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The Hunt Institute for Botanical Documentation, a research division of Carnegie Mellon University, specializes in the history of botany and all aspects of plant science and serves the international scientific community through research and documentation. To this end, the Institute acquires and maintains authoritative collections of books, plant images, manuscripts, portraits and data files, and provides publications and other modes of information service. The Institute meets the reference needs of botanists, biologists, historians, conservationists, librarians, bibliographers and the public at large, especially those concerned with any aspect of the North American flora.

Hunt Institute was dedicated in 1961 as the Rachel McMasters Miller Hunt Botanical Library, an international center for bibliographical research and service in the interests of botany and horticulture, as well as a center for the study of all aspects of the history of the plant sciences. By 1971 the Library's activities had so diversified that the name was changed to Hunt Institute for Botanical Documentation. Growth in collections and research projects led to the establishment of four programmatic departments: Archives, Art, Bibliography and the Library.

An 11

~~rough~~ ~~Notes for~~ 1

A. A. MϕBk

16 + 17 ... each

1 pp.

Including Scheme at beginning

Finish Indexing Th. 7 Sc 8 Aug 5 Done | M.P Bk

" " T. 10 Aug 6 Done

Index. Mpt Bk Bot 9 Done Aug 4 | Finished Nov 10 G.p. 94.

Finish Index Mpt Bk I Done to date Nov 21

Final index Pl. III Done up to date Dec 2

Index Mpt Bk 11 — done up to date

Mpt Bk 12 — Done up to date 5

Read & index or annotate:—

Cyperaceae Done Dec 3. 38

Phyllodes I & II ✓ Phyllode note book M H 1 Done Dec 3 Done Dec 3 Phyllodes II ✓

T. H. (& literature in box) (Done Dec 4, but have not brought thro' literature

L. of L. ~~pt literature~~ Done Dec 3. 38

Read & annotate In Water Plants Done. 1938

Monocots

Gramineae

} finished Jan 3. 39

F. notes Done. | Indexing Up (4) Finished Aug 2. 39

Jury & Bacon = 17th cent. notes Done Jan 4. 39

Stamen notes. Done

Root & shoot literature in drawer Done

} 24 drawer cabinet.

My own papers. 7 vols 1 2 3 4 5 6 7 } Done Jan 4. 38

Go through & index papers & notes in

Mpt Bk I Done
Boxes II Done
& drawers III Done
IV

V
VI
VII
VIII
IX
X

XII
XIII
XIV
XV
XVI

Read & annotate ~~boxes~~ those so important in boxes

F I

F II

F III

F IV

F V

F VI

F VII

Read Enblers general stuff, (1*5-3 pages) has important technical learning

Go & read the papers & other notes in Mpe book ref envelope

Box of Foster, Grégoire & Schuepp in drawing room need not be read. The principal general papers have been taken out of it.

!!! Go through subject indexes & get them digested into book form !!!

Space for ~~book~~ pamphlets in V, XIII & XV

Anatomy (XII) transferred to cardboard box in attic

On return from Lyme turn to index
While of (14)
end of ~~x~~ (13)
end of (T. 10)
end of (1)

Done June 26. 1938

On title of books & some other general notes see envelope in (I-IV) case

A.A.

Any great discovery, or the work of any man with fine mind generally sets a foot [illegible] those [illegible] takes some one given direction ~~If [illegible]~~ This direction remains fruitful until this potential path is exhausted. By that time the original worker has been forgotten & some fresh start has been made in some quite other field & the process repeats itself. But when we return to the work of the first man & scrutinise, we often see that it includes germs of other developments, which in equity would have taken place, but which were never got a chance because some one development absorbed all the energies of the time, or in the development of a fruitful line ~~[illegible] travel [illegible]~~ may keep other developments in ~~tread~~ one [illegible] rapid development in a later period remains dormant. For this reason, every later generation will do well to return to the work of great men, since ~~the~~ the man who immediately succeeding took from it often ~~did~~ did not exhaust it, but the energy of the leader, ~~being~~ having proceeded as far as it could in one direction, is then diverted into exploration from a quite different starting point.

See also (1) 29

A.A.

When the {belief in actual evolution / Darwinian theory} came in, & the abstract relations between plant types were transformed into a concrete historical sequence, the subject fell into the hands of people whose minds were attracted by the material & tangible ~~concrete [illegible]~~, in the case of, thereby dropped below them) the earlier morphologists who [illegible] thinking on the level of abstractions & ~~had~~ realised that they were doing so

~~[Some words other than abstract & concrete must be found, because of their use in philosophy.]~~

Modified camel story

~~The~~ An Englishman and Frenchman & a German each wrote a book on the giraffe. The Englishman went to Africa & shot giraffes in their native haunts ~~; the Frenchman~~ by inductive and being over-analytical so that he ~~confused~~ did not complete his analysis anatomy of dead giraffe ~~with~~ by synthetic study of its life history; the Frenchman studied the giraffe in the Jardin des Plants ~~and~~; ~~and in his study in Paris, thus avoiding~~ thus avoiding overweighting his view with undue analysis & ~~attaining a certain cultured balance~~ but at the same time missing many of the facts; the German sat in his study & evolved the ~~camel~~ giraffe out of his inner consciousness by wholly deductive methods

An Englishman, a Frenchman & a German each wrote a book on giraffes. ~~The Englishman went to Africa, shot them in their native haunts, anglicised them;~~ being ~~inductive~~ of mind but over-analytical, so the

Being inductive of mind the Englishman went to Africa, shot the giraffes in their native haunts & dissected them; but being over-analytical, he did not complete his anatomical study of the dead giraffe by a synthetic study of its life history. ~~&~~ The Frenchman watched the giraffe in the Jardin des Plantes, ~~thus avoiding~~ overweighting his view with undue analysis, & thus ~~acquiring~~ achieving a certain cultured balance, but at the same time missing many of the facts. The German sat in his study & evolved the giraffe out of his inner consciousness by wholly ~~deductive~~ deductive methods

In scientific research you disregard anything about your subject except the truth but there is not known [illegible] & then of truth you can make known. Like a man who works [illegible] of a vast cathedral working at the ^ nearby a little bit of carved masonry. His result when you see it [illegible] very effort but it is not necessarily an knowledge of the cathedral as a whole, [illegible] of any more value than any of the bits of knowledge that were already in our possession. The whole of disregarding that is already known — except of teaching or as any interest to bring it up to date as of [illegible] progress —

A.H.

In scientific research your business is with some small marginal area where the known impinges on the unknown. The area considered the known is left to specialist groups of teachers who concern themselves in general not with the exception but with the rule. The result is that what remains unchanged for lengthy periods is the point of view. The untouched area; generally explained from the standpoint of the already known, valued in Philosophy as ... The data acquired are viewed from the early standpoint; if they have been suggested ... they come to explain their standpoint, they generally conform to its existing views.

