

This is nearly time for Membership Renewal in ITEST. It comes around with increasing frequency, doesn't it? One new feature this year is the possibility of paying by credit card -- either MasterCard or Visa. This is explained in **Announcements** in this issue.

It has been proposed that ITEST sponsor meetings commemorating Mr. Jack Kinney who presented papers at our meetings in the mid 1990s. It has been proposed that these meetings, one-day or weekend meetings, might approach major questions sensibly, not yielding to ideologies on either side of the political spectrum -- a la Jack Kinney. Would you be interested in such Conferences and could you help finance them.

One topic could be the President of Zambia's refusal of a large shipment of corn from the United States because it is genetically engineered. This is the same corn that most of us in the United States eat. This corn might be deleterious to the health of his citizens, he said. They are currently starving to death. The people probably would not worry about such nebulous fears when they're starving. There seems to be something wrong with his logic. It sounds hauntingly like the destruction of My Lai "to save it." I am sure most of you remember that event of the Vietnam War. Another example: Jack, if asked, would have said that the most pressing aspect of African poverty is the need for clean drinking water and the separation of drinking water from sewage. Please note that the Johannesburg Conference on Sustainable Development concentrated hardly at all on these problems in the developing nations. Why?

Anyway, we would like your input on meetings of this kind which could easily be held at various locales around the United States. We would, however, need local efforts in the planning and setting up of these meetings. If you are interested please let us know. The ITEST Office could be a valuable resource in coordinating efforts. As the year winds down we will be celebrating some of the greatest events of both Judaism and Christianity. We wish you the blessings of the season. The grace of God be with you. We shall be in touch with you all about the various initiatives we look forward to planning. May God bless you and your work for him.

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Robert Brungs, S.J.

The ITEST Bulletin: Publisher, Robert Brungs, S.J.; Editor, S. Marianne Postiglione, RSM

ITEST Offices: Director, Robert Brungs, S.J.
Director of Communications, S. Marianne Postiglione, RSM
3601 Lindell Boulevard
St. Louis, Missouri 63108 USA

ANNOUNCEMENTS

GOOD NEWS

1. At last! ITEST can now offer its members the opportunity to pay dues or order books, videos and other materials using a credit card (Visa and/or MasterCard only). This alternate method should be helpful especially to our overseas members who often have to pay from \$10 to \$20 more for dues than those in the States. Renewal notices will be sent out in October for calendar year, 2003. At that time you may renew using your card. We must, however, have the following information:

FOR EXAMPLE

Name of Card MasterCard or Visa

Number #0000 0000 0000 0000

Name as it appears on the card - John/Jane Doe

Date of expiration e.g., October, 2005

You may write that information on the back of the membership card if you wish or you may phone in the data to the ITEST office. The staff promises that those numbers will be treated carefully and will be held in strictest confidence.

2. Visit the ITEST web site to see the enhancements at <http://ITEST.slu.edu>. Among other things, we have added a new category, *Theological Viewpoints*, which will showcase articles, commentary and yes, even entire books, on various topics related to science/technology and theology/faith. We invite you to submit articles fitting this category for possible inclusion on the ITEST web site. Also on this site, in response to frequent requests for the now out-of-print book, *The Vineyard: Scientists in the Church*, by Eva-Maria Amrhein and Robert Brungs, SJ, we have made the book available free of charge to all who access the site. Any material used from the book should be credited to the co-authors. In the near future we will be adding an updated substantive article of Fr. Brungs on "Reproductive Technologies: Babies without Sex".

3. Call for articles, commentaries and reflections for future issues of the *ITEST Bulletin*: The articles may be submitted on floppy disks, e-mail attachment (no viruses, please) or hard copy. We accept WORD, WordPerfect 5.1 (DOS version), WordPerfect for Windows or plain text.

Once the members of the editorial board decide that the article will be published they will notify the author(s) regarding the particular issue in which the article will appear. Manuscripts will not be returned to the author.

4. Renewal notices will be sent soon for calendar year, 2003. We are keeping the cost of dues at \$50.00 for regular members and \$25.00 for students. With the cost of postage and mailing rising almost every year it would help us if you renewed early thus saving ITEST the added expense of second and third renewal reminders. If you have not renewed since 1999, your name will be removed from the active membership list soon.

5. NEW IDEAS FOR FUTURE WORKSHOPS

We will be meeting soon with a committee to plan the Fall, 2003 workshop on "Globalization." The topic will be refined and made more specific as we study the various aspects of globalization on which to focus, for example, economic, technological, psychological/sociological, theological. We will be contacting essayists for this workshop soon. If you know someone who might write a paper, contact us at the ITEST Office. As soon as we have a definite date, we will pass on the information.

6. As noted on the front page, the ITEST Board is entertaining the idea of holding one day workshops in parts of the country other than the Midwest, perhaps in the Spring of 2004. Besides affording the ITEST staff a chance to "get out of the office," it would make it easier for members within those areas (Washington, DC, Chicago, for example) to attend and participate. We are open to ideas on topics, locations (retreat house, conference center, school or church hall), suggested dates and times, and so on. If you are interested in organizing a meeting in your area, contact us and we can help put the thought into action. Tom Sheahen has suggested a workshop on -- in his own words, "Sorting out the real problems from the phony ones." For example, what is a more pressing problem in developing countries: carbon dioxide emissions and genetically modified food or proper sanitation and clean water? It is a fact that the lack of basics seriously threaten the very lives of the world's poor. We could sponsor a panel of scientists and technologists to discuss some of these problems focusing on underlying causes and offering some solutions. If you would like to be involved, let us know soon.

THE NEUROPSYCHOLOGY OF RECOVERY FROM BRAIN DAMAGE

Dr. Patricia Raymond

Dr. Raymond currently coordinates Psychological Services at the Zambarano Unit of Eleanor Slater Hospital, a chronic care hospital in Rhode Island. She serves at this 150 bed program for younger patients with chronic disease and disability who have problems that are too complicated for Nursing Homes. She and her staff provide counseling, behavioral interventions, neuropsychological testing and group treatment. She is also part of the Organizational Development team at the hospital. Over the next two years Zambarano plans to provide leadership and team building skill training for licensed nurses and physicians to enhance their abilities as co-leaders of the health care teams on their units. At present direct care staff are participating in human relations training called Managing Ourselves, Managing Others. Dr. Raymond earned her BA Salve Regina College, Newport, Rhode Island and her PhD at the University of Rhode Island (URI), Kingston. She is on the Graduate School Faculty at the URI and supervises a doctoral student at Zambarano. She also sits on the professional advisory committee of the Rhode Island Chapter of the National MS Society. Reprinted from Brain Research and Human Consciousness, ITEST, March, 1986.

The astute observations of a country doctor in Montpelier, France and the later work of the French surgeon Paul Broca began the long journey of discovery in modern man's quest to understand how the brain works. From the early discovery of the suspected role of the left hemisphere in language function as proposed by Dax and Broca in the mid 1800's to the age of transplantation of brain and neural tissue in animals and even humans in the 1980's, neuroscientists continue to be captivated by the mysterious inner workings of the human brain.

The brain is the source of everything that we are. It is the source of everything that makes us human, humane, and unique. It is the source of our ability to speak, to write, to think, to create, to love, to laugh, to despair and to hate.

These are the words of Nancy Andreasen, M.D., Ph.D. in her chapter, "The Revolution in Neuroscience" in the book *The Broken Brain*. Psychiatry, Neurology, Neuroscience and Neuropsychology are on parallel and sometimes overlapping paths of discovery in the recent proliferation of interest in the brain-behavior relationship. Programs in Behavioral Neurology, Neuropsychology and Neuroscience are becoming more and more common in American universities and medical schools. One might speculate that this corresponds to, or reflects the "me generation" or what others describe as a time of self concern and absorption. Or, we might conclude that modern medicine's technological advances have both necessitated and made possible the detailed exploration of brain function we are witnessing today.

In the 1980's we are able to save the lives of many

more men and women who suffer severe brain trauma or disease than we were just 10 years ago. These advances in acute medicine have resulted in much more complicated medical, social and psychological problems for the survivors, their families and the health care community.

Of course myriad ethical questions have arisen since the introduction of the term "brain death." Even this complicated issue is more clear cut, or black and white, than the larger grayer issue of "quality of life" and the definitions of marginal or sufficient consciousness for basic human function. I will leave these moral and philosophical questions for later discussion.

The focus of this brief paper will be a presentation of how the brain functions (in light of our limited understanding of the neural networks in the brain) under normal conditions and after structural or neurochemical lesions (injured areas) secondary to external trauma or internal pathological disease states. I will attempt to describe some of the more recent work on recovery of function in the experimental neuropsychology literature and discuss the parallel recovery patterns seen in the rehabilitation of the brain-injured in my own clinical practice.

How the Healthy Brain Works

Learning the vocabulary of neuroanatomy is much like acquiring a foreign language. The brain structures have been named over the centuries in Latin and Greek. Some of the names represent the description of the shape of the structure such as the amygdala which means almond, or the hippocampus which represents its

sea horse shape. Others are just descriptive with names like *corpus callosum* (tough body) and *substantia nigra* (black substance) or are named after their discoverers... the Sylvian fissure, now sometimes referred to as the lateral fissure. I will attempt to give you the Berlitz version of neuroanatomy in a few short paragraphs. Those of you who have a basic understanding of the way the brain is set up will have to bear with me as I present this brief language lesson.

The normal brain is divided into two hemispheres and connected by the corpus callosum, a band of axonal (nerve cell tube-like structures) fibers. The entire cortex, the two hemispheres, sits on top and covers the diencephalon or "between brain" which in turn is above the midbrain and brain stem. All of this sits within a fluid called the cerebral spinal fluid and is protected by the hard bony structure of the skull. The fluid flows around and through the brain structures in a system of ventricles or fluid filled spaces which serve to nourish and protect the brain as well as to provide important geographic landmarks. The cortex is considered the seat of "higher cognitive functions" and is generally divided into 4 lobes which are named after the bones in the skull. They are the frontal, temporal, parietal, and occipital lobes.

