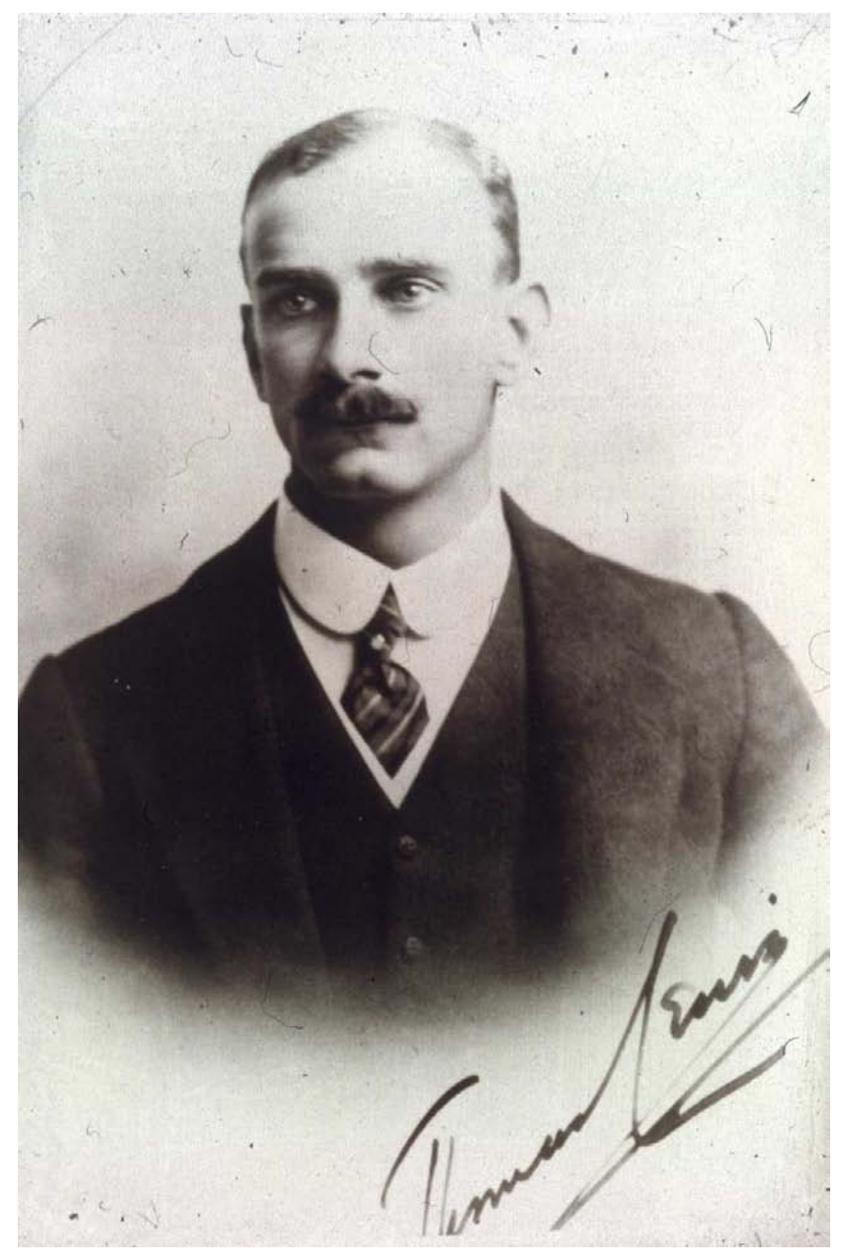
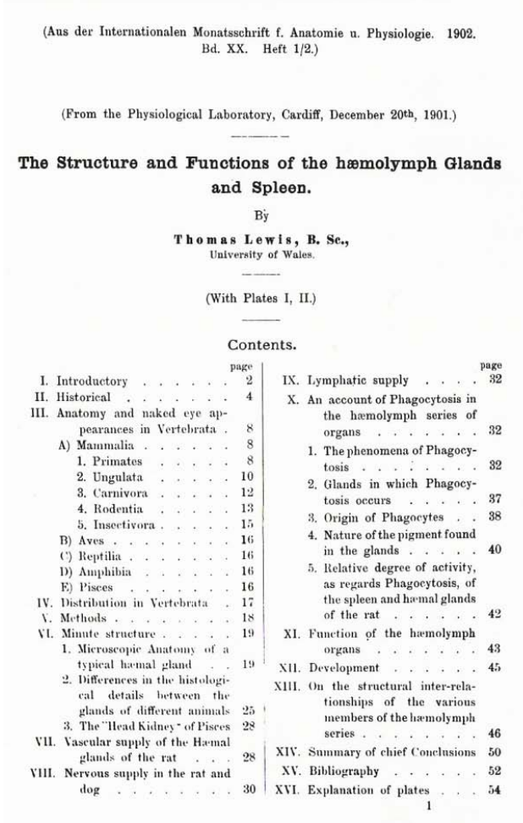
Sir Thomas Lewis, CBE DSc FRS MD FRCP 1881 – 1945

Physiologist, Cardiologist and Clinical Scientist.



- Born in Cardiff 1881 to a long established Welsh family
- Father was a mining engineer
- Educated at University College Cardiff and University College London
- Physician University College Hospital 1910-1945
- Member of the staff of the Medical Research Council
- Lewis's mission in life was to apply scientific methods to clinical medicine. He introduced the term Clinical Science and founded the Medical Research Society to promote the careers of young researcher workers. He was more than a cardiologist! He was a Clinical Scientist.



(Aus der Internationalen Monatsschrift f. Anatomie u. Physiologie. 1902. Bd. XX. Heft 1/2.)

(From the Physiological Laboratory, Cardiff, December 20th, 1901.)

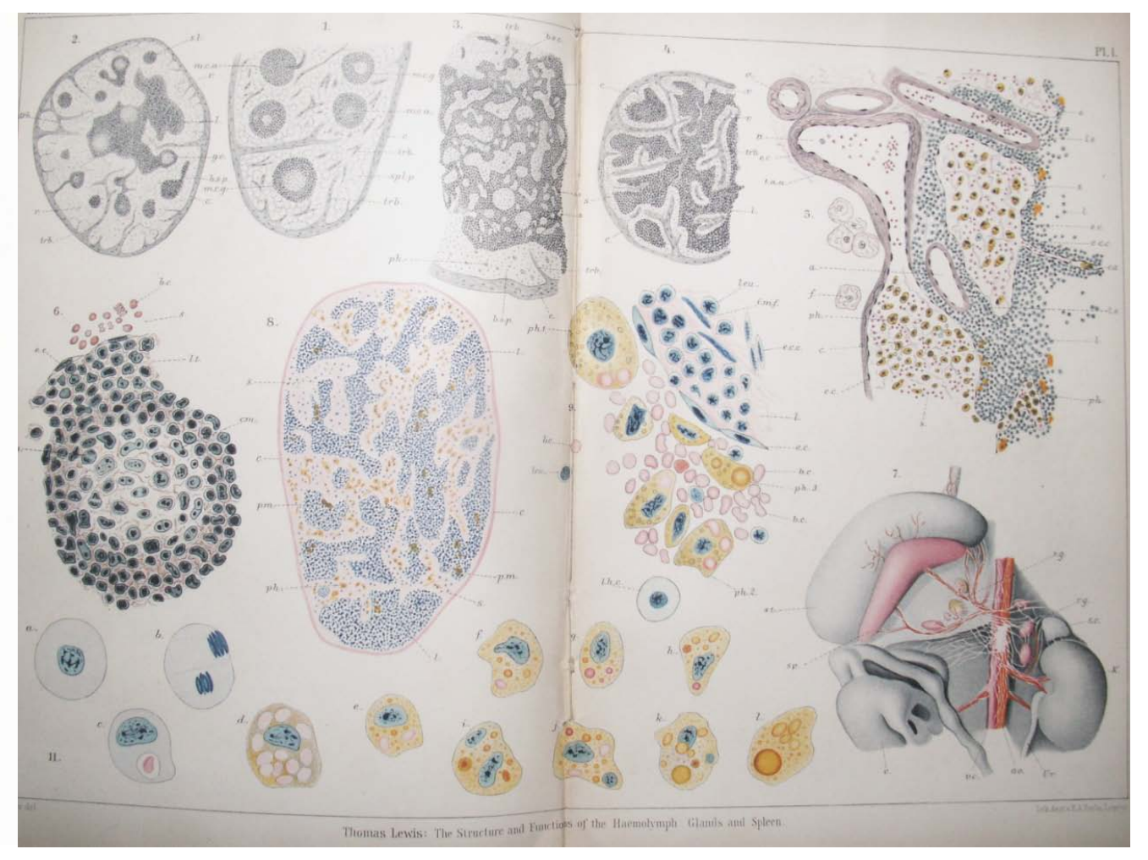
The Structure and Functions of the hæmolymph Glands and Spleen.

