

that at last that which he saw interiorly he saw actually, phenomenally.

This is the miracle. Just as the Lord performed the greatest of all miracles when He took upon Himself a human body that He might make the Word flesh, so this opening of Swedenborg's spiritual eyes exceeded all miracles because by that means the Lord revealed the Glorified Human as it could not have been revealed in the Christian Church, and as it is now revealed in the Writings.

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## THE SPLEEN

Adapted from Swedenborg's *Animal Kingdom*

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The spleen is a viscus of a blackish red color to the left of the stomach, under the diaphragm and close to the lower ribs. It is surrounded by two serous coats from the peritoneum. Interiorly it is entirely made up of little compartments and follicles of different shapes, connected together by strong fibers. It is divided into innumerable cells which are continuous productions of the common internal membrane of the organ. The venous ramifications appear to be surrounded by the same membrane. The cells intercommunicate by common orifices, causing the spleen to represent one continuous cavity with lesser and least divisions. Nerves and arteries pass into this tissue, and veins and lymphatics pass out of it. The common capsule conducts and encloses them as soon as they enter. Numerous nerves from the splenic plexus accompany the vessels, especially the arteries.

Considering its size, its supply of blood is large. The splenic artery arising from the trunk of the aorta by the left branch of the coeliac runs along the upper border of the pancreas and then, dividing into several branches, sinks into the spleen. As soon as these branches enter, they split into fine threads. Of these threads, one part ramifies on the cellular walls and there terminating opens into the cavities; another part ends in certain spheroidal granules or vesicles; and still another is reflected to the surface of the organ.

The veins divide and ramify in like manner, being everywhere perforated with little foramina. Between their ramifications is an extravasation of blood which is retained in a kind of downy and delicate tissue which extends through the whole spleen. The ramifications increase from small to large and at last all at once rise into a great vein termed the splenic vein, which runs along the lower border of the pancreas and discharges into the portal vein of the liver.

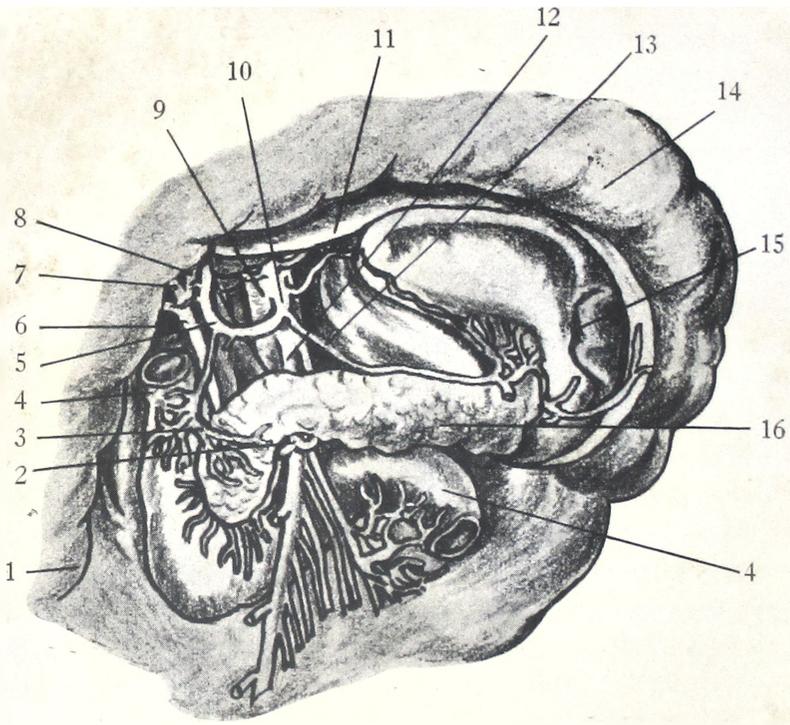
In oxen and sheep there are no venous ramifications, but as soon as the splenic vein enters the organ, then, after a course of half an inch or an inch, it disappears, leaving nothing but a canal perforated on all sides. The beginning of this canal still exhibits some remains of venous coats, but the canal form is soon lost, and then we find nothing but sinuses.

