Name That Murmur — Eponyms for the Astute Auscultician
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After the introduction of the stethoscope by René Laennec in 1819, the art of auscultation gained traction as a group of early adopters described the heart murmurs they were now able to hear. A race to discover and define ensued. Leading physicians published their new observations, and a robust crop of eponyms was born for use by future generations of physicians and medical trainees. This list of eponymous heart murmurs includes a number of particularly esoteric selections that should satisfy novices and seasoned clinicians alike.

Austin Flint Murmur

Austin Flint was an American physician practicing in the early and middle 19th century and a true pioneer in medical education. He cofounded two medical schools, Buffalo Medical College (now State University of New York at Buffalo) and Bellevue Medical College (which later joined the New York University College of Medicine), and taught at six medical schools. A prolific writer, he is credited on more than 200 published articles and wrote one of the major textbooks of his time, *A Treatise on the Principles and Practice of Medicine*, which persisted through six editions.1

The Austin Flint murmur is a mid-diastolic rumbling sound present in selected cases of non-rheumatic aortic regurgitation. The sound is indistinguishable from mitral stenosis. Flint postulated that the murmur was due to regurgitant flow onto the mitral valve that pushed back the mitral leaflets, decreasing the size of the mitral orifice and impairing flow from the left atrium to the left ventricle. 2

Multiple theories regarding the cause of the Austin Flint murmur persist, including regurgitant flow causing vibration of the anterior mitral-valve leaflet, the turbulent flow of the regurgitant jet colliding with incoming blood from the left atrium, and the regurgitant jet hitting the left ventricle myocardium, or a combination of these.3-5

Barlow’s Syndrome

South African physician John Barlow first submitted his work on mitral-valve prolapse to the journal *Circulation*, but the manuscript was refused for its “overstated conclusion.”6,7 After considerable abbreviation of the paper on Barlow’s part, it was finally accepted and published in 1968 by the *British Heart Journal*. Despite the initial rejection, this paper would generate substantial interest.

According to a search of the ISI Web of Knowledge, Barlow’s work is the 13th most cited paper in the 101-year history of the journal (which became *Heart* in 1996), with nearly 400 citations.6

In his paper, Barlow described the features of mitral-valve prolapse in 90 patients with nonejection clicks, late systolic murmurs, or a combination of the two. The click corresponds to the point at which the voluminous mitral-valve leaflets reach maximal stretch. The musical late systolic murmur arises from mitral incompetence, a result of the prolapse of the leaflets (Video 1, an audio recording of the murmur, is available with the full text of this article at NEJM.org).8

The murmur is loudest at the apex or left sternal border. The click and murmur may occur concurrently, but more commonly the click initiates the murmur. There may even be multiple consecutive clicks. The click or murmur of mitral-valve prolapse moves closer to S1 with standing, and closer to S2 with squatting.8,9 Barlow was able to supplement his auditory observations with corresponding phonocardiographic tracings that confirmed his findings.8 Barlow’s syndrome refers to the spectrum of symptoms caused by mitral-valve prolapse.10

Patients’ experiences range from the click or murmur alone to palpitations, chest pain, or syncope.11,12
Richard Cabot was an American physician and a trailblazing educator (Fig. 1). Recognized by his peers and medical trainees as an expert diagnostician, he introduced case analysis at Harvard Medical School and founded Case Histories of the Massachusetts General Hospital, the case series that continues to be published regularly in the Journal. Cabot was a vocal agitator for increased social services and a patient-centered approach to patient care and history taking. He was instrumental in establishing the first in-hospital social service department in the United States, at Massachusetts General Hospital in 1905.13 Collaborating with his colleague Frank Locke, Cabot published a series describing three cases of severe anemia with diastolic murmur in patients who had been given a diagnosis of valvular disease but were found to have normal heart valves on autopsy.14 The Cabot–Locke murmur is a diastolic murmur that sounds similar to aortic insufficiency but does not have a decrescendo; it is heard best at the left sternal border. The murmur resolves with treatment of anemia.15

Carey Coombs Murmur

The Englishman Carey Coombs was a rheumatic fever specialist whose book, *Rheumatic Heart Diseases* (1924), was based on more than 600 of his cases.16 The Carey Coombs murmur is a short mid-diastolic murmur caused by active rheumatic carditis with mitral-valve inflammation. The murmur is soft and low pitched, heard best at the apex.16,17 The murmur is frequently transient, with onset during acute rheumatic mitral valvulitis and improvement or resolution with recovery from the acute illness.18 It is thought that the murmur is the result of turbulence caused by thickened mitral-valve leaflets.19 Although similar to the diastolic rumble of mitral stenosis, the Carey Coombs murmur does not have an opening snap, presystolic accentuation, or a loud first sound, but may follow an S3 gallop.17 The latter may be superficially confused with an opening snap.

