the radicle is coloured brown whilst the hypocotyl & cotyledons is left uncoloured. Now when a seedling Megarrhiza with the plumule just reaching the surface was thus treated, the whole radicle (+ hypocotyl) & the whole of the tubular petioles (densely covered with root hairs) became brown whilst the plumule was quite uncoloured. Therefore I think it certain that the tubular petioles act functionally like a root and that the cotyledons are hypogean. The sole use of this

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DOWN,
BECKENHAM, KENT.
RAILWAY STATION
ORPINGTON. S.E.R.

Jan 19. 00

My dear Gray,

I have been greatly interested with the Megarrhiza seeds which you so kindly sent me. You have been misinformed about their germination, for I think you cannot have watched the whole process. Some were placed by me on, and others half an inch beneath the surface, and others deeper,

but none of the cotyledons were lifted up. One seed on the surface was a little tilted by the root not penetrating the ground, but this often occurs with all kinds of seeds. The petioles of my specimens were not stiff enough to bear the weight of the seed. What takes place is that the radicle bends down & penetrates the ground, but grows only to a length of about half an inch or less (length rather doubtful as I did not wish to kill specimens by making sections). When of this length its growth is arrested, and the lower ends of the tubular petioles grow quickly & penetrate the ground just like a root to a depth of nearly 2½ inches; then their growth ceases, and now the radicle takes up the game & grows very quickly. In every case the base of the radicle lay 2½ inches beneath the surface. You probably know that if ordinary seedlings are placed in solution of permanganate of potassium

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wonderful manner of growth which occurs to me is to hide the enlarged root, at least at first, beneath 2½ inches of soil as a protection against enemies. When my plants are two or three weeks old I will cut a slice from the root, and taste it & test it for starch. Now can you tell me whether the plant is an annual or perennial? When the root has become huge does it come to the surface, and is

It there hard, and is it then bitter?

I wonder whether it is attacked by beasts birds insects or slugs in California?

It is has been a great grief to me that not one of the seeds of Ipomoea hepta phylla has germinated: my gardener opened some & found them rotten. I hope I haven't wearied you much

Ever, my dear Gray.
Yours sincerely

Charles Darwin