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Letter 7346 Darwin to Francis Darwin

18 October [1870][f1](#)

The Moat | Tunbridge

Oct 18.

My dear Frank

I enclose cheque for £115: [f2](#)I expected of course to have to aid you as you were so much longer than usual at Cambridge, but the above is rather more than I expected; & what is worse I do not see how you can hold out for this quarter with only £46.⁵⁰.—[f3](#)But never, for God's sake, conceal debts from me, & tell me now, whether you owe any more: tell me this & think deliberately when you acknowledge the cheque to Down, where we return on Thursday morning. [f4](#)

As you have not kept accounts it is of course impossible for you know how you have overspent your income.— Let me urge you to make a point of conscience (& then I know it will be done, i.e. if I can persuade you that it is a duty) to keep accounts.— You cannot be sure about paying your debts if you do not, nor can you tell how to economise & spend your income to best advantage. I have never known a man who was too idle to attend to his affairs & accounts, who did not get into difficulties; & he who habitually is in money difficulties, very rarely keeps scrupulously honourable, & God forbid that this sh^d. ever be your fate.— If you once got into habit of attending to your money, & this implies keeping accounts, you w^d. feel it very little trouble. My father, [f5](#) who was the wisest man I ever knew, thought it the duty of every man, young & old, to keep an account of his money; & I very unwillingly obeyed him; for I was not always so bothersome an old fellow as I daresay I appear to you.—

We have been to Leith Hill & came here yesterday & have enjoyed ourselves; though mamma is not very well to day.

This is a wonderfully curious & pretty place. [f6](#)

Your affectionate Father | Ch. Darwin

Footnotes

[f1](#) The year is established by the references to the Darwins' holiday at Leith Hill Place and Ightham Mote (see nn. 4 and 6, below).

[F2](#) CD listed the amount for "F[rank]" under "Boys" in his account book (CD's Classed account books (Down House MS)).

[F3](#) Francis had been at Trinity College, Cambridge since 1866; he graduated in 1870 (\ODNB\), taking third place in first class honours in the natural science tripos in December (\The Times\, 19 December 1870, p. 6).

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F4 The Darwins returned to Down on Thursday 20 October 1870 ("Journal" (Appendix II)). No letter from Francis acknowledging the cheque has been found.

F5 Robert Waring Darwin.

F6 The Darwins were staying at Ightham Mote, a moated medieval manor house, which is in fact closer to Sevenoaks than to Tunbridge; they had left Down on 13 October, going first to Leith Hill Place ("Journal" (Appendix II)).

Letter 10517 Darwin to Francis Darwin

29 May 1876

Hopedene
Monday 30th

S My dear F.

You c^d. make aggregation less intense by using *much* weaker sol. of C. of Ammonia; or by putting minute splinters of glass on glands.

If your case of Teazle holds good it is a wonderful discovery. Try whether pure water or weak infusion of raw meat will bring out the protoplasmic masses.

The closest analogy seems to me that of an independent Amoeba or Foraminiferous animal &c which feeds by involving at any point of its gelatinous body particles of organic matter & then rejecting them— A mass of rotting insects would give such particles.— Perhaps this is your view. But I do not understand what you mean by a resinous secretion becoming slimy++, or about *living* insects being caught. I would work at this subject, if I were you, to the point of death.

If an Amoeba-like mass comes out of cells and catches dead particles & digest them it w^d. beat all to fits true digesting plants.

I never saw anything come out of quadrids of Utricularia & I c^d. hardly have failed to see them, as I was on look out for secretion. It w^d be a grand discovery. Could you chop up or pound++ scraping from raw meat, or better ^{1/2} decayed wq meat & colour the particles first, & then you c^d see them in the protoplasmic masses; for surely you could hardly expect (unless there is a distinct hole)++ that they sh^d. be withdrawn within cells of glands.— The case is grand—

Are any orifices or orifice visible in cut-off summit of gland? For heaven sake report progress of your work.—

I see in last G. Chronicle another man denies that Dionaea profits by absorption & digestion, which he does not deny. It seems to me a monstrous++ conclusion++— But this subject ought to be investigated

|
Especially effects on seed-bearing— Teazles good. for this—

Yours affection^{ly}— | C. Darwin

No doubt marginal glands of Drosera answer to glands on serratures of other leaves. Probably glands w^d. be found on apices of spikes of Dionaea in bud-state.

Footnotes

Word++ indicates a place where a footnote will be added

Letter 11586 Charles Darwin to Francis Darwin

2 July [1878]

Down, | Beckenham, Kent. | Railway Station | Orpington. S.E.R.

