

The Biopolitics of Womb Life: Science Beats a Path To The Unborn And Stumbles Over Some Moral Dilemmas

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Abstract: None available.

Full Text: Headnote ABSTRACT: Clifford Grobstein, we are told on the jacket of his book, *Science & The Unborn*, was at one time a laboratory scientist, teacher, medical school dean and "an analyst of biomedical policy." The reader would have been better served had he been given some more specific information about Grobstein's educational background. Was he a surgeon, an obstetrician, a psychologist, a philosopher or what? TOWARD A DEFINITION OF HUMANESS As the heat of battle rises between the Right-to-Life (anti-abortionist) and Pro-Choice (pro-abortionist) forces an ever increasing number of experts have joined the fray lending the weight of their scientific expertise to the on-going battle. Grobstein makes a valiant effort to be impartial, to determine the status of the unborn on purely scientific grounds. He wants to help society reach a clearer vision of the unborn unclouded by emotionally charged and biased arguments. His conclusions will rest on logic and the latest hi-tech techniques for the study of intrauterine life. Much of the discussion that follows is based on findings obtained through the use of this new gyne-gadgetry so a few words of explanation might be in order. Ultrasonography has rapidly replaced the more hazardous X-rays as a means of "seeing" into the womb. In this technique a small apparatus which produces high frequency sound waves is placed on a pregnant woman's abdomen and the echoes like in radar are transmitted to a TV screen. Realtime scanning allows observers, including the mother, to watch the baby's movements from the sixth week of life on. The invention of fiberoptics allows doctors to look into any dark space in the body including the ovaries and the uterus. For example, with the aid of a fiberoptic endoscope, New Zealand obstetrician A.W. Liley¹ determined that by four and a half months the unborn exhibits a wide repertoire of motor responses to external stimuli such as grimacing when a bitter substance like quinine is added to the amniotic fluid or doubling its rate of swallowing of amniotic fluid if saccharine is added. Amniocentesis is a procedure by which a long needle is introduced into the amniotic sac. Under ultrasound observation some fluid with flaked off fetal cells is then withdrawn and the cells are studied for genetic disease such as Down's Syndrome. Amniocentesis cannot be performed until the 16th week of pregnancy and the results are not known for another four weeks. A more recent technique is chorion villi sampling which can be performed much earlier in pregnancy but is also more traumatic (it collects living cells from the developing placenta) and consequently, leads to a higher rate of miscarriages.² Another innovation which has enabled scientists to study the until now hidden process of conception and early development of the conceptus is in-vitro fertilization more commonly known as IVF or test tube babies. IVF occurs in a flat laboratory dish that contains a culture similar to the fluid in the oviduct (Fallopian tube). To this glass plate are added ova and sperm. Under proper laboratory conditions if the egg or eggs and the sperm cells are all healthy one can observe with the aid of a microscope every detail of fertilization, cell division and subsequent growth. The results of ultrasound and amniocentesis may create a serious moral dilemma for parents who are found to carry a defective child. But IVF and techniques that it has spawned have shaken our society's fundamental views of human procreation. In the wake of IVF we are faced with a multitude of questions: Questions of ownership-who do the eggs and sperm belong to, who does the zygote and morula (the initial stages of embryonal development) belong to? Questions of control-who decides on what happens to the ova and spermatazoa, to the products of conception? The parents, the laboratory, some committee? When we ask-at what point along the continuum of development from a one cell organism to a newborn does this being acquire the legal status of a person-we arrive at an intersection of biology, philosophy and jurisprudence, a place where

