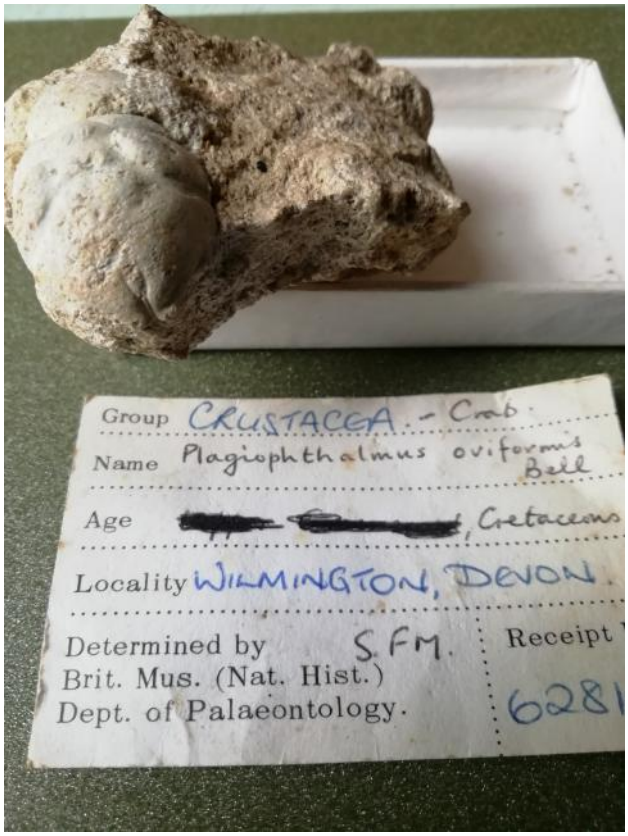

Fig 5. The fossil crab, Plagiophthalmus oviformis Bell. From the Stonar School Collection and collected by Philip Curnow. The original specimen label is missing. The accompanying form is a Natural History Museum, London determination slip. (photo credit: Simon Carpenter)

can be given away at public events or sold to raise funds to support geological charities.

It is likely that the collection is widely dispersed. All organisations accepting 'ex-Stonar School Collection' specimens will be encouraged to acknowledge this on specimen labels and documents.

At the time of writing, Somerset Earth Science Centre are interested in taking some of the Stonar material to improve their handling collections. The Centre, based at Moons Hill Quarry, Stoke St Michael work closely with schools, colleges, universities and community groups across Somerset to improve their understanding of the Natural World and in particular, the Earth Sciences. A small collection of graptolites, collected by Philip Curnow has also been donated to Bristol City Museum.

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Thanks

I would like to start by offering my sincere gratitude to Stonar School for relinquishing care of their geological collection so it can be refreshed and used with the geological community elsewhere. Elizabeth Devon, former Head of Geology at Stonar School alerted me to the threats facing the School geology collection and has helped provide information about the collection and collectors. I am indebted to Richard Ashley for finding out more about Philip Werran Curnow. Before this writing project began, we knew very little about Philip, so it is has been very exciting to discover that he was a Fellow of the Geological Society of London and a past Curator of Geology at Bristol City Museum. I would also like to thank Alan Bentley, friend and geologist for helpful comments and discussions during the course of this project and for assisting in the identification of the fossils and minerals. Finally, I would like to thank the many people who gave their rocks, fossils and minerals to Stonar School and in particular, the contribution made by Philip Werran Curnow.

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'Breaking news – meteorite impact causes devastation near South Gloucestershire village'

By Charles Hiscock

In this internet age we are also constantly being bombarded by news flashes from across the world onto our mobile phones, computers and tablets. The news may be a few seconds old when it reaches us. Some of it will be 'fake news', a scourge of modern media that leaves us wondering if we can believe some, or all of, that which we see or hear. The constant information and warnings we get about 'fake news' prompted me to wonder what it would have been like if instant communications had existed in the Triassic Period. More precisely, 214 million years ago! Hence the title of this short article (and no, it is not 'fake news', it is true – but a bit delayed and embellished!).

