

Bloody rain again! Red rain and meteors in history and myth

P. McCafferty

*Irish and Celtic Studies, Queens University Belfast, 9 University Square, Belfast BT7 1NN, Northern Ireland and Armagh Observatory, College Hill, Armagh BT61 9DG, Northern Ireland
e-mail: pmccafferty03@qub.ac.uk*

Abstract: In July 2001, red rain fell over Kerala in India shortly after reports of a meteor. When analysed, this red rain appeared to contain red cells, apparently demonstrating that such cells must exist in space and that the theory of panspermia is correct. However, doubts have been expressed about whether reports of a meteor were merely a coincidence. This paper examines historical and mythical accounts of red rain, to establish if these, too, show a connection with meteors.

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Introduction

In July 2001, red rain fell over Kerala in India. Initially this was attributed to desert dust and fungal spores, but when the phenomenon was investigated, it was established that the red rain contained small, unidentified, red, cellular particles (Louis & Kumar 2006). It was concluded that the red particles probably had an extraterrestrial origin, the result of a meteor airburst event on 25 July 2001, just hours before the red rain first started to fall.

This conclusion raises the possibility that, in space, there are objects that contain red, blood-like cells. In other words, comets possibly harbour life. Such an image of a comet, containing a liquid interior teeming with red cells, is difficult to imagine and even harder to accept. So when faced with the prospect that the fall of red rain in Kerala is extraterrestrial in origin, it is tempting to apply Occam's Razor and to dismiss any link between red rain and a meteor as a coincidence. It is much easier to question both the results of any experiments and the circumstances of the fall, than to accept that red rain has an extraterrestrial origin. Such expressions of doubt have been raised about the Kerala Red Rain:

'The reports sound completely improbable ... it would be a fantastic result if it were true and would tell us once and for all if there was extraterrestrial life. But they are assuming these micro-organisms came from a comet when no comet has been observed.' (Fitzsimmons 2006)

'Regarding the extraterrestrial-microbe hypothesis, Sampath *et al.* found no meteor debris in the colored rainwater. Moreover, the extraterrestrial hypothesis rests on the assumption that a loud thunder and flash of light during a storm was an exploding meteor. However, a better causal

explanation for a thunderous sound and flash of light during a storm is thunder.' (Goddard 2006a)

These are valid criticisms, but one should, however, remember that the application of Occam's Razor can occasionally be wrong. For example, when Thomas Jefferson was told that a meteorite fall in Weston, Connecticut in 1807 had been witnessed by two Yale Professors, Silliman and Kingsley, he reputedly said 'it is easier to believe that two Yankee professors would lie, than that stones should fall from the sky' (Wood 1968). Sometimes the simplest explanation is not always correct. We know today that stones do indeed fall from the heavens even though this once seemed impossible, so, although it seems unlikely, perhaps red rain does too. Maybe the report of a meteor airburst event just before the falls of red rain is not purely coincidental.

This question is a crucial one: Are the meteor and red rain events linked – or just a coincidence? Without conclusive evidence such as meteoritic dust mixed with red rain, it is difficult to say anything specific about Kerala's red rain. Given the imperfect, and sometimes incredible, nature of historical reports, it is also impossible to prove that any single event in the past was extraterrestrial. No single event can prove the argument: by now all evidence is missing and all eyewitnesses are dead. That said, it is hoped that this study will provide an interesting historical perspective and establish if, in general, there is a connection between falls of red rain and meteoritic activity.

In this paper, we first take a look at ancient historical accounts, then at more recent accounts that were subjected to scientific analysis, and finally finish with some interesting examples of red rain from myths. In terms of approach, a list of the various occurrences of coloured rain was compiled using sources such as Britton's meteorological chronology (Britton