angles fear to tread. Is the single zygote cell that begins the profound transformation human? Scientifically there is no question; the zygote is certainly human to its core. But does the zygote display all of the characteristics of a human being? Can a single cell be a human being, a person, an entity endowed with unalienable right to life, liberty, and the pursuit of happiness? This question cannot be answered on scientific grounds alone. Human being, person, and human rights are not terms stemming from scientific definition. But one trained and accustomed to think as a scientist cannot fail to note significant disparity between the common meaning of these terms and a single cell. Grobstein's book is intended to establish a firm public policy on the unborn through a reasoned process of accommodation between those who believe in absolute criteria based on traditional religious teachings and secular humanists who subscribe to relative criteria derived from current scientific knowledge and current moral values. Obviously, the author belongs to the latter group. As such he strives to establish personhood as a function of individuality. He identifies six phases of biological development that lead to full individuality. IN SEARCH OF INTELLIGENT LIFE IN THE AMNIOTIC UNIVERSE The first of these he calls "singleness." This begins when the blastocyst i.e. the fertilized ovum after about 10 days of development fastens itself to the inner lining of the uterus. Rapidly, part of the outer cell mass of the blastocyst develops chorionic villi which are little finger like projections or roots. They are the precursors of the placenta. The inner cell mass is transformed into a embryo with a linear thickening called the primitive streak. From the time of appearance of the streak, singleness of future development as an organism is being established. If we are going to use developmental staging in order to get a better handle on the status of the unborn then implantation is an eminently sensible way of marking one such stage. However, to describe the preceding state as merely genetic individuality seems unwarranted. After all, the new genetic entity established at fertilization is unique, there is no other one like it anywhere. The author states that in the immediate post-fertilization stage the cells of the blastocyst are loosely associated rather than closely adherent as they are at and following implantation. Therefore, the blastula has no claim to individual singleness. The author subsequently enlarges on these differences. Which reminds me: the organization of this book is such that we are told again and again (pages 22, 30, 33, 35, 38, 57, 93, 104, 106, 116, 117, 136, 139 and 142) that a certain subject will be dealt with more fully later. I can tolerate some fragmentation of material but to have the flow of ideas interrupted fourteen times in a 163 page book is really too much. In Grobstein's model the second stage of development ends at about eight weeks. It is not clear from the book when it actually starts. This stage is characterized by cells specializing into organs. For example, the rudimentary heart begins to beat after 28 days, the limbs appear as formless buds at 35 days, etc. When the embryo is able to perform more human functions it acquires "Functional individuality." As organogenesis advances it sets the stage for "behavioral individuality." This is characterized by fetal movements observable at six weeks. As the unborn child grows older these movements change from total body reactions to very specific, apparently volitional ones such as thumb sucking or the turning of the head to avoid an amniocentesis needle. Since behavior has communicative value, behavioral individuality represents a new dimension relevant to both, social status and "psychic individuality." What is meant by psychic individuality? I use the term here to designate inner subjective experience, such as each adult is directly aware of, testifies to as a common accompaniment of behavior, and, based on the behavior of others, assumes to exist in them as well. From this definition we can proceed to the common assumption that a fundamental characteristic of human beings is their inner sense of being that is variously designated as sentience, self-awareness, consciousness, or, more generally, psychic individuality. This term underlines the uniqueness and particularity of inner awareness as it is experienced by individuals designated as persons. The critical question then is when, in the course of development, a person first exists to experience such individuality in at least minimal form. Grobstein believes in the widely accepted principle that the mind is a function of the brain. However, he postpones a discussion of this subject until a later chapter. Still on the question of psychic individuality, Grobstein says that the absence of behavioral signals from a fetus does not prove that it has no inner experiences. He assumes that the unborn child does not communicate. It is regrettable that he is unaware

