

**#1 *Harvesting The Dead***

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DEATH: Nothing in life is simple anymore, not even the leaving of it. At one time there was no medical need for the physician to consider the concept of death; the fact of death was sufficient. The difference between life and death was an infinite chasm breached in an infinitesimal moment. Life and death were ultimate, self-evident opposites. With the advent of new techniques in medicine, those opposites have begun to converge. We are now capable of maintaining visceral functions without any semblance of the higher functions that define a person. We are, therefore, faced with the task of deciding whether that which we have kept alive is still a human being, or, to put it another way, whether that human being that we are maintaining should be considered "alive."

Until now we have avoided the problems of definition and reached the solutions in silence and secret. When the life sustained was unrewarding by the standards of the physician in charge -- it was discontinued. Over the years, physicians have practiced euthanasia on an ad hoc, casual, and perhaps irresponsible basis. They have withheld antibiotics or other simple treatments when it was felt that a life did not warrant sustaining, or pulled the plug on the respirator when they were convinced that what was being sustained no longer warranted the definition of life. Some of these acts are illegal and, if one wished to prosecute, could constitute a form of manslaughter, even though it is unlikely that any jury would convict. We prefer to handle all problems connected with death by denying their existence. But death and its dilemmas persist. New urgencies for recognition of the problem arise from two conditions: the continuing march of technology, making the sustaining of vital processes possible for longer periods of time; and the increasing use of parts of the newly dead to sustain life for the truly living. The problem is well on its way to being resolved by what must have seemed a relatively simple and ingenious method. As it turned out, the difficult issues of euthanasia could be evaded by redefining death.

In an earlier time, death was defined as the cessation of breathing. Any movie buff recalls at least one scene in which a mirror is held to the mouth of a dying man. The lack of fogging indicated that indeed he was dead. The spirit of man resided in his *spiritus* (breath). With increased knowledge of human physiology and the potential for reviving a nonbreathing man, the circulation, the pulsating heart, became the focus of the definition of life. This is the tradition with which most of us have been raised. There is of course a relationship between circulation and respiration, and the linkage, not irrelevantly, is the brain. All body parts require the nourishment, including oxygen, carried by the circulating blood. Lack of blood supply leads to the death of an organ; the higher functions of the brain are particularly vulnerable. But if there is no respiration, there is no adequate exchange of oxygen, and this essential ingredient of the blood is no longer available for distribution. If a part of the heart loses its vascular supply, we may lose that part and still survive. If a part of the brain is deprived of oxygen, we may, depending on its location, lose it and survive. But here we pay a special price, for the functions lost are those we identify with the self, the soul, or humanness, i.e., memory, knowledge, feeling, thinking, perceiving, sensing, knowing, learning, and loving.

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Most people are prepared to say that when all of the brain is destroyed the "person" no longer exists; with all due respect for the complexities of the mind/brain debate, the "person" (and personhood) is generally associated with the functioning part of the head—the brain. The higher functions of the brain that have been described are placed, for the most part, in the cortex. The brain stem (in many ways more closely allied to the spinal cord) controls primarily visceral functions. When the total brain is damaged, death in all forms will ensue because the lower brain centers that control the circulation and respiration are destroyed. With the development of modern respirators, however, it is possible to artificially maintain respiration and with it, often, the circulation with which it is linked. It is this situation that has allowed for the redefinition of death—a redefinition that is being precipitously embraced by both scientific and theological groups.

