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The History of Transplantation: Man and his Biological Self

A Cartesian Prologue

Descartes presented the concept of a two-fold man: the unbearable idea of the strange union of body and soul. Body belongs to the first part, matter; it can be infinitely divided. The second part is the individual soul, which cannot be divided. There are as many thinking units as there are individual souls. On the one hand, man as a body is entangled in the network of mechanical and chemical laws; he is moved by various converging forces. On the other hand, he is wildly autonomous and can freely submit to such social bonds as he may wish-slavery on the one hand, absolute freedom on the other; physical contiguity as well as moral loneliness and responsibility on the other.

Descartes clearly thought of the body in mechanical and reductionist terms: the body is submitted to laws of motion and matter. Reason is of course bound to clear and distinct ideas, but the will may indulge in wanderings. And in this discrepancy between self-limiting reason and will lies the possibility of mistake and sin. Jean-Paul Sartre, who claimed to be one of Descartes' heirs, did not stress the powers of reason so much as the powers of free will. Human will can deny the limitations imposed by the biological framework. The biological machine is influenced by other factors: geographical, historical. Sartre renamed *it facticité*. »Facticité« is everything that constrains man during his life, when he wants to realize his freedom and strives for it through thick and thin.

This idea of spatial contiguity and material continuity is of the utmost historical importance. Particles can impart various movements to the body and affect all organs. Particles can exchange their localities. Transplantation in this context is nothing but a technical device, a case of local movement. My claim is that the Cartesian system afforded a new background to two ideas of ancient lore: the so-called transplantation of disease (not to be confused with the modern concept of contagion or infection), and the miraculous transplantation of organs (with the example of blood transfusion).

The history of transplantation is the history of fruitful exchanges between souls and bodies. This history leads us to consider a progressive switch of meaning and value in connection with the body. The body in today's thinking is credited with »uniqueness«, and it has in recent years acquired

the soul's status. It still retains something of the soul's former dignity. Diversity of bodies (or organisms) has itself become a factor open to selection and to evolution. Diversity confers a sense of achievement on the biologist whose view is Leibnizian: the greatest degree of diversity compatible with the harmony of the whole, the theme of worldly greatness and goodness.

This variety is, however, a limit, preventing many therapeutic procedures intended to restore health or physical integrity. But man tries to go beyond these limits to improve well-being and survival, faithful to his sense of human and social community whose influence overcomes physical hindrances. He imagines new strategies and devices through this community like our modern centers for transfusion and transplantation.

But before coming to the present where body and soul, body and mind, exchange their traditional qualities, let us go back to the seventeenth century and the Cartesian era.

Circulation and Blood Transfusion

In the first quarter of the seventeenth century, there was an innovation in the field of medicine: the discovery of the circulation of blood. No matter who initiated it, let us say Harvey for tradition, it represented a break with Aristotelian tradition. Until this time, higher status was accorded to the spherical motion of astral bodies which rolled along the seven circles of the universe. The sublunar world was only acquainted with rectilinear movements, natural and violent.

Harvey forged one system out of three. According to Galen, veins sprang from the liver, arteries from the heart, nerves from the brain, and they radiated from their centers; there was no flow-back. Harvey substituted for these waves of spirits a circular movement: blood flowed through vessels and came to the lungs and the left ventricle of the heart and was pushed through the aorta to the arteries and delivered to the veins that brought it back again to the right chambers of the heart. We must note here that for the first time a circular motion was ascribed to human blood. This circular motion determined materially the span of life. But at the same time, the body began to close its circle and to keep separate from others. Man paid for his new physical autonomy and dignity by becoming solitary. John Donne, who was Harvey's contemporary, had to remind people that »no man is an island«. Therefore, »never send to know for whom the bell tolls ...«

As soon as it was discovered, the circulation of blood suggested a new device to balance its inconveniences, blood transfusion. In 1667, Samuel Pepys listened in a tavern to an exciting story from his Royal Society fellows: a lunatic had received a blood transfusion.

A few months later, Jean-Baptiste Denis, a French surgeon, transfused the blood of a lamb into a man's veins. This man was suffering from an unknown fever and had been bled many times. Transfusion improved him. After some additional attempts, Denis succeeded in transfusing a madman whom his wife longed to cure or to kill and who was, in fact, relieved of the burden of life shortly after the transfusion. Following these initial attempts, transfusion was forbidden and its therapeutic use postponed until the nineteenth century.