The spleen has no excretory duct, but it has lymphatics. Running along the delicate membranes of the cells, veins, and capsule, these lymphatics mount to the surface, and then, in the manner of drains, pass through the omentum and mesocolon to the receptaculum chyli.

The spleen has been removed from living animals with no other result than a modification of the appetite. Some dogs, after the removal of the spleen, displayed a voracity of appetite, but there was no disturbance of the digestive system. It has also been observed that in dogs, after the removal of the spleen, there is a constant desire to micturate. The spleen has also been removed from human beings, who yet have continued in good health for years. There are also cases of congenital absence of the spleen without anything special being observed during life.

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Whatever the members of the body desire and demand from the universal mass of the blood, is cheerfully accorded them even if from the utmost boundary of the body. The heart and lungs receive the whole of the blood that they may convoke and examine the supplies and may then distribute them throughout the kingdom. To the cerebrum and cerebellum, the medulla oblongata and the spinal cord, is offered the choicest blood, breathing fresh life and suitable for serving the eminent functions of those organs.



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| 1 Ascending colon                       | 9 Abdominal aorta                      |
| 2 Inf. pancreatico-duodenal artery      | 10 Coeliac axis                        |
| 3 Sup. pancreatico-duodenal artery      | 11 Under surface of left lobe of liver |
| 4 Duodenum                              | 12 Sup. mesenteric artery              |
| 5 Hepatic artery                        | 13 Splenic artery                      |
| 6 Ductus choledochus (common bile duct) | 14 Transverse colon turned up          |
| 7 Cystic duct                           | 15 Spleen                              |
| 8 Hepatic duct                          | 16 Pancreas                            |

To the numberless glands in the head and thorax is delivered the serum intended for secretion, that is, the salivary serum.

To the spleen, pancreas, liver, and gall bladder is assigned the sluggish and impure blood, suitable for the inauguration of the new chyle. A like blood, capable of marriage with the chyle, is delivered to the stomach and intestines. The kidneys receive the effete or urinous serum thrown out by the former organs. The generative members and, in women, the placenta also and the fetus, receive a blood full of spirit and life. All the other members receive such blood as serves their purpose and suits their office.

As an entire viscus demands and receives from the whole mass a quantity and quality of blood equal to that which it expends, so every one of its parts, even to the very least, makes the same demand of its viscus, so that at last the simplest fiber is the prime cause of the whole effect. This fiber and the spirit which it carries is the sole ruler in the whole body, there being nothing else that is active and living. And since this fiber is determined according to every intuition of the soul, it follows that the commencement of the operations here treated of, springs from the soul itself. Hence, it is not the viscus regarded as a compound that causes the mass to supply the due quantity and quality of blood, but the soul acting in the simplest fiber. Such therefore as the soul is, such must be the series of causes all the way to the ultimate effect.

Each organ derives its power of action from the nature of its office; for its office determines its construction, situation, connection, and potency. Hence it follows that it also determines an incitation of each member and each part thereof to the performance of its offices, and an invitation of such blood as suits the office. The invitation is a kind of attraction that may be likened to the attraction of a siphon; for when the minutest organs expand by means of the fibers, they invite the blood that is waiting in the adjacent branches, just as the vesicles of the lungs invite the air. Incitation, on the other hand, is produced by the motion of contraction when these same little organs compress themselves and express the fluid they have lately invited.

The use both determines and unfolds the reason of the structure, for every organic form resembles the use inscribed upon it; but the structure, apart from its use as a guide, does not give a reason for itself except as this can be interpreted by examining

numerous effects and their causes. In the spleen, the eye sees nothing more than a structure and complex of fibers and vessels. When it is removed, its absence is scarcely to be recognized. This, and the fact that it has no observable excretory duct, has led to many random conjectures as to its use. That it has a use is certain. Nature never produces even the smallest point without having an end or use in view.