In philosophy on the other hand, the data — the same for generations of explorers must remain the same for generations of explored field — remains the same; what changes is the point of view of each generation; the contribution of an original mind to philosophy is to bring a new point of view, or to work out the implications of this point of view. The achievements of Greek philosophy remain, as of utmost present value to students of philosophy; they are built into the foundations of modern science, though they play no part in the daily day to day work of the modern scientist.

On the whole the researcher accepts the 'known area' and is content to view it from the accepted standpoint. His interest is concentrated on the data which he hopes to draw from his unknown area.

6

"The human mind is prone to analysis" (Russell ES BA add p94)

natural human instinct of self defence. "The whole" — the whole environment, the universe, is altogether overwhelming & unmanageable. But if broken up into little bits it can be dealt with, — it loses its terrors.

Does not Achilles & the tortoise show that the analysis of Time & space are fundamentally fallacious? A A.

This tendency to analysis is characteristically human quality. For its absence in animals see

(2) 76

+ for absence in lower grades of man see bottom of same page

AA. Oct 4. 39

The animal can do things without ~~producing~~ undergoing any essential change in its body. When a bird ~~[illegible]~~ uses its beak to pick up food, the beak remains essentially unchanged. But for most plants the only available forms of action are either growth, or ~~the~~ both, their death & ~~[illegible]~~ discarding of parts; the organism involves a change in the form & size of the organism.

The growth phases of a bulbous plant, which in autumn is a dry bulb; in the spring bears leaves & flowers & fruit (with an intervening sexual process); & in the autumn loses its parts above ground & becomes a bulb again (or several bulbs) ——— corresponds to the whole series of unconscious activities in an animal, & also with conscious & directive activities such as sexual reproduction & moving & storehouse of food (e.g. squirrel), & going to shelter for the hibernation (e.g. dormouse)

Russell E.S. (1934a)

Lore, [illegible] [illegible] ... behaviour

p 69. "Now for this point of view, ... behaviour is simply one form of the general directive activity of the organism; it is that part of it which is concerned with the relations of the organism to its external world. Plants show behaviour in this general sense just as much as animals do, but they, being for the most part sessile & stationary creatures, respond to the exigencies of environment, & satisfy their basic needs, mainly by processes of growth & differentiation, & only exceptionally by active movements."

8

AA. Oct 4. 1934

Russell ES (1934²) emphasizes the harm done to biology by the bifurcation into matter & mind due to Descartes.

Trace out the difference it would have made if science had followed Spinoza's monism instead of Descartes dualism.

Nov 15. 37

Would the divorce between form & function in plants correspond?

Analogy & Biol. Theories AA Oct 19.36 9

The theories of biology are founded on a confusion
between identity & parallelism; we are back to
the analogy theories of the Middle Ages.
There is an analogy between crystal development & the
development of living beings — the
worthy [illegible] of the analogy [illegible] [illegible] but it seems an
[illegible] on knowledge of both — to be clear to human mind
But is [illegible] than
analogy; basis of a theory is
to ingetus to work on & believe to be more
lost unless the theory [illegible]
than an analogy. A certain analogy between [illegible]
[illegible] & the relations of animals &
plants & their natural habitat was to
basis of Darwin's theory; if he had not believed in
the something more than mere analogy he could
scarcely have felt [illegible] in detail as he did. [illegible]
is, to work it out in [illegible] the treasure buried in
the vineyard would never have tilled the soil so
as they did, [illegible] belief than the treasure was
actually there.
We have no method of treating
vague analyzed material
The medieval philosophers were right in [illegible] that
in starting from man, the microcosm, you start
from what is known & proceed to the unknown.

10

Troll's type concept

In Troll's Vergleichende Morphologie der höheren Pflanzen, Bd I, Vegetations-organe, Lief. I 1935) the type concept as formulated by Goethe, is accepted as being beyond criticism, & as forming the unalterable bases of morphology. One of the results of the unquestioning acceptance is that Troll perpetuates & extends the ~~biological reasoning~~ flaw in Goethe's thought — to which attention is drawn on pp 17–18 (parts 7 Bot Rev paper) to Goethe, namely consistently in [illegible] the abstract character of the "type"

Deleted from addendum to Bot Rev paper but not used.

Leaf : shoot

= microcosm : macrocosm.

De Bary p 308-9

The commonest arrangement in axillary shoots of Dicots & Gymnos is that "the bundle system of the axillary shoot is united on the point of insertion with two bundles, which may be called the bundles of insertion"

i.e. the branches are primarily dorsiventral in anatomy, being radial only by subsequent branching. They may be quite as dorsiventral basally as petioles. A.A. Nov 10.36

Published: Proc. Linn Soc of May 6.1937

One point that has struck me particularly in pr Sprague's methods, is that he often finds it more useful to set Cordus's descriptions side by side with modern figures, rather than with modern descriptions. This seems to indicate that, in comparing an ancient and a modern description, we are not - as is usually assumed - comparing something imperfect with something of the same sort, but relatively perfect. On the contrary the old description ~~is~~ may be regarded as an abstraction from reality, made from the standpoint of its particular century, while the modern description is merely a corresponding abstraction, made from the standpoint of our own day, which gives a better view in some directions, but, in others, an inferior one. On the other hand, a ~~A~~ representation by a good artist "dates", ~~however~~, far less, and though it is necessarily abstracted to some extent, yet it approaches nearer to concrete reality than either the early or the modern description; it may be said, indeed, to include both.

Leaf & Shoot 13

August 12. 1837

It occurred to me when I had been drawing & looking at the stipules of Acacia Zygomeris DC, that they had a resemblance to some cotyledons, e.g. beech, & it then occurred to me that stipules may be regarded as related to the leaf in the same way as cotyledons to the primary shoot, & prophylles of the lateral shoot. The analogy in prophylles would be the closest.

Petiole = rachis ≡ axis
pinnules of a compound leaf ≡ individual leaves of a shoot.

Aug. 13. 1937

The lull in development between calyx + corolla — delayed devt. of corolla — (see Bot. Rev 1937) may mark the change between the vegetative + the reproductive phases — a change-over of great importance.

Title of Lyte's Niewe Herball

"their strange Forms, Figures

Fashions & Shapes"

Quotation about – ones on digest

ideas that may come in of preface of Nyph Bk

(8) 6 5

On relation of morphology & physiology —
of sterile & fertile phases in Puccinia graminis
1937. Brown XII

16

Invagination 17

Invagination Sept 12. 37

Is not a capacity of invagination ~~of the form~~ one of [illegible] that have been basic in the evolution of the animal kingdom? [illegible] in the gastrula is impossible & much of subsequent development.

In plants it plays a minor but very important part & ~~[illegible]~~ [illegible] ramal-like structures — pitchers of insectivorous plants, of scale leaves of Lathraea. Emerges glandular activity. Might be cases of animals to achieve ~~[illegible]~~ any of thickening of firm cell walls.