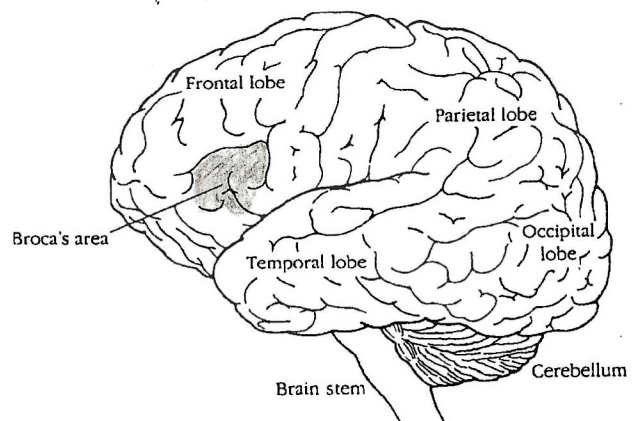
The primary cells in the brain are the neurons and the support system of glial cells. Neurons are not actually connected, but rather communicate with each other through chemical substances called neurotransmitters. These substances travel from one cell to another across a synapse (space between nerve cells where the connection are made). When the second cell receives the neurotransmitter a chemical reaction produces an electrical potential which is then conducted down the axon to the next synapse. The most commonly discussed neurotransmitters are Norepinephrine, Dopamine, Serotonin, Acetylcholine and GABA. At a basic level it is the interaction of nerve cells which mediate all behavior. The behavioral expression of that interaction is dependent upon the wiring of the neural networks and the state of the mechanisms governing the synthesis, release, and reuptake of the neurotransmitter substances. These two factors are in turn influenced by genetics, experience and disease.

Some researchers have pointed out that environmental enrichment can produce significant changes in the intact brain. For example, Greenough (1976) found increased branching and neural connections in animals reared in cages with more stimuli and objects with which to play (enriched environment). Bennett, Diamond, Krech & Rozenzweig (1964) reported elevated levels of specific cortical enzymes. Goodman, Bogdasarian and Horel

(1973) hypothesize that throughout life there are constant changes in nerve cells in the normal brain. It is suggested that these are some of the known effects of experience on the neuronal networks of the brain.

Behavioral Geography

Although the linking of behaviors to specific locations in the brain is at best theoretically questionable, for heuristic purposes, I will describe the behavioral geography of the higher cortex. If we were to divide the cortex into a front half and a back half the division would naturally fall at the central fissure (valley) which starts at the apex and runs down to the lateral fissure. One might roughly state that information is received or perceived in the parietal, occipital and temporal lobe structures that lie behind the central fissure.



Expressions and creations of the brain are articulated by the frontal and temporal structures located in front of this fissure. This is a very simplistic division, but I find it helpful in describing some of the functional responsibilities of the different parts of the brain.

Since this is a discussion of human consciousness, I will concentrate on the "higher cortical functions" with some explanation of the role of mood states and drives. One point to mention about the control of basic movement and sensation of the limbs and trunk of the body is that the locus of control for the left side of the body is in the contralateral (opposite) or right side of the cortex. It is also of some interest to note that the representation of the body in the brain is upside down. That is that the head is controlled by structures deep in the cortex and the feet are represented at the top. This may be evolutionary protectionism since the structures critical to human function, the head and hands, are buried deep in the brain and therefore protected from external trauma. This reversed representation explains why a person who has a stroke in the left side of the

brain will have weakness or paralysis on the right side of his/her body. It is also interesting to note that the amount of brain tissue associated with the motor and sensory aspects of specific body parts is directly related to the complexity and importance of their function. For example, the lips or finger tips have much more tissue allocated for their function than an entire arm. It appears that it is the importance of the function not the physical size of the body part which affects the amount of tissue assigned to govern its operation.

The division of duties within the cortex are even more complex when we consider thinking, remembering and the place of emotion and motivation. It has long been known that language (for right handers and most left handers) is mediated by structures in the frontal and temporal lobes of the left hemisphere. Expressive language is thought to be in the posterior region of the frontal lobe, whereas reception or comprehension of what we hear is believed to be in the posterior part of the temporal lobe. These are referred to as the Broca's and Wernicke's areas respectively. There is a bundle of fibers connecting the two areas which are necessary for the person to hear what you say, make some sense of it and formulate a response.

This is a simplistic explanation of the speech and language system since any effective communication will also require some activation of memory "traces" (with connections to the hippocampus in the subcortical structures) and interpretation of the conative aspects of the speech which are most likely decoded in the temporal lobe of the right hemisphere where the prosody or music of language is processed. Of course, the facial expression of the communicator must be perceived by the visual cortex (occipital lobes) along the optic tracts (nerve path from the eye to the visual cortex) and interpreted in the association areas located at the junction of the parietal, occipital and temporal lobes. In other words language like most if not all higher cognitive functions involve the well orchestrated function of the entire brain.

While all of this is taking place, another component to this conversation is being processed in the subcortical structures. These "limbic" structures are in a delicately balanced feedback loop which regulates basic emotion and drive states. Thus, if the face has a fearsome expression and the content of the verbalization is hostile, then the limbic system may react with a "fight" or "flight" response. All of this is happening in milliseconds. Some of it is in conscious awareness and much is automatic, without awareness and occurs at a "subconscious level." This describes the function of a healthy brain in response to some verbal stimuli (conversation)

in the environment. Imagine the intricate connections required to drive a car through unfamiliar territory and at the same time carry on a conversation with your passenger!

We are also capable of thought with little external provocation. We have the capacity to fantasize, dream up explanations, or concoct theories. We can elaborate and assign meaning to our emotional states and we can decide what it is we are experiencing or seeing. These capacities are the results of the rich connections between the limbic system and the frontal lobes. Neuroscientists are discovering that, for instance, moods associated with neurohormonal changes sensed in the limbic system affect the information processing in the frontal lobes. This is a reciprocal relationship which matures through development. Thus, the mature adult is able to moderate or suppress a need state such as hunger in order to politely finish a conversation or await the arrival of a dinner partner's plate. The higher centers serve as inhibitors of more basic impulses. Moderation or balance of this type is also seen in the control of muscles and motor function.

To resume our behavioral geography lesson, I point out the dominance of the right hemisphere in non-verbal pursuits such as figure-ground discrimination, depth perception, form recognition and facial recognition. The right hemisphere seems to also have a role in the regulation of mood states, the appreciation of music and the visual-spatial aspects of arithmetic. Sequencing and setting up meaningful hierarchies as well as appreciating global configurations appear to be the primary responsibility of the right hemisphere.

The left hemisphere is dominant for verbal activities. It is also managing vigilance, complex motor planning, linear arithmetic and appears to have a role in the control of anxiety. It is the detail hemisphere. There is much concern for the trees, but little appreciation of the forest.

We presume that the role of the frontal lobe is with "executive functions", emotional elaboration, self-control and initiation. This is considered the neuroanatomical seat of higher cortical regulation. An intact person can initiate a request for food if he/she is hungry, or plan the preparation of a meal. A person with impaired frontal activity might perceive the hunger but not be able to organize himself or herself to take action and get the need met. The frontal lobes are also important in maintaining and directing attention/concentration as well as cognitive flexibility. In short the brain, the organ of adaptation, relies heavily on the "leadership" role of the frontal cortex.

Memory is more difficult to localize. However, it is known that destruction of the mamillary bodies, the hippocampus, or bilateral thalamic lesions, (all located in the subcortical region), have profound effect on memory. Most neuropsychologists today would also mention the role of the frontal lobes in attention and cognitive organization as essential components in the functional system of normal memory.

You now have a thumbnail sketch of the behavioral geography of the intact brain. But, what happens when this delicately balanced system of functional neural networks is interrupted or damaged? The next part of this essay will address brain damage and the current theories of functional recovery. Time and space do not allow a detailed (left hemisphere style) discussion of recovery after brain damage. Rather, the next paragraphs will summarize some interesting work in experimental neuropsychology and neuroscience.

Mechanisms Underlying Recovery

The mechanisms which mediate recovery of function or the sparing of neural tissue following brain trauma continue to be enigmatic in the field of neuroscience. There are many factors which can affect the behavioral recovery following brain injury. Obviously the extent of the lesion, the condition of the brain at the time of the insult, the genetic endowment, a prior experience of an enriched or non-enriched environment, the speed at which the lesion occurred (i.e. rapid vs. slow onset) and the age of onset are all factors in the behavioral outcome. If the brain sustains a slowgrowing lesion, it has the capacity to alter neural pathways in order to preserve function. Rapid onset lesions such as stroke and traumatic brain injury are much more devastating and result in considerable disability. If the person has had high level cognitive function and an enriched environment, then it is hypothesized that he/she will have the potential for more behavioral recovery. It is suspected that this person has rich and numerous neural connections which allow for considerable cognitive flexibility and increases the chance that an alternate wiring system will handle the behavioral expression. There are some who postulate that there are male/female differences in degree of specialization of brain function, suggesting that female brains are more highly specialized for linguistic and other cognitive processes. (I of course am convinced that this is further evidence of female evolutionary progress.) This specialization may be a hindrance in recovery of function since this might limit plasticity.

There has been much discussion of the behavioral recovery or the sparing of function in brain damage

which occurs at a very early age. Some researchers have recently challenged this assumption. Stein, Finger and Hart (1983) point out that "the immature mammalian CNS is endowed with a greater capacity for some kinds of anatomical and physiological changes which could underlie recovery." On the other hand Johnson and Almi (1978) report that brain lesions in infancy can be as disabling as those which occur in adulthood. This may well be due to the developing functional specification of neural tissue. Others have postulated that in early development and perhaps even in adulthood, there are dual or overlapping systems which are gradually suppressed by the neural system dominant for that function or behavior. If the damage occurs before the clear dominance develops then the alternate structure easily assumes the task. For example, a child who has most of his/her left hemisphere damaged at an early age, usually develops normal speech and language. It is believed that the remaining brain tissue assumes the function. This adaptation is sometimes referred to as *plasticity* of brain tissue. Thus brain damage that occurs during early development may result in less disability.