From a consideration of its structure, it is evident :

FIRST, that the spleen pours out the whole of its arterial blood into its cellular compartments. The method of purifying the blood in the spleen is a method not in use anywhere else in the body excepting in the penis. It consists in the fact that the spleen, by what in other parts is called extravasation, extrudes all the arterial blood into certain little membranous crypts or cellular down ; \* for none of the arterial blood escapes from the organ (excepting perhaps by the branches reflected to the surface). After the above-mentioned extravasation, the blood is forced into the veins and thus converted into blood of a different kind, not properly venous.

SECOND, that it there turns it over and kneads it. This is a necessary consequence of its very texture. For certain filaments are continued from the proper coat of the spleen to the walls of these cells. Moreover, quasi-muscular fibers run transversely from wall to wall ; and there are also vessels and fibers which, being inserted into the walls, alternately contract and expand. Hence each cell must necessarily contract and expand in like manner. So likewise must the vascular extremities which are conglomerated into spherules, and the sheaths which grow from and are implanted in those cells and tissues. For if we admit the expansion and contraction of the spleen itself and its vessels and fibers, we can have no good right to deny the same to the cells which are composed entirely of a production of the exterior coat and of vessels and fibers. If then there is an alternate expansion and contraction, it follows that there is a turning over and kneading of the enclosed blood.

THIRD, that the veins absorb a part of the blood by their numerous orifices ; for the veins, particularly the venous trunks, are perforated on all sides with open foramina. This is plainly visible in oxen.

\* The splenic pulp.

FOURTH, that the lymphatics claim a part. The lymphatic orifices by which the humor is taken up and pumped out toward the surface, seem to be more numerous than can ever be detected by the microscope. The lymph appears to escape by the common capsule which surrounds the vessels and nerves, and also by the venous coats, these being continuous with the capsule. It is also probable that the cellular tissue itself throws out a part into the omentum.

Thus, the great splenic vein and a host of lymphatics are the spleen's excretory ducts.

The uses of the spleen as manifested by its structure, are to draw off the impure blood from the trunk of the aorta; to break it up and prepare it so that, in the first place, it may serve the liver for its purificatory office and as a menstruum for refining the chyle, and also may serve the stomach and likewise the mesentery, as a similar menstruum; in the second place, that it may serve the omentum; and in the last place, the kidneys; not to mention numerous subordinate uses.

*That the spleen draws off the impure blood from the trunk of the aorta.* This is proved: 1. By the position of the coeliac artery close under the diaphragm and between the thorax and abdomen. Thus it guards and opens the first door to the abdominal viscera. 2. By the nature of the aortic blood. Since the brain and the thoracic region have taken up the choicest blood, what remains in the aorta when it pierces the diaphragm is comparatively impure. 3. By the nature of the blood which is carried down to the kidneys. The renal arteries which draw off the feculent part of the serum, come off from the aorta a little below the splenic artery. Thus, while the kidneys carry off the urinous portion of the serum, impurities are first drawn off by the splenic artery, and this lest an undue quantity of impure blood go to the kidneys and clog their operation. This seems to be the reason why dogs, after excision of the spleen, have a constant desire to micturate. 4. By the nature of the blood carried down to the organs of generation. The spermatic arteries go off from the aorta a little below the renals, and since they supply the organs of generation, they demand a most refined blood. This demand cannot be met unless the blood has been previously purified by the coeliac and renal arteries; 5, and to the muscles of the lower region; for all muscles subject to the gov-

ernment of the will require a cleaner and more lively blood than do the viscera.

Add to this that in order that the purificatory viscera—the spleen, the pancreas, and the liver—may draw off impurities and invite the blood suitable to their offices, the coeliac artery comes off from the trunk not obliquely but at right angles; while the arteries destined for the voluntary muscles come off obliquely; and this, in order to prevent the aorta from injecting the blood stream into the viscera with the force of its own torrent, and intruding it uninvited; and to allow it to be drawn out and invited by the viscera themselves, as the nature of the use requires. Nor must it be forgotten that the splenic artery goes to the spleen in a tortuous and serpentine manner like the internal carotid in its progress to the cerebrum; and that this breaks the impetus of the blood and gives the pancreas and spleen the opportunity of selecting and attracting it.

