

Jacob Jongbloed (1895–1974): A Dutch Pioneer of Aviation Medicine

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Jacob Jongbloed (nick-named “Janus”) was a Dutch aviation physiologist and avid aviator. While lack of funding hindered his work tremendously, he nonetheless became an important figure in aeromedical research between World War I and II, chiefly in the field of the effects of acceleration on the human organism. Most of his work was published in Dutch and German journals, rendering him an unknown force in the English-speaking world. Only after World War II did he make a name for himself in Anglo-American circles, primarily due to his involvement in various international organizations dealing with aeromedical matters and his part in developing the first Dutch heart-lung machine. Due to his many posts and his scientific work in the field, he could be regarded as the “father” of Dutch aviation medicine.

Keywords: Jacob Jongbloed, Dutch aviation medicine, Soesterberg, Utrecht, altitude physiology.

JACOB “JANUS” JONGBLOED was born on March 11, 1895, in the Frisian city of Joure, c. 80 km northeast of Amsterdam in the Netherlands. After attending high school in the city of Heerenveen, he went on to college in Nijmegen, graduating in 1914 with training to become an elementary school teacher (4).

Aviation Interests

Just after finishing college, however, he was drafted into the infantry on August 1, 1914, at the outbreak of the First World War. He was transferred to the aviation department (Dutch: Luchtvaartafdeeling, LVA) of the Dutch army shortly after to become a pilot. When the Netherlands demobilized in 1916 he was made an officer (Lieutenant) of the reserve. He obtained his Fédération Aéronautique Internationale (FAI) pilot license on May 23, 1917, and thereafter served as a flight instructor at the LVA base at Soesterberg (15).

Between 1922 and 1923 he was a member of the stunt flying team “De vijf fingers an één hand” consisting of five team members from the LVA in Soesterberg. The team was given their name by a contemporary journalist who wrote that their formation flying was so well coordinated that they appeared like five fingers on one hand. They achieved some fame in the Netherlands and adjacent countries, having their own logo and even a calendar published on their behalf.

After his studies in medicine (see below) he soon combined active flying with aviation medicine. In 1929 he helped to set up an airmail route with the Dutch airline KLM to the Dutch East Indies (today’s Indonesia) (15).

For this he participated as copilot in a scouting flight. Jongbloed monitored and recorded various data of the crew for research on the hygiene of long-distance flying, such as the effects of fatigue or low temperature on the performance of the crew (10). He remained an Officer in the Reserve of the LVA until 1939 and participated in numerous air races and other flying activities. He also became involved in various administrative activities on the boards of sport flying associations (9).

Research in Aviation Medicine

In 1922 Jacob Jongbloed enrolled as a medical student at the University of Utrecht (Rijksuniversiteit te Utrecht). His enthusiasm for flying had left him with an ardent desire to pursue the subject at an advanced level, i.e., beyond mere flying. As he had experienced the medical problems in aviation first-hand, he developed a personal interest in the matter. His dedication can be illustrated best by his rigorous daily routine: in order to fund his studies (and to follow his passion of flying) he retained the post of flight instructor at Soesterberg airfield, giving lessons in the mornings and evenings while attending classes at the university during the day. In 1927 he obtained his doctorate of medicine; his thesis dealt with studies in hypoxia (10).

Upon graduation he became flight surgeon at Soesterberg and was consequently promoted to Captain of the Reserve. He held this post until 1931 when he decided that he wanted to get more involved in academic research. In 1929 he had already defended his Ph.D. thesis in physiology; his dissertation dealt with problems in high-altitude flying (4). His supervisor was A. K. M. Noyons (1878–1941), Professor of Physiology at Utrecht University since 1928. Jongbloed’s studies were on hypoxia, the effects of acceleration on the human body, and the possibility of decompression illness (DCI) in

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high-altitude flight. Experiments were conducted at Soesterberg, where a decompression chamber was available and where his fellow pilots volunteered as test subjects. Laboratory work was done in the university laboratory to which Noyons granted him access.