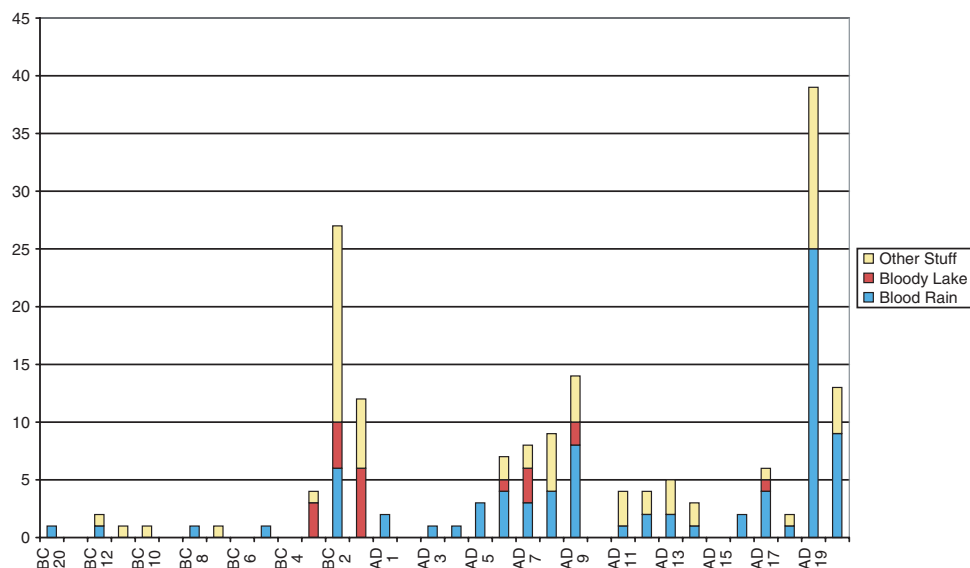


Fig. 1. Number of events per century.

1937), various historical annals, Obsequens' list of strange omens (Obsequens 4th Century AD), Greg's compilation of Meteors and Fireballs (Greg 1861) and Charles Fort's compendia of unusual events (Fort 1919). There is a danger that some of these accounts may have been exaggerated to suit particular agendas, so caution is required. With that caveat in mind, let us step into the past, and see what people once thought they were seeing.

Historical examples of red rain

Let us start with history. Throughout the centuries, there have been many reports of milky, coloured or even blood-red rain falling from the sky, of rivers turning to blood or of honey-flavoured dew. For example, in Ireland, in 984 BC, apparently, 'snow with taste of wine fell continually' (O'Donovan 1848). In AD 715, in Ireland, 'it rained a shower of honey upon Othan Bec, a shower of silver upon Otham Mor, and a shower of blood upon the Foss of Laighen' (Britton 1937, p. 24). In 461 BC, in Italy, 'it rained flesh, and none of the flesh left unplundered by birds of prey went bad' (Pliny, II, lvii). In Rome, in 183 BC, 'there was a rain of blood for two days in the precinct of Vulcan and ... Concordia' (Obsequens, v). In 108 BC, 'twice there was a rain of milk' (Obsequens, xl); and again in 104 BC, 'in Lucania there was a rain of milk, at Luna, of blood' (Obsequens, xliii). Many of these events sound completely incredible, so it is tempting to simply dismiss them as the superstitious ramblings of pre-scientific peoples, especially when they are recorded in association with strange aerial phantoms (461 BC) (Pliny, II, lvii–lviii) or even talking dogs (104 BC) (Obsequens, xliii).

Altogether, there are at least 80 accounts of red rain, another 20 references to lakes and rivers turning blood-red, and 68 examples of other phenomena such as coloured rain, black

rain, milk, bricks, or honey falling from the sky. These phenomena have occurred throughout the centuries and in many different locations from Classical Rome to medieval Ireland, Norman Britain and 19th century California to 21st century India.

It would also seem that the references are clustered in particular centuries, as shown in Fig. 1. This clustering can be due to reporting, since in some centuries there are very few historical documents whereas in others there are many extant sources: for example, Britton's compilation extended to AD 1450 while Charles Fort's work concentrated mainly on the 19th century. However, it may also be a genuine reflection of the pattern of actual events: the 20th century had many fewer records of red rain than the 19th century; some documents, such as the Annals of Ulster, show no red rain for centuries, and then record a number of such events in just a few years. Furthermore, within some centuries there are distinct clusters of events into particular decades.

As has been said, the aim of this study of past references to red rain and other strange forms of precipitation is to investigate if the phenomena are linked to meteoritic events. So, for each event, a simple question was asked: Is the event linked to, or associated with, a meteorite or comet? Most reports of red rain are reported as isolated instances and have no association with comets or meteors. For example, in AD 859, 'blood-red snow had fallen in many places' and 'the Adriatic sea was so affected by the extreme cold that the merchants, who had never before gone there except by ship, were able to visit Venice with their wares on horses and carts' (Reuter 1992, p. 46). Other reports contained references to both red rain and comets or meteors – and these were deemed to be linked. It was found that of 168 events, 60 were linked to meteoritic or cometary activity (23 of 80 red rain events, 13 of 20 bloody river events and 24 of 68 occasions of other material). The linkages are shown in Fig. 2.