By

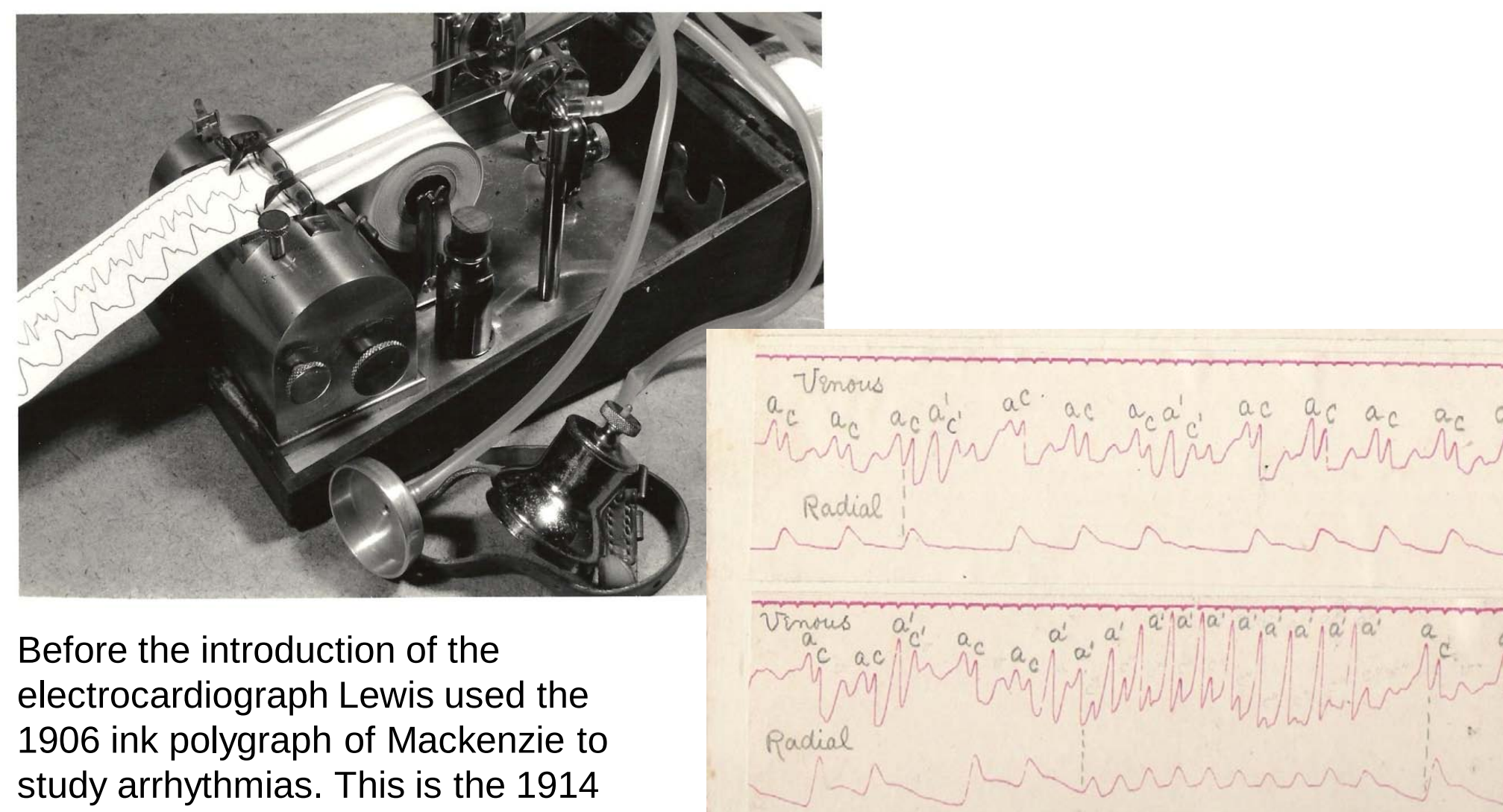
Thomas Lewis, B. Sc.,
University of Wales.

(With Plates I, II.)

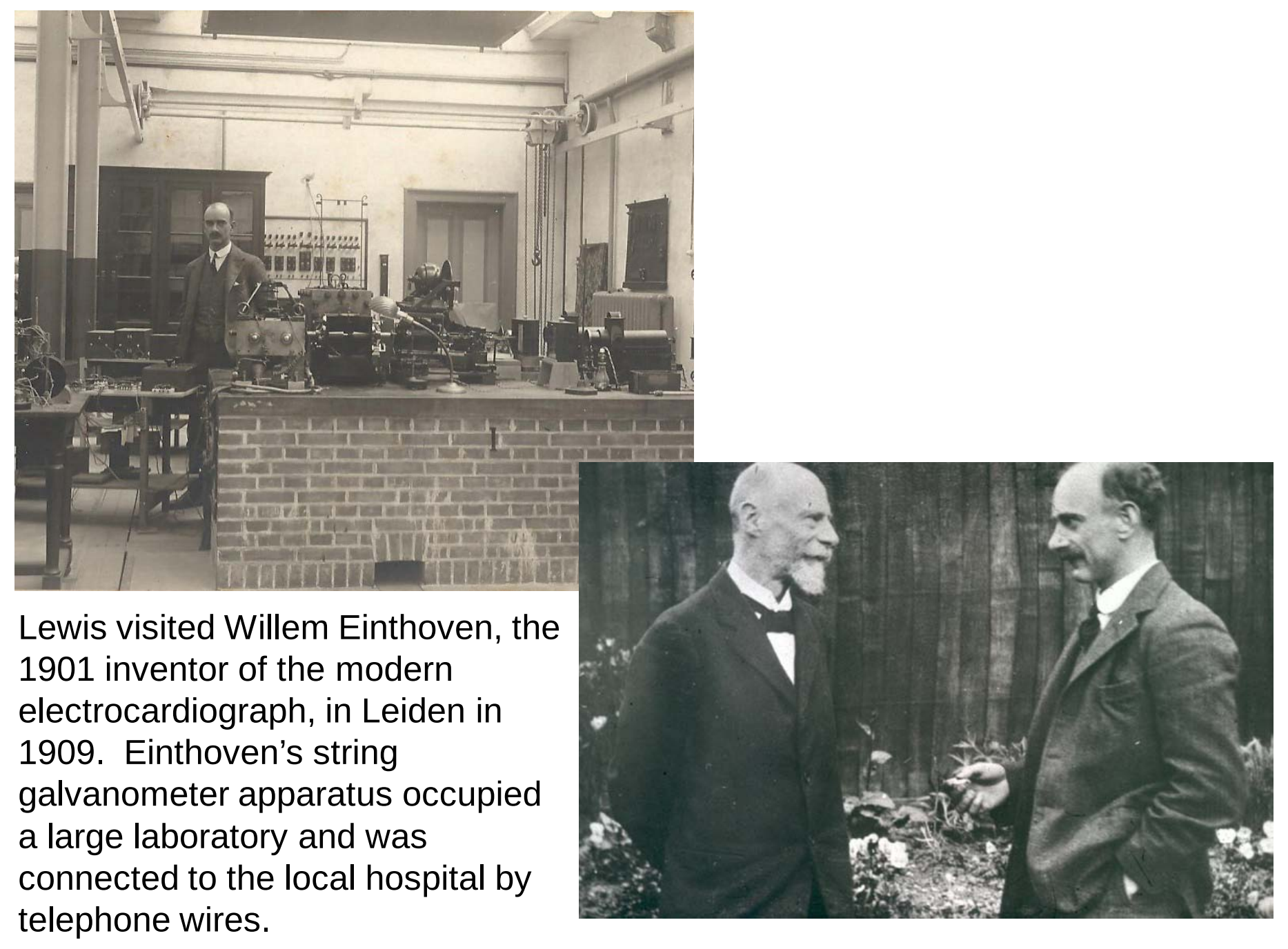
Contents.



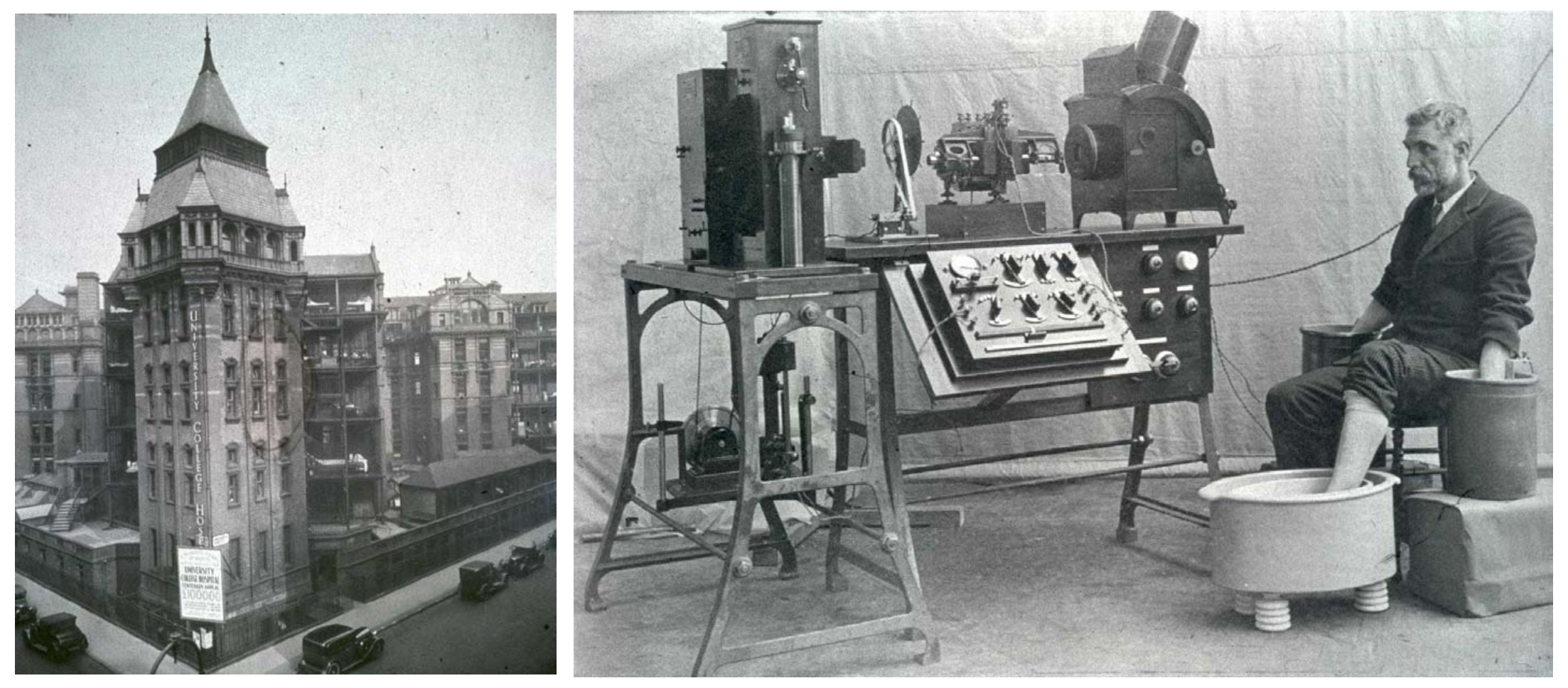
His first scientific paper, 54 pages and illustrated by him in colour, became a standard work on the haemolymph glands. He was aged 19, a student in Cardiff. At UCL he did experimental research on the circulation and became a Fellow of the Physiological Society aged 22, attending its meetings for the rest of his life.



