Chairman's Report for the Bath Geological Society, 2016

The Society has had another successful year with a wide range of topics in the talks and pleasant days out on our fieldtrips. The membership is nearly constant around 80 and our talks attract between 30 and 70 each time. The fieldtrips have been very well supported. We are always pleased to see non-members attending the events and hope that they will join us on a more regular basis. Earth science continues to receive more and more coverage in the news and on the television and people in general are becoming more interested in the world around them.

Our monthly meetings held in the BRLSI in Queen Square Bath are well supported and in the last year we were entertained by many speakers. In November (2015) Peter Bath from the Dorset Geologists' Association Group described the stone and marble used in Kingston Lacy Hall near Wimborne Minster, an impressive, but little known rival to Chatsworth House for decorative polished stone, notably of foreign stones of Grand Tour Provenance. This mansion is clearly a place for a geological trip, but with a hand lens and camera, rather than a hammer! Dave Green (of Geostudies) gave an explanation of the complex Geology of Anglesey, ahead of a weekend excursion which took place in June (2016). One of our local formations and curiosities, known for centuries as landscape marble, was discussed at February's meeting by Sarah Greene from the School of Geographical Sciences, University of Bristol. The Rhaetic Cotham Marble is a thin but laterally extensive stromatolitic limestone which may have been a consequence of the events taking place towards the end of the Triassic, leading to major extinction and global change. In March, Alex Whittaker from Imperial College London, expounded on Landscape Dynamics, Climate and Tectonics, a highly topical area of research in the last 10 years or so. He explained how geomorphic, sedimentological and numerical modelling techniques can be used to constrain how earth surface processes are influenced by tectono-climatic boundary conditions, and how they govern the production of stratigraphy.

The world's worst nuclear disaster, which took place on the 26th April 1986 at the Chernobyl nuclear power plant in the Ukraine, was the topic of Lorraine Field (BGS) in April's session. The effects of the disaster were felt far wider than just the Ukraine – it was only in November 2012 that the last of the sheep movement restrictions was lifted in the UK. In May, Dave Waltham from Royal Holloway, University of London, discussed the "Lucky Planet", also the title of his recent book. He argued that although there are countless exoplanets orbiting other stars and these vast numbers of planets outside our solar system make us ever hopeful that we may come across extra-terrestrial life, the Earth is actually truly exceptional. Our climate stability is one of the most important factors that makes it able to support life, and it is nothing short of luck that made such conditions possible. The four billion year stretch of good weather that our planet has experienced is statistically so unlikely that chances are slim that we will ever encounter intelligent extra-terrestrial other worlds.

The University of Bristol's Professor Philip Donoghue, recently elected a fellow of the Royal Society, gave us an insight into the new approach of studying and understanding fossils. In his Molecular Palaeobiology talk in June, he explained how fundamental palaeontological questions of the rates and processes of evolutionary change can be addressed. In July Professor Hazel Rymer, from the Open University talked about the environmental impact of a degassing volcano in Nicaragua, which has been monitored for several decades now. Professor Richard Fortey, from the Natural History Museum in London discussed "Survivors" - the Living Fossils in September's meeting, those organisms which were able to cope with mass extinctions, horseshoe crabs, the brachiopod *Lingula*, lampreys etc. In many cases it seems their particular habitat did persist in spite of the global changes taking place around them, rather than simply being a matter of luck.

The evolution of man has always been a fascinating, if not sensitive, topic and Fred Spoor from University College London explained in his October talk how it now seems that there were several species of hominids living together in the past before our species came to dominate the world.

In February, the society performed its annual clear-up of the geological sites at the Brown's Folly nature reserve. In April, the chairman took the society on a fieldtrip to Sully Island and Bendrick Rock, near Barry, on a fine day with 30 people attending. The Triassic rocks here in South Wales were deposited around the edge of an enormous lake or inland sea in which the Mercia Mudstone (Keuper Marl) was deposited. A range of shoreline limestones was developed, with stromatolites, tepees, palaeosoils and evaporites (gypsum). The highlight was being able to still see dinosaur footprints since unfortunately many have been removed by professional collectors. The field trip to Anglesey led by Dave Green in May was well supported with 16 attendees enjoying the geologically fascinating but frustrating island. The main focus of excursion was the controversial Precambrian to Cambrian sequence, of high grade metamorphic rocks and granites, the Mona Complex with volcanics and enigmatic mélange, and the Eastern Schist Zone with blue schist of oceanic affinities. A fieldtrip to the Vale of Wardour in June with the Wiltshire Geology Group led by Isobel Geddes and Steve Hannath involved a walk across the vale from one side of the eroded anticline to the other, seeing exposures of upper Jurassic to Cretaceous strata.

One of the staunch members of the Bath Geological Society and its committee, Elizabeth Devon, is leaving the area for pastures new in the northeast-borders. We should thank Elizabeth for all her work for the Society over the years, but also for her major contributions to the geological community in the area. Her running of the West Country Geology Blog has kept everyone informed of regional events and Earth science news, such a great resource. Also many thanks to all committee members for their work for the society and to you the members for all your support.

Maurice Tucker

Yellowstone National Park

Mellissa Freeman

Yellowstone National Park in Wyoming, which spans 2.2 million acres, became the world's first national park in 1872. It sits as a high plateau surrounded by the Madison Range to the west, the Gallatin and Beartooth Mountains to the north, the Absaroka Mountains to the east and the Grand Tetons to the south. The geological history of this area is well known with three major eruptions over a 2 million year period, two of which are the largest known in Earth's history. It contains around 55% of the world's geysers (approximately 400 currently active) and has one of the world's largest hydrothermal systems.

Yellowstone sits above a hotspot where magma from deep within the earth rises close to the surface. The crust is very thin here - in the region of 2 to 3 miles in thickness compared to continental crust in other parts of the world (30 to 40 miles in thickness). It is also the only place on earth where there is a hotspot below continental crust. Other well-known places with hotspots are Hawaii, Iceland and Galapagos where the crust is oceanic, see Fig 1.

There was a large amount of geological activity in this region long before the emergence of the hotspot. During the Palaeozoic era (540 to 245 million years ago) the Yellowstone region was subject to many marine transgressions and regressions. Deep sea sediments including limestones, sandstones and shales can still be found mostly in the north west of the National Park and sit beneath Hucklebury Ridge tuff, a product of the first large eruption at Yellowstone. Triassic rocks (245 to 205 million years ago) are represented by deposits of siltstone and shales in the east of the park that would have accumulated in swamps and shallow muddy seas. Hydrocarbons and coal that formed from Cretaceous sandstones and shale deposits that were later subjected to pressure and heat can also be found. The late Cretaceous saw the start of mountain building. There were two major