The physiological and structural mechanisms of recovery are poorly understood. One of the early explanations of recovery was offered by Von Monakow in 1911. He introduced the concept of *diaschisis*, sometimes referred to as *neural shock*. Although the mechanism for this phenomenon is yet to be demonstrated, the theory suggests that neural areas related to but distinct from the damaged zone are also depressed in function. This may be due to arrested production of neurotransmitters. As time passes the function of these neurons is unblocked and this results in what appears to be the return of lost functions. This certainly fits with some recent research by Robinson at Johns Hopkins who found that there is evidence of bilateral depletion of certain neurotransmitters in rat brains following a stroke-like lesion in only one of the hemispheres. It is also consistent with the Russian neurologist Luria's report that restoration of function occurs when the spared neurons are disinhibited or deblocked through pharmacological intervention. An example of this return of function in my own clinical experience is in the effectiveness of antidepressant medications in the treatment of stroke patients. These drugs tend to increase the supply of norepinephrine at the synapse, which should result in lifting the depression of neural shock. Patients often respond dramatically in their level of alertness and ability to process information. Others have used d-amphetamines to achieve the same behavioral and cognitive responses in the traumatically head injured adult.

Neural *sprouting* has been postulated as an important

mechanism of recovery. Again this may involve spared neurons from the same system spreading tentacles to bridge the "communication gap" caused by the damaged area. This explanation suggests reorganization of neural tissue. Since this is a phenomenon observed in the healthy brain, it is likely that it may also be a mechanism which functions in response to disease or injury. Stein, the Director of the Neuroscience program at Clark University, has pointed out that the growth of glial cells in the damaged area which causes a type of scarring may limit the effectiveness of sprouting. Sprouting may be one of several ways in which the return of behavioral function is accomplished, but it does not explain all types of recovery.

Denervation supersensitivity is yet another consequence observed to follow brain lesions. This mode of recovery suggests that depressed central nervous system activity may result in a supersensitivity to neurotransmitter substances. The reaction can be attributed to an increase in the number of receptor sites for the transmitter which is predominant in that neural region. This facilitates the use of the reduced number of surviving neurons in the injured functional system during the time when the neurotransmitter substance is less available in the brain. Supersensitivity is also observed in human subjects recovering from brain damage. Our experience in Rhode Island suggests that young head traumas and older stroke patients are often equally sensitive to very low doses of drugs which affect neurotransmitter availability at the synapse. The exact mechanism of this process is poorly understood, but it is believed that the brain attempts to compensate for neural shock and the consequent decrease in neurotransmitter levels. Supersensitivity can also have deleterious effects on behavior. Stein, Finger and Hart (1983) suggest that the supersensitivity might be more generalized than is necessary, thus resulting in exaggerated transmissions and therefore poorly modulated behavioral expressions.

Stein has contributed a fascinating account of the mechanism of recovery through his work in experimental *brain transplantation* in rats. He and his colleagues have conducted numerous studies of the effect of transplanting fetal brain tissue into lesioned areas of the brain on the recovery of behavioral competence. He found that those with transplants can learn a maze or a visual discrimination task more efficiently than those without transplants, but that neither group did as well as the normals. After sacrificing the animals and examining the brain tissue, he concluded that the connections between the transplant and the host brain are inconsistent and of questionable functional assistance. His work, the work of Finger at the Washington University in St. Louis, as well as others have led to the

theory that the transplanted immature CNS tissue may only play a role in recovery in so far as it is a source of a substance known as *Nerve Growth Factor* (NGF). In studies investigating the effect of Nerve Growth Factor alone, Stein has concluded that NGF can facilitate recovery of behavioral functions following brain damage. He reports that these "factors" are "thought to enhance the survival of neurons that would ordinarily die as a primary or secondary effect of brain insult" (Stein, 1985). These growth factors are now known to be produced by the injured brain as well as to be found in developing neural tissue.

The concept of the preventive role of NGF in the sparing of neural tissue might fit with the theory of neural shock and the depression of neural function in related tissue. Perhaps nerve growth factors will serve to limit or reduce neural shock and its consequent suppression of behavioral function. Stein takes his conclusions one step further and suggests caution in the pursuit of fetal tissue transplants in humans when the injection of nerve growth factors can be as effective, with limited risks, and considerably less moral concern. Tissue transplants from the adrenal cortex to the brains of patients with Parkinson's Disease have already been attempted in Sweden with mixed results. These transplants were less controversial because the patient served as his/her own donor.

Further work on the exogenous administration of nerve growth factors and brain gangliosides have suggested that the injections are capable of facilitating recovery of spatial learning tasks in the brain damaged rat. This treatment was found to be effective even after massive bilateral lesions. The *gangliosides*, which are molecules found in the outer leaflet of the neural membrane, are believed to promote neural sprouting to the damaged area. It is hypothesized that the gangliosides also decrease the denervation supersensitivity found in areas of tissue damage. No toxic effects were noted. The gangliosides appear to have no effect on uninjured tissue. No human studies have yet been attempted.

There are some indications for the pursuit of animal studies of brain transplantation. Stein suggests that there is much to be learned about the specificity of nerve growth factors to certain regions or functional systems within the brain. We might also learn more about atypical growth such as in central nervous system tumors. The remarkable discovery of an endogenous healing substance in an organ felt to have limited restorative potential brings us one step closer to understanding and perhaps facilitating recovery of behavioral competence following severe brain trauma or disease.

Clinical and Philosophical Implications

Certainly brain transplantation and the use of fetal neural tissue will spark considerable controversy in scientific, social, political and religious circles. The discussion may be unnecessary, however, since we are quickly recognizing more "natural" methods of facilitating return of function in a damaged brain. The desire to implement new discoveries, though, may supercede the wisdom to wait for more successful treatment strategies. Brain transplants could become an experimental part of medical practice.

Perhaps a more pressing issue to address is the "quality" of survival following severe brain injury. Let me take a moment to concretize or add substance to the discussion of these abstract issues by describing two patients whom I treated in a comprehensive rehabilitation setting. The first person is a 28 year old man, Gary, who was brought to the emergency room of a community hospital after an overdose of drugs and alcohol. His heart and lungs had ceased to function, so resuscitation was attempted and he was "brought back to life." After a period of recuperation, it was discovered that there had been significant loss of oxygen supply which resulted in severe brain damage. The behavioral consequences were blindness, quadriplegia (minimal ability to control movement in all extremities), markedly decreased memory for new information and the inability to initiate activities. He was also unable to speak, although capable of language. He could not manage his own bowel and bladder function. Gary was treated in a rehabilitation program with little success and eventually was transferred to long term care in a chronic disease hospital where he will remain for many years.

Our present state of the art medical technology allows us to save the life of this young husband and father, but neuroscience has not yet developed to a point where we can restore the "quality" of that life. Quality of life is a phrase that is difficult to define when we are discussing recovery from brain damage. As a neuropsychologist I would include the return of behavioral competence, and the restoration of personality and emotional stability in any description of a recovery which restored a person to quality living. The bare bones of quality existence assumes that the person is aware of him/herself and others and can interact with those others in meaningful ways. Others in my field might go further and require independent thinking, remembering, and planning of activities or perhaps even return to an active role in one's family or social network.

Another story I'd like to share with you is that of a 25 Year old man who decided to be a good samaritan and

stopped to assist a person whose car had a flat tire. It was a rainy night with poor visibility. Another motorist, failing to notice Carl, struck and severely injured him. On admission Carl had multiple fractures including his skull. He underwent a craniotomy which involved evacuation of part of the right frontal lobe. He was in a coma for several weeks and experienced a period of confusion and poor memory for daily events for several months after that. His progress was slow. As he gradually awakened, he was agitated and aggressive as is common in this phase of recovery. The agitation and combativeness lasted for weeks. Carl's basic interests were in being left alone or getting something to eat or drink. We still talk about him and quote his famous line "Carl wants and needs a drink." During that time he was fed through a tube because he could not open his mouth wide enough to put anything in it. He was treated with medication to manage the agitation and later a different drug for his pathological eating behavior and other depression-like symptoms. He spent two years in a comprehensive rehabilitation program. Carl was finally able to eat on his own and walk with the assistance of one person and a walker. His cognitive recovery was less impressive. Poor memory function as well as the inability to assess the appropriateness of his behavior made him completely dependent on others to make even the simplest judgements. His frontal lobes were severely damaged leaving him with little capacity to evaluate his cognitive strengths and weaknesses, plan for the future or appraise his ability to carry out any life goals. His ambitions and desires remained intact, but the ability to achieve them was lost.

This young college educated man was referred to long term care in a nursing home. Although he had a fiancée at the time of his accident, she had gradually drifted away. It is expected that Carl will not return to independent living or any type of employment. His dream continued to be to marry and some day have children. Fortunately for him, he failed to appreciate the fact that his dream was shattered on that rainy night.

Thousands of young people are suffering the same traumatic brain injuries and consequent personality and cognitive changes. Many are in persistent vegetative states or light coma for years. On the other end of the spectrum are those who suffer progressive diseases of the central nervous system which destroy or compromise brain function and behavioral competence. The most familiar are those with Parkinson's Disease, Alzheimer's and Multiple Sclerosis. We have considerable promise in the research of neuroscientists like Stein, Finger, Cotman and others. Meanwhile, we are left to wrestle with the psychological, social and moral impact of brain damage on the survivors, their families and the larger

community. Neuroscientists have given us the tools to save the bodies of the severely brain damaged, but we remain in the dark ages in our capacity to restore their minds.

