

ASTRONOMY

Cosmic Debris Bombs Earth

Interplanetary warfare has been going on for millions of years. In destructive power, this barrage beats every man-made weapon under the sun.

By **JAMES MELLEN**
Science Service Correspondent

➤ EVERY DAY millions of potential death dealers from outer space head for earth with murderous speed and precision, zooming through space to burst into our atmosphere—only to fizzle and spark into a multitude of flaming streaks.

Smugly, learned men contemplate a particularly brilliant specimen of these flaming streaks in the sky and record in their books another meteor.

Nature, in allowing mortals this smugness, has been kind. Against the incessant barrage of cosmic bombings, she has provided us with an armor tougher than the thickest steel. This armor we call air.

Meteors are believed to be the flying debris left by comets. When meteors run into earth in the course of their adventures in space, the earth's gravitation attracts them at speeds of eight to 50 miles per second—up to 3,500 times as fast as a cruising car.

Shadow-Casting Fireball

As these meteors pierce the 200-mile-thick cushion of air which is our atmosphere, they meet the formidable resistance of billions of molecules of gas every cubic inch. The strain is too great. The meteor disintegrates and, in a few seconds, nothing is left of an ordinary meteor but a trail of fire. If a meteor's trail is bright enough to cast a shadow, it is called a fireball.

Does this disappearance mean we are safe from the danger of meteoric bombardment? From ordinary meteors we are, but when a big one falls, and at least several hundred do fall every year, look out! Men have seen swarms of such big meteorites rock the earth; they have collected big hunks of meteorites; they have found huge gaping holes in the earth, called meteor craters.

Astronomers call the object in the sky a meteor; the meteor body when it reaches the earth, a meteorite.

In 1908, a central Siberian area of wooded shallow swamps was struck with such smashing fury that a great "pillar of fire" was visible to villagers for miles around. The ensuing rumble was heard over 600 miles away. Pressure waves in the atmosphere were recorded as far off as England. Nearby villages suffered the combined effects of an earthquake, tornado and flood.

When the first scientist to make any observations of the devastated area, Russian meteoriticist Dr. L. A. Kulik, arrived on

the scene about 18 years later, he found the scarred area full of large water-filled holes, the biggest of them 150 feet across.

From his observations and eye-witness accounts, he estimated that some 40,000 tons of meteoritic material in one great swarm had bombed the bleak Siberian swampland.

Although there are a few records of deaths due to meteorite falls since as early as 1511, this Siberian holocaust appears the best example yet known of the violence of cosmic forces come to earth.

Had the meteorites landed four hours, 37 minutes later, they would have scored a bull's eye on Leningrad, wiping out the city and its inhabitants as effectively as several hydrogen bombs.

Other cities have had close shaves, as the following newspaper headlines in recent years show:

"Meteor Big Enough to Destroy City Bursts Over Seattle."

"Pittsburgh Barely Missed Annihilation June 24, 1938."

"Early Morning Mystery Blast Rocks 6-State Eastern Area."

Cases of small meteorites observed to hit cars, house roofs or to land in bushes or



COSMIC FRAGMENT—From the amount of radium, helium and lead this fragment of the Canyon Diablo meteorite contains, scientists estimate its age as 100,000,000 years. It crashed to the earth, however, only in geologically recent time.

fields are quite common. The biggest known meteorite seen to fall landed in Arkansas on Feb. 17, 1930. It weighed 820 pounds. Other pieces found in the area weighed 80 pounds or less.

At a height of 10 miles, the meteorite was seen to break into three pieces. All were lost to view at a height of five miles. The big piece was found three weeks later in clay soil, where it had gouged a hole more than eight feet deep. The clay was scattered for 50 yards around.

Identification of Celestial Matter

When meteorites are not seen to fall, some speculation on their origin is involved. However, identification of celestial matter is not very difficult and can usually be made by studying its internal structure and chemical composition.

Meteorites fall roughly into two groups: the siderites, which are entirely composed of metal, mostly iron; and aerolites, which are largely stone. In-between meteorites, which are half metal and half stone, are siderolites.

The biggest known meteorite, which may have fallen long ago, weighs about 35 tons, and still lies where it was found in Hoba West, near Grootfontein, South Africa. It measures about ten by nine by three feet.

The next largest, only a little smaller than the Hoba West meteorite, was brought from Cape York, Greenland, to New York by Admiral Peary, and is now on display there in the Hayden Planetarium. Looking like polished steel, it is 92% iron and nearly eight percent nickel.