The movement toward redefining death received considerable impetus with the publication of a report sponsored by the Ad Hoc Committee of the Harvard Medical School in 1968. The committee offered an alternative definition of death based on the functioning of the brain. Its criteria stated that if an individual is unresponsive and unresponsive, i.e., in a state of irreversible coma; if he has no movements or breathing when the mechanical respirator is turned off; if he demonstrates no reflexes; and if he has a flat electroencephalogram for at least twenty-four hours, indicating no electrical brain activity (assuming that he has not been subjected to hypothermia or central nervous system depressants), he may then be declared dead. What was originally offered as an optional definition of death is, however, progressively becoming *the* definition of death. In most states there is no specific legislation defining death; the ultimate responsibility here is assumed to reside in the general medical community. Recently, however, there has been a series of legal cases which seem to be establishing brain death as a judicial standard. In California in May of this year an ingenious lawyer, John Cruikshank, offered as a defense of his client, Andrew D. Lyons, who had shot a man in the head, the argument that the cause of death was not the bullet but the removal of his heart by a transplant surgeon, Dr. Norman Shumway. Cruikshank's argument notwithstanding, the jury found his client guilty of voluntary manslaughter. In the course of that trial, Dr. Shumway said: "The brain in the 1980s and in the light of modern day medical technology is the sine qua non -- the criterion for death. I'm saying anyone whose brain is dead is dead. It is the one determinant that would be universally applicable, because the brain is the one organ that can't be transplanted."

This new definition, independent of the desire for transplant, now permits the physician to "pull the plug" without even committing an act of passive euthanasia. The patient will first be defined as dead; pulling the plug will merely be the harmless act of halting useless treatment on a cadaver. But while the new definition of death avoids one complex problem, euthanasia, it may create others equally difficult which have never been fully defined or visualized. For if it grants the right to pull the plug, it also implicitly grants the privilege *not* to pull the plug, and the potential and meaning of this has not at all been adequately examined. These cadavers would have the legal status of the dead with none of the qualities one now associates with death. They would be warm, respiring, pulsating, evacuating, and excreting bodies requiring nursing, dietary, and general grooming attention -- and *could probably be maintained so for a period of years*. If we chose to, we

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could, with the technology already at hand, legally avail ourselves of these new cadavers to serve science and man-kind in dramatically useful ways. The autopsy, that most respectable of medical traditions, that last gift of the dying person to the living future, could be extended in principle beyond our current recognition. To save lives and relieve suffering -- traditional motives for violating tradition -- we could develop hospitals (an inappropriate word because it suggests the presence of living human beings), banks, or farms of cadavers which require feeding and maintenance, in order to be harvested. To the uninitiated the "new cadavers" in their rows of respirators would seem indistinguishable from comatose patients now residing in wards of chronic neurological hospitals.

**PRECEDENTS:** The idea of wholesale and systematic salvage of useful body parts may seem startling, but it is not without precedent. It is simply magnified by the technology of modern medicine. Within the confines of one individual, we have always felt free to transfer body parts to places where they are needed more urgently, felt free to reorder the priorities of the naturally endowed structure. We will borrow skin from the less visible parts of the body to salvage a face. If a muscle is paralyzed, we will often substitute a muscle that subserves a less crucial function. This was common surgery at the time that paralytic polio was more prevalent. It soon becomes apparent, however, that there is a limitation to this procedure. The person in want does not always have a second-best substitute. He may then be forced to borrow from a person with a surplus. The prototype, of course, is blood donation. Blood may be seen as a regeneratable organ, and we have a long-standing tradition of blood donation. What may be more important, and perhaps dangerous, we have established the precedent in blood of commercialization -- not only are we free to borrow, we are forced to buy and, indeed, in our country at least, permitted to sell. Similarly, we allow the buying or selling of sperm for artificial insemination. It is most likely that in the near future we will allow the buying and selling of ripened ova so that a sterile woman may conceive her baby if she has a functioning uterus. Of course, once *in vitro* fertilization becomes a reality ... we may even permit the rental of womb space for gestation for a woman who does manufacture her own ova but has no uterus.

Getting closer to our current problem, there is the relatively long-standing tradition of banking body parts (arteries, eyes, skin) for short periods of time for future transplants. Controversy has arisen with recent progress in the transplanting of major organs. Kidney transplants from a near relative or distant donor are becoming more common. As heart transplants become more successful, the issue will certainly be heightened, for while the heart may have been reduced by the new definition of death to merely another organ, it will always have a core position in the popular thinking about life and death. It has the capacity to generate the passion that transforms medical decisions into political issues. The ability to use organs from cadavers has been severely limited in the past by the reluctance of heirs to donate the body of an individual for distribution. One might well have willed one's body for scientific purposes, but such legacies had no legal standing. Until recently, the individual lost control over his body once he died. This has been changed by the Uniform Anatomical Gift Act. This model piece of legislation, adopted by all fifty states in an incredibly short period of time, grants anyone over eighteen (twenty-one in some states) the right to donate en masse all "necessary organs and

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tissues" simply by filling out and mailing a small card.

