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Dr. John H. Gibbon, Jr. and Jefferson's Heart-Lung Machine: Commemoration of the World's First Successful Bypass Surgery

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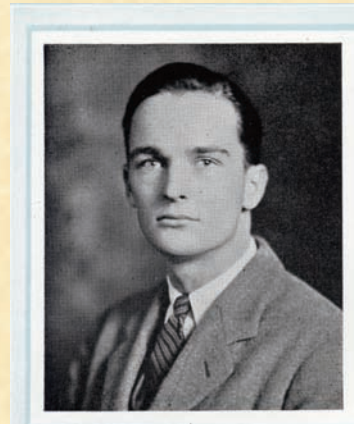


Dr. John H. Gibbon, Jr. and Jefferson's Heart-Lung Machine

Commemoration of the World's First Successful Bypass Surgery

*"Many are the trusts I've had
With the mortals here,
Their bodies offered to my trust,
To cut and sew and maybe cure."*

- John Heysham Gibbon, Jr., 1960



JOHN HEYSHAM GIBBON, JR., A.B. PHILADELPHIA, PA. ADA Princeton University

JACK is city born and bred, but lives in the country most of the time. He came to us from Princeton with a hard hat, smiling face, but no fur coat. We learned to know him best, however, in his inimitable soft falsetto, that much cherished crowning glory, impossible of adequate description. In his Junior year, Jack broke his leg, while courting on a flexible flyer and following this developed his own method of securing early mobilization. He believes swinging doors are easier to enter than others. Jack has many friends. We have all learned to like this boy with the perfect profile, blue eyes, and Uncle Walter's hair. It seems he never gets home without stopping at Gib's domicile, that repository of art, philosophy and good fellowship.

We admire and respect Jack for his scholastic attainments, his straightforward thought, action and speech, his moral and ethical code, to which he strictly adheres, his personality, his loyal friendship, and everything else which goes to make him so likeable, stimulating, and worthwhile to all who know him.

