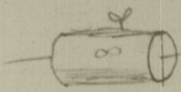
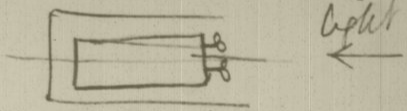
Af 79

If on a Sachs Geo Heliotropism revolver one grew seedlings, which sleep well one would be able to see whether the direction of the light has anything to do with it -



Again if one had a revolving cylinder in a box

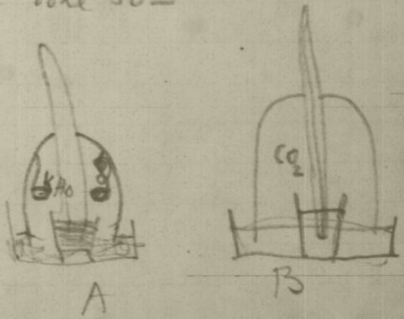


they ought to sleep, & this would prove it to be epinasty & not geotropism which keeps leaves horizontal

(D's idea is that the cots are positively heliotropic & try to move up, but are prevented

by epinastic: but in this case when dark comes they ought always to bend down

Wolls experiments of Assimn might be much better done I think: supposing CO_2 dyd. come from roots, it was always being sucked out by the KHO - it ought to be so -



then test starch in parts
in the air. You would thus
see whether the presence or absence
of CO_2 in one part made any
difference in another part

.

. If the 2nd roots bend down when primary roots are cut off then the same thing done on the clinostat would prove that the 2nd roots had a sense of the direction of the axis — apart from the sense of gravity

Nectar

Kidney beans. I must test for cane sugar as well as grape

C.D. has read somewhere of a a mothe-collector (who cared nothing about nectar) who said that mothes came to the nectar ore Glyceria fluitans {see Cuckham School Pond} as this is a nemophil + also a water plant it cannot want to attract or repel insects.

Riley's Report Dep of Agriculture Washington D.C. 1879

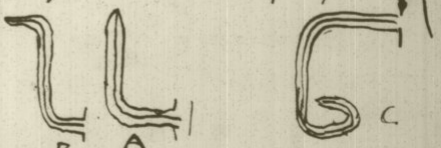
p 10 Moths visits honey gland on leaves of Gossypium also on glands on peduncle above pods on Dolychos also on sweet candy-like from flowers of Paspalum leaves a grass

Hygroscopic bending of Stipa & Broom pods with heat compared with Stipa & some mechanical thing like catgut would be worth doing

---

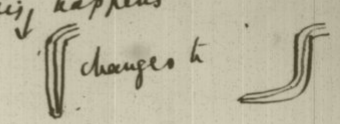
Frank. Beiträge

I think his experiments of fir branches absolutely disprove that epinasty - is what makes them horizontal - If epinasty means any thing it means that the upper side tends to grow as much quicker as geotropism tends to make the lower side - Therefore when a shoot is put vertically up

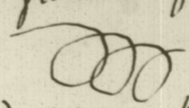


it would change from A to B, but when put vertically down it should go as C. This test is what does

happen with Belladonna shoots put upside down horizontal. (Can this somehow be the same as the tropism mooted which Frank describes when a fir shoot is upside down) - But according to Frank this doesn't happen in all cases - but this happens



What would happen with a Klinostat & a shoot of belladonna - It ought to grow so for ever for



there would never be any thing to balance its spinarity
By this way one could distinguish between De Vries mechanical balancing & Frank's idea which I will call choice - or one might call it Franks - geopolarity - to mean that it regulated itself by geotropism

Etiolation –

Put a seedling so, with cotyledons

in a dark box and see whether darkening the cotyledons makes the hypocotyl grow – It ought if my idea that it is a wish to reach the light – (done by Godlewski) B·2 1879

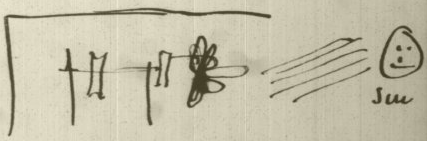
continuation of Epinasty -
For if a leaf or shoot is only
horizontal because it balances
between epi & apogeotr then in
the Klinostat it ought to curl up
epinastically - but if it is choice
it ought to remain horizontal as
a vertical stem grows on vertically
in Klinostat - At least I suppose
it does - It would be very curious
to see how things nutate on the
Klinostat - When a stationary
shoot Pnutates & gets out of
the vertical is it apogeotropism
which stops that growth; & if so
the Klinostat would stop nutation

