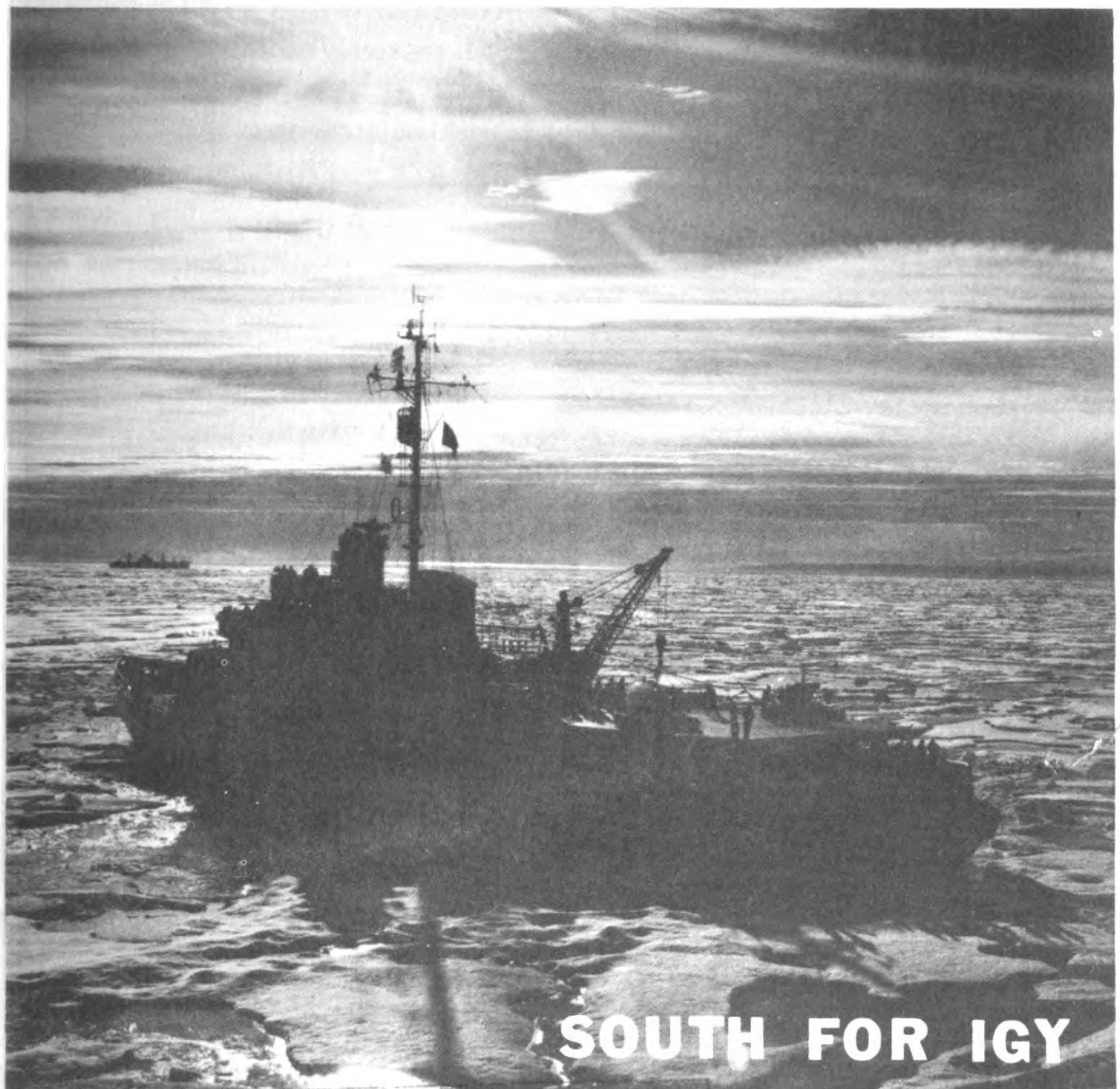
OFFICE OF NAVAL RESEARCH FEBRUARY 1955

Feb. 1955

RESEARCH REVIEWS



NAVEXOS P-510

DEPARTMENT OF THE NAVY
WASHINGTON, D. C.

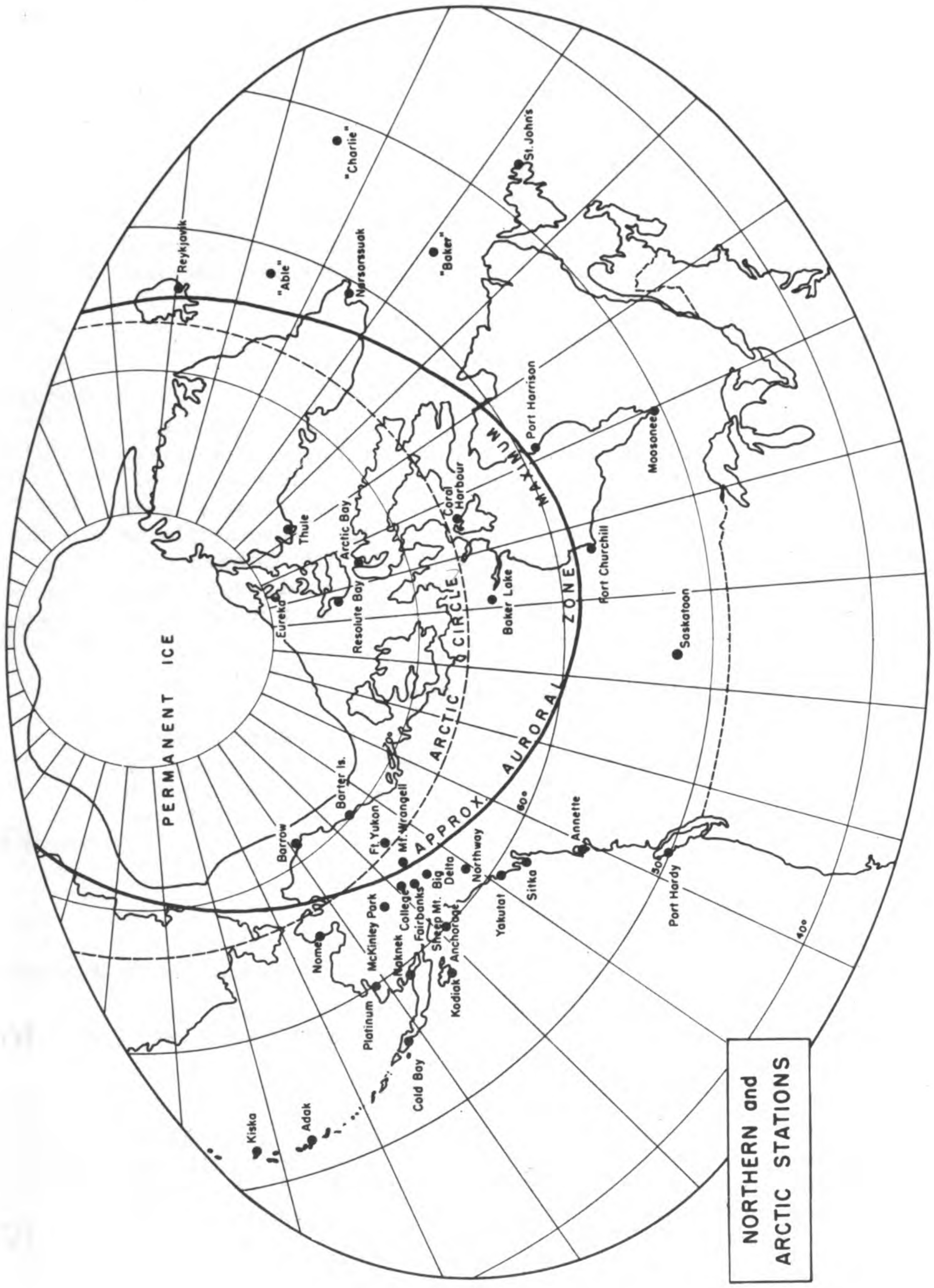
COVER PHOTO: USS ATKA, the Navy's icebreaker with a past, by now is probably nudging the ice flows of Antarctica. Successively under the Russian and U. S. flags, the squat 269-foot vessel has become an old hand in polar seas. The reason for her trip is outlined in the first two articles of this issue.

Research Reviews endeavors to report briefly highlights of technical progress in research by Navy laboratories and contractors and the development of important naval research facilities. Articles which meet these broad criteria and possess a good degree of readability are welcomed. Manuscripts and changes of address should be sent to Code 740, Office of Naval Research, Washington, D. C.

Research Reviews is listed for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. Subscription price: $ 1.50 per year in U.S. and Canada; $ 2.00 per year, foreign; $ .15 per individual copy.

Approved by Bureau of the Budget, 14 February 1952

In This Issue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ARCTIC STATIONS
PERMANENT ICE
ARCTIC CIRCLE
APPROX. MAXIMUM AURORAL ZONE
Reykjavik
"Able"
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"Charlie"
"Baker"
St. Johns
Thule
Eureka
Resolute Bay
Arctic Bay
Coral Harbour
Baker Lake
Port Harrison
Moosonee
Fort Churchill
Saskatoon
Barter Is.
Barrow
Ft. Yukon
Mt. Wrangell
Northway
Big Delta
Sheep Mt.
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Naval Research and the International Geophysical Year

By now, everybody who follows the science columns knows something about the International Geophysical Year, and that U. S. scientists will take part. The purpose of this article is to give a brief forecast of the role the Navy will play in the undertaking.

It will be recalled that there were international "Polar Years" in 1882-3 and fifty years later in 1932-33, during which scientists of various nations cooperated in probing the secrets of the polar regions. Because research has stepped up its pace so rapidly in the past two decades it was decided by the International Council of Scientific Unions not to wait for fifty years to elapse, but to hold another "Year" in 1957-58, twenty-five years since the last one. Furthermore, investigations of phenomena in the Arctic and Antarctic seemed so involved with research in more temperate climates and cut across so many scientific boundaries, it was decided to call the forthcoming effort a "Geophysical Year." The timing works out very nicely, because 1957-58 happens to be a period of unusual sunspot activity. At any rate the dates have been established at July 1, 1957 to December 31, 1958. So far, 39 nations have indicated they will participate. Between now and the jump-off thirty months hence scientists in every quarter of the globe will be hard at work preparing plans, preliminary data, and instrumentation.

For the purpose of IGY, the science of "geophysics" has been broken down into ten sub-fields or disciplines. These are:

Rocket Exploration of the Upper Atmosphere
Latitude and Longitude
Aurora and Airglow
Ionospheric Physics
Solar Activity
Meteorology
Geomagnetism
Cosmic Rays
Oceanography
Glaciology

The divisions are arbitrary of course. The work of the oceanographer, for instance, or of the glaciologist would be impossible without supporting meteorological data, and though "Rocket Exploration" has been designated as a research field unto itself, the purpose of upper atmospheric sounding is to obtain data in such matters as the ionosphere, the aurora, cosmic rays, and the activity of the sun. Furthermore the location of launching sites, and times of firing frequently depend on geomagnetics and meteorology. As in former "Years," interest will be centered in the polar regions, but polar phenomena can be studied meaningfully only in relation to conditions in temperate and equatorial areas. Therefore geophysical stations will be set up from Norway to Tasmania, in jungles and at sea, as well as in the Arctic and Antarctic. Certain "days" have been programmed in each month, so that throughout the Year data will be simultaneous and interrelated.

