

Tektite: Unique observations of men under stress

Variations in childhood background appear to correlate closely with work and social effectiveness

by Richard H. Gilluly

(Editor's note: SN writer Gilluly spent two weeks at the Tektite base camp gathering material for this and other articles. He descended to the habitat between missions to get a first-hand view of living conditions there.)

Behavioral scientists have long been interested in the behavior of men under different kinds of stress, and many studies have been made of men and their behavior on Arctic and Antarctic expeditions, during natural disasters, and in combat situations. But most of the studies have been hampered by their reliance on subjective reports and other kinds of secondhand or otherwise unreliable information.

With the advent of the manned space program, a new urgency has been given to discovering exactly how men of different backgrounds react to hazardous, confining or highly unpredictable environments. The knowledge is needed both so that men for hazardous missions can be more rationally selected and so that the missions themselves can be designed to minimize psychological stress.

The Tektite manned underwater habitat programs (SN: 10/3, p. 283) have provided behavioral scientists with a unique opportunity to observe men in the socially confined and stressful environment that will be characteristic of the National Aeronautics and Space Administration's Skylab program (SN: 10/10, p. 303); in fact, one of the major goals of the Tektite program was to provide an analogue to

Skylab so that NASA could conduct the behavioral studies now in progress. NASA originally had wanted the Tektite missions to be a simulation of Skylab, but marine scientists, recognizing the immense potential for marine science work on dives from an undersea habitat, insisted that an exact simulation would seriously hamper scientific work. NASA agreed to a compromise when it was realized that having working scientists aboard would make Tektite a better analogue to Skylab. The Tektite aquanauts were thus not confined to the habitat, but they were constantly observed while inside it.

The Tektite study, which ended this month, was exceptional not only in terms of numbers of persons observed and the length of time involved, but also in the detailed nature of the observations. Each of the four rooms in the twin cylinders of the habitat was under constant surveillance with wide-angle television monitors and microphones. In a room in the Tektite command van in the craggy hills of St. John Island above Greater Lameshur Bay in the Virgin Islands, where the habitat is located, University of Texas students kept a 24-hour watch on the aquanauts, more than 40 of whom were studied.

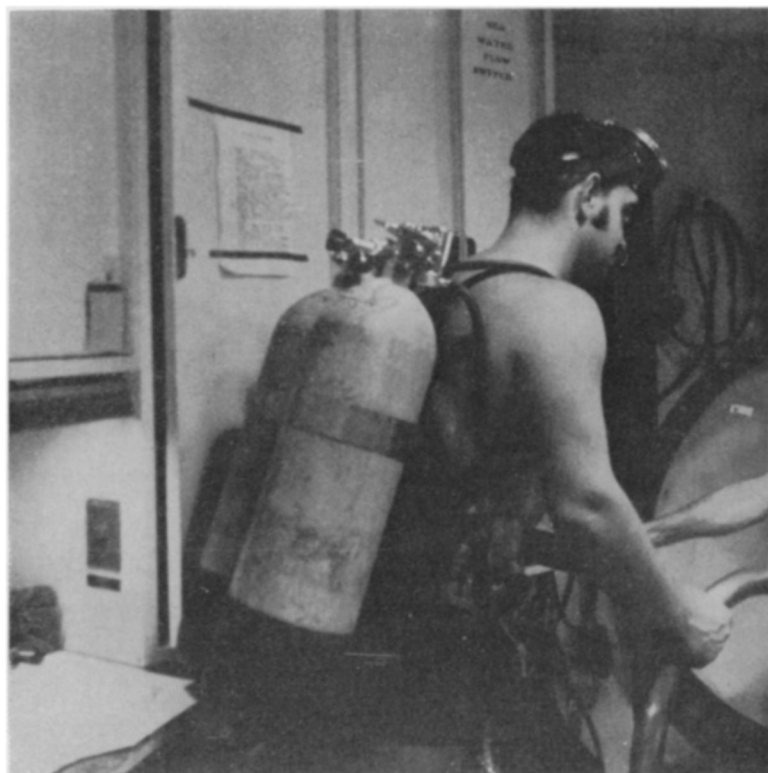
The operation was highly computerized; thus many of the students had and needed no special background in behavioral sciences. Each aquanaut's behavior was recorded on punch cards every 6 minutes while he was in the habitat (producing some 15,000 punch

cards weekly), and any unusual behavior was recorded on videotape for later analysis at the University of Texas by Dr. Robert Helmreich, principal investigator for the NASA project.