of the large literature on fetal responses to auditory and vibratory stimuli. For example, audiologist Michele Clements³ found that fetuses in the last trimester were calmed by the music of Vivaldi and Mozart but disturbed by the orchestral pieces of Beethoven and Brahms. The latter caused an increase in heart rate and violent kicking. I have spoken to many pregnant women who have described what I call "protest kicking" by their babies when they attended rock concerts, car races, or, when they were exposed to other loud and high pitched sounds such as airplane landings. Equally ubiquitous are reports of pregnant mothers playing with their unborn children. The game consists of the mother pushing in one finger on one side of her lower abdomen and then on the other. If the baby is awake and facing the abdomen and the mother repeats the pattern several times, the unborn child will often push back with their hands or feet. Mothers tell me that the first time they experience this "contact" is the happiest moment of their pregnancy and one can easily see why. "Social individuality," as here defined, is recognition of one's role by others in one's society. When the unborn child makes himself felt to his mother either by movement, kicking, or hiccups then he evokes an empathetic response from her. This response by the mother or others earns the unborn an upgrade in his status. Thus the concept of continuing emergence of individuality cannot be ignored in considering status for the unborn. The concept recognizes that the term unborn covers a period of enormous change by almost every criterion. Individuality in its several aspects comes successively into existence. Each new increment fundamentally changes the nature of the developing entity, in ways not needing consideration when assigning status to adults. These evolving aspects of individuality, separately and in their relationships, must be taken into account in any humane policy linking levels of individuality to status. THE NEUROLOGIC MATRIX OF THOUGHT Central to an inquiry of the individuality/humanness of the unborn child is the question of cognition. At what point in her pre-natal or post-natal life does a child begin to think, to dream, to remember, to be aware of herself and her surroundings? To answer this fundamental question Grobstein provides us with a very thorough introductory course in neuro-embryology. For any one interested in learning about the origin of neurons, how synaptic connections, reflex arcs, spinal cord tracts or the reticular formation develop and function-this is welcome information. Unfortunately, it's rather tangential to the central issue of sentience. Grobstein does devote two pages to "Pain and Recognition of Inner Experience." This is a general discussion with absolutely no reference to any research on pain perception in the unborn. Furthermore, no consideration is given to the transmission of impulses through other sensory modalities such as touch, taste, smell, vision, hearing and balance. This is a most regrettable omission since it seems rather essential to the general thrust of his exploration. The American Academy of Pediatrics, in a policy statement published last year⁴ said that recent research shows that premature babies are capable of feeling pain during surgery. Anand⁶ in a major review article (201 references) in The New England Journal of Medicine says: Numerous lines of evidence suggest that even in the human fetus, pain pathways as well as cortical and subcortical centers necessary for pain perception are well developed late in gestation, and the neurochemical systems now known to be associated with pain transmission and modulation are intact and functional. Physiologic responses to painful stimuli have been well documented in neonates of various gestational ages and are reflected in hormonal, metabolic, and cardiorespiratory changes similar to but greater than those observed in adult subjects. Other responses in newborn infants are suggestive of integrated emotional and behavioural responses to pain and are retained in memory long enough to modify subsequent behaviour patterns. Leaving pain aside for the moment let us review some of the evidence for fetal sound perception. The environment for the fetus resembles the aquatic environment insofar as the physical nature of sound transmission to the ear. Rubel⁶ reports research by Saunders and his colleagues indicating conduction of sound to the external and middle ear follows principles of vestibular and cutaneous transmission of audio signals. In a pioneering study, Spelt⁷ reported conditioning the fetal infant to an external auditory stimulus during the final two months of gestation. The imprinting (longterm memory, autonomic SR driven) of the mother's normal heartbeat, and the implications for normal health of the fetus, were investigated extensively by Salk.⁸ The perinatal infant responds to the adult heartbeat rhythm with less anxiety and more stable sleep