Beyond the postmortem, there has been a longer-range use of human bodies that is accepted procedure—the exploitation of cadavers as teaching material in medical schools. This is a long step removed from the rationale of the transplant -- a dramatic gift of life from the dying to the near-dead; while it is true that medical education will inevitably save lives, the clear and immediate purpose of the donation is to facilitate training. It is not unnatural for a person facing death to want his usefulness to extend beyond his mortality; the same biases and values that influence our life persist in our leaving of it. It has been reported that the Harvard Medical School has no difficulty in receiving as many donations of cadavers as they need, while Tufts and Boston Universities are usually in short supply. In Boston, evidently, the cachet of getting into Harvard extends even to the dissecting table. The way is now clear for an ever-increasing pool of usable body parts, but the current practice minimizes efficiency and maximizes waste. Only a short period exists between the time of death of the patient and the time of death of his major parts.

**USES OF THE NEOMORT:** In the ensuing discussion, the word *cadaver* will retain its usual meaning, as opposed to the new cadaver, which will be referred to as a *neomort*. The "ward" or "hospital" in which it is maintained will be called a *bioemporium* (purists may prefer *bioemporion*). Whatever is possible with the old embalmed cadaver is extended to an incredible degree with the neomort. What follows, therefore, is not a definitive list but merely the briefest of suggestions as to the spectrum of possibilities.

**Training:** Uneasy medical students could practice routine physical examinations -- auscultation, percussion of the chest, examination of the retina, rectal and vaginal examinations, etc. -- indeed, everything except neurological examinations, since the neomort by definition has no functioning central nervous system. Both the student and his patient could be spared the pain, fumbling, and embarrassment of the "first time." Interns also could practice standard and more difficult diagnostic procedures, from spinal taps to pneumoencephalography and the making of arteriograms, and residents could practice almost all of their surgical skills -- in other words, most of the procedures that are now normally taught with the indigent in wards of major city hospitals could be taught with neomorts. Further, students could practice more exotic procedures often not available in a typical residency -- eye operations, skin grafts, plastic facial surgery, amputation of useless limbs, coronary surgery, etc.; they could also practice the actual removal of organs, whether they be kidneys, testicles, or what have you, for delivery to the transplant teams.

**Testing:** The neomort could be used for much of the testing of drugs and surgical procedures that we now normally perform on prisoners, mentally retarded children, and volunteers. The efficacy of a drug as well as its toxicity could be determined beyond limits we might not have dared approach when we were concerned about permanent damage to the testing vehicle, a living person. For example, operations for increased vascularization of the heart could be tested to determine whether they truly do reduce the incidence of future heart attack before we perform them on patients. Experimental procedures that proved useless or harmful could be avoided; those that succeed could be available years before they might otherwise have been. Similarly, we could avoid the

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massive delays that keep some drugs from the marketplace while the dying clamor for them. Neomorts would give us access to other forms of testing that are inconceivable with the living human being. We might test diagnostic instruments such as sophisticated electrocardiography by selectively damaging various parts of the heart to see how or whether the instrument could detect the damage.

Experimentation: Every new medical procedure demands a leap of faith. It is often referred to as an "act of courage," which seems to me an inappropriate terminology now that organized medicine rarely uses itself as the experimental body. Whenever a surgeon attempts a procedure for the first time, he is at best generalizing from experimentation with lower animals. Now we can protect the patient from too large a leap by using the neomort as an experimental bridge. Obvious forms of experimentation would be cures for illnesses which would first be induced in the neomort. We could test antidotes by injecting poison, induce cancer or virus infections to validate and compare developing therapies.

