

news and views

REPORTS of unusual aerial phenomena always attract great interest, are surrounded by folklore and superstition and irritate scientists who find them hard to explain. By far the most common such reports concern luminous spherical or ellipsoidal objects which appear without warning, often move through the air erratically, and disappear without trace, sometimes explosively. Each year, hundreds of eye witness accounts of such events are reported to local newspapers, the police and even military authorities. Occasionally the accounts are published in scientific books and journals, and several have appeared in *Nature* in the past few years. When the events occur during adverse weather conditions they are often called ball lightning. The invention of a precise name is somewhat misleading because it suggests that these phenomena are well understood. They are not. Indeed, so puzzling and bizarre are the properties attributed to these luminous balls that many scientists have preferred to deny their existence.

For the theoretical physicist, the hardest thing to swallow is that the balls are often said to be encountered inside closed, or nearly closed, structures. One spectacular report appeared a few years ago of a luminous sphere moving down the inside of an all-metal aircraft in flight. More frequently, witnesses claim to observe ball lightning inside their own homes.

One particularly alarming account of such an event is described by M. Stenhoff of Royal Holloway College, London University, in this week's issue of *Nature* (page 596). The case is particularly intriguing because the single witness, a lady living in the English Midlands, was able to produce material evidence in support of her story. During the course of her unnerving experience, the witness claims she was struck full in the body by a blue sphere of light, which totally disintegrated her clothing at the centre of impact. The dress she wore has a hole several centimetres across. Surprisingly, she sustained little physical injury, complaining only of a burning sensation in her wedding ring when she instinctively brushed the object away.

Taken at face value, this report highlights the hazards surrounding the present lack of understanding about these phenomena. It is not at all clear, for example, that conventional light-

Ball lightning

from P. C. W. Davies

ning precautions are of any use against such things, or indeed that ball lightning actually has any direct connection with ordinary lightning. None of the several theories which has been proposed in recent years accounts for the properties of the luminous spheres completely satisfactorily. The most difficult part is to explain how they can remain coherent, stable and luminous for durations up to, apparently, some minutes. There is also the peculiar kinematic behaviour—in many cases the balls are said to move upwind, and even trail along beside aircraft travelling at several hundred m.p.h. through the air. Electrical explanations based on ionic recombination fail to explain the long lifetimes. Various plasma theories have been published, but run into problems of stability. Even nuclear theories have been tried. They would predict that the Midlands lady should be suffer-

ing from radiation sickness. Perhaps the most imaginative suggestion of all is that micrometeorites of antimatter are responsible!

One of the most promising theories is due to the Russian physicist Peter Kapitsa, who has proposed a model based on the existence of UHF electromagnetic waves produced by an ordinary lightning strike. A standing wave pattern could then be created under some circumstances, which might then ionise the air in the region of an antinode, thus producing a luminous patch which could be sustained in energy by the external field. This theory certainly accounts for many of the enigmatic properties of the luminous balls, but is not completely convincing. It seems likely that some nonlinear, coherent electromagnetic process which is still not understood is regularly taking place in the atmosphere.

As always with transient aerial phenomena, scientific progress is hampered by lack of precise observational data. Accounts often reflect the beliefs and perceptual distortions of the witnesses. In addition, the usual unreliability of the human memory for accurately recalling details of speeds, sizes, durations and so on makes any theorising based on random narrative evidence from the general public particularly risky.

The present unsatisfactory situation would be greatly improved if the aura of mystery and superstition surrounding unusual aerial events were dispelled. Good, detailed eye-witness reports of luminous balls are frequently made by competent observers such as airline pilots, but are rarely passed onto scientists. Instead many of them find their way into military files, where they are shrouded in a ridiculous secrecy. (Incredibly, the British Ministry of Defence continues to deny scientists access to their accounts of these events.) With proper cooperation between scientists and the public, particularly the local press, and the civil aircraft authorities, it would be possible to follow up ball lightning reports rapidly, enabling tests for radioactivity and so forth to be carried out. One sensible improvement would be for the Meteorological Office to draw the public's attention to the existence of this potential hazard, particularly during stormy weather, and request detailed reports. □



A hundred years ago

A CORRESPONDENT, Mr. F. Green, writing from Cannes, France, states that on the 8th instant, for the first time this year, he heard the Cuckoo in a valley amongst mountains sixteen miles to the westward of that place. The first time last year that he heard it in the same neighbourhood was on the 10th of April.

ON April 2 at 5.55 a.m., an earthquake was felt at Berne. Two movements took place from east to west. The duration at was two seconds; doors were opened, and church bells were rung by the shocks. In Neufchatel a strong detonation was heard; the oscillation was very strong in the lowest part of the city, and clocks struck the hour before the appointed time. Persons who were in the streets declared that warm wind was blowing for some seconds. A few hours afterwards a rain-spout occurred near Mainz, in Rhenish Hesse. A number of houses were struck by a thunderbolt and ignited, many others were flooded by the water falling from the mountains, and people drowned by an instantaneous flood.

from *Nature*, 13, April 13, 475; 1876.