It appears that Jongbloed was the first person to actually devise a study of DCI in aviation. The Austrian physiologist Hermann von Schrötter (1870–1928) discussed this topic with regard to ballooning as early as 1902 in the German-speaking world (14) and the American Yandell Henderson (1873–1944) mentioned the possibility of DCI upon rapid ascent in an airplane in 1919 (5). However, both these scientists refrained from studying DCI because they did not consider it very likely to occur in the near future. Jongbloed, on the other hand, while not gaining significant new insights into the topic in his thesis, maintained: “Both are surely record-flights [current speed and height records], but what is today only possible with a specially constructed aircraft will be a common possibility in a few years’ time” (7).

Jongbloed’s thesis was in large part a summary of the state-of-the-art of contemporary aviation physiology, reviewing the work of Louis Bauer (2), Joseph Barcroft (1), and John Scott Haldane (3) and his methodology was heavily influenced by the latter. Though Barcroft and Haldane focused on mountaineering, Jongbloed was able to apply their work to aviation and thus make a valuable contribution to the field of aviation medicine.

Jongbloed’s research funding remained limited and in 1930 he took an additional part-time job at the department for otorhinolaryngology at the university hospital in Utrecht under Professor Franciscus H. Quix (1874–1946) (4). The following year he was given the post of “Conservator” in the Physiological Laboratory (an equivalent of “Demonstrator” at English universities). His activities were, by and large, restricted to teaching, but Noyons supported him and let him use the laboratory for research in his spare time.

Following on from his interest in hypoxia in both his M.D. and Ph.D. theses, Jongbloed began to focus on acceleration, particularly on the effect it has on heart perfusion. A centrifuge was available at Soesterberg and he used EKG, blood-pressure gauges, and X-ray to investigate the blood-flow in the carotid artery. His research soon began to show interesting results and he presented his findings at a physiology congress in Rome in 1932 (10).

In 1934 Jongbloed became a lecturer in aëro-fysiologie (aviation physiology) at Utrecht University under Professor Noyons. The post was established in 1922 at the request of the Ministry of Education, Art and Science and the Ministry of War for the Netherlands to establish a link between medical research and the medical service of the LVA (16). The post was initially held by Pieter Matthis van Wullften-Palthe (1890–1974), who wrote his Ph.D. thesis about aviation psychology in 1921 and who was also an officer of the reserve (4). This post gave Jongbloed a little more time and money for his research since he was now eligible for research grants.

In 1936 Jongbloed became advisor to the Ministry of Transport for aviation and aviation medicine (Dutch: Raad voor Luchtvaart en luchtvaartgeneeskundige van het Ministerie van verkeer en waterstaat). He began publishing a number of papers in scientific journals, the majority of them in Germany. Among them was the eminent physiology journal *Pflügers Archiv*, in which he published three papers together with Noyons in the 1930s, one on the effects of acceleration on the cardiovascular system and two on determining the human volume and specific weight under pressure. In 1936 he managed to go to the UK for a short period to meet Joseph Barcroft in Cambridge and discuss some aspects of oxygen affinity of hemoglobin, which led to his first—and for a long time only—paper in the English-speaking world. However, he remained largely unknown as an aviation physiology researcher outside German or Dutch circles, probably because this paper was on more general topics and not specifically on aviation medicine (8).

Jongbloed’s work in the 1930s, however, was still largely restricted to teaching and only Noyon’s friendship secured him access to the lab to do genuine research, which explains the many jointly authored papers at that time. Looking at his activities in the 1930s, it is apparent that his work suffered tremendously from low funds and limited opportunities to do his own research (he only received two rather small grants in 1935 to travel to Belgium and the USSR). When Noyons died in the summer of 1941, Jongbloed was immediately proposed as his successor by his colleagues. The board of Utrecht University was concerned that this might look like favoritism, especially as such accusations had been uttered before in the face of the close relationship Noyons and Jongbloed had. This discussion led to a delay in the decision process. Eventually Jongbloed was elected for the post in April 1942. On May 11, 1942, he gave his inaugural lecture on general human physiology, now his main field in the university (17).

