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HUMAN ADJUSTMENT TO ANTARCTIC ISOLATION

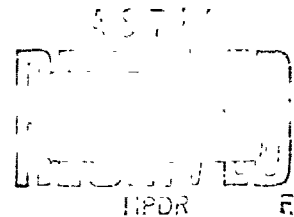
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HUMAN ADJUSTMENT TO ANTARCTIC ISOLATION

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1. In a study such as the one reported here it is difficult to indicate and give full credit to the various people and organizations who made the study possible. Although the writer made two field trips to Antarctica to collect data, and is responsible for the preparation of the paper as it stands, the study itself represents the effort of a considerable number of people. The study was sponsored by the Neuropsychiatry Branch, Bureau of Medicine and Surgery, U. S. Navy, through the Office of Naval Research. It was begun when Captain G. N. Raines, (MC) USN, was Chief of Neuropsychiatry, and continued under Captain J. Nardini, (MC) USN, as Chief of Neuropsychiatry. Lt. Commander John Rassmussen, (MSC) USN, and Commander R. S. Herrmann, (MSC) USN, as Chiefs of Clinical Psychology in the Neuropsychiatry Branch, did much to facilitate the work. Traveling from the states to Antarctica as well as full cooperation while in Antarctica, was made possible through the efforts of Rear Admiral George Dufek, USNR, and his staff of Task Force 43. On the second trip to the Ross Sea area, the writer was accompanied by Captain C. S. Mullin, Jr., (MC) USN who shared in the data collecting responsibilities. The facilitating efforts of all these people, plus the full cooperation of the personnel that wintered over in Antarctica, are greatly appreciated. The opinions expressed in this report, however, are those of the writer and do not necessarily express the opinions of any of the cooperating agencies or persons.

INTRODUCTION

By request, the Neuropsychiatry Branch, Bureau of Medicine and Surgery, U. S. Navy, undertook the task of making psychiatric evaluations of U. S. Navy and civilian IGY personnel who were to be assigned to the IGY Antarctic stations during Operation Deep Freeze. The assessment program was started in 1956 at the Naval Base in Davisville, Rhode Island, and all men subsequently destined for Antarctica went through the assessment program. For the first three years of the psychiatric evaluation, only those men were eliminated who were judged to be unfit for general Navy duty. It was felt desirable from a research point of view, to permit men who were evaluated as having poor adjustment potential to proceed into Antarctica since there did not exist objective, empirically derived criteria for elimination of these men.

In order to complete the evaluation it was felt that some knowledge of the physical and social environment, the stresses that they might produce, etc., was needed in order to evaluate, in a predictive manner, the varying patterns of psychodynamic functioning, as observed in the assessment program held at Davisville. Accordingly, two psychiatric teams were dispatched late in 1957 to Antarctic regions to gather such information. One team was dispatched by ship to Ellsworth Station, Edith Ronne Land, Antarctica (1. Mullen and Connery). The other team was dispatched by Navy Air Transport to NAF, McMurdo Station, Victoria Land, Antarctica (2. Rohrer). During the first year, data were collected by the author on men who had "wintered over" at McMurdo, Hallett, Little America, Byrd, Scott (a New Zealand station), and Pole stations. In addition, data were collected on some "Summer Support" personnel. In view of the findings of these first field trips, it was decided to send a second team back to establish the reliability of the tentative findings made during the first trip.

The decision had been made prior to the second trip, that the research efforts should be concentrated on the so-called "small stations," because of the differences in variety and quality of social transactions found there, as contrasted with the "large stations," and also because of the greater isolation felt by the men who occupied the small stations during the winter. However, there were some data gathered from the two large stations that the U. S. maintained in Antarctica during 1958-59, i.e., McMurdo and Little America. Twenty-eight men were interviewed at these two large stations. In addition all of the camp personnel who had wintered over at Hallett and Byrd stations were interviewed, as were all the men stationed at Scott Base, a New Zealand station adjacent to the NAF facility at McMurdo.

A structured interview schedule, used with personnel at Ellsworth Station during the preceding year, was utilized with all men in the small stations during the second field trip. In addition, informal or less structured interviewing took place with practically all of these men.

BRIEF DESCRIPTION OF THE PHYSICAL LOCATION AND ARRANGEMENT OF THE U. S. ANTARCTIC STATIONS

Antarctica is a large violent continent. Temperatures of minus 104 degrees fahrenheit, and winds of 130 knots per hour have been recorded there. Moreover the weather is subject to sudden change and the rising wind velocities are frequently accompanied by the blowing of fine powder-like snow, the "white out" condition, which obscures the perception of the horizontal and vertical axes. Between the large and small stations are large crevasse fields that make traveling by land from one to another a very treacherous undertaking. The Antarctic stations are physically isolated from the rest of the world for a period of from eight to ten months a year. In case of catastrophe, such as a fire, there is no opportunity for receiving outside assistance or of evacuating from the camp site. As can be imagined there is a very realistic threat to the existence of the men during the period of isolation. Despite the very real threat to contemporary existence created by the terrain and atmospheric conditions found in Antarctica, the intensive explorations instigated at the start of the International Geophysical Year and continued since that time differs markedly from the epic explorations, and attendant hardships, experienced by such men as Scott, Shackleton and Amundsen. The pony meat used by Shackleton and the dog meat used by Amundsen, fresh killed when needed, have been replaced by

poultry, beef and pork slaughtered in modern packing houses and shipped or air dropped to the various stations. At McMurdo it was found necessary to double the capacity of the refrigerated reefers to prevent food spoilage; a marked contrast to Shackleton's quick frozen ponies!

Scott Station, the IGY station maintained by New Zealand, is located approximately four miles from the Naval Air Facility on McMurdo Sound. It is a small compact station, built in such a manner that one can move from working quarters to living quarters without having to go outside. In 1958 it had a complement of twelve men. In contrast with the U. S. stations, these men are all civilians. Some of them had been drawn from the New Zealand Civil Service, others from academic departments in New Zealand universities. Of the small stations studied, this station with its proximity to the U. S. station on McMurdo Sound, was least isolated. However, many of the characteristics found in the more isolated small stations were found to hold for Scott Base also.