What would a plant such as De
Vries supposes balances by helio or
apheliotr - I suppose a heliotrs must
balance with apogeotr or epinasty
If it balanced with apogeotr
I presume that it would remain
as it was since geotrop & helio
would both be destroyed together

The torsion experiments might be done with Q branches of trees I think.

leaf

Now a plantain is vertical in dark; therefore a plantain plant in dark on klinostat ought to remain as it is - A plantain in the light on a klinostat growing on a box, would be lighted from above & would have no geotropism to fight with therefor it ought to go flatter than ever against the ground - What would happen if a rosette plant grown in a narrow tube of water were put with under



side illuminated & gravity destroyed - Would they twist round

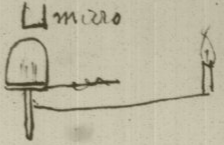
Is anything to be made out of the mechanics of estivation or of the packing of cotyledons in seeds - are they so to gain strength?

Circumnutation or Klino stat - In circumnutation what limits the movement in the various directions

In finding out what the weight goes for in the position of leaves try a magnet on the leaf- See how a magnet alters the circumnutation.

Wms Gardener says that taking off leaves makes a woody shoot lead away, try cutting off leaves on nutating branch of Movements of Plants

Circumnut" of unicellular organs - moulds under micro scope with a revolving candle



It might help to upset De Vries Root hairs without such an arrangement -

Perhaps chlorophyll can be made without K but not. Destroyed ie turned into starch -

Try germinating peas in dark with and without K

This is connection with the dark green colour of vegn with too little K, or too much N.

Spanish Chestnut –
zig zag growth of branches
arious fact – (makes the
tree compact –)

Weep ash at Leith Hill
branches turn up at end
when reach ground, like
my Lysimachias growing
along the ground

R. rubus saxatilis cuttings

see Bakers letter in Organbild Pamp. folio

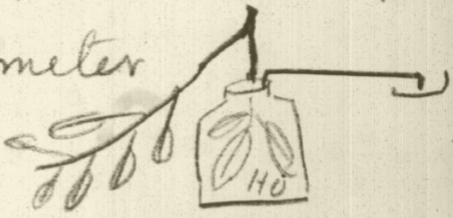
Why do deciduous trees defoliate what good is it to them? Can it be that they need not be so strong – & to resist snow – ... Or is it connected with shade –

How do larch & fir compare in strength of architecture or material –

What deciduous shrubs or small trees

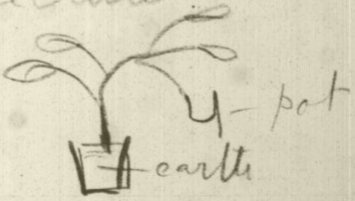
are there? But would
a small shrub be broken any
less than big one -

Suggestion about stomata. Test what opens & shuts them by potometer



then put salt in -

For lectures



then ice the pot -

If darkness is the stimulus to bending of plumule, try the effect of darkening the tip of plumule - This ought to be same part :

Dandelion corkscrew
+ split dand - effect of
alcohol, camphor, ether
Debries plasmolysis
Electricity, Heat, Light