Mother and Child, Lamb and Lion

The original point about Denis was not so much that he succeeded in blood transfusion, but that he stressed the fact that transfusion was legitimate.' His argument: the pregnant mother is continually transfusing her own child in spite of the fact that mother and child may be quite different - the child may look like the father. This procedure reconciles two opposite poles: diversity and identity. Transfusion restores the broken identity between individuals. But something has to be exchanged, like blood.

But if something has to be exchanged, is it not likely that individualities are also exchanged? The obvious aim of transfusion was to cure illness, but there was also a potential for metamorphosis. What made transfusion such a fad? It was the secret thought that anything might happen: a man might turn into an animal, or at least a wise man turn mad, an old man turn young, and (a naughtier idea) a Royalist turn Puritan (or the reverse), as Samuel Pepys put it in his *Diary*. Transfusion moved between two issues of equal probability: was it a mixture, where one component was the winner, or was it a mixture in variable proportions? Medicine then had to determine the right mixture. In the absence of chemical knowledge of the blood, it was difficult to go any further and to assess the degree of incompatibility between individuals, as Thomas Willis indicated in the 1670's.²

In 1863, when the French physiologist Paul Bert wrote his thesis³ on grafts, such knowledge was still missing. Paul Bert's work is broadly theoretical with few experimental claims. Transplantation (either of blood or of organs) seemed to be a crucial issue for biology because it marked the limit of the vital forces (some organisms are better able to repair their own damaged organs) and involves a clearcut definition of individuals and species. Pregnancy is still the most provocative example of successful graft and is the model for all attempts at transplantation. Paul Bert says that grafting is more interesting because of its failures than its achievements.

Paul Bert worked during the time when Jennerian smallpox inoculation was successful. Inoculation represented the prophylaxy of disease, the counterpath to contagion. Thanks to the useful fluid (vaccine), children

could benefit from immunity from the big scourge. But this fluid, which came originally from cows and was passed from arm to arm, could be adulterated or infected with syphilis and become potentially dangerous for weak children. Man was beginning a long and fruitful series of transactions between his biological self and the other living beings. But it was necessary to throw light on such obscure procedures. For instance, it was safer to obtain smallpox vaccines from the cow lymph, an upsetting idea. Denis had himself chosen lamb and calf because animals are not so vicious as man. Was this assertion to be taken seriously?

Man and the Others

Before the first World War, two main procedures were challenging the definition of the relationship between individuals, blood transfusion, and organ transplantation (at the time kidney transplantation). The same thing occurred with both: physicians underrated the natural limits that are enforced upon man; they still trusted a mode of approach that did not strongly discriminate between human machines.

Both histories can be told briefly in the same way: in 1900, in a footnote to a paper⁷, Karl Landsteiner, working at the Wilhelminian Hospital in Vienna, observed the fact that many normal sera agglutinate the red cells of other normal people. Landsteiner pointed out that foreign corpuscles are probably clumped within the vessels, when the red cells of one human individual are introduced into the circulation of another who happens to have blood capable of agglutinating them.

The mixing of two drops of blood to test compatibility before transfusion was carried out⁸ in New York, at the Mount Sinai Hospital, seven years after Landsteiner's paper. Notwithstanding this, transfusions went on, without any previous grouping, well into the 1920's and 1930's. Agote, the man who discovered that sodium citrate would prevent clotting, acknowledged that he had never concerned himself with blood grouping. Until 1930, donors were selected on the basis of kinship. Transfusion would challenge the acknowledged division of mankind into subgroups, families, races, and so on, and would suggest a new model from which biological individuality would spring.

The same adventure took place in the case of kidney transplantation. In 1914 Alexis Carrel, a surgeon working at the Rockefeller Institute, made the point quite clear⁶: kidney transplantation no longer represents a surgical problem, but the fundamental biological issue remained entirely unresolved. It is easy to graft a dog with its own kidney and this kidney is not damaged, but all attempts to graft a dog's kidney to another dog had been fai-

lures. Murphy, also working at the Rockefeller Institute, emphasized three conclusions drawn from his experimental work: grafts from alien species are impossible; even grafts from other individuals from the same species are rejected; grafts are invaded by small lymphocytes which are the agents of destruction; grafts are better accepted by embryos or, if lymphocytes had been destroyed, grafts are rejected if lymphocytes are injected into the embryo. This theoretical interpretation of failures was a break through in the promising field of the substitutive therapy initiated by Descartes. In 1954, Merrill and Hume in Boston demonstrated that Carrel was right. They succeeded in transplanting a kidney between identical twins. In the meantime, dozens of kidney transplantations had been performed, but the interpretation of failures was made difficult by a jumble of infections, surgical accidents, poor organ conservation, etc. None had clearly recognized the clue of the so-called uniqueness of the individual. At the International Transplantation Conference in Washington in 1963, physicians admitted that on many occasions they had hurried too much!

