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Lichfield Science & Engineering Society

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31 March 2019

Dear Member,

This is my third newsletter for the 2018-2019 year. It records and summarises the lectures, visits, and other activities of LSES in what has been a very successful year. That is due to the constant attention and hard work of your committee and they deserve your thanks for keeping LSES at the forefront of science and engineering in Lichfield and around and making it so enjoyable.

LECTURES

10 January 2019, “The Future of UK General Practice”

Professor Helen Stokes-Lampard, Chair of the Royal College of General Practitioners.

Helen told us about the principles of General Practice medicine since it was set up 70 years ago at the advent of the National Health Service and the emphasis on excellent quality health care for all from a local service. It is free at the point of delivery and we all pay for it through our taxes

The Royal College of General Practitioners is a membership organisation for doctors worldwide which sets standards for its 53,000 members and promotes the physical and mental health of its patients, not forgetting their social care.

In 2014 government set a five year plan to rescue the health service which made 106 promises and which included strict targets for waiting times. In January 2019 it was superseded by a Long Term Care Plan, This emphasises the need to deal with health inequalities and looking after vulnerable patients while reducing the pressure on GPs by using other medical services more extensively, and provides extra finance for the NHS.

Dr Helen described her typical day in surgery, she is a GP partner one day a week at a Lichfield Surgery, the rest of her week she is dealing with policy of the Royal College and all the public relations and government contacts which are so important to her role.

She answered questions for nearly another hour after the lecture, you can see and hear her presentation on the LSES website.

The lecture was so popular that we had to arrange to move to the main theatre. Thanks to the Garrick Theatre for their help with the change. It was attended by 182 members, 20 visitors and 12 students.

13 February 2019, Schools Lecture, “Microbial Factories – Putting Bugs to Work”,

Dr Alan Goddard, Aston University

Bread and beer are the best know products of yeasts which are microbial factories. Less recognised is the production of acetone, ethanol and butanol as biofuels.

Insulin is produced by a type of e-coli modified by gene cloning, and statins are also produced using bugs.

Alan kept the audience on their toes with an interactive quiz during the lecture, and there was a prize for the winner.

There were lots of questions from an audience of 90 plus students. Hear it on the website.

14 February 2019, Presidential Lecture, “Fighting Infection”

Professor Peter Lambert. Aston University

Peter showed how infections have reduced over the past century, through improvements in public health and nutrition but mostly through a series of antibiotic drugs. The public have come



to rely on antibiotics to cure their illness and protect them during surgery, and they have been widely overused both for human and animals but bacteria mutate constantly and develop resistance to the prescribed drug, such that new antibiotics are required but few are available.

Medical experts have predicted a catastrophic failure in health care if antibiotic use is not greatly reduced and the best drugs carefully protected against overuse. Research into new drugs is being pursued only slowly by drug companies because of the costs of evaluation and proving their safety. Some new approaches to cure infections were discussed.

Peter then answered questions from the audience.

The lecture was a completely full house attended by 147 members, 16 visitors and 2 students.

Thursday 14 March 2109, “WMG’s Capabilities for Translating Scientific Research into Competitive UK Battery Cell Production”

Dr Melanie Loveridge, Associate Professor of Electrochemical Materials, International Automotive Research Centre, University of Warwick

Increasing demand for mobile power has needed higher energy density batteries, originally nickel cadmium cells but now lithium ion battery packs. WMG was set up in the '80s and now has an Energy Innovation Centre to develop batteries for electric cars. Batteries make 50% of the weight of cars and the technical requirements are severe; fast charge, long life, more energy density, good safety.

WMG is at the forefront of research and pilot manufacture of these batteries and has the industrial equipment which allows all the stages of manufacture to be accomplished under one roof, from electrode materials and coating lines to cell and pack assembly and long term testing. Most of their work is under contract to car manufacturers like JLR and McLaren. Melanie answered questions afterwards and it is all on our website.

This lecture was well attended by 141 members and 1 student and 8 visitors.

9 April 2019: “Faster Fusion: Fact or Fantasy?”

Dr Alan Costley, Tokamak Energy Ltd

Dr Costley clearly explained the principles of nuclear fusion and how it had developed over the past 60 years mainly using tokamak toroidal plasma containing equipment working in excess of 50,000,000°C. The expense of this complex equipment means that it is mostly funded by international teams working together. The Joint European Torus (JET) at Culham, UK had got the closest to achieving sustainable fusion, but the results indicated that a much larger torus was required so ITER was designed and is being built in France.

Latest research has shown that a smaller spherical shaped torus would achieve fusion and a privately funded company Tokamak Energy Ltd have built a development unit and plan to achieve fusion in the next 10 to 15 years, almost before ITER is completed.

Alan answered lots of questions on nuclear power and the design of fusion reactor, but emphasised the global need to move away from carbon based energy.

20 February 2019: Discussion Lunch “Diet”

23 members and their guests enjoyed an excellent lunch followed by a discussion. Jenny Arthur introduced many and varied topical diets which few had tried and none found satisfactory, but ideas for alternative ways to lose weight are always in the news. We all recognise the need for good nutrition and physical exercise to remain fit and healthy, and we need less food as we get older and are less able to keep our vitamin D levels high enough, so that supplements are advised for the winter months.



Obesity is a national problem at all age ranges and the medical authorities seem unable to promote the message of eat less and exercise more. There was much discussion on how each of us copes.

VISITS

21 February 2019: Visit to Birmingham University Dental School

The University's £50 million Birmingham Dental Hospital and School of Dentistry opened its doors to students and patients in April 2016. The design of the building allows huge amounts of natural light to enter and also for the students to interact. A large group of 35 members was given a highly informative tour of the School, including visits to student classes and post graduate research laboratories. The new facility is the first integrated, stand-alone dental hospital and school to be built in the UK for almost 40 years

Thursday 21 March 2019: Visit to London Electric Vehicle Company.

15 members were given a fascinating, close proximity line side tour by two senior managers of this taxi assembly plant. Operational for 18 months, current production is 12 vehicles a day with a maximum capacity of 30 vehicles per day.

We were first shown the sub-assembly lines, where aluminium components are glued together by robots and are then passed through an electric oven, which hardens the glue. A system of "poka yoke" prevents the wrong components being selected. Moving on through the chassis assembly, we saw the body panels being fitted to the vehicles, again by glue. All the body panels, were made from composite materials, with the exception of the bonnet, which is an aluminium pressing. The final section was the powertrain and the battery packs.

Under normal operational use the taxis are emissions free, but a small petrol engine is used to replenish the batteries should the energy stored get too low.

Tuesday 26 March 2019. Visit to Heysham 2 Power Station

12 LSES members were pleased to be invited to Burton Engineering Society's trip to Heysham 2 Nuclear Power Station. After an early start and a long coach journey it was a worthwhile visit. Built between 1980 and 1988 the station, with its two reactors, delivers 1230MW to the Grid, the highest output of all EDF's UK sites.

Our enthusiastic and well-informed guides took us through the whole process; reactor building, generators and control room, the latter in its original 1980's appearance looking rather dated. But it works and we were shown, but not allowed to touch, the big red button. The attention to safety was striking; not only the aspects needed for an AGR gas cooled nuclear power reactor using UO_2 but also no small change in your pockets, it might drop into something important, and a rigorously enforced use of the handrails when climbing stairs. All in all an enjoyable visit and sincere thanks to Colin Walton who organised it all.

With best wishes,

Bob