Images in Medicine: The Tales of William, Willem, and Waller, and the Birth of the Electrocardiogram

Marcellus Francis L. Ramirez, MD.

In 1927, the Department of Medicine of the University of Santo Tomas Faculty of Medicine and Surgery was first formally organized by Dr. William J. Burke, who served as the head of the department until 1939 when he was succeeded by Dr Gervasio de Ocampo. Dr. Burke was a cardiologist and a philanthropist born in San Miguel, Manila, who finished his medical studies in Dublin, Ireland, and returned to practice medicine in Manila in 1900. While he was known to have received pontifical orders for his benevolent contributions from several institutions, little is written about his major contribution to the field of medicine and cardiology in particular.

It was Dr. William Burke who introduced and installed the first electrocardiograph in the Philippines. A commemorative plate built in his honor through an ordinance by the Manila City Council and signed by then Mayor Alfredo Lim on January 7, 1993, celebrates this milestone. This ornamental plate stands up to this present day in the Burke Building along Escolta Road in Binondo (Figure 1), which incidentally, is also documented as the first building in the Philippines to have an elevator [1,2].

His exploits as a cardiologist is further preserved and celebrated in an iconic picture with him holding an electrocardiographic tracing, and discussing its interpretation with a fellow physician, a classic black and white photograph with the caption "Dr. William Burke – A Portrait of a Physician" (Figure 2). This nostalgic picture wonderfully depicts the pedagogical relationship of the mentor and the student and stands as a symbolic representation of the clinician as a teacher.

However, not long before William Burke organized the department and brought the electrocardiograph to the Philippines, another visionary with a related name, "Willem" to be exact, became responsible for the invention of this medical tool which stands to this day as the most important diagnostic apparatus for the detection of myocardial ischemia and cardiac rhythm abnormalities, and remains an essential part of the initial evaluation of cardiac diseases.

Between the years 1900-1901, Willem Einthoven, a Dutch physician and physiologist, invented the first surface lead electrocardiograph- a string galvanometer using a fine quartz string coated in silver, which would later provide the first electrocardiographic recording, jumpstarting an era of greater understanding of cardiac rhythm disorders. The equipment then weighed around 600 pounds, needed several personnel to set up, and required the subject to dip his extremities in pails filled with electrolyte solution. He was awarded the Nobel Prize in physiology and medicine in 1924 [3].

Willem, however, credited another French physiologist, Augustus Waller, for the first human electrocardiogram in 1887, fifteen years before his string galvanometer recorded the first surface lead ECG tracing. Waller recorded electrical currents of the heart using a mercury capillary electrometer. This first electrogram consisted of only two deflections- ventricular depolarization and repolarization. Waller's work inspired Einthoven to refine the electrometer and subsequent string galvanometer,

✉ Marcellus Francis L. Ramirez, M.D.
mlramirez@ust.edu.ph

Department of Medicine, University of Santo Tomas Faculty of Medicine and Surgery; Staff, Section of Cardiology, Department of Medicine, UST Hospital

