ASTRONOMY

Earth Bombarded Daily

Gigantic craters splashed out of the earth's surface by celestial bombs, hurtling at us from outer space. Most meteors burn, but some crash through.

By ANN EWING

➤ GIGANTIC CRATERS all over the world have been gouged by meteorites smashing into the earth's surface. More destructive than anything yet conceived by man, including the still theoretical fusion H-bomb, are the celestial "bombs" hurtling at us from outer space.

Meteors are small, astronomical bodies that flash across the sky. When these masses reach earth from outer space, they are called meteorites. Although about a million meteors flash into our atmosphere every day, only a very small number reach the ground.

Most of them are burned up high in the atmosphere, making beautiful displays of silent celestial fireworks—shooting stars. The most spectacular features of meteorites are the mammoth upheavals formed when massive ones crash into the earth.

It is now believed that most of this great mass of meteoric material disintegrates at the moment of impact, leaving only gaping scars in the earth's surface to show former existence. But it was once thought that the meteorite mass could be found buried deep in the ground under the crater site, a valuable, extra-terrestrial source of metals.

Over 100 meteorite craters, scattered at random over the world, have so far been identified. They range in size from more than two miles across down to small ones less than 30 feet across. There may be other large craters not yet identified, and there may well be many more small ones, whose "fingerprints" have been lost through the action of wind, rain and storm.

Since the study of meteorites gives us a clue to the make-up of the universe and to the relative distribution of elements, scientists eagerly examine the celestial fragments, whether they are found near the craters or in isolated spots.

The largest crater yet found, and definitely believed to have been caused by a meteorite, is the Chubb crater, located in the far northern corner of Quebec. If the massive missile had landed about 50 miles farther north, it would have made a spectacular splash in Hudson Bay, to be lost forever.

The meteor, however, crashed into the barren land of northern Canada, pushing up ripples in the granite rock as far as two miles from the crater's rim.

The 11,000-foot wide crater was spotted when F. W. Chubb, a Canadian prospector, noted a round lake on some aerial photographs he was studying. He called this unusual geological feature to the attention of Dr. Victor Ben Meen, director of the Royal Ontario Museum of Geology and Mineralogy.

In July, 1950, they explored the crater and this summer a larger, better equipped expedition spent three weeks exploring the site. Though no fragments of meteoric material were picked up at the site, magnetic instruments did detect an anomaly, indicating the presence of a huge chunk of iron—not normally found in those barren, granite lands. The surface of the crater's lake is 500 feet below the rim's top level.

Recognized 50 Years Ago

It was only a little over 50 years ago that people realized there is such a thing as a meteorite crater. This knowledge came from the study of Canyon Diablo, or Meteor Crater, at the outermost fringes of Arizona's Painted Desert.

Carved out in prehistoric times, this crater was first thought to be unique. Then, when other craters were discovered, it was thought to be biggest—and it was the largest known, until the discovery of the Chubb crater in Canada. Arizona's crater, however, still has one claim to uniqueness. It is easily accessible compared to the others.

The crater is approximately round, averaging about 4,000 feet in diameter and 570 feet in depth. Several thousand pieces of meteoritic iron, one of which weighs 1,014 pounds, have been found on the surrounding plain.

In western Australia is found the Wolf Creek Crater, observed from an aircraft in June 1947. From the air it looked like a huge bomb crater and was thought to be of meteoric origin. Only a few fragments, however, have been found in the vicinity. The crater is 150 feet deep, and 2,800 feet in diameter at the bottom of the hole.

The second meteorite crater to be discovered and identified as such is also in the United States. Located in Texas, it is known as the Odessa Crater. About 560 feet in diameter, it is quite large.

It is also quite ancient, for the crater itself is largely filled, its present depth being only about 15 feet. This crater and another smaller one of about the same age later found near it are the most weather-worn, and therefore probably the oldest, of all the craters yet found.

Near Henbury, in the center of Australia, a group of 13 meteor craters was

CHUBB CRATER—Dr. Victor Ben Meen (left), leader of the National Geographic Society-Royal Ontario Museum expedition, and Dr. I. W. Jones, chief of the Geological Surveys Branch of the Quebec Department of Mines stand on the rim of the two-mile-wide lake-filled scar of Chubb Crater.

discovered in 1931. Of these craters, 12 are roughly circular while the 13th and largest crater is oval. It is the only crater in the world of an elliptical shape so far definitely identified as of meteoritic origin. Scientists believe that it may have been caused by the simultaneous impact of two large bodies a short distance apart.

