Walter Ehrlich's recent paper on the discovery of the cardiac conduction system contains errors that were brought to his attention by reviewers of previous versions of the paper. I reviewed earlier versions of the essay for Circulation in 1989 and JAMA in 1991 and provided detailed evidence and multiple citations to refute his interpretation of the discovery of the sinus node. Ehrlich's paper was rejected by those journals, and it is apparent from the published version that he ignored most of my suggestions and those of the other reviewers. As a result, factual errors and misinterpretations are contained in the version published in the Perspectives.

When his paper appeared in the Perspectives, I contacted Edward Mormon, Ph.D., who Ehrlich thanked for his "support." I have known Ed Mormon for several years and value his friendship and respect him as a historian and archivist. We discussed my concerns regarding the content of Ehrlich's paper and the fact that the published version ignored criticisms provided to Ehrlich as outlined below. Despite the fact that Ehrlich was made aware of my concerns through discussions with Mormon in September 1993, he allowed the republication of his essay in the Japanese Circulation Journal to proceed. What follows is a refutation that I sent to the editor of the Perspectives on 7 October 1993.

This letter addresses the misconceptions in Ehrlich's paper as well as the failure of the peer review process in this instance. He closed his essay with the statement: "Truthfulness is, however, especially essential for all scientific disciplines: Truth is worth the battle." These principles also apply to historical papers. Reviewers, editors, and readers assume that authors submit papers that are factually correct, and if authors are informed of errors or misinterpretations they will correct them.

In his introduction Ehrlich implied that the traditional view that Keith and Flack discovered the sinus node is incorrect. To support this claim, Ehrlich cited his recollections of his medical training in Prague before World War II. He recalled that he was taught that "the sinus node was discovered by Aschoff and Tawara... while the atrioventricular node... [was discovered by] Keith and Flack." But he admitted, "I cannot now find this version of events in any book we might have used at that time."

Ehrlich's claim that his view is supported by Werner Spalteholz's anatomy textbook does not withstand scrutiny. The plates for Spalteholz's Handatlas der Anatomie des Menschen were engraved in 1895—1903, before Keith and Flack described the sinus node? It was translated into English by Lewellys Barker between 1900 and 1903, also before the description of the sinus node? This is why there is no mention or depiction of the Keith-Flack node in Spalteholz's anatomy! Ehrlich implied, however, that this omission supported his version of history—it does not. This was pointed out to him in the reviewers comments for the JAMA version.

In a further attempt to justify his view, Ehrlich used a rather unorthodox source: Mexican artist Diego Rivera's mural depicting events and individuals in the history of cardiology. After suggesting that the mural validates his claim that "a version (crediting the discovery of the sinus node to Tawara and Aschoff) exists," Ehrlich admitted that the mural "is also characterized by several erroneous attributions and omissions." Mexican cardiologist Demetrio Sodi-Pallares, a world leader in electrocardiography, claimed shortly after the mural was completed, "It has been known for many years that the stimulus which releases the necessary electromotive force for activation of the heart arises in the sinoauricular node (S-A node; node of Keith and Flack), then travels through the auricles to reach the auriculoventricular node (A-V node; node of Aschoff and Tawara), thence traverses the bundle of His..." To answer Ehrlich's ques-
tion regarding what "version" was taught in Mexico—surely it was this traditional account.

Ehrlich's attempt to support his claim by using selective quotations from contemporary authors simply demonstrates the vitality of this field of investigation around the turn of the century. Scientists and historians accept a concept articulated by cardiologist George Burch (and many others) that "scientific advancements reflect the contributions of many people." Keith and Flack never claimed that they alone made all of the discoveries that led to their recognition of the sinus node. Indeed, as Ehrlich noted, they cited in their 1907 paper the important contributions of Tawara, Wenckebach, and Hering.

Ehrlich does not believe that Keith and Flack deserve credit for discovering the sinus node. He is alone in this view. Thomas James, in his definitive study of "the development of ideas concerning the conduction system of the heart," claimed that Keith and Flack were "indisputably the discoverer[s] of the sinus node." This was just one of 15 citations supporting the traditional opinion that I supplied to Ehrlich as part of the Circulation review. But he chose to ignore those sources—none appeared in his list of references.

"We owe to Wenckebach," claimed Ehrlich, "the first morphological and functional characterization of the sinus node in man." But Wenckebach, himself, credited Keith and Flack with the discovery of the sinus node. He did not claim that the muscular area connecting the superior vena cava with the right atrium that he identified was the sinus node. British cardiologist Thomas Lewis later explained, "Since the actual pacemaker has been isolated (by Keith and Flack)...this bundle of muscle fibres (described by Wenckebach) has lost its original prominence in the corresponding discussions." In his comprehensive 1913 book on cardiac anatomy Viennese anatomist Julius Tandler unequivocally credited Keith and Flack with the discovery of "a special muscle formation," the sinus node. Wilhelm His, Jr. also attributed the discovery of the sinus node to Keith and Flack. The opinions of these European scientists, contemporary workers in the field, are surely authoritative.

Citing Thomas Lewis's 1925 monograph on the mechanism of the heartbeat, Ehrlich proposed that Lewis, through his writings, "might—directly or indirectly—be the source of the claim of Keith and Flack's priority..." If, as I suggested in my reviewers comments for the Circulation version of the paper, Ehrlich had looked at the 1911 first edition of Lewis's book, The Mechanism of the Heart Beat he would have found an excellent and unbiased summary of early work on the conduction system. Lewis devoted the first chapter of that book to "recent anatomical discoveries" and discussed the contributions of Gaskell, His, Kent, and Tawara as well as those of Keith and Flack.

It is surprising that Ehrlich persevered despite compelling evidence that his views regarding the priority of discovery of the sinus node were incorrect. By publishing his paper despite overwhelming proof from previous reviewers that his premise was wrong, Ehrlich exemplifies Julius Comroe's claim that "Almost any scientist working today can get his work published, somewhere, once he decides to 'write it up'... The main determinant of what is or is not published therefore seems to be the scientist, for it is he who decides to become or not to become an author." I would be glad to provide to interested readers copies of my reviews of the two earlier (rejected) versions of Ehrlich's manuscript.

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REFERENCES


Japanese Circulation Journal Vol.57, December 1993
Letters to the Editor

7. JAMAES TN: The development of ideas concerning the conduction system of the heart. Ulster Med J 1982; 51: 81—97

The above letter was referred to Dr. Ehrlich and Dr. Suma, who offer the following replies:

Japanese Circulation Journal Vol. 57, December 1993