References

Andreasen, N.C. (1984). *The broken brain: The biological revolution in psychiatry*. New York: Harper & Row.

Backlund, E.O., Granberg, P.O., Hamberger, B., Knutsson, E., Martensson, A., Sedvall, G., Seiger, A., & Olson. (1985). Transplantation of adrenal medullary tissue to striatum in Parkinsonism—first clinical trials. *Journal of Neurosurgery*, 62, 169-173.

Bennett, E.L., Diamond, M.C., Krech, D., & Rosenzweig, M.R. (1964). Chemical and anatomical plasticity of the brain. *Science*, 146, 610-619.

Cotman, C., Nieto-Sampedro, M., & Gibbs, R.B. (1984). Enhancing the self-repairing potential of the CNS after injury. *Central Nervous System Trauma*, 1, 3-14.

Finger, S., & Stein, D. G. (1982). *Brain damage and recovery: Research and clinical perspectives*. New York: Academic Press.

Goodman, D.C., Bogdasarian, R.S., & Horel, J.A. (1973). Axonal sprouting of ipsilateral optic tract following opposite eye removal. *Brain, Behavior and Evolution*, 8, 27-50.

Greenough, W.T. (1976). Enduring brain effects of differential experience and training. In M. R. Rosenzweig & E. L. Bennett (Eds.), *Neural mechanisms of learning and memory* (pp. 255-278). Cambridge MA: Massachusetts Institute of Technology Press.

Johnson, D.A., & Almi, C.R. (1978). Age, brain damage and performance. In S. Finger (Ed.) *Recovery from brain damage: Research and Theory* (pp. 115-134). New York: Plenum.

Monakow, C. von. (1969). Die Lokalisation im grosshirn and der abbau der funktion durch kortikale herde. Wiesbaden: J. F. Bergmann, 1914. Translated and excerpted in K. H. Pibram (Ed.), *Mood, States and Mind* (pp. 27-37). London: Penguin.

Robinson, R.G. (1979). Differential behavioral and biochemical effects of right and left hemispheric cerebral infarction in the rat. *Science*, 205, 707-710.

Stein, D.G. (1985). Fetal brain tissue transplant techniques: A cautionary note. *Commentary*, 157-160.

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THEOLOGY AND THE MIND-BODY PROBLEM

Father (Doctor) Benedict Ashley, O.P.

Father Ashley is a priest of the Dominican Order, Chicago Province. He is a graduate of the University of Chicago and the University of Notre Dame and has doctorates in philosophy and political science, and the post-doctoral degree of Master of Sacred Theology conferred by an international committee of the Order of Preachers. He was formerly President of Aquinas Institute of Theology, St. Louis, Professor of Theology at the Institute of Religion and Human Development, Houston, TX. He has been Professor of Theology at the Pontifical John Paul II Institute for Studies in Marriage and Family, Washington, D.C. and Visiting Lecturer in Humanities at the University of Chicago (1999), the Institute for Psychological Sciences, Arlington, VA (2001-02) and the John Paul II Cultural Center, Washington, D.C. (2002-02). At present he is Emeritus Professor of Moral Theology at Aquinas Institute of Theology, St. Louis and Assoc. Professor at the Center for Health Care Ethics, Medical School of St. Louis University. He is member of the board of the Institute for the Psychological Sciences, Washington, DC and a Senior Fellow of the National Catholic Bioethics Center, Boston. Reprinted from Brain Research and Human Consciousness, ITEST, March, 1986.

I. The Theological Data

The point of departure for any strictly theological understanding of the relation of the human mind to the human body must be our faith in the Risen Christ and his promise that those who believe in him will share in

his bodily resurrection. St. Paul says, "if Christ was not raised, your faith is worthless. You are still in your sins, and those who have fallen asleep in Christ are the deadest of the dead. If our hopes in Christ are limited to this life only, we are the most pitiable of men." (1 Cor. 15:16-19)

Yet later in this same epistle St. Paul says, "How are the dead to be raised up? What kind of body will they have?", and answers, "What is sown in the earth is subject to decay, what rises is incorruptible. What is sown is ignoble, what rises is glorious. Weakness is sown, strength rises up. A natural body (*soma psychikon*) is put down, a spiritual body (*soma pneumatikon*) rises up." (15:42-44) Because of this expression "spiritual body" some have understood the resurrection as a transformation in which the material body has no share. (1)

Paul, however, is asserting the resurrection of a material body but one which is "spiritualized" in the sense that it has been freed from the weakness and corruptibility from which it now suffers.(2) That this was the understanding of the early Church is clear from the care shown by the evangelists Luke and John in their accounts of the appearances of the Risen Christ to insist that he was no ghost, but was tangible, still bore the marks of the crucifixion, and was able to eat ordinary food.(3)

The Church has been content with this article of faith and has given little official recognition to speculations about the nature of the resurrected body or its relation to the human person as such. Nevertheless, the rise of various heresies have forced her to make certain clarifying pronouncements. First, from an early date she had to declare that the material body was created *good* and is not the origin of evil in the world against the Gnostics who taught the contrary.(4) Second, she rejected the notion that at death the human person is annihilated or at least "sleeps" until God 'recreates it or awakens it at the Resurrection, by teaching that a spiritual mind survives the death of the body and while awaiting the resurrection already experiences the vision of God, the pains of hell, or the purifying work of grace.(5) Third, in reaction to certain scholastic speculations and Renaissance skepticism about the immortality of the soul, the Church insisted that the spiritual aspect of the human person in life is the very "form" of the body yet by reason of its spirituality survives it.(6)

No questions are raised by theologians today about the first of these doctrines. As to the second, some of the early Church Fathers seem to have supposed that the resurrection is a recreation of the total human person. Some Catholic theologians have proposed the idea that all the faithful share with the Blessed Virgin Mary in an immediate bodily assumption at death.(8) Finally, as to the third, many questions are raised by Scripture scholars today about how these matters can be freed from the Greek philosophical language of "matter" or

"body" and "form," "spirit," "soul" or "mind" and restated in more biblical terms. They want to avoid the *dualism* introduced into Christian thinking by the influence of Plato, so evident in St. Augustine and in extreme form in the so-called "father of modern philosophy," Descartes.(9)

Unquestionably it is a pressing task for theologians today to overcome this sort of dualism inherited from Plato and Descartes (I have recently published a long book which I hope may contribute to that goal.(10) Nevertheless, it would be a serious theological error to deny that there really is a duality in the human person expressed catechetically in the terms "body and soul."

The fundamental anthropological text in the Bible is the first chapters of *Genesis* to which St. Paul himself refers, comparing the Risen Christ to Adam (1 Cor. 15:45-49, immediately after the passage previously quoted). Adam is not merely a body but also spirit. In *Genesis* 2 it is said that Yahweh "formed man (Adam) out of the clay of the ground and blew into his nostrils the breath of life, and so man became a living being." (v.7) Thus the human person is not merely a material body but also a living body by reason of the spirit (breath) of life, yet of course so are the other animals.

Therefore, the Priestly editor of the book was careful to explain in Chapter 1 how the human differs from the merely animal. God says, "Let us make man in our image, after our likeness. Let them have dominion over the fish of the sea, the birds of the air, and the cattle, and over all the wild animals and all the creatures that crawl on the ground . . . God created man in his image, in the divine image he created them (vv. 26-27)." The Yahwist implies the same by telling how God had Adam name the animals, a sign of man's control over them, and gave him the garden of Eden to guard and cultivate (2:15, 19-20).(11)

What does it mean to say we are created in God's image and likeness?(12) The Scripture just quoted seems to mean directly that we are God's image because we share in His creative dominion over the rest of the visible creation. But why? Obviously because we surpass the animals in intelligence and freedom which make it possible for us to know and control creation. Thus while we are bodies we also live with intelligent freedom and are responsible for our world and our relations one to another. Thus Christian anthropology has to recognize that on the one hand we are essentially and necessarily a part of the material creation and on the other we transcend that material creation by our power as co-workers with the Creator to understand and shape our world.

The Darwinian and Neo-Darwinian theory of the evolutionary origin of the human species raised a difficult problem for Christian anthropology. Pius XII in his encyclical *Humani Generis* (1950) gave a satisfactory (but not definitive) solution to this problem by recognizing that the question of human origins is one for science to settle provided that it also be recognized (1) that the secondary causality of natural evolutionary processes is absolutely dependent on the primary causality of the Creator and (2) that the spiritual human soul is the result of a special act of the Creator.(13) In other words, God creates the total human person, but he produces the body *mediately* through evolutionary processes and the human parents, but the soul *immediately* as the finishing touch to this single creative act.

This solution, however, has not satisfied everyone because it seems to some that such special intervention by God in the origin of countless millions of human beings, many of whom perish in the womb, is a multiplication of miracles. Consequently some favor the suggestion of Teilhard de Chardin that the human spirit may emerge from matter by the same evolutionary process by which new forms of life emerge from old and even from inanimate matter. This suggestion runs into the dilemma that (a) either it involves the transformation of matter into spirit by material processes -- and this seems metaphysically impossible, or (b) it requires us to accept *panpsychism*, i.e., the ancient theory that all matter has a spiritual dimension. Teilhard himself, like Julian Huxley,(14) accepted the latter alternative, but it lacks all possibility of empirical verification and requires just as much faith as Pius XII's doctrine of the soul's special creation. Indeed, the Scriptures seem to favor the view that the Creator calls each of us into existence in immediate I-Thou relation with himself.(15)

This immediate creation of the human soul seems evident in the case of the incarnation of the Son of God by virginal conception in the womb of Mary through the power of the Holy Spirit, especially as the Evangelist Luke presents it (Lk 1:26-38).(16) Although, of course, the origin of Jesus who is the New Adam, the paradigmatic human being, is unique; nevertheless it is significant for understanding our own origin, as Luke suggests by the way he relates the conception of John the Baptist to that of his Lord.