Hon. Donald A. Quarles

The organization for this vast cooperative undertaking has been worked out for some time. The international group in charge of coordination is the Comité Spécial Année Géophysique Internationale—CSAGI—appointed by the International Council of Scientific Unions. The American authority is a National Committee appointed by the National Research Council and the American Academy of Sciences. NRC-AAS will work jointly with the National Science Foundation (NSF), which has already been given a special appropriation of two million dollars by Congress for IGY, and hopes to get ten or eleven million more by the time the Year starts. NSF will parcel out expense monies to various U.S. participating agencies, both government and civilian.

The Department of Defense has indicated that it will also support the scientific program, using funds appropriated for research. Assistant Secretary of Defense (Research and Development) Donald A. Quarles has already appointed a three-man IGY Committee: Dr. John E. Vance for the Army, MAJGEN James McCormack for the Air Force, and ONR's Dr. E. R. Piore for the Navy. Thus the Navy's effort is being coordinated by ONR in the person of its Deputy and Chief Scientist.

The Department of Defense has also been asked to provide logistical support—both manpower and materials to build and operate stations, ships and planes for transportation, floating bases for ocean operations, etc—as distinguished from research funds allocated for scientific personnel and instrumentation. Requests from naval agencies, such as NRL and the Naval Observatory, for this kind of help likewise will be channeled through ONR.

The Navy, directly through its various research facilities and indirectly through its civilian contractors, will participate in most of the ten "disciplines" or programs.

The Naval Observatory, for instance, is planning to take part in Solar Activity, Longitude and Latitude, and Ionospheric Physics. The Observatory has developed a new technique for measuring longitude and latitude, using a dual-rate noon-position camera. Sixteen of these cameras will be loaned to observatories distributed around the world, and the Naval Observatory will operate an additional four: two in Washington and one each at San Diego and Hawaii. The Observatory will collaborate with Mt. Wilson Observatory, with McMath-Hulbert Observatory, and the Air Force's High Altitude Observatory at Sacramento Peak in studies of solar activity. Similarily it will collaborate with the National Bureau of Standards and a number of universities and geophysical institutes on ionospheric, auroral, and high-altitude physics, and with the U.S. Coast and Geodetic Survey on the determination of geodetic latitudes and longitudes.

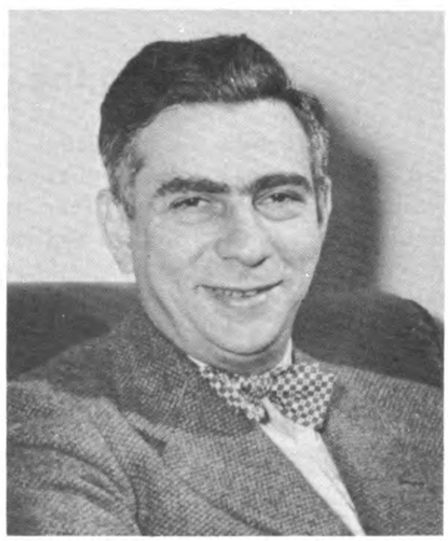
The Office of the Chief of Naval Operations is particularly interested in meteorology, and is anxious to see constant-level balloon flights over ocean areas included in the IGY program. The Bureaus of Medicine and Surgery, Aeronautics, Ships, and Yards and Docks have also indicated interest in the results but thus far have no plans for participation at the research level.

Because the international program named "Rocket Exploration of the Upper Atmosphere" as one of the ten phases, it is natural that the Naval Research Laboratory has been involved almost from IGY's inception. H. E. Newell, Jr., Head of the Rocket Sonde Branch at NRL, and Chairman of the (nongovernmental) Special Committee for IGY of the Upper Atmosphere Rocket Research Panel, attended the early CSAGI meetings and he will coordinate the Navy's effort in this field.

The rocket program, as thus-far outlined, will be a joint effort between the Army (Signal Corps), Air Force (Cambridge Research Lab), and Navy (NRL and State University of Iowa under ONR contract) each bearing about a third of the technical and logistical burden. The "rocket exploration" will be by high-altitude sounding rockets (Aerobees), balloon-borne rockets (Rockoons) and plane-borne rockets (Rockairs).

The principal firing sites will be a) White Sands, New Mexico, b) Ft. Churchill on Hudson Bay, Canada, c) in Frobrisher Bay on the west coast of Greenland (near the Geomagnetic Pole), d) in the Pacific, probably off San Diego, and e) in the Antarctic. Present Plans call for 36 Aerobees and 100 or more Rockoons or Rockairs. To provide proper division of effort, NRL will fire 20 of the Aerobees, and the Air Force and Signal Corps will be in charge of the other 16. Most of these will be fired at Ft. Churchill. NRL will also fire the rockoons which are to be launched in the Pacific, and Iowa State will launch the Navy's rockoons off Greenland and in the Antarctic.

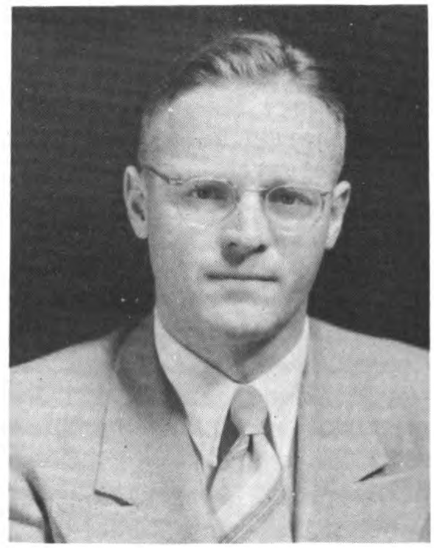
Ft. Churchill, which already has a large U.S. Army-Air Force installation, was chosen as the major launching site because a railroad provides easy transportation, and because it is on the edge of the Northern Auroral Zone. The latter is a key consideration because the Aerobee research will be directed especially to the aurora and to the ionosphere and solar radiations in the auroral zone. However, the rockets will also be instrumented to obtain data on cosmic rays, temperature and pressure, and high-altitude winds.



Dr. E. R. Piore

The Rockoon launchings off the coast of Southern California will support a project of NRL's Optics Division. They are particularly interested in obtaining upper-atmospheric data on solar ultra-violet and X-ray emissions during solar flares.

It should be emphasized that none of the projects mentioned represent "new" research. The Naval Observatory's solar and longitude and latitude observations and measurements are continuing programs, and NRL has been carrying on upper-atmosphere sounding flights since 1946. Both agencies were planning to continue these programs through 1957-58 anyway. The only changes contemplated because of IGY are a stepping-up and a realignment to co-operate with the international effort. For instance, NRL will fire more rockets than planned, and will fire some of them at Ft. Churchill and elsewhere rather than at White Sands.



Dr. H. E. Newell, Jr.

The same thing will be true of other Navy-supported programs. ONR and other naval agencies already have scores of research projects in geophysics. Undoubtedly many of the investigators will fit their work into the IGY schedule in 1957-58. Some will use existing facilities and stations and require no extra funds. In other cases extra manpower or travel money or instrumentation will be needed.

Finally, it must be pointed out that the beginning of the International Geophysical Year is still two and a half years away. The broad outlines of the Navy's participation have been established but doubtless many changes will be made in specific plans before the agenda becomes firm.

Simulating the "Complex Sea State"

At Colorado A&M College, a device is being used to achieve simple and complex seas for the purpose of studying the behavior of seaplanes. The Navy is sponsoring these investigations, which follow the familiar technique of using models and making motion pictures of the manner in which this miniature ocean behaves in simulated conditions of the open sea.

A circular tank is the basic equipment with two wave machines installed to operate simultaneously or independently. The towing apparatus may be placed anywhere on the tank's periphery. If the two wave machines are operated simultaneously, the wave trains intersect and thus produce a "complex" sea. The motion pictures taken during the course of the experiments reveal how the model seaplanes have acted, and determinations can be made of the characteristics of yaw, pitch, rise, and roll.

The ATKA Antarctic Expedition

The Navy's participation in the forthcoming International Geophysical Year has already begun. Last December 1 the icebreaker USS ATKA(AGB3) set sail from Boston and will soon be engaged in an extensive cruise in Antarctic waters at the order of President Eisenhower. Part of its mission is to do reconnaissance preliminary to the establishment of three Antarctic bases to be manned by the United States. These will be among the 21 odd bases from which the IGY teams of six or more nations will operate. Eleven or more of them will be on the continent of Antarctic and the rest on peripheral islands.

The ATKA will also carry on various scientific and supporting projects during the cruise. One of these will be an investigation of whistling atmospherics, those capricious audiofrequency radio pulses of undetermined origin that are often detected in the temperate zones. They have not been noted as yet in equatorial and polar regions—in fact, one important hypothesis regarding their origin requires that they be scarce in these areas.

This theory holds that "whistlers" are waves radiated from lightning strokes. The ionosphere, owing to magnetoionic phenomena, is doubly refracting, and the wave is split into an ordinary and an extraordinary ray, one of which is lost into space and the other propagated along the lines of the earth's magnetic field, across the magnetic equator, and into the other hemisphere, finally arriving at the ground as a dispersed wave train. (Since the velocity varies with the frequency, the pulse is dispersed into its component frequencies as it travels through the ionosphere). Some of these waves are thought to be reflected from the ground and to retrace their paths approximately to their point of origin; when they arrive, they have undergone double dispersion and are thus about twice as long as the unreflected ones. These long whistlers have been detected.

It is easily seen from the foregoing that, if this theory is true, whistlers would be practically nonexistent at the magnetic equator, where the lines of the earth's field are horizontal, and at the poles, where few thunderstorms, hence few lightning strokes, occur. Observations made by the personnel of the ATKA expedition may provide important clues to the nature of this mysterious phenomenon. They will be made simultaneously with similar observations at five "conjugate points" in the Northern Hemisphere: Stanford, Seattle, Boulder, Hanover (N. H.) and Washington. The results may be of considerable scientific value in future investigations such as, for example, an investigation of the properties of the atmosphere above the F_2 ionospheric layer. As we to to press, dispatches from the ATKA indicate they are already getting significant data on the whistler problem.

Extensive cosmic-ray studies will be carried on by Dr. Keith Brian Fenton of the University of Chicago, an Australian citizen formerly associated with the National Research Council of Canada. Dr. Fenton is equipped with an excellent cosmic-ray intensity recording instrument which was transferred to the ATKA from the Canadian icebreaker LABRADOR. He has indicated that this apparatus will be kept in constant operation from Boston to Antarctica and back again. Thus the scientific world will, for the first time, be provided with a nearly unbroken line of cosmic-ray data recorded on the same apparatus from high northern to high southern latitudes. This information will be of very great value indeed.

Seismological observations will be made on the Antarctic continent and on the Ross Ice Shelf by Reverend Daniel Linehan, S. J., of Boston College. He is equipped with specially designed seismological instruments, and a supply of TNT for his use was taken on board at Panama.