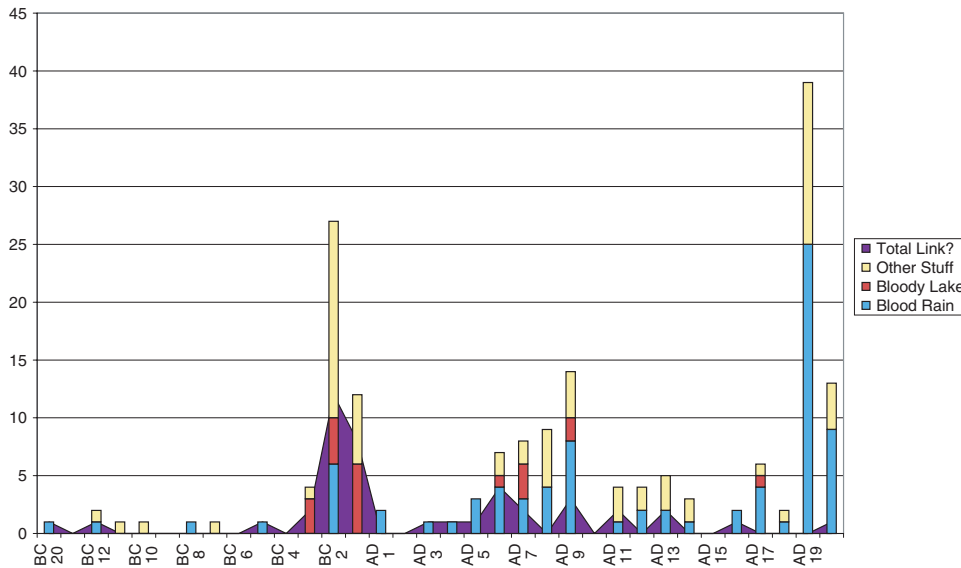


Fig. 2. Events per century with links to meteors.

Of course, the strength of the link varies among the events. In some cases, the fall of red rain seems to have occurred after an airburst, while in other cases it is merely recorded in the same year as a stone-fall or the appearance of a comet. For example, in AD 1017, ‘there appeared a most frightful comet for four months. The same year it rained blood in France; the stains were indelible in all things but clothes and wood’ (Wilde 1856). In some of these reports, the events are probably unconnected, but in others, the connection seems strong, with the events strongly associated with, if not actually caused by, unusual celestial activity. The strongest link between red rain and a meteor fall is probably this example, from Egypt, 30 BC: ‘not only did rain fall in places where no drop had ever been seen before, but blood besides, and the flash of weapons appeared from the clouds, as the showers of blood mingled with water poured down. In other places the clash of drums and cymbals and the notes of flutes and trumpets were heard, and a serpent of enormous size suddenly appeared and uttered a hiss of incredible volume. Meanwhile comets were observed in the heavens ...’ (Dio, Book 51, xvii). If we interpret the huge hissing serpent as the trail by a fireball, and the flash of weapons as a meteor storm, then this report connects red rain and meteors.

All too often, the connection is not so clear. For example, in 106 BC, ‘it rained milk in the regions of Perusia & Rome; an uproar in the sky was heard and javelins seen to fall from heaven; there was a rain of blood; at Rome in daylight a torch was seen flying high’ (Obsequens, xli). Here we can see an apparent connection between the fall of red rain and meteoritic activity, but it is difficult to tell from this account if these events occurred in the same day or merely in the same year. This is fairly typical of the limits of analysing this type of phenomenon from history: there are never enough details and the accounts often leave us with more questions than answers.

Red rain in an era of science

Even if one wanted to take the early stories seriously, most occurred too long ago to allow any rigorous scientific examination. It seems that such records must always remain outside the remit of serious science, to be forever relegated to the realm of the bizarre. All one can hope for is that a sensible extrapolation from a modern-day observation may explain some events in the past, and unlock the mystery of certain phenomena. Science has had some success with such attempts; for example, it is now appreciated that red snow can be due to the presence of minute vegetable organisms known as *Protococcus Nivalis* (Clark 1875). The appearance of drops of red liquid on clothes has been explained as the deeds of butterflies (Cowan 1865). We know that Saharan dust storms can leave cars in Europe covered in a thin layer of orange dust. One can speculate that local pollution from numerous coal fires could have been responsible for black rain, while waterspouts may have sucked up fish into the clouds, to drop them later on people below. These attempts at explanation only go so far and cannot even begin to clarify such phenomena as flesh falling from the sky.