Byrd Station is located in Marie Byrd Land on a snow plateau some 6,000 feet high, and some 600 miles southeast of Little America. It and the Pole Station, are the most isolated stations maintained by America in the Antarctic. As a matter of fact, Byrd Station could make some legitimate claim of being the most isolated station maintained by the United States. The station itself is built below the level of the snow. At the time of our second visit, there was a complement of 18 men at the Station, all of whom had wintered over the preceeding year. The plane on which we arrived in November, was the second one that had landed since the preceeding February. Thus, we were able to get into the station before too much contamination from outside contacts had taken place. The huts, built below the level of the snow, are connected by corridors constructed of one inch mesh chicken wire, covered with canvas or parachute cloth. Generally, the bunking arrangements were such that two men occupied a cubicle, approximately 8 x 10 feet in size. As a group, the personnel who had wintered over at Byrd in 1958 were in fine spirits. When the writer had left on one of the last planes to get out during the "summer" of 1957-58, the group as a whole had been highly anxious and fearful of what lay ahead. However, they had more than accomplished the work that had been scheduled for them. They had strong feelings of having done well on their mission and there was a good social integration between the Navy and scientific personnel at the station.

Our 1958 visit to Hallett was marred by the fact that we arrived there about six hours after the worst plane crash that has occurred in the Antarctic took place, some 50 miles from Hallett. The plane, a P2V, on which we were traveling from McMurdo to Hallett, was diverted to search for the crashed plane. Once the plane was located a helicopter from McMurdo evacuated the occupants of the crashed plane into Hallett. This, in a small station of fourteen men, caused considerable excitement and disruption of what probably would have been a far more "normal" existence. In addition, Hallett was more "contaminated" than had been the Byrd group, due to the fact that some three or four planes had to make emergency landings there because of weather while attempting to fly from New Zealand to McMurdo Sound. Our interviewing of the men at Hallett was done as soon as all the men that had been involved in the crash were sent back to New Zealand. The pressure and excitement of having the wounded and dead people in camp plus the over-taxing of the rather meager facilities available, due to the search plane crews coming in, as well as ourselves, may have distorted some of the information we gained at Hallett. On the other hand for some of the men, it may have made it easier for them to talk about what they had actually experienced, now that the isolation was over.

Hallett Station is located about 290 miles north of McMurdo, near Cape Adair. The station proper is built on a raised beach of about 25-30 acres beyond which rises the glacier covered chain of volcanic mountains that rim the Ross Sea. It is the home of a large Adelie penguin rookery and at the time of our second visit there, the penguins were coming at about the rate of 1,000 per day. The sea, which later in the summer would be open, was frozen over and the landing strip on the frozen sea was one of the best to be found in the Antarctic. The station is a combined U.S.-New Zealand IGY Station with the U. S. furnishing, during our second visit, all of the support (Navy) personnel plus one civilian scientist. The other four scientists were New Zealanders. As at Byrd, the Commanding Officer of the station was a Lieutenant in the Naval Reserve on active duty in the Medical Corps.

In addition, visits were made to McMurdo and Little America, both of which had complements of more than a hundred men. A total of 28 men were interviewed at these stations. Twelve of these had experienced considerable difficulty in wintering over, the remainder were regarded as being particularly successful in adjusting to the wintering-over period.

Travel in the Antarctic for the research team was greatly facilitated by the expediting carried out by Rear Admiral Dufek and his staff. With the exception of the trip to Hallett, which was made on a converted bomber, all of our other trips in the Antarctic were made on R4D's, which is an early Navy version of the old commercial DC-4 airplane. The scheduling of the planes to the various stations was so arranged to permit us to complete all of our interviews as we went along, i.e., there was no delay in waiting after we had completed gathering our data. The following report reflects the cumulated data gathered from seven stations on two successive field trips to the Antarctic.

RESULTS AND DISCUSSION

The data resulting from interviews with the 163 men seen during the two trips to Antarctica were analyzed through content analyses techniques in order to obtain frequency counts of the various adjustment problems that they encountered. These frequency counts were in turn translated into percentages with the intention of presenting them in tabular form in this report. After the tables had been prepared and closely scrutinized, it was realized that this quantitative fragmentation and re-grouping of the data obscured, or destroyed, the true picture of the adjustment and attendant problems that men living in the Antarctic experience for it failed to relate the adjustment problems to many of the situational variables that were operating with differing amounts of intensity, at different periods of time, during the isolation. Too, individual variation in modes of adjustment were related to the psychodynamic structure of the individual, and this too was obscured by the quantification of the data.

Therefore it was decided to report the data on the adjustment of the men much in the manner of a clinical report. The reader should bear in mind that the phenomena reported are based on interviews with all 163 men, but not all of the men experienced the phenomena described at the same time, nor did all 163 men have the adjustment problems described. There are however some generalities that apply to all of the men who wintered over in the Antarctic.

It should be emphasized that spending a year in the Antarctic give rise to different types of adjustment problems than those that have been reported for the Arctic. This difference is due to the fact that men in the Antarctic have no hope of escaping from the time the last plane or ship leave, in January or February, until the return of ships and planes the following October or November. Whereas in the studies reported (e.g., 3. Debons, 4. Edgerton, 5. McCollum) on the Arctic, there has always been the opportunity in case of emergencies, such as a critical illness, for a plane to evacuate men from these stations. This "total commitment to isolation" for a definite period of time that existed in the Antarctic, is of critical importance in understanding the psychodynamics of the men so isolated.

ADJUSTMENT UNIVERSALS

There are some adjustment universals that do occur for all men in the Antarctic. One is the cyclic nature of the adjustment problem. This can be broken down into three phases. The first phase is one of heightened anxiety on arrival in the Antarctic. This heightened anxiety may last for from two or three weeks to two or three months. The modal point tends in the direction of the two or three month period. Typical quotes from some of the interview materials indicate some of the sources of anxiety.

"During the first part of the year I often wondered if we were going to wind up like the outfit we replaced here. I used to worry a lot about that. In that crew, half of the guys wouldn't talk to the other half."

"The first of the year when I got here, I was really scared of what would happen to me down here."

"We overlapped with the group before and everybody in that group told us that we would get irritable during the winter. That bothered me when I first got down here, particularly for the first couple of months I was here."

The fear of "not knowing quite what to expect" was a major factor in the heightened anxiety. The following report of a man who had arrived on the ice in late October, reflects this fear. An officer at breakfast the morning after the Christmas party was laughingly reporting a dream. He dreamt that he was told that he had two hours to get to the air strip with all of his things in order to return to the states. When he got packed he had too much gear for the weight allowance so he decided to leave a foot locker. He stated that in the dream he had just reached Christchurch, New Zealand when he woke up. Then he added, "I was just a year ahead of my time."

Another man stated that during the first three months after he arrived in camp he had trouble sleeping. He stated that he tried to take sleeping pills but that didn't help. He did say however that tranquilizers did help him, for he could take Meproamate tablets and go to sleep.

At one station the writer was approached individually by seven men asking him to winter over with them. It developed that what was bothering them was a fear that their psychic integrity would be destroyed during the wintering over period, and this fear raised their anxiety level. Apparently they felt that because I was a psychologist there was some magic I possessed that would keep them from having such a breakdown.

A physician who had been on the ice for approximately two months, and with whom I was discussing what was then my tentative hypotheses concerning heightened anxiety, finally stopped me from speculating further by saying, "You know you shouldn't be talking about that to a fellow who is going to winter over." He then got up and abruptly left the room.

The chief technique used to allay the heightened anxiety was work, and in the preparation for wintering over, there is always considerable amount of work to be done. Given the realities of the need to be preoccupied with a work role in order to be prepared for the period of darkness, it should also be noted that the work role was one of the few socially acceptable roles available to the men. It served a therapeutic function in that by working as hard as they could, they did not have much time to fantasy about what was going to happen later on, or for that matter, time to brood over the loss of other cherished social roles, (e.g., father, husband, sweetheart, etc.).

With the coming of winter and the gradual disappearance of the sun, even the work role was reduced for most men. This resulted in varying degrees of depression for all; the second phase of the adjustment cycle. For most it was not a pathological depression for they continued to perform effectively in the roles to which they had been assigned even though their role activities were greatly reduced. Perhaps some quotes from various interviews will make this point more concrete.

"In the middle of the winter when things slackened off down here, there was a feeling of being blue."

"If you were pretty well occupied all the time, then you didn't feel so 'down in the dumps' as did the people who had very little to do."

"During the winter he got off the beam for a while. Along about mid-winter, he got in a thoroughly withdrawn mood, and just wasn't reasonable."

"During the winter months it was monotonous, I got 'down in the dumps' and I guess I had some loss of concentration then."

"He got homesick in the middle of the winter and acted like he wanted everyone else to get homesick too."

"Along in June I got 'down in the dumps.' In the middle of the winter things got boring. I was pretty moody then. Also along about the same time I was having some trouble concentrating."

"When it got dark it got depressing and you thought a lot about your family."

"He had a severe period of depression. It apparently started in February and lasted for at least three months."

"During mid-winter I just got fed up with everything. Sort of moody. I would 'goof' off on my maintenance work until things broke down and I had to fix it. Everyone else was the same."

"During the winter months he became quite absent-minded, you couldn't get through to him. He became so absent minded thinking about his wife that for days on end he let his work go, forgetting to do even the essential things necessary for the maintenance of the camp."

In one diary that I was permitted to read, I ran across numerous references, during the mid-winter period, to how depressed the man had felt. There were repetitive statements such as, "I guess that the Lord is the only thing I had to depend upon to get me through."

This period of depression affects everyone, even the best adjusted men who wintered over in the Antarctic. It is accompanied by the use of repressive inhibition as an adjustment device. It is quite probable that the use of repression as an adjustment device is the primary cause of the depression, plus of course, the stringent restrictions on the number of social roles available to the men.

With the ending of the period of total darkness and the return of the sun once again, the amount of depression experienced tends to be lessened. Apparently the depth of repressive tendencies also were lessened for it was during this period that some hostility started to break out. Most of it was of a verbal nature, but even verbal hostility had largely been inhibited during the period of darkness. Also the return of the sun heralded, in a rather dramatic fashion, that the period of isolation was drawing to a close. Too, with the sun returning it was possible once again to work at outside chores, i.e., there was an increase in work role activities that helped to lessen the degree of depression. It is at this time that anticipatory goal responses of "leaving the ice" began to appear. The following quotes may make this more specific.

"When the first plane came in, I was upset and really had a bad migraine."

"When the plane came in my concentration became worse. I guess I had some 'going home fever'."

"When I was ordered to make up my bunk I refused to do it. I said that I was going to leave on the Glacier and there wasn't any sense being all 'spit and polished' at this time."

These anticipatory responses were characterized by a decrease in the usual camp routine, e.g., housekeeping chores. A reaction of one man, during this period, to an order that the camp had to be cleaned up was: "We've got a good station even if we need a little cleaning up. What are they trying to do, make this another boot camp where you sleep on the floor so you don't muss up your bunk." The camp obviously was receiving poor housekeeping care.

"Everybody in camp felt that the order to clean it up was unfair. We felt that we ought to leave it like they left it for us last year and let the new group do all the cleaning up."

Also during this period there was an increase in the amount of beer drinking activity. Men refused to take orders because they said they were going to be leaving in a day or two, then they would be under a different command. This was true of both the civilian and Navy personnel. For example, one piece of technical equipment necessary for a civilian scientist job was left unrepaired by the person who had been using it the previous year. He said, "Let the new man fix it. I've done my duty down here."

In some cases even though there was an overlap, in time, of the crew that had wintered over and the new crew who was to winter over, there was no transfer of information between the men. The old crew was too busy packing, getting their things together, and so forth to care about passing on to the new crew information about idiosyncratic pieces of equipment and similar things that would be useful to the new crew in the months to come.

One of the most widely documented phenomena that occurs among men who spend time in polar regions, particularly in the Antarctic, is the occurrence of periods of sleeplessness. This apparently is not only a universal, in so far as the American and New Zealand camps that we studied, but is reported to occur in the other IGY camps maintained in the Antarctic by the various countries. Another way of saying this is that periods of sleeplessness in the Antarctic is a cultural universal. There appears to be no single cause for the periods of sleeplessness. Nor is the frequency of periods of sleeplessness highly correlated with any seasonal variation of the year, although in mid-winter there tended to be a greater frequency reported. The periods of sleeplessness apparently are more closely related to the individual's psychodynamics rather than to any universal characteristic of isolation per se. Quite frequently it is related to increased anxiety.

"I had one spell of sleeplessness that lasted for four or five weeks. It was along in June I guess. It seemed like everyone in our cubicle had the 'big eye' along about this time. With me, I was trying to weld a frame on a bulldozer and the ramp I was using to hold the frame together broke. It was pretty difficult in that minus 60 to 70 degree weather to weld anything anyway. When the ramp broke, I knew that I couldn't get the bulldozer fixed, so I quit sweating it and gave up. After that I started sleeping better." Apparently for this man, the anxiety aroused by the frustrations connected with his attempt to weld the frame was sufficient to cause him to be unable to sleep.

A second individual said: "I had trouble sleeping, it was in the winter. I would have thoughts on my mind, go to bed, go to sleep and then wake up a half of an hour later. This went on all through the period that the sun had disappeared. It disappeared when the sun came up, but then when the first plane came in, I again had trouble sleeping. I don't know why it should happen then, it might be the excitement of knowing that the end of the year was coming soon. I thought that maybe my sleeplessness was due to not having enough physical exercise, but the people that did lots of physical labor, they had trouble sleeping too."

Some of the sleeplessness was due to a reduction in the work role. The following quotes document this.

"I had two rather long periods of sleeplessness. They lasted three or four weeks. It happened during the middle of winter. When the sun came up I had more work to do and I got over being unable to sleep."