In 2009 I was invited by Mark Mitchelmore to have a tour of Churchwood Quarry about a mile north of the village of Wickwar. Mark Mitchelmore was a geologist for Cemex UK, the owning company and operator of the quarry. On a fine day in September we walked around the perimeter of the quarry on the excavated level at the top of the marine Lower Carboniferous Clifton Down Limestone (340 mya), the material that was processed in the quarry and sold as aggregate for the road and house building industries. However, the Clifton Down Limestone is overlain by first the Triassic Dolomitic Conglomerate, a scree and alluvial fan deposit laid down by the erosion of the Carboniferous mountains, which grades upwards into a fine yellowish sandy matrix. This, in turn, grades into the desert sediments of the red Mercia Mudstone Formation. The break at the top of the Clifton Down Limestone represents an unconformity with a gap of about 74 million years.

In 1973 A. Kirkham was in Churchwood Quarry when he discovered 'unusual green spherules up to 1mm diameter within erosional troughs along the unconformable top of the marine, Lower Carboniferous, Clifton Down Limestone'. The spherules were found initially in a 'cross bedded deposit of hard and soft silty marls occurring discontinuously at similar stratigraphic

levels along much of the western face of the quarry'. Subsequently, the spherules were analysed, photomicrographed and dated to 'between Late Carboniferous and Late Triassic although Triassic is more likely'. He also considered the origin of the spherules, suggesting that 'they were created as molten ejecta associated with a meteorite impact'. (Kirkham 2003 – abstract below)

Glauconitic spherules from the Triassic of the Bristol area, SW England: probable microtektite pseudomorphs

A. Kirkham

KIRKHAM, A. 2003. Glauconitic spherules from the Triassic of the Bristol area, SW England: probable microtektite pseudomorphs. *Proceedings of the Geologists' Association*, **114**, 11–21. Marine Lower Carboniferous Limestone is unconformably overlain by Triassic desert sediments at Wickwar, Bristol, SW England. Deposited by fluvial activity along the unconformity are pockets of partly cross-bedded marly limestones containing abundant glauconitic spherules with distinctive internal architectures, such as spheres within spheres. They are accompanied by shocked-quartz and probably pseudomorph altered glass spheres representing former microtektites created by a meteorite impact with Earth. Their possible link with mass extinction events are considered.

In the late 1980's Gordon Walkden was working in the Carboniferous quarries of the Bristol area on the lizard and small dinosaur remains that had been discovered in the Triassic fissures in the quarries. He made a visit to Churchwood Quarry but it proved unrewarding for the fossil remains but he did collect 'a lump of pink rock with green balls in it'. He called it 'a pretty curio with no immediate explanation. It just went into a drawer to await developments'. Ten years or more later, when working on a thin section of the Cretaceous/Tertiary impact deposit from Haiti, the penny dropped. He realised that those little green balls he had collected from Churchwood Quarry were the same, or similar to the KT boundary deposit. (Walkden 2004)

I had read the both articles shortly after publication so, in 2009 when I visited the quarry, I asked Mark Mitchelmore about the spherulitic deposit. He said that most had been quarried away in the intervening years but, with a bit of luck, we might find some small pieces. We walked around the south west face of the quarry on the top of the limestone until reaching the graded face of the Mercia Mudstone. Within the red rock were small pieces of yellowish sandy rock more akin to the fine sandy deposits at the top of the Dolomitic Conglomerate. However, it was not plain sailing and we had to search a lot of the material before pieces were discovered containing the tell-tale little green balls. Mark told me that the original deposit was loaded with them but the pieces I was able to collect contained more sparse numbers. The photographs in the journal reports showed the green spherules to be abundant almost to the exclusion of other materials. Nevertheless, the specimens that we collected were good quality and show the spherules very clearly, figures 1 and 2. During lockdown I rediscovered my specimens of the green spherules which I collected that day and they inspired me to write this article.

Gordon Walkden's scientific sleuthing on the green spherules eventually led to the conclusion that they had been formed by the impact of an asteroid at Manicouagan in northern Canada where a 100km crater

Fig. 1 Green spherules

Fig .2 Close up of green spherules

exists from an impact that occurred during the Triassic. By dating techniques it was possible to place the age of the deposit at 214-215 mya.

Fake news? Well, up to a point because the impact was 2000 km away from Britain (since the Triassic, that distance is now 4400 km due to plate tectonics and the opening of the Atlantic Ocean). Not just up the Triassic road from Wickwar but the result of the impact, as we see, did leave its mark on the south Gloucestershire village, albeit in a way not obvious or devastating to the locals! There was no Atlantic Ocean in between us and Canada and the terrain at the time was an arid, windswept desert making it an ideal place for the landfall of an asteroid with the minimum of disruption to life on earth. There was been no major extinction recorded at that time in the Triassic. The impact caused melting of the rocks and ejected it into the atmosphere. It was only over a long period that the finest ejected material slowly returned to earth but the coarser particles rained down across the planet a short time after impact. They were then washed from the surface by heavy rain storms into playa lakes, pools and wadis where they aggregated into shallow deposits (Curtis 1982).