In cooperation with the Weather Bureau, the Navy has augmented the ATKA's aerological staff so that hourly, rather than three-hourly surface observations can be made. Moreover, two radiosonde observations will be made daily.

The 269-foot, 5,000-ton ATKA was originally commissioned by the Coast Guard as the U.S.S. SOUTHWIND. Under the lend-lease plan she served the Soviet Union for four and a half years as the ADMIRAL MAKAROV. Her present assignment adds a new chapter to her colorful ten-year career.

The skipper, CDR Glen Jacobsen of Seattle, and his crew were given a "Godspeed" by Admiral Byrd, officially representing the Secretary of the Navy. The Commander's previous experience in the polar regions was in the Arctic last summer. Several of the other men are old Antarctic hands, having accompanied Byrd on one or more polar expeditions. Among them are: Navigation Officer LCDR Frank Woodke, cold-weather equipment-testing specialist MAJ Murray Wiener, USAF, and Army civilian electronics engineer Amory H. Waite. Other naval scientific personnel on board are: oceanographer Dr. Willis L. Tressler and cartographers Charles Culkins and Charles Williams of the Naval Hydrographic Office, and LT Earl H. Moser, USNR, of BuY D. Although unable to send any personnel, BuShips contributed a list of items to be studied, and the results may provide a basis for BuShips participation in future expeditions. The Marine Corps is represented by LTCOL Eugene H. Strayhorn, the Air Force (in addition to MAJ Wiener) by Mr. Norman Bright, the Geological Survey by Mr. William E. Davies, and the Weather Bureau by Mr. Paul A. Humphrey and Mr. George R. Toney, Jr. The total complement consists of fourteen observer-passengers, including the scientists and press representative Walter Sullivan of the New York Times, in addition to the officers and enlisted men of the vessel.

The ATKA carries basic supplies for a six months stay, although she is expected to return by April or May, and additional provisions ("dry stores") are sufficient to sustain the group for a year longer, should the need arise. Adequate cold-weather clothing is provided for all hands. For land penetrations anc close inspection of the seacoast, the ATKA is equipped with three Bell HTL-5 helicopters and two "snow weasels". Admiral Byrd's old camp at Little America is among the places scheduled for a visit.

The ATKA expedition and the subsequent IGY explorations will do much to enhance our limited knowledge of the increasingly important continent that Admiral Byrd has called an "unlimited reservoir for natural resources which are difficult to mine but which will be desperately needed as time goes on."

High-Altitude Balloon Flights

Over a period of several weeks in January, 1955, a series of balloon flights were launched in San Angelo, Texas. These were in continuation of the SKYHOOK program of cosmic-radiation research sponsored by the Office of Naval Research and the Atomic Energy Commission.

The huge SKYHOOK balloons, measuring up to 90 feet in diameter, carried about 150 pounds of apparatus for studying cosmic rays, the high-energy nuclear particles from outer space. The launchings at the Goodfellow Air Force Base were supervised by representatives of Winzen Research, Inc. of St. Paul, Minn. CDR John W. Sparkman, Jr., Office of Naval Research field representative, was in charge of the research experiments.

Upon the termination of the various flights, scientific instruments were parachuted down, and the plan for recovery enlisted the aid of cattlemen and ranchers living in the area. Scientific groups from the University of Minnesota, the University of Chicago, the State University of Iowa, and others were at the Goodfellow Air Force Base participating in the activity.

The work of piecing together the information collected, and evaluating it is now going forward. During the past eight years the Office of Naval Research has sponsored cosmic ray investigations at various latitudes from the equator to the North Pole in a continuing probe of the stratosphere to increase the Navy's understanding of cosmic radiation.

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The Individual vs the Team Attack in Medical Research

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Northwestern University
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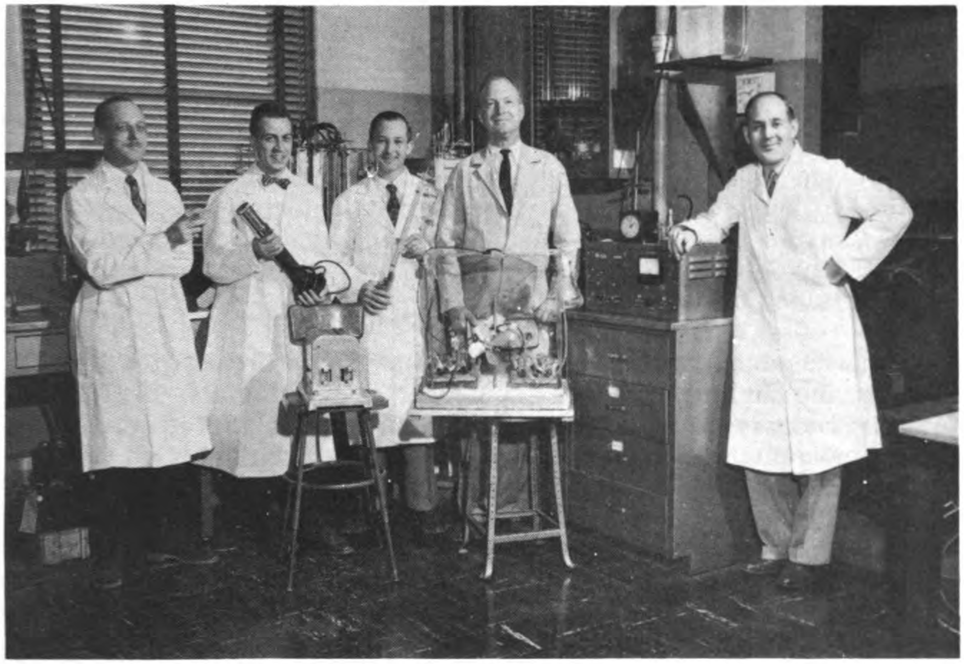
Medical problems have long excited the imagination of mankind and recent conquests in this field are so amazing we have come to expect the miraculous. Many of our therapeutic discoveries have come within the last quarter century: for example, the vitamins, insulin, sulfonamides, antibiotics, adrenocortical steroids and hormones. Many of the diseases which could only be diagnosed in 1925 were brought under control by 1950. Almost every one of these conquests was associated with the name of some single discoverer or pair of coworkers. Without this originality of the independent investigator there would be no medical research; the individual attack on disease problems has been, is, and will continue to be essential.

However, many complicated disease problems are beyond the reach of a single investigator and these can best be solved by the coordinated efforts of a team of men with different training, skills, intuitions, and "blind spots." Certainly the complex interrelations associated with the change from normal tissue growth to malignant tumors involve scientific disciplines of such diversity that no one person could possibly have mastery over them all. In the realm of physics, the release of atomic energy and the control of the chain reaction are classical examples of accomplishments made by teams of scientists working toward a common end. The U.S. Navy, during World War II, employed medical research teams to great advantage, as indeed it still does. In view of the interest in this kind of undertaking that will surely continue to exist, it would seem pertinent to examine some of the differences, tangible and otherwise, between the group techniques and those of the individual scientist.

In modern science, all creative work rests upon the discoveries of others. The researcher is first to recognize this and to call attention to the published works of his predecessors. To the casual observer, Einstein may appear to be a solitary thinker. Actually, he is a link, albeit an impressive one, in the long chain of men who, with patience and resolution, are gradually pushing back the frontier of ignorance. Timewise, he is a part of a team. But a team always receives its impetus from some original mind. For example, the use of Atomic Energy was—twelve short years ago—merely the ambitious dream of a few pioneers such as Enrico Fermi and Niels Bohr.

The usefulness of an individual investigator or of a research team is indicated by the results. Will the original mind left alone produce the results of many big teams or will a team of ten men produce in



A Typical Research Team--Drs. R. K. Jennings, J. W. Hahn, H. D. Slade, A. F. Coburn, and R. W. Schayer of the Rheumatic Fever Research Institute.

hundredfold what the components could have done individually? The answer to this question depends, in part at least, on the motivations of scientist, and the interaction of these motivations among closely associated laboratory workers. Relatively few really creative men seek merely financial gain or great honors through medical research. They are spurred on by intellectual curiosity—the successful medical researcher is a truly curious person—and, more potent than intellectual curiosity, the deep desire to bring healing which has ever characterized men in medical research. The physician, day after day, holds the hand of the departing spirit.

The world owes much to the conquests of the "impossible" by the solitary worker. But now comes the question: can conquests which cannot yet be made by the individual be made by groups of men closely coordinated? I believe that the answer is yes—but the barriers to success are much more numerous and more difficult to overcome. Nevertheless, the last half of the twentieth century may well be the period of team conquests. Already, our Government research teams and some of our great industrial research teams are not only developing, but are also making original discoveries which probably no individual could have made in his lifetime.

The nature of the attack on a disease must be determined by the nature of the problem. For more than half a century, the scientist has defined a disease problem and then set forth alone to solve it. This individual approach worked successfully against many of man's most lethal enemies, but not in all cases. Even though diphtheria and bacterial endocarditis were both caused by gram-positive bacteria, the problems they presented proved to be entirely different. Active immunization was effective in wiping out diphtheria but entirely ineffective in lowering the mortality rate from bacterial endocarditis. A new approach with antibiotics has placed bacterial endocarditis in the category of curable diseases. A quarter century ago, many of us entertained preconceived ideas on the conquest of subacute bacterial endocarditis; I venture to guess that no man foresaw that colonies of Streptococcus viridans in the heart valves would be eradicated by the product of a common mold—penicillin—made available by the collaborative efforts of chemists and biologists.

This is also true of our unsolved disease problems of 1955. For example, the challenge of primary cancer of the stomach may inspire the individual worker to develop an original approach or it may stimulate an individual worker to form a team of men with varied skills to explore many facets of this complex problem. The results of the individual's tactics or of the team's strategy may or may not be substantial. If, in either instance, success is attained, it will be because either the individual or the team has arrived at the basic character of the problem and has not attempted to shape the problem to a preconceived idea. In this regard, the team has one advantage over the individual; the team members will probably not all have the same blind spots or preconceived ideas.

Today, the individual worker in medical research is more than ever dependent on equipment, library facilities and close association with other laboratory workers. Furthermore, the man on a team who is worth his salt is indeed an independent investigator who has original ideas but who plans his tactics to fit in with an over-all team strategy. In the final analysis, the difference between individual and team attack may consist only in whether a tactic is employed by one person or an over-all strategy is put into effect by a closely coordinated group.

For many years I never saw or spoke with my collaborator, Dr. Edgar W. Todd of England. Yet, working 3,000 miles apart, we were able to contribute antistreptolysin O and antistreptolysin S. This could not have been accomplished by myself alone. Dr. Todd "pulled me up" most of the way. We had a limited objective, a tactic devised for two men working near London and New York. This was a perfect collaboration. This was not a team attack. Then, in 1945, Dr. Todd and I discussed comprehensive means whereby rheumatic disease might eventually be conquered. We would need equipment, supplies, and a closely coordinated group of men with the necessary assistants—in brief, a team attack. My concept of a team in research is a group of "mountain climbers" with their assistants, sharing one strategy, working closely together toward a common goal which may finally be reached by one or two of them.

