

## Sir Thomas Lewis (1881–1945)

The poor prognosis associated with chaotic irregularity of the pulse was clearly known by most of ancient physicians. Perhaps the earliest description of atrial fibrillation is in Chinese, in The Yellow Emperors Classic of Internal Medicine, but in recorded history, William Harvey in 1628 was probably the first to describe ‘fibrillation of the auricles’ in animals. The first electrocardiographic recording of atrial fibrillation was made by William Einthoven in 1906, in which significant background noise precluded the identification of atrial activity although normal ventricular complexes were seen. Einthoven termed his ECG as ‘*pulsus inadequalis et irregularis*’ without speculating about the mechanism that caused irregular QRS complexes and chaotic undulating baseline. In 1909 and 1910 Sir Thomas Lewis in London and Rothberger and Winterberg in Vienna independently established atrial fibrillation as a clinical identity.

Thomas Lewis, born in Cardiff in 1881, was one of the most important British physicians of his day, a renowned cardiologist and a great pioneer of scientific medicine. He graduated in 1905 from University College Hospital, London with the University Gold Medal, and he worked there for the rest of his life. From the very beginning he was drawn to research, although he was also a clinician, believing that research in the laboratory and at the bedside would help to solve many of the mysteries still confronted by physicians caring for cardiac patients.

Lewis focused his investigations on the cardiovascular system. His first cardiac studies were related with sphygmographic recordings in patients with aortic regurgitation. Initially he used polygraph curves to investigate arrhythmias, and later he turned to the analysis of the heartbeat using electrical records from the newly invented electrocardiograph.

In 1908 he was able to make use of the first electrocardiograph machine in England that was made in Einthoven’s laboratory. This electrocardiograph was first installed in A. Waller’s department at the Imperial Institute in South Kensington. Lewis obtained his own electrocardiograph, made in



Germany, in 1909. In 1911 he replaced his original apparatus with his first electrocardiograph made by the Cambridge Scientific Instrument Company (Fig. 1). In 1908 Lewis recorded an ECG from a patient with a heart block and published it in his first book on arrhythmias. It was while using his first machine that Lewis was able to record rapid irregular arrhythmia as a result of atrial fibrillation (Fig. 2).

With the improvement of methods, fibrillatory f waves became clearly visible. Lewis believed that these waves could result only from the fibrillation in the auricle. He noted that the R waves are usually normal in the presence of atrial fibrillation (AF).

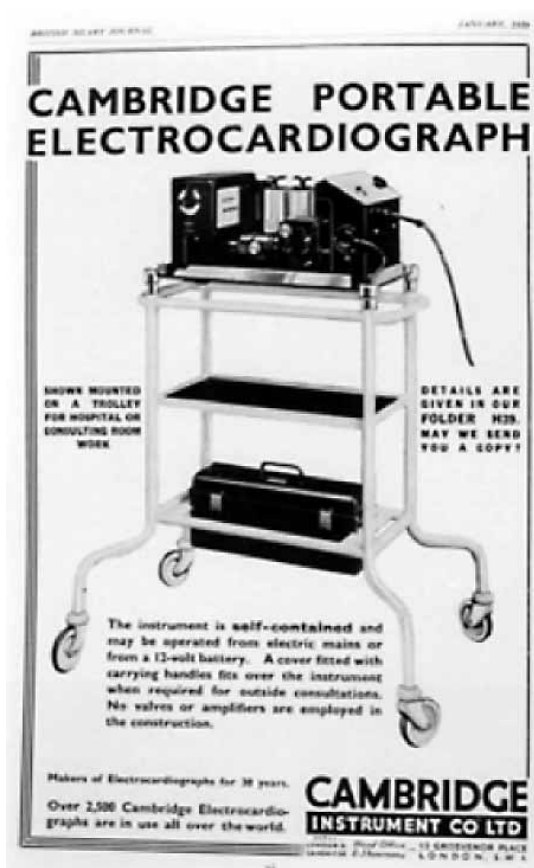
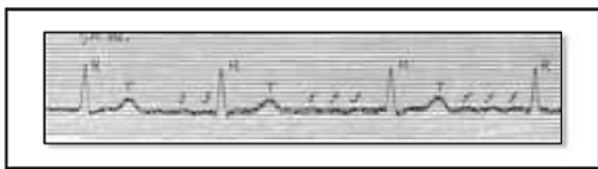


Figure 1. The Cambridge mobile electrocardiograph.



