
Doing Darwin's experiments



Fly traps and sundews

Activity 1b: Design your own insectivorous plant

Subject: Science

1 hour

Suggested preparation

Presentation:

[Doing Darwin's experiments](#)

What do I need?

Letter 8719: Darwin to Mary Treat, 1 Jan 1873

Letter 8989: Mary Treat to Darwin, 28 July, 1873

Letter 9005b Darwin to Mary Treat, 12 Aug, 1873

Letters questions: [Is it a plant or an animal?](#)

[Who's who?](#)

Darwin was fascinated by carnivorous plants (he referred to them as insectivorous) and conducted many experiments into their feeding habits. But what exactly is an insectivorous plant? Use Darwin's letters to help you find out and make a classification flowchart, showing your findings.

What do I do?

1. Read through the letters and answer the questions.
2. Make a list of the features that define whether something is a plant or an animal and decide which category an insectivorous plant fits into and why.
3. Create a classification flowchart for an insectivorous plant, using guiding questions, e.g. Is it alive? Does it eat other life forms? Does it synthesise its own food?

Letter 8719 Charles Darwin to Mary Treat 1 Jan 1873

Down,
Beckenham, Kent.
Jan 1. 73

Dear Madam,

I am very much obliged for your kind letter; & should esteem it a great favour if during warm weather next summer you will observe two points for me in *Drosera filiformis*. Namely to place some flies within quarter of an inch of the apex of the leaf & observe whether it bends at all after an interval of a day or two. Secondly to rub with a clean needle a few of the glands with some little force, and to touch each gland half a dozen times; & then observe whether in the course of an hour or two the hairs or filaments bearing these glands become incurved. I am glad to hear that *D. filiformis* catches only small insects, as I suspected this. I have observed with care several other species of *Drosera*...



With my best thanks
I remain Dear Madam
Yours very faithfully
Charles Darwin



Charles Darwin

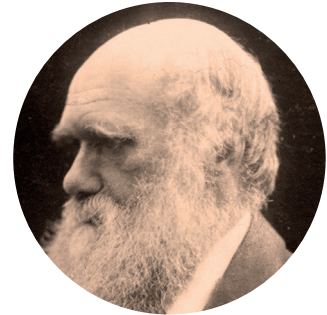
Letter 8989: Mary Treat to Charles Darwin, 28 July 1873

Vineland, New Jersey.
July 28, 1873.

Mr. Darwin—

Dear Sir,

... I carefully removed strong plants away from atmospheric agitation, and found they would bend toward a struggling fly. I pinned living flies within a quarter of an inch of the leaf, in less than an hour the flies legs would become entagled in the filaments. I then tried them three quarters of an inch from the leaves. The leaves bent perceptibly away from the light toward the flies, but did not reach them at this distance. I tried bits of raw beef with the same result. I could see no effect produced upon the glands by rubbing them with a needle; perhaps I did not understand just how you wished it done.



But the most perfect, active fly-trap among these plants is *D. longifolia*. In less than three hours a vigorous healthy leaf will fold completely around a struggling fly, and bits of raw beef will become so enfolded in the leaf as to be completely hidden from view, while mineral substances—dry bits of chalk, magnesia and pebbles made no impression on the leaves. I wet the chalk in water, the filaments soon began to clasp it, but soon unfolded again, leaving it free on the blade of the leaf.

Yours very respectfully

Mary Treat.



Letter 9005b Charles Darwin to Mary Treat, 12 Aug 1873

Aug. 12. 1873
Down, Beckenham, Kent

Dear Madam

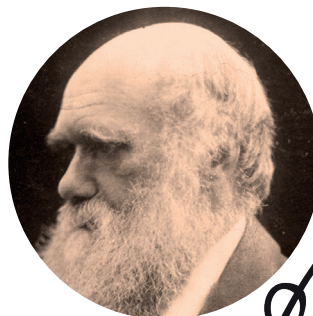
I am very much obliged to you for having so kindly sent me an account of *Drosera filiformis*.

Your statements will be very useful to me in my short account of this species. I am familiar with what you state about *D. longifolia* & *rotundifolia*.

I have just lately been working hard for the last 2 months on the latter species; & before long shall draw up an account of their digestive powers & action under various stimulants. If I were in your place I should be afraid to publish the statement about the *Drosera* bending towards flies or meat which they did not touch; unless I had tried the experiment many times, under the most rigorous precautions; for I am convinced that no botanist wd believe the statement unless all the precautions taken were described in detail.

With my best thanks, I remain dear Madam
yours faithfully & obliged

Ch. Darwin



Charles Darwin

Letter questions:

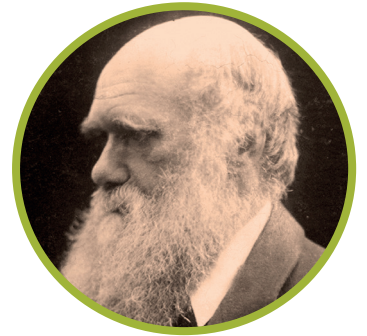
1. In the letters from Darwin to Mary Treat, what is Darwin interested in finding out about *Drosera filiformis* and why?
2. What does he think that movement on the glands of the leave will cause to happen?
3. In letter 8989 what does Treat say happens to the plants even though they are not touching food? Why might this be unusual?
4. Why does Darwin caution her to repeat tests?

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Who's who?

Charles Darwin

Charles Darwin (1809-1882) was a naturalist who established natural selection as the mechanism for the process of evolution. He joined the voyage of HMS *Beagle* when he was 22, a journey he described as the 'most fortunate circumstance in my life'. He wrote to around 2000 correspondents all over the world as a means to inform his research. Most famously he published *On the Origin of Species* in 1859, but he researched and wrote extensively on natural history throughout his life.



Joseph Hooker

Joseph Dalton Hooker (1817–1911) was a botanist who worked chiefly on taxonomy and plant geography. Hooker accompanied James Clark Ross on his Antarctic expedition (1839–43) and later publishing the botanical results of the voyage. He was appointed palaeobotanist to the Geological Survey of Great Britain in 1846. He travelled in the Himalayas (1847–50) and introduced many plants to Britain for the first time. He became Assistant director of the Royal Botanic Gardens, Kew from 1855 to 65 and was made director in 1865. He held the post for 20 years and was knighted in 1877. He was a trusted colleague, close friend and confidant of Charles Darwin for most of his life and exchanged 1,400 letters with him.



Doing Darwin's experiments: Who's who?

Mary Treat

Mary Lua Adelia Treat (1830-1923) was born in Trumansburg, New York but after marriage moved to Vinelands, New Jersey. Her studies of the natural world gave her respect and reputation during her lifetime. Like Darwin she worked at home, creating what she referred to as her 'Insect Menagerie'; an enclosed space from which she observed the minutiae of the natural world around her. After Treat separated from her husband, Dr Joseph Burrell Treat, in 1874, she supported herself by writing popular science articles for widely read magazines and published 5 books. Treat carried out experiments and collected plants and insects for leading naturalists including Asa Gray and Charles Darwin. Darwin commented: 'Your observations and experiments on the sexes of butterflies are by far the best, as far as is known to me, which have ever been made.' Treat exchanged at least 15 letters with Darwin and he acknowledged her work in his book *'Insectivorous Plants'* (1875).



Image of Mary Treat © Vineland Historical and Antiquarian Society