In the 19th century some contemporary events were subjected to scientific analysis, and the various reports compiled by Charles Fort (Fort 1919). Unexpectedly, analytical results tended to deepen, rather than solve, the mystery. A fall of red rain in Italy, 23 June 1877, was initially reported to contain ‘microscopically small particles of sand’ but further analysis shed doubt on this conclusion. It was observed that drops of this rain left tenacious stains ‘such as sandy water could not leave’ (Lais 1877; Fort 1919, p. 52). When red rain fell at Blankenberge, Holland on 2 November 1819, two chemists in Bruges concentrated 144 ounces of material down to four ounces without forming a precipitate. They concluded that the red-violet rainwater contained muriate of cobalt (De Meyer & de Stoop 1819; *Annals of Philosophy* 1820;

Edinburgh Philosophical Journal 1820; Fort 1919, p. 52). A yellow substance that fell on 14 February 1870 at Genoa, Italy, was found under microscope to contain ‘numerous globules of cobalt blue, also corpuscles of a pearly colour that resembled starch’ (Boccardo 1870; Fort 1919, p. 40).

Some other red rains seemed to contain organic material. A rain of a peach-red colour at Giessen, Germany, in 1821, was found to contain flakes of a hyacinthine tint, thought to be pyrrhine (Daubeny 1836, p. 2; Fort 1919, p. 306). Analysis of red snow that fell in Switzerland in 1867 showed a high proportion of ‘variously shaped organic matter’ (*Popular Science Review* 1870) although this material (diatoms, pollen, wool) was thought to have come from the Sahara desert (*Nature* 1870). A red rain in the Mediterranean region on 6 and 18 March 1888 was tested: when burned, ‘the odour of animal matter from it was very strong and persistent’ (Flammarion 1889). In 1863, from 30 April to 2 May a substance that was ‘reddish varying to yellowish’ fell ‘enormously and successively’ upon France and Spain. When burned, it ‘carbonized and spread the odour of charred animal matter’ and ‘in alcohol it left a residue of resinous matter. Hundreds of thousands of tons of this matter must have fallen.’ This substance was apparently not pollen (Bouis 1863, p. 973; Fort 1919, p. 40).

Sometimes the red rain was found to look bloody even under the microscope. A chemist analysing blood-red rain that fell near Lyons, France on 16–17 October 1846 noted that it contained ‘a great quantity of corpuscles’ (Lewy 1847). Ehrenberg estimated that 720 000 lbs of matter fell during this shower and that one-eighth of the fall was composed of microscopic diatoms (Ehrenberg 1849). A fall of red snow near Crystal Palace, London on 12 March 1876 was ‘of corpuscular composition’ (Timbs 1876, p. 89), thought to indicate ‘the presence of an algae, *Protococcus nivalis*’ (*Nature* 1886). Analysis of a golden-yellow fall, on 27 February 1877, at Peckloh, Germany, discovered ‘four kinds of organisms, not pollen [...] there were minute things shaped like arrows, coffee beans, horns, and disks’ (*Monthly Weather Review* 1877; Fort 1919, p. 38).

On occasion, scientific attempts to explain the occurrences can sound more implausible and fantastic than the events themselves. For example, on 1 August 1869, flesh and blood showered from the sky for three minutes onto the farm of J. Hudson in Los Nietos Township, California. The rain of gore covered several acres and was attributed to buzzards flying overhead (Fort 1931, ch. 7). Similarly, on 15 May 1890, when something the colour of red blood fell over Calabria, Italy, laboratory analysis concluded that it was in fact blood. It was suggested by Professor Luigi Palazzo, head of the Italian Meteorological Bureau, that ‘the most probable explanation of this terrifying phenomena is that migratory birds (quails or swallows) were caught and torn in a violent wind’ (Palazzo 1901, p. 104; Fort 1919, p. 310). This superficially plausible explanation neglected to mention that no wind, feathers, or dead birds had been observed. Such inherent inconsistencies did not stop a similar explanation being proposed for the fall of red rain in Kerala – this

time involving the blood of bats (Muir 2006). Another ‘explanation’ that explains nothing was the attempt to link eight falls of black rain over the parish of Slains in Scotland between 1862 and 1866 to five eruptions of Vesuvius and three of Etna (Ratcliffe 1872, p. 267) suggesting an incredible vendetta by two Italian volcanoes for one small part of Scotland.