*That the spleen breaks up the blood and prepares it.* This is effected by means of the pancreas which clears away the viscid and grosser matters and sends them off by the pancreatic duct. The splenic artery passes over the upper border of the pancreas, and gives to the latter many branches. These penetrate the pancreatic glands, and from them these glands secrete the pancreatic juice. Thus, the pancreas is an intermediary between the coeliac artery and the spleen, and commences the work which the spleen continues.

*It is effected also by means of the omentum.* The splenic artery sends shoots not only to the pancreas but also to the omentum. Thus it may be concluded that it there deposits the fattiness of the blood; for its branches penetrate deeply into the omentum.

The spleen does the rest: It takes up the blood now separated from the serum, it being a peculiarity of the spleen that it receives only purely globular or red blood. Indeed its fabric does not admit of any other fluid; for the serum, rough with saline spicula, easily becomes viscid and would break up the delicate cellular down of the spleen. After throwing the blood into its cells, it rolls it about, works and reduces it, lashes it from wall to wall, gently thrashes it, throws it from cell to cell, and in every cell subjects it to a similar treatment. Thus it separates the globules from each other, combs down and wipes away accretions, tears asunder

connected portions, and thus breaks up, loosens and sets free all clots and irregular pieces, leaving a free and unfettered blood consisting of pure globules, and yet the legitimate with the spurious, the soft with the hard, and the young with the old.

The fabric of the spleen shows that it cannot break up the blood globules but can only separate those which are sticking together; for its cellular spaces are too large to act upon the globules individually; besides which, the cellular walls are not furnished with motive fibers but are soft and yielding. The breaking up, therefore, must be accomplished in the extreme arterial capillaries, the glands, and particularly the bile pores of the liver which are furnished with tritutory apparatus like little intestines.

Thus prepared, the blood is then a menstruum for refining, impregnating, inaugurating, and copulating the new chyle. By the splenic vein, the spleen sends this menstruum back to the pancreas which pours in a similar menstruum and propels it to the portal vein of the liver. For a similar use, it insinuates a part of it by short veins into the stomach. In this way the spleen assists both the liver and the stomach. It subserves the liver by supplying it with a blood separated into globules; for, as shown in the chapter on the liver, that organ acts upon the blood globule itself.

As to the lymph, the spleen dispenses this in a different manner. Bringing it to the surface through the pores in the capsule and in the venous coats, it transports it to the omentum, and thereby to the receptaculum chyli.

The activity of the spleen is very similar to that of the pancreas and liver. Like those organs, the spleen contracts and constricts its artery and vein. The cells and glandular acini then open and invite the advancing blood to come into their recesses. During this time, the foramina leading into the veins appear to be closed; but when the spleen and vessels expand, the cells and acini contract. That there is such an alternation of expansion and contraction is proved by the continuation and dissemination of the surface membrane and of the vessels and nerves throughout the interior tissues of the spleen; for the internal common coat of this viscus penetrates all the way to the so-called glands and, as in the pancreas and liver, invests them. The consequence is, that here, as in the liver, all things are carried on tranquilly so that no movement of any part

is apparent; and the incitation is exactly correspondent to the invitation.

The liver, pancreas, and spleen are the three viscera whose special province it is to purify the blood, though the main duties devolve upon the liver. From their association in function, their succession of operations, their connection with each other and with the aorta, and from the power of each to demand its tribute at will from the system, we may see clearly that when the spleen is excised, or diseased, the pancreas, working with increased energy, undertakes a part of its office, then the liver, and afterwards several of the abdominal and thoracic viscera. Thus the office of the spleen is indeed distributed and extended, yet never with complete success, that is, never without disturbance of that state and order which the nature of the body's supreme Mind has introduced and established as being most highly perfect and harmonious with itself.