Journal of the Minnesota Academy of Science

Volume 17 | Number 1 Article 14

4-1949

Abstract Papers

to the right appear farther away, those to the left appear nearer. The floor appears to slant left side up, right side down. Objects also appear distorted, and their apparent sizes change. To experience this false localization best, it is necessary to find surroundings where the empirical factors to spatial localization are not strong. The visual space can also be distorted when the lens is placed so as to magnify the retinal image in the vertical meridian, or meridional lenses can also be placed at symmetrically oblique meridians before the two eyes to give still another type of distorted space as perceived in stereoscopic vision. An overall magnifying lens before one eye, however, produced little or no spatial distortion because of the induced size effect phenomenon.

We have recently shown that with one exception these spatial distortions can be predicted on the basis of the geometry involved, the optics of the lens and the concept of image disparity.

The point of this rather over-simplified discussion is to show that stereoscopic spatial localization is effective as an entity over the entire binocular visual field and is not alone concerned with discrimination of differences in depth in the region about the fixation point.

MICROWAVE DEMONSTRATOR

WALDEMAR E. KLAMMER
State Teachers College, Mankato

ABSTRACT

The oscillator we use was built from surplus military radar cavities made available by General Electric for distribution to educational institutions. Complete instructions for conversion were prepared by Dr. C. L. Andrews, who did considerable work with this type of equipment while he was with General Electric. The cavity with a 2C40 "lighthouse" tube is a continuous wave oscillator with waves of 11 to 13 cm. The plate potential may be 250 volts a.c. or d.c. If a.c. potential is used, the radiated wave will be modulated with 60 cycles. We are using a transformer which will give either 250 or 295 volts. The latter is used for short periods only or the cavity becomes too warm. It serves to increase our output enough to give us better results on some demonstrations. The reflector we use was one from an old spotlight with the dipole set at the point of focus.

To study the field of radiation, we have an intensity meter. This consists of a microammeter equipped with a quarter-wave dipole antenna and a fixed silicon crystal detector. For accessories we use a double antenna arrangement for Young's experiment, Fresnel zone plates to show constructive interference, a polarizing grille, and a wave guide. The latter can be easily constructed by using small

stovepipe elbows or flexible metal tubing slightly larger than the dipoles. By changing the size and shape of the outlet end of the wave guide one can control the beam from a wide cone shape down to a sharp beam focus.

The continually expanding applications of microwaves to communications and industry would alone be sufficient cause to teach some theory about them in schools today. Microwave demonstration equipment is available which not only shows its application to radar, the ability to guide the beam around corners through wave guides, etc., but also, since a beam of quazioptical waves is radiated, is admirably suited to demonstration of the behavior of light waves. To be able to perform experiments on reflection, refraction, polarization, standing waves, and diffraction to a large group in a lighted room is certainly a boon to the teaching of science. We have found the demonstrations successful at the college level and many applicable to groups in the lower grade levels.

STRUCTURAL RELATIONSHIPS IN THE GOLD AND TUNGSTEN DEPOSITS, SUGARLOAF MINING DISTRICT, BOULDER COUNTY, COLORADO

RALPH L. LANGENHEIM
University of Minnesota, Minneapolis

ABSTRACT

A portion of the Sugarloaf mining district was mapped at two-hundred feet to the inch. All accessible mine workings were mapped at fifty feet to the inch. It was possible to obtain fine detail because the area had been thoroughly prospected.

The area studied lies along a two-mile segment of the Livingstone fault, in Black Tiger Gulch, six miles west of Boulder, Colorado. The fault strikes NW-SE and dips 87 degrees west. It is approximately forty miles long and is one of a series of major faults which dominates the structural framework of the Northern Front Range. A large diabase dike, the Iron Dike, almost parallels the Livingstone fault to the east, but is cut by it in the southern end of the map area. The Schoolhouse dike, a small limburgite body trending east-west, cuts across the Iron Dike but is offset by the Livingstone fault in the north end of the map area. This body has previously been considered younger than the Livingstone fault and associated with tungsten mineralization. All of these features, except the Schoolhouse dike, are offset by a series of minor faults striking approximately east-west and usually dipping north. In each case the north block is displaced to the west. Almost all of the gold telluride and ferberite ore produced

in the area is from veins in these faults. The country rock is Boulder Creek granite gneiss.