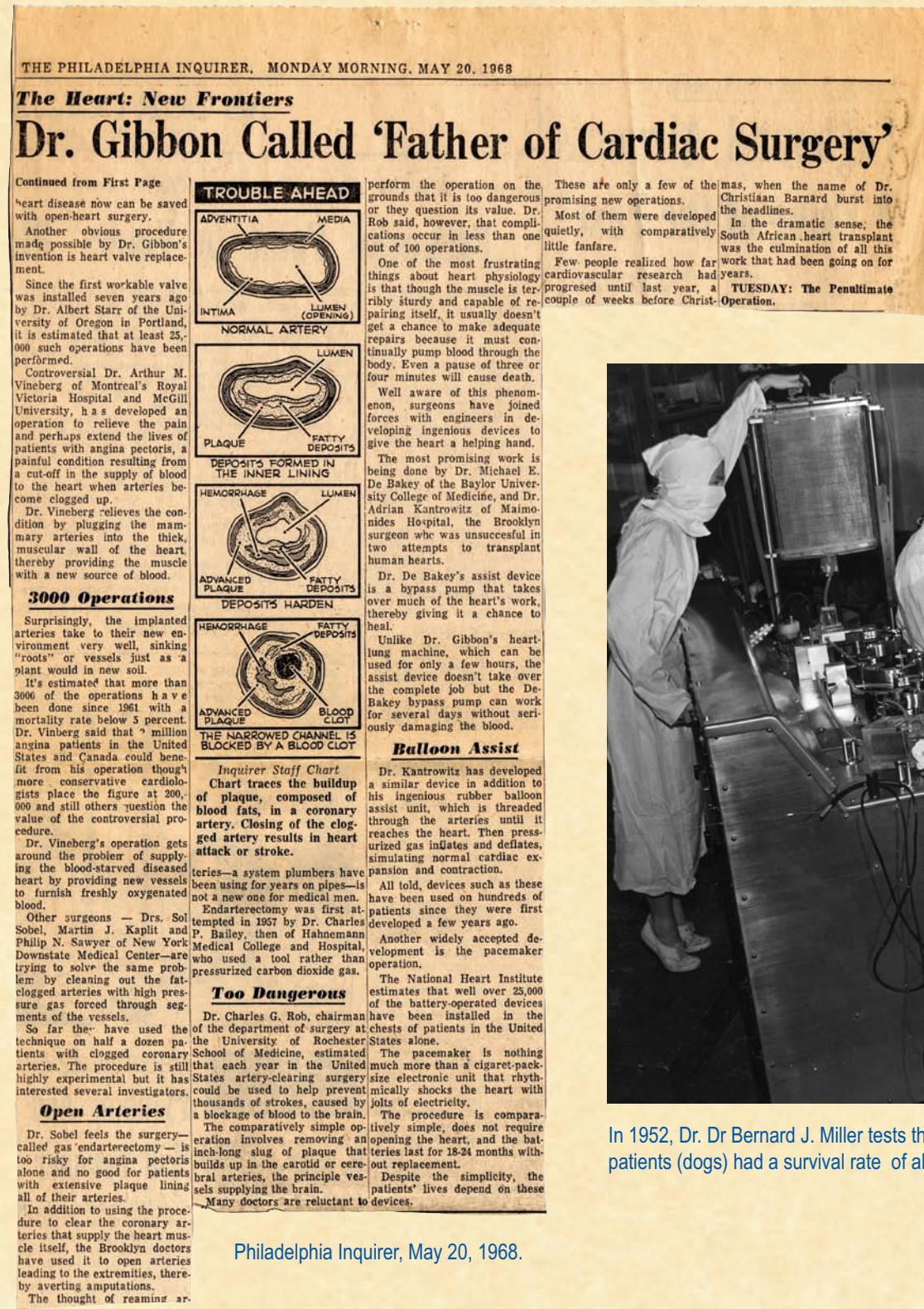
Bland, Schaeffer, Cromwell, Louns, and Academy Societies PENNSYLVANIA HOSPITAL, PHILADELPHIA, PA.

Excerpt from "The Clinic", 1927 JMC senior class yearbook.