Activity was divided into several categories, including marine science work, solitary recreation, co-recreation, relaxation, sleep, maintenance of self and others, and communication, both with the surface and with fellow aquanauts. Types of movements and postures were also identified.

Psychological testing and inventorying of each aquanaut team were completed before it entered the habitat. Once beneath the surface the team members had no other direct human contact, except among themselves, for as long as 30 days. The tests included standard ones, such as the Minnesota Multiphasic Inventory, plus a new life history questionnaire designed by Dr. Helmreich and Dr. Roland Radloff of the Naval Medical Research Institute, a consultant to the program. The two men are co-authors of a 1968 book on men under stress. "This life history questionnaire has certainly been our most valuable instrument," says Dr. Helmreich. "Tests such as the MMPI are valuable for psychiatric diagnosis but of limited usefulness when dealing with normal subjects."

In addition, the aquanauts periodically filled out mood inventory cards while in the habitat and were given debriefings when they resurfaced. A prime objective of the debriefings was to obtain aquanauts' reports on their



Aquanaut team inside the Tektite underwater habitat: In close



Cooper-Hoke

quarters those from small towns and those with good childhood work experience seemed to function most efficiently.

colleagues for a sociometric analysis of peer choices.

Work behavior, social behavior and emotional stability are the prime areas of research. Although the computer processing has just begun, some conclusions have begun to emerge, most of them based on the personal history questionnaire.

Some distinct differences are clearly evident between different aquanauts in the three study areas, says Dr. Helmreich. And there are some clear-cut correlations between these differences and the aquanauts' life histories.

The life history questionnaire is designed to be wholly objective, requiring no interpretations by the subject. It could be inaccurate only if a subject deliberately falsified it. Questions include such matters as birth order, parents' occupations, types of schools attended, school performance, size town in which reared, work history during childhood, death or divorce of parents, family moves, adequacy of food, clothing and shelter during childhood, relative physical size, honors and awards, extracurricular activities and dating patterns. "Many of the questions bear on self-image," observes Dr. Helmreich, "But in the questionnaire, the data on which self-image might be based are objective."

The most productive aquanauts, generally speaking, are from a stable, small-town environment. An exceptionally important variable is childhood work experience: Men who worked as

children apparently learned good work habits which continued into later life.

Firstborns, generally, are the most achievement oriented (and thus more than half of the scientists who occupied the habitat were firstborns) and tend also to do better in social areas, possibly, Dr. Helmreich thinks, because of the greater parental attention to firstborns and thus their greater need for approval. There is some indication that later borns make better divers, but this is not clear yet; it is possible the firstborns are more attuned to the needs of their colleagues on dives, even though later borns are technically better divers, Dr. Helmreich has suggested.

"Korean War data indicate later borns as combat pilots shot down more planes than firstborns," says Dr. Helmreich. "But they also may have lost more of their own wing men."

The apparent reason for the work superiority of aquanauts raised in small towns: "A person from a small town, especially a scientist, has come a long way," says Dr. Helmreich.

"Also, a small-town person is more comfortable in close interaction, whereas someone from a big city is part of the lonely crowd." And, he adds, a person from a small town receives more attention and rewards for achievement and thus "has a more secure validation of his own worth and ability."

Dr. Radloff stresses that the aquanauts are by no means a cross-section of the population, most of them having major scientific accomplishments to

their credit. "Although there are differences between them, they are all highly skilled and enough at peace with themselves to be willing to spend two weeks or more in such a stressful environment. The differences are like those between all-stars and average players on a major league ball team."

No particular selection process was used to weed out those who might be unfit for the program. "Many of these weeded themselves out," says Dr. Helmreich. "Plenty of opportunity was given for those who didn't really want to go down to bow out gracefully during the two weeks of training prior to going into the habitat."

Despite this self-selection process, there have been men in the habitat who perhaps should not have been there. The major problem has been social isolation imposed on some single member of a crew. "We're uncertain so far whether the crew rejects the man or the man the crew," says Dr. Helmreich, "but we are leaning toward the former." But there was no need to make special arrangements for early decompressing and relief of the occasional social isolate.

The Tektite behavioral scientists refuse to discuss any particular crew or crew member (all information is kept in the strictest confidence). Concerning the performance of the female aquanauts relative to that of the male aquanauts, however, Dr. Radloff cautiously concedes that some of the hardest working people in the habitat were women. □