Such attempts to explain the phenomena in purely terrestrial terms remind one of the way in which many scientists dismissed as impossible the stories of stones falling from the sky, and preferred instead to attribute such events to volcanoes, lightning strikes or tornados. Only in 1802, after a number of unequivocal falls of stones from cloudless skies, were meteorites finally accepted. And, with reports of red rain, occasionally it seems that the phenomena may have an extraterrestrial origin, with organic or bloody phenomena observed immediately after meteorite falls. For example, when an aerolite detonated over Mansfeld, Thuringen in Germany at 2 am on 6 November 1548, ‘a substance was said to have fallen from it like coagulated blood’ (Baumhauer, quoted in Greg (1861)). When a large fiery mass fell and exploded on the ground on Lethy Island, East Indies at 1 pm on 24 March 1728, a jelly-like mass, silvery and scaly, was found (Greg 1861). On 21 January 1803, a meteorite that fell in Silesia seemed to lie burning on the ground; next day a jelly-like mass was found on the snow (Greg 1861). Similarly, when a fireball fell over Heidelberg in July 1811, it was followed by the fall of a gelatinous substance (Greg 1854). On 13 June 1822, a bituminous substance fell with a fireball over Christiania, Norway (Greg 1861, p. 463).

One must be cautious when reading such reports. After a meteorite fall, people scour the country, expecting to see something strange. For example, the morning after a white silvery fireball explode violently over Amhurst, Massachusetts, on 13 August 1819, a gelatinous substance was discovered in the front yard of Professor Dewey. He showed it to Professor Graves, who described it as ‘unlike anything before observed by anyone who saw it’ (Graves 1820). It was bowl-shaped, about 8 inches in diameter, one inch thick, and ‘bright buff-colored.’ Removing the covering revealed a ‘buff-colored, pulpy substance of the consistency of soft-soap’, with ‘an offensive, suffocating smell’. A few minutes of exposure to the air changed the buff colour to ‘a livid color resembling venous red’ (Graves 1820), ‘It absorbed moisture quickly from the air and liquefied’ (Fort 1919, p. 55). Strange indeed! Years later, another object was discovered by Professor Hitchcock. Professor Graves confirmed that it was exactly like the one discovered after the fireball: it corresponded in size, colour and consistency, and showed similar chemical reactions. Professor Hitchcock knew that this object had no connection to a fireball: it was a gelatinous, terrestrial fungus (Hitchcock 1834).

Nevertheless, the meteoritic explanation still remains an intriguing possibility for red rain. Red rain that fell in Sicily on 9, 10 and 11 March 1872 ‘was found to consist of 100 parts of red iron ochre, 75.1; carbonate of lime, 11.7; organic matter, 13.2’ and ‘was accompanied by meteoric dust’

(Silvestri 1872, p. 83; Fort 1919, p. 52). On 19 November 1829, after a fireball over Prague, some ‘little pieces of stone with a red crystalline surface, that smelt of phosphorus and sulphur’, were found (Greg 1861). A 7½ lbs. meteorite that fell onto Kaba, Hungary on 15 April 1857, was found to contain ‘an organic resinous matter like ozocerite’, although this was dismissed as material ‘absorbed in passing through the atmosphere, or from the earth into which it would have fallen when hot’ (Greg 1861). A meteor explosion over Murchison, Australia, in 1969, was described as smelling of methylated spirits. Subsequently, meteorites from the fall were found to contain 74 amino acids (Kvenvolden *et al.* 1970).

It has become increasingly appreciated that, in addition to their cargo of ice and dust, comets also contain a large amount of organic material. In 2004, the Deep Impact Spacecraft, which slammed a separate, smaller craft into Comet Tempel 1, revealed an extraordinary amount of organic material, with polyaromatic hydrocarbons and amino acids (JPL 2006). It is now more widely accepted that complex organic molecules can be formed in interstellar space; it is understood that bacterial life is amazingly resilient and could even survive the extreme conditions of entry into earth’s atmosphere. Increasingly, the idea of panspermia, with comets as the source of life on Earth (Hoyle & Wickramasinghe 1999), is no longer seen as quite so outlandish.