Dock’s Murmur

In his *New York Times* obituary, American doctor William Dock was remembered as a devoted career academic and irascible visionary. His prophetic warnings bucked convention. They included questioning the value of prolonged rest in hospitalized patients in the 1930s and, a decade later, cautioning that high-fat diets could lead to clogged arteries. He also popularized Sutton’s law: bank robber Willie Sutton’s explanation that he robbed banks because “that’s where the money is.” Dock taught that if “the money” resided in a specific diagnostic test, that test should be conducted immediately instead of several steps into a general algorithm.20

Dock described the murmur that bears his name in a 1967 case report of a patient with heart failure resulting from hypertension; the patient had no apparent valvular disease. But a continuous diastolic murmur with early and late accentuation was in fact present, in a sharply localized area, 4 cm left of the sternum in the third intercostal space, detectable only when the patient was sitting upright. The murmur was measured with the use of phonocardiography and found to be distinguishable in morphology from existing murmurs. The patient’s autopsy revealed that the descending branch of the left coronary artery was markedly stenosed, whereas the heart valves, great vessels, and coronary artery orifices were normal. Dock’s murmur is greatest in diastole, with a presystolic peak, a pattern consistent with blood flow through the coronary...
George Gibson was a committed teacher and academic who practiced in London at the turn of the 20th century. In his most significant work, Diseases of the Heart and Aorta, he described his namesake murmur as being caused by a persistent patent ductus arteriosus. The murmur was also featured in his subsequent lectures.\(^{22,23}\) The Gibson murmur is continuous, beginning after the first heart sound and extending through the second heart sound, which is distinctly audible over the unbroken rushing of the murmur (Video 2, echocardiogram, and Video 3, audio recording). The murmur may diminish during diastole. Although the murmur is audible over the entire base of the heart, Gibson noted that it is best heard at the left upper sternal border.\(^ {23}\) The Gibson murmur may make a humming, purring, or clanging sound or may sound like machinery or rolling thunder, depending on its severity. The continuous murmur may even be audible from the back, at the left interscapular region, or cranial to the scapular spine. The murmur grows louder as the child ages and arterial dilation increases, and the area of maximal intensity may migrate farther left.\(^{22,24}\)

### Graham Steell Murmur

Scottish cardiologist Graham Steell was an avid horseman and iconoclast. He was known for his illegible notes, brevity of speech, and excellent bedside teaching. For his more robust patients, he was said to recommend horseback riding as the best form of exercise.\(^ {25}\) Although this murmur of pulmonary insufficiency bears Graham Steell’s name, it was first described by others — notably, George Balfour, for whom Steell worked as a house officer at the Edinburgh Royal Infirmary in 1873.\(^ {26}\) Steell nevertheless published numerous articles describing the murmur clearly and in depth.\(^ {27}\) He posited that the pulmonary regurgitation was usually the result of chronically elevated blood pressure in the pulmonary artery, resulting from mitral stenosis (Video 4, echocardiogram). The Graham Steell murmur is a soft, blowing, decrescendo diastolic murmur running off of an accentuated second sound that mimics the murmur of aortic insufficiency. The Graham Steell murmur is best heard in a localized area at the left upper sternal border.\(^ {28,29}\)

### Key–Hodgkin Murmur

Charles Aston Key was one of the most prominent surgeons of the early 19th century. Key operated in London, the undisputed pinnacle of surgical activity during his time, and was a contemporary of Thomas Hodgkin, the physician for whom Hodgkin’s lymphoma is named.\(^ {30}\) Hodgkin lectured intermittently at Guy’s Hospital, where Key was a staff surgeon.\(^ {31}\) Key is credited with first drawing Hodgkin’s attention to the problem of aortic incompetence. Subsequently, Hodgkin wrote the first case series that both described aortic incompetence and included a postulation of its pathophysiology.\(^ {32}\) Syphilitic aortitis was the leading cause of aortic regurgitation at the time, causing dilatation of the ascending aorta, aortic valve ring, and occasionally leaflet retroversion. The Key–Hodgkin murmur is a diastolic murmur of aortic regurgitation; it has a raspy quality, similar to the sound of a saw cutting through wood. Hodgkin correlated the murmur with retroversion of the aortic valve leaflets seen post mortem.\(^ {33}\)

### Roger’s Murmur

The French physician Henri-Louis Roger was a pediatrician who developed a special interest in auscultation while working in Paris at the children’s hospital, Hôpital des Enfants-Malades, during the mid-late 1800s.\(^ {34}\) Comparing autopsy findings of interventricular defects with murmurs previously documented in the medical record, Roger recognized that holes in the interventricular wall were associated with murmurs (Video 5, echocardiogram). Roger’s murmur of ventricular septal defects is holosystolic and heard best at the left upper sternal border. The murmur is loud, and its sound has been compared with that of a rushing waterfall. It is accompanied by a harsh thrill. The smaller the ventricular septal defect, the louder the murmur. Roger emphasized the benign nature of congen-
ittal ventricular septal defects, having observed that many of the patients who had the defect were cyanotic and had normal life spans. But his observations were hampered by the times he lived in — a normal life span in the 1800s was much shorter than it is today. It is now well understood that ventricular septal defects can become problematic, causing pulmonary hypertension, right heart failure, and endocarditis. Maladie de Roger describes patients with asymptomatic ventricular septal defects. Patients with symptomatic ventricular septal defects, which cause cyanosis and progressive pulmonary hypertension, have Eisenmenger’s syndrome.

**CONCLUSIONS**

The modern era of diagnostic cardiology is focused on costly technologies, with regular use of electrocardiography, echocardiography, and coronary angiography. However, it is the authors’ opinion that physicians continue to enjoy and value the bedside exam. In addition to its diagnostic function, there is considerable therapeutic benefit in the application of the stethoscope to the chest. We hope the description of these murmurs will stimulate renewed interest in the bedside exam.

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