

## The Bristol Scientific Club Programme of Meetings for 2018-2019

### **(1) Saturday, 27 October 2018**

Cancelled at short notice due to the unforeseen medical condition of our principal guest speaker Dr Philip Basson.

#### **Guest Speakers: Philip Basson and Klaus Kemp : “Diatoms – from Science to Art.”**

Philip Basson's many publications deal with the Higher Macro Algae and when studying these raised queries about the observed diatoms. His queries were directed to the late Frank Round at Bristol and as a consequence he invited Philip to Bristol where he has focussed on the basic structures of diatoms and their global distribution. Frank Round also introduced Philip to Klaus Kemp who had become fascinated by the Victorian's interest in microscopy which had revealed for the first time the amazing variety and structures of Diatoms and Radiolaria. Today's talk is a direct result of their collaboration. In Part 1 of their joint talk Philip will give some highlights of his work which will provide an overview of the study and importance of diatoms both environmentally and commercially. Historically the advent of the microscopy allowed slides of diatoms to be portrayed as an art form and it is this aspect that Klaus has further developed using current optical microscopy. In Part 2 he will demonstrate the wonders of Diatoms when utilised as an art form. A surprising outcome of Klaus' work has resulted in a prize being won by Bristol University's Biological Sciences Department.

*Dr Philip Basson born 1931, is a Paleo-botanist. He graduated at Eastern Michigan University, taught first at Missouri then Cornell before moving to the American University of Beirut; firstly as Assistant Professor, then Chairman of the Biology Department under the aegis of U Cal's Berkeley 'education abroad programme' and Director of the Beirut Study Centre. Publications, when Professor of Biology at the University of Bahrain, included 'Benthic Marine Algae of the Indian Ocean'.*

*Klaus Kemp, born 1937 in Spandau, came to England in 1947, worked for very well-known scientific supply houses, firstly Flatters & Garnet, then Salford University, and finally at Philip Harris where he worked until retirement. Klaus now lives in North Somerset. His interest and knowledge of Diatoms, Radiolaria and Butterfly scales has resulted since retirement in his being involved as consultant and advisor to a number of TV programmes such as; BBC's 'Coast', Channel 4's 'Miniature Art', BBC2's 'The witness was a fly' and also 'Riddle of the Sands'.*

### **(2) Friday, 30 November 2018**

#### **Guest Speaker: Uzy Smilansky: “Archaeology in 3-D”**

This talk will review recent work carried out at the Computerized Archaeology Laboratory at the Hebrew University (Jerusalem). Ancient artefacts are optically scanned in 3-D resulting in high resolution digitized models, which are further elaborated to document and study the archaeological finds. It is here that computational methods are harnessed to support the Archaeological research in addressing old issues and providing new approaches. I shall try to give a glimpse into our various activities and modus operandi by focussing on examples from our studies of ceramic and lithic artefacts, coins, botanical remains, etc.

*Uzy Smilansky is Professor Emeritus in the Physics department of the Weizmann Institute, Rehovot, Israel and Benjamin Meaker Visiting Professor at the University of Bristol. His*

*research interests include; studying the “finger-prints” of classical chaos in quantum mechanics and the development of mathematical and computational methods to assist in archaeological research.*

### **(3) Saturday, 16 February 2019**

#### **Guest Speaker: Adam Finn: “How vaccines really work.”**

Most parents (and most doctors) assume that the simple adage “Vaccinate your child so he or she will not get sick” accurately summarises the public health miracle of immunisation which flowed from Edward Jenner’s observation made a few miles from Bristol at the turn of the 18th century. This is far from the truth. With the single exception of tetanus, an infection acquired from the environment and not from other people, all the vaccines we offer to all our children not only offer them personal protection – often very imperfect and transient – but also interrupt the chain of onward transmission. Such indirect effects – often termed, rather misleadingly, “herd immunity” – were long regarded as a kind of bonus extra, which added to icing to the cake of direct protection by vaccination. Not any more. They are now central to the thinking behind development of vaccine programmes to the point that a recently introduced meningococcal vaccine programme in the UK was designed entirely for its indirect protective effects. This change in emphasis brings new approaches to research into infectious diseases to the fore. Now we need to know the determinants of infectiousness to others – rather than just the determinants of susceptibility of the individual. Luckily we have new molecular microbiological tools we can use to do the necessary studies in children to find answers to these questions.

*Adam Finn is Professor of Paediatrics at the University of Bristol School of Clinical Sciences. His research interests at the Bristol Childrens’ Vaccine Centre include: Microbial and host interactions in the human upper respiratory tract and pathogenesis of bacterial respiratory and invasive infections in children. Respiratory mucosal naturally-acquired and vaccine-induced immunity to pneumococcus and other bacteria. Clinical trials of vaccines and antimicrobial agents in children.*

### **(4) Saturday, 16 March 2019**

#### **Speaker: John McNamara: “Exposing the logic: modelling the adaptive behaviour of organisms”**

When you look around you in the natural world you will see living organisms performing diverse and often bizarre activities. For example birds sing, flock, migrate. Male deer grow large antlers that they use to fight each other. Some fish change sex. Many of these activities can be understood as resulting from the action of natural selection in the past. Arguments in terms the effects of selection have been given ever since Darwin. At first most arguments were verbal and in qualitative terms, but around 40 years ago biologists started constructing mathematical models explaining behaviour in terms of maximisation of fitness. I will illustrate this modelling approach in more detail, explaining the definition of fitness in different settings with relevant specific examples.

*John McNamara, FRS, is Emeritus Professor of Mathematics and Biology at the School of Mathematics of the University of Bristol. Professor McNamara is a mathematician, behavioural ecologist and evolutionary biologist whose research involves developing new methods and models for the study of animal behaviour. His interests include; the dawn*

*chorus in birds, overwinter survival strategies, annual routines, trans-generational effects, adaptation to fluctuating environments, the ecological rationality of behavioural strategies and evolutionary game theory.*

**(5) Friday, 12 April 2019**

**Speaker: Michael Berry: “Magic mirrors and magic windows.”**

Ancient oriental mirrors possess a property that seemed magical and was probably unintended by those who made them: the pattern embossed on the back of such a mirror appears in light reflected onto a screen from its apparently featureless front surface. In reality, the embossed pattern is reproduced on the front, in low relief invisible to direct observation, and analysis shows that the projected image results from deviation and concentration of the rays, but not enough to focus them.

In this unfamiliar regime of geometrical optics, the image intensity is given simply by the same mathematics as used in image processing for edge detection. Observation confirms this theoretical interpretation.

Current research aims to create the transparent analogue of the magic mirror: ‘magic windows’, in which glass sheets, flat to unaided vision, concentrate light onto a screen with intensity reproducing any desired image.

*Professor Sir Michael Berry, FRS is a theoretical physicist at the H H Wills Physics Laboratory, University of Bristol, where he has been for more than twice as long as he has not.*