The fact that some disease states have not been brought under control may well be an indication that the individual attack is not adequate and suitable for all medical problems. For example, the success of the Atomic Energy Commission's teams of scientists clearly shows that great accomplishments, far beyond the capacity of the individual, can result when men band together under the inspiration of a common scientific exploration. Perhaps only those who have actually worked alone and then worked on a team are in a position to evaluate the relative advantages of each approach. This is exemplified in my own experiences in the fight against rheumatic fever. Between 1925 and 1941 I was convinced that "he travels fastest who travels alone." To my way of thinking, it was essential to determine the factor of infection in the rheumatic state and to establish the accumulated evidence on a firm basis. This was done by a "task force" of three persons, physician, technician and nurse. In retrospect, it was a job for an individual who was free to devote himself fully to the adventure.

The second phase began in 1941 when I enjoyed a most happy year working with Dr. Rene Dubos at the Rockefeller Institute. It was then that I learned from Dr. Charles Lee Hoagland the importance of the full-time man in medical research. Intricate problems of disease mechanisms require more concentrated thinking and time than can be given by the physician who is responsible primarily for the teaching of medical students and the care of ward patients.

Then came World War II, and with it disease problems far too large for the scope of any one person. To attack streptococcal diseases, the U.S. Navy formed many teams of field investigators (Epidemiology Units) at points where recruits were trained, and established one team of clinical investigators at a hospital in California where large numbers of rheumatic fever patients were sent to convalesce. These teams were composed of rugged individualists with little in common; we were truly an odd lot of men. Nevertheless, it was soon apparent that, given a common objective and a cementing spirit, the men pooled their knowledge and attacked disease problems effectively. Subsequently, Epidemiology Unit Number 50 gave rise to the development of a team attack on exotic diseases in Egypt, an experiment probably unique in the peacetime history of the U.S. Navy (Research Reviews, June 1954). With not only the consent, but also the full cooperation of the Egyptian government, the American Navy was given a long-term lease on Egyptian land and the authority to establish a research unit in Cairo. This occurred in the summer of 1945, even though the emotions of nationalism were at feverish height throughout the Arab world. That this team attack on problems of tropical disease has subsequently proved to be a success is now widely recognized.

The third phase in my personal approach to disease problems began during World War II. The concept became a reality in January 1947 when Northwestern University established, as a department of its Medical School, the Rheumatic Fever Research Institute. Here, for the first time, I had the opportunity to share laboratory problems intimately with colleagues under one roof. I shall cite an example of what this privilege has meant to me personally. During World War II our Navy Epidemiology Units were confronted with the task of suppressing epidemics of streptococcal infections. It was apparent that we were dealing with microorganisms with great infectivity. One key research problem involved elucidation of the characteristic which made certain bacterial strains highly communicable. It was recognized that this problem required the collaborative effort of several men. This opinion was summarized: "The nexus between a host-bacterium interaction and the acquisition of communicability by the streptococcal cell can probably best be defined by the collaboration of the clinical epidemiologist, the student of bacterial metabolism and the enzyme chemist."

This problem of infectivity is now under attack at the Rheumatic Fever Research Institute by four of my associates and myself. The attack is being spearheaded by Dr. Hutton D. Slade, a man trained in bacterial metabolism, assisted by an immunologist, an isotope chemist, a biochemist and a clinical epidemiologist. Together, we five and our assistants are studying strains of Group-A hemolytic streptococcus which caused epidemics in the U.S. Navy and strains of the same serologic recruits. The ultimate objective is to determine what is the characteristic of the unusual strain of hemolytic streptococcus which makes it communicable. We are all of the opinion that no one of us can accomplish this alone. Together, we may at least obtain information which will lead eventually to the identification of the factor of infectivity. This is just one of the key problems in the rehumatic diseases, now being attacked by a team of men working in a close intellectual and spiritual association in an experimental model, The Rheumatic Fever Research Institute.

In summary, there is no substitute for the original, individual worker. Without his "divine spark" there will be no science. In the past, like the miner, he has attacked his medical problems alone, with "pick and shovel." But the problems of medical research now confronting us are more complex, and the answers are not so close to the surface. To get down deep, the individual worker must have a "diamond drill" and a team of colleagues. Nevertheless, each member of the team can still be an individual worker. In the language of the ornithologist, the difference is: instead of being forced to work as a "lone eagle," the investigator can now work in a "covey." This change of circumstances is an adaptation to the demands of our most pressing medical problems.

Staff of the Rheumatic Fever Research Institute

Flat TV Tubes for Instrument Flying

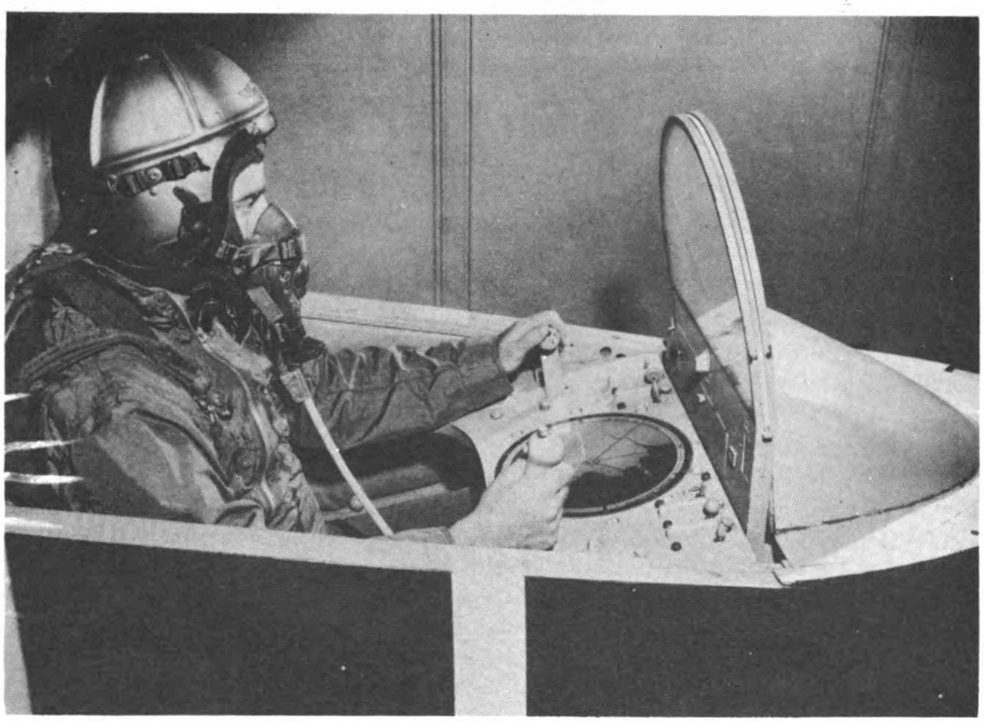
A radically different type of television tube which should permit drastic simplification of aircraft instruments and contribute to safer all-weather flying was shown to the airframe industry and the press last month. The occasion of the announcement was a meeting at the Douglas Aircraft Company's El Segundo, California plant to acquaint airframe representatives with the joint ONR-BuAer long-range aircraft instrumentation program.

Coordinated teamwork by the instrument and aircraft industries has produced significant advances in the Navy's aircraft instrumentation program. Douglas Aircraft Company, the prime contractor, has coordinated the program and assisted in promoting the exchange of ideas in this highly competitive industry. A major development in connection with this program was the development of a television tube which is a flat, transparent plate. A proprietary item of Willys Motors, Inc., it is still in the laboratory stage. One model of the tube, developed by the West Coast Electronics Division of Willys Motors, was adapted for Navy use by Willys.

This model of the tube is approximately the size and shape of a metropolitan city telephone book. It is approximately three inches thick as compared to the current standard television picture tube's 20 inches of depth. The tube consists of a phosphor screen sandwiched between glass plates. It functions by electronically exciting selected areas or spots on the phosphor screen. A very powerful focusing ability results in high definition and brightness. The compact, portable tube employs only electrostatic principles, which eliminate the necessity of using conventional magnetic components which are heavy, costly and require greater electrical power.

Development of the new tube is expected to result in an instrument panel consisting of only two basic instruments instead of the 30 or more now in use. Both instruments would be television picture tubes. One instrument would be a semi-circular plate mounted vertically and directly in front of the pilot. Because of its transparency it would not interfere with the pilot's vision during contact flight. Altitude, speed and attitude of the aircraft would be shown on this plate. Physical obstacles such as mountains, which the pilot sees in visual or contact flight, would be depicted artificially. This one instrument would inform the pilot the attitude of the aircraft about its three axes: pitch, roll and yaw.

The second instrument would consist of a round plate mounted below the first, just inside the cockpit rim. Broad physical features of the earth below would be depicted by analogy. The appearance would be somewhat similar to that of a radar map. This instrument would also show other information necessary for navigation or traffic control. By means of calibrations around the rim the number of miles to the pilot's



Mock-up of Aircraft Cockpit. Both the vertical screen and the circular display are flat TV Tubes, as described in the text. Pilot holds joystick in his right hand, throttle in his left.

base, fuel remaining and similar information would be shown in an easily readable and understandable manner.

Other instruments now necessary to determine fuel consumption, power settings and other data will be integrated into the two instruments. Because TV tubes are used, several items of information can be selectively superimposed in the same area, to be used as needed. The tubes would present an analogy of the visual world the pilot would see if he were flying in clear weather. Thus he would have a more readily understood picture of the visible world than the dials and pointers of present instruments give.

Still another aim of the Navy's long-range aircraft instrumentation program is to reduce the control system to two basic controls: a control stick and a throttle. Six switches would be used to select specific types of information needed for take-off, landing, traffic control and other specific situations. The ultimate goal of the joint program of the Office of Naval Research and the Bureau of Aeronautics is the ability to fly by instruments at least as well as by visual flight. Its aims are to discover the proper way to present information and to devise fool-proof equipment to reduce instrument training time and to increase flight safety. This program might conceivably reduce instrument training time by 75 percent.

Simulation of actual flight conditions is a new concept in aircraft instrumentation. It is the result of research in human engineering, the science of adapting the machine to the capabilities of its human operator. First, the information a pilot actually needs to fly an airplane had to be determined. Then display requirements were devised which took into account the pilot's senses of sight, hearing and touch. Several years of research were required to determine how instruments could be adapted to the human sensory system as well as the speed and amount of information an individual can assimilate and coordinate.

With these human capacities and limitations as a background, technical requirements for a new type of display system were devised. They are now being engineered into a unified system. The basic idea of this new system is to require the least number of mental computations by the pilot. It should reduce pilot errors due to misreading the instruments or miscalculating the information.

Douglas Aircraft Company has constructed a mock-up of an aircraft cockpit with completely integrated instrumentation for carrier all-weather flight. It was designed in accordance with specifications established by the Bureau of Aeronautics and the Office of Naval Research.

The Navy expects that the first experimental aircraft using this instrument and control system will be flown about 1958. As components are developed, however, they will be incorporated in existing and new aircraft. The first interim instrument panel of this program will soon be installed in aircraft in production. The first simplified panel to be developed is now being tested. It has relatively conventional displays but fewer instruments than present panels and integration of the information has been definitely improved.

The Earth Photographed . . . .