His research in aviation medicine, however, came to a complete stop then. Since the outbreak of World War II and the following occupation of the Netherlands by German troops, many chairs at Dutch universities were restricted to teaching; research was only allowed where regarded as vital by the Germans. Surprisingly, the Germans did not seek Jongbloed’s services and he was not keen to provide them. German aviation physiologists were happy to have secured their turf and were not eager to invite competition for funds; hence nearly no foreign researchers were asked to contribute, aside from visiting fellows from other Axis powers. Just like the previous decade, the 1940s were again “lost” for Jongbloed, as far as aviation medicine was concerned (11).

Post World War II Research

After the war, Jongbloed started to work on general physiology, publishing an overview of human physiology in 1946, which became the standard textbook in the Netherlands and achieved 10 editions by 1967. Furthermore, in 1948 he started to collaborate with C. L. C. van Nieuwenhuizen on a heart-lung machine leading

to a prototype the following year. In 1951 he licensed an improved model to the company Van Doorn to put it into serial production. In 1956 the first heart surgery with this machine was carried out in Utrecht (17). His machine was met with much interest among international surgeons and he thus spent 3 months in the summer of 1951 in South Africa lecturing on its technical details (12).

From 1955 to 1965 he also ventured into sports medicine and industrial hygiene, an activity largely arising from Noyons' field of work. Jongbloed counseled many Dutch athletes and sports associations and prepared them for international competitions. He chaired the Dutch Federation of Sport Physicians and in 1964 he received the golden badge of honor from the Dutch Sports Federation for his long medical support to Dutch athletes (17). Furthermore, the Physiology Department of the University of Utrecht installed the "Janus Jongbloed Research Center" for Sports Medicine in 1987 to honor his name and his work in the field. [The center was merged with other institutions in 1995 and consequently no longer exists under this name (e-mail from Mr. Marten Tromp, archivist at the University of Utrecht, February 3, 2009).]

While his genuine work in aviation medicine was not revived after the war (beside popular articles in newspapers and a series of two-page articles on issues in space medicine in a Dutch medical journal), Jongbloed nonetheless played an important role in the field in the Netherlands and beyond. In 1952 he was asked to chair the National Center for Aviation Medicine at Soesterberg, a position he held until his death in 1974. Also in 1952, he joined the Aeromedical Panel of the NATO "Advisory Group Aerospace Research and Development" (AGARD) and became a member of the commission to overlook the Dutch National Aviation Academy. Furthermore, he became chairman of the First European Congress of Aviation Medicine held in Soesterberg in 1956 (4).

Among Jongbloed's students was Peter H. Kylstra (1924–1981), who later claimed some fame in physiology of his own and who authored the many obituaries on Jongbloed for journals and newspapers upon Jongbloed's death (he became Jongbloed's assistant in 1951 and, after Jongbloed retired, Kylstra became director of the university's museum). Another student of Jongbloed's was Martin P. Lansberg who, under the supervision of Jongbloed, wrote his Ph.D. thesis on space medicine in Utrecht in 1958. This thesis was translated from Dutch to English and published by Elsevier 2 years later as "A Primer in Space Medicine" and became a widely noted book on the topic. Lansberg later went to the United States to work for the Naval School of Aviation Medicine in Pensacola, FL, and NASA.

Jacob Jongbloed retired from his professorship in 1965 and died July 21, 1974, in Utrecht. He is now commemorated as the "founding father" of Dutch aviation medicine, for he gave Dutch aviation medicine a face for so many years in its infancy and chaired almost all the important commissions and institutions involved in the topic.

Honors

The many honors to Jongbloed's credit give evidence to this appraisal. Among others, the FAI awarded him the "Paul Tissandier Diploma" in 1959 (4). From 1960 to 1974 he was also Member of the International Academy of Aviation and Space Medicine (IAASM) (6). In 1984 the Dutch Association for Aviation Medicine (Nederlandse Vereniging voor Luchtvaartgeneeskunde) established the "Jongbloed fund" to subsidize aeromedical research and to honor Jongbloed's name (13).