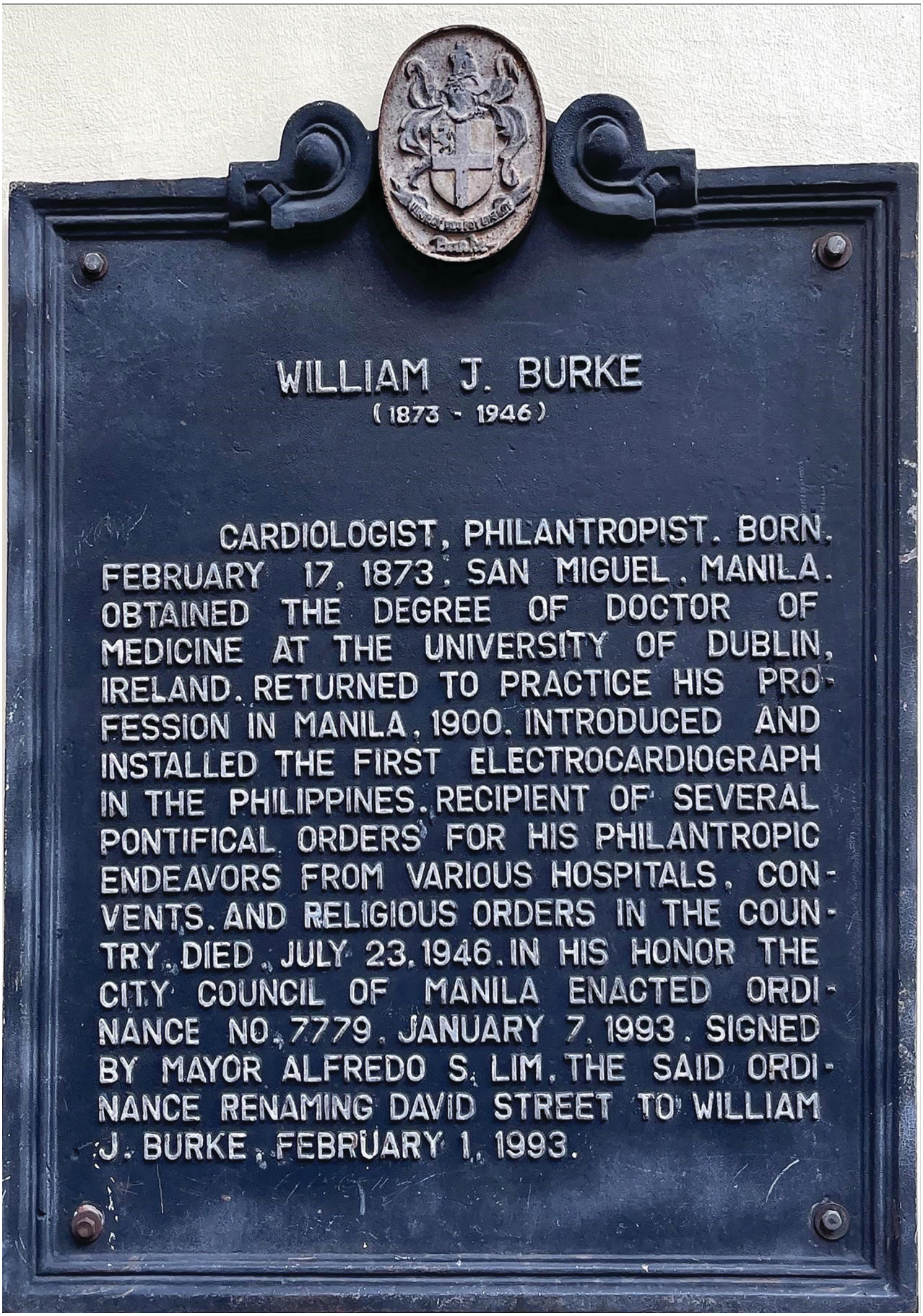

Figure 1. The commemorative plaque in Burke Building in Escolta St., celebrating the milestones of Dr William J. Burke, the founding chairman of the Department of Medicine. (photo taken by the author)

Figure 2. Picture of Dr. William Burke as a physician. (photo derived from the archives of the University of Santo Tomas Hospital)

leading to the recording of the waveforms that we know today: the P wave, the QRS complex and the T wave. This paved the way for a better understanding of cardiac arrhythmias [4–6].

While Waller's work laid the foundation for electrocardiography, Willem's vision transformed it into the finest moment in electrocardiology, and William's heart initiated a new era of medicine and cardiology in the country.

REFERENCES

1. Borras IG. Intramuros during the American colonization. TALA: An Online Journal of History 2019 June. 2(1):22-37. Available from: http://talakasaysayan.org/index.php/talakasaysayan/article/view/23/22
2. Villalon A. An Escolta walking tour. Philippine Daily Inquirer. 28 April 2013. Available from: https://lifestyle.inquirer.net/100997/an-escolta-walking-tour/.
3. AlGhatrif M, Lindsay J. A brief review: history to understand fundamentals of electrocardiography. J Community Hosp Intern Med Perspect [Internet]. 2012;2(1):14383. Available from: http://dx.doi.org/10.3402/jchimp.v2i1.14383
4. Lüderitz B. Historical perspectives of cardiac electrophysiology. Hellenic J Cardiol. 2009;50(1):3–16.
5. Waller AD. A demonstration on man of electromotive changes accompanying the heart's beat. J Physiol [Internet]. 1887;8(5):229–34. Available from: http://dx.doi.org/10.1113/jphysiol.1887.sp000257
6. Rosen MR. The electrocardiogram 100 years later: electrical insights into molecular messages: Electrical insights into molecular messages. Circulation [Internet]. 2002;106(17):2173–9. Available from: http://dx.doi.org/10.1161/01.cir.0000036741.27574.ce