To summarize. The Catholic faith teaches that (1) the human person is endowed by the Creator with a body which is so essential to the integrity of the person that it will be restored after death by a divine act of mercy, the resurrection, for eternity; (2) the human person is also endowed by the Creator with spiritual existence manifest in the intelligence and free will by which we

are superior to other animals and by which we are images of God; (3) by virtue of their spirituality human beings survive bodily death and remain conscious while awaiting the resurrection.

To these defined doctrines it should also be added as theologically certain, but not defined, that the origin of every human person by reason of her or his spirituality depends immediately on a special creative act of God. It is within these limits that our philosophical and scientific theories about the relation of the human mind to its body ought to be developed if they are to be in harmony with Christian faith.

II. Empirical Data Which Theology Must Accept

Ordinary experience makes evident to us how dependent our consciousness is on optimal bodily functioning. When I am asleep, feverish, drunk, or drugged, or even merely weary or emotionally upset I experience a marked change in my conscious state which becomes sluggish or confused or goes blank. Moreover, I experience that I cannot see in the dark, feel accurately when my hands are numb, hear well when my ears are plugged. Of course I do not know what it is like to be dead, but nothing I have ever observed the dead do leads me to suppose that they are conscious.

Scientific investigation has not invalidated these common sense observations, but it has added immensely to our information about the ways in which human thought is dependent on the functioning of the human body. The ancient Greek physicians, who were the direct progenitors of modern biology and medicine, disagreed about the physical seat of consciousness. Some, including Aristotle, located it in the heart, because this seemed to be the first organ to appear embryologically and the last to die, and because it seemed to be the prime mover or energy source for the whole organism. Others, like Plato, more dualistic in their thinking, located it in the head, as the most noble organ and therefore most appropriately the abode of the eternal soul during its brief earthly exile. Oddly enough the latter, less empirical, view turned out to be correct.(17)

Nevertheless, it would be wrong simply to conclude, as is often done, that our conscious life is segregated in the brain. What is empirically verifiable is that unless the rest of our organs are in normal connection with the brain they cannot contribute to conscious experience. But this does not logically contradict the subjective experience that our sensations are located in our sense organs. When I feel an object touching my hand I seem, at least, to feel it in my hand, not in my brain. Nor do I see the sun in my brain, but in my eyes; or

hear music in my brain, but in my ears; nor do I taste a good steak in my brain, but in my salivating mouth. Thus from an experiential point of view my sensations are not located in my brain but in my whole body, although when something happens to my brain my body becomes insensate.

The world of my imagination and memory seems only vaguely related to my actual body, although I can usually retrace the elementary images which compose it to particular organic sensations experienced in the past. For example when reading a vividly written novel I pass from consciousness of my body seated in my favorite chair in my room into a fictional world where I am on a stormtossed sea voyage, and then back again to my quiet chair.

On the other hand, the realm of abstract thought does not have a vague relation to my body, rather it has no relation at all. Of course my thoughts are mine, and therefore subjectively identified with my body; but in their objective content are not in space or time. When for example I work a simple problem in arithmetic, I am not aware of any location for the numbers I use or whether they belong to the past, the present, or the future.

Finally, when I reflect on myself as the subject who is experiencing these sensations, images, or thoughts what I experience is multi-leveled. I am aware that this is Me who has this familiar body presently in this location and situation. I am also aware that here and now there is present to me a world of memory and imagination which I am calling up to help me interpret and anticipate what is going on with my body in the real world. This world of images is itself multi-leveled, since in it some images are in the foreground, some only semi-consciously in the background. This background imagery is interwoven with feelings, pleasant, painful, and neutral to form the context of my conscious thinking and decision-making.

Both these worlds of sensation and imagination under some respects are presented to me simply as *facts* but sometimes also as *meaningful*, that is, I can interpret them in terms of abstract categories, as particular instances of universal concepts. Finally, at the center of this entire content of my consciousness, holding all the rest together within a continuous horizon is my *self-consciousness*, my awareness that it is I to whom everything else is present including my own body which locates me in the real world. What is odd is that this self-consciousness has no content of its own. All that I am conscious of are the various levels of my experience as rooted in the ground experience of my own body.

No matter how enthralled I may be with the objects I am seeing, no matter what flights of memory or imagination I may take, no matter how abstract my speculations, I cannot cut my moorings to my awareness that my body is Me in the here and now. If for a moment I seem to forget this I drift off in dreamy sleep or I pinch myself to come back to reality. Thus I cannot deny the fundamental fact of experience that, try as I may, I cannot sever self-consciousness from body-consciousness which is somehow included in it as its existential ground. This fact of ordinary experience has been confirmed by sensory-deprivation experiments(18) which show that when a human experimental subject is deprived not only of external stimuli but even of tactile and muscular sensations by being floated in a tank of water at body temperature, he or she begins to dream or hallucinate.

What scientific study has contributed to the understanding of such primary empirical data is an immense fund of more detailed information not accessible to ordinary consciousness about the structure and function of the sense organs and nervous system and especially about our brains. What this research tells us is (a) how external objects and also the states of our own body act on the sense organs, e.g., how the color and shape of a flower are transmitted and impressed on the retina of the eye; (b) how this information is transmitted by the nerves to the brain; (c) how this information is stored in the brain and coordinated with information already stored there; (d) how this stored information can be accessed when needed. *But it says nothing about our conscious awareness of this information.*

Thus the activity of the central nervous system resembles that of an advanced computer, although it is well recognized by scientists that this is only an analogy since in many respects the CNS is very unlike a computer. Nevertheless, there seems no theoretical reason why it would be impossible to develop computers that could approximate to any degree desired the human brain's information-processing activities, and in some respects even surpass them. Yet this does not prove that a computer performs this information-processing *consciously*. Some have argued that since we process information consciously, and a computer can process information just as well as we do, then a computer must also be conscious.(19)

This is bad logic, since it assumes what it seeks to prove, namely, that information-processing is *necessarily* a conscious process. A book contains a great deal of information, but it is unlikely that the book is conscious of the information it contains. A computer is nothing more than an electronic book programmed not only to

record but to reshuffle the information it contains and print out this recombined information.

Moreover, self-consciousness is something more than simple consciousness. A comparison of animal with human behavior warrants the conclusion that animals are just as conscious as we are of the environment. Bees can fly unerringly to a certain kind of honey-laden flower by detecting its precise shade of color in the midst of a complex landscape. But it is by no means certain that animals are *self-conscious*, that they know that they know, as we certainly do. We can notice in our own awareness the difference between being aware of a red spot of color and being aware that "I am looking at a red spot." The reason that we cannot be sure that animals have such self-consciousness is that they cannot tell us they do. Human language is capable of expressing self-consciousness; the forms of animal communication which have been studied cannot do so, at least cannot do so unambiguously.(20)

Thus the empirical data relevant to the mind-body problem, both that accessible to common sense and that uncovered by scientific investigation, show us that the body plays an essential role in the life of the mind, but do not show that this role is anything more than the reception, storing and processing (in the sense of combination and permutation) of information. We are left with the problem of accounting both for consciousness and self-consciousness. Consequently, it is necessary to subject this data to a process of philosophical analysis that most scientists by-pass.

III. Philosophical Analysis of the Empirical Data

Two questions need to be asked which discussions of the mind-body problem too often fail to distinguish: (1) Can self-consciousness be the act of a bodily organ? (2) Can *self-consciousness* be the act of a bodily organ? Of the ancient philosophers only Plato and Aristotle clearly distinguished these two questions. Plato responded negatively to both; while Aristotle affirmed the first and denied the second. Modern philosophy, beginning with Descartes, has tended to confuse the two questions. For Descartes sensation is an imperfect form of self-consciousness, and for Locke self-consciousness is a less vivid form of consciousness.(21)

In this century Gilbert Ryle aroused a great deal of controversy by attempting in his *The Concept of Mind* (22) to eliminate the notion of "consciousness" (in Descartes' sense) altogether. He argued that we are never conscious of our "self" but only of public objects or of our own acts and that our own acts are always performed on or in reaction to public objects.

Therefore, to say that "I am conscious" is simply to say that my behavior always refers to the same objects to which the behavior of other human beings also refers. Thus it would seem to follow that if a human and a humanoid robot both behave in the same way with reference to the same object (e.g., both avoid running into the same wall) that both are equally "conscious." We can concede to Ryle that we have no consciousness which is simply an awareness of a self in the sense of a mind empty of anything but itself as a thinking subject or "transcendental ego." We can also concede that we have no consciousness of ourselves as minds filled with innate ideas, as Plato and Descartes supposed, but this does not eliminate the distinctions between unconscious, conscious, and selfconscious behavior, which are empirically certifiable.

Let us consider the way Aristotle made these classical distinctions.(23) He held that we can, at least in many cases, (24) empirically distinguish animal from vegetative life by the fact that animals have sensation and plants do not. Moreover, we can empirically verify that animals have sensation (a) by ascertaining that they have specialized organs adapted to receiving information transmitted by light, sound, pressure, temperature, etc.; (b) by observing that they react to such information by appropriate behavior in view of basic life needs, e.g., pursuing food and escaping predators.

Such behavior must be judged to be "conscious" for two reasons: (1) It is *vital* activity in Aristotle's sense that vital activity is different from merely physical activity in that a living organism activates itself, one part moving another; while non-living things are activated by agents other than themselves. (2) It is vital activity that manifests the animal is acting on information received in an *objective*, not a subjective mode. Information is received subjectively when it modifies the intrinsic structure of the recipient. It is received objectively when the receiver receives while retaining its own intrinsic structure unmodified in any significant way. Thus when a plate of glass is heated it is intrinsically modified so that it becomes *hot glass*, but when acting as a mirror it reflects my face. It does not become *human glass* but the bearer of a human image. Yet a mirror is only analogous to a sense organ because it is not living i.e., self-activating.