Because they have an active hematopoietic system, neomorts would be particularly valuable for studying diseases of the blood. Many of the examples that I draw from that field were offered to me by Dr. John F. Bertles, a hematologist at St. Luke's Hospital Center in New York. One which interests him is the utilization of marrow transplants. Few human-to-human marrow transplants have been successful, since the kind of immunosuppression techniques that require research could most safely be performed on neomorts. Even such research as the recent experimentation at Willowbrook -- where mentally retarded children were infected with hepatitis virus (which was not yet culturable outside of the human body) in an attempt to find a cure for this pernicious disease -- could be done without risking the health of the subjects.

Banking: While certain essential blood antigens are readily storable (e.g., red cells can now be preserved in a frozen state), others are not, and there is increasing need for potential means of storage. Research on storage of platelets to be used in transfusion requires human recipients, and the data are only slowly and tediously gathered at great expense. Use of neomorts would permit intensive testing of platelet survival and probably would lead to a rapid development of a better storage technique. The same would be true for white cells. As has been suggested, there is great wastage in the present system of using kidney donors from cadavers. Major organs are difficult to store. A population of neomorts maintained with body parts computerized and catalogued for compatibility would yield a much more efficient system. Just as we now have blood banks, we could have banks for all the major organs that may someday be transplantable -- lungs, kidney, heart, ovaries. Beyond the obvious storage uses of the neomort, there are others not previously thought of because there was no adequate storage facility. Dr. Marc Lappe of the Hastings Center has suggested that a neomort whose own immunity system had first been severely repressed might be an ideal "culture" for growing and storing our lymphoid components. When we are threatened by malignancy or viral disease, we can go to the "bank" and withdraw our stored white cells to help defend us.

Harvesting: Obviously, a sizable population of neomorts will provide a steady supply of blood, since they can be drained periodically. When we consider the cost-benefit analysis

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of this system, we would have to evaluate it in the same way as the lumber industry evaluates sawdust -- a product which in itself is not commercially feasible but which supplies a profitable dividend as a waste from a more useful harvest. The blood would be a simultaneous source of platelets, leukocytes, and red cells. By attaching a neomort to an IBM cell separator, we could isolate cell types at relatively low cost. The neomort could also be tested for the presence of hepatitis in a way that would be impossible with commercial donors. Hepatitis as a transfusion scourge would be virtually eliminated. Beyond the blood are rarer harvests. Neomorts offer a great potential source of bone marrow for transplant procedures, and I am assured that a bioemporium of modest size could be assembled to fit most transplantation antigen requirements. And skin would of course, be harvested-similarly bone, corneas, cartilage, and so on.

Manufacturing: In addition to supplying components of the human body, some of which will be continually regenerated, the neomort can also serve as a manufacturing unit. Hormones are one obvious product, but there are others. By the injection of toxins, we have a source of antitoxin that does not have the complication of coming from another animal form. Antibodies for most of the major diseases can be manufactured merely by injecting the neomort with the viral or bacterial offenders. Perhaps the most encouraging extension of the manufacturing process emerges from the new cancer research, in which immunology is coming to the fore. With certain blood cancers, great hope attaches to the use of antibodies. To take just one example, it is conceivable that leukemia could be generated in individual neomorts-not just to provide for *in vivo* (so to speak) testing of antileukemic modes of therapy but also to generate antibody immunity responses which could then be used in the living.

**COST-BENEFIT ANALYSIS:** If seen only as the harvesting of products, the entire feasibility of such research would depend on intelligent cost-benefit analysis. Although certain products would not warrant the expense of maintaining a community of neomorts, the enormous expense of other products, such as red cells with unusual antigens, would certainly warrant it. Then, of course, the equation is shifted. As soon as one economically sound reason is found for the maintenance of the community, all of the other ingredients become gratuitous by-products, a familiar problem in manufacturing. There is no current research to indicate the maintenance cost of a bioemporium or even the potential duration of an average neomort. Since we do not at this point encourage sustaining life in the brain-dead, we do not know the limits to which it could be extended. This is the kind of technology, however, in which we have previously been quite successful. Meantime, a further refinement of death might be proposed. At present we use total brain function to define brain death. The source of electroencephalogram activity is not known and cannot be used to distinguish between the activity of higher and lower brain centers. If, however, we are prepared to separate the concept of "aliveness" from "personhood" in the adult, as we have in the fetus, a good argument can be made that death should be defined not as cessation of total brain function but merely as cessation of cortical function. New tests may soon determine when cortical function is dead. With this proposed extension, one could then maintain neomorts without even the complication and expense of respirators. The entire population of decorticates residing in chronic hospitals and now classified among the incurably ill could be redefined as dead. But even if we maintain the more

