

Darwin's *Drosera rotundifolia* experiments

Among the experiments conducted by Charles Darwin at his home Down House in Kent, were several that focused on leaf response to the placement of objects on the carnivorous plant, *Drosera rotundifolia*, which Darwin had come across while walking in Sussex heathland. Here is an extract, describing such an investigation, from his book, 'Insectivorous Plants', which was published in 1876:

'Particles of meat, dead flies, bits of paper, wood, dried moss, sponge, cinders, glass, &c., were repeatedly placed on leaves, and these objects were well embraced in various periods from one hr. to as long as 24 hrs., and set free again, with the leaf fully re-expanded, in from one or two, to seven or even ten days, according to the nature of the object. On a leaf which had naturally caught two flies, and therefore had already closed and reopened either once or more probably twice, I put a fresh fly: in 7 hrs. it was moderately, and in 21 hrs. thoroughly well, clasped, with the edges of the leaf inflected. In two days and a half the leaf had nearly re-expanded; as the exciting object was an insect, this unusually short period of inflection was, no doubt, due to the leaf having recently been in action. Allowing this same leaf to rest for only a single day, I put on another fly, and it again closed, but now very slowly; nevertheless, in less than two days it succeeded in thoroughly clasping the fly.

When a small object is placed on the glands of the disc, on one side of a leaf, as near as possible to its circumference, the tentacles on this side are first affected, those on the opposite side much later, or, as often occurred, not at all. This was repeatedly proved by trials with bits of meat; but I will here give only the case of a minute fly, naturally caught and still alive, which I found adhering by its delicate feet to the glands on the extreme left side of the central disc. The marginal tentacles on this side closed inwards and killed the fly, and after a time the edge of the leaf on this side also became inflected, and thus remained for several days, whilst neither the tentacles nor the

edge on the opposite side were in the least affected.’

Carnivorous plants are mostly found in moist environments where soil nutrients are often washed away leaving a nitrogen-poor soil. They have adapted to this environment by developing a variety of lures and trapping mechanisms to capture flies and other insects. Once caught the plants digest the protein in the insects’ bodies as a replacement for the lost nitrogen. Darwin was fascinated by the diverse trapping mechanisms he found in this group of plants and set about studying them. The results of his work were published in 1876.

For the experiment described earlier Darwin used living samples of *Drosera rotundifolia* and placed a variety of objects on the leaves. These objects included paper, glass, meat, cheese, human hair and even a toenail. You too can replicate his experiment by placing similar objects on the leaves of a *Drosera rotundifolia* and recording the responses. One question you might want to ask is do you find a relationship between the protein levels in the placed object and the level of leaf inflection observed in response?

Good luck with your experiments. We would like to hear how they went please email dawn.sanders@kcl.ac.uk with your observations.

For further information on Darwin’s insectivorous plants book please go to:

<http://charles-darwin.classic-literature.co.uk/insectivorous-plants/>

Authors

Dawn Sanders Centre for Informal Learning and Schools,
King’s College, London.

Michael Holland, Chelsea Physic Garden, London.