At the quarry, these lagoons formed in the undulating topography of the Carboniferous limestones and concentrated the spherules in lenses. While looking for

the spherule samples, I found some well-preserved fossil ripples in Mercia Mudstone, indicative of the shallow lagoonal conditions, figure 3.

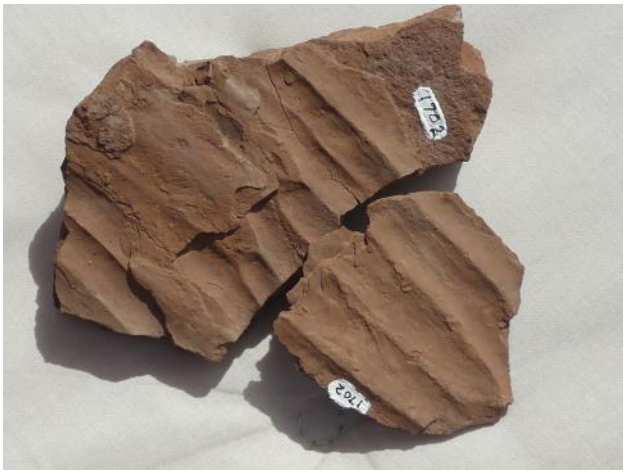

Fig. 3 Ripples in Mercia Mudstone

In 2020 the only evidence of the effect of the impact about 214 mya, 20,000 km from Wickwar, lies in various museum collections and the scientific papers written about it. Nevertheless, it is a sober reminder that these events do happen albeit rarely and that, maybe sometime in the future there will be a similar deposit of little green balls over the village of Wickwar. Now, that would be true news!

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Equatorial Rain-Forests in Bath: Fossil Coal-Measure Plants from Twerton - Radstock

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Introduction

This article discusses the Carboniferous rocks in the area of Bath – particularly the Coal Measures which were exploited in the 18th and 19th centuries in the area between Twerton and Newton St Loe. Evidence for the former coal mining activity is scant in western Bath but fragments of shale with fossil plants, as well as pieces of coal, siderite and sandstone derived from the old tips can be found. There is plenty of evidence of mining farther south / southwest in the Radstock area and coal tips are still present and accessible for collecting fossils.

Carboniferous rocks in the Bath region

One is accustomed to Jurassic sedimentary rocks in the Bath area but it is also possible to see Carboniferous rocks, and not just in the pavements of Bath either, which are of Pennant Sandstone in many places. This very hard, weather-resistant Upper Carboniferous stone was exploited at Willsbridge, just 8 km northwest of Bath, and farther afield (e.g. Hanham, Downend, and Temple Cloud). If interested, you could visit the old Pennant Sandstone quarries and exposures on your way to Longwell Green in the nature reserve of the Siston Brook valley at Willsbridge Mill (Grid Ref ST666 708) or the fine exposures along the old railway line, now a cycle track, just past Bitton towards Bristol. These outcrops are of Downend Sandstone, the lower part of the Pennant Sandstone Formation, a clean quartzitic-lithic-micaceous arenite with largescale cross-bedding and channel structures, deposited by major rivers flowing from south to north, 310-15 Ma ago. However, samples of other Upper Carboniferous coal measure facies, along with plant fossils, can be collected from old coal tips in the region. The nearest site, perhaps surprisingly, is near Twerton and a little farther afield to the south old tips can still be seen in the region of Radstock. The Radstock Museum of Somerset Coalfield Life (radstockmuseum.co.uk) has many spectacular fossil plants on display as well as artefacts from the mining activities and a reconstruction of a coal mine; it is well worth a visit.

Coal mining history and geological context

Coal has been mined in the Somerset coalfield since Roman times, but it was not until the late 1600s that is became a major industry with more than 60 pits working over the next four centuries. Peak production was in the late 19th and early 20th centuries but from then on it steadily declined until Nationalisation in 1947 when there were only 12 pits left. The last two, Kilmersdon and Lower Writhlington, near Radstock, closed in 1973. At the surface there are two small areas of Upper Carboniferous rocks in the Somerset coalfield, in the vicinity of Pensford and around Nettlebridge; otherwise they occur below the Triassic and Jurassic cover. Some