

Insects and medical Research

- For over a century, lesser fruit flies (namely, *Drosophila melanogaster*) have been used as tools in genetics and also in studies on developmental biology.
- In the medical arena, for example, such flies have helped to unravel the genetic basis of various birth defects in humans.
- They are also currently being used to model Huntington's disease, Parkinson's disease and other neurodegenerative disorders of the human nervous system.

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- Their value in modern genomic studies is widely recognised, and up to **77 per cent** of human disease genes have been shown to have near equivalents in the *Drosophila* genome
- Larvae of the **greater wax moth** are widely used in **medical and veterinary** research, in place of small mammals, for modelling the progress of microbial infections such as black death or plague (caused by the bacterium *Yersinia pestis*), melioidosis or Whitmore's disease (caused by the bacterium *Burkholderia pseudomallei*) and tularemia (caused by the bacterium *Francisella tularensis*).

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- The suitability of wax moth larvae in such studies is enhanced by their tolerance of elevated temperatures that match the human core (body) temperature of 37°C.
- The larvae are similarly suitable for modelling fungal pathogens of humans, including the causal agents of conditions such as aspergillosis, candidiasis and cryptococcosis.

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- Wax moth larvae are also suitable for *in vivo* testing of the pathogenicity and toxicology of microbial organisms.
- Finally, insects are also being used as tools in various novel research areas, both medical and non-medical. Examples include:
- Studies of **cockroaches**, **leaf-cutter ants** and **locusts** as possible sources of antibiotics, for example, to combat superbugs such as methicillin-resistant *Staphylococcus aureus* (MRSA).

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- The use of **braconid wasps** (namely, the American species *Microplitis croceipes*) and **honey bees** – dubbed ‘**sniffer wasps**’ and ‘**sniffer bees**’, respectively – to **detect drugs and explosives**, and possibly also in the future to detect the presence of **diseases in humans**.
- Neurological studies of **collision avoidance in flying locusts**, which might aid the development of **innovative robotics** relevant to the automotive industry.
- Studies into the consequences of weightlessness in space, using adult lesser fruit flies