Interpret clubbed laminae of [illegible]. Peltate leaves as invaginations in development, — cf Pitcher leaves

Aristotle
Causation

material cause was materials of the road; efficient cause the Roman soldiers who made it; formal cause the idea of a road made in the Roman mind; final cause to make it possible to get from place to place

A. A.; — Topography of vascular system in a leaf 18

July 29. 38

Vascular tissue. Cf main roads in a county, though the expression of needs are also profoundly influenced by nature of the county. In Switzerland it is the passes that determine the position of the roads, & give them a permanent orientation. The smaller paths, as for a house on main road, are more clearly simply the expression of a need of little vascular bundles running to nectary. The physical form is a matter of obedience to the (?)

There may also be features in the road system determined neither by topology or causes nor by needs but dependent on a preconceived scheme e.g. the straightness of Roman road.

AA Aug 4. 1938

Pelorie

May the peculiar thing that peloria can be produced commonly in an otherwise normal plant, & by also the terminal flower may be pelorie, be due to the fact that the terminal position may supply something in the way of increased nutrition which is then the general active supplies to the whole inflorescence (not merely the favoured terminal region) in the Mainz (?) then are wholly pelorie

Institutes for Medieval churches - tracts, mode of writing etc (8) 98 etc

postulation of stages phyletic ~~changes~~ as an "explanation"

"Congenital fusion" — devt. shows that there has been no fusion of distinct primordia. Does this correspond to a tendency to assume changes in phylogeny which have never been passed thro' in order to make a clearer picture for the mind.

Shoot structure — leaf & position of buds

Two tendencies in leaf ① tendency towards dorsiventrality which is due to its being an organ a segment[*] only of a radial structure ② tendency towards radial structure, due to tendency, as a segment of the shoot, to repeat shoot structure. Shown in peltation radial leaves & leaf tips.

* a superficial arc, or a hollow cylinder or spiral (more than complete cylinder) surface detached from a radial organ, so that it has an inner & an outer surface.

?? How do buds get their essential radial character & power of continued growth ~~they have the~~ & ~~free~~ ~~surface~~ How can the position between leaf & axis encourage this? Can one work in the prophyll? Why should the bud be a more complete ~~exact~~ repetition of the shoot than the leaf

AA Lyn-10.37

Peltate leaves, especially those with numerous leaflets. eg. lupins, and closely compacted internodes short shoots.

Sept 11.37

Are my duly pinnate older leaves going for a stock? ?

Cf Goebel in Troximus 1923. 2. 3 p 1366

Acc to Troll (p 265) ~~basal~~ leaves for basal shoots for a trunk e.g. after stump, few better supplied for the root-stock & by be more larger & lobed while the rest are simple (e.g. Symphoricarpos racemosa. ~~[illegible]~~ I mean tooth & small leaves of

[Cf Anemone polygonatifolia as in Hunt leaves]

dev. of latent possibilities. AA

Primary leaves & bracts are ~~Hemmungsbildungen~~ arrested forms

I think the ordinary leaf form is a ~~Hemmungsbildung~~ of the potential leaf form.

of ordinary leaf form*

* Adiantum Foster will not I ~~assume~~ allow this for low leaves & bracts are in one sense. Since primary I think they undoubtedly are pre-leaf & functioning agents, they cannot be expected to correspond exactly to developmental stages in another organ.

Vallentyne shows to us the embryonic stages of any animal cannot be exactly equivalent - the release of steps, to a series of pre-leaf stages as Haeckel supposed - & this is also true in comparing the sequence of stages in the development of leaf, with the seriation of leaves. There in different type in the same plant. The series, & Adiantum is a genuine seriation in complexity, & complexity & Foster's work then shows that the particular level of complexity which shall be attained is decided at a very early developmental stage, in no way negates this seriation.

It is what we would expect. The

bract for instance is two things. It's not only an arrested foliage leaf — it is also in its own individuality a bract, & this could not be achieved by a simple arrest in the development of a foliage leaf * see note (10) 55

One may speak of a senator — hamadet — village-town, ~~but at the same time~~ & regard a village as ~~in a certain sense~~ a town arrested in development, but this would only be true in a certain limited sense. A village has special features of its own & is not merely an arrested stage in the development of a town

(the earliest stage in which savage tribes are now living) Cf the simple old view that savage tribes of present day represent phases that civilized Europeans, today have passed

Nov. 18.38

Sept. 13.37 Leaves & shoots — Tiedemann

axis in nodes of Umbelliferous leaf — Tiedemann etc

Crantzia etc or Sium latifolium.

might be compared with assimilating shoots with reduced or obscure leaves. Same nodal anastomosis (see Troll)

Long continued apical growth e.g. Carum verticillatum leaves > 40 cms (Troll p 93) is like shoot

further details see my abstract of Glück, Tiedblätter paper of 1934)

Kromrnia ~~cerato~~ ceratophylloides Glück p 95

the name is a comparison of the leaf of the shoot of ceratophyllum

Evolution - Retardation
of individual + race

23

Times Lit Sup. Sat - Sept - 11. 1937
p 660 Horace Walpole: Two unpublished letters
edited by W. Forbes Gray

Walpole Jan 20. 1791
"I have long thought that Nations who made early Progress in Sciences & Arts, & stopped short, are like forward children who have quick parts at five years old, were advanced no farther at fifteen, & at thirty are blockheads."

Syn-Ch. 3) Buds

The leaves of some Umbelliferae show as much growth & production of appendages (pinnae) as many annual shoots, but they lack buds (apical or lateral) to continue the growth.

Adv. Buds occur between the ~~dorsal & ventral surface~~ extent surface of the shoot & the intent surface of a leaf.

~~A pinna~~ There is no angle between the insertion of a normal pinna & an extent surface.

Can one say then the ~~[illegible]~~ blade (or pinna) does not grow from the margin of the ~~outer~~ inner of the junction of the surfaces, but from the margin of the ~~[illegible]~~ outer surface not surface? There is thus no outer surface which the pinna forms an angle except with the inner surface of the pinna for extreme cases of umbellifer leaves

For a g.p. wholeness of extent surface is required.

A g.p. which divides in 2 halves by constriction as it were (dichotomy) is all extent & provides 2 g.p.s,

but a leaf, however large has one intent & one extent surface

In true surfaces must be all extent for a radial g.p. ~~[illegible]~~ localising

but extent + intent for a flattened organ,

since the contour margin of extent & intent.

AA Sept. 15 37

Seems like profound difference betw. adaxial & abaxial leaf surfaces — adaxial younger)

Troll p324 (I 1.2) points out that the lateral shoots are dorsiventral in their origin. He shows [illegible] the dorsiventral [illegible] figures lateral shoot of Dracaena, embracing the parent axis at the base very much like a leaf with a broad leaf base. Hydrothrix gardneri p325. He says that has a lateral shoot underneath which is a very shaped [illegible] Wettst., & says he is going to describe it, but I have not found it.

p336 Troll (I, 1.2) points out that "Flachsprosse" (under which he includes the Asparageae phylloclads, Phyllanthus etc.), phylloclades, Mühlenbeckia, ~~of limited growth, the terminal~~ are ~~characterized by~~ ~~[?] as [illegible] however~~ resemble leaves. ~~[illegible] Asparageae~~ It appears that ~~except~~ Phyllanthus angustifolius has shoots of limited growth, which (however) are [illegible] comparison suppose he is thinking of Asparageae) This pattern is the Xylophylla sect. of Euphorbia. But are they really of limited growth, & do they go on from year to year? and are they limited in Mühlenbeckia platyclados (figure p. 338)

Look into this.