Cut out screw - to show
contract^{n} -

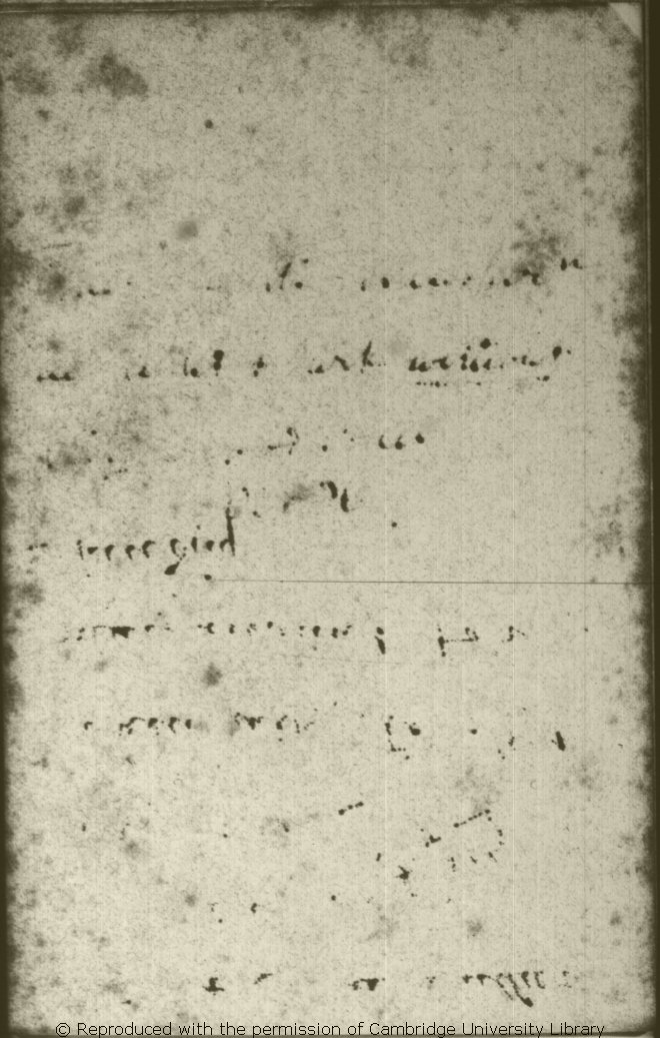
Weighing in water
and splitting - Might do
it like Hartigs xylometer
Or by the micrometer
screw dodge -

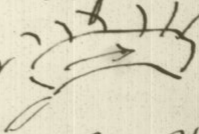
How make them sink –

Dandelions in glass tubes
fixed at angles –
Compare with free dand
watching circumn –
If stimuli 
are equal oblique things
remain where they are on
klino stat,
Try with grasses which
grow on klino, observe
geo a single grass halm

on the klino, with a
microscope - and on

Vines suggests transpir^{n}
in light & dark without
CO_2 - good idea
Oct 86.



Dionæa see whether
the inner surface
gets longer

when contracts. This
may account for
bending

General study of glands of water plants cf Dubal Jour Bull Bot Soc Fr XXIII ?130 + ERL Brit Assoc

Development of hetero style flowers —

Lathyrus ~~odoratus~~ pratensis (yellow) has fine under ground horiz runners & sigmoid bumps on

roots

Continued growth of plasmolysed things ie circles of dandelion which open at first close up afterwards

Partly done by Anna B

= Alteration in size of pith transversely

Anna B

= Weighing in water of pith

= Alteration in size of wood as measured by oil pot – with stimuli & killing wood –

Tree trunk measurer

temperature great difficulty

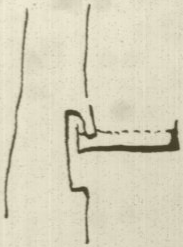
Sucking up by cut branch

see whether it can do

more than 30 inches of

H_2S -

Cut a bit out of a tree



& put eosin

seedlings

Can a shoot be stimulated when it is plasmolysed

= Fix a shoot down horizontal & plasmolyse it after hrs & before unpinned - Then unpin it & put in water will it bend -

= Experiment on period of receptivity - it must depend on period of circumnutation

= Experiment on growth of secondary roots - I think they bend up or down

much easier than
vice versâ

Rectipetalität (in horiz plane on jerk-klinostat)
Effect of bending

Growth on klino, & jerk-up

klino - mit Perlz

K coming out of leaves

CO water on leaves -

Effect of injecting water
on growth

Effect of induced current on grain-halms, on pitti – on the tip of root

= Stipa hygrometer – for stomata

= Shaking effect on transp^n in light & dark.

= Effect of cold water on leaves ie is it absorbed owing to diminished pressure – try with litmus

Order of ripening of stamens

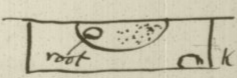
Assimilation by water plants in various things - tested by iod probe

Can leaves empty starch when plasmolysed?

Beet root - hollowed out & filled with starch!
in some French lunatic

Engelmann's bacteria
dodge – Sachs says that
land plants cannot make
starch under water. Try
whether bits of leaf of land
plant act differently to
water plant –

ii Do Bacteria avoid
a source of CO_2



How does colour of plant
affect heliotropism

Can red thuja in winter assimilate - try Engelmann

Do drops of water on leaves interfere with assimilation

Yellow clover or honeysuckle or Croton - with iod probe

Cots of hypogean plants can they give off O_2 at once?

How is the pulvinus anatomy

would it be possible to get a frog into cold-paralysis - and try them whether electr makes it contract - If it does not killing it might do so - & then would distinguish between them -

of red leaves?