Only a self-activating organ can receive information in a strictly objective manner, since such objectivity requires that the receiver constantly restore itself to a neutral state, otherwise the information it receives becomes incorporated as part of its own intrinsic structure, i.e., as a subjective form. Thus, for example, a photographic plate is permanently modified by the

image it receives. A mirror is only so modified temporarily and thus receives the image in a quasi-objective manner, but it too remains subjectively modified until a new image falls upon it. On the contrary, a sense organ like the eye receives an image in a purely objective manner because by its vital self-activation it constantly returns itself to a neutral condition ready to receive a new image, never permitting received information to be incorporated into its intrinsic structure. Aristotle expresses this by saying that "Cognition is the reception of the form of another precisely as other."(25)

Self-consciousness, however, according to Aristotle, does not exist at the animal level. Chimpanzees have been observed, apparently, to recognize their own faces in a mirror or a photograph, but this need not imply they are doing anything more than discriminating one face from another and reacting to it with a repertoire of appropriate learned behavior.

Moreover, even if we remain at the level of simple consciousness, we need to ask whether awareness of objects is all of the same type. If I draw a triangle on the blackboard and ask someone who has not learned geometry what he sees and then ask the same question of a geometrician, I will get two different answers. The geometrician sees the same triangle as the non-geometrician, but he recognizes it not merely as a concrete sensory image but as an instance of a three-sided plane figure, i.e., he abstracts from its concrete conditions and attains its "essence," its unitary principle which can be realized in countless different particular conditions.

But is it possible for us to attain this kind of insight with respect to the essences of natural things such as living organisms? Aristotle and Aquinas often seem to assume that we can, but they also state explicitly that we cannot.(26) This contradiction can be resolved if we interpret the latter assertion simply as a denial of the Platonic doctrine of an innate, perfect intuition of essences. Since for Aristotle we have no such intuition but arrive at essential knowledge only by abstraction from concrete sensory experience, this essential knowledge always remains inadequate.

For example, today we have no doubt that every molecule of water is H_2O whatever its accidental location or temperature, etc., that this formula truly expresses its essential character as distinguished from any other chemical substance and that it furnishes an explanatory principle for its various properties. Such a formula expresses precisely what is meant by "essence". On the other hand, such a formula fails to express the exact character of the unifying chemical bond which makes this molecule a primary natural unit and thus

expresses the essence inadequately. Hence it is open to further scientific exploration and refinement of understanding.

Since intellectual or essential cognition differs in this specific way from sensory cognition, and not merely in degree as Locke thought, the Identity Theory of the relation of mind to body based on the Lockean epistemology, is open to question. The fact that the body is the seat of sensory cognition need not imply that it is also the seat of intellectual cognition. But is not this implied by the fact that intellectual cognition is impossible without sensory cognition, since it is derived from the latter by abstraction? Not necessarily, since this dependence of intellectual on sensory cognition is only dependence on a material condition not on an efficient or formal factor.

For example, when a teacher draws a variety of triangles on the blackboard, the pupil at first attains only to sensory cognition, but after being urged by the teacher to compare these figures and to notice what they have in common, many achieve spontaneously and in a flash of insight the concept of a three-sided plane figure abstracted from all concrete conditions. This intellectual insight necessarily depends on the sensory awareness of the visible triangles but is not produced by any sense organ nor does it have the form of any particular triangle.

That intellectual cognition is not a brain activity is even more evident if we consider not the intellectual awareness of objects external to our self-consciousness, but the very nature of self-consciousness itself. To know an object and simultaneously to know that I know it, requires either an implicit or explicit act of reflection on my own act of knowledge. To be self-conscious is to be present to myself as a whole. This is impossible to a body which is a whole whose parts are present to each other only at their interfaces. This is why the human brain, which acts immediately as an instrument in the service of intellection, is essentially a marvelously dense network of interconnect-neurons. Such a network comes as close as any extended body can to approximating a state of affairs where every part of a whole is simultaneously present to every other part, yet it is only an approximation.

Another way to illustrate this same point is to consider some of the consequences of the famous theorem of Goedel,(27) according to which it is logically impossible to decide every question that can be raised in a purely formal system having a finite number of axioms (if this system is sufficiently complex to be able to express simple arithmetic). Formal logical systems, as this term

is understood in modern symbolic logic, are constructed to deal with "sets" or collections of items which can be put in one to one correspondence with the real integers, and the real integers are derived from spatially discrete (and thus material) units or their similarly discrete parts. Hence, Goedel's theorem is a statement relevant to quantitative or extended wholes. If the human mind were such a whole it could reflect on itself only imperfectly and consequently would always include items not provided for in any set of axioms actually present to consciousness. Since self-consciousness means total reflexivity, this explains why we can always ask new questions undecidable by a given formal system, and can also form new axioms to enlarge that system so as to deal with the new questions we have raised.

Another way to illustrate essentially the same point is to note that the human mind differs from the animal mind precisely by its capacity for creativity.(28) It is true, of course, that the higher mammals, especially the hominoid primates, have the capacity to transcend the purely instinctual patterns of behavior exhibited by lower animals such as insects by learning new patterns of behavior, but these new patterns appear to be no more than specifications of already existing instinctual behaviors; or, in the case of domesticated animals, of patterns imitated from human behavior.

It has never been demonstrated, however, that subhuman animals can exhibit the kind of inventiveness which is so obviously typical of the human species. Subhuman animals have never developed *cultures*, while all known human groups have. It is generally admitted by evolutionary theorists that the striking thing about the human species is that it is able to transcend, at least to a notable degree, the evolutionary process.(29) We have developed a science and technology by which environmental forces become the servants of human purposes. The scientific understanding of evolution and our growing technical control over it through genetic recombination are irrefutable evidence that we are creative animals.

A more fundamental and obvious evidence of human creativity is the fact that only the human species communicates by true *languages* which they themselves invent. The attempts to teach animals languages have only made clearer that these animals never invent such languages themselves, and that their efforts to learn them are never unambiguously successful.(30) Language of the human type contains not only exclamations, warning cries, and proper names as do animal "languages," but also symbols for abstract concepts, as well as syntactical symbols such as "and," "therefore," "because" for purely logical relations. Such symbols serve a

purpose only for an animal who has intellectual cognition as distinct from sensory and imaginative cognition. Moreover, since the ability to use true language underlies all human thinking and creativity, the fact that such language is specific to the human species is the clearest possible evidence that we have a unique mode of consciousness.

These illustrations of the unique kind of consciousness proper to the human species, transcending the possibilities of an extended organ like the brain, empirically refute the Identity Theory. They also show why no computer will ever be able to think in the human mode, although human creativity can invent such computers to approximate to any degree desired the permutation and combination of logical symbols according to programmed rules by which we express our thoughts in logical symbols. Computers operate according to formal logical systems, but the formal systems of modern symbolic or mathematical logic are themselves empty until interpreted by a human mind which assigns meaning to their symbols. Moreover, it is an error to suppose that modern symbolic logic is able to do anything more than to approximate in the manner of a model the actual logical processes of thought.(31)

Thus we come back to affirm, on the basis of these arguments and illustrations, that human mentation is an operation of the body, as regards sensory cognition but not as regards intellectual cognition, i.e., abstract thought and self-consciousness. Now what about the "unconscious mind" that plays so large but ill-defined a role in modern psychology? (32) There seems no great difficulty with such a concept if it is identified simply with the sensory memory considered as the storehouse of images which are unconscious until activated. Furthermore, we can admit that within this store dynamic processes of recombination may go on of which we are not aware. Finally, we can admit that these memories are activated in dreams and in the subconscious (i.e., in the imperfectly conscious) background of our sensory consciousness where they can assert important influences on our thinking and feeling.

The well-publicized phenomenon of multiple personality raises a puzzle for any account of the mind-body relation, but seems adequately explicable as the dramatization of conflicts within a single person and a single mind in which the actor while acting one role compulsively and perhaps unconsciously suppresses the memory of another role. There is no need to suppose that these are cases of two minds existing in one body, except in a phenomenal sense, any more than to suppose that an actor performing Hamlet is possessed by the soul of Hamlet.(33)

The interpretation of Jungian psychology with its theory of the creative and integrative role of the unconscious and especially of the "collective unconscious" is a much more complicated matter. (34) To assign creative functions to the same unconscious that is the source of our irrational biological drives is completely implausible, since these drives are instinctual and deterministic, the very opposite of the freedom of creativity. I have argued elsewhere (35) that Jung has confused the unconscious with the *superconscious* or intellectual aspect of the psyche in its intuitive rather than rational mode of operation. The ego of psychoanalytical theory is only that area of consciousness which is easily verbalizable and in which our ordinary every-day practical experience goes on. The mystics and those who have studied creative and decision-making processes have always recognized that there is a higher (or, if you like, deeper) region of consciousness: intuition, the *ratio superior*, or superconscious (not to be confused with the superego, which is part of the unconscious) where cognition of the fundamental categories and first principles of theoretical thought and the fundamental options of practical thought take place. (36)

Thus human creativity arises not from the deterministic unconscious, but from the free, intellectual, spiritual superconscious. Jung confuses the two, I believe, because (a) the contents of the superconscious are, as Jacques Maritain says, (37) "nonconceptual" (it would be better to say "proto-conceptual" or nonverbalized); (b) when the barriers by which the censor protects the ego from distraction are lowered, the contents of both the unconscious and the superconscious flood into consciousness and reinforce each other. This is why creativity is facilitated by what Kris (38) has called "regression in the service of the ego," a regression which also occurs in free-association, dreams, and drug induced states. As for Jung's notion of a collective unconscious, rather than attribute the observed universality of archetypal symbols to genetic factors as he seems to do, it seems more plausible to explain them by common human experiences and our universal historical heritage mediated through our various cultures.

