

## **EDITORIAL**

### **William Hewson, Thymicologist; Father of Hematology?**

By WILLIAM DAMESHEK

A GOOD MANY YEARS AGO, when going by train was still reasonably common, I met my famous townsmate Professor Edwin M. Cohn on the afternoon express from Boston to Chicago. After a couple of rounds of his favorite sherry, he was well relaxed and in an affable mood. We fell to talking about medical greats in the field of the blood, and inevitably the conversation centered on one of Dr. Cohn's passions—William Hewson (1739–1774), the 18th century physiologist. He urged me to read his books and if possible to pick up one of the original texts of the *Experimental Inquiries*, which he had in all its variations and editions. This conversation actually started me on my quest of rare works on hematologic subjects and in the course of time I not only had *Part the First* of Hewson's *Experimental Inquiries into the Properties of the Blood* (printed for T. Cadell in the Strand, MDCCCLXXII, but *Part the Second* and *Part the Third*; the latter two volumes appeared in 1774 and 1779. It is of interest that *Part the Second* was dedicated to our own Benjamin Franklin, Esq., LL.D., F.R.S.

The subtitles of these three remarkable volumes are of interest: "*Part the First* Being a Second Edition of an Inquiry into the Properties of the Blood. With Remarks on Some of its Morbid Appearances; and an Appendix, Relating to the Discovery of the Lymphatic System in Birds, Fish, and the Animals called Amphibious." "*Part the Second*. Containing a description of the Lymphatic System in the Human Subject, and in other Animals. Together with observations on the Lymph, and the changes which it undergoes in some diseases." "*Part the Third*. Containing a Description of the Red Particles of the Blood in the Human Subject and in other Animals; with an account of the Structure and Offices of the Lymphatic Glands, of the Thymus Gland, and of the Spleen. Being the remaining part of the observations and experiments of the late Mr. William Hewson, F.R.S., by Magnus Falconer, Surgeon and Teacher of Anatomy." William Hewson died at the age of 35 at the peak of his abilities, death resulting from an infection incurred at a post-mortem dissection.

The words "Thymus Gland" on the title page of *Part the Third* caught my eye as I was thumbing through this volume on a rather drab Sunday afternoon during the Christmas recess. Having recently become absorbed in that remarkable little organ and having participated in a highly stimulating symposium on the thymus in October, 1962 (The First International Thymus Conference, Minneapolis, directed by Dr. Robert Good), I jumped at the word and looked into the book to see what Hewson had written. The results of this mild research were indeed startling. Here were set forth the lymphocyte distributing function of the thymus, the reason for its gradual atrophy in early adolescent life and perhaps even a preview of Burnet's recent concept of "first" and "second level" lymphocytes. And this in 1779—almost

200 years before the first thymus conference, and actually as fresh in its outlook as anything that had been reported there!

Regarding the thymus, Hewson wondered—as we do now—whether it should be defined as a gland, especially since an excretory duct had never been found. When he passed a ligature around the thymus in the living animal, many lymphatic ducts became visible, some quite large, and these seemed to contain chyle. Microscopically, using a lens with a  $1/23''$  focus, the fluid seemed to be identical with that in the lymph glands and there were “a great number of small, white, solid particles, exactly resembling in size and shape the central particles in the vesicles of the blood, or such as are found in the fluid of the lymphatic glands.” From these experiments he concluded that the lymphatic vessels were probably the excretory ducts of the thymus.

When he incised the thymus, a “white thick fluid” oozed out, exactly as in the lymph nodes, and when this fluid was diluted with serum and Glauber’s solution it contained “numberless small particles precisely corresponding with those found in the lymphatic vessels, passing from the thymus; and with those found in the fluid of the lymphatic glands.” Hewson concluded that “one use of the thymus is to secrete from the blood a fluid containing numberless solid particles similar to those in lymph nodes; and that the lymphatic vessels arising from the thymus convey this secreted fluid through the thoracic duct into the blood vessels, and thus become the excretory ducts to this gland. That the structure and uses of this gland are similar to those of the lymphatic glands, to which it may be considered as an appendage.”

Finally, he speculated that “this curious circumstance of the thymus being largest in the earlier periods of life, and becoming gradually less as the animal advances towards maturity, constantly takes place in the human subject. The inference naturally drawn . . . is that the thymus is necessary to perform an office requisite in the foetus state and in the early part of life. . . .”