Tolerance as a Positive Phenomenon: The Learning of Self

The idea of the uniqueness of the individual was not the consequence of the shortcomings of surgery. Failures could be ascribed to immature medical techniques. The concept of graft rejection between individuals of the same species was fully accepted when it was integrated into a positive conceptual system: graft rejection was not only a nightmare of nature, it ultimately revealed itself as a »positive« phenomenon, the »learning of self«.

Frank Macfarlane Burnet in the 1940's was one of the first researchers to stress the importance of what he called »a biological point of view«, very similar to a holistic point of view and clearly opposed to a chemical and reductionist approach. Along the path of evolution, why had species learned to reject grafts? Burnet stressed that graft rejection (or rejection of bacteria or any chemical stuff) was not the primary phenomenon, but that tolerance was! Graft rejection slowly took place either during embryonic life or after birth according to species. So, graft rejection is a positive phenomenon, and rejection of »not-self« is equivalent to the constitution of »self«. Murphy had explained these phenomena as due to the embryo's immaturity, which was quite different. Tolerance was a fascinating theme because it attributed to graft rejection a normative and constitutive value. Tolerance was a new property of the body, and it was reflexive only. Biology was acknowledging an old medical tradition, idiosyncrasy.

Cheating the Body

The issue often has been raised⁸ that medicine is never merely descriptive language, but always involves evaluation. The definition of individuals, labeled as »selves«, and species includes an appraisal and an evaluation at the same time. The individual is unique and cannot be transplanted with safety. The same happens with all biological phenomena, viewed with the physician's eye. Smallpox is a disease; however, it may confer on the patient an everlasting immunity. All biological phenomena may involve something which confers a selective value.

Immunity is a genuine biological phenomenon. The immune system succeeds in coping with pathogens, but it is sometimes a scavenger of self, involving an equilibrium difficult to maintain. It is a potential threat to the validity of laws, absolute or graduated. These differences between individuals may lead to a medical relativism. The body is still explainable in terms of physicochemical concepts, but the limit of medical knowledge, designated as »terrain« by the hygienist's language has acquired a new content. The »self« is not only an epistemological limit, but an inclusive concept able to be investigated.

When the Austrian physician von Pirquet coined the word *allergy*,⁹ it meant for him that man's constitution was altered after its first meeting with a pathogen. Allergy has now switched to a different meaning, namely that every body's constitution is singular, so that it is sometimes unpredictable and easily explains pathological disorders. Allergy has become a popular word today, and although many physicians complain about it, they cannot afford to drop it.

Some practitioners claimed that the scope of allergy could include all medicine (defined as what is of concern to individuals). Other historically-oriented physicians replied that allergy (or the possibility of being »other«) meant immunity, referring to the so-called secondary immune response, or better, to memory. These ambiguities of denotation nicely show the intertwining of two arguments: man is different from others and different from himself during the course of his life. Allergy points to the inadequacy of general laws that nonetheless maintain acceptable predictive value. Biology and Western medicine have been historically tied to the same yoke; if they sometimes pretend to go astray, they go on exchanging information and clues.

Man wished to become »other«, to be transfused, transplanted, inoculated, modified in various ways. In doing so, he had to cope with his basic biological self. It is no accident that von Pirquet was interested in Freud, strange for an internist of the time. Struggling to improve these medical *tours*, he had to meet the others. It is not surprising that idiosyncrasy has

never been as popular a word as allergy which means essentially the same thing. Neither the prefix *idio* nor *auto* had this popularity, even though »idio« provides today an internal coherence to the idiotypic network of the immune system. It reminds us that biological individuality cannot be defined without referring to the others. Transplantation, the science of »inter-selves«, shows clearly a good example of what one does not dare to call dialectics. Self has to be defined altogether in a reflexive and transitive way. In the meantime, bodies have exchanged their characteristics with souls and have acquired the privilege of playing variations on a theme which in ancient times belonged to angels.

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