Liver and secretions
- Internal environment
- Experimental Medicine (1865)

19th Century Foundations of Scientific Medicine

- Diagnosis and instrumentation 1800-1900
- Stethoscope (1816)
- Microscope (1600s, 1825)
- Other devices
  - Thermometer (1841 linked to disease)
  - Spirometer (1846 lungs)
  - Sphygmomanometer (1835 blood pressure)
- Chemical tests (1841 urinalysis)
- Wilhelm Conrad Roentgen (1845-1923)
19th Century Foundations of Scientific Medicine

“Clinical laboratories were the vehicles that transformed the new physiology into practical methods for diagnosing and treating illness.” (Porter, p. 347)

Sir William Osler (as quoted in Porter) called laboratories, “as essential to the proper equipment of hospitals as the interns. They are to the physician just as the knife and scalpel are to the surgeon.”

Michel Foucault, Birth of the Clinic (1963)

What is the difference between the following opening questions posed by a doctor to a patient?
- "What is the matter with you?"
- "Where does it hurt?"

What does Foucault say was implied when a patient became "the object of a gaze" by a doctor?

How did the rich and poor, hospitals and clinics, become part of the basis of modern medicine in the nineteenth century? What was the contract between the parties?