The question now arises: If the human person has capacities for abstractive and creative thought which transcend the operation of the brain yet require the operations of the brain and sense organs as necessary conditions, how can we best characterize the relation of the mind to the body? Certainly, neither Platonic or Cartesian dualism will do, since they deny the necessity of this condition. Nor will psychophysical parallelism, for the same reason. At the other extreme we must reject the Identity Theory or the Marxist epiphenomenalism, because these theories fail to recognize the transcen-

dence of intellectual cognition and self-consciousness. The panpsychism of Teilhard de Chardin must also be put aside as entirely speculative. Nor is anyone likely to revive the Platonizing notion of the plurality of forms proposed by some scholastics, since this fails to account satisfactorily for the unity of the human person; or the Averroistic interpretation of Aristotle according to which intellection is the work of a single world soul, because this theory neglects human individuality.

Thus we are left with the Thomistic interpretation of Aristotle according to which each human person has his or her own essentially spiritual soul capable of intellectual cognition but requiring for this cognition the services of a body to which the soul gives vital organization and actual existence as an organism. This philosophical definition is not derived *a priori* from metaphysical principles, but from an analysis of human behavior as compared with animal behavior.

Some Thomists, who are often qualified as Transcendental Thomists, as well as those who speak of "cognitive theory," and many phenomenologists, Thomistic and otherwise, take an approach to this mind-body problem that proceeds counter-clockwise to the empirical one I have pursued. They believe that the "turn to the subject" by which Descartes initiated the history of modern philosophy and which Kant believed necessary if philosophy was ever to be "critical", is the only possible point of departure in our times. Hence they begin with the self-consciousness of the subject and proceed to ask why the intentionality of cognition necessarily places the knowing subject in a "world" whose facticity and historicity involve embodiment.

Undoubtedly such an approach has many rhetorical and perhaps some philosophical advantages, but I do not believe these sufficiently compensate for other serious disadvantages. The chief of these is that such an approach from the subject requires philosophers (and theologians who make use of philosophers' results) to dissociate themselves from the outset from the results and the concerns of scientists.

Even Bernard Lonergan who in *Insight* (39) showed himself to be a theologian seriously interested in the scientific mode of thought, seemed to have been concerned about it not for what it revealed about the world and human nature, but simply as one phase in the self-questioning of the subject. Even some very traditional Thomists such as Jacques Maritain fell into this same trap by proposing to give scientific thought its autonomy in separation from philosophy but only at the price of denying to science the capacity to attain to noumenal reality. (40) In my opinion modern phi-

losophy has made a tragic mistake in believing that the way to be modern is to alienate itself from the very force which has made the modern world, namely, the natural sciences.

To conclude this superficial but too protracted philosophical analysis of the empirical data, common-sense and scientific, relevant to the mind-body problem, we can say with assurance that this analysis confirms the revealed data of Christian revelation, and supports a theological interpretation of that data of the non-dualistic, realistic type favored by Thomism and similar theological systems, and commonly used in official church documents.

IV. Some Theological Applications

A great number of theological applications can be made of this proposed answer to the mind-body problem, since as Karl Rahner said with some exaggeration but much truth, "Theology is anthropology." In other words the human person as the image of God is the best analogy we have by which we can know God. Here I will only suggest for the sake of illustration three areas of theology in which a correct understanding of the mind-body relation is of crucial importance.

First, in the historical development of the doctrine of the Incarnation one of the chief difficulties was the tendency to conceive of the Second Person of the Trinity as simply assuming a human body for His earthly temple much in the manner that the Third Person indwells every Christian. Even the great defender and doctor of the Incarnation, St. Athanasius sometimes speaks in terms of this Logos-sarx, Word-flesh, Christology, understanding St. John's expression, "The Word was made flesh" as if "was made" meant nothing more than "came to dwell in." (41) Such a Christology is obviously too much influenced by the Platonic conception of the soul as a quasi-divine spirit which descends temporarily into the body. Thus for a time little thought was given to the fact that Jesus would not have "become man" unless he had a human psyche.

Today, we are perhaps liable to the opposite error. An advocate of one of the "Christologies from below" now so popular might easily be tempted to adopt some form of the Identity Theory of the mind-body relation in an effort to conform to current psychology and to "make Jesus seem more human." This would result in reducing Jesus' human psychology to the level of sensory, imaginative, and emotive life to the neglect of his transcendent (but still human) intellectual life, and especially his *ratio superior* or superconscious. (42)

The testimony of the mystics shows that it is in the superconscious that the mystical union with God is effected at the *apex mentis*, while simultaneously a mystic may be suffering intensely at lower psychological levels. A neglect to recognize this possibility of vast contrasts between simultaneous levels of human consciousness, it seems to me, is the reason that so many Christologists today reject the medieval theories of Jesus' consciousness as monophysitic. A better analysis of the mind-body relation, with more account taken of the higher levels of human consciousness discovered not only by Christian but also by non-Christian mystics should lead to a less reductionist theology of Jesus' self-consciousness and his awareness of his filial union with the Father.

Second, St. Paul, preaching in the Areopagus, found it difficult to make the doctrine of resurrection seem anything but ridiculous to his Greek audience (Acts 17:22 sq.). Their Platonic dualism made it seem absurd to them that any spiritual-minded person once freed by death from the burden of the body would want to return to it. The opposite difficulty troubled the Reformers who rejected the philosophical efforts of the scholastics to demonstrate the natural immortality of the human soul. Some of them opted for the view (already mentioned above as an opinion of some early Church Fathers) that the soul dies with the body and "sleeps" until the Judgement when God will re-create it along with the resurrected body. This seemed a convenient way to get rid both of purgatory and the intercession of the saints which they felt derogated from the *sola fide* principle on which their whole theology rested. The eminent Lutheran Oscar Cullmann has revived this line of reasoning in our own times. (43)

A correct understanding of the mind-body problem furnishes a basis for asserting at least that the natural processes which bring about the death of the body cannot destroy the soul. If, as I have argued, human intellection and self-consciousness cannot be the activity of the brain, yet neither can the human person be dualistically divided, then it must be that the unifying principle of the human person transcends the material order and its processes. Yet this principle is proper to each individual and thus even as it survives in a separated state must remain related to the body which it has lost and needful of its replacement. Thus even from considerations of nature, quite apart from the order of grace and salvation, the undying human soul seeks a resurrected body, although it has no power of itself to fulfill this exigency.

The fact that we know that the human soul cannot die as the body does, leaves us still in the dark as to what

kind of life could be possible to a mind which requires the body to supply it with the necessary data for its thinking. We here enter an order of mystery where only speculation is possible. The theory proposed by Aquinas (44) is not without its difficulties. He argues that, once the human soul is relieved by the death of the body of its lower functions of giving life to the body, it is still able to be self-conscious in the manner of a pure spirit which is, so to speak, transparent to itself. Moreover, it retains all of the abstract knowledge which it acquired in this life, although it has no natural means of acquiring any more. Nor can it think of any concrete particulars known in its past life because these depend on sensory images which have been destroyed with the body. The souls of the dead can probably communicate with other spiritual beings, but this communication does not supply for the detailed knowledge which they enjoyed in earthly life and which they lost at death.

Consequently, Aquinas resorts to a special preternatural action of God by which the souls of the dead are supplied with the particularized knowledge necessary for them as they undergo purification or enter into heaven to intercede on our behalf while awaiting the return of their bodies.

Third, a correct understanding of the mind-body relation is fundamental to moral theology, especially to many of the current issues in bioethics. A striking example is furnished by the controversy over procured abortion. (45) A number of writers, otherwise not likely to defer to the authority of Aquinas, have attempted to revive his theory of what they entitle "delayed hominization" in order to justify the destruction of the fetus in the interests of the mother at least up to the time of the implantation of the zygote or even up to the time of the development of the cerebral cortex.

These authors usually correctly state that Aristotle and Aquinas doubted that an unorganized mass of matter could be substantially united to a soul, since the soul is nothing other than the form or organizing principle of an organic body. They are also correct in saying that Aquinas accepted Aristotle's opinion that the embryo does not reach the animal or sensory phase of organization until between 60 and 80 days after the deposit of semen in the mother. Nevertheless, these modern proponents of delayed hominization fail to notice that Aristotle's conclusion depends not only on his general principles which are consistent with the account of the mind-body relation I have been arguing for, but also on his inadequate understanding of embryology.

When the same principles are applied to the now known facts of genetics and embryological development,

a different conclusion results, namely, that the fertilized ovum is the actually human body informed by the spiritual human soul, and consequently, that the deliberate destruction of the fertilized ovum is murder. The Catholic Church in the 1974 "Declaration on Procured Abortion" of the Congregation for the Doctrine of the Faith, with her usual caution, has continued to leave this an open question, while insisting that whether abortion is technically murder or not, it is still a serious injustice against life similar to murder.

Aristotle and Aquinas thought that the mother supplies nothing but an unorganized mass of menstrual blood to the process of reproduction. The father supplies the semen which contains an active "pneumatic" principle capable of organizing this matter first into an organism having vegetative functions (i.e., animated by a vegetative soul) and then into one capable of sensation (i.e., animated by an animal soul). Since sensation is the highest possible contribution of the body to human personality, at this point the body is sufficiently organized to be informed by God with a specifically human, unitary spiritual soul capable of intellectual activity as well as sensory and vegetative functions. The semen is able to accomplish this complex task of preparing the human body for the human soul not by any power intrinsic to itself, since it is not even a living organism, but because it is an instrument of the father, just as a brush as the instrument of an artist can produce something far more complex than itself. Since, however, it is a fundamental principle of Aristotelian philosophy that "whatever is moved is moved by another," this required him to suppose that the semen remains in the womb as a separate entity as long as it is forming the maternal blood. This account of the reproductive process, although in many respects mistaken, was not the product of armchair philosophizing on Aristotle's part. He derived it from the empirical observations of the Greek physicians and from his own embryological observations and experiences, all of which were limited by the lack of a microscope.

