

bombardment of the meteorite in space by cosmic rays produces a network of radiation damaged material. The density of this network shows appreciable depth dependence and a measurement of this density in the recovered meteorite leads to an estimate of how much material overlaid that region when it was in space.

The photographic records of these meteorites are of paramount importance because from them the velocity of the meteorite and the luminosity of the fireballs may be calculated as a function of height. ReVelle and Rajan applied their theoretical model to the observed light and velocity profiles and, after introducing a few assumptions (such as that the radiation field was isotropic and that the mass of the main body at any specific moment is much larger than the mass of the associated fragments), they obtained a curve which showed how the luminous efficiency varies as a function of height in the atmosphere and as a function of meteorite velocity.

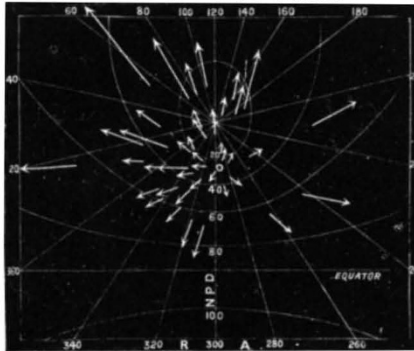
The authors compared their results with a low velocity laboratory simulation experiment carried out by Givens and Page (*J. geophys. Res.* 76, 1039; 1971). Here artificial meteors were produced by firing 0.6 mm stainless steel spheres with a light gas gun into a column of still air at 0.052 atmospheres of pressure. The resulting 'meteor' train was observed using a series of broad band multiplier phototube radiometers. The velocities of the spheres were about 8 km s⁻¹ in comparison to the Pribram meteorite which initially had a velocity of 21 km s⁻¹ and Lost City and Innisfree meteorites which had velocities about 14 km s⁻¹. When corrections were made for the velocity effect the results agreed very well.

The main conclusion of ReVelle and Rajan is that there is a phase lag between the ablation of meteoritic material and the emission of luminosity. The luminous efficiency was found to be a rather complicated function of the meteorite velocity. Also when the meteorites Lost City and Innisfree were losing mass at the maximum rate, the luminous efficiency in the visible wavelength region of the spectrum was about 0.3%. For the faster Pribram meteorite the value was about 0.04%. The authors adding the proviso that the Pribram results are regarded as being less reliable.

It is important to note that the 0.3% result is a factor of between 5 and 10 higher than the empirical luminous efficiency assumed by Cepelch and McCrosky (*J. geophys. Res.* 81, 6257; 1976) in their analysis of fireball trails. This means that even though only 3 parts in 1000 of the energy lost by a meteorite goes into visual radiation this is considerably more than was estimated previously. So, bright fireballs are now thought to be produced by smaller incident meteoroids and the total mass of cosmic material hitting the Earth in the fireball size range has to be revised downwards by a factor of 5 to 10. □



100 years ago
METEOR SHOWERS



Shower of Aquariads July 27-30th.

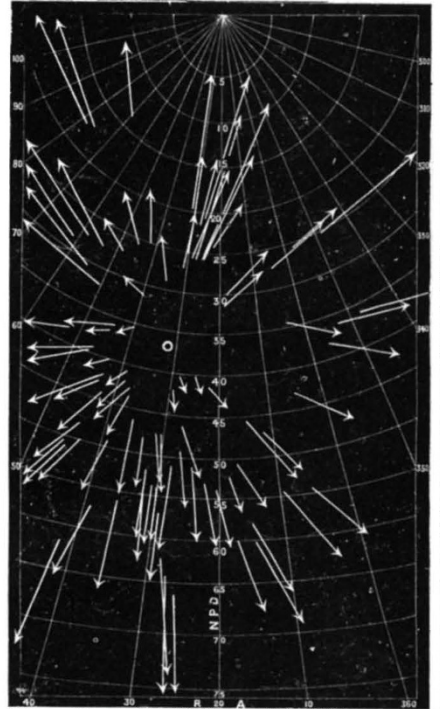
SEVERAL of the meteor streams observed at Bristol within the last two years appear to be of such marked intensity as to merit special description, and the following notes in connection with them may possess some interest to observers.

My observations in July, 1878, led me to recognise a large number of slow meteors with long paths (averaging 17°) and occasionally leaving faint trails of sparks, ascending amongst the stars of Pegasus, Andromeda, &c., which, by their parallelism of motion, obviously proceeded from a common radiant point south of Pegasus. I watched them narrowly, and determined the position with fair precision as near δ Aquarii.

A succession of clear nights occurred from July 26 to August 2 in 1878, and I obtained some lengthy observations. In about twenty-

two hours of watching more than 400 shooting stars were seen in the eastern sky, chiefly amongst the constellations of Perseus, Cassiopeia, and Andromeda. I saw many swift meteors leaving short streaks and otherwise exhibiting much uniformity in their appearances and directions. The radiant point was not reconcilable with that of the well-known annual shower of Perseids. It was sharply defined about 3°S. of the group χ Persei, and the maximum of the shower was witnessed on July 31, when 21 meteors were noted diverging from the point described.

Shower of Perseids II July 28-August 1st.



From *Nature* 21, 29 April, 621; 1880.

The Uninvited Guests

from Graham Darby

MOST people are no doubt unaware that they are accompanied through life by several herpes viruses lying dormant in the tissues of their bodies. The human herpes viruses have the characteristic of establishing long-term relationships with their hosts, emerging only infrequently to cause disease.

Since these viruses are ubiquitous in the population the first encounter between the infectious agent and its human host usually occurs early in life and results in an inapparent infection or rather mild disease. In the developed countries of the world this initial encounter often occurs later in life and, paradoxically, this delay may result in a more serious primary disease. Subsequently the viruses remain with us for life. There is little evidence that cytomegalovirus (CMV) or Epstein-Barr virus (EBV) usually cause further problems but both herpes simplex (HSV) and varicella-zoster (VSV) which establish latent infections in the peripheral nervous system may re-

emerge to cause recurrent episodes of disease. HSV type 1 causes periodic eruptions of cold sores around the mouth but these generally heal quickly and leave no scars. However, a closely related virus, HSV type 2, is more damaging as it usually infects the genital regions where it causes a painful and often socially embarrassing disease. Indeed, in some areas of the world it is emerging as the most common problem seen in V.D. clinics. VZV can remain latent for many years after childhood chicken pox but it too many reactivate, usually late in life, to cause shingles.

An overall view of our understanding of these agents and the diseases caused by them was provided by a meeting in Atlanta this Spring*. Both virologists and clinicians attended the meeting and the growing clinical importance of molecular biology was nicely demonstrated by B. Roizman

*An International Conference on Human Herpesviruses was held at Emory University, Atlanta, Georgia, U.S.A. from March 17th - 21st, 1980.