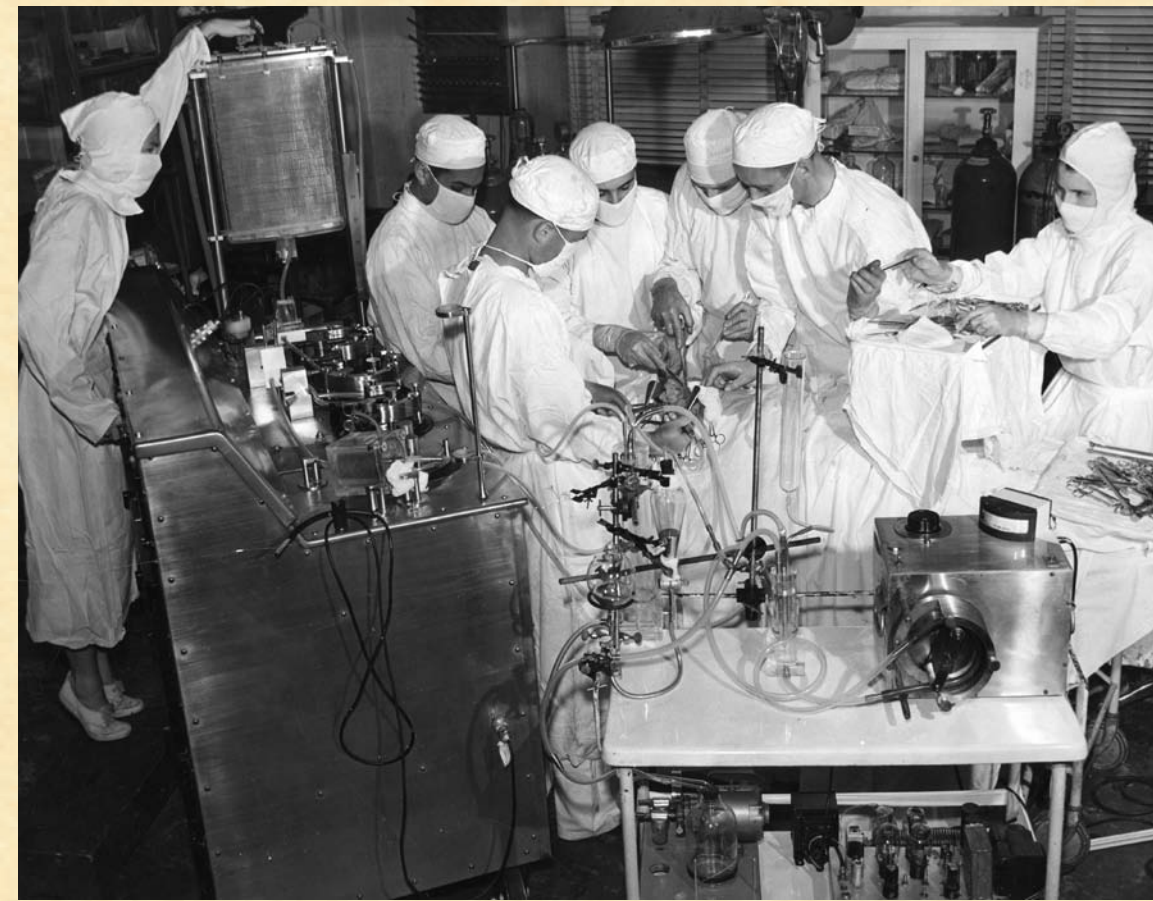
Dr. Gibbon (seated with arms folded) at Mechanical Heart Dinner, IBM Country Club, September 13, 1950. Seated Left to Right: Dr. Paul R. Hawley, Dr. E. Gordon MacKenzie, Dr. John H. Gibbon, Jr., Dr. John F. Rogers Standing Left to Right (IBM Engineers): Robert T. Blakely, G.A.V. Malmros, I. Smith Homans, Jr., J.H. Fraser.

On May 6, 1953 at Jefferson Medical College Hospital, Dr. John Heysham Gibbon, Jr., his staff, and with the help of his latest-designed heart-lung machine, "Model II," closed a very serious septal defect between the upper chambers of the heart of eighteen-year-old Cecelia Bavolek. This was the first successful intercardiac surgery of its kind performed on a human patient. Ms. Bavolek was connected to the device for three-quarters of an hour and for 26 crucial minutes, the patient totally depended upon the machine's artificial cardiac and respiratory functions. "Jack" Gibbon did not follow this epoch-making event by holding an international press conference or by swiftly publishing his achievements in a major medical journal. In fact he later recalled that it was the first and only time that he did not write his own operative notes (which were supplied by Dr. Robert K. Finley, Jr.). According to a recent biographical review by C. Rollins Hanlon, "Therein lies a hint of the complex, unassuming personality behind the magnificent technical and surgical achievement of this patrician Philadelphia surgeon."



Philadelphia Inquirer, May 20, 1968.

recorded the patient's waning vital signs prior to the procedure he thought, "If only we could remove the blood from her body by bypassing her lungs, and oxygenate it, then return it to her heart, we could almost certainly save her life." Despite a successful removal of large clots from the patient's pulmonary artery, she never regained consciousness. This "critical event" initiated Gibbon's determination to produce a heart-lung machine. Over the next two decades, most of his colleagues and superiors shared little hope in the prospect of designing a successful apparatus, but Gibbon cobbled together



In 1952, Dr. Bernard J. Miller tests the heart-lung machine which helped Gibbon perfect. The experimental patients (dogs) had a survival rate of about 90%.

fellows and employment that allowed him time for research. One of his supporter-colleagues was a researcher at Harvard, Mary "Maly" Hopkinson, whom he would marry and thus continue their work together mostly at UPenn's research laboratories. By 1939, they published results of total body perfusion experiments on a number of laboratory cats that survived by employing the early apparatus invented by Gibbon.