Modern genetics and embryology has made it possible for us vastly to improve this account. We now know that while it is true that one of the spermatazoa in the semen activates an ovum to initiate its development into an embryo, the ovum and the sperm contribute equally to the matter of the nascent organism. This contributed matter, however, is by no means unorganized, but already has an elaborate structure. When the nuclei contributed by each partner fuse, they form a new and unique nucleus which then becomes the actively organizing principle of the new organism.

This primordial nucleus of the one-cell zygote not only

contains all the information required to build a mature human being in all its complexity and detail but also the active power to execute this program (provided of course that it receive an adequate input of energy and additional materials from nutrition and respiration). When this one-cell organism divides it does not just form two cells adhering to one another, but a two-celled organism in which the nuclei of one of the cells has a predominant influence. As this multiplication of cells forms a blastula and then a gastrula, it is always possible to detect a differentiated cell or patch of cells which inherits this predominant, organizing role in the organism, and eventually this organizing center is succeeded by the neural streak which becomes the central nervous system, and from which finally the brain differentiates as the permanent governing organ on which the entire life of the organism depends.

Thus at all times, and in a continuous succession, from zygote to baby and then on to adulthood there is always a central organ which guides the organism to build itself according to the program complete within it from the moment of fertilization. Since this program is a design for a specifically human, sentient being, there is no reason on the basis of Aristotle's own principles to doubt that the embryo is ensouled with a spiritual soul from conception.

These few illustrations will serve to indicate that an adequate view of the mind-body relation, especially one that makes it possible to use and correctly interpret the results of scientific research can be fruitful in theology, and how, on the other hand, vestiges of Platonic dualism or contaminations from the materialistic Identity Theory or other inadequate theories can obscure our understanding of Christian revelation. How wise was Aquinas when he said, "Error concerning creatures results in a false understanding of God, and leads our minds away from the God to whom faith strives to lead us." (47)

NOTES

1. Morton Kelsey, *Afterlife* (New York: Paulist, 1979), accepts "resurrection" but as an entrance into a spiritual realm in which we merely remember bodily experiences from our former life.
2. See the discussion in Hans Conzelmann, *1 Corinthians*, Hermeneia Series (Philadelphia: Fortress, 1975) pp. 248-283.
3. "In their panic and fright they thought they were seeing a ghost. He said to them, "Why are you disturbed? Why do such ideas cross your mind? Look at my hands and feet; it is really I. Touch me, and see that a ghost does not have flesh and bones as I do. " (Lk 24:37-39). Cf. John 20:24-29; 21:12-14.
4. H. Denzinger and A. Schoenmetzer, S.J., *Enchiridion Symbol-*

orum, 33 ed. (1965), afterwards DS, n.286, Leo I, "Quam laudabiliter" (440), whose authenticity has been questioned, and n.462, Council of Braga (451-464). These declarations were against the Manichees and Priscillianists who had inherited the Gnostic dualism. On the other hand, the Church also rejected the notion that the soul is not a creature but a spark of the divine; see nn. 190, 201, 285, 360, 403, 455-6, 685, 3896.

5. DS 1440-41, Lateran V (1513), cf. also nn. 857, 990, 1002, 1304-06.

6. DS n. 902, Council of Vienne (1312).

7. H. Lassiat, *Jeunesse de l'église, la foi au 2e siècle*, 2 vols. (Paris: Mame, 1979).

8. See E. J. Fortman, S.J., *Everlasting Life After Death* (New York: Alba House, 1976) pp. 95-117 for Protestant and Catholic discussion on the "interim state."

9. Most writers dealing with the mind-body problem today seem to take for granted that the debate is between Descartes' extreme dualism and the Identity Theory. See for example the pro-identity stance of A.J. Ayer referred to in note 22 below, or the refutation of the antiidentity work stance of Karl R. Popper and Sir John C. Eccles, *The Self and its Brain* (New York: Springer International, 1977).

10. *Theologies of the Body: Humanist and Christian* (Braintree, Mass.: The Pope John Center, 1985), afterwards TB. I refer the reader to this book for more extensive bibliography on the topics of the present paper.

11. Note the words "guard and cultivate." The constantly repeated charge of some ecological enthusiasts that the Bible is responsible for western man's ruthless exploitation of the environment because *Genesis* gave humankind dominion over the earth is wholly false. See David F.K. Standl Rast, O.S.B., "What Can Theology Contribute to an Ecological Solution" in Richard E. Sherrell, ed., *Ecology* (Richmond, Virginia: John Knox Press, 1971).

12. TB, pp. 416-417.

13. DS, n. 3896.

14. See Giovanni Blandino, S.J., *Theories on the Nature of Life* (New York: Philosophical Library, 1969) pp. 211-221 and 287-288 for a discussion and criticism of the various forms of panpsychism.

15. See Benedict Ashley and Kevin O'Rourke, *Health Care Ethics*, 2nd ed. (St. Louis: Catholic Health Association, 1982), pp. 227-233 for discussion and bibliography and my essay, "An Integrated View of the Christian Person", in *Technological Powers and the Person* (St. Louis: The Pope John Center, 1983) pp. 313-333, for a discussion of current attempts to distinguish being "human" from being a "human person."

16. TB, pp. 492-496.

17. TB, p. 320; p. 340, n. 58; p. 342, n. 76.

18. See P. Solomon *et al.*, eds. *Sensory Deprivation* Cambridge, Mass., Harvard University Press, 1961).

19. The Nobel laureate Herbert Simon, "Is Thinking Uniquely Human?", *University of Chicago Magazine*, Fall, 1981, pp. 12-21 argues in this manner that computers can be built to think.

20. TB, pp. 325-326 with bibliography on p. 42, note 4. especially A. Sebeok and Robert Rosenthal, *The Clever Hans Phenomenon: Communications with Horses, Whales, Apes and People* (New York: New York Academy of Sciences, 1981); a devastating criticism of the still much popularized reports of

chimpanzees who have been taught "language," which shows that the teachers gave unconscious clues to which the animals were conditioned to respond appropriately.

21. For good summaries of these theories of cognition see James G. Clapp, "Locke" vol. 4, pp. 488-495 and Bernard Williams, "Descartes," vol. 2, pp. 346-348 in Paul Edwards, *The Encyclopedia of Philosophy* (New York: MacMillan, 1967).

22. Gilbert Ryle, *The Concept of Mind* (New York: Barnes and Noble, 1949).

23. *De Anima*, Bk II and III, Chapters 1 to 5.

24. *Historia Animalium* 5886 18-22.

25. "By a 'sense' is meant what has the power of receiving into itself the sensible forms of things without the matter." *De Anima*, 424a 17-23.

26. On the now very dated but still unresolved controversies on this matter see my two articles published in 1961, "Are Thomists Selling Science Short," Albertus Magnus Lyceum, River Forest, Ill. and "Does Natural Science Attain Nature or Only the Phenomena?" in Vincent E. Smith, *The Philosophy of Physics*, (Jamaica, N.Y.: St. John's University), pp. 63-82.

27. TB pp. 327-332 and pp. 342-343 notes 80-82.

28. TB pp. 312-318.

29. TB pp. 22-23.

30. Cf. Note 20 above.

31. Aristotelian logic is as an analysis of the mind-dependent relations between objective concepts, but modern or symbolic logic deals with the rules by which certain marks on paper are to be combined. Symbolic logic forms models or diagrams (such as the Venn diagrams of the syllogism) which illustrate human thought, but no matter how cleverly formed can only approximately describe it. Hence Aristotelian logic cannot be reduced to symbolic logic, while symbolic logic cannot be shown to be consistent without the use of the Aristotelian logic congenial to "ordinary" language.

32. See Henri F. Ellenberger, *The Discovery of the Unconscious*, (New York: Basic Books, 1970) for a history of this concept.

33. I do not mean that persons suffering from this pathology are faking. We all exhibit different personalities at different times and all somewhat dramatize ourselves. But when we are in one phase we do not usually suffer from aphasia for our other phases as do these victims.

34. See C.G. Jung, *The Archetypes and the Collective Unconscious*. Bollingen Series XXII (New York: Pantheon, 1959).

35. See my article, "A Psychological Model with a Spiritual Dimension," *Pastoral Psychology*, 23:224 (Mat, 1972): 31-41 and TB p. 337, notes 32-35.

36. According to Aquinas the first principles both of theoretical and practical knowledge are *per se* evident. This does not mean that they are innate but that the intellect acting as *intellectus* rather than as *ratio* abstracts their terms immediately from sensory experience and directly, without any middle terms, apprehends their congruence or incongruence so as to make a judgement.

37. Jacques Maritain, *Creative Intuition in Art and Poetry*, (New York: Pantheon, 1953).

38. Ernst Kris, *Psychoanalytic Explorations in Art* (New York: Schocken, 1964).

39. Bernard Lonergan, *Insight: A Study of Human Understanding*, (New York: Philosophical Library, 1957).

40. See Note 26 above for controversy on this question.

41. See Raymond E. Brown, *The Gospel According to John*, Anchor Bible (New York: Doubleday, 1966) I, p. 13 and 31-35 for exegesis of this expression.

42. Oscar Cullmann, *Immortality of the Soul or Resurrection of the Dead* (London: Epworth, 1958).

43. TB pp. 599-602.

44. The following is based on my essay, "A Critique of the Theory of Delayed Hominization," in Donald G. McCarthy and Albert S. Moraczewski, O.P., *An Ethical Evaluation of Fetal Experimentation: An Interdisciplinary Study*, (St. Louis: The Pope John Center, 1976) pp. 113-137.

45. *Summa Contra Gentiles*, II, iii.

IN MEMORIAM

Father Leo J. Haigerty
Mrs. Mabel Meyer

We also ask your prayers for ITEST members who are ill. May they feel the restoring hand of the Lord.