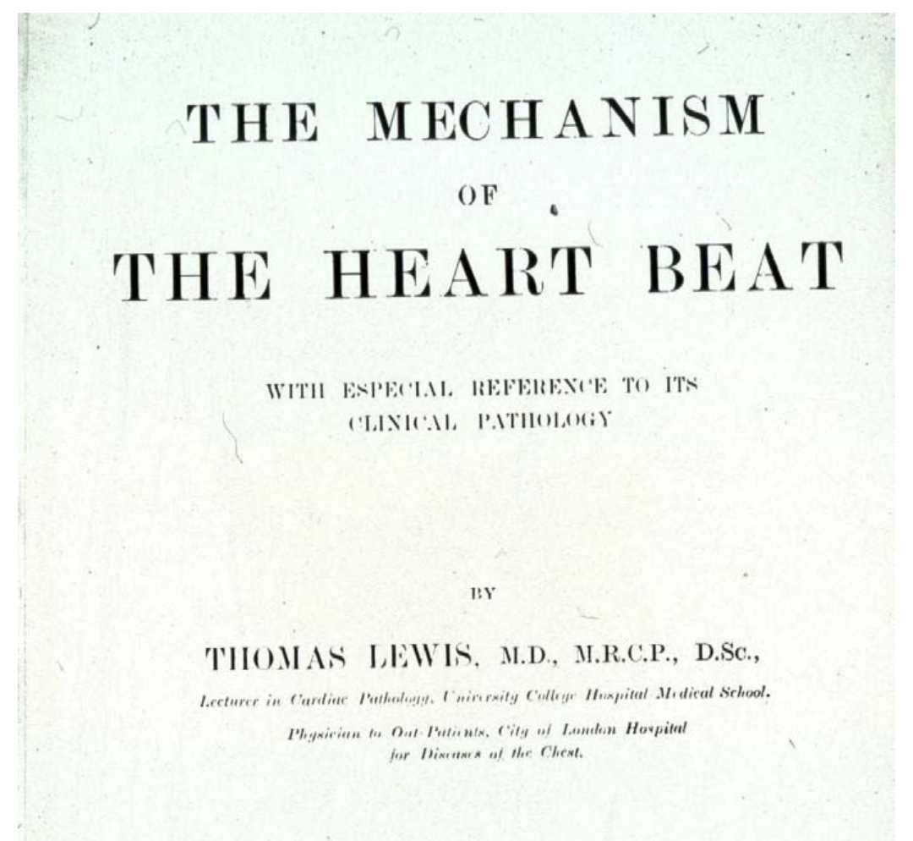
Before the introduction of the electrocardiograph Lewis used the 1906 ink polygraph of Mackenzie to study arrhythmias. This is the 1914 Lewis-Mackenzie model. Illustrated is a recording of episodes of paroxysmal nodal tachycardia showing the diagnostic giant **a** waves in the jugular venous pulse.



Lewis visited Willem Einthoven, the 1901 inventor of the modern electrocardiograph, in Leiden in 1909. Einthoven's string galvanometer apparatus occupied a large laboratory and was connected to the local hospital by telephone wires.



The Cambridge Instrument Company made a superb smaller electrocardiograph based on the Einthoven galvanometer and Lewis installed this in his laboratory in University College Hospital medical school.



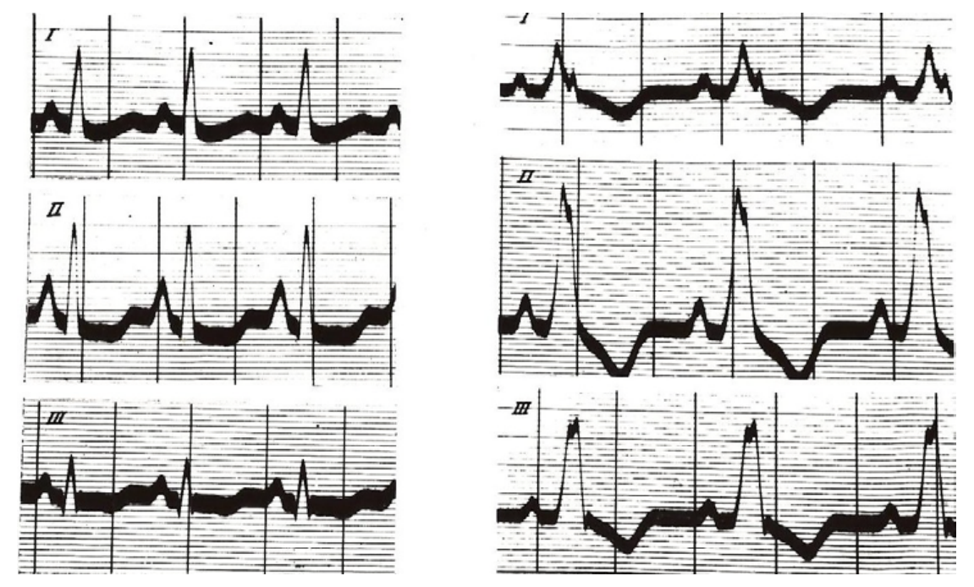
THE MECHANISM
OF
THE HEART BEAT

WITH ESPECIAL REFERENCE TO ITS
CLINICAL PATHOLOGY

BY

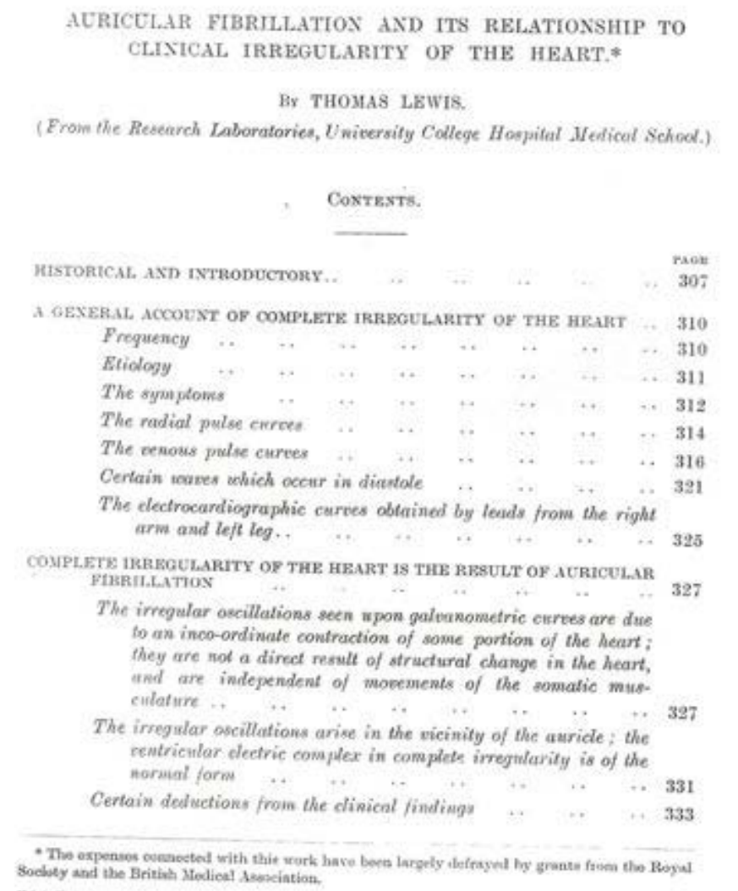
THOMAS LEWIS, M.D., M.R.C.P., D.Sc.,
Lecturer in Cardiac Pathology, University College Hospital Medical School.
Physician to Out-Patients, City of London Hospital for Diseases of the Chest.

Lewis's position at the age of 29 as one of the foremost cardiac investigators was signalled by his 1911 monograph on ***The Mechanism of the Heart Beat***. It was hailed in the USA as "the bible of electrocardiography". It had 295 pages, 214 illustrations and over 300 references. A huge achievement single handed.



Electrophysiological studies on the dog heart. These were of outstanding quality and led to his election as a Fellow of the Royal Society. The figures show the limb lead ECG's before and after the production of bundle branch block done by pinching the septum with forceps via the right ventricle.

Two simultaneous recordings direct from the dog heart from his study which proved that the SA node was the pacemaker of the heart. Done by having a galvanometer with two strings in it, a Cambridge Company invention.