If the theory that shoot, not stem & leaf are the units, then our categories of stem & leaf lose all validity. But this of course does not affect the descriptive fact that the leaf bases and surfaces of the shoot may be clearly divided into areas each of which corresponds to a leaf.

26

AA Lyn 75.37

Troll speaks of Goebel's life long "fast-tragisch" prejudice against the "typologischen Methode" (footnote l. l.c. p 31) but ~~[illegible]~~ actually Troll nearly always forgets to 'typological method' & his book is not essentially being wander into phylogeny - different from other text books.

Note in bibliography
on Geoffroy de Saint Hilaire must be
indexed & Geoffroy, see Geoffroy de
Saint-Hilaire, since Saint Hilaire is an
addition to the sur name Geoffroy. ~~The same note in this is opposite [illegible] of Marwat [illegible].~~

~~Herder [illegible] Nelson~~
~~Bossuet. Sermon sur la Mort~~

Rep. Biologie médic. La Misère cellulaire
et la vie. No. 4. 1929.

Agassiz L. The Species & classif. in Zoologie
~~Caullery in Histoire des sciences biol. Hist. de France de Hanotaux.~~
~~Janet, P. Les Causes finales. Paris 1878~~

AA Sept 7. 37
Study diff. betw. specific & ordinal
characters. They should be differ. of type above
by differ. of evolution. But [illegible] the
so-called ordinal characters are not the [illegible],
they are correlated with the real ordinal distinct's
which cannot be {[illegible] (reduced)} simple technical
expressions —— the real value of a
genus in a palm or an aroid evaporates
when you try to analyse it into characters.

Characters

See Vialleton p 174

Ref Vallois, H
Y a-t-il plusieurs souches humaines?
Rev. gén. des Sciences Apl 1927

Spinoza's idea of the characteristic of the living thing that it continues in its own existence is a development of the commonsense, humanly-minded of calling them "beings" — affirms {the ~~existence~~ tendency to existence in living creatures (urge to existence is primary character?)} AA Sept 8. 37

Bergson l'Évolution créatrice? p 15 (quoted in [illegible] 58) Individuality

[illegible] if individuality were perfect, no reproduction would be possible. Individuality is thus that ~~[illegible]~~ towards which living things tend — it's a goal which in nature things can never be achieved, or rather it's an abstraction which does not correspond perfectly to any concrete reality. AA Sept 8. 37

AH Lopez 8.37

Viollet(?) visualises a generalized tree ~~or rather~~ as ~~[illegible]~~, ~~one or more~~ a number of bushes, possibly united underground, each having separate form its origin from the soil of the branches which do not give rise by fresh branches, but they divide into alternate tiny branches, the new branches he imagines as represent species. for the hypothetical branch arising from ~~[illegible]~~ dormant buds below the surface of the soil — 29

29

see p 345 etc

Despite his protests he is thus driven to accept a diagram which is not very far from the transformist one. The ~~crux, which he~~ crucial problem, which he does nothing to solve, is how is the origin of the "buds" for which ~~the~~ new orders originate, the new "créations" or subordres and families.

Leurs / from the heads / of the new branches dont les liens avec former buissons is [illegible] p. 77

Lopez 8.37 Viollet's return to Cuvier, — Tells return to Goethe ; Russell's return to Aristotle the final cause

cf. my note on the return to great men for fresh starts for them.

see ① ~~[illegible]~~ 1

The return to fountains of ideas which like a spring on high land may give rise (?) to streams more than one river system ? to [illegible]

Sep. 26. 37

Is Troll's gestalt Morphologie really a parallelism between the shoot — the shoot
single flr
complex — part of a shoot
compound flr (Iris part)

In same way to him there is parallelism between the behavior of leaf (partial shoot) & shoot.

As the shoot branch of prudence [illegible] like itself, are [illegible] natural for shoot to shoot complex.

As [illegible] partial shoots (leaves) are from [illegible] whole shoot (buds)

Shoot basically radical
leaf — dorsiventral

All vegetative shoots are potentially shoot-complex as
~~The~~ & so are reproductive shoots (inflorescence)
A single shoot then is not a shoot-complex is
a mental abstraction.

31

Caullery, M. Histoire des Sciences biologiques, Hist. de France de Hanotaux } look up these (for Ruggeri)

Janet, P. Les causes finales. Paris 1878
pp 184-5

"cet accord si frappant entre forme et fonction qui explique si bien le sens profond du mot forme, qui comprend à la fois la configuration et l'activité de l'être. .... forme et fonction ne se séparent jamais.

[Form & function are two aspects of one reality comparable with Spinoza's "~~thought~~ extension" & "thought" as {attributes / aspects} of {Substance / God}. "Mode" = plant, {functioning organ} FORM & FUNCTION

Attribute thought / function } mode

attribute extension mode {form} A. A

Illustrates my approach even of rudiments, in here the "fun" is internal rather than external AA]

CYTOPLASM & CHROMOSOMES AA.

Can it be true the organization type, Viollet, & the up-grade evolution (see Guppy cited - Mimosa) are cytoplasmic phenomena, & down grade evolution, chromosomal phenomena (forestero) genus, species minor units)

Is it any more difficult to conceive the type / prototype flowering plant, coming into being & developing stage after stage, than in ~~dodging~~ conceiving the same process occurring in "transformism" supposes?

steps to ~~as~~ the ~~into~~ the miracle of the devt. of flowering plant from

AA Type 6.37

SUDDEN or GRADUAL EVOLUTION ? 32

CYTOPLASM & CHROMOSOMES

a single ~~minute~~ mass of ~~complete~~ nucleated protoplasm occurs in every generation, & yet the seedy [illegible] of these types are capable of free life — they lead direct to the plant itself. It is not more difficult to conceive this result as attained by a series of previous ~~stages~~ steps, each of which was viable & successful — its stage. There any complete success would make the unsuitable stages in something different.

Not more difficult to imagine a ~~nucleated~~ protoplasm in nucleated centres coming into existence & coming then by degrees? — & imagine such a mechanism being developed by degrees. The nucleated protoplasm would ~~[illegible]~~ consist of (1) the cytoplasm — the basis of its organisation as a flowering plant, of the grass type, or the [illegible] i.e. to arrow type, ... (2) the chromosomes ~~[illegible]~~ [illegible] in [illegible], while the characters they [illegible] are responsible for the ~~[illegible]~~ occasional ~~[illegible]~~ shifts & variations — ~~[illegible]~~ (mutations) ~~[illegible]~~ give rise to & generic variants in the type*. How far the chromosome variants can go. Can they ... the genera? Since specific changes, or changes ~~[illegible]~~ powers go further? I doubt whether the Biochemist [illegible] clearly from the ... ~~the~~ ... — see specificity of [illegible] matter in specificity of cytoplasm — this must be a cytoplasm (! ref) — I would think — ? plastids also independent.