Red rains in myth

It has been proposed that many myths, with their descriptions of intensely violent battles between superhuman warriors, may in fact be a record of earlier times when the skies were busy and humans witnessed comets at close range, spectacular meteor showers and even destructive Tunguska-type events, in which a relatively small cometary fragment can devastate a huge area by exploding in mid-air (Clube & Napier 1982). This model has allowed some hitherto inexplicable Irish myths to be interpreted and understood (McCafferty & Baillie 2005).

If this astronomical interpretation is correct, then in many myths there are direct links between bloody rain and violent meteoric activity. For example, in the *Táin Bó Cuailnge*, it appears that Ireland was subjected to extraordinarily violent events on the night before the spectacular daytime appearance of a comet, too bright to look at (McCafferty & Baillie 2005, p. 128). Just days afterwards, the goddess Medb has her gush of blood shortly before the superhero Cúchulainn strikes the bald-topped hills with his rainbow-sized sword, and a victorious enormous bull arrives over the eastern horizon and scatters a vanquished bull’s blood and flesh over the landscape (Kinsella 1969). In other words, red rain was seen on the same day as a meteor.

Chinese mythology recounts a similar correspondence:

‘the three Miao tribes were in great disorder and Heaven decreed their destruction. The sun came out at night and for

three days it rained blood [author’s emphasis]. A dragon appeared in the ancestral temple and dogs howled in the market place. Ice formed in summertime, the earth split open until springs gushed forth, the [cereal crops] grew differently, and the people were filled with a great terror. Kao Yang gave the command in the Dark Palace, and Yu ... grasped the jade staff of authority and set out to subdue the ruler of the Miao. Amidst the din of thunder and lightning, a spirit with the face of a man and the body of a bird came bearing a jade baton to wait upon Yu. The general of the Miao was felled by an arrow.’ (Watson 1967)

In Greek mythology, one can find similar references, suggesting that events are describing meteoric activity and linking such activity to bloody rain. For example, in Homer’s *The Iliad*, Book 4, ‘Athena shot down from the sky like a blazing star, scattering a multitude of sparks, striking everyone with awe’ (Jones & Rieu 2003). Just a few days later, there is more activity of a celestial nature: ‘the goddesses flew between earth and heaven’ and ‘bronze-clad Ares then rose in a cloud into the broad skies, looking like the column of black air from a tornado’ and ‘with a terrific thunderclap, Zeus launched a dazzling bolt of lightning and guided it to earth in front of Diomedes’ horses. There was a dreadful flash of burning sulphur’ (Jones & Rieu 2003, *The Iliad*, Books 5 and 8). Most significantly, in the midst of five days of apparently intense meteoritic activity, there is a shower of blood: the God Zeus, realizing that his son Sarpedon would die, sent a ‘shower of bloody raindrops to the earth in tribute’ (Jones & Rieu 2003, *The Iliad*, Book 16).

Given that this research was inspired by the fall of red rain in Kerala, it seems fitting to end this paper with an example from Indian mythology. In the Mahabharata, the Gods have assembled to watch the impending battle below:

‘The air was filled with the shouting of men, the roaring of elephants, the blasts of trumpets, and the beating of drums: the rattling of chariots was like to thunder rolling in heaven. The Gods and Gandharvas assembled in the clouds and saw the hosts which had gathered for mutual slaughter. As both armies waited for sunrise, a tempest arose and the dawn was darkened by dust clouds, so that men could scarce behold one another. Evil were the omens. *Blood dropped like rain out of heaven* [author’s emphasis], while jackals howled impatiently, and kites and vultures screamed hungrily for human flesh. The earth shook, peals of thunder were heard, although there were no clouds, and angry lightning rent the horrid gloom; flaming thunderbolts struck the rising sun and broke in fragments with loud noise.’ (Mackenzie 1913)

A meteoritic interpretation of this event is that a daytime meteor shower and fireball storm with Tunguska-type events was witnessed at sunrise while comets appeared in the sky above. The daytime radiant rose in the east – appearing as though thunderbolts were striking the sun. Most significantly, these meteoritic events were accompanied by a fall of red rain.

Discussion

We have seen that many reports of red rain also referred to comets and meteors. This is perhaps because ancient reports were simply collections of omens and prodigies, and therefore inevitably bound to report red rain together with fireballs, comets and talking dogs etc., even if there was no real connection between the phenomena. On the other hand, in some reports there are much more explicit links, suggesting that red rain fell from clouds during a meteor shower. Furthermore, on occasion, meteorites are found to contain unexpected organic components. Bizarre though it may seem, this raises the possibility that some falls of red rain were extraterrestrial in origin.

