

Koch's postulates – Teacher

Background information

Robert Koch (1843 – 1910) was a German physician and is considered one of the founders of microbiology. He is famous for his work on tuberculosis, cholera and anthrax and for the development of Koch's postulates.

Koch's postulates are four criteria designed to establish a causal relationship between a microbe and a disease. Koch originally designed the postulates to establish the cause of anthrax and tuberculosis but they have been generalised to other diseases.

In order to link a microorganism causally to a disease, Koch postulated that:

1. The microorganism must be found in abundance in all organisms suffering from the disease, but not be found in healthy organisms.
2. The microorganism must be isolated from a diseased organism and grown in a pure culture.
3. The cultured microorganism should cause disease when introduced into a healthy organism.
4. The microorganism must be reisolated from the inoculated, diseased host and identified as being identical to the original microbe.

Not all of Koch's postulates will hold true for every disease, for example asymptomatic or subclinical infection carriers are known to exist for many diseases, rendering the first postulate inaccurate. However, despite some limitations, Koch's postulates are useful in helping determine the cause of some diseases, especially when more than one microbe may be the possible causative agent.

Relevance to plant biosecurity

Plant scientists need to determine the cause of a specific disease before they can successfully manage or eradicate it. Koch's postulates can play an important role in the diagnosis of plant diseases.

Activities for students

- Read an interview with Dr Gretna Weste (1917 – 2006), an Australian botanist, to see find out more on her work with plant diseases and how she used Koch's postulates. This interview is provided by the Australian Academy of Science and can be found at <http://www.science.org.au/scientists/gw.htm#5>. The section of particular interest is called "Why and how would take-all fungus infect Australian wheat?"
- Conduct an investigation to demonstrate Koch's Postulates. Student worksheets and experimental methods can be found in many senior biology texts and online. See below for a useful link.

More information

<http://www.crcplantbiosecurity.com.au/program/diagnostics>

<http://www.saps.plantsci.cam.ac.uk/worksheets/ssheets/ssheet18.htm>

<http://www.science.org.au/scientists/gw.htm#5>