* Cytoplasm the type or an individual form. The cytoplasm supplies the general & the nucleus the particular. Nov 19.41

[A.A. Sep. 10. 37] Angary of p 58 of Ruggeri

Induction. How little is has to do w/ scientific thought in practice. Look into Bacon for this. Mendeleyev be completely master the inductive method in practice his scientific thought was completely sterile. Today scientific thought as given on the ways of analysis is the inductive. [illegible] is today a work of art as given is easy to be analysed by the author's ways, as for instance of the texture of planes & masses may be of value but the analysis, too, it may be satisfactorily occurring, bears no relation to any conscious idea whatsoever in the artist's mind. In the same way the biologist arrives by the process of creative thought — then he does the work of logic or some result, then he does the painful one — of process — often the difficult to come painful one — of "writing up" his results. Since the creative mental ... has become the ... the inductive form of scientific thought is the very recognised form of scientific procedure" (p 57 Ruggeri)

Biologist's mind: clearly the concrete character of scientific procedure (p 57 Ruggeri)

It is the attempt to turn science into an abstract scheme which makes Jeffreys inductive probability so hollow. A.A.

[must read Mach on induction & deduction]

[? Does induction serve physics & chemistry & biology & does botanical physiology — A.A. Aug 4. 38]

Nov 19.37

34

Reduction / median bundle as compared with
lateral in certain leaves is comparable to
the loss / apical growth not transferred to
lateral growth in leaves as compared with shoots (apical
region). It is, as it were, a state further down / the

Nov 4. 37

Cf ontogeny of individual animal or plant
& dev. of mind in baby & adult in man.
Probably the identification with phylogeny
fails in the same form.

Cf synthetic judgments *a priori* in which "new
elements are constantly being added", & analytic
judgments in which everything is given & only has to be
unravelled, to epigenesis & preformation
(Cf Clarke on Kant of these two forms of judgment)

Feb 22. 38

Hacquetia Epipactis DC — whole plant resembling composite flr.

Alpine Hous CBG. Inflorescence only above
ground. Simulation of a composite 5 or more green bracts
(rather yellowish) toothed, surrounding a yellow disc of
flowers.

carpel is de Candolle's word

p473

le pistil ... composé d'organes élémentaires, tantôt libres, tantôt adhérens ensemble; ce sont ~~ces~~ ces organes élémentaires que j'ai nommés carpelles

p476

"Chaque carpelle peut être considéré comme une petite feuille courbée ou pliée en-dedans sur elle-même

De Candolle Vol I
Organographie 1827

39

? Means] maxima & minima in size

Maxima & minima used as constants. cf. MacLeod

Linaria cymbalaria on a wall Orbury Sept 3. 34

one leaf-lamina 77 cms (3 1/16 in) [these are both measurements] not calculating in width & 55 mm (2 3/16 in) in length [both measurements] the case] the length, as

The measurement is less satisfactory in the case] the length, as the top of the petiole spreads rather gradually

Such a leaf size is so rare in this plant that one cannot imagine it would be of mean value as a constant. Hooker's Student Flora gives leaves 1/2 – 3/4 in diam.

~~cf my dimensions~~ in my old Linaria Cymbalaria paper.

Petiole a continuation of a stem segment.

40

Power of forming an extended lamina depends upon ① separation of bundles or ② ~~repetitive~~ branching of main bundle ~~③~~ of pin-veins, laterals ③ repetition of the branching in the laterals of differ-orders. It is this repetitive diverging retardat ~~branching~~ venning.

To allow for a net the secondary veins must diverge from the primary. If they are almost ∥ to the tertiary veins will ~~at once meet~~ the have no scope for branching devt.

What determines the angle at which the branch veins arise?

Close ∥ without homology to phylogenetic relationship (the ~~flower~~ of a new flower) between flower & inflorescence shows that close ∥ without relationship is possible in history.

Thus parallelism without common ancestry

A.A. meny, verat. 41

Reticulation means branching of more than 2 orders
— it cannot come about if the branches of the second
order do not branch again. The free ends presumably
mean a still higher order of branching, the last branches
being too feeble to reach another vein.

Having little, if any, thing's rigid, that power of
branching depends on amount of secondary tissues, Dioscorea
+ Smilax give to show more secondary tissues than
any other monocots — their leaves, — Aroids
& Hydrocharis [illegible] have some second. Eryngium (narrow
leaved) should have bundles with [illegible] cb.

Look up my sects of monocot leaves ? in attic.

Look in sects of Dicot leaves for origin of
~~secondary~~ branches

Veratrum, Monocots — Dicots
Can differ be accounted for by relative powers of
sec. tissues in ~~Dicot~~ Monocot leaf bundles?

See Gramineae IX

See [illegible] p 59

Mar 10. 38

42

Tendency to radial structure in Monocot leaves correlated with the sheathing leaf base i.e. the greater proportion of the axis which takes part in leaf production.

radial structure

meaning ?

---

cf Lemna frond (= shoot-short with prophyll)

to a leaf (= shoot-short with prophyll [single] or prophyll + ... leaves below [Cyperus])

Jf 7.38

Cf leaf Lemna shoot

The fact that a character is
potentially present (e.g. the staminodes
in Spiranthes that are potential stamens)
does not mean that they were necessarily
present in some ancestor.

Feb'y. 37
A. A.

March 17. 38

The leaf in its fuller dev^t aims at short structure; in the more reduced dev^t as the scale leaf, when there's no approximation to short structure.

A. A.

no free bifacial reg^n: Tropaeolum majus (10) 62

On lateral branches type of [be] ~~capture~~ young shoot as leaf aims at being a shoot, see (10) 57

March 19.38

45

Has
~~Is~~ spiral attachment of leaf to axis
in some Eryngiums any corresponding feature
in attachment of leaflets to rachis?
Is the lupin attachment spiral?

spiral attachment of leaf to axis

May 1938

Can we envisage the leaf as consisting of two parts

(1) petiole (with med. reg. of leaf base) + {midrib of simple leaf / rachis " compound leaf

~~The sheath is merely the basal region of (1)~~

i.e. ~~"axial" element of leaf~~

element of leaf which corresponds to "axial" element of shoot (stem)

(2) {stipules, possibly lobed pairs of sheathing leaf base to / Lamina, which is a marginal out-growth from (1) / leaflets

The expanded base of sheath represents transition from ~~axis~~ stem to leaf as the hypocotyl represents transition from root to ~~axis~~ stem

so thus to anatomical change from axis to leaf & shoot

The stipules : leaf = bracteoles or prophylls : shoot.

= cotyledons : primary stem

Mrs Bh. May 17. 38

47

Holism. To connect into one coherent whole the artist's mysterious feeling for external form, with the analytic detail of the anatomist

manuscript

This must be necessary for a full comprehension of form

Aug 26-27. 1938

Form relations within individual plant — homologous members show // but not identical ~~homology~~ ontogeny. One type of member does not result simply from inhibited devt. of another type e.g. bud scales not merely inhibited foliage leaves.