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rigid limitations of total brain death, it would seem that a reasonable population could be maintained if the purposes warranted it. It is difficult to assess how many new neomorts would be available each year to satisfy the demand. There are roughly 2 million deaths a year in the United States. The most likely sources of intact bodies with destroyed brains would be accidents (about 113,000 per year), suicides (around 24,000 per year), homicides (18,000), and cerebrovascular accidents (some 210,000 per year). Obviously, in each of these categories a great many of the individuals would be useless -- their bodies either shattered or scattered beyond value or repair.

And yet, after all the benefits are outlined, with the lifesaving potential clear, the humanitarian purposes obvious, the technology ready, the motives pure, and the material costs justified-how are we to reconcile our emotions? Where in this debit-credit ledger of limbs and livers and kidneys and costs are we to weigh and enter the repugnance generated by the entire philanthropic endeavor? Cost-benefit analysis is always least satisfactory when the costs must be measured in one realm and the benefits in another. The analysis is particularly skewed when the benefits are specific, material, apparent, and immediate, and the price to be paid is general, spiritual, abstract, and of the future. It is that which induces people to abandon freedom for security, pride for comfort, dignity for dollars. William May, in a perceptive article, defended the careful distinctions that have traditionally been drawn between the newly dead and the long dead. "While the body retains its recognizable form, even in death, it commands a certain respect. No longer a human presence, it still reminds us of that presence which once was utterly inseparable from it." But those distinctions become obscured when, years later, a neomort will retain the appearance of the newly dead, indeed, more the appearance of that which was formerly described as living.

Philosophers tend to be particularly sensitive to the abstract needs of civilized man; it is they who have often been the guardians of values whose abandonment produces pains that are real, if not always quantifiable. Hans Jonas, in his *Philosophical Essays*, anticipated some of the possibilities outlined here, and defended what he felt to be the sanctity of the human body and the unknowability of the borderline between life and death when he insisted that "Nothing less than the maximum definition of death will do -- brain death plus heart death plus any other indication that may be pertinent-before final violence is allowed to be done." And even then Jonas was only contemplating *temporary* maintenance of life for the collection of organs. The argument can be made on both sides. The unquestionable benefits to be gained are the promise of cures for leukemia and other diseases, the reduction of suffering, and the maintenance of life. The proponents of this view will be mobilized with a force that may seem irresistible. They will interpret our revulsion at the thought of a bioemporium as a bias of our education and experience, just as earlier societies were probably revolted by the startling notion of abdominal surgery, which we now take for granted. The proponents will argue that the revulsion, not the technology, is inappropriate. Still there will be those, like May, who will defend that revulsion as a quintessentially human factor whose removal would diminish us all, and extract a price we cannot anticipate in ways yet unknown and times not yet determined. May feels that there is "a tinge of the inhuman in the humanitarianism of those who believe that the perception of social need easily overrides all other considerations and

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reduces the acts of implementation to the everyday, routine, and casual." This is the kind of weighing of values for which the computer offers little help. Is the revulsion to the new technology simply the fear and horror of the ignorant in the face of the new, or is it one of those components of humanness that barely sustain us at the limited level of civility and decency that now exists, and whose removal is one more step in erasing the distinction between man and the lesser creatures-beyond that, the distinction between man and matter? Sustaining life is an urgent argument for any measure, but not if that measure destroys those very qualities that make life worth sustaining.