habits. A.W. Liley⁹ reports early data on FHR (fetal heart rate) response to both pure and complex tones. Likewise, Wedenberg¹⁰ observes that the fetus is "listening all the time after the 24th week." Grimwade¹¹ and Grimwade et al.¹² report direct differentiation of FHR to a wide variety of frequency stimuli. In addition, differentiation of response to sine tones and percussive sounds is reported. Sakabe, Arayama and Suzuki¹³ report AER (auditory evoked response) in the fetal brain. Walker, Grimwade, and Wood¹⁴ recorded intrauterine sound in 16 pregnant women, before and after the rupture of the fetal membranes (with the microphone in the cervical canal) and after their rupture (with the microphone lateral to the fetal head). Human intrauterine recordings, taken after the rupture of the amniotic sac, indicated that the most audible speech stimulus in utero was the mother's voice, presumably because her vocal tract is located closer to the uterus than are any other speech generators¹⁵. Bernard and Sontag¹⁶ stimulated three fetuses within the last 2 1/2 months of gestation with a wide range of pure tones, presented via a loudspeaker positioned over the head region of the fetus. Cardiac acceleration (indicative of a startle response) was seen in all fetuses shortly after the onset of tonal stimulation. Fetuses within the last 7 weeks of gestation showed an increase in pulse rate in response to the presentation of a 3000-Hz pure tone at 110 dB¹⁷ and fetal eye-blink responses have been observed, via ultrasound imaging, to vibroacoustic stimulation from the 25th week of gestation on.¹⁸ Henry Truby¹⁹ studied the precursors of breathing and vocalization patterns in fetuses. He found that the unborn child was "practicing" in the amniotic fluid these groups of muscles which after birth would be necessary for crying and voice production. Truby²⁰ also researched on the cry patterns of premature infants using acoustic spectrograms. In many instances he found that the voice prints of newborns corresponded to a large degree with that of their mothers but not their fathers. In other words, the voice was not genetically inherited but acquired from listening to one's mother. This thesis is further supported by the finding that newborns of mute mothers do not cry or cry in a peculiar fashion. Thus, it appears that auditory stimuli are transmitted to the brain, where they are processed, acted upon and stored in memory. Grobstein fails to discuss results of electro-encephalogram (EEG) studies of unborn children. Let me give you some examples of data which I think are relevant but missing from the text. Intermittent EEG bursts in both cerebral hemispheres are seen at 20 weeks and bilaterally synchronous ones at 26 to 27 weeks.²¹ By 30 weeks, the distinction between wakefulness and sleep can be made on the basis of electroencephalographic patterns.^{21,22} Cortical components of visual and auditory evoked potentials have been recorded in preterm babies (born earlier than 30 weeks of gestation),^{22,23} whereas olfactory and tactile stimuli may also cause detectable changes in EEG of neonates.^{22,24} Most importantly REM sleep which in adults almost always correlates with dreaming has been found to exist as early as 23 weeks (using optic fibers).²⁵ PRENATAL LEARNING After Marion Diamond, neuroanatomist, U. of Cal. Berkeley, placed pregnant rats in an enriched environment, their offspring showed a distinct thickening of their brain's cortices.²⁶ Enriched animals had a 10% increase in cholinesterase and a 10% increase in glial cells. (Several years ago Diamond reported on a higher ratio of glial cells to neurons in the brain of Albert Einstein²⁷). And the enriched get richer. Each succeeding generation had increasingly thicker cortices. Diamond's finding is supported by Japanese researchers²⁸ who report that the offspring of rats reared in a toy-filled environment are better at learning mazes than the offspring of a control group. This is true even when the pups are reared by foster mothers. Anthony DeCasper, professor of psychology at the University of North Carolina, has been researching fetal perception and memory for the past ten years. His most recent experiment involved two groups of pregnant mothers. During the last six and a half weeks of their pregnancy group A read to their unborn children "The Cat in The Hat" twice a day, while group B read "The King, the Mice And the Cheese." in the same way. When the babies were born, the researchers offered them a choice between the two stories as recorded by their mother on tape. Within a few hours after birth, eleven of the twelve newborns adjusted their sucking rhythm to hear the familiar story as opposed to the new story.²⁹ These data provide the first direct evidence that the unborn not only hears and recognizes his mother's voice, but also that he seems to remember the words! Robin Panneton³⁰ a student of DeCasper's asked pregnant women who were close to term to sing a

melody everyday for the rest of their pregnancies. Their infants were tested postnatally with a choice procedure in which they could listen to the familiar melody or an unfamiliar melody. Sixty-three infants were tested. The melodies differed only in their prosodic characteristics (e.g., frequency contours). Analyses of responses showed that the prenatally experienced newborns preferred the familiar melody over the unfamiliar melody whereas a control group of non experienced newborns showed no systematic preference. These results are consonant with our understanding of the fetal auditory system and the intrauterine sound environment. FROM PETRI DISH TO SPACE CAPSULE I believe that had Grobstein reviewed some of this research he and his readers would have seen the unborn in a very different light. As it is the author moves on to an examination of policy issues as they relate to the major phases of the unborn child. His most interesting observations concern the status of what he refers to as the "the preembryo" i.e. the fertilized ovum before implantation: Preembryonic development transforms a cell into a multicellular assembly, in preparation for initiating implantation into the uterine wall. It therefore chiefly involves early production of the peripheral trophoblast to mediate interaction with the uterus. In the natural course of events, embryo formation begins during the process of implantation. The author holds to the belief that the preembryo is an unrealized potential person. It is a collection of living human cells and as such it has no claim to a status normally assigned to persons who are at the highest known levels of multicellular organization. The question is raised but not answered whether biological humanness is the same or different from the concept of humanness as described in international conventions on human rights. A recent report of the Ethics Committee of the American Fertility Society³¹ stated: "Basic research on human pre-embryos should be considered only when no adequate substitute is acceptable and only to procure data that are likely to be of clinical importance." And: "The Committee concludes that it seems prudent at this time not to maintain human pre-embryos for research beyond the 14th day of postfertilization development." Grobstein sat on this Committee and he argued in favour of research even after the 14th day cutoff period.³² This is not surprising from a man who says: Having manipulated and dissected hundreds of mouse embryos in the course of study of their development, I can testify that, in the language of the quick and the dead, the physical experience of dissecting an embryo is more reminiscent of autopsy than of surgery. and I would feel much less comfortable in dissecting a human embryo than that of a mouse-although I expect that the two direct experiences would be very much the same. It makes sense, within this context that the author advocates unrestrained research on the preembryo as long as it is for the good of science. This broad definition could entail almost any activity eg. the training of lab technicians-as long as it is "approved by a suitable review body" (p. 82). He seems to feel that preembryos sacrificed on the altar of science serve an important role in the human family. Their deaths are not in vain, humanity has benefited from their brief lives and we should stop fretting about them. Grobstein would like to utilize preembryos or parts of them for the development of vaccines, cancer research and the study of congenital defects. Growing preembryos for cell, tissue or organ donation is another attractive possibility. The latter are not only more readily maintained under laboratory conditions than whole embryos but also less likely to cause public outcries or opposition. Should surplus eggs obtained in IVF procedures be cultured for medical experiments? Should such eggs be fertilized and then become the property of the lab? And if this was feasible legally and ethically in a government supervised research setting would it not be just a short time before commercial hatcheries were established? One could reach a stage where ovaries in culture produced ova, and testes produced spermatozoa, and the tenuous control that human donors now have on the eggs and semen they provide for the creation of their babies would be totally lost to them. A logical extension of the above line of thinking are Grobstein's ideas about space colonization. In addition to carrying carefully selected reproductive adults, the spacecraft would also be stocked with frozen preembryos, spare bodily parts and lengths of DNA for later transfer of particularly important genes. Imagine the life of a child raised somewhere in space with no parents, no heritage, knowing only that he is a product of modern technology. How would he feel, what kind of person would he become? We know from studies of adopted children that many of them as soon as they are old enough try to search out their biological parents. It is equally