AURICULAR FIBRILLATION AND ITS RELATIONSHIP TO CLINICAL IRREGULARITY OF THE HEART.*

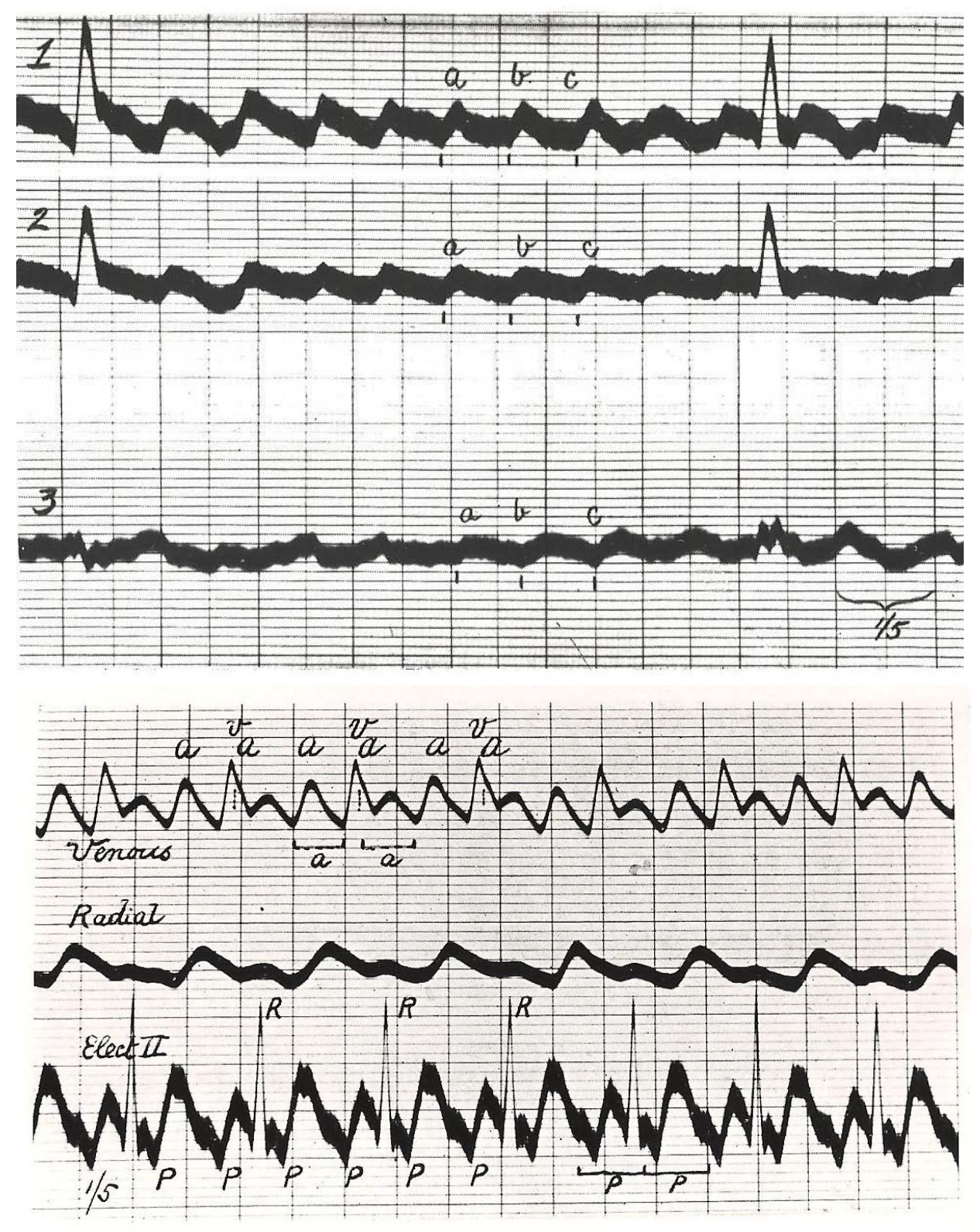
BY THOMAS LEWIS.

(From the Research Laboratories, University College Hospital Medical School.)

CONTENTS.

* The expenses connected with this work have been largely defrayed by grants from the Royal Society and the British Medical Association.

This 66 page paper in *Heart* in 1910 was a totally comprehensive study, both experimental and clinical, which proved for the first time that the common form of persistent irregularity of the heart was due to atrial fibrillation. This article is one of the classics of cardiology.



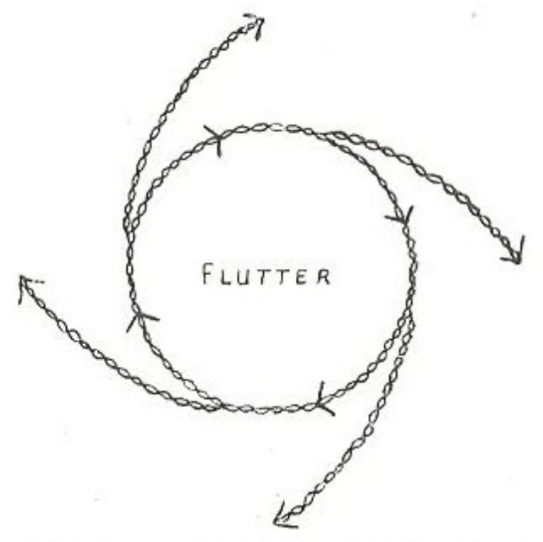
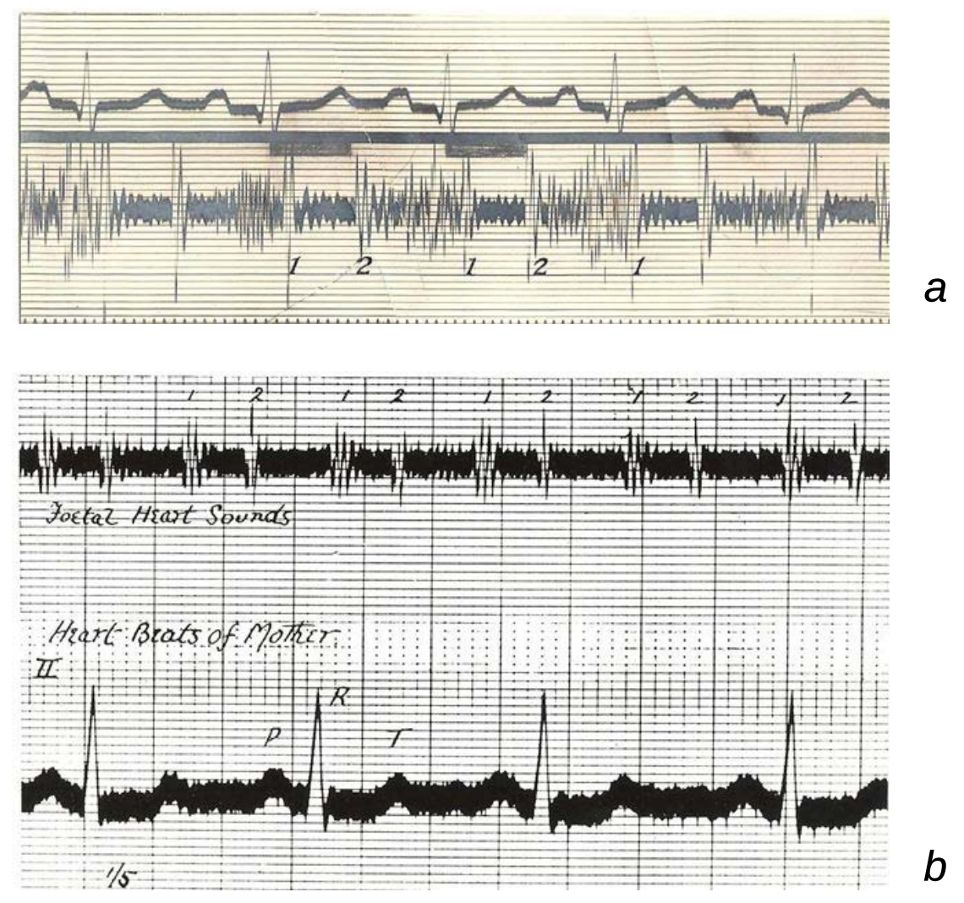
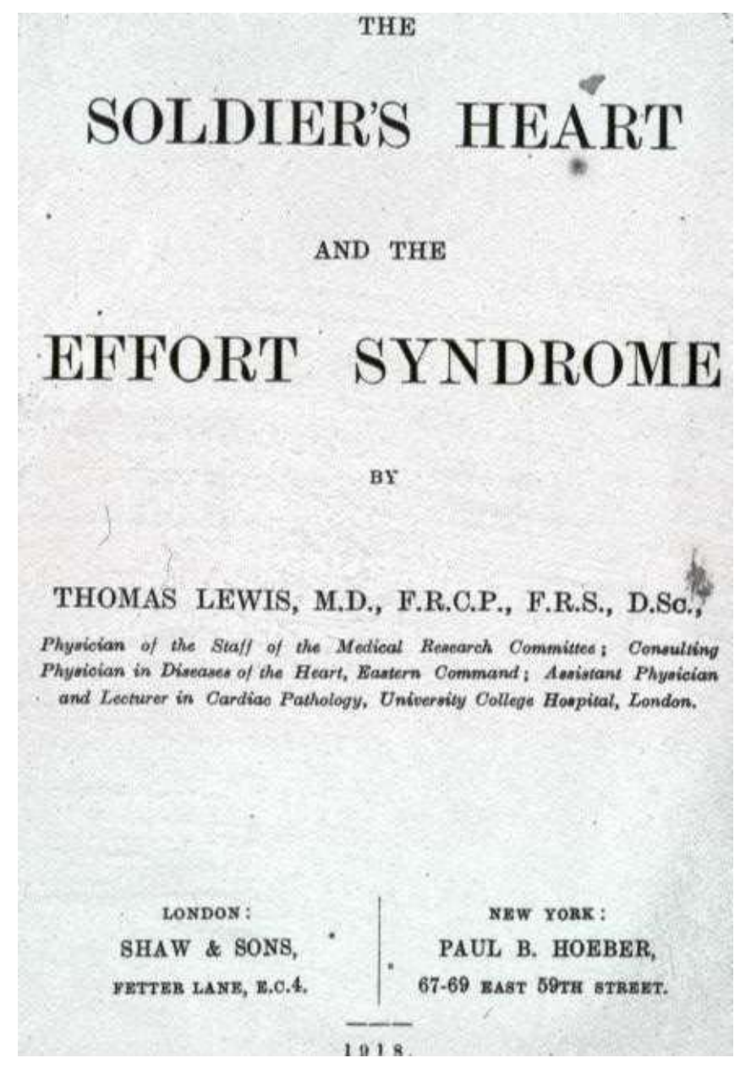


FIG. XII.—A diagram illustrating the successive paths followed by the excitation wave in flutter. The path is finely sinuous, but is in general accurately repeated from cycle to cycle.

