Report of 6 November 2014 Meeting
Royal Society
Southern Highlands Branch

Speaker: **Dr Madeleine Beekman**
                   Professor of Behavioural Ecology and ARC Future Fellow
                   School of Biological Sciences
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Topic: **Bees in the food chain: Is life as we know it about to end?**

Dr Beekman opened her lecture to an audience of 80 with a recent report from Avaaz, the campaigning community bringing people-powered politics to decision making worldwide. As of three weeks ago, Avaaz declared that 3,500,000 people had signed a petition to governments worldwide to ban toxic pesticides such as neonicotinoids. They stated that the EU had already banned them, and they were expecting the US government to soon do the same.

 Among other things, they argued that our entire food chain is in danger as bees die off. They stated that bees pollinate 75% of growing plants, that multiple scientists blame certain toxic pesticides for bees' rapid demise, and that rapid action was required before the honey bees became extinct. Dr Beekman addressed each of these arguments in turn.

She started with the claim that bees pollinate 75% of growing plants. In fact, globally 60% of our food comes from crops that do not depend on animal pollinators. Those depending on pollinators account for 35%, while 5% of crops are unclear. Of the 35% depending on pollinators, only 12% found the pollinators essential, 28% were highly dependent and 20% slightly dependent.

 Dr Beekman described honeybees as the most economically valuable pollinators of crop monocultures globally, with the yields of some fruit, seed and nut crops decreasing by more than 90% in the absence of bees. In the absence of wild bees, managed bees need to be provided. . Compared with non-honeybees, honeybees are versatile, cheap and convenient, although they are not necessarily the best pollinator for all crops on a per flower basis.

Dr Beekman then turned her attention to the claims concerning the neonicotinoids, a class of neuro-active insecticides chemically similar to nicotine. These are systemic pesticides widely used as seed coatings, which have allowed reduction in the total amount of pesticides used. They also show reduced toxicity compared with previously used organophosphate and carbamate insecticides.

Although neonicotinoids were banned from use in flowering crops (e.g. rapeseed) in the EU for two years due to heavy campaigns, Dr Beekman stated that no effects on bees had been observed in field studies using field-realistic dosages. In laboratory studies however,

lethal and sub-lethal effects on bees have been observed. The neonicotinoid ban hit UK farmers hard as their crops fell victim to the ravages of pests which had previously been well controlled. She referred attendees interested in an objective summary of what is currently known about the effects of neonicotinoids (and the possible consequences of a ban) to *Godfray et al. 2014 Proc R Soc B 281:20140558*

Finally, Dr Beekman addressed the Avaaz argument that the honeybees are going extinct and that there will be a pollinator crisis. She stated that the number of managed colonies in the US is now half what it was in the 1950s, but has been stable since 2000. However, global colony numbers have increased over the same period. In those places where the bee colony numbers have decreased, causes may include the spread of pests and parasites, such as the *Varroa* mite, changes in land use, improper pesticide and herbicide use, ageing of the beekeeper population in Europe and the US, and lower market prices for their products and services.

 She concluded that honeybees are not going extinct any time soon, although many other bee species have gone extinct or are threatened with extinction. She advised that as Australia relies heavily on honeybees for pollination, and the arrival of *Varroa* seems inevitable, we had better prepare for its arrival.

Clearly there is much more research needed in this complex field.

Anne Wood