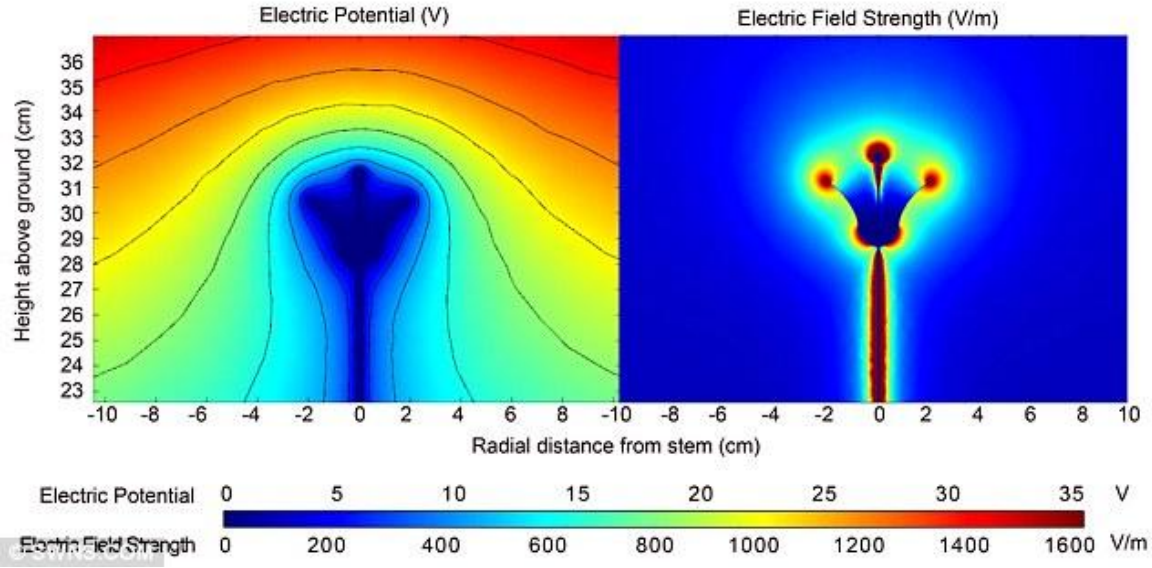
The buzz and the bees: Flowers use electrical fields to communicate with insects… with voltage indicating pollen levels
Flowers use electrical signals which work alongside their physical attributes
This enhances their advertising power to bees
Scientists studied almost 200 bees collecting pollen from petunias

Seeing a large bumblebee inside a bright flower is a common sight over the warm summer months. It has long been known that bees are attracted to the flowers by their bright colours and enticing fragrances. However, it has now emerged that flowers are using less obvious forces to attract their pollinators.



Energy: Scientists revealed today that flowers give out electrical signals to attract bumblebees to their pollen. This graph shows the electrical fields surrounding a flower

Scientists revealed today that blooms give out electrical signals to attract bumblebees to their pollen - with their voltage changing to warn others when their nectar is low.
The flowers use electrical signals which work in concert with their physical attributes - enhancing their advertising power to bees. The team, from the University of Bristol, studied almost 200 bees collecting pollen from petunias to reveal the electrical relationship for the first time.
PhD student Dominic Clark, from the University of Bristol's School of Biological Sciences, said: 'Flowers are like giant advertising billboards for bees.

'We have known for a long time that flowers use colour and smell to advertise to their pollinators.
'More recently though, it is being discovered that flowers take advantage of more and more of their pollinators' senses to send their messages.

Connection: The electrical signals work in concert with the physical attributes of the flowers to attract the bees

'There is a bat-pollinated vine for example, with flowers that change shape when they're empty of nectar so that they appear different to the bat's echolocation radar and the bat can avoid them.

'We believe that the electric field is a previously unappreciated source of information for insects like bees and the plants they interact with. 'This ability might not be confined to bumblebees.'

Professor Daniel Robert, from the University of Bristol, who led the research, said differences in electrical charges allowed flowers and bees to communicate. He added: 'The last thing a flower wants is to attract a bee and then fail to provide nectar; a lesson in honest advertising since bees are good learners and would soon lose interest in such unrewarding flowers.

'The co-evolution between flowers and bees has a long and beneficial history, so perhaps it's not entirely surprising that we are still discovering today how remarkably sophisticated their communication is.' The research, published in Science Express, took the team three years to complete and involved watching each bee visit a flower up to 50 times.

Attraction: This graph superimposed on a video shows the electrical signal emitted from a flower as a bee approaches and lands on the plant

Fascinating: As the bee gets closer to the flower, the voltage emitting from the bloom increases

Signal: With the bee inside the purple plant, the voltage level reaches its highest peak

Plants are usually charged negatively and emit weak electric fields. Bees acquire a positive charge as they fly through the air. No spark is produced as a charged bee approaches a charged flower - but a small electric force builds up to potentially convey information. The researchers placed electrodes in the steams of petunias, discovering that when a bee lands, the flower's charge changes and remains different for several minutes. It is believed that this could be a way to warn bees that the flower has been recently visited, meaning the nectar content is low.

Bees are also able to tell the difference between different floral electric fields - knowing when a flower's charge has changed. It is not yet known how bees detect the electric fields but researchers believe hairy bumblebees bristle up under the electrostatic force.

Dr Heather Whitney, a co-author of the study, said the discovery of electric detection had opened up a 'whole new understanding' of insect and flower communication. She said: 'This novel communication channel reveals how flowers can potentially inform their pollinators about the honest status of their precious nectar and pollen reserves.'