Atrial flutter. Using bipolar chest leads arranged in a triangle, (still known as the Lewis lead) , he showed that flutter was due to a Circus Movement in the right atrium "around the mouths of the venae cavae" He mapped the electrical axis of the excitation wave by using simultaneous three channel recording –remarkable for 1920. His hypothesis is widely accepted today.



Using a carbon microphone it was possible with the Einthoven galvanometer to record very good quality **phonocardiograms.**
(a) Diastolic murmur with pre-systolic accentuation in a patient with mitral stenosis. In the second complex one can see the opening snap at the onset of the murmur.
(b) A delightful recording of the baby's heart sounds in utero with a simultaneous electrocardiogram of the mother. Annotated by Lewis. About 1914.

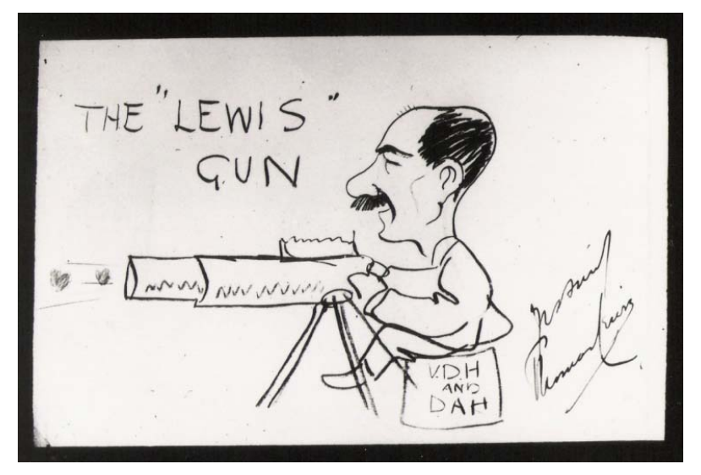


THE
SOLDIER'S HEART
AND THE
EFFORT SYNDROME

BY

THOMAS LEWIS, M.D., F.R.C.P., F.R.S., D.Sc.,
Physician of the Staff of the Medical Research Committee; Consulting Physician in Diseases of the Heart, Eastern Command; Assistant Physician and Lecturer in Cardiac Pathology, University College Hospital, London.

LONDON: SHAW & SONS, FETTER LANE, E.C.4.
NEW YORK: PAUL B. HOEBER, 67-69 EAST 59TH STREET.
1918



In World War I he showed that so called "Soldiers'Heart" was not heart disease and he re-named in The Effort Sydrome , valuably proving that remedial exercises were good treatment. He rejected the other terms, Disordered action of the heart (DAH) and Valvular disease of the heart (VDH) –which were innocent murmurs -and is shown in this cartoon shooting them down with the Lewis machine gun.

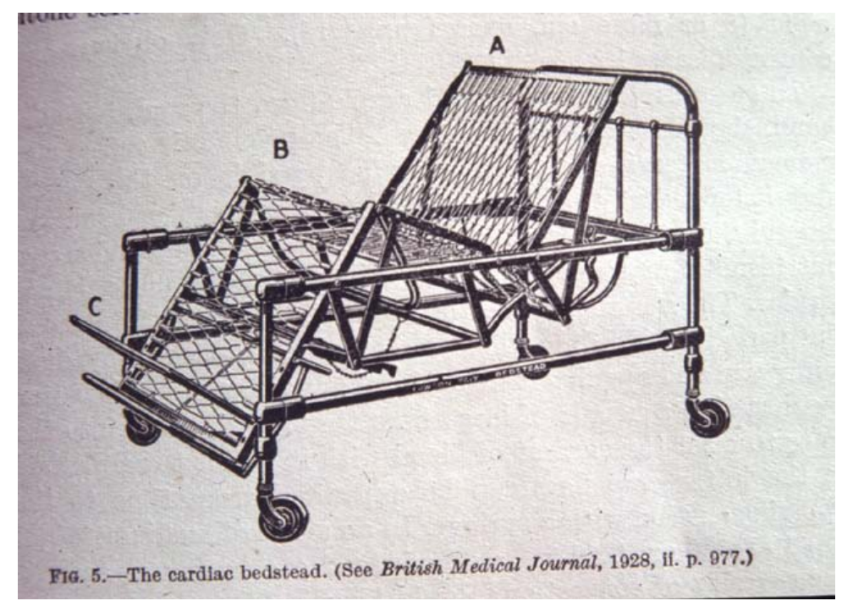


FIG. 5.—The cardiac bedstead. (See *British Medical Journal*, 1928, ii. p. 977.)

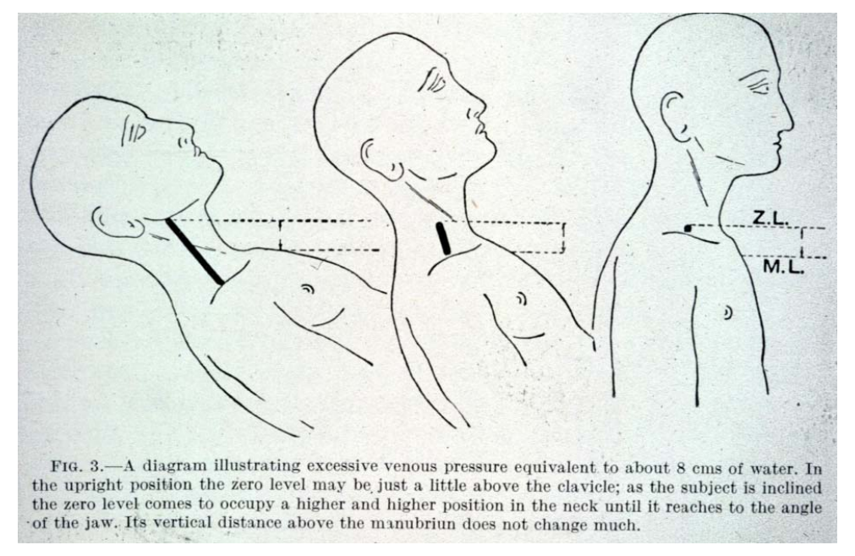
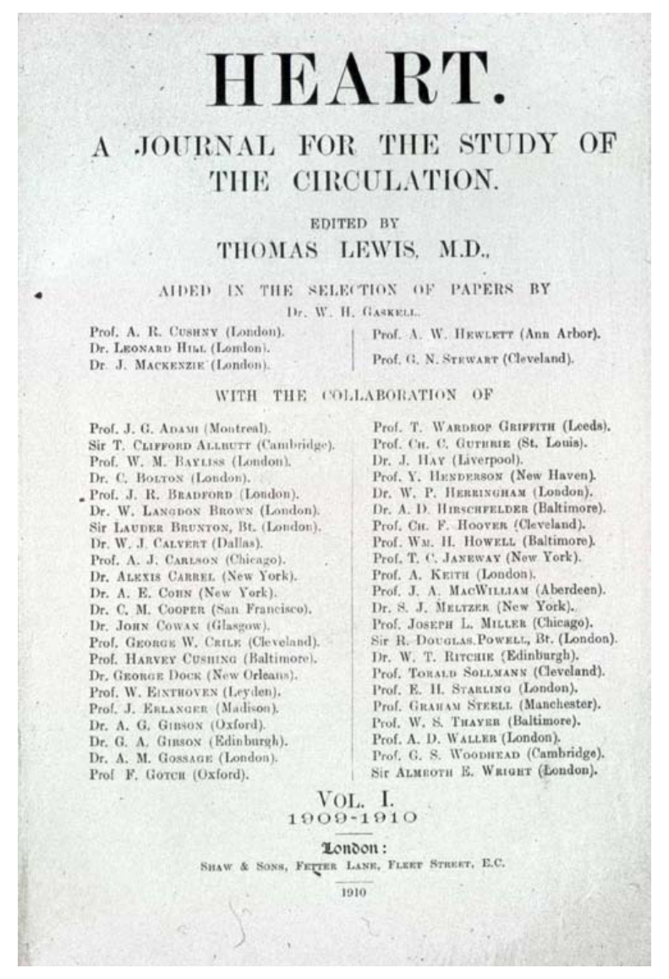
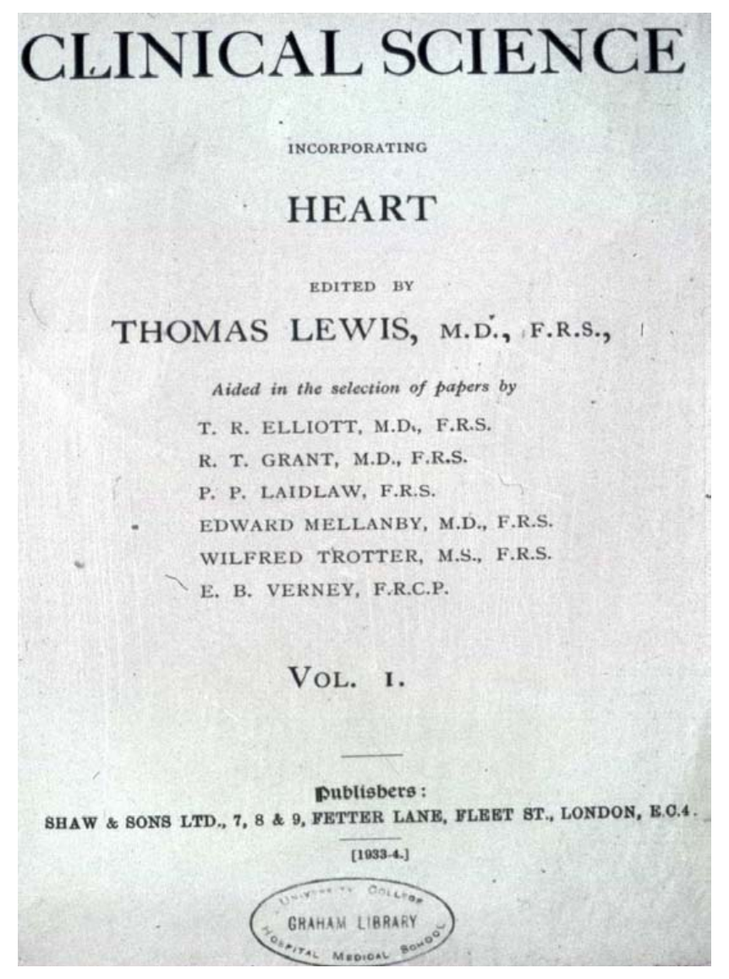


FIG. 3.—A diagram illustrating excessive venous pressure equivalent to about 8 cms of water. In the upright position the zero level may be just a little above the clavicle; as the subject is inclined the zero level comes to occupy a higher and higher position in the neck until it reaches to the angle of the jaw. Its vertical distance above the manubrium does not change much.