July 2^d

My dear F.

Murie has written to me & you, asking me if you were away to look over your revise, which I have done & found nothing to correct & no criticism to make to you, except that one or two sentences might have been clearer. The whole++ strikes me as excellent & conclusive.— The revise is marked "25 copies": had you not better get more?—

I have sent cheque to a repeated bill from Griffin for 2.10.10— A thermometer has come from Kew, for which I have also paid,— I think 1.11.0.— There is a "*certificate*" with the thermometer.—

I will now go through your letter, but first will say that Bernard seems quite well, though temper not quite so placid as formerly. He has just started very happy & eager in "boobo" with Miss Dorcy & Bessy to the Station.

I think you certainly had better call on Semper; you can say that I asked you to do so to give my very kind remembrances. You know that he has lately returned from America—has travelled much in Philippines & Malay Arch.—has worked on same subjects as Balfour—is a first-rate man, & I liked him, but he is said to have bad temper & to think that everyone is depreciating him.— He dedicated a magnificent essay to me on eyes of a Mollusc,—++ Onchidium.—

I have written to Kew about Porliria: do++ the leaves look like silver under water? Can they shut up to check evaporation; something of this kind occurs (Duval-Jouve)++ with certain grapes: you could try (if you could get permission) by enclosing small branch in well wetted bottle with wet sponge.—

I am glad to hear that Sachs tries "fools experiments".

Do what you think fit about the £10 Telescope, & any other instrument; only do not waste money, as you know your honoured father hates this.

I go on maundering about the pulvinus, cushion or gland whichever you call it, & from what I have seen roughly in the petioles of the Cotyledons of oxalis, I conclude that a pulvinus *must* be developed from ordinary cells, which secrete water into the inter-cellular spaces on the concave side of a bending organ; & that a pulvinus is developed only when the bending has to be continued for a period++ after growth has ceased or nearly ceased.

The cotyledon of Oats bending towards light would, I think, do for observation, & I much wish that you w^d. try either there, or here whether by cutting thin sections about ^{1/10th}. of inch above the soil of 2 or 3 cots:, you could measure under high power the diameter of the cells, & observe whether their diameter is the same all round. If you can ascertain their++ average diameter, then cut sections on the most bent part, at same height above soil as before, & see if cells on convave side++ of the stem where bent through heliotropism (or apogeotropism) are smaller than those on convex side.

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I cannot remember whether such observations have been made, but I think that they are worth making. If there is++ no such action, as I imagine how++ the deuce can a pulvinus be developed in all sorts of Families?

I am trying a slight modification of your dodge; & putting night-light under large bell-glass, standing on little wooden bricks to let some air come in, & I have succeeded in keeping jar of water for many hours between 75⁰ & 80⁰ F;

I have thanked Murie & returned revise.

Footnotes

Word++ indicates a place where a footnote will be added

Letter 11628 Francis Darwin to Charles Darwin

24 July 1878

Botanisches Institut
Würzburg

July 24/78

My dear Father,

I have tried watering Porliera out of doors, I gave four small cans full in the day & next morning it was wide open though for several days before it had been shut. The pot-plant is very unhealthy I am afraid as its leaves are dropping off at the stalk.

I had a little talk to Sachs about heliotropism & he thinks it is no good to moulds to be heliotropic, he says that moulds which you find inside wallnuts or apples are highly heliotropic. He does not remember ever having seen a mould heliotropic in a state of nature but only when you bring them into unnatural conditions: he says potato underground stems are sensitive to light so that they won't grow or hardly at all in light, but he doesn't know whether they are heliotropic or not. I don't quite know what part he means I will talk some more. He says he agrees with Nägeli to a large extent in thinking that certain facts cannot be explained by saying that they are useful or not useful, but he thinks they exist as properties of plants like the power of assuming a certain form is of a crystal. If all plants were heliotropic & none apheliotropic, one might believe this. Stahl is working at the effects of light on the movements of swarm-spores, & he says he can make them heliotropic or apheliotropic as he likes, if puts some in bright sun & others in darkness & then put them both in diffused light, the sun-ones go to the darkest side & the dark ones to the lighter side.

