Explanations in science

Explanations are very important in science. It could be suggested that a large part of what scientists do is designed to provide explanations – explaining how and why things happen.

What is an explanation? – a simple definition would be an answer to a '**why**' question.

What makes a good explanation? – a good explanation satisfies its audience.

What makes *a good scientific explanation*? – a good scientific explanation is one that would satisfy most scientists!

What criteria do scientists use when judging explanations?

In general explanations in science are expected to

- be ***logical***
- be ***relevant*** (so they answer the actual question posed)
- be *consistent* with available ***evidence***
- draw upon ***accepted*** *scientific ideas* (principles, laws, theories) about the topic
- not ***contradict*** other accepted scientific ideas

(**note** – explanations that do not seem to meet all these criteria are sometimes admitted – after all existing ideas, or interpretations of evidence, may sometimes be wrong).

Scientists also tend to prefer explanations that are simple as possible, making as few assumptions as possible. However, sometimes question can be answered at quite trivial levels, and trivial explanations may not be very useful.

"Why do 'sodium' street lights have an orange glow?"

"Because the lamps emit light that is orange."

"Yes, but why?"

BEWARE: for any answer to any question in science you can probably ask, "Yes, but why?" A 'complete' explanation (if it is possible) could get ***very*** complicated.

Think about the question '*why does it rain?*' – a 'complete' explanation would involve changes of state, gravity, solar radiation, and many other scientific ideas. Usually when scientists ask for explanations there are many things they are expecting to 'take for granted'! In order to make any progress, scientists normally have to focus on a limited aspect of a question at one time.