When the comparison (is necessary ~~narrow~~ confined within narrow limits) of veg. & rep. structure is in question, the //ism can only be go[rl] [limited in nature] [senescent bud] since the distinction between reproductive & veg. structures must go back to the remoter ancestry. It is however possible that ~~in~~ in some ancestral stock the reproductive members may have resembled the veg. members more [or occasionally less] closely than in modern species — But the lack of phylogenetic series in the higher plants means that there is no definite evidence about this.

~~Comparisons may be instituted, [or relations traced] (order not important)~~

between?

~~Serial~~ ~~~~

(1) Serial ~~~~ appendages members in an individual plant e.g. cot. - foliage leaf — bract. — Short & root.

(2) the main morphological categories,

(3) corresponding ~~veg.~~ ~~members~~ appendages e.g. ~~leaves~~ foliage leaves in a given family in the same species or

(4) ♂ & ♀ reproductive shoots

related plants

(5) veg. & rep. ~~members~~ appendages in the same plant, or allied plants

(6) members belonging to diff. morphological categories (Gestalt)

(6A) between whole ~~~~ member & its parts

e.g. shoot & leaf
& ~~~~ ~~members~~ these e.g. {cotyledons / prophylls / (bracteoles)} & stipules; axis & petiole; leaves borne by whole shoot, & the blade of a single leaf!

Part : whole in the phyllome : e.g. is not the relation of the whole to the parts in a mosaic.

T. C.

6 B. between an individual member, &c
Complex unit formed by the repetition of such single units
e.g. single leaf & compound leaf. (Pinnae & pinnules of compound leaf may be called leaves of 2nd or 3rd order)
(Stipellae = stipules of 2nd order)
or flower & inflorescence in complex of inflorescences.

(The idea of {"order" / "degree"} as seen in leaves & inflorescences is unlike anything in the higher animals where members are not repeated)

Do the word members be avoided as far as possible? The shoot consists of axis & appendages.

50

Sept 11. 38

The analogy ~~between~~ living things & machinery is basically the relation between a living thing [man] & the contrivances which he has himself constructed, as it were in his own image, to reinforce & supplement his own neuro-muscular equipment. As this is the origin of the machine, ~~it~~ some degree of parallelism inevitably exists between it & the living ~~thing~~ creature of whose activity it forms an extension. It is only in a strictly limited sense, however, that the machine (a derivative of a living thing) can be used to ~~explain~~ interpret the living thing, though it may well provide a demonstration which brings the working of certain ~~system which is capable~~ aspects of living activity into a clearer light.

A.A.

Floral Anatomy

F. A. treated too much as ~~an isolated~~ a phenomenon isolated from vegetative anatomy. It can only be understood on a background of knowledge of vegetative anatomy. The extreme complexity of the leaf structure of the Leguminosae (see Japanese work) if interpreted as f. a. is, often ~~would~~ ~~most elaborate~~ would ~~might~~ lead to the morphological results ~~lead to results of so~~ ~~a reductio ad~~ ~~so undefensible~~ which would be reductio ad absurdum.

Amherstia might be used as an example.

Sep. 23. 1938

The root may be regarded as in a sense the "core" of the plant. It is fundamentally simple. When secondarily thickened it tends toward stem (shoot) structure

~~There should be two words of branch: as present one word is used for lateral "branch" of a shoot, and for "branch" root.~~ The formation of new members in the plant follows 2 lines:—

~~The two words are wanted to distinguish~~

(1) a complete repetition of the parent member e.g. when a root gives off a lateral root, and a shoot gives off a lateral bud which reiterates shoot organisation.

(2) an incomplete repetition of the parent member. This process does not occur in the root, but it occurs in the shoot, in which the leaf is an incomplete repetition of the shoot

---

Gradual passage of ~~shoot~~ root into shoot

In living organisms any absolute delimitation of the parts is impossible. ~~Thus~~ No ~~absolute~~ line can be drawn on absolutely delimiting a limb or organ of an animal body from the trunk – But in the dead and disarticulated skeleton, this distinction is an easy and absolute one.

~~Delimitation~~ of morphological units

Defects of analysis Hiltner

Leaf very short

Leaf repeatedly —
Goebel III. 1. p 1659
Amorphophallus bulbifer

of [petiole] leaf in tree — branching not beginning until a type level is reached.
B.A. Oct 24.38

All validity of comparison derived in the old fashioned morphology except from the phylogenetic homology is assumed
B.A. Oct 24.38

Every family within its limits tends to run through the whole gamut of possible forms. [cf the range of stipules & pseudostipules in Leguminosae — must some time find good examples] This tendency to complete expression of all possibilities may not receive full expression — it may be latent rather than actual. The tendency to explore all possibilities, as it were, within the limits of the family range leads inevitably to parallelism. If we ~~imagine a~~ ~~represent species by a point the~~

AA Nov 7.38

The urge ~~to full~~ towards self expression — the desire of scope for ~~[illegible]~~ expansion of all ~~possible~~ processes — which is one of the main & powerful driving forces among self-conscious humans, may also ~~exist in an unself-conscious form~~ ~~in the~~ have been, in an unself-conscious form, an active factor in the evolution of plants.

AA Nov 7.38

The possible & the actual

Can whorl formation in itself result in phyllome reduction? It certainly leads to union of bases in some cases e.g. interpetiolar stipules. But does it also, [struck] tend to reduction of individual members?

AA
Nov 8. 38

It must tend to: one does not get highly complex pinnate leaves for instance arising in whorls. Whorled leaves tend to be simple e.g. Rubiaceae, & rosette leaves (alternate) also e.g. Saxifraga & Sedum. This ought to be gone into statistically.

Cf how short the internodes whorling

Nov. 17. 1938

(1)

SLOANE 8864.

17, CADOGAN SQUARE,
London S.W.1.

Dear Mrs Arber,

Thank you very much for sending me your paper about the Gynaeceum of Papaveraceae. It interested me a great deal, even though I am terribly ignorant of modern work on the morphology of the carpels.

I noticed with interest that in several places you talk of the "vestigial ~~floral axis~~" apex of the floral axis ~~in alluding to the~~; & since vestigial, I think, is the adjective for portions remaining from a larger whole, it seems to me that it has a phylogenetic ~~bearing~~ meaning — For, in the ontogeny this part did ~~at~~ not ever, I take it, bear any floral parts — To me there is no difficulty in believing in the persistence

of a vestigial floral axis, which once
– in a past geological age – bore carpels
(other appendages). But I had imagined
(imagined is, apparently the right word) that
you believed that there was no evidence
in favour of anything but microevolution.
I find it difficult to give any but a phylogenetic
meaning to the word vestigial. On the other
hand, though the limits of microevolution
may be very differently estimated, I should
be astonished to find the presence of a non
-vestigial axis, bearing one actually bearing
the floral parts, + its disappearance, as falling
within micro-evolution: in a sense, the
same difficulty arises in my mind about
the composition of the gynaeceum. The arrows
of your figures marking the boundaries of
the carpels are easily comprehensible to my
mind if I look upon the carpels as once hairy

SLOANE 8864.