Figure 1. The photograph shown is a composite of two photos, one from 155 and one from 138 miles altitude. The earth's curved surface fades to a horizon 1,085 miles away. The distance along the horizon is 1,036 miles. Superimposed on an outline map of the Western states and Mexico is a shaded area that shows the extent of the photograph. Approximately 1/5 of United States has come under the seeing eye of an aircraft camera that uses film only 4 x 5 inches in size. Geographical features such as the Rio Grande valley can easily be identified; many other landmarks can be pinpointed by experienced air photo interpreters.

from 158 Miles Up

(TEXT ON FOLLOWING PAGE)

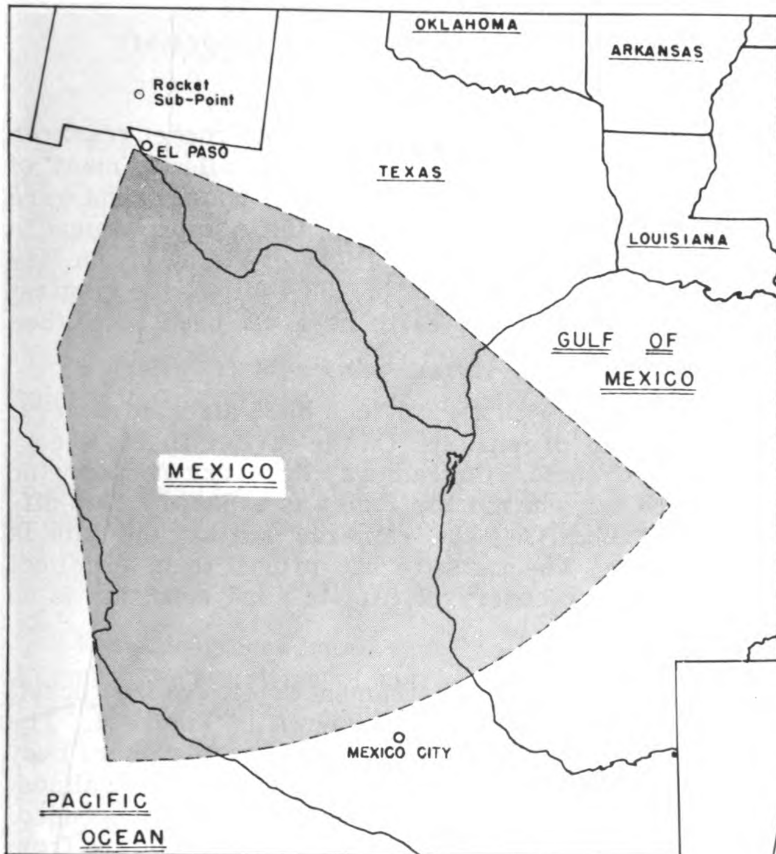


Figure 2. Extent of photographed area (shaded).

Figure 3. K-25 aircraft camera.

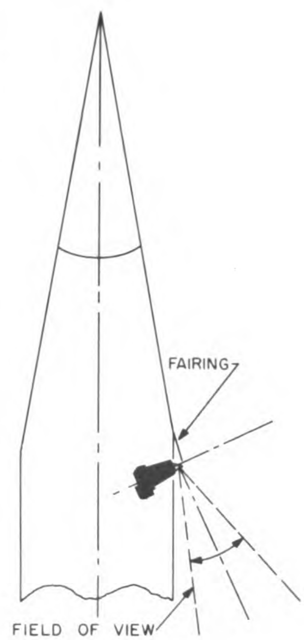


Figure 4. Method of installing camera with a right angle prism to achieve maximum field of view.

How the Pictures Were Taken

R. C. Baumann and L. Winkler
Rocket Development Branch, Naval Research Laboratory

Since the Naval Research Laboratory began its rocket research program about eight years ago, cameras have been installed in many of the rockets. The first reasonably good high altitude photographs were obtained on a V-2 rocket flight in April, 1947. Little improvement in definition or altitude was obtained until the flight of Viking 11, on May 24, 1954. This rocket reached an altitude of 158.4 miles, the greatest height from which photographs of the earth have yet been taken. (See inside back cover).

The pictures were taken with a 4 x 5-inch K-25 aircraft camera, Figure 3, the same type used previously. On the earlier flights sheet-metal housings were built to enclose the camera. Recovery was poor; the case frequently opened on impact and the film was exposed. This difficulty was overcome by modifying the cameras so that the film is wound into a steel cassette. The cassette has proved to be excellent protection for the film, and recovery of film in good condition is no longer the big problem it used to be.

The camera was installed in the instrument section of the rocket, approximately twelve feet from the tip, as shown in Figure 4. The camera was fitted with a right angle prism so that the camera body would not protrude beyond the rocket skin, even though the earth, almost directly below the rocket, was in the field of view as the rocket ascended. The axis of the camera was inclined twenty-four degrees upward from the horizontal so that the rocket body would not appear in the pictures. The camera was oriented in direction so that it pointed south southwest at takeoff.

The rocket rose vertically from its launching platform and shortly after was inclined to the north. Its fuel burned out 104.7 seconds after takeoff at an altitude of 37 miles. From the time it was launched until slightly past peak, a carefully designed stabilization system reduced the pitch and roll to a few degrees. Then, at 331.8 seconds, steam control jets in the body of the rocket were turned on. They caused the rocket to rotate slowly, so that 19 seconds later, when the nose was separated from the afterbody, the nose was pointing toward the earth. After separation, the motion of the afterbody (which carried the camera) was uncontrolled, and its gyration was unpredictable.

The impact of the section containing the camera was unusually gentle. The only damage to the camera was a chipped prism and one slightly bent shaft. It was in operating condition when recovered; in fact, since the bent shaft has been replaced, the camera is considered suitable for another flight.

Another picture of the earth taken during the flight of the Viking 11 is shown on the inside back cover.

Marine Borer Research

Thomas R. Sweeney

Protective Coatings Branch, Chemistry Division,
U. S. Naval Research Laboratory

For centuries efforts have been made by people who follow the sea to protect wooden structures that come into contact with salt water from the attacks of marine borers. Perhaps the earliest attempts were those of the Phoenicians and Trojans who put sheaths of lead on those parts of their galleys that experience had shown were weakened by the boring activities of marine animals.

Scientists studying the marine borer in more modern times have isolated and described several hundred species which vary greatly in appearance and other characteristics. Borers have been found in coastal waters all over the world, and their attack on marine timbers and other wooden structures exposed to salt water runs into a damage that can be measured only in multi-millions. An estimate of something like fifty million dollars is advanced as the borer damage in 1954 to docks and facilities in the United States alone.

It has long been known that creosote is the best agent so far found to combat the activities of marine borers. Also it is known that many preservatives that are highly toxic to wood-destroying fungi and insects have little or no effect in the protection of wood against marine borers. In the use of creosote as a preservative for marine timbers, particularly heavy concentrations are needed to repel the borers and to compensate for the depletion of the creosote through leaching or washing.

NRL WORK ON MARINE BORER CONTROL

While the Navy has been conducting investigations into many aspects of marine borer control, the segment concerned with the relationship between the chemical nature of creosote and its ability to protect wood has been going forward at the Naval Research Laboratory. In manufacture as a wood preservative, creosote is obtained by the distillation of high-temperature coal tar, and is the fraction collected in the range of about 200° to 400° C. Altogether, scientists have identified nearly 400 separate compounds from the products of coal carbonization, of which somewhat less than half fall within the distillation range of creosote. In addition, many more unidentified compounds also undoubtedly occur in creosote and when it is considered that some two dozen compounds account for about half the volume of this material its extreme complexity can be appreciated.

Since 1950 the investigation of creosote has been going ahead on a planned basis. The attack on the problem has been, basically, an attempt to gain a knowledge of the action of whole creosote by examining the action of its constituent parts. The mechanics of this attack involve a study of the fractionation of creosote by suitable chemical or physical means (for example, extraction with alkali, acid, and solvents and

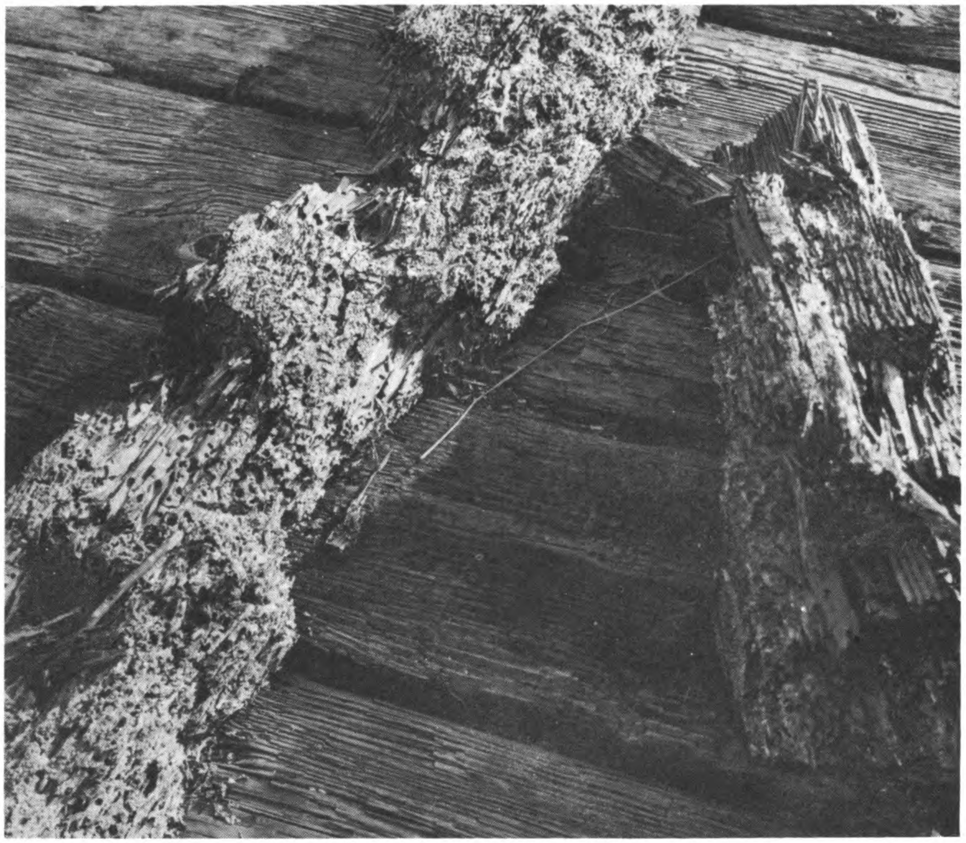


Figure 1 - Destruction of marine timbers at a seaplane ramp location, Guantanamo Bay, Cuba (1949). These timbers had been creosoted before being used in building the ramp, but in 15 months were reduced to a hopelessly weakened condition by vigorous attack from LIMNORIA and TEREDO. The long channel-like borings of TEREDO are frequently uncovered (as shown above) by the borings of LIMNORIA which characteristically work inward from the surface. The combined activity of borers such as these compound the deterioration and hasten the failure of marine timbers.

fractional distillation at reduced pressure) and determining the protective efficiency of the fractions so obtained. Examples of fractions studied include:

1. Whole creosote,
2. Creosote freed of tar acids,
3. Creosote freed of tar bases,
4. Creosote freed of both acids and bases,
5. Creosote fortified with each of six different distillation fractions of creosote,
6. Chlorinated creosote, and
7. Creosote fraction obtained by solvent extraction.