No appreciable amount of ore has been discovered more than 1,000 feet from the Livingstone fault. Very little ore is present in the Livingstone fault which is heavily silicified or filled with gouge. Ore is concentrated in small rich pockets in the cross veins by several different means. Some is produced from shoots confined to those portions of veins traversing diabase. Intersections between veins or between a vein and the Livingstone fault also serve to localize ore. Changes in dip or in strike of the vein are associated with other ore bodies. In each case ore has been concentrated where the configuration of the vein or the character of the wall rock has made open space available to ore bearing solutions. A chemical reaction may also have been operative in concentrating ore in the diabase.

It is concluded that ore is localized along the major faults within the district because these faults served as conduits for rising ore bearing solutions. As these solutions approached the level of deposition they were forced out of the major faults by plugs of earlier formed silicified breccia and gouge. The solutions then passed outward into the cross faults depositing ore minerals wherever openings occurred. The sequence of events within the map area during the Laramide disturbance is as follows: intrusion of Iron Dike diabase, intrusion of Schoolhouse limburgite, major faulting, barren quartz and pyrite mineralization, cross faulting, and gold and tungsten mineralization.

THE HEAVY COMPONENT OF PRIMARY COSMIC RAYS

PHYLLIS S. FREIER
University of Minnesota, Minneapolis

ABSTRACT

Photographic plates and cloud chambers sent up in free balloons to altitudes of 80,000 to 97,000 feet give evidence for the existence of heavy nuclei in the primary cosmic radiation. These nuclei have atomic numbers ranging from that of helium to those of the region around molybdenum. It appears that these heavy nuclei are present along with the more abundant hydrogen component (protons) in a ratio which is roughly that of their natural abundance in the universe.

Some of these heavy particles have energies in excess of 100 Bev. From them one should be able to learn more about high energy nuclear phenomena. They also give new data to be used in any theory of the origin of cosmic rays.

SOME INTERESTING LOW TEMPERATURE PHENOMENA

C. N. WALL
University of Minnesota, Minneapolis

THE SIGNIFICANCE OF EXPERIMENTS ON A SCATTERING OF NEUTRONS

GEORGE FREIER
University of Minnesota, Minneapolis

ABSTRACT

Early scattering experiments with charged particles led people to believe that the atom was composed of a small positively charged nucleus surrounded by electrons. The interaction between nuclei which produced the scattering was adequately explained in terms of a Coulomb law of point charges and Newtonian mechanics. However, in nuclear collisions which allowed charged particles to come very close together, the scattering showed many anomalies which implied that certain short range forces come into play in the immediate neighborhood of a nucleus. The anomalous scattering is due to a mixture of Coulomb forces and nuclear forces and therefore is difficult to interpret. Collisions between charged particles and neutrons allow only the nuclear forces to do the scattering. A study of the scattering of neutrons allows one to determine more precisely the nature of nuclear forces. A knowledge of these forces then allows one to explain how neutrons and protons can exist together in bound states as constituents of more complicated nuclei.

ORIGIN OF MINNESOTA LAKES

J. H. ZUMBERGE
University of Minnesota, Minneapolis

ABSTRACT

Most of Minnesota's lakes are directly or indirectly related to the late Wisconsin Stage of the Pleistocene. Lakes described are type lakes and no attempt is made to classify every one of the lakes in the state. Some of these type lakes are as follows: Deflation pits in outwash, drift dammed pre-glacial valleys, tributaries dammed by main stream, main stream dammed by tributaries, ice block pits (simple and complex), bed rock basins, and glacial lake remnants. All

lake types are not included in the above list but others will develop from subsequent work.

EXPERIMENTAL ACCESS TO THE NERVE MEMBRANE BY CONSIDERING THE NERVE A HIGH-LOSS COAXIAL TRANSMISSION LINE

OTTO H. SCHMITT AND PETER STEWART
University of Minnesota, Minneapolis

ABSTRACT

The general theory of transmission lines, first developed for long distance telephone lines and recently extended to cover the ultra high frequency cases met in radio and television developments, is now well worked out. This general theory is not directly applicable to studies of the nerve impulse because of the non-linear phenomena which accompany excitation. It is possible, however, to apply transmission line theory directly to the case where a nerve is subjected to subthreshold stimulation with sinusoidal currents. In this case the theory becomes enormously simplified because a nerve has negligible inductance and because losses are great enough to prevent reflection from the ends of the nerve.

Experimentally it is necessary only to measure the rate of attenuation and phase shift along the nerve to evaluate the quiescent capacitive and resistive constants of the inaccessible nerve membrane.

STUDIES RELATING TO THE MECHANISM OF THE REACTION OF OLEFINS WITH FORMALDEHYDE*

ALFRED T. BLOMQUIST
Cornell University, Ithaca, New York
and
MOSES PASSER
University of Minnesota, Duluth

* The authors are preparing a detailed account of this study to be published soon in one of the chemical journals.