Is there any bacterial
O given off by the
yellow chromoplasts
in petals -

Protopl takes O from
osmic acid - How would
this affect chlorophyll
in light and dark?
Two halves of bending
organ

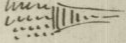
Put a leaf any leaf
on electrodes and
try what stimulus it
does say by acid.

—

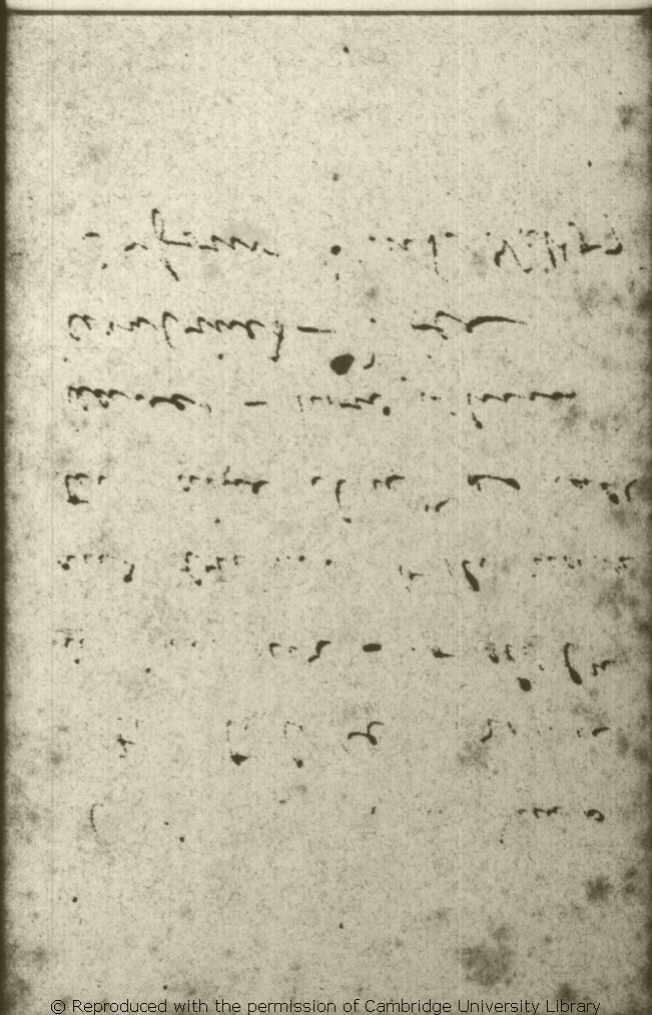
Tradescantia hair
circulation then a bit
of green leaf in with
it – light – sort
of Engelmann

Veins of leaf and
movement of food material
cutting veins

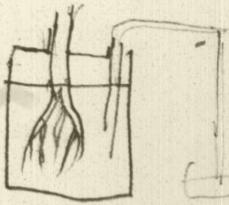
Local effect of Ca on
movement of starch

Try whether sugar solution
moves easier when made
Ca with it. 

Compare etiolated plants grown in damp with etiolated grown in dry air - If etiol^{n} and dryness both cause the same elong^{n} small leaves - how when combined - ? See Dufour Ann Sc Nat 07



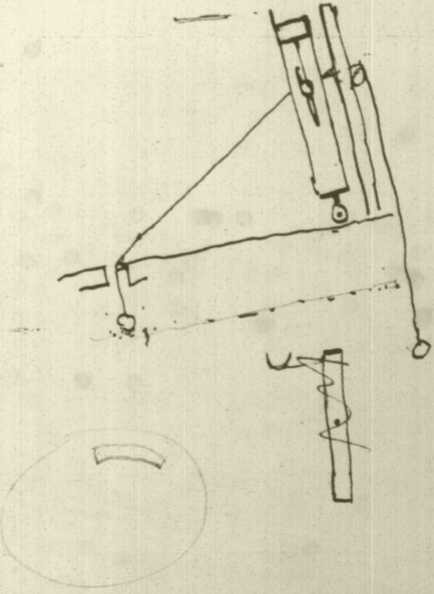
How does air pressure affect root suction



or evaporation of rooted plants

Let wood suck up nitrate solution, and then see - where it is by diphenyl - in medullary rays.