Lewis's ward at U.C.H. The cardiac bedstead was designed by him to prevent nocturnal dyspnoea and to facilitate drainage of leg oedema. He introduced the concept of estimating the right atrial pressure by measuring the height of the neck veins from the sternal angle.



HEART.
A JOURNAL FOR THE STUDY OF THE CIRCULATION.
EDITED BY
THOMAS LEWIS, M.D.,
AIDED IN THE SELECTION OF PAPERS BY
VOL. I.
1909-1910
London:
1910

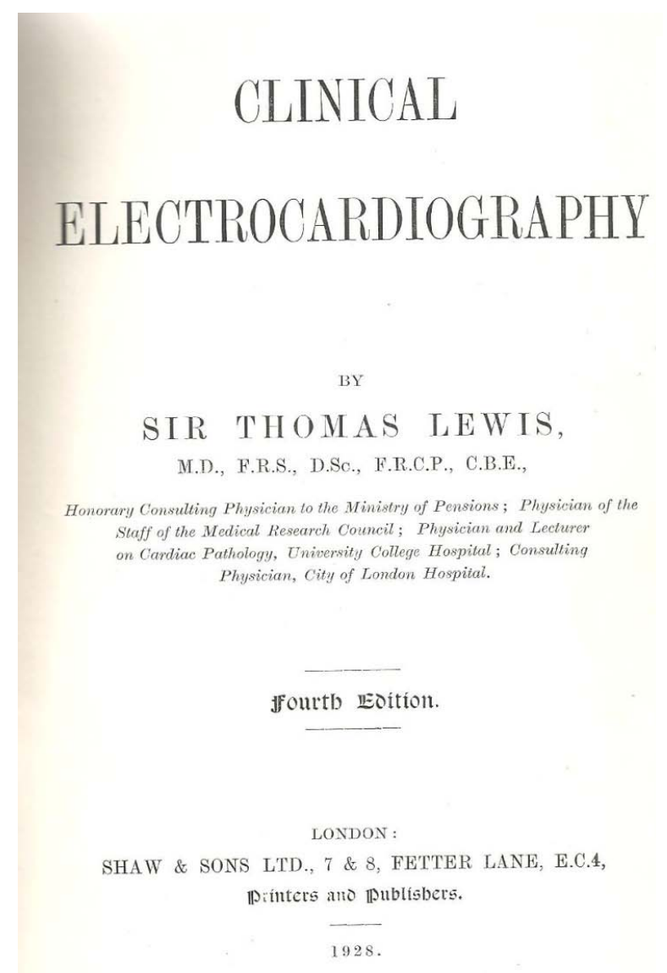


CLINICAL SCIENCE
INCORPORATING
HEART
EDITED BY
THOMAS LEWIS, M.D., F.R.S.,
Aided in the selection of papers by
T. R. ELLIOTT, M.D., F.R.S.
R. T. GRANT, M.D., F.R.S.
P. P. LAIDLAW, F.R.S.
EDWARD MELLANBY, M.D., F.R.S.
WILFRED TROTTER, M.S., F.R.S.
E. B. VERNEY, F.R.C.P.

VOL. I.

Publishers:
SHAW & SONS LTD., 7, 8 & 9, FETTER LANE, FLEET ST., LONDON, E.C.4.
[1933-4.]

Lewis was a great editor. With Mackenzie he founded ***Heart*** in 1909, changed it to ***Clinical Science*** in 1932 and was an editor of the two journals for 34 years –an unsurpassed record.



CLINICAL
ELECTROCARDIOGRAPHY
BY
SIR THOMAS LEWIS,
M.D., F.R.S., D.Sc., F.R.C.P., C.B.E.,
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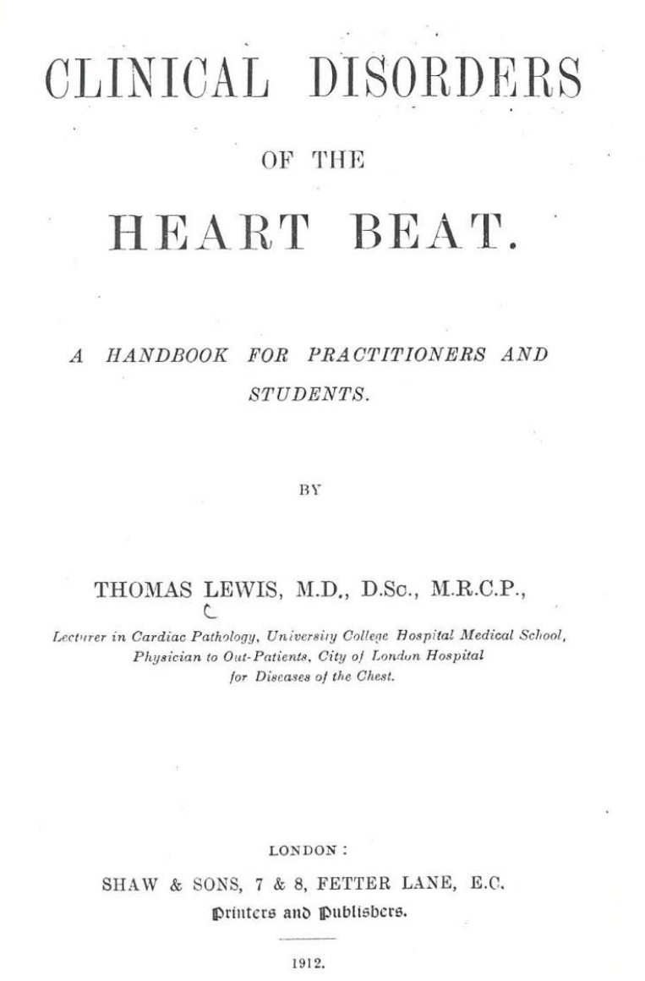
Fourth Edition.
LONDON:
SHAW & SONS LTD., 7 & 8, FETTER LANE, E.C.4,
Printers and Publishers.
1928.



CLINICAL DISORDERS
OF THE
HEART BEAT.
A HANDBOOK FOR PRACTITIONERS AND STUDENTS.
BY
THOMAS LEWIS, M.D., D.Sc., M.R.C.P.,
Lecturer in Cardiac Pathology, University College Hospital Medical School, Physician to Out-Patients, City of London Hospital for Diseases of the Chest.
LONDON:
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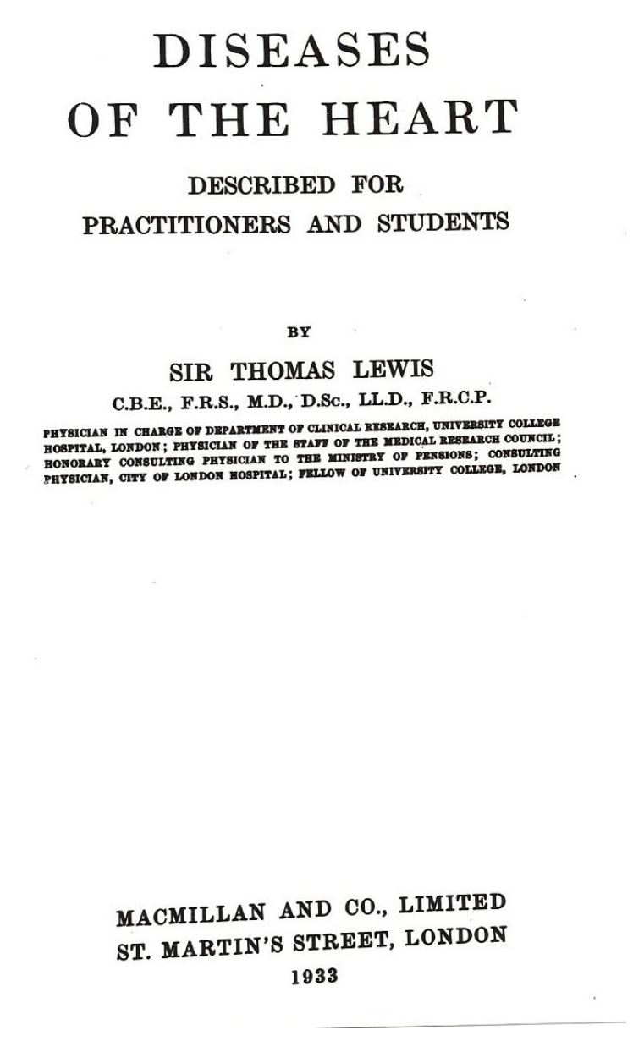
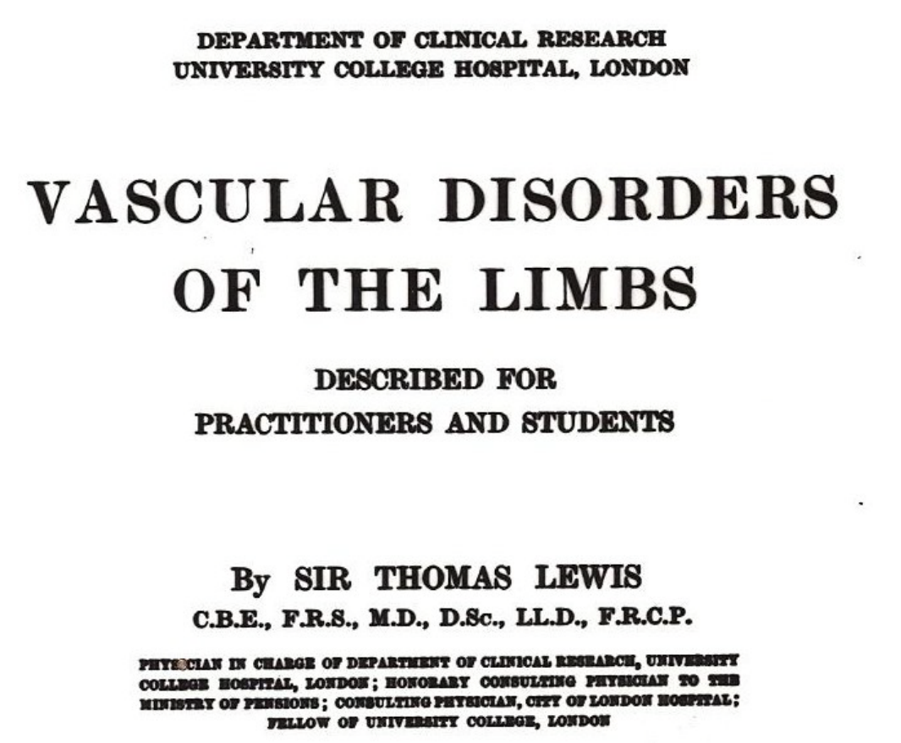
Printers and Publishers.
1912.