Origin of Giant Craters

Mystifying as meteorite specimens may be, probably nature's strangest "whodunits" are the 100-odd giant craters that man has found, usually by accident. These, fortunately, are found in out-of-the-way places. They are assumed to have been formed when great meteorites, or showers of them, hit earth.

Whether such meteorites just plowed into the earth with their huge mass settling underneath the holes they carved, or whether they exploded upon impact because of the great heat generated, thus sending out a "tidal wave" of air and shower of debris sufficient to form craters, has been a hotly debated question.

The latter theory is rapidly gaining ground, one reason being that large masses of meteorite have not been found underneath craters.

Canyon Diablo, in the outermost fringe of Arizona's painted desert, was discovered around 1890. Today it is known as Meteor Crater. It once had the reputation of being the world's largest imprint of celestial force,

but now its claim to being largest is being questioned.

The likely absence of a main mass, plus the fact that several million tons of meteorite would have fallen under the "plowing theory," lead scientists to think that a meteoritic explosion took place, hurling cosmic shrapnel over the desert.

"There is no main mass," meteorite expert Dr. H. H. Ninninger says.

The present record holder for the world's largest hole in the earth supposed to have been formed by crashing meteorites is Chubb Crater in northernmost Quebec. It is an immense, round-rimmed lake in a bed of impacted subarctic granite.

The circumference of the granite rims is 6.8 miles, that of the lake shoreline, 5.4 miles. The almost perfectly circular lake has a maximum depth of 825 feet, and its surface is 500 feet below the top level of the rim.

Canadian geologist Dr. Victor Ben Meen, has studied the crater, has not found any meteoritic specimens there, although magnetic instruments indicate the possibility of a big chunk of iron lying below the lake.

Definite proof of its meteoritic origin is lacking, but if this origin is denied, an extreme geological phenomenon is required to explain how 10,000,000,000 tons of rock were gouged out of the face of the earth, to be replaced by a mammoth water-filled basin.

Dr. Meen has said that if a meteoritic body similar to that which could have caused Chubb Crater were to strike Manhattan Island, "the city would be torn from the earth and life would be eliminated within a radius of 100 miles by the shock waves; the crust of the earth would ripple like pond water."

The meteor swarm that missed Leningrad by a few hours was just a baby compared to what must have dropped over Arizona.

Yet in spite of these dire facts, this remains true: no single, man-afflicting catastrophe attributable to meteorites is on record. Very little of our globe is populated by man; three-quarters of it alone is water.

The chances for a thickly inhabited area to be bombed, therefore, are almost zero—something like one in 200,000,000 for New York, calculations have shown.

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MEDICINE

Diagnosing Polio

Accurate diagnosis of poliomyelitis is still extremely difficult, one reason being lack of a practical, reliable and inexpensive laboratory test for it.

➤ POLIO, IN spite of all the attention given to it by scientists and the public, continues to be "one of the most difficult of all diseases to diagnose accurately," Drs. Amos Christie and Randolph Batson of Nashville, Tenn., and Dr. Robert Britt of Evansville, Ind., state in the *Journal of the American Medical Association* (April 24).

One of the difficulties, they point out, is that there is no practical, reliable, inexpensive laboratory test for the disease which all physicians could make or have made.

The laboratory studies usually made need very cautious interpretation, the three doctors warn. Counts of white blood cells do not help much. The spinal fluid white cell count is of much more importance in diagnosing polio.

However, polio patients may have a normal white cell count in their spinal fluid. Protein in the spinal fluid is usually supposed to be elevated in polio, but at least a third of a series of patients the three doctors report on had normal protein values in the spinal fluid when admitted to the hospital.

The history and physical examination are important for diagnosing polio. About half of the patients with polio have a "prodrome," that is, a one- to three-day period of symptoms of a cold, stomach upset or slight rigidity of the neck. The polio patient gets over this and seems well for several days

before the start of the paralytic, feverish period.

One suspicious sign in polio is the way the patients keep their spine in a rigid, fixed position. If sitting in bed they usually take a "tripod" position with both arms bracing them in back. This sign, however, may be present in any condition that causes irritation of the covering membranes of the brain.

Patients with hysterical reactions due to "poliophobia," or fear of polio, usually have numbness in the arm or leg that shows false paralysis.

During one year, 140 patients with poliomyelitis were admitted to Vanderbilt Hospital, Nashville. Only 10% were diagnosed mistakenly, which the doctors consider a good record.

During the same year, 23 other patients were referred to the same hospital with a diagnosis of polio who actually had other diseases. The diseases that were mistakenly diagnosed as polio included meningococcal meningitis, brain tumor, tick typhus, and hysteria with "poliophobia."

Science News Letter, August 7, 1954


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