ASTRONOMY

Study Arizona Crater

➤ THE METEORITE causing the world's largest meteoritic crater in Arizona probably hit the earth from a southwesterly direction.

When it struck, large quantities of meteoritic material were pitched forward to the positions where they are now found. These are the conclusions of Dr. John S. Rinehart of the Smithsonian Astrophysical Observatory and Harvard College Observatory, Cambridge, Mass.

His "highly reasonable" theory resulted from the most extensive survey yet made on the distribution of meteoritic debris around the crater. The Arizona meteorite crater is the world's largest crater known with certainty to have been caused by the smashing impact of a meteorite.

It is a large bowl-like depression lying in a sandy semi-arid region of northern Arizona. In outline, the crater is a rough square, about 4,100 feet across and 600 feet deep, with an elevated rim rising 160 feet above the surrounding plain.

The crater has been well-known since 1870, and has been the object of numerous surveys since then.

Dr. Rinehart's survey was aimed at trying to fix the mass of the meteorite that made the crater and its direction of flight. Some 700 soil samples were collected and analyzed to find the distribution of the tiny bits of meteoritic material scattered for several miles around the crater.

He developed a new method for separating the strongly magnetic particles of meteoritic origin from the weakly magnetic ones of earthly origin. The 700 samples analyzed were taken from a grid, with the crater as its center, approximately 80 square miles. The locations were separated by about one-half a mile, and two samples, 20 feet apart, were taken at each location.

In addition, to study the vertical distribution of material, soil samples from every few inches along the wall of a hole driven to bedrock were taken at 25 locations.

After studying the distribution pattern, Dr. Rinehart concluded that the meteorite must have been almost completely shattered when it struck, with pieces weighing a thousand pounds downward. Whether a large mass still remains buried beneath the crater is unknown.

Science News Letter, March 1, 1958

NATURAL RESOURCES

Chemicals Kill Lampreys

➤ SIX CHEMICALS that kill sea lampreys, even in small doses, but do not seem to harm game fish have been discovered.

These chemicals should be even more effective in actual streams than they are when tested under laboratory conditions, three scientists suggest in *Science* (Feb. 14).

The sea lamprey is a predator living off other fish, to which it attaches with a sucker-like mouth, then rasps away the flesh with a circle of razor-sharp teeth. The sea lamprey invasion of the Great Lakes has whittled down the once heavy game fish catch to a mere trickle, and cost the fish industry untold millions.

Many methods have been tried and many more are being tested in the anti-lamprey campaign. The most promising one for immediate control is application of toxic chemicals while the sea lampreys are in the larval stage in inland streams and before they begin their existence as parasites.

Six mononitrophenols containing halogens have been found "significantly more toxic" to sea lamprey larvae than to fish or other water organisms. These chemicals are equally or more effective when used as sodium salts, it was found by Drs. Vernon C. Applegate and John H. Howell of the U. S. Fish and Wildlife Service, Rogers City, Mich., and Manning A. Smith of Bucknell University, Lewisburg, Pa.

In work supported in part by the Great Lakes Fishery Commission, they tested different concentrations of the chemicals in laboratory jars, using sea lamprey larvae and fingerlings of such game fish as rainbow trout, brown trout and bluegill sunfish. In every case a much higher concentration of the chemical was needed to kill ten percent of the fish than to kill all of the larvae, double or more the amount in most cases.

The scientists then constructed a running water runway in which natural stream conditions were duplicated and tested two of the compounds. These experiments showed the "toxic effects of each of the substances upon fishes seemed to be considerably less" than effects observed under laboratory-jar test conditions.

Some species of fishes used in the running water tests showed susceptibility to concentrations of chemical ranging from 20 to 40 parts per million. Yellow perch, white suckers and bullheads suffered significant mortalities at these higher concentrations.

In the lab tests, several of the compounds killed all the lamprey larvae in less than 45 minutes with no apparent harm to game fish exposed to the same concentrations for 24 hours.

At least six generations of larval sea lampreys live in the stream in which they are spawned before migrating to their parasite existence in the Great Lakes. With the present method of blocking streams with electrical barriers that kill or repel adults before they reach spawning grounds, as much as seven years may pass after all suitable streams are blocked before the lamprey population in a lake shows any marked decrease.

Science News Letter, March 1, 1958

● RADIO

Saturday, March 8, 1958 1:30-1:45 p.m., EST

"Adventures in Science" with Watson Davis, director of Science Service, over the CBS Radio network. Check your local CBS station.

Dr. Dean Roberts, executive director, The National Society for Crippled Children and Adults, the Easter Seal Society, will discuss "Aid for the Crippled."

GYRO BREAKTHROUGH—Gyroscopes, like the one being checked in the photograph by Speery Gyroscope Company engineer John Wilson, can be improved in performance more than 1000%, it is reported.

TECHNOLOGY

Develop Gyroscope With Virtually Perfect Accuracy

➤ GYROSCOPES with virtually perfect precision for extremely accurate guidance of missiles and aircraft have been developed by the Sperry Gyroscope Company, Great Neck, N. Y.

The high accuracies achieved by the gyros result from constant rotation of the ball bearings in the gimbals on which the gyro is suspended. Gyroscopes are devices with finely balanced spinning wheels that have an inherent ability to point continuously to a fixed position in space. They form the heart of virtually every shipboard and airborne navigation system, compass, bombing and fire control systems.

Used with computers and Doppler radars, which measure speed, gyros can provide for pinpoint navigation anywhere on earth without assistance from ground radio aids. Teamed with computers and accelerometers, gyros hold the key to navigation in outer space.

The principle of the new development is called Rotorace. In initial use, it has reduced random drift rate to a quarter of a degree per hour from the usual three or more degrees hourly.

Science News Letter, March 1, 1958