

# Obituary: Arthur E. Weyman, 1941–2024

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On June 17, Arthur E. (Edward) 'Ned' Weyman, one of the pioneers and towering figures of echocardiography (Figure 1), passed away at the age of 83 years. His main professional accomplishment was the leadership of the Cardiac Ultrasound (or 'Non-invasive') Laboratory at the Cardiac Unit of the Massachusetts General Hospital (MGH) in Boston, USA, which for >40 years trained many of the best and the brightest minds in echocardiography and was—and remains—a powerhouse of echocardiographic and cardiovascular research. His other main achievements were his many seminal publications defining the field of echocardiography, perhaps most importantly his textbook, which in its first edition in 1982 was titled *Cross-sectional Echocardiography*<sup>1</sup> and in its second edition<sup>2</sup> expanded to *Principles and Practice of Echocardiography* (1994). This majestic textbook, to which many of his disciples and co-workers contributed, remains unsurpassed 30 years later in its depth, scope, and detail as an attempt to develop and explain the whole of echocardiography from first principles.

Weyman was born in New Jersey in 1941, where he also studied medicine at the New Jersey College of Medicine. After residency at a New York hospital and 3 years as a military physician in the US Navy, he trained in cardiology at the University of Indiana in Indianapolis where Harvey Feigenbaum had developed an interest in the budding technique of echocardiography. Weyman was fascinated by the technique, which soon became very powerful and indispensable with the introduction of 2D or 'cross-sectional' echocardiography. During his years at the University of Indiana, he was involved in the development of one of the early 2D echocardiographs and conducted early studies of cardiac structure and function with the device. To a great extent, what we now consider the views and sequence of a 'standard' echocardiogram were defined by him in the late 1970s. A remarkable personal account of this time by him can be found on the American Society of Echocardiography's video channel.<sup>3</sup>

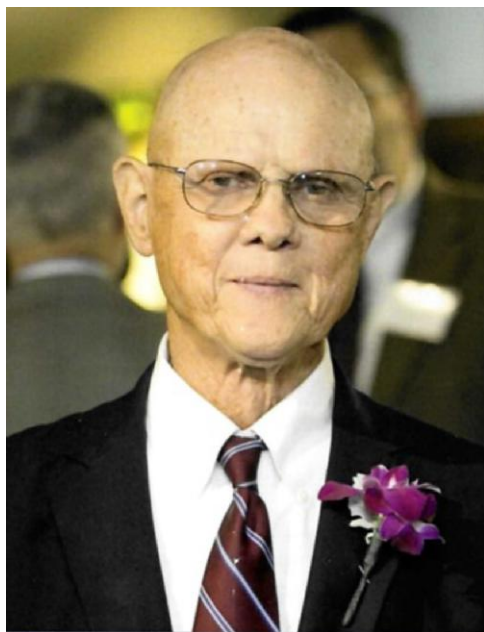
In 1980, he was appointed Director of the Cardiac Ultrasound Laboratory at MGH and Associate Professor of Medicine at Harvard University. He was chief of the cardiac unit at MGH (1994–96) and promoted to full professor at Harvard in 1995. He continued in this position until his retirement in 2022. Among his many professional achievements are his presidency of the American Society of Echocardiography (1991–93) and the foundation and first presidency of the National Board of Echocardiography. He received numerous awards, and in his honour, the Arthur E. Weyman Young