17, CADOGAN SQUARE,
S.W.1.

been separate in phylogeny; but, as, if I have understood rightly they are never free in the ontogeny, I find it very difficult to attach a clear meaning to the ~~theoretical~~ existence of ~~these~~ boundaries, which on such a ~~view~~ would seem to be hardly ~~with~~ even theoretically present — but merely analogical possibilities (What a frightful expression are those last two words!) I do wish ~~that~~ I could understand the non-phylogenetic view of morphology — I will have another try —

I do so enjoy reading your papers

Through what terrible times we have passed since I saw you! The times seemed grave enough then; but now I look back to ~~Cambridge~~ ~~theoretical~~ as to a world of sanity & beauty. I am very glad

that we have staved off war; but I do not think that it was well or wisely done. I cannot think that it was reasonable to fight against the self-determination of the Sudeten Germans; but, if this was so, we should have kept out of the whole witches' kettle! And above all we should not have guaranteed the present Czechoslovak frontier, which we cannot even reach, far less protect!

I have always known that when I grew older, I would not give way to the idea that because the world was different, it was worse for. I read the past as showing a long continued progress - slow, with many descents between the upward slopes - but still sloping upwards. I still think that that is the only reasonable view; but I do think that it is a "cursed spite" that I should have been born at such a time that from the mid-thirties (1915) onwards I suppose for at least 30 years in all, I should be in the trough of the wave!

The anti-semite madness is a horror too

SLOANE 8864.

17, CADOGAN SQUARE,
S.W.1.

A reasonable French cousin – a business man – who is staying with us declares that there is a wave of Xenophobia – in particular of antisemitism rising in France!

I hope that you & your girl are well

Yrs affly

Isabel Browne

57

Extract from A.A.regly , Nov. 17, 1938

I ought not to have used the word vestigial, which certainly carries a phylogenetic suggestion. All morphology in the last 50 years has become so much saturated with the phylogenetic idea that it is hard to find language for other conceptions. I only meant that - unlike many other plants, in which the ultimate whorl of appendages used up the hole material of the growing apex, in Papaver etc. there is a tiny central cone of shoot tissue left over which dies out without giving rise to further appendages. Its survival above the last appendages does not seem to me to prove, or even suggest, that in some ancestral form it was carried further and bore further phyllomes.

The question you raise about what meaning one attaches to the (imaginary) boundaries of the carpels in such a form as Papaver, if one excludes phylogeny, is not at all easy to answer; (I am spending much energy struggling with the adjustment of my morphological ideas, and it is slow work.) I think one can only say that the idea of the shoot (floral or vegetative) as divisible into an axis, and phyllomes borne upon that axis, does prove to be a succesful key to the comparative description of Angiospermic forms. One can trace a consistent series from free to "fused" carpels , for instance, which (without employing any phyletic theory at all) shows what the plant can actually do. (I really went for Papaver because it is perhaps the most difficult case that exists to fit into the ordinary carpel view, and I can quite understand that the complxities which it shows may

make some people think my interpretation of it improbable. It seems to me that the plant is capable of making phyllomes that are nice and free and have a proper midrib and are thoroughly leaf-like in the ordinary sense. But it can also make other outgrowths which have none of these characters, but which we can best understand because we compare them with a whorl of phyllomes fused together and having in the process failed to develop some of the characters which we specially associate with leaves. I don't imagine that the plant cares a bit about typical phyllomes - I don't think that it has first to make its gynaeceum (for instance) out of nice text book leaves and then take many generations discreetly reducing it, and manufacturing something puzzling out of itm, which would become simple if we had the ancestral stages in front of us - I think it can quite well do it all at once. I see no reason why it should go through these stages at all.

AA Nov 25.38
Dec 16 38

Subordination of axis typ in flr my lead to progressively more tendency towards simulation of the axis — Meyer Obr axis-like — on the parts of the floral whorls, shown particularly in the carpels less so in the stamens.

59

axis simulation

Antagonism bet. veg. & rep. growth may be concerned with the fact that active veg. growth prevents the formation of short shoots; in other words active veg. growth hinders flowering because it is opposed to the production of short shoots (flowers)

short
Abbreviation

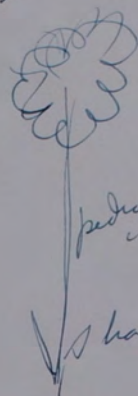
Dec 1. 38 & Dec 16. 38

Cf. petiolate leaf w- stipules to a flower with bracteoles

top / petiole = [illegible]

petiole peltate bearing foliar expansion at apex

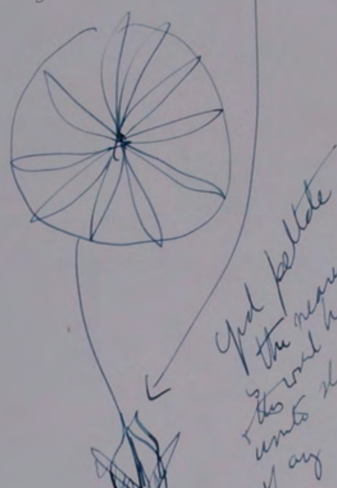
/ stipules



T of / pedicel = [illegible] gives off floral appendages.

pedicel bearing [illegible] / foliar expansion at apex

/ bracteoles



Can find ~~one~~ perfect analogy cf. peltate leaf ≡ calyx but can one find [illegible] stipules?

Cf. peltate the nearer [illegible] would have [illegible] stipules [illegible] of

Dec 2. 38

Can the aggregate shoot (e.g. cpd flr) resembling a single shoot (e.g. single flr) be compared with the body corporate ~~any~~ in human society, {~~for~~ resembling / repeating many characters of the} an individual

The body corporate acts & behaves in many ways as if it were an individual. Smaller corporate bodies may each again form a unit in a larger corporate body which again repeats the features of individual; like a synflorescence, repeating characters of ~~an individual~~ an inflorescence, which again repeats the char^s of individual.

Dec 4. 38

What morphologists have hitherto mainly agreed [?] done is that evidence (teratological, anatomical, ontogeny, comparative form etc) is admissible ~~[illegible]~~ ~~[illegible] [illegible]~~ & ~~determine~~ their in solving the problem — the historical course of phylogeny. We ~~now~~ have now left this position & have changed our view as to what the problem of morphology is.

forming parallel [?] [illegible] evidence, & now about the nature of the ~~[illegible]~~ problem ~~[illegible]~~.

of what structures can be homologised on grounds of common descent

In [illegible] the problem was considered & [illegible] evidence given & the ~~evidence~~ [illegible] was valid. But the [illegible] has gradually been undermined & we look at plans from [?] different eyes.

Dec 4. 38

63

V.U my pseudo-laminas they still hold if
pure-on a non-historical basis? — to veins of leaf base
separately (without a petiole or on the top of it) rather
than a midrib or midrib + main laterals giving
rise to lateral branches.