"I was bothered by sleeplessness throughout the dark period, and again right after the sun came out I had a bad spell."

Apparently this latter period of sleeplessness was related to increased anxiety for the man went on and stated: "That sleeplessness is caused by a need to get away from everyone. I finally broke it the last time I had it by climbing up into the Aurora Tower. Nobody was up there and I could relax. Sleeping pills didn't help me any. However, if I got on the ham set for two or three hours I could get relaxed and then I could go to sleep."

"I had several severe periods of sleeplessness. They started in May and lasted to the latter part of September. I would go for three or four weeks at a time, sleeping only an hour a day. During that period I was extremely fatigued because I was working 12 to 14 hours a day, but that did not seem to solve the problem."

Apparently there are a complex of factors interacting that produce the sleeplessness. Sometimes it is caused by heightened anxiety, at other times by depression, at other times by a reduction in work role, and at other times it is associated with the excitement of getting out of the isolation itself.

Another universal was the increased use of repression as an adjustment technique. The use of repression was most marked in the small stations where there was great interdependence among camp members, and where a show of hostility or aggression jeopardized the group as a unit. Some quotes may make this concrete.

"If you want to live down here, there is one thing you have to learn fast, don't let the nonessentials upset you. The guy working next to you might not like you whistling through your teeth, and you might not like the way he holds his fork, but that is unimportant, so you pay no attention to it, and pretty soon you forget it, and you don't notice the way he holds his fork and he doesn't notice the way you whistle through your teeth."

Another man talking about the isolation from women said: "You put women out of your mind. You don't think about them down here, you wait until you get back home."

A second man talking about sexual deprivations stated: "Down here you handle sex by trying to keep it off your mind. It isn't here, so you might as well forget about it and that is what I did."

Another said: "When someone did something I found irritating, I just ignored it and pretty soon I didn't notice it anymore."

Two more quotes give evidence of repression.

"When I get fed up with a guy I would go down to my shop in the Jamesway and get away from it all, or else I would stop talking with the guy and avoid him, just ignore him that is what I mean."

"I didn't have any trouble adjusting, some of the things that the other fellows did bothered me at first, but you don't pay any attention to them, you just have to learn a different way of living, that's all."

Another universal which occurred in all the camps studied was the phenomenon of compensatory eating. It may be argued that intense cold is the primary factor responsible for the increased weight gain that practically everyone demonstrated who wintered over in the Antarctic. However, the heightened values that were associated with food during the wintering over period suggests that there was a compensatory factor involved in eating. It should be observed in passing that the deprivation of more basic gratifications of an individual are not the only possible factors responsible for compensatory eating. It may be that boredom results in compensatory eating. Following are some quotes from interviews that indicate the compensatory nature of eating.

"The cook was a jewel, he went out of his way to prepare surprise dishes for us. Everyone seemed to get more particular about the food as time went on. I gained 28 pounds while I was here."

"One thing you have to have is a good cook down here. We had one who was a pretty good baker and baked lots of cakes. He was always leaving out extra snacks for us too."

"There was not a great variety that we had down here, never had any fresh vegetables. We climbed the mountain over there and found some curry powder that had been cached there by the British last year. It helped season up the food some."

In the small stations one came into daily face-to-face contact with every member of the station. This fact plus the felt isolation, resulted in a leveling of the formal status ranks within the group. For example there was no separation between NCO and Officer's recreation. A second factor was that there were a number of common tasks that contributed to status leveling, such as taking turns in the mess hall by both officers, civilians and enlisted men; the rotation of people with no regard to rank or status to bring in snow to the melter; when the supplies came in, everybody worked as stevedores in getting the supplies to camp. The following quote documents one instance of status leveling.

"You know, the group now is a lot closer than they were when they came down here. For example I would call . . . by his first name and sit in his office and drink beer. He was my supervisor, I couldn't do that back in the states."

For two status classifications, that of cook and radioman, there was a considerable raising of the values attached to those statuses as contrasted with those held in a more complex society. The cook had his status enhanced because of his close relationship with one of the few socially approved basic need gratifications--eating, and because he presided over the "common" room as the mess hall was used in most cases. The radiomen achieved higher status because of their contact with the outside world. Their ability, or inability as they chose, to make contact with families via phone patches or ham grams enhanced their status.

Accompanying the status leveling that took place in the small stations was a reduction in the amount of status strivings by the men. The small station is a microcosm, the only real world that the men know for the period of isolation. For the men, there was not much reality for striving to move upward socially. This factor of reduced status strivings was an important determinant in the selection of the kinds of recreational activities engaged in by the men. For many, the recreational activities planned by the men prior to leaving the states involved status mobility goals. For example, almost everyone had brought down some kind of correspondence course or books to study for increasing their rank or gaining an increase in their technical or scientific fund of information. What happened is revealed by the following quotes:

"I did start a correspondence course but I dropped it soon after I started, just didn't seem to be able to get around to working on it, although I had a good deal of time."

"I wanted to learn a bit more math and brush up on foreign languages, but somehow I never got around to it."

"I'd planned to do a lot of reading, but it seemed like it was a lot simpler just to sit around and listen to the hi-fi set or watch a movie."

"I brought down several medical textbooks that I had planned on reading while here. Despite the fact that I didn't have much true medical practice to engage in, I never got around to reading the books. Maybe that is the reason. My world was so non-medical here."

With status leveling, a reduction in status strivings, and a stringent reduction in the number and variety of available social roles, there was a corresponding increase in the importance of the man's work role. Everyone guarded jealously the prerogative of his own work role. Even when it was recognized that some other one in the group might have more skills in repairing a particular piece of equipment, the man who was officially responsible for the work would not permit another to work on his job. Two quotes make this point more explicit.

"I had trouble with . . . over the water stills. I rigged them out, got them working, and I knew how to keep them working. But he told me that was his job and for me to keep my hands off of them. Actually he didn't know how to keep them running, so he had a lot of trouble with them, but he wouldn't let me help him."

"I've been working with radios for 14 years now, some of these sets I can tear down and rebuild blindfolded. Our electrician just got rated, and he didn't know anything about radios at all. When I attempted to help repair a radio when it broke down he got angry and threatened me a couple of times. Yet he didn't know how to do the job himself. Sometimes I would wait until he got through tinkering with it, tell him that it was working all right and then when he got out of the radio room, I'd fix it myself, but he didn't want anybody touching it but himself."

Leisure time activities of the men who wintered over do reflect the reduction in status strivings by the men and the need they felt for interacting together as a group, a mutually reinforcing as well as an anxiety reducing technique. The following quotes illustrate this point.

"I brought along a bunch of photos that I had hoped to put into an album but I never did get around to it. I never had any free time." (Actually the leisure time this man had, as he revealed later in the interview was spent playing such games as monopoly, scrabble, and so forth).

"I brought along some correspondence courses but I didn't have time to work on them while I was down here. Seems like all we did down here was to work, eat, go to the movies, drink a couple of beers, and then go to bed. This went on for months."

"Most of my free time I spent playing records. During the winter I drank a lot of tea."

"Most of my time I spent either in bull sessions or using the ham set. When I got tired of arguing with the boys I'd go in and use the ham set for a while."

"In my leisure time I tried all the things that were in the hobby shop but soon tired of that. I did a few paintings and got tired of that too."

"I spent most of my time reading and drinking beer. There were a lot of bull sessions too. It got to the point that they ran out of things to argue about they would start all over again on the first topic."

ADJUSTMENT SPECIFICS

In addition to the universals that had been mentioned with respect to adjustment in the Antarctic there were some specific kinds of adjustment problems experienced by some of the men. While not all of the men had these experiences, they are sufficiently important to be recording here.

One of the specifics that actually caused more interpersonal tension and difficulty during the wintering over period than any other single factor involved "acting out" behaviors engaged in by people who had deep-seated inadequacy feelings, were overly immature--in short, people who had personality and character disorders. Again some quotes may make this more specific.

"A lot of us got mad at him when he used a seal as a target for throwing knives at. That was last fall and we didn't think that he had any business acting like that. Later he found the chief's favorite sun glasses and cut the frame on them because he had had an argument with him earlier. Nobody could prove it, but we all know who did it."

A person who had deep-seated feelings of inadequacy stated: "The day I jumped off that boat and landed here, my virility jumped up four times as strong. I'll be honest, sometimes I was masturbating four or five times a day at first, and did it daily, sometimes twice daily until August, and then the need for it completely disappeared."

Another said: "I came down here to prove something to myself and I failed, I'm just no good as a man I guess."

One way of "acting out" was through the use of aggressive techniques. There was, for example, the radioman who refused to follow systematic broadcast schedules and told the officer in charge that he would keep whatever schedule he pleased. Actually the command was fearful to reprimand him for fear that he would destroy the transmitting equipment, the only contact that they had with the outside world. The aggressive actions of three other men were described as follows:

"He used to take the snow wessel out to see how many penguins he could run over and kill. We all got angry with him about that."

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" . . . had plenty of problems adjusting, one time when he was drinking he became so angry he ran his fist against the wall for no reason at all."

The following response was given in reply to a question as to why a young man had decided to winter over. (Parenthetically it should be noted that for a number of years prior he had had a running feud with his father). He stated: "During the Christmas holidays I mentioned to my father that I thought of applying for a job here. He replied real sarcastically, 'Fine chance you have of getting a job down there.' So I went back and applied for the job, and with a bit of cheek I pulled it off. I showed him."

Another technique used to adjust was by withdrawing. The following quotes illustrate this technique.

" . . . refused to do anything or work with anybody. He stayed off to himself all the time down here, he wouldn't have anything to do with anyone."

"During the first two months when . . . was having a considerable time over being anxious, the technique that he used was to pull out of the group and avoid us all."

"I deliberately cut off my contact with everyone I knew statewise. I didn't even put through a phone contact to a girl back home, I did this deliberately."

" . . . would avoid people when he was angry, he would stay away from us all."

"There was only one person in our camp that had any trouble. He was sleeping in the IGY hut and raised so much cane about the noise there that they finally arranged it so that they would have a room by himself. This was what he wanted all the time."

There was a good deal of regressive behavior that occurred among the men, although most of it occurred just prior to their getting off the ice. A few however did show marked regressive behavior during the year. One young man complained of pains in his legs, that prevented him from walking and hence had to be served his meals in bed. However, he was able to get up and watch the movies at night!

A second young man told me that he could sleep from 16 to 18 hours over the weekend, and generally did so. His sleep was apparently a regression to a more infantile pattern of behavior.

Another young man stated: "I tended to over sleep, especially during the winter months. I slept better than 12 hours a night. I slept more than I should because there was nothing else to do."

The regressive behavior occurred more widely as the men were getting ready to leave the ice. Much of it was characteristic of behavior typical of the age range from 8 to 16 years. There was exaggerated bragging on what they had accomplished during the winter months. Also there were petulant, childish ways of acting once the men had left the small stations, when they refused to help with any work at the larger stations. One person returning after wintering over got up on the fantail of the ship in his swimming trunks for a sun bath with the temperature around 25 degrees Fahrenheit. After this rather adolescent way of acting, he hovered over the heating unit in the cabin, swathed in blankets, for two hours to get rid of the chill that he had developed.

As would be expected in the anxiety motivated attempts to adjust to the Antarctic environment, some people developed psychosomatic complaints. For example one man, who had been on the ice for about six weeks, began stuttering and came around to talk about it with me. On inquiry it developed that as a child he had stuttered, but the stuttering had disappeared when he was 9 years old. It had reappeared while on the ice.

In another of the small stations, a scientist developed nausea and headaches to the point where finally the station physician had to give him glucose and saline injections to overcome the dehydration caused by the nausea. This attack of nausea had been preceded by a rather long period of sleeplessness and depression.

In another case, while a Navy man was being flown from McMurdo to a small station to winter over, he developed double vision and had to be evacuated to the states. Another man developed severe, painful migraines after he had gotten on the ice. He had not had migraine attacks prior to that time. Another person who had had experience with migraines prior to getting on the ice stated, "It seemed like anything that broke the routine resulted in the migraines hitting me. They were worse too after the sun came up." The latter reference apparently associated with anticipatory responses of leaving.

One rather interesting case was that of a chief who, using his seniority, bumped the chief who was scheduled to winter over in order that he might get on the ice. After he had been there for a little over two months, during which time he has expressed much overt dissatisfaction with conditions there, he developed blisters on his right hand. Because his work depended on manual dexterity he was unable to report for work and came to the sick bay for treatment. Numerous medical techniques were applied but the blisters did not clear up. Instead they tended to get worse. It was decided then to send him back to the states and use one of the summer support people to winter over in his place. As soon as he was told his orders had been cut, and that he was returning to the states, the blisters disappeared.

With many of the men who had wintered over, however, the net result of the experience was not that of developing symptoms of maladjustment. Many of them felt that the experience had permitted them to become more mature. To quote:

"I think as a result of wintering over I will be able to deal with people better. Now that I have made chief I will be working crews and I will be better able to understand what the men in my crew are thinking about--at least better than I would have been before I came down here."

"I'm less brash, and not so quick to judge people as I was before I came down here. Being in a small camp in the Antarctic is like being under a microscope for you really get to see people and get to know them." Similar statements were made by a considerable number of other men.

There are two other rather unique behavioral phenomena to be observed in the Antarctic that are worthy of note. One has been labeled the "Long Eye" phenomena, the other is increased sensitivity to auditory stimulation. The "Long Eye" is a condition quite similar to the condition produced after a person has been placed in environments that provide a minimum of sensory stimulation. However, in the Antarctic the condition occurs when the individual is isolated from the social group, so apparently it is intimately related to interpersonal, or social stimulus deprivation rather than reduced gross sensory input. Cases have been observed where it was produced either by the group isolating an individual, or the individual because of their own motivation completely isolating themselves from the group. It is accompanied by a reduction in work role. Generally it is preceded by a rather long period of sleeplessness. Symptomatic characteristics are described variously as "they stare right at you, but never see you." "They look beyond you." "They just sit and stare, never talk or anything. They won't wash and generally wear their clothes for weeks at a time. Sometimes they break down and cry like a baby. Other times they just go off by themselves, never say a word to anyone." "They have a twelve foot stare in a ten foot room." Some of the people who have experienced this "Long Eye" phenomena describe hallucinations that involve light flashes or perceive movement where there is no movement. Other symptoms are that they lose appetite, they have prolonged periods of silence, and "they lose their skin color, their skin gets gray." In some cases they become suspicious of others, a sort of paranoid "acting out." In addition to the fact that this condition quite frequently occurs because of work role deprivation, it also occurs when there is a felt increased responsibility by a person. The phenomena disappears when the individual finally goes back to talking and interacting with the group, or when the group permits the individual to re-enter the group and again interact with them.

The other rather interesting phenomena is that of increased sensitivity to auditory stimulation. This does not occur among all of the members in the small isolated group, but the fact that a number do experience it gives the phenomenon some significance. For example, one person complained bitterly about people using the dryer late at night. He stated that the dryer had a whistle that irritated him very much. The dryer incidently was two bunk houses away and the insulation was quite adequate in the houses. The same person however stated that when someone was typing in his own bunk house it didn't bother him, he could sleep through it. During the mid-winter when his work role was reduced, he stated that the whistle bothered him the most.

Another person stated that during the winter the bunk house became so noisy he couldn't sleep there. He went down to the supply house and rigged him up a bed there. He stated that it seemed like during the winter, throughout the day and night somebody was always making noises in the bunk house. The phenomenon of increased sensitivity to auditory stimulation has been described rather vividly by Giaeffer (4).

Apparently this increased sensitivity is closely related to the increased repression that many of the men in isolation use as an adjustive device. Repression is an intra-psychic process and the use of it results in a reduction of the psychological intensity value--a decreased awareness--of intra-psychic stimulation. Awareness of stimulus configurations is a relative matter and usually an awareness balance is struck between internal and external sources of stimulation. Now given a reduction (because of repressive processes) in the intra-psychic sources of stimulation there should develop an increased awareness of external stimulus configurations, particularly if they are unrelated to the repressed material. This is precisely what happened in the small isolated stations in the Antarctic and may be responsible for the increased awareness of the external stimulation, particularly to auditory stimulation. Probably also related to the increased sensitivity is the fact that the normal range and variety of different external stimulus configurations is reduced due to the isolation. Certainly, in observing the activities of a group in isolation there is a seeking out, or longing for, a greater variety in the stimulus patterns impinging upon the individual than are available.

VALIDITY OF ASSESSMENT PREDICTIONS

Prior to the assignment of the men to Antarctic duty, all men, both civilians and Navy personnel, were assessed by an assessment team made up of staff attached to the Neuropsychiatry Branch, Bureau of Medicine and Surgery, U. S. Navy. Only those men who were judged to be unfit for regular Navy duty were eliminated. However, a general overall judgmental evaluation was made, on a scale ranging from A to D, of the probable adjustment each man would make. Also prepared was a brief summary of their major modes of adjusting. These were made by the psychiatrist and clinical psychologist who independently saw each man. After the independent evaluation had been made, the two would get together and make the overall evaluation as to the probable adjustment of the individual.

While it was impossible during our relatively short visits to Antarctica to get any detailed evaluation of the adjustment of each of the men during the various time periods, it was possible to identify people who had adjusted most poorly and/or had caused the most difficulty during the wintering over period, and to identify those men who were highly successful in their adjustment and contributed most to good interpersonal relationships. Because the measures obtained in the Antarctic of their adjustment were overall impressions rather than detailed refined measures, it was decided to isolate six of the men who, during the two year period of study had been most successful in adjusting to small station life, and six of the men who had been least successful and then to describe what had contributed to their being successful and unsuccessful. Once this had been done to then go back to the original assessment records and pull the folders on these men to check the validity of the assessment predictions. This is of course just a first step in developing adequate criteria, but it will at least establish a bench mark for gauging the effectiveness of the assessment program.

The Six Most Poorly Adjusted Men:

ASSESSMENT SUBJECT A: The prediction in overall adjustment of this individual, as rated in the assessment program, was D. He was described as a schizoid individual, uncertain as to his sexual role and a person who related poorly to people. Evidence was found for the potentiality of his creating a great deal of interpersonal friction. He was described as being a person in which hostility played an important part in his psychodynamics and it was directed toward others.

PERFORMANCE SUBJECT A: This man was quite withdrawn in the group's interactions. He showed a great deal of hostility towards others and it was of a very immature variety. For example he became extremely hostile when, one evening, a picture scheduled for showing was not shown and another was substituted in its place. He threatened to report the incident directly to Washington. He disturbed all the persons in the station and they finally gave in to him, replacing the old scheduled picture. He was generally regarded by his fellow members in the camp as the most poorly adjusted person there.

ASSESSMENT SUBJECT B: Prediction rated C. This person has a flat dull affect, and is preoccupied to some extent with his inner tensions. Under stress he would likely somatize his difficulties. He shows a great deal of anxiety and handles his anxiety by introspective self-doubts and suppression. His aggression is generally directed against himself. Overall, he is a passive-dependent personality.

PERFORMANCE SUBJECT B: It was generally agreed that one of the big reasons that the small group, in which this man wintered over, had not achieved even greater success was because of Subject B's failure to get his work done. "He always has to have people working along with him" was the way he was described. A part of this had some reality orientation because his job necessitated working with the maintenance of electrical equipment. In the spring after he had wintered over he exhibited quite dependent behavior and was unable to relate affectively to the men he wintered over with, or the group that came in to take over. His affect was dull, and he gave the appearance of a rejected child in a corner of the school yard.

ASSESSMENT SUBJECT C: Prediction rated C towards D. This man's motivation for going to the Antarctic was judged to be somewhat unhealthy. His hostility is directed towards others and his most important adjustment problem is that he exhibits very little ability to absorb emotional stress. He has some castration anxiety. What little emotional responsiveness he has is poorly controlled. Some paranoid tendencies are likely.

PERFORMANCE SUBJECT C: This man was engaged in two physical aggressive acts. He showed considerable inadequacy feelings and the assessment team was correct in picking up his motivation for going on the ice as being an unhealthy one, inasmuch as it was to attempt to "prove himself." He was one of the men who refused to let some of the more competent people in the group do any part of his work, perhaps reflecting a paranoid tendency as noted by the assessment group.

ASSESSMENT SUBJECT D: Prediction rated D. This man was judged to be compulsive, over controlled, and exhibited some negative immature features in his personality. He is selectively attentative, and has a good deal of confused sexual identification. Generally he is passive dependent to which he sometimes shows reaction formation. The infantile characteristics in his makeup indicate that he would have some difficulty controlling the aggressive features in his personality. Hence since he handles his anxiety by constriction he will probably have to displace or somatize any aggression that he feels.

PERFORMANCE SUBJECT D: This man had an extremely difficult time in wintering over and was remarked on by almost all of his fellow members in the camp. He had some rather severe periods of depression during the year. He developed violent headaches and would at times, after drinking a beer or two, show very infantile aggressive behavior. For example, he is the one who ran his fist through the wall. He is also the man who developed migraine headaches while on the ice.

ASSESSMENT SUBJECT E: Prediction rated C. This man handles his anxieties by evasion, trying to stay uninvolved, resists, is vague, and finds fault with what he has to work with. He is an anxious, passive resistant man who defends himself by being vague or hypercritical when cornered. He can't cope with personalized wrath except on a rejecting basis.

PERFORMANCE SUBJECT E: In talking with this man it was learned that his chief motivation for wintering over was to evade an emotional involvement that he had entered into in the states. He exhibited many passive-aggressive acts, some of which were self destructive. One of them was an attempt to de-enlist during the middle of the winter in order to give his responsibilities to a man of lesser rank who had functionally taken over for him.

ASSESSMENT SUBJECT F: Prediction rated C minus to D. This man handles anxiety by compulsively acting out. He probably has mood swings. He exhibits traits of negativism and narcissism. His fluctuating mood swings from impulsivity to depression. Underneath he is preoccupied with the question of his manliness. His basic personality pattern is that of a passive-aggressive personality with mood swings.

PERFORMANCE SUBJECT F: This person had a great deal of difficulty in achieving the goals that had been set for him during the year. He was unable to form any warm or lasting friendships in the group, but he was generally tolerated by the group. He was criticized considerably when it was his turn to assist in mess hall duty because he was always late and thus imposed upon the cook. During mid-winter it is stated by a fellow group member, as well as mentioned by the man himself, that he had had a long period of depression and sleeplessness when he didn't seem to be able to get any work done. This he used in explanation of one of the "reasons" that he failed to achieve the objectives set for him during the year.

The Six Highly Successful Wintering Over People:

ASSESSMENT SUBJECT A: Prediction rated A. This man is a reserved, warm individual who had a great deal of sensitivity, has many inner resources, and shows a considerable amount of emotional response.

PERFORMANCE SUBJECT A: This man was one of the best liked men in camp. He went out of his way to make life more pleasant for the other members of the camp and knowing the importance of the movie camera which he operated did some quite ingenious repair work to keep the machine going, after it had broken down in mid-winter and there were no spare parts with which to repair it. He did a lot of quite pleasant kidding with everybody in the station. No one exhibited any resentment toward him. One of the station leaders, in talking about him, said that he was one of the reasons for much of the stability that had been achieved in the group during the year.

ASSESSMENT SUBJECT B: Prediction rated A. This man was described as being a well adjusted young man of superior intelligence and sufficiently free of conflict that he could function near his maximum innate capacity. His motivation was positive in that he was seeking something that he wanted rather than escaping from a problem. He handles anxiety by delaying response. Hostility towards himself is expressed by demanding a great deal from himself.

PERFORMANCE SUBJECT B: Of all the men in this small station, this subject is regarded as standing in a class by himself. The maturity that he exhibited was marked. The men would seek him out asking his advice. His ability to work with the camp members was outstanding. While his status, in terms of a complex society, was considerably higher than many of the men in camp he was always one of the first to assist in doing some of the hard manual chores that had to be done. He kidded with the men in a somewhat patronizing manner, thereby keeping them from getting too close to him. He was described by one of the men in the following manner. "If there is such a thing as an All Antarctic Boy, that's him," and this was said without any tone of hostility at all.

ASSESSMENT SUBJECT C: Prediction rated B. He is a good bet. This man had some ability to absorb emotional stress, and has very little confused sexual identification. His emotional reactions are well controlled. He does show some depression. A generally passive, self reliant, friendly, modest, self denying and adaptive person. He is mature but passive.

PERFORMANCE SUBJECT C: This man was a cook and was dearly beloved by all of the members of the camp. He worked long hours and everybody appreciated it. He went out of his way to develop variety in the food that he prepared. He generally avoided any arguments in the mess hall and when he did get involved it would be in a pacifying manner. He did also show some depressive tendencies but they were controlled. Overall he made an excellent adjustment to the Antarctic.

ASSESSMENT SUBJECT D: Performance rated A. This man is assertive, relaxed, self reliant, friendly, self indulgent, sociable and adaptive. He has very little intra-personal friction and shows very little evidence of confused sexual identification. He has a well controlled emotional reaction, and shows very little evidence of depression.

PERFORMANCE SUBJECT D: This man was regarded as a first rate group member. He never got excited over anything, and with the exception of one period when he was attempting a work task that proved to be impossible, he showed no evidences of any problems in adjustment. During that period he experienced a period of sleeplessness. He was tolerant in his dealings with the other people and assumed responsibilities for seeing to it that his work was done properly. He is one of the men who felt that the experience of wintering over had been a profitable one for him.

ASSESSMENT SUBJECT E: Performance rated B. This man has a great deal of positive inner resources. He is generally assertive, is obsessive compulsive, yet he is a sensitive man. He is well controlled emotionally, except that he is vulnerable to depressive influences. He handles anxiety by denial.

PERFORMANCE SUBJECT E: This man was regarded as the informal leader of the station. He was an older man, one always ready to listen to any problems that anyone in the station had. He would generally respond to those problems in an emotionally sympathetic manner and also generally give helpful advice. He went out of his way and out of the line of duty, in order to help all the other people in the station. He was variously described by the other men in the small group as "a jewel," "a winner," and similar positive flattering statements.