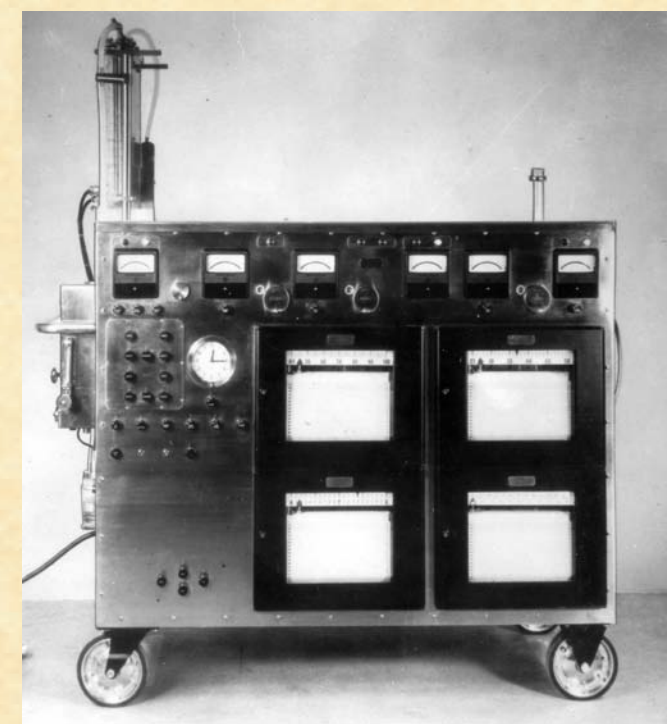
World War II interrupted Gibbon's research and separated him from his growing family for four years. He was made Chief of Surgical Services at the 364th Station Hospital in the Pacific Theater.

After the war, returning to Philadelphia, his alma mater offered him the position of Professor of Surgery and Director of Surgical Research, with the understanding that he would continue his pursuit of the heart-lung device. He accepted the JMC post in January 1946.

Through JMC's connections, IBM and its premier engineering department entered the picture and worked with Dr. Gibbon and his oxygenator to develop a larger device known as IBM "Model I." Maly Gibbon and the JMC surgical Residents were also deeply involved in the evolution of this huge apparatus (too heavy for the buildings' elevators) which proved repeatedly successful in experiments on dogs. But limitations on the machine for human patients existed and the decision was made to cannibalize parts of Model I for Model II which was ready for its first test in February 1952. Although the heart-lung device was fully functional, the first patient, a 15-month old baby, died during the operation. A post-mortem revealed a much larger defect than was suspected. After the triumphant Bavolek case in May, Gibbon employed the Model II on two more patients in July 1953. Both children subsequently died, prompting Gibbon to declare a year's moratorium regarding use of the heart-lung machine, pending investigations into solving clotting problems and blood loss. A redesign of the device resulted in Model III, delivered to campus in July 1954.



Caricature of Dr. Gibbon in 1948 JMC Yearbook.



Heart-Lung Machine.....

The Mayo Clinic, which probably had more cardiac cases than anywhere in the U.S., asked for plans for Gibbon's oxygenator which he shared with them in February 1953. The Mayo Clinic further developed the "Mayo Gibbon-type oxygenator" and for the next several years operated on hundreds of patients. The mortality rate for intracardiac surgery dropped from 50% in 1955, to 20% in 1956 and to 10% in 1957. A new age for cardiac surgery was underway.



Dr. Gibbon, Cecelia Bavolek and the artificial lung, ca. 1954

Gibbon received accolades and awards, continued his private practice and continued teaching at JMC until his retirement in 1967 as Samuel D. Gross Professor of Surgery. Although he was criticized for "abandoning" further use of the heart-lung machine after the deaths of the two children in 1953, his friends recognized that it was very much in his character not to put humans at risk, even when faced with the prospect of losing his life-long project to others.