The determination of the protective value of a material requires much more than a simple pharmacological test for toxicity. It is relatively easy to dispatch a marine borer with any of hundreds of chemicals; it is difficult, however, to find a material that will remain at the desired site and retain its protective activity when submerged in the sea for a forty- to fifty-year period. Regardless of whether the protective action of a material is toxicological, mechanical or repellent, permanence is essential. Any test must reflect the ability of the preservative to resist leaching from wood.

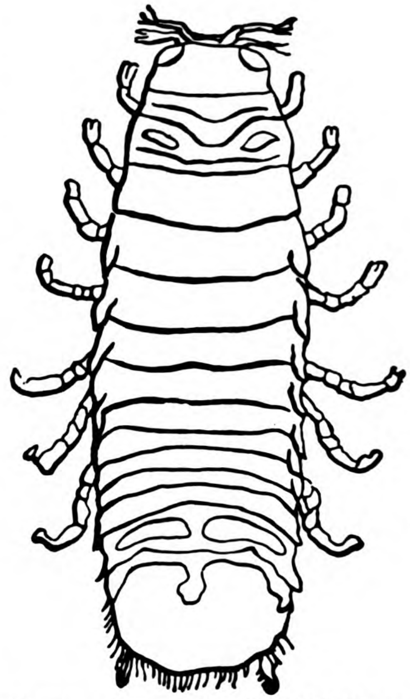


Figure 2 - The LIMNORIA or water flea (greatly enlarged here) can bore from the surface inward on a marine timber at a rate as high as one inch in a year. In some cases, an attacked 12-inch timber can be severed in six years.

Because the composition of creosote will vary somewhat from batch to batch, it was deemed necessary, in preparation for this study, to set aside a large quantity of the American Wood Preservers' Association Grade 1 creosote out of a single batch, so that all of the present and any future research could be conducted on the same material. This was done and the effectiveness of this "standard" creosote was established at the outset by comparison of the rate of marine borer attack on untreated wood with the rate of attack on wood impregnated with the "standard."

To measure the protective ability of creosote fractions and other materials, wooden panels are pressure impregnated to various retentions with the materials to be studied. For each material two sets of panels are prepared; one set is subjected to an accelerated leaching for 16 days in a water bath held at 80°C, to simulate an actual service leaching over a number of years. Both the leached and unleached sets of panels are then exposed to marine borer attack in the sea, the attack being rated periodically on an arbitrary scale.

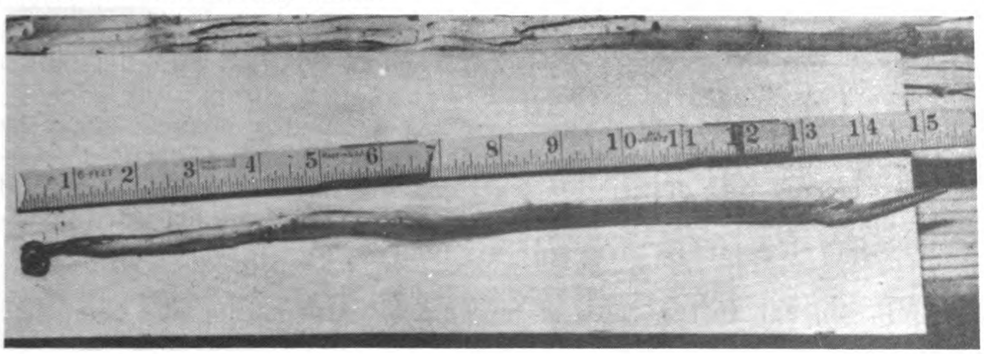


Figure 3 - This member of the TEREDINIDAE family of the borers, the BANKIA, grew to a length of 15 inches in Kodiak, Alaska. In warmer climates more to the liking of such borers, they sometimes reach three feet long in length.

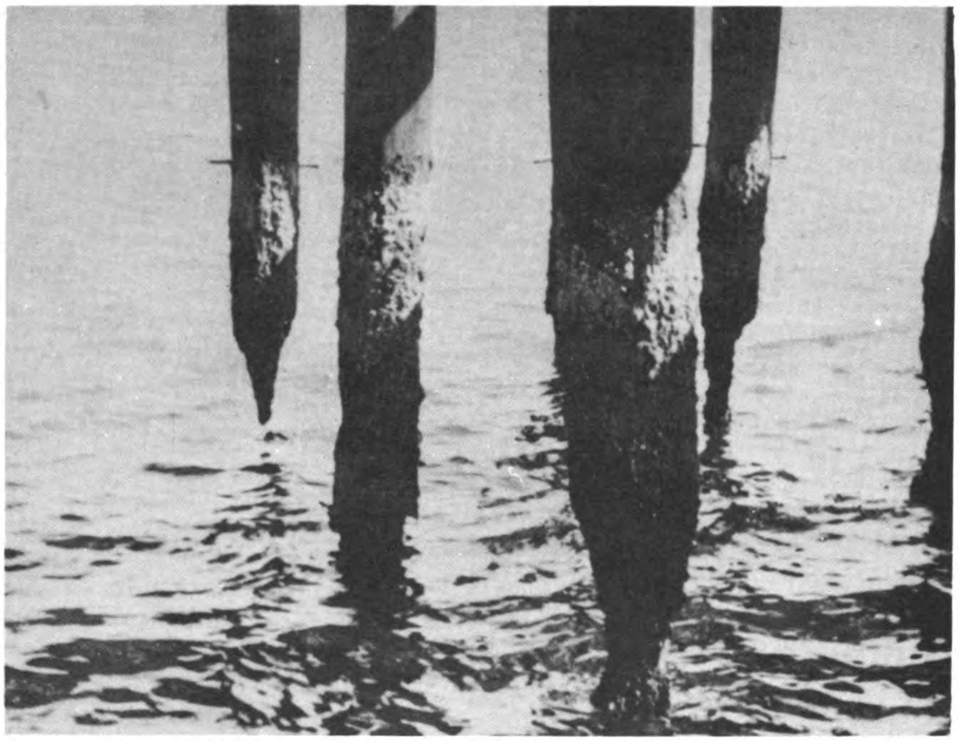


Figure 4 - The destruction of these marine timbers has the hour-glass appearance typical of LIMNORIA attack.

Results of the evaluations indicated that all of the fractions mentioned, as well as the fraction-fortified whole creosotes, conferred resistance to borer attack on the wood; the degree of resistance was a positive function of the concentration of the preservative in the wood. Before leaching it appeared that creosote freed of tar acids, creosote freed of tar bases, creosote freed of both tar acids and bases, and the solvent extraction fraction were all superior to whole creosote, whereas creosote fortified with distillation fractions 2 and 3, respectively, was inferior to whole creosote. After 16 days of accelerated leaching the solvent-extraction fraction and the creosote freed of tar acids still appeared superior to whole creosote; creosote fortified with distillation fraction 2 also appeared to be superior to whole creosote after leaching. The other materials tested after leaching seemed to possess about the same degree of resistance to attack as whole creosote. Fortified creosotes prepared with distillation fractions 4, 5, 6, and residue appeared to be about equally effective compared with each other; there were insufficient data to compare them with whole creosote.

In general, in the case of fungicides, chlorination of a compound seems to increase such toxicity as the compound already possesses but rarely imparts toxicity to a compound that is not in itself fungicidal to some extent. In considering the possibility that the chlorination of creosote would enhance its effectiveness against marine borers, it was realized that the economics of chlorination would make it feasible on a large scale. It was also possible that, considering the effect of chlorination on compounds of the type that occurs in creosote, the physical properties of the chlorinated material might be superior to whole creosote, e.g., it might have a higher boiling point, lower melting point, and decreased solubility. A possible disadvantage to the chlorinated material is that the chlorinated compounds may slowly hydrolyze in sea water. Chlorination of creosote to a chlorine content of 18.4 percent produced a material which appeared to be an effective preservative although no better than whole creosote. Because of the additional cost of producing chlorinated creosote, however, it cannot be considered as competitive with ordinary creosote for marine use.

By recovering pilings from the sea that have been in service for many years and extracting the residual preservative from them, it has been shown by distillation procedures and fungi toxicity tests that a differential leaching of creosote constituents has occurred; practically everything in the creosote boiling below 230°C had been leached away. A study is being made at the Laboratory to determine whether differential leaching occurs in the accelerated leaching procedure that is currently being used to determine the effectiveness of the various fractions of creosote. This is being done by periodically collecting the material being leached from treated panels, examining these fractions spectrophotometrically in the ultraviolet and infrared regions of the spectrum and, in addition, obtaining on these fractions average molecular weights, and distillation data. Results to date indicate a definite preferential leaching of various creosote constituents from the experimental panels.

The role of the tar acids (a mixture of phenolic compounds contained in creosote and amounting to about 5 percent by weight of creosote) in the preservation of timber by creosote has been the subject of much controversy. There has been no evidence obtained from the present studies that tar acids extractable from creosote with Claisen alkali are essential to its preservative action. On the contrary, they appear to have a deleterious effect.

Another phase of the problem concerned the question of whether wood impregnated with creosote would protect adjacent untreated wood against attacks by marine borers. This question was studied by sandwiching panels of untreated wood of varying widths between panels of treated wood and noting the intensity of attack on the untreated area during exposure in the ocean. For comparison, sandwiches were fabricated with wood treated with a copper-base antifouling paint and also with wood treated with gloss lacquer. Wood impregnated with creosote afforded little protection to adjacent untreated wood; the protection afforded by the copper-base antifouling paint was distinctly superior to that afforded by creosote.

NAVY PROGRAM ON WOOD BORER CONTROL

For some years the Bureau of Yards and Docks has been carrying on studies concerned with the damage caused by marine borers; reports exist that date back to 1907. The use of test panels to gather information was started on a systematic basis in 1922, and for many years the Clapp Laboratories of Duxbury, Mass. kept the research going on a scale somewhat less comprehensive than the original plan. Then in 1942, the technique of using test panels was given new support; the Bureau of Yards and Docks contracted with the Clapp Laboratories to analyze test panels maintained at 56 important harbor locations. Thus test-panel information started to come in from harbors as far away as Australia and New Zealand. The number of test-board sites has increased to about 400 and, in addition to the financial support of the Bureau of Yards and Docks, the research has the cooperation of several agencies of the U.S. Government, as well as many industrial concerns and various municipalities owning or operating marine installations.

The program of the Navy is going forward at this time to encompass:

1. Continuation of test-board studies and publication of findings on incidence, rate of attack, etc. of marine borers,

2. Study of the physiology of the TEREDO,

3. Investigation of the constituents of creosote by chemical and spectroscopic means,

4. Development of a bio-assay method for the evaluation of various preventative treatments,

5. Investigation of other wood preserving materials,

6. Preparation of an inspection manual,

7. Improvement of design methods, and

8. Promotion of annual meetings for those interested in marine borers, to stimulate interest and to exchange ideas and results of research.

The Marine Laboratory at the University of Miami has been supported by both the Bureau of Yards and Docks and by the Office of Naval Research in making detailed studies of the physiology of various marine borers. The program began in 1948 and is expected to continue for many years. A technique has been developed to raise borers in captivity, and thus to study various species as they go through the life cycle.