Investigator's Award of the American Society of Echocardiography was instituted. Already during his time in Indianapolis, he had authored several landmark articles, such as an initial description of pulmonary valve motion in pulmonary hypertension and other conditions,<sup>4</sup> septal motion in right ventricular volume overload,<sup>5</sup> negative contrast echocardiography in the detection of shunts,<sup>6</sup> and echocardiographic studies related to coronary artery disease.<sup>7,8,9</sup> However, the scope of echocardiographic research initiated and mentored by him dramatically widened after he started as the leader of the MGH laboratory. The following decades yielded numerous and profound contributions to echocardiography and cardiology in general. Examples (with some representative references) are the quantification of acute ischaemic changes and post-infarction remodelling of the left ventricle,<sup>9,10,11,12</sup> prediction of outcomes of balloon dilatation of mitral stenosis,<sup>13</sup> the discovery of the saddle shape of the mitral annulus with consequences for the definition of mitral valve prolapse,<sup>14,15</sup> the geometry and physiology of the left ventricular outflow tract and the mitral valve in hypertrophic obstructive cardiomyopathy,<sup>16,17</sup> the physiological background of the mitral pressure half-time and of flow indices of left heart diastolic function,<sup>18,19,20,21,22,23,24</sup> Doppler assessment of stenotic lesions,<sup>25,26,27</sup> the physics behind the colour Doppler representation of regurgitant jets,<sup>28</sup> colour Doppler assessment of regurgitant lesions,<sup>29,30,31</sup> and the development of 3D echocardiography by spatial reconstruction from 2D data,<sup>15,32</sup> as well as a multitude of other topics. The laboratory branched out early into stress echocardiography, intraoperative transoesophageal echocardiography, intravascular ultrasound, and myocardial contrast echocardiography. Generations of fellows from the USA, but also from other countries and continents, trained and worked under his leadership at the MGH Cardiac Ultrasound Lab. To name some of them, alphabetically, Vivian Abascal, Chunguang Chen, Christopher Choong, Linda D. Gillam, Brian Griffin, Mark Handschumacher, Judy Hung, Eric Isselbacher, Leng Jiang, Sanjiv Kaul, Mary Etta King, Robert A. Levine, Donato Mele, Mark Nidorf, John O'Shea, Aleksandar D. Popovic, Miguel Rivera, Leonardo Rodriguez, Anthony Sanfilippo, Marielle Scherrer-Crosbie, Samuel Siu, William J. Stewart, José Antonio Vazquez de Prada, Cedric Vuille, Neil J. Weissman, Susan Wiegers, Gerald Wilkins, and the authors of this obituary, all spent formative parts of their career in Weyman's laboratory. No fewer than seven presidents of the American Society of Echocardiography trained in his lab, more than in any other. This could

The opinions expressed in this article are not necessarily those of the Editors of *EHJCI*, the European Heart Rhythm Association or the European Society of Cardiology.

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**Figure 1** In memoriam Arthur E. Weyman.

not have been achieved without the dedicated help of excellent, bright, and deeply engaged sonographers such as Pamela Harrigan, Jane E. Marshall, and many others.

Weyman was an astute and often caustic discussant and commentator, but even those who did not agree with him (of whom there were a few) acknowledged his fairness and straightforwardness. He was also a source of incisive and original observations, some of them outright funny. He liked the data raw, not well done, and the phrase 'Let's look at the raw data' was a favourite. He once categorized researchers not up to his standards as 'bird watchers' (lacking hypothesis-driven science) and 'wave surfers' (always ready to jump from one fashionable topic to the next, more attractive one) and distinguished them from the true scientist, who does not let go of a subject until it is studied and explained in depth by an adequate general model. To quote him on this, 'Ask important questions and answer them carefully'. An example of his ability to rapidly condense a problem to its core was his commentary on the quest for diastolic function assessment by Doppler filling parameters that those are only indirect and partial consequences of diastolic function, and 'you can't make a chicken out of chicken salad'. Likewise, he described very well the challenges of subjective wall motion assessment, remembering an occasion where he and Harvey Feigenbaum in Indianapolis looked together at an echo, where Feigenbaum described with much enthusiasm seeing a wall motion abnormality, while Weyman drily commented that 'it looked perfectly normal to me'. In line with this, he often pointed out that 'it is the most difficult to read a normal study'.

For the fellows in his laboratory, the rigorous, but fair, and ultimately inspiring and invigorating process of presenting and discussing data and hypotheses in a demanding but rewarding environment proved invaluable—those who survived the preparatory sessions at the lab before congress presentations could be sure that no unexpected questions would emerge later at the public discussion of their data. All who went through his school were imbued with a spirit of respect for the stubbornness of raw data, for the scholarly process, and for good scientific habits. Despite the rigour of his tutelage, there was genuine fondness among his many trainees.

Arthur E. Weyman passed away in Boston, surrounded by his family. He is survived by his beloved wife, Jean, four children, and many grandchildren.

As former fellows who had the privilege to benefit from his personal kindness, professional rigour, and scientific scholarship, we will hold him in fond memory.

**Conflict of interest:** None declared.

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