Freer branching Dec 8 cb + also case
, separation greater where no cb.

Dec 16.38
Separation of veins in rachis leaf
e.g. Plantago

AA Dec 9.38

Two ways of looking at same facts in A plant under 64

otherwise uniform axis may have long leaf stalks which lift the leaves well above the level of soil. This may be interpreted (1) as an adaptation to ensure the leaf-blade receiving the necessary sun & air or (2) as a growth correlation, the abbreviation of the internodes encouraging the elongation of the petioles.

[Can I get a good instance? Cyclamen petiole relatively long —

When we say that the phyllode is a petiole we mean — with the reservation that a normal petiole is not a free-living organ, so the identity cannot be complete. A petiole can no more be identical with any complete form of foliage leaf than an embryo/an organ [illegible] can be identical with any free-living form with which it may be compared.

Dec 11.38

The puzzling morphology of Utricularia seems to become explicable if one accepts the idea that there is marked heterophylly — the leaves may be simple & ovate (or some such form) or peltate; or else narrowed & either simple or branched, & bladder-bearing. It has been stated that the leaves (morphologically) are identical with the water shoots, but the evidence of this is doubtful; it is based on the existence of abnormalities, such as the "direct* development" of leaf of undoubted foliar nature into a water shoot.

But what exactly does this mean? Can you not be given by true & a adventitious shoot by adventitious buds (of that gives use of the water shoot by adventitious budding? The leaves are known to bud, WP), & the leaves remain patterns for Goebel p 104 meristematic & capable of development in the [illegible]. Goebel 91-93 p 150 & 1888 p 293 (leaves becoming [illegible])

The peculiar behaviour of Utricularia is a good example of leaves (and) & imitate short characters in producing adventitious shoot buds, & in retaining prolonged apical growth.

It is also said that an inflorescence bract or bracteole may be replaced by a shoot, but it would need very careful examination to see that this was real replacement & that it was not merely an axillary shoot belonging to the fallen or undeveloped bract.

* Glück 1906 p 23

It does seem to be a real replacement, but this type of argument still holds

(Dec 13 28) 66

upper sheath of Monocot seedling is
difference from ligule. More like auricle
than ligule anatomy. (Does this associate w. root nature of cot.?)
In certain Monocot. seedlings the plumule is
enclosed in a sheath belonging to the cotyledon.
The part of this below the attachment of the leaf base
cotyledon stalk may be described as of leaf base
structure, but the part close to attachment of the
cotyledon stalk — the "upper sheath" — is more
problematic. There are 2 forms of vascular skeleton
in the seedlings that have a well-developed upper
sheath (E.S. p 215) The bundles entering the upper
sheath may be branches of those which pass from
cotyledon straight up & they then end blindly
near the tip of the sheath (e.g. Commelina — cotyledon bundles traverse
ligule type); or one or bit of the upper sheath of them run down paniculate the
may pass up into the sheath (e.g. some Zingiberaceae, such
cotyledon sucker (E.S. p214) In such cases is
Roscoea) we may draw the upper sheath of
than one system not to call upper invagination, of
axis ... rather the ... of plumule. It
cotyledon ligular; is seen itself ... of Burmanniaceae
base of cotyledon itself to coronal ... further drawing by AA?
may be compared with Tigridia (p 168) ... the sheath; is up
A more puzzling case is ... dorsal ... of a double
Here a single bundle enters the dorsal ... & then separates
into ventrally; some doubling downs on itself ...
bundle in one ventral ... dorsal system ... cotyledon sucker.
... as a single bundle, passes into the cotyledon sucker
Here we have doubling with invagination (cf. my stamens
in Fumaria)

Dec 15, 1938

The congenital concrescence theory of equitant leaf has the element of truth in it that it realises that the epidermis of the "limb" is entirely the lower epidermis of the leaf. The main point of the leaf is truly unifacial so that its epidermis corresponds to the epidermis of the short axis, whereas in any bifacial leaf, the upper epidermis has no homologue in the axis; ~~as found~~ the ~~fo~~ it does not strictly correspond to the outer epidermis of the axis

(see Phormium, Dianella. This page 306-7 may be really congenital concrescence.

Dec 21. 28 + Jan. 7. 39 68

The original leaf — the rudiment or the ~~leaf base (sheath)~~ [rachis (midrib)] — ~~of~~ have. This

g.p. — ~~is~~ maybe essentially ~~a leaf base (sheath)~~.

~~Quickly grows a te apparent a petiole~~ — an

attempt at reconstructing the radial stem

structure, & this attempt at a stem

bears "leaves" quickly or marginally

In te Monocots the petiole rather than the rachis tends to be the

primary member (of the sheath); in dicots it is

the leafage which is more important — as an

early stage than the petiole which develops by

intercalary growth, ~~to then more clearly first~~

~~from base ... upon ... show~~ the

~~between leaf base & lamina which appears the~~

~~petiole.~~

Dec 22. 38

69

Digitized by Hunt Institute for Botanical Documentation

Jan 4, 38.

In the fusion of whorls of floral members, have we an attempt on the part of the partial shoots to produce something shoot-like jointly? A long flower tube in some ways is like an axis

In the individual free carpel there may be peltation which is an attempt on the whole shoot, or on [illegible] to ... several fused carpels may together produce a shoot-like effect.

Orders of complexity in flower & shoot 70 ... gestalt

Partial shoots together or separately may produce a shoot-~~like~~ effect, just as individual (shoots / flowers) or a complex of (shoots / flowers) may produce the flower gestalt

Stigma

Trifolium palustre L. In each fertile carpel
a canal lined with papillae forms the upward
continuation of the locules, & the canal contains
above into the papillose ventral surface of the carpel,
and is exposed at the level at which the carpel opens out.
The stigmatic surface is thus simply the continuation of the
inner ventral surface of the locules. The 3 sterile carpels
have no locules, correspondingly, no
stigma.

Prof. surmise

Sonnet CXVII And on just proof surmise accumulate

Veg. up phase

In flowering plants the vegetative phase is primarily the phase of juvenility and the reproductive phase of maturity. These two phases are not only distinct in time (though they may grade into one another) but they are markedly antagonistic - excessive vegetative growth (as in many aquatics) is detrimental to reproduction (~~cf. veg. reproduction of aquatics~~); and on the other hand the reproductive phase may involve destruction and death of the vegetative parts (e.g. bamboos, ~~(?) Aloes,~~ etc.

Veg. phase is the individual; reproductive phase is the race - antagonism of claims of race versus claims of individual.

Classification as a mental process

Though he points out the difference between homogeny and serial homology, Darwin does not really keep the two clear in his argument [left to later—see page for p. 362]

Classification is a function of the human mind, our ideas of imposed upon the external world. When we homologise two structures, we only mean that to put them into the same category satisfies our minds

"Aristotle's Researches in Natural Science" T.E.Lones. , 1912 pp. 210. Aristotle recognised many cases of the existence in some animals of component parts which may be considered to take the place of certain parts in other animals. For instