

tive; that is, they should indicate that starch molecules are too large to pass through the membrane. The water of each beaker surrounding the dialysis bags is then tested for sugar, using Benedict's solution. The bag to which enzyme had been added will give a positive indication that the starch has been digested to sugar (maltose and glucose), of which the molecules are small enough to pass through the dialysis membrane. The water surrounding the dialysis bag to which no enzyme had been added will give a negative test for sugar, indicating that no sugar molecules diffused through the membrane.

The above procedure provides for continuous use of the same materials by many students. An even more realistic demonstration could be made by filling the dialysis bags with distilled water and placing the sealed bags in beakers containing starch solution, one of which contains enzyme (amylase). The bags could then be opened after a few hours to sample for the presence of starch and sugar. The techniques described by F. W. Price (1972: *American Biology Teacher* 34 [1]: 23-24) for the detection of specific sugars could increase the meaning of this experiment by demonstrating the specific sugar moieties of amylose.

This experiment provides a significant demonstration of (i) the products of starch digestion and (ii) the necessity of digestion—the breaking of large molecules into small molecules—before absorption can take place.

The use of chromatography and other modern chemical techniques makes this experiment applicable to the digestion of proteins and the absorption of amino acids as well as the digestion of fats and the absorption of fatty acids.

Ralph S. Hogue
Dallas Baptist College
P.O. Box 21206
Dallas, Texas 75211

LIVING WITH CONFLICT

• A slightly longer version of the following article appeared in the 15 February 1972 issue of *UU World*, the news journal of the Unitarian Universalist Assn.; © 1972 by the journal. It is reprinted here, as edited, with the kind permission of *UU World* and the author.

Myriad generalizations can be made regarding the nature of the developing human. The ones most germane to this discussion are:

1. Each being is unique from the moment of conception and is possessed of a drive toward survival, growth, individuation, autonomy.
2. Each being is in constant interaction with a nurturing environment and is possessed of a drive toward assimilation, relatedness, attachment, and belongingness.

The existence of these twin drives—toward individuation and toward attachments—creates a field

of energy, comparable to the energy field of opposing magnetic poles, in which life takes place.

There is no escape from the tension that man's conflicting drives create. There is no "solution" to the problem. There are just temporary states of relative equilibrium.

Visualize the embryo struggling to maintain and enhance itself, to separate itself from its host. And at the same time it struggles to retain its altogether essential dependence upon the nurture and protection of that host.

The image of the developing embryo is more than an analogy of man's lifelong struggle between dependence and independence. It is simply the first stage of a process that continues until death. We see this process in dramatic perspective when the toddler pushes himself off the lap of his mother. He strikes out in exploration, only to come scurrying back for reassurance and comfort when confronted by the too strange, the too threatening. We see him crawl back into her secure embrace, reestablish his beachhead, and venture forth once more.

The paradox is at work in reverse during adolescence. The young person who is the most autonomous, who has the strongest sense of identity, is the one who can afford to retain his ties with family. He can adopt a submissive stance when appropriate. He can fuse himself with the essence of another human being in an intimate relationship.

It is only by serving his conflicting needs simultaneously that man creates himself in his full humanity.

What this implies to me is that conflict is a condition of life, ever-present *within* the human being, inescapable, and, in fact, an energizing agent in the life process. That conflict can be overwhelming is apparent from a reading of statistics on mental illness, violence, drug addiction, suicide.

The stress of harmonizing life's conflicting drives is minimized in societies where two conditions obtain:

1. There is a stable socializing unit, which nurtures and reinforces the developing child — such as the extended family in Asian societies, the tribe in parts of Africa, the kibbutzim in Israel.
2. There are limited but clearly defined, accessible, and patently acceptable routes by which the child can move toward individuation within the society.

Certainly it is clear that these two conditions do not obtain in contemporary American society. Our socializing unit is the nuclear family, defined by many as isolated, unstable, and vulnerable to stress. The community, which in turn should nurture and support the family, is beset by the twin woes of industrialized urban existence: anonymity and mobility. Thus the developing human, be he an infant, a teenage parent, a retired widower, must constantly work to maintain roots in a shifting, unstable, and often indifferent social milieu.

To add to our stress, the contemporary society

presents us with an array of conflicting alternatives in our search for selfhood. Our most basic role-identifications are obscure or contradictory. Sex roles, age roles, family-member roles, work roles are defined variously as we move through space and time in our open, dynamic culture.

It is little wonder that, just as the test-rat subjected to a schedule of random electric shocks becomes immobilized, some of us withdraw from voluntary choices. This may be through debilitating addiction to alcohol, drugs — or television. Others abdicate from the task of self-definition and choice-making by a mindless allegiance to simplistic, often polarized positions, such as women's lib, black power, and "don't trust anyone over 30."

Each of us desperately needs a caring community in which he can become himself.

Who is that self? What is it becoming? We can only afford to entertain these questions within a trustworthy, supportive relationship. One in which we are known and accepted. One in which we can admit to our ambivalence and anxieties. One in which we can change, grow, regress without losing identity or belongingness.

Esther Dean Callard

Professor and chairman

Dept. of Family and Consumer Resources

Wayne State University

Detroit, Mich. 48202

A PLANETARIUM PROGRAM

Many school districts now have planetariums. These can be used in the teaching of biology, not just astronomy: many of the themes in biology have cosmic dimensions.

One program that proved to be successful was a natural expansion of several basic concepts found in most biology textbooks: the origin of the universe, the solar system, and life. The visual portion of the program used color slides, both commercial and homemade, in three rotary-tray slide projectors; three Super-8 film loop projectors; and the planetarium projector. The slide projectors were equipped with manual and automatic fade-in, fade-out adjustments and automatic slide-advance timers. The audio portion, which included background music and narration, was prerecorded on stereo tape. Prerecording the sound permitted greater flexibility with the audio portion while freeing the demonstrator to concentrate on the visual effects. The narration was kept to a minimum: raising questions and proposing hypotheses. The background music, chosen to enhance the narration, was a mixture of heavy, instrumental rock, "switched on" Bach, classical music, and timely ballads. To simplify the recording procedure the music was recorded in stereo first and the narration was added later.

The program began with the lights slowly dimmed to complete darkness. Stars gradually appeared, and

with them came the sound of wolves howling in the distance. (The howls were recorded on different tracks to give the impression of the wolves answering each other.) Soft, mysterious background music was introduced as the narrator set the theme: "The sound of howling wolves—evidence of life. From where did this life come?" By means of a slide projector with a very slow manual fade, so that the pictures appeared out of nowhere, color photographs of star clusters, galaxies, and nebulae were projected on the planetarium dome as the narrator speculated on the origin of the universe.

Formation of the solar system, with emphasis on the origin of the earth, was the next topic. The slides in this section were made from color paintings that depicted the cosmic-dust hypothesis of planetary origin, the molten primordial earth, torrential rains and ocean formation, volcanic activity, and the formation of pools of "organic soup." Color photographs of the sun, moon, and planets were also used. Various hypotheses as to the origin of life were introduced, with emphasis on the heterotroph hypothesis.

The remainder of the program was without narration. The three slide projectors were used randomly to project slides illustrating plant and animal forms, from the simplest to the most complex. The three film-loop projectors were also used at this time. Loops were selected that were free of printed words and diagrams: life cycles of the praying mantis, *Daphnia*, and a sea anemone. Man was represented at first by pictures of babies and young children in natural settings. At this point the film loops were turned off and each slide projector took on a specific theme: scenes of nature, of pollution and overpopulation, and of war and the machines of war. This series of slides culminated with the sound of an explosion and a flashing stroboscope light. After a period of total darkness and silence, a new series of nature slides faintly appeared and music was again heard. The remaining time was taken up by the showing of additional nature slides at full brightness. The final scene on each projector was a portion of the same sunset.

The entire program lasted 40 minutes. When making the initial recording, it was difficult to pace the time allotted for viewing the slides and contemplating the narration. The tendency was to move too quickly: in the mood-setting atmosphere of the planetarium room a slower pace was more effective.

Students responded well to the program. Many asked if they could see it again. Others asked to help in the preparation of new programs. During the follow-up sessions the students were full of questions about what they had observed and were eager to suggest answers to questions posed during the program. A second program is now being developed with the aid of students; its theme is "Light and Photosynthesis."

W. Robert Stamper
Cheltenham High School
Wyncote, Pa. 19095