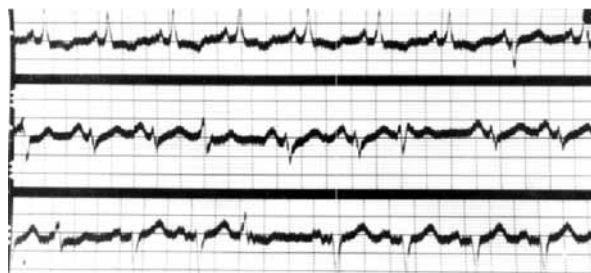
**Figure 2.** An electrocardiogram of a patient with atrial fibrillation recorded by Lewis depicting f waves 'derived from a fibrillating auricle'.

Therefore, he concluded that f waves present through the cardiac cycle can only originate from the atria and not from the atrioventricular node as was earlier suggested by McKenzie. In 1909, he published a preliminary report on his electrocardiographic studies in patients whose pulses were 'continuously and extremely irregular'. Based on this research he concluded that AF was a 'common condition'. His theory was based both on experimental and clinical studies. He described his experiments with dogs with electrically induced atrial fibrillation showing atrial waves with oscillations of 500–900/min and presented 31 clinical cases of AF [1, 2].

Controversy about the exact mechanism of atrial fibrillation remained for many years. It was Lewis who was the first to develop 'multiple heterotopous centre' theory and suggested that such multifocal atrial activity might account for both atrial tachycardia and atrial fibrillation. In 1920 Lewis assumed that the atria were involved in one constant re-entrant circuit travelling through the vena cava and crista terminalis and suggested a 'circus movement' theory for atrial flutter that prevailed throughout the following decades [3]. Furthermore, 85 years before Allesie's experiments demonstrating that 'AF begets AF', Lewis, based on his experiments, concluded that the fibrillation itself aggravates the irritability of auricular tissue. His major therapeutic contribution concerned the mechanism of the action of quinidine, which he related to its ability to maintain a gap between the head and the tail of the wave of excitation in atrial flutter and fibrillation [4].

He gave up electrocardiography in 1925 and devoted himself to research on blood vessels of the skin and response to injury. He also investigated different aspects of pain. His observations on the sequence of events that followed stroking sensitive or normal skin with a blunt instrument, known as the 'triple response', were described in 1924 and were attributed to the release of a histamine-like substance.

Lewis authored numerous articles and textbooks. 'The mechanism and graphic registration of



**Figure 3.** The electrocardiogram of Sir Thomas Lewis, taken by his assistant John Honour on 28 December 1945, 10 weeks before Lewis's death.

the heartbeat', hailed as a bible of electrocardiography, will remain Lewis's most outstanding contribution [5]. The Royal Society awarded him with the Copley Medal in 1941, and in 1944, jointly with the Royal College of Physicians, presented him with the Conway Evans Prize.

In 1909 Thomas Lewis founded, with James MacKenzie, the journal 'Heart' and became its only editor. In 1933 he renamed it 'Clinical Science', remaining its editor until 1944.

Sir Thomas Lewis had his first heart attack at the age of 43 and died after his third myocardial infarction developing heart failure. In 1944 he was admitted to University College Hospital where his own electrocardiogram was taken by his assistant John Honour (Fig. 3). A few months later Lewis was dead.

## References

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