Many publications on aviation medicine and other fields in human physiology stand to his credit, most of them in Dutch or German journals. This led to his rather low level of recognition among international colleagues. Sadly World War II severely hindered his success in aviation medicine. He had to decline an invitation to a congress at the Institute for Aeronautical Sciences in New York in 1939, for example, due to the outbreak of the war (10). He consequently remained largely unknown outside the Netherlands and Germany in his most productive years.

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REFERENCES

1. Barcroft J. The respiratory function of the blood. Vol. 1: Lessons from high altitudes. Cambridge: Cambridge University Press; 1925.
2. Bauer LH. Aviation medicine. Baltimore: Williams & Williams; 1926.
3. Haldane JS. Respiration. New Haven: Yale University Press; 1922.
4. Haneveld GT. De geschiedenis van de luchtvaartgeneeskunde in Nederland [The history of aviation medicine in the Netherlands]. Soesterberg: Nederlandse Vereniging voor Luchtvaartgeneeskunde; 1987:222–223, 225–226. [In Dutch.]
5. Henderson Y. The physiology of the aviator. *Science* 1919; 49: 431–41.
6. IAASM membership lists. Dayton, OH: Wright University Library. Aerospace Collection, FSC 40, Series 3, Subseries 2, Box 22, Folder 10.
7. Jongbloed J. Bijdrage tot de physiologie der vliegers op grote hoogten [Contributions to the physiology of aviators at high altitudes]. Utrecht: Bruna; 1929: 2. [In Dutch.]
8. Jongbloed J. Spectrophotometer investigation into the differences between foetal and maternal haemoglobin in man. *J Physiol* 1938; 92:229–31.
9. Jongbloed J. Flitsen uit mijn leven als militair vlieger van 1916 tot 1939 [Flashes from my life as military aviator from 1916 to 1939]. In: Hartong FL, Hartong-de Roode JAW, eds. Gedenkboek uitg. ter gelegenheid van de 20ste Reunie van Oud Soesterbergers, 7 juli 1974, geschreven door hen die het beleefden, 1912–1940. Breda: Brabantia Nostra; 1974:37–40. [In Dutch.]
10. Kylstra PH. Jacob Jongbloed 1895–1974, fysioloog. Manuscript in Dutch, n.d. Utrecht: Utrecht University Museum. Document Collection, Box 102, Folder 0285.9443.1; pp. 2-3. [In Dutch.]
11. Lünen Av. 'Splendid isolation'? Aviation medicine in World War II. In: Maas A, Hooijmaiers H, eds. Scientific research in World War II. London: Routledge; 2009:96–108.
12. Note [editorial]. *Passing events. S Afr Med J* 1951; 25(6):418.
13. Prof. dr. J. Jongbloedfond's website. Retrieved 8 July 2010 from <http://www.jongbloedfonds.nl/>.
14. Schrötter Hv. Über Höhenkrankheit mit besonderer Berücksichtigung der Verhältnisse im Luftballon [On high-altitude sickness with special regard to the conditions in a balloon]. In: Anonymous, ed. Protokoll über die vom 20. bis 25. Mai 1902

JONGBLOED DUTCH PIONEER—VON LUNEN

- zu Berlin abgehaltene dritte Versammlung der Internationalen Kommission für wissenschaftliche Luftschiffahrt. Strassburg: DuMont-Schauberg; 1903:102–129. [In German.]
15. Van Limburg Stirum LC, ed. *Nederlandsche Luchtvaarders* [Dutch aviators]. Utrecht: Bruna; 1937:67. [In Dutch.]
 16. Various authors. *Stukken betreffende de privatdocenten in de aero-fysiologie en hygiene der luchtvaart, 1922-1942* [Documents concerning lecturers in Aviation Physiology and the Hygiene of Aviation of the curators of the University of Utrecht, 1922–1942]. Box 59, Folder 1134. Utrecht: Het Utrechts Archief [Utrecht City Archive]. [In Dutch.]
 17. Various authors. Dutch paper clippings on Jacob Jongbloed; c. 1950–1974. Utrecht: Utrecht University Museum; Document Collection, Box 102, Folder 0285.9443.2 [In Dutch].