Do earlier reports help shed light on the fall of red rain over Kerala? Between 25 July and September 2001, an estimated quantity of 50 000 kg of red cells fell over Kerala. If the material is terrestrial in origin, it is difficult to explain how such material could have been raised to the clouds by winds etc. On the other hand, if extraterrestrial, assuming a density of 1.0 g/cm³, this quantity could have come from a spherical object, roughly 4.6 m in diameter – smaller than the fall of red rain over France in October 1846, which contained roughly 720 000 lbs of matter, of which one-eighth was microscopic diatoms (Ehrenberg 1849). Data is unavailable for other falls of red rain, although they probably contained less material.

There are problems with the extraterrestrial model, however. Most instances of red rain fell in the first ten days from 25 July 2001, but there were isolated falls up to September of that year. This has raised doubts about whether the red rain was really extraterrestrial. If the red rain had indeed arrived with a meteor, one would not expect it to be falling over the same location after even a few hours – it should have dispersed. This is a feature noted with previous falls of coloured rain. Attempts to link eight falls of black rain over Slains in Scotland between 1862 and 1866 to eight eruptions of Vesuvius and Etna were rightly ridiculed by Charles Fort – but he noted that ‘nor would orthodoxy be any better off in thinking of exploding meteorites and their debris: preciseness and recurrence would be just as difficult to explain’ (Fort 1919, p. 44). If it is difficult for terrestrial models to explain how 50 000 kg of red cells could have been raised aloft, it is equally difficult for an extraterrestrial model to explain why the cells fell over one area for weeks and months.

The possibility that red rain cells – whether from a terrestrial or extraterrestrial source – could breed and multiply in clouds may offer one explanation. One can conjecture that a stable convection current is established between the Indian Ocean and the Ghat mountains during the monsoon season (Goddard 2006b). If red cells somehow manage to seed the clouds over Kerala, then they could feasibly maintain a resident population by breeding, and then falling on the population below intermittently, as long as the clouds remain stable.

However, the possibility that extraterrestrial red rain cells could breed on earth introduces a new element to the problem. If the panspermia hypothesis turned out to be correct, and life on earth did indeed result from colonization from space by living cells or spores, then red rain cells would have almost certainly already arrived on earth, and would now be breeding successfully somewhere on this planet. As a result, it would be almost impossible to distinguish the extraterrestrial red cells from existing, identifiable, terrestrial species, and indeed it has already been suggested that the red cells of Kerala bear similarity to spores from a local species of algae (Sampath *et al.* 2001).

Perhaps, though, the first few generations of extraterrestrial red cells would find the habitat on earth less than the optimum and would exhibit breeding characteristics wildly different from most earthly species. Experiments on the red rain from Kerala apparently demonstrated that the cells reproduced at high temperatures (Louis & Kumar 2003), which may offer an explanation for some rather bizarre ancient reports: in Rome, in 91 BC, ‘at sunrise a ball of fire shot to the heavens with a huge noise; bread was broken and blood oozed from the middle’ (Obsequens, *liv*). Centuries later, in AD 806, in Ireland, a similar event occurred: ‘the cakes were converted into blood, and the blood flowed from them when being cut’ (O’Donovan 1848). In AD 1161, in Brittany, a famine was ‘preceded by a blood-rain in the diocese of Dol; rills of blood ran from a fountain, and bread when cut shed blood in abundance’ (Tatlock 1914, p. 443). These reports are quite strange, but who knows, perhaps some ingredients for Roman bread or Irish cakes were contaminated with extremophilic red cells, which thrived and multiplied in an oven and later oozed from the baked bread.

Conclusion

This study has attempted to shed some historical light on the issue of red rain. It has shown that the phenomenon has been reported from many different locations and across many centuries. The phenomenon is also much more complex than one might have expected, and not to be dismissed easily by obvious terrestrial explanations such as Saharan dust or pollution. Red rain remains unexplained.

Although historical reports provide insufficient details to prove that red rain has an extraterrestrial origin, there appears to be a strong link between some reported events and meteoritic activity. The reported airburst just before the fall of red rain in Kerala fits a familiar pattern, and cannot be dismissed so easily as an unrelated coincidence. With that in mind, the Kerala samples, and any others that might occur in the future, should be investigated with every scientific resource at our disposal.

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