Why then should the thymus be large in the foetus and become smaller? “The reason . . . is, we conceive, that it may act as an auxiliary to the lymphatic system, for the purpose of forming more of the central particles of the blood, than could have been made by the lymphatic glands alone during that time, when nature wants them most. . . .”

“If the thymus gland were wanting in the young animal, the lymphatic vessels and glands must have been made considerably larger than they now are, or out of proportion to the other parts of the body; otherwise the animal could not have been duly nourished, and the purposes of nature must have been defeated; but by the assistance of the thymus, a sufficient quantity of the central particles, to be converted into blood necessary for the growth of the animal, are formed, and nature at the same time preserves a just proportion in the lymphatic system; then, as the animal becomes larger, and of consequence, the lymphatic system more extended, that alone and unassisted can now furnish a sufficient quantity of these particles for the growth of the animal and repair of the constitution; the thymus being no longer necessary and occupying a space which by this time will become useful for



William Hewson (1739–1774)

other purposes, the size of it will be gradually diminished, and its parts absorbed into the habit.”\*

Hewson’s experiments on the thymus seem to have escaped attention in the mounting bibliography of that recently renascent organ. Thus, his observations of the “central particles of the blood” with their solid “core” that we now call nuclei, and his suppositions that the “solid particles” of the thymus (which we now call lymphocytes) are the same as those found in the lymph nodes, the thoracic duct, and the spleen were pioneering ones and made with the greatest difficulty using tiny microscopes. But his physiologic experiments are even more startling in their design and execution as were his logical deductions which only now, after almost 200 years, seem to be gaining general acceptance. Thus, his notion that the thymus was essential to embryonic and early post-natal life, for the nutrition of the body and for the distribution of

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\*George Sullivan, who edited the Sydenham Society’s *The Works of William Hewson*, F.R.S., London, 1846, has the following to say in an editorial note relating to this passage:

In the Appendix to the English Edition of Gerber’s “Anatomy” pp. 95–100, the reasons are detailed which induce me to believe, that the fluid of the thymus differs only from that of the lymphatic glands in containing more particles; that these have the characters of nuclei or immature cells; and that both the lymphatic glands and the thymus are organs for the elaboration of nutritive matter, the activity of the thymus being most remarkable at that period of the economy when growth and nutrition are most active. Whether the ultimate destination of these embryo cells be simply to serve as central particles for the formation of blood-corpuscles, as Hewson supposed, or for the foundations, either mediately or immediately, of cells concerned in growth and nutrition generally—is another question deserving of further inquiry.

lymphoid tissue throughout the lymphoid tissues, corresponds with some recent ideas of the trophic (nutritive) function of lymphocytes and of DNA distribution.

There is no place in this little discussion to dwell on some of Hewson's other and better known studies, most of them to be found in these three volumes on *Experimental Inquires*. His experiments on coagulation mechanism demonstrated that it was fibrin which was responsible for the final act of clotting. He was one of the first to describe the lymphatic system accurately in a host of animals and to carry out a series of experiments on the lymph which showed the absorptive function of the lacteals "on the extremities of the villi." He demonstrated that the "red particles" of the blood in the human subject were not spherical, as Leeuwenhoek had stated, but were flat and tended to pile up like coins in blood that was diluted with serum. Although at times he seemed to confuse the red cells with the lymphocytes, it is apparent that his descriptions of the cells found in thymus, lymphoid tissues, spleen and thoracic duct were amongst the first to have been made of these interesting cells. The scope of Hewson's experiments in such a brief career, encompassing as they did most of the major fields of what we now call hematology, is truly amazing. If anyone deserves to be called the "Father" of Hematology, it would seem that this brilliant and lucid young experimenter should be given this long neglected honor. When Dr. Cohn spoke enthusiastically of Hewson some 15 to 20 years ago, I listened politely; now that the thymus has again been revived, I must belatedly share his prescience. In fact, Dr. Cohn may have understated the case for Hewson, the first "complete" hematologist.

*William Dameshek, M.D., Director, Blood Research Laboratories, New England Center Hospital, and Professor of Medicine, Tufts University School of Medicine, Boston, Mass.*