DISEASES
OF THE HEART
DESCRIBED FOR
PRACTITIONERS AND STUDENTS
BY
SIR THOMAS LEWIS
C.B.E., F.R.S., M.D., D.Sc., LL.D., F.R.C.P.
MACMILLAN AND CO., LIMITED
ST. MARTIN'S STREET, LONDON
1933

In addition to his scientific monographs, Lewis wrote books specifically for students and practising doctors. He took his role as a teacher seriously and his fine command of English and very clear writing made his books deservedly popular.

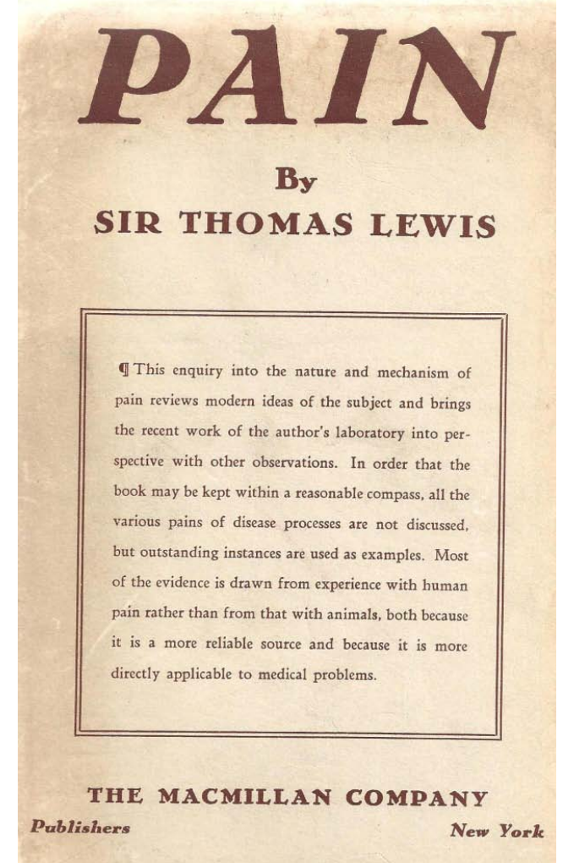


DEPARTMENT OF CLINICAL RESEARCH
UNIVERSITY COLLEGE HOSPITAL, LONDON

VASCULAR DISORDERS
OF THE LIMBS
DESCRIBED FOR
PRACTITIONERS AND STUDENTS

By SIR THOMAS LEWIS
C.B.E., F.R.S., M.D., D.Sc., LL.D., F.R.C.P.
PHYSICIAN IN CHARGE OF DEPARTMENT OF CLINICAL RESEARCH, UNIVERSITY COLLEGE HOSPITAL, LONDON; HONORARY CONSULTING PHYSICIAN TO THE MINISTRY OF PENSIONS; CONSULTING PHYSICIAN, CITY OF LONDON HOSPITAL; FELLOW OF UNIVERSITY COLLEGE, LONDON

His clinical research, using simple methods of investigation, elucidated the mechanism of the response of the skin to injury (the H substance), of the principle underlying muscular ischaemia in the limbs and the heart, and the mechanism of Raynaud's disease.



PAIN
By
SIR THOMAS LEWIS

¶ This enquiry into the nature and mechanism of pain reviews modern ideas of the subject and brings the recent work of the author's laboratory into perspective with other observations. In order that the book may be kept within a reasonable compass, all the various pains of disease processes are not discussed, but outstanding instances are used as examples. Most of the evidence is drawn from experience with human pain rather than from that with animals, both because it is a more reliable source and because it is more directly applicable to medical problems.

THE MACMILLAN COMPANY
Publishers *New York*

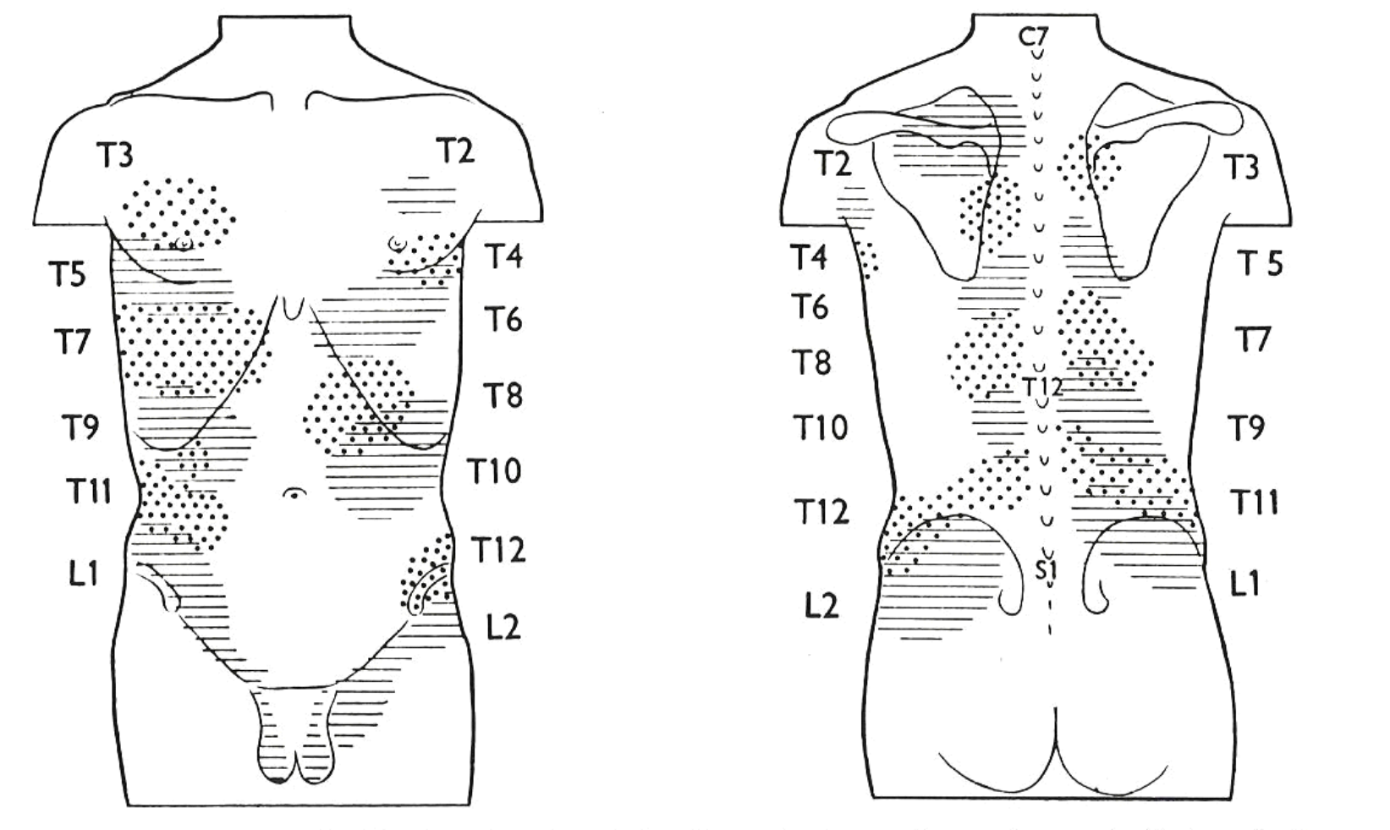
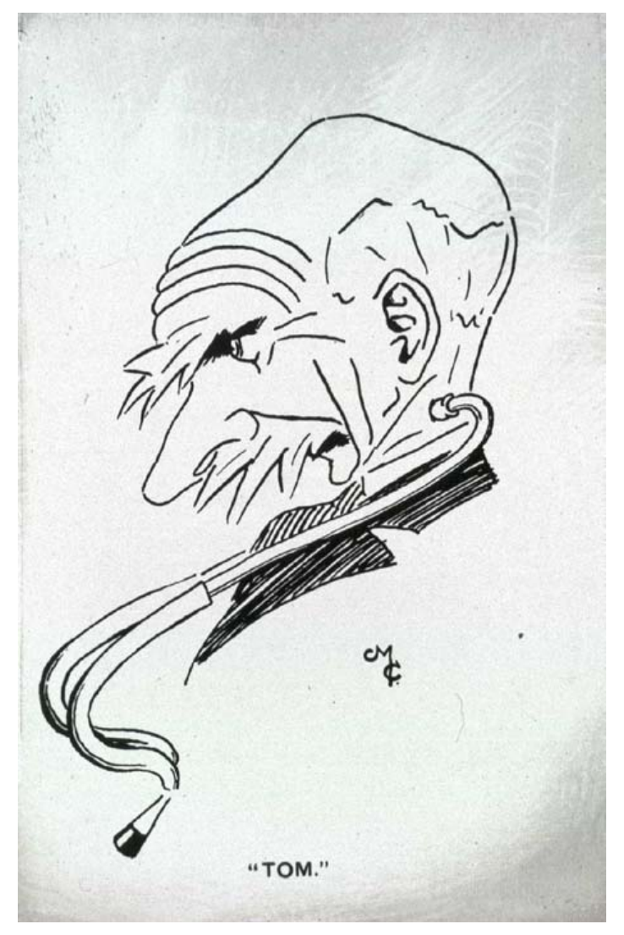


Fig. 1. Shows the distribution of pain arising from the interspinous ligaments T 2 to L 2. Alternate areas have been hatched and stippled.