Another part of the Navy's program on marine borer control is located at the U.S. Naval Civil Engineering Research and Evaluation Laboratory, Port Hueneme, Calif. The two principal aspects under investigation are:

1. Study of the important and necessary factors in existing woods naturally resistant to marine borer attack,

2. Exploration of new and untried methods of preservation.

The laboratory also has marine borers under culture with the idea in mind that species found in the Port Hueneme area can be subjected to the same sort of scrutiny over a life cycle that has characterized the work at the Marine Laboratory, University of Miami.

Another contract of the Bureau of Yards and Docks is with the Battelle Memorial Institute, Columbus, Ohio. The objective is to develop gamma-radiographic pile-inspection equipment for use on underwater sections of marine piles. One of the problems is to eliminate the inherent danger to personnel which would be incurred in the use of x-ray equipment in underwater locations. Such equipment can be used to great advantage in making systematic inspections, lowering costs of maintenance and replacement, and creating a system of records that will be invaluable in coping with the marine borer problem.

The Navy's forward-looking policies in the field of marine borer research have been supplemented by independent activities of many industrial organizations dealing in paints, preservatives, and marine timbers. As results and improvements continue to pile up, there will be benefits not only to the Navy and National Defense, but to many others such as small boat owners, fishermen, and owners of waterfront structures.

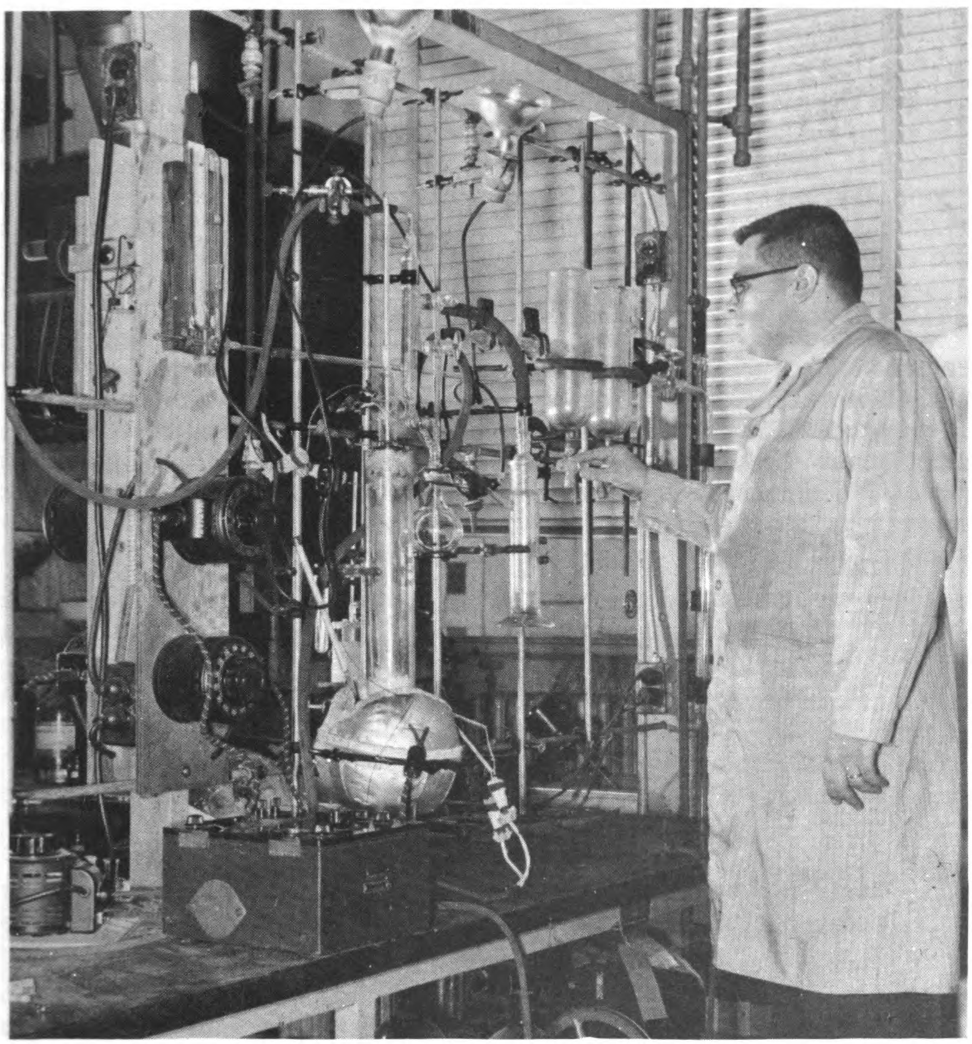


Figure 5 - Chemist G. R. Price adjusts stopcock on apparatus for the vacuum fractional distillation of creosote.

Research Notes

Scripps Granted Million Dollars for Oceanography

The Rockefeller Foundation last month granted $1,000,000 to the University of California for research at the Scripps Institution of Oceanography. The money is earmarked particularly for studies of the plant and animal resources of the sea—the same kind of research ONR has been supporting at Scripps and similar oceanographic facilities.

The grant will be expended over an eight-year period. It will be used to strengthen present research projects and initiate new ones. A visiting professorship and four resident professorships will be established, in addition to several graduate fellowships and post-doctoral fellowships. Plans also include improvements in laboratory equipment and facilities and greater use of the University's fleet of five ships for experimental work on marine plants and animals in the open sea far from land.

At La Jolla, Dr. Roger Revelle, Director of Scripps, said that there are two urgent reasons for intensifying research on the life of the sea. "In some respects, marine biology has lagged behind the other biological sciences. Because of advances in other fields, notably in genetics and chemistry, many problems are now ripe for solution; answers to these might be of greatest importance to biology as a whole. Life began in the sea and from the sea we may learn something about life's basic processes..."

"The second reason for more intense research is the increasing seriousness of the world food problem. This requires that every effort be made to expand the harvest of the sea. The oceans cover seven-tenths of the globe. They teem with living things, yet we draw on them for only a little over one percent of our food. To increase that percentage materially, fundamental research on the biological productivity of the sea is essential..."

The research problems that will be tackled will include: How do marine organisms synthesize into living matter the energy received from the sun? How do they grow and reproduce? What are the relationships between the manifold types of creatures living in the ocean? What determines fluctuations in the numbers of animals and plants, and how can the succession of forms prevailing in the course of a year or over longer periods of time be interpreted?

Optimascope

Electronic engineers at NRL have developed an optical imaging cathode-ray oscilloscope, or "Optimascope" for short. One possible application is a radar tracking scope upon which black-and-white or colored optical signals can be projected and—if need be—photographed.

The instrument uses a standard cathode-ray tube modified by mounting two small plane mirrors on the horizontal deflection-plate structure of the tube, at a 45-degree angle to the centerline of the electron-gun assembly. Thus optical images can be projected through the neck of the tube and be reflected onto the phosphor-coated inner surface of the tube face.

Possible military applications for the device, as seen by its developers, include:

1. Use of optical cursors with radar or sonar information or the use of electronic cursors with optically projected information;

2. Superimposition of photographs of ordinary or radar maps on raw video for navigation;

3. Use of a periscope and the Optimascope to project an optical picture of the visual space ahead of an airplane onto the active scope face—by this means a pilot could see ahead while he was tracking simultaneously through radar;

4. Use of very small instrument dials mounted behind the instrument panel around the base of a multimirror Optimascope—each dial might have its own sources of illumination so that the dials could be projected onto the tube face one at a time or all at once—it might be arranged that a given dial would be projected automatically whenever it registered a reading outside of a set tolerance limit;

5. Projection of scope moving pictures on the Optimascope for training purposes.

Underwater Physiology Symposium

Approximately one hundred scientists and naval officers were in Washington January 10 and 11 to attend a Symposium on Underwater Physiology. This first in-service symposium on the subject was sponsored jointly by the Office of Naval Research and the National Research Council.

Because of the increased importance of underwater swimming, it is necessary to utilize swimmers to the best possible advantage. As in any other new field, however, problems have developed. In an attempt to resolve some of these problems and to exchange ideas and information, the Office of Naval Research and the National Research Council brought together scientists who have worked on various aspects of underwater physiology.

Seminars followed by panel floor discussions were held on the problems of oxygen toxicity, and decompression and bends. These served to re-emphasize the persistance of the problems and to bring before the group possible approaches to their ultimate solution. It was clear that a greater effort on the part of both naval research facilities and civilian laboratories is necessary in order to overcome these and other physiological problems involved in free diving.

Most of the civilian scientists who attended the symposium saw the impressive facilities of the Experimental Diving Unit at the Naval Gun Factory for the first time and were impressed again with the importance of early solution of the problems of underwater swimmers and divers. As a result there have been some immediate requests for use of the facilities of the Experimental Diving Unit for investigative attacks on these matters. Such cooperative studies between civilian scientists and Navy laboratory personnel are regarded as one of the principal fruits of the symposium.

On the Research Reserves

Plastic-Coated Glass-Fiber Screening

LCDR James M. Osborn, USNR, a member of Research Reserve Co. W-1, is in charge of a project set up at the Army Engineer Research and Development Laboratory, Fort Belvoir, to find a better screening material for Army Barracks. Extensive tests have indicated that a plastic-coated glass-fiber fabric is probably the answer, not only for the Army but for all Armed Forces shore installations. These fabrics, which require no paint or shellac, have been tested under a wide variety of climatic conditions: Hurricanes in Florida, snow and icy winds in Canada, blistering sun in Arizona, rapidly changing heat and humidity at Fort Belvoir, Virginia, and steaming jungle in Central America. The jungle tests were conducted at the Naval Research Laboratory's tropical exposure site at Coco Solo in the Canal Zone.

The best of the fabrics have shown no slippage and very little discoloration after three years of normal exposure, and their life span may far exceed this period. Even areas severely burned by contact with lighted cigarettes—a hazard as endemic to GI window screens as doodling to restaurant tablecloths—have withstood a minimum of 16 months exposure to extremely adverse weather conditions. Under such conditions, ordinary screening materials have been known to fail in eight months time, even without the cigarette burns. This is especially true in seacoast areas, and, for this reason, the Navy stands to gain much through the use of the new materials, if the final evaluation is satisfactory.

The screens were found to withstand weekly washings with soap solutions, which were made necessary by the accumulation of soot from coal stoves, grease from mess halls, bird droppings, etc. Repeated dousings with water, coffee, and other liquids were found to produce regional changes in appearance but no apparent damage.

The more important features of plastic-coated glass-fiber screening may be summarized as follows: They require no paint, yet are corrosion resistant and will not stain frames and building walls; they have good dimensional stability, i.e., they do not bulge or stretch under normal conditions; they are lightweight (5 ounces per square yard), easily installed, and available in many colors; they are made of materials that are readily available in wartime, hence their use would conserve critical war materials; they are easily woven, requiring no special looms.

The presently known disadvantages are: The plastic coating burns or chars upon exposure to lighted cigarettes, and crickets are capable of chewing through the screening (a minor problem).