Try whether a root or stem put hor for 1' and vertical for 2" will show geotrop equally-



Try whether Drosera
can increase in N
by feeding with alkaloids
(What alkaloids -) Alkal
cannot be used by roots

Grow willow cuttings
and make the shoots
grow downwards
by hanging weights
+ by cuttings
no better than
Vocketing weeping

Grow willow cuttings
and make the shoots
grow downwards
by hanging weights
+ big cuttings
no better than
Vocking weeping

Grow 2 beans

A at 30° C

B 15

When both are 20 mm long compare volume + dry wt —

I have a lurgescent
lamp till see
bubbles then
electricity.

Plasmolyse epinastic
& hyponastic things —
Examine extensibility
of cell walls — as two sides
Thickness also —

Seotrop

See Dutrochet on effects of Syrup on Balsamic capsule; he got them full of syrup then in water & saw usually movements - Try with Seotrop[m]

—

What is effect of cold on pith swelling in water?

start geotrop

then plasmolyse

then in water +

see if curve increases

Does the slowing of growth by plasmolysis follow ~~any regular law~~ stimulus law. Say 1/pc 2, 3, 4, 5 · sol[n]s of sugar + see whether slowing goes with logarithm

Or try spectrop[y] in these sol[n]s

If temp x kills a bit of turgescent shoot what temp kills it when plasmolysed ie what temp prevents it recovering.

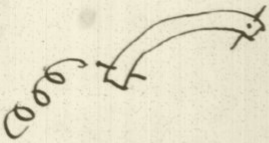
June 20/92

Respiration of wood -
suggest to Blackman
June '92

Assimiln of marine algae
eg when tide down
June '92

start a Thing growing

then electrify it



Oct 6 92

Ⓡ Engelmann Blood T

try with things in different

sorts - with land plants

- and especially reversed

as a test for respirn

Is there an optimum for lengthening of fungescent filth in water

Water plants

Water plants
bubbling in sun
rate very much
increased by alcohol

How about other
stimuli

Try the effect of alcohol
on escape of bubbles from
wood - capillary tubes
&c

done

Nov 92

Roots are ductile when decap - Wiesner Sitz Wiener 1884 part i how is cell sap -

How do they react to bending forcibly

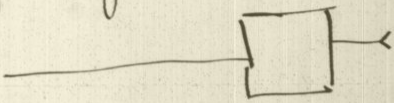
On decap

How Darwin & Noll's increase in plasmolys

Send induced Current
thro' and then try
what is isotonic -

Dict3 - Substr - Pf II[ii]

when there is no axle shading ↓



I see no reason why a single plant[x] should grow out at rt angles to light - Does it?

Assimiln of Drosera
when fed -
CO_2 assimn in Sugar
(Willis)

—

Test assim of water
plants by sucking
CO_2-less air thro water
+ nitrate -

June 2/53

Is there any relation between beaked fruits in compositae & nature of pappus - Centre of grav

BC 57. 135

Try Strontium with Lemna - oxalate in SrO different to look at from

Loew Flora 92
Since Caulerpa can stand $MgSO_4$, can it stand oxalic acid
Is this why $MgSO_4$ is a purgative

Try Sporangia of ferns
first in airless water
then in gaseous water
Cf Devaux

Engelmann's method
on plasmolysed
cells.

Tempere & Engelmann
Halo of bact

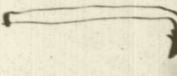
Feb 95

Black & white gelatine
on roots - like bean
+ mustard

Try helio of Narcissus
as for transmission
very easy - good
also for shock

Try Pfeffers early tips
by plasmolysing & forc
bending (Also tips of
beet roots

Feb 55

Also  glass

lip in glass fixed, at
varying angles -

Heliotr roots in cases

Try cob of avena for
curvature in salt (Moll
Wiesner) Kro when
scotroped cut transverse
ring  concave
half should behave
differently -

For Noll-Weiner try
drinin's turgor by
induced current

—

Try fern orchid
+ plasmolysing
bits of petals from
minute to min

Mar 2/95

—

Sugar culture
what sugars in
leaves - Sort of
Brown & Morris
with sugar feeding

2d Ed

Rom B.C 50 p 301

T. subterraneum

stalks grow for ever

if not reach ground

= "canomis" -

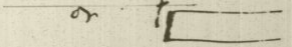
turkum end

Tq 11 qC

Emulsion looked at
microscope. - Bell off
ton leaves

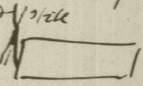
or a flap of membrane 1847

or

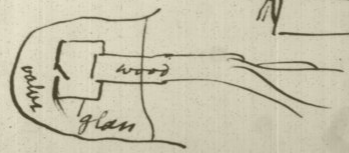


flap turning on axis

sucked/pulled



or



Feb 10 · 97

Try feeding Euglena
with very fine iron part
Euglena is apogeotaxic
∴ ought to go away
from magnet
what paper is abt
starch or nucleus
or something or kind