In the Rub'al Khali desert of Arabia are the Wabar Craters, their claim to distinction being that they were made in desert sand. Two separate craters have been mapped, with indications of two others, perhaps more, buried in the sand. In the shifting desert, it is difficult to tell how old these large depressions in the sand are. But they are evidently fairly recent, else they would have been long since obliterated.

Dumping Spots for Stones

Although discovery of meteoritic impact craters is quite recent, and many of them are in places not easily accessible without modern transportation, man has been living and cultivating fields among a group of them since "time immemorial." On the Baltic Island of Oesel, six of them were investigated and identified in the 1920's, although they were first described in 1827. More craters than the six now identified may belong to the group—these are the holes that have been considered by the nearby farmers as convenient dumping places for stones turned up when tilling their fields.

Twice in this century Siberia has been the scene of a meteoric fall—two "bombings" that would have resulted in more destruction than atomic bombs if the targets had been cities instead of relatively deserted areas.

On June 30, 1908, a great meteor swarm blazed over central Siberia and tore into the earth, destroying a large forest area. This was the first time that the formation of sizable meteor craters had been observed, although unfortunately no investigation of the fall was made until 1921.

Place of the fall was spotted from the devastated forests. Pine trees were felled with their tops pointing away from center for a distance of 37 miles. Several thousand square acres were laid waste.

The center of the fallen forest is near the southern limit of permanently frozen ground. In the muddy swamp are numerous round depressions—varying reports place their numbers from 10 to 200.

Second Siberian Meteorite

A few hundred miles from the port of Vladivostok is the Siberian village of Novopokrova. There on the morning of Feb. 12, 1947, a school teacher with admirable presence of mind noted down the time of a brilliant flash in the sky: "10h35m."

Searchers for this blazing meteorite found a series of more than 100 holes, in the Sikhotaalin Mountains, some of them 30 to 400 feet deep and as wide as 75 feet. These holes were scattered over a one-square-mile area that has been intensely studied by Russian scientists.

They believe that the "rain of iron" resulted from the breaking up of a large single mass within the earth's atmosphere. Before it broke into millions of pieces it is believed to have weighed a thousand tons and to have had a diameter of about 30 feet.

Shock Wave Devastation

After this mass broke up, each piece rushed through the air at a speed many times that of sound, carrying in front of it a shock wave of compressed air that did not have time to move aside from the projectile. It was these shock waves that produced the extensive devastation.

One queer geological feature in the United States, never yet satisfactorily explained, is the Carolina "Bays." They lie in the coastal region of Georgia, North and South Carolina, Virginia and Maryland—hundreds of shallow, elliptical depressions, many of them filled with peat bogs. Approximately half of them are more than a quarter of a mile long, and over 100 of them exceed a mile in length.

Although they are of generally oval shape, measurements have shown that the shape varies with the size, the larger being the more elliptical. These giant marks in the earth's surface have their long axes in nearly the same direction—northwest and southeast.

The Bays were formed at least 10,000 years ago, perhaps as long as 50,000 years ago. Although a few geologists attribute them to a shower of meteorites, the consensus is that they have an entirely different origin.

Science News Letter, December 1, 1951

Chipmunks retire to winter quarters earlier each fall than most hibernating *animals* but they awake from time to time to eat the food they stored in their burrows.

DENTISTRY

Four Ways to Ward Off Toothaches

➤ RESEARCHERS are struggling to find an easy way to prevent tooth decay with its consequent toll of aching and lost teeth. They hope to find a tasteless, decay-fighting chemical that could be put into food, as iodine is put into salt to prevent goiter. But until they find the right chemical, they advise the following four ways of reducing tooth decay:

1. Reduction of carbohydrate consumption, especially sugar. Evidence indicates that decay is started by acids resulting from the action of bacteria on carbohydrate foods in the mouth.

2. Removal of carbohydrates from the mouth by tooth brushing immediately after each meal. The decay activity takes place within 20 to 30 minutes after eating.

3. Strengthening the resistance of enamel to decay by the use of fluorides. This could be done by applying the fluoride to the tooth surface in the dental office or as a community activity by adding it to the drinking water. This has been undertaken in many communities as a public health measure by adding an optimal amount of fluoride—1.0 part per million—to the drinking water.

4. Use of urea, ammonia, chlorophyll or penicillin to augment the mouth's natural bacteria-fighting ability. Anti-bacterial substances are being thoroughly investigated in many research studies today in the hope of learning their effectiveness in the control of dental decay.

These methods were discussed on the University of Illinois' telephone refresher course for dentists.

Science News Letter, December 1, 1951