The new fabric was found by the army to withstand ordinary abuse satisfactorily; it is, of course, vulnerable to kicking and other violent treatment although it does have a higher burst strength than conventional screening. All in all, this new kind of screening appears to be markedly superior in many respects to conventional and all-plastic varieties, which have failed to meet the rigorous needs of the Armed Services. Naval interest, therefore, is invited.

Nine Companies Commended by Chief of Naval Personnel

The Chief of Naval Personnel has sent Letters of Commendation to Commanding Officers of Naval Reserve Research Companies which were evaluated as OUTSTANDING by the Commandants of Naval Districts for Fiscal Year 1954. Letters read that "This creditable showing could result only from noteworthy leadership on your part and from excellent cooperation and performance of duty by the personnel under your command. I commend your entire company for its excellence, and I send it a hearty 'well done'". Commendatory letters were received by the following Commanding Officers who served during Fiscal Year 1954.

CAPT Louis M. Smith	CO, NRRC 1-1
CDR Viktor Schreckengost	CO, NRRC 4-8
LT Keith H. Jacobson	CO, NRRC 5-4
LT James E. Land	CO, NRRC 6-2
CDR John F. Carruthers	CO, NRRC 8-5
LCDR Robert H. Shaw	CO, NRRC 9-5
CDR George V. Schliestett	CO, NRRC 11-2
CAPT George J. Higgins	CO, NRRC 12-8
CDR Albert V. Logan	CO, NRRC 13-5

Week End Conference for Commanding Officers

Official approval has been given for the Week End Conference of Commanding Officers of Naval Reserve Research Companies which will be conducted at the Office of Naval Research, Washington, D. C. on 7 and 8 May 1955. At this conference the mission, objectives, status, and plans of the Research Reserve will be reviewed with the Commanding Officers of the companies. The Bureau of Personnel has approved the granting of Active Duty for Training to Commanding Officers, or their representatives, for the conference in excess of any two-week period already performed. Long distance travel is approved on the basis that maximum use will be made of government air. Air lifts to accomplish this purpose are being requested from the Chief of Naval Air Reserve Training. Further information, including specific reporting instructions and the terminals for the air lifts, will be announced at an early date.

Program Officers Conference

Research Reserve Program Officers from the ONR Branch Offices and the Reserve Program Officer, Southeastern Area, will attend the annual Program Officers Conference at ONR, Washington on 5-6 May 1955. The Reserve Program Officers will remain to attend the Commanding Officers Week-end Conference on 7-8 May.

New Company Activated

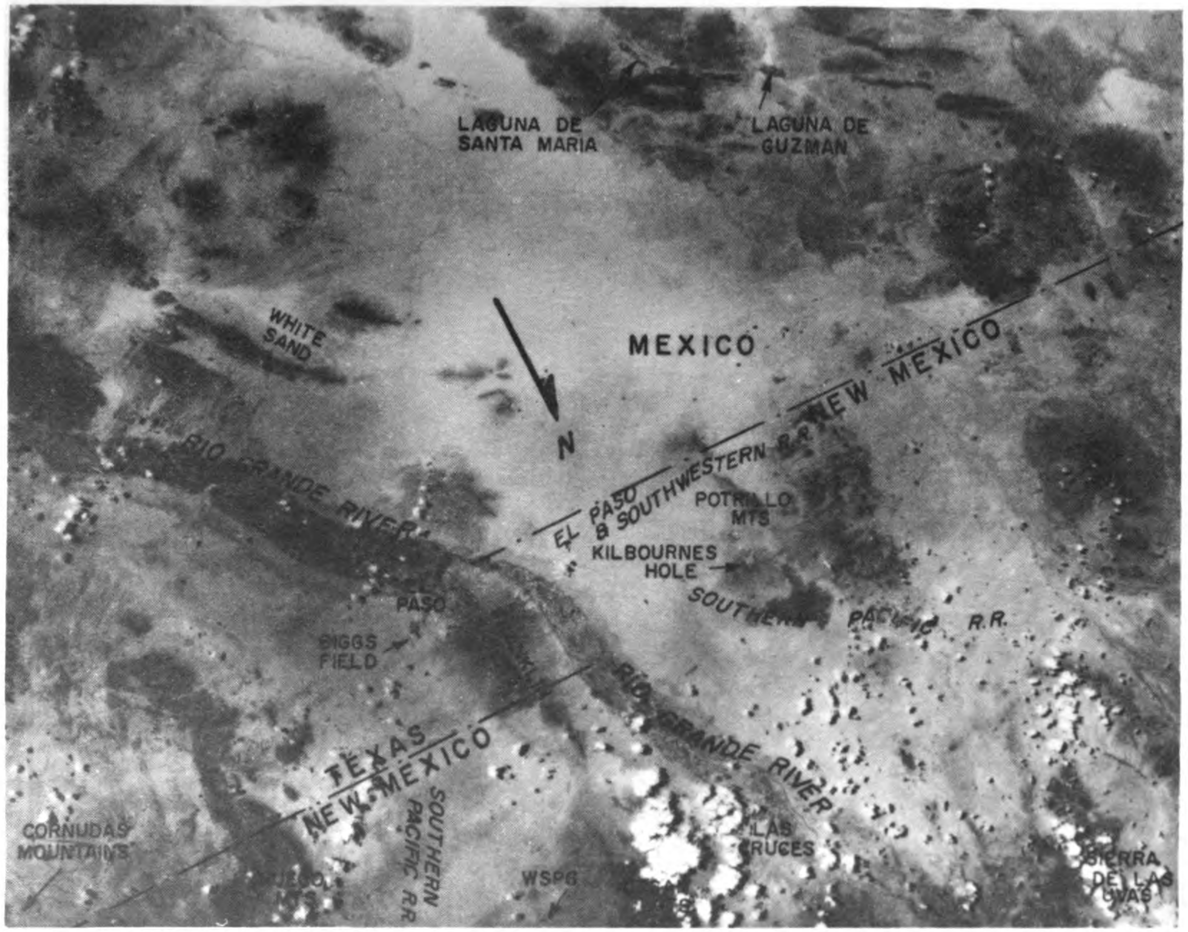
Naval Reserve Research Company 6-15, Fort Walton, Fla. was officially activated by the Commandant, Sixth Naval District as of 1 January 1955. The formal commissioning meeting is scheduled for 17 February 1955. CAPT Theodore Blanchard, USNR, Special Assistant to the Chief of Naval Research (Research Reserve) and LCDR J. T. Bedsole, USNR, Research Reserve Program Officer, Southeastern Area, will represent ONR at the commissioning. LCDR C. A. Buist, Jr., Program Officer in ComSix, will represent the Commandant.

Orders have been issued to seventeen reserve officers, most of whom are affiliated in scientific and technical capacities with the Air Proving Ground and Air Force Armament Center facilities in the Fort Walton area.

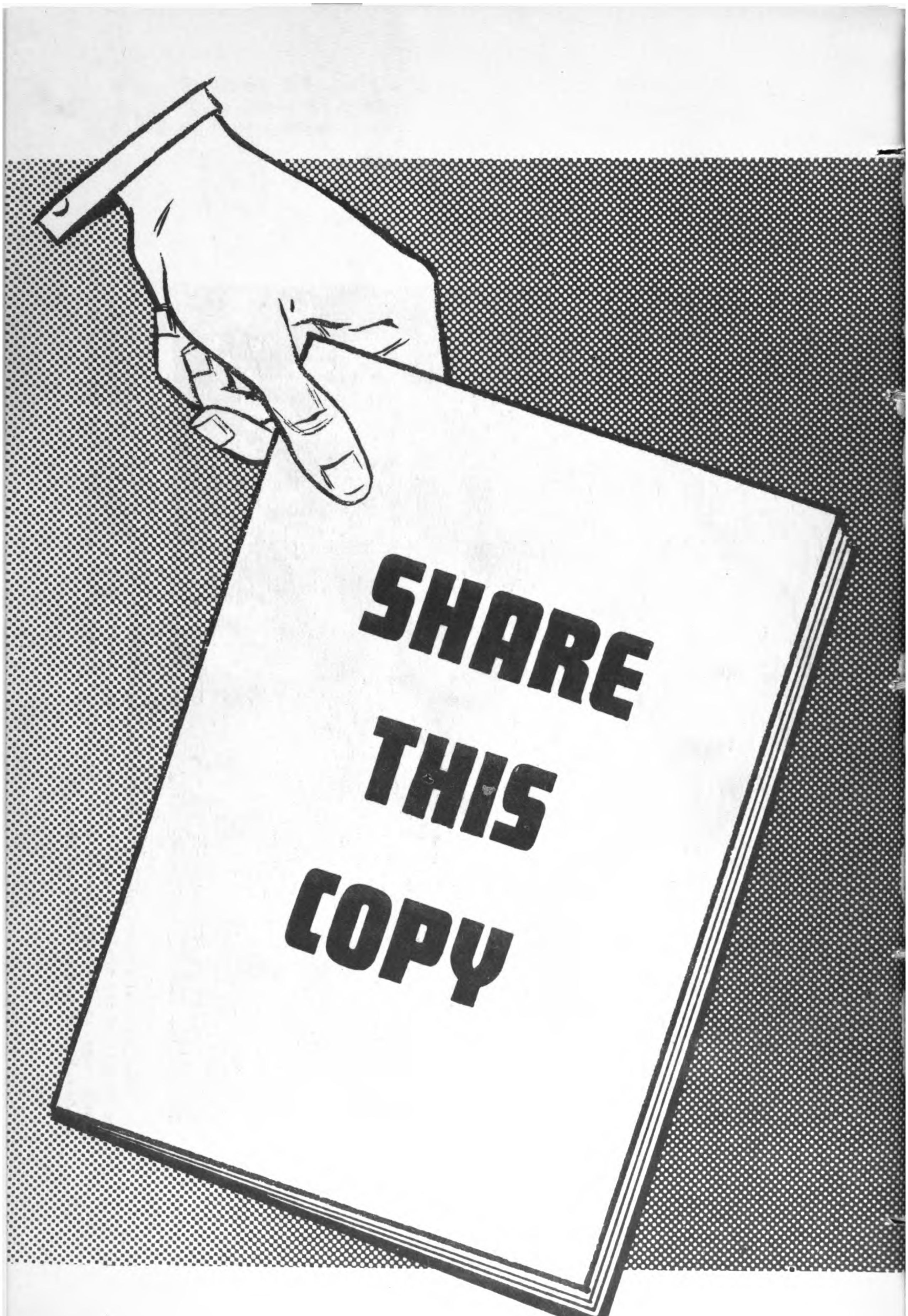
Retiring Company Commander Honored

A dress sword, scabbard, and belt being presented to CDR David S. Powell on the occasion of his retirement as Commanding Officer of NRRC 3-5, New Haven. The ceremony took place in the Hammond Metallurgical Laboratory at Yale, the Company's training headquarters. The officers were CDR J. C. Menzies, Exec., CDR K. I. Boone, CDR J. H. Goldman, the new CO, and CDR Powell.

U.S. GOVERNMENT PRINTING OFFICE : 1955 O - 330570



The highest known photograph ever taken of the earth, snapped as Viking 11 reached the Zenith of its trajectory, 158 miles up. The camera was pointing south. The only man-made objects distinguishable even on contact prints, were railroads and the runways of an Air Force base. More on page 16.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