In Massart
Weber law with
Euglena - shunting
one prep.
Feb 21/97

mar 9. 97

Do clover leaves turn surface to dark heat -

Try constant temp for sleep (Foot)

July 21 97

Stomata on fruits

—

Effect of slow $\frac{1}{4}$ = pulling leaf. longways; ✕ ways

Oct 97

Melastoma

~~Rio~~ seeds from 2
sorts of author

see CD & JM Rack 913

Electric Stim of pith
is it prevented by
Chloroform

'93 or 94

On a latent period

Dark & light - on ? seedlings

Dionaea surface centre

Diam of wood transln

Movement of food when veins cut

Leaf-drop with intermittent

Klinostat

Ductility - Knight's machine

Temp & Gas

Sep 98

Can the acid bruchein in succulents be any help to do with shut stomata

Do they get CO_2 from ground

Spirogyra conjugate when water evap – would addition of salts do it ? Sep 98

Oct 2/98

Kohl Trans 147

Do stomata open wide on remaining leaves when others cut off – & if so is it prelim?

Oct 30 90

Try macroscopic tests for proteids on leaves for checking Laurent Godlewski &c.

Dec 12. 98

Before reading H Brown's notes –

To try effect of assimil^{n} on temp of leaf – must have a leaf whose stomata are immobile or must try no stomata eg lower s of nymphaea or ~~not~~ spirogyra – Must have it protected from ~~the~~ evaporation – and have an equivalent wet blotting p on other pyrometer – With spirogyra the whole thing would go in a felted box

with glass heat disk of H-O or alumn for roof + top light

or under an inverted [illegible]
glass-over water.
Or could be done under
water - with pyrones or
air thermoms or even
to podium cigarettes.
Try diff parts of variegated
leaf in sat air
I always meant to try this
also - Stabl - Respn
Fever &c
I had the idea of not touching
leaf w pyro. for Detlefsen
but props touching better

After reading Brown
Try a leaf injected with
sugar against one inj w
water with no traces for
a time having been starved

Tg 99

Chemotaxis with

2 pollens of Linum

grandiflorum

Culture of Drosera

& Utric - assim^n &c

Oct 1900

Feed leaves on mixture of sugars will it pick out cane? or maltose in the dark for 20 hrs

Dec 99

What is rate of transmission of air in tangential and radial direction in dry wood. And resistance to do in damp

=

Resistance to transfer flow ought to be done

Feb 3 Jan 31 1901

mark root +
measure microscd
in one hr

Sachs did it roughly
in 6 hrs in peas
+ sat region further
back

of yield of roots in CO_2
when cols in air +
cols in water

Roots in small volume
of water

over →

Feb 1901

Roots in gelatine coloured blue w litmus

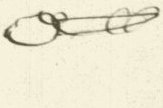
Mar 1901

Centaurea as a muscle nerve preparation

May 12 1901

Quinine screen
on formation of
chlorophyll.
+ on bubbling

July 20 '01



vertical down - then move it rapidly ← and slowly back - This would cause pressure or hitting on the hard cell walls - the root should go ↓ the root might be well supported any how stem × root would go opposite ways -

Lemna roots
Geotr?
Try fixing by tips

=

Sep 26 01

Rubbed
^ Sealing wax attracts
light objects – would
it attract starch grains
in roots & make them
bend wrong way –

What happens to
starch grains in
artificial rhythm

Important
Oct 6. 01
Tertiary roots of
bean should have
no starch-organs

Secondary roots should
be dia-galvanotrop
if I am right

Jan 20 1902

Try a cell in dilute glycerine – starch should fall slowly

Jan 21 02 If a root or seed has developed in entirely in Khuo has it the same geo sense

Kosaroff Bot Cen 83
org

CO_2 depresses transpiration of cut branches even better than rooted
Can it shut stomata

Nov 27 02

Root turgescent
electric shock
does it ~~go~~ emit
water

May 21 1903

How do cuttings toll up from down — where is movable starch?

1906 Jn 28

Heredity of acquired char - like summation of stimuli each alone imperceptible