

Report of 15 February 2018

Royal Society

Southern Highlands Branch

Speaker: Professor Madeleine Beekman FRSN

Topic: Are You More Intelligent than a Slime Mould?

This lecture attracted a 60 person audience when it was presented in a pleasant conference room at Mittagong RSL, a new venue for the Southern Highlands Branch of the Royal Society. The change in location was necessitated by the building program taking place at the Performing Arts Centre, Chevalier College, Burradoo.

Professor Beekman is Professor of Behavioural Ecology at the University of Sydney and a fellow of the Royal Society of NSW. She previously held prestigious research fellowships such as the Australian Research Council (ARC) Queen Elizabeth II Fellowship (2003-2012) and an ARC Future fellowship (2013-2016). She did her PhD at the University of Amsterdam and was a postdoctoral researcher at the University of Sheffield before she moved to Australia to join the University of Sydney in 2001. She is currently the Deputy Head of School of the School of Life and Environmental Sciences, as well as the Chair of Ecology, Evolution and Environment.

Professor Beekman presented her findings on the slime mould, a unicellular organism with no neurons at all. The findings of her team have been astonishing. She now has a sound basis for asking such questions as to whether the slime mould is as smart as we are with our large brain. *Physarum polycephalum* – meaning the multi-headed slime mould – has emerged as a model system for decision making. Despite its simplicity, this organism has clearly demonstrated to the research team that it is capable of very complex behaviour.

The audience was intrigued to see a number of time-lapse videos on the behaviour of the slime mould. As the organism expands and contracts tendrils called ‘pseudopods’, it can be seen that its network settles into the shortest possible routes as efficient as those designed by humans. It can make multi-objective foraging decisions and balance its nutrient intake. Sometimes though, when placed in perplexing situations designed by the researchers, it was observed making human-like “irrational” choices among foods of different qualities.

Professor Beekman presented unforgettable examples of the efficient networks created by the slime mould when she examined the railway networks in the Tokyo area and in the British Rail system. Her team placed a map of Britain on a suitable substrate for the slime mould, and then marked, using 50 dots of food, the locations of 50 cities in the rail network. The food source dotted on the city locations was a preparation of oats which the slime mould had demonstrated a liking for. To the astonishment of the researchers, the network created by the slime mould as it foraged in the most efficient way from one food

source, or city, to another, bore an uncanny resemblance to the actual network of British Rail. The same observations were made when the slime mould was presented with 32 food sources in the Tokyo area.

It is difficult to do justice to Madeleine Beekman's beautifully presented and fascinating lecture in a space as limited as this. Even the questions she raised at the conclusion of her presentation heightened the intriguing essence of her lecture:

- Can the slime mould learn? *We think so*
- Can it make associations? *We don't know yet*
- If it can make associations, can it teach another slime mould?
Wouldn't that be amazing...
- Can our questions become even weirder? *Probably*

We look forward to her next lecture.

Anne Wood FRSN