ASSESSMENT SUBJECT F: Prediction rated B plus. This man has a great intellectual potential and is also highly intellectual. During the interview there was no evidence of any anxiety or overt conflict. He has had previous polar experiences. He sometimes shows ambivalence about asserting himself and while he is systematic, he has a flexible approach to the situation. He shows a great deal of originality in perceiving and integrating his experiences. His inner resources are of sufficient strength to meet and cope with emotional impact from within or without, and to give stability to his adjustment. He has a tactful sensitivity in dealing with others and a capacity for maintaining good interpersonal relationships and empathizing with others without undue dependence on them for emotional support. Yet he is restrained in his dealings with others and had difficulty in establishing close affectional ties.

PERFORMANCE SUBJECT F: This man was called upon to make one of the most difficult types of adjustment to the Antarctic. He came through successfully and was regarded as a good group member. He tended to be preoccupied with the scientific problem that he had come down to work on, and therefore did not mix a great deal with the group. However, his relationship with all the group members was one of acceptance by them along with a respect for him as an individual.

It will be seen by contrasting these twelve case summaries on poor and well adjusted group members, that the face validity of the assessment procedure appears to be quite high. It is difficult of course to generalize widely from such observations. Much more systematic work should be done on developing criteria for evaluating people who are going to spend long periods in isolation with no opportunity for return to a more complex society. Yet these results do suggest that such assessments can be made with a considerable degree of validity.

SUMMARY AND CONCLUSIONS

This report is concerned with a discussion of problems of human adjustment experienced by men who wintered over in the Antarctic. The data on which the discussion is based resulted from interviews with, and observations of, 163 men in the Antarctic.

Three rather different levels of behavior were described. First, there was the cyclic adjustment that the men made to the Antarctic. This consisted of heightened anxiety on entrance into the Antarctic; a period characterized by heightened depression, that covered most of the dark winter months; then a period characterized by the occurrence of anticipatory behavior preparatory to leaving the Antarctic.

The second class of data had to do with the interpersonal transactions in the small stations, and the types of ego defense mechanisms that the men used during this period of time.

The third class of descriptive material was concerned with the occurrence of adjustive phenomena, apparently unique to life in Antarctica. One consisting of what has been called the "Long Eye;" a condition produced by depriving an individual of interpersonal transactions with the group. The second phenomena has to do with increased sensitivity to auditory stimulation.

It was pointed out that all the generalizations arrived at appear to have some validity relative to adjustment problems made to the Antarctic. It was also pointed out that there was a great need for more systematic study of these phenomena. It is felt that this proposed systematic study of the phenomena that occur in the Antarctic is important not only to understanding the problems of maintaining United States stations in the Antarctic, but also because of the complete commitment to isolation for a definite period of time, the generalizations that might be developed would have some application to possible problems of space travel since the conditions of isolation and the degree of commitment are the same in both cases. It is also possible that generalizations about adjustment to the Antarctic might have some applicability to the problems of prolonged submersions aboard submarines.

Following are 14 testable hypotheses which have been developed on the basis of the data presented on the foregoing discussion.

1. Acceptance by an individual of commitment to isolation, with the knowledge that there is no escape, results in concern with a different class of adjustment problems than those problems experienced by people in isolation who are not so committed.

This could be tested by the following measures; nature of group interaction patterns, both during work and leisure time; expressions of felt deprivations; verbalized fantasies; the way hostility is handled; the hierarchy of value systems held as measured by direct observation and verbalized expressions of values; and a measure of tendencies to inhibit.

2. A reduction in the number of social roles in which an individual engages will be accompanied by an increased number of adjustment problems.

3. An increased tendency by an individual to inhibit internal feelings will be accompanied by an increased sensitivity to external stimulation. This can be measured by measures of response to sub-liminal stimulation and also by the proposed technique to be developed to measure inhibitory tendencies.

4. When an individual in a given living area develops sleeplessness it will be contagious and spread through the group living in those quarters.

5. A reduction in role activities will be accompanied by an increase in sleeplessness.

6. Increase in anxiety will be accompanied by sleeplessness.

These last three hypotheses can be measured in a number of different ways. Some of them are as follows; flicker fusion, EEG, measure of muscle action potentials, and the to be developed measure of inhibitory tendencies.

7. Isolation will result in social status leveling, i.e., the group will, as isolation proceeds in time, move in the direction of becoming a peer group.

8. The greater the interdependence of members in the group, the less will be the hostility expressed towards members of the group.

9. The greater the number of "unknowns" that a person has about conditions of life in isolation, the higher will be his anxiety.

10. The greater the reduction in work role, the greater the amount of depression that will be experienced by an individual.

11. The greater the number of self deprivations, the greater will be the depression of the individual.

12. An increase in the number of cues indicating an approach to escape from isolation will be accompanied by an increase in nonconstructive activity.

13. The closer one approaches to escape from isolation, the greater will be the amount of aggressive behavior exhibited.

14. Those persons diagnosed as having personality and behavior disorders will be responsible for the greatest amount of friction occurring in the group.

At least the following measures should be obtained systematically throughout the wintering over period: measures of flicker fusion, EEG recordings, action potential recordings, work and leisure time interaction patterns of the group, the effects of group pressure on individual behavior, measures of mood affect changes, measures of motivational patterns derived from psychomotor tasks, recordings of verbalized fantasies, measures of inhibitory tendencies, and measures of response to sub-liminal stimulation. In addition to these measures one would want to collect data of a social-psychological nature pertaining to group interaction and status role changes, particularly as they relate to subjective psychological phenomena such as depression, the use of leisure time as related to isolation, and so forth.

It is recommended that these hypotheses along with other hypotheses that may be generated, be explored by having a psychologist or psychiatrist, plus a corpsman technician, winter over in one of the small stations in order to systematically collect data to test the hypotheses.

BIBLIOGRAPHY

1. Mullen, C. S., Jr., and Cranery, J. Psychological study at an Antarctic IOY station. U. S. Armed Forces Med. J., 1959, 10, 290-295.
2. Rohrer, J. H. Some Impressions of Psychic Adjustment to Polar Isolation. Neuropsychiatry Branch, Bureau of Medicine and Surgery, U. S. Navy, 1956, pp. 52.
3. Debons, A. Study of Adjustive and Nonadjustive Behavior as Reflected by Variations of Shifts in Disposition of Infantrymen Assigned to Alaska. Ladd Air Force Base, Alaska: Arctic Aeromedical Laboratory, 1950.
4. Edgerton, H. A. Personnel Factors in Polar Operations. New York: Richardson, Bellows and Henry, 1953.
5. McCollum, E. L. Survey of Human Adjustment Problems in the Northern Latitudes. Ladd Air Force Base, Alaska: Arctic Aeromedical Laboratory, 1950.
6. Gjaever, J. The White Desert: The Official Account of the Norwegian-British-Swedish Antarctic Expedition. London: Chatto and Windus, 1954, pp. 112-128.