true that adopted children have more difficult lives than non adopted children. They have higher rates of personality problems, socialized delinquency,³³ mental illness,³⁴ etc. Grobstein's statement that "there is no reason why research on human embryos must (author's italics) lead to complete external development" (ectogenesis) shows that he is willing to contemplate it. This dramatically underscores his tragic lack of appreciation for the human psyche. Can anyone really believe that a baby incubated in a glass and steel apparatus will have the same human qualities as one who spends nine months in her mother's body, listens to her voice, is stroked, spoken to, sung to, played with, and thought about? Has the author never heard of Harlow's 35 monkeys who separated from their mother's at birth went into horrible depressions or, studies on pre- and perinatal bonding³⁶⁻³⁷ and the deleterious effect for human babies of lack of contact with their own mothers? IF IN DOUBT, FORM A COMMITTEE Grobstein plods on to argue that humanness, pre-natally is age dependent. He subdivides the continuum of pre-natal life into: 1. preembryo-zygote to implantation-about 10-14 days, 2. embryo-primitive streak to appearance of primitive movements -about 3 to 8 weeks post conception, 3. fetus which is further broken down into: early fetus-9 to 20 weeks-"presentient" middle fetus-20 to 30 weeks-"presentient" late fetus-30 weeks and beyond-"minimal sentience." On the basis of the above analysis Grobstein then suggests that we adopt a public policy based on the gradual acquirement of human properties by the unborn child. The younger unborn child will have the less protected status, the older the more "with circumstances playing a significant role on a case-by-case basis" (p. 119). To further elucidate this concept as well as to deal with other ethical and moral questions regarding genetic and reproductive research he proposes the establishment of: . . . a broadly constituted national group-advisory and responsive to governmental authority and responsibility [which]-would formulate guidelines and maintain federal oversight. The oversight group, possibly a Commission on the Unborn (CUB), would supply general definitions of status, guidelines for specific decision making, and continuing oversight and evaluation of the resulting activity. Local groups would operate within CUB definitions and guidelines to participate, as necessary, in making judgements about individual cases in specific circumstances. There you have it. A Commission on the Unborn, or The President's Panel on the Unborn, or something like it. But how would it work? If the committee members represented the conflicting views in our society, could they ever come to any decisions? And if the committee was only comprised of scientists-how many of us would trust the future of this planet to scientists alone? Do I need to remind you of the scientists who told us that X-rays were harmless, that Thalidomide was great for pregnant women, that atomic plants were safe, etc. etc.? The questions raised here are important and intellectually challenging. Unfortunately the discussion lacks depth and the answers lack substance.

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