July 25th Something or other stopped me finishing. I was rather seedy last night & didn't appear at the laboratory & this morning Sachs came all the way to see how I was, & drove me to the Labor in his drosky, & was very kind wanting to send me books & red-wine which is here the cure for all evils. I am all square this afternoon though rather too floppy to work. I will talk to Sachs about roots & geotropism. I was very glad to find that Sachs is dead against all the people that find the Descendenz theory in Ray Lamarck, Goethe &c. Sachs says that he believes some ferns of the family Marratiacea+e sleep, & some plants of the family in which Canna is. I think in my list I told you that Guaiacum officinale looks as if it ought to sleep but seemed to be ill, I thought it was a Leguminosa+e, but it is a Zygophyllacea+e & in a lecture Sachs said it slept. He says the pale joint in the leaf sheath of grasses is analogous with the movement organs of mimosa &c but he doesn't know whether they move. He thinks that we have worked at bloom to some extent from a wrong point of view & he believes that leaves want to keep dry in order that they may keep their stomata open to breathe. But why are they so idiotic as to have stomata which shut when they are wet. Perhaps they do that in order to keep their intercellular spaces from being water logged & then found they were stifling themselves & found it a better plan to keep the water off altogether. Or perhaps those leaves produced bloom whose stomata did not shut well in wet. He says that nerves have no bloom & also no stomata. He can give me two references to papers where the number of stomata on the upper & under side of lots of leaves is given, & by seeing about the bloom in these one might make out something. *T. resupinatum* ought to help us, where the stomata differ on the two sides.

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The result:

ANNOTATIONS

`1.1 I have . . . the stalk.] *crossed pencil*
`1.00 next morning . . . shut.] *scored red crayon*; "Porliera" *added red crayon*
`2.1 I had . . . heliotropism 2.00] "Heliotropism" *added blue crayon*
`2.00 he says . . . heliotropic. 2.00] *double scored red crayon*
`2.00 he says . . . conditions: 2.00] "Theory" *added red crayon*
`2.00 they won't grow . . . crystal. 2.00] *crossed pencil*
`2.00 Stahl . . . lighter side. 2.00] *scored red crayon*
`3.00 Something . . . said it slept. 3.00] *crossed blue crayon*
`3.00 I think] *opening square bracket pencil*
`3.00 I think . . . to be ill, 3.00] "& Bloom" *added red crayon*
`3.00 Zygophyllacea+e . . . it slept. 3.00] *double scored blue crayon*
`3.00 He says . . . move 3.00] "Bloom" *added red crayon*
`3.00 He thinks . . . to breathe 3.00] "Bloom" *added blue crayon*
`3.00 But why . . . altogether 3.00] *double scored blue crayon*
`3.00 Or perhaps . . . something. 3.00] "M. Mer experiments about keeping leaves closed for week under wet" *added pencil*
`3.00 *T. resupinatum*. . . sides. 3.00] *double scored red crayon*

`Top of letter: "Bloom & General Theory"

Letter 12152 Darwin to Francis Darwin

12 July [1879]

Down, | Beckenham, Kent. | Railway Station | Orpington. S.E.R.

D July 12th

My dear F.

I am glad you have tried touching cells, for I sh^d. never have rested until hearing a result of some kind. Was the point kept in contact for some little time? It rejoices me that the Phys. (I forget name) has looked at Dipsacus; I have always thought that you ought to go with that subject.— W^d. it worth while to show him aggregated matter in Drosera in movement, ie in early stage of aggregation? I doubt whether you will succeed in Drosera by contact, as gland only sensitive part & seat of movement chiefly at base of filament.

I have tried in peat++ radicles of Pisum with caustic above & below. There was no difference between the 10 control & 10 touched *above* in their geotropism; but I hardly looked early enough. But of the 10 touched *below*, 3 curved in *opposition* to geotropism—2 or 3 were straight & 5 or 6 geotropic *in slight degree*; so contest wonderfully great.

I can see it will be impossible to try gold-beaten skin on mustard radicles.

It has pleased me that I think I fully understand cause of “Sachs' curvature” of radicles— too long to explain by letter.

I have finished long chapter on Sleeping Plants & sent it to M^r Norman to copy & diagrams to M^r Cooper.—

I am now looking over piles of notes on Heliotropism. By the way I am becoming frightened at changing so well-known a term as Heliotropism & cannot bring myself yet to write “Helism”. Or “Proshelism”.. I am more perplexed than ever about life of D^r. D: Hen thinks it very dull, & wants it much shortened & otherwise arranged. Erasmus likes it. Your mother wants parts shortened.— I shall take it on Aug. 1st to Lakes & finish it there.

I am tired— Ever yours | C. Darwin

(What are your plans, if you have any, you degenerate Darwin.) Abbadabba flourishing & drumming

Footnotes

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