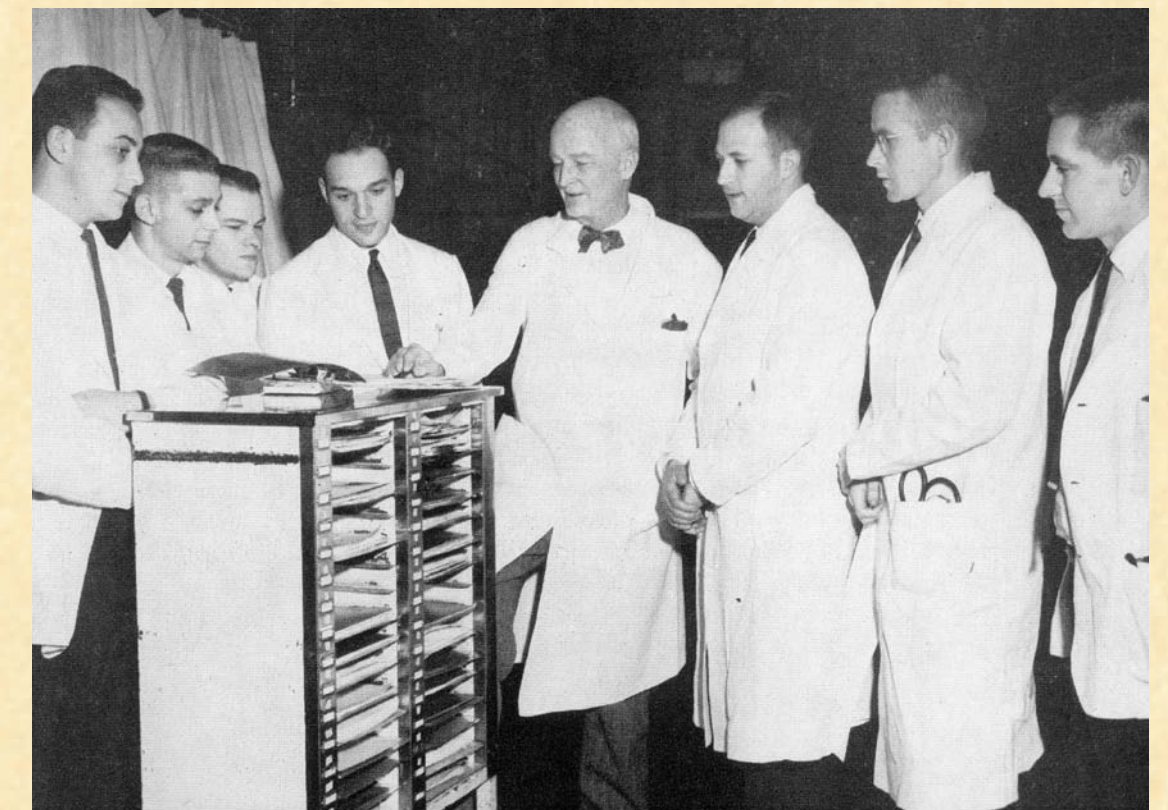
A daily cigarette smoker, like many of his contemporaries, Dr. John H. Gibbon, Jr., suffered a fatal heart attack at the age of 69 on February 5, 1973 while playing tennis.

Further Readings:

A Dream of the Heart: The Life of John H. Gibbon, Jr., Father of the Heart-Lung Machine. Schumaker, Jr., Harris B. Santa Barbara, CA: Fithian Press, 1999.

John Gibbon and His Heart-Lung Machine. Romaine-Davis, Ada. Philadelphia, PA: University of Pennsylvania Press, 1991.

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Dr. Gibbon on Ward Rounds with Students and Residents Herbert Cohn (3rd from right) and Howard Snyder (2nd from right), 1962