His research into the difficult subject of Pain was quite superb. Among other investigations he showed how injured skin becomes even more painful with his concept of the Nocifensor Response. Like Mackenzie before him he did perceptive studies on referred pain

EXERCITATIO
ANATOMICA DE
MOTV CORDIS ET SANGVINIS IN ANIMALIBVS,
GVILIELMI HARVEI ANGLI,
Medici Regii, & Profeſſoris Anatomiæ in Collegio Medicorum Londinenſi.
FRANCOFVRTI,
Sumptibus GVILIELMI FITZERI.
ANNO M. DC. XXVIII.

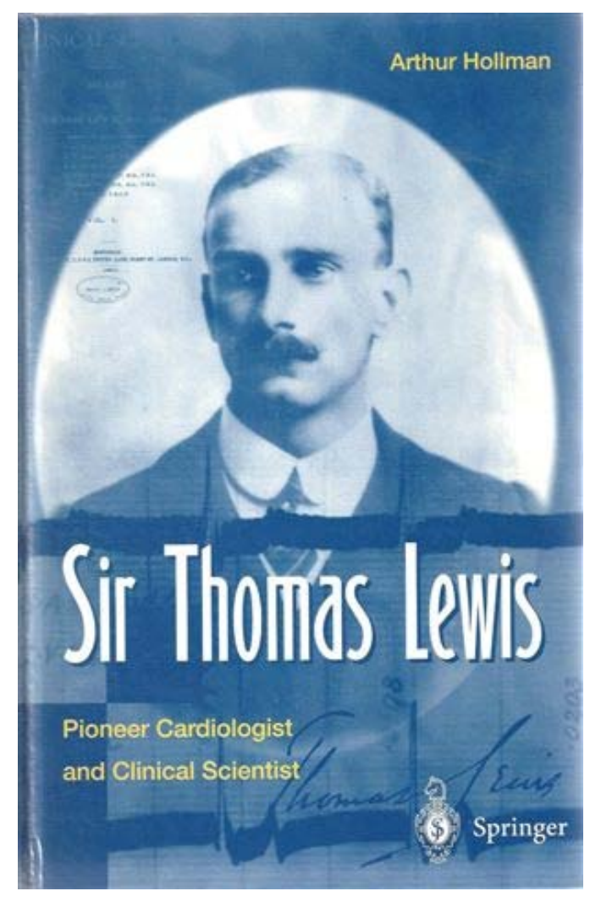
William Harvey was his hero. "The founder of physiology and of clinical science" Together with Henry Dale he made in 1928 a movie film recreating Harvey's experimental work That film has been re-made by the Wellcome Trust and is available.



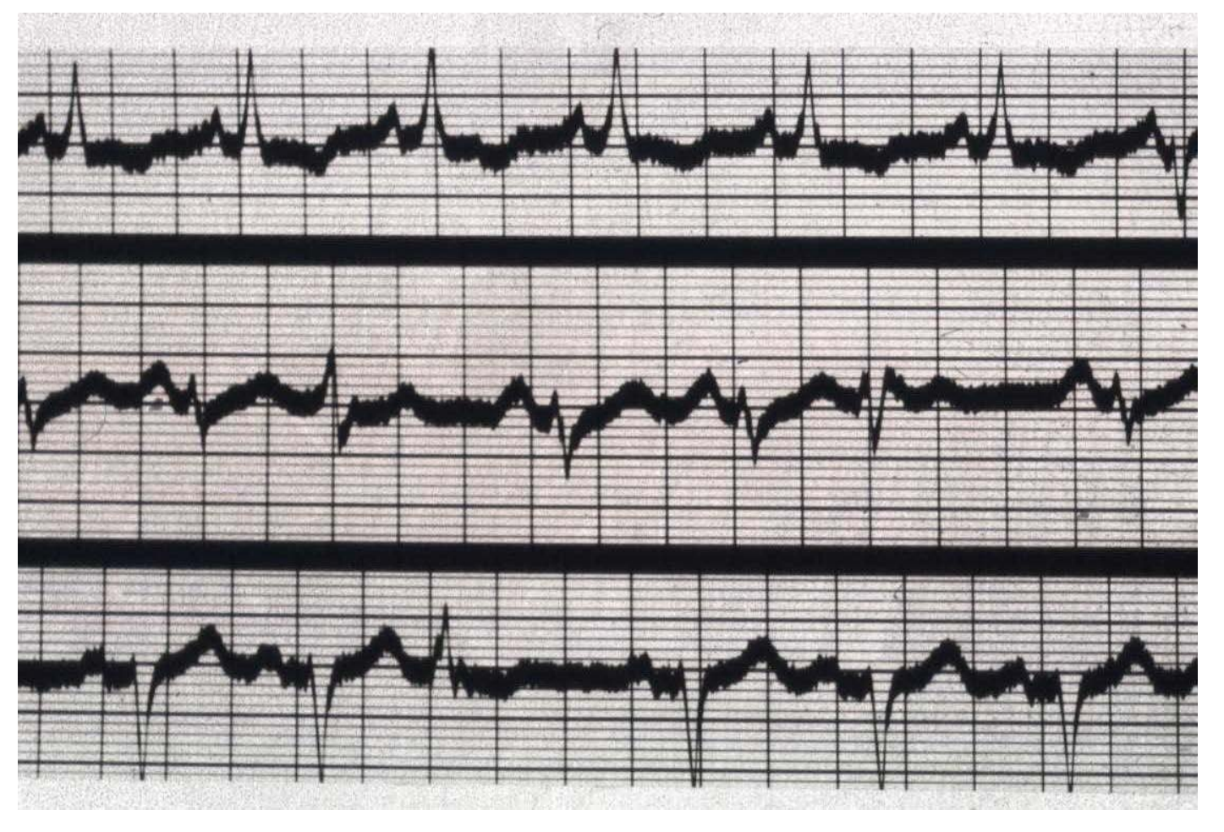
His portrait at the age of 58 and a student's cartoon. Note the stethoscope. Lewis insisted on very short tubing for better auscultation.

From his boyhood Lewis was devoted to the countryside. He was a good ornithologist and an excellent photographer with his 1902 Dollmeyer ¼ plate camera which is now in the BCS museum in London. The photo is of the Common Tern.

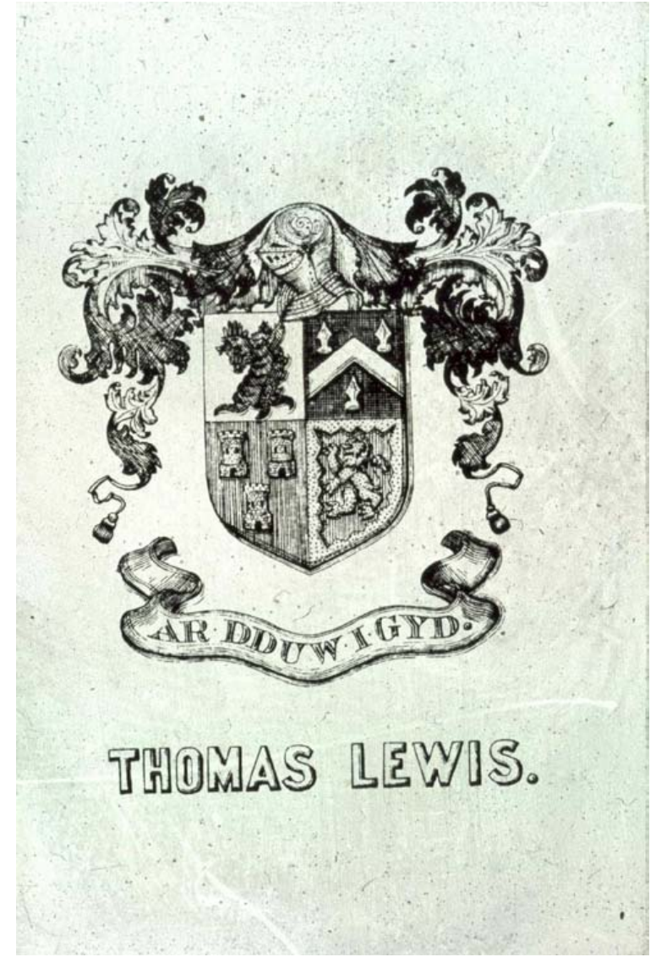
On the centenary of his birth a stamp in his honour was issued in Mauritius where the prime minister Sir Seewoosagur Ramgoolam had been a student of his at UCH.



The biography of Lewis



At age 46 he had a myocardial infarction and a second one at age 54. Previously he smoked about 60 cigarettes a day and was among the first to declare in 1933 that "long continued smoking is injurious to the blood vessels, including the coronary vessels". By age 62 he had left heart failure and this electrocardiogram was taken four months before his death in March 1945. Can you see any evidence of previous infarcts?



He was buried in Llangasty churchyard by Llangorse Lake in the Brecon Beacons, an area where he had loved to study wildlife as a boy in Wales, and this is his tombstone. His bookplate has the family motto, Ar.Dduw.I.Gwd. (To God the Honour)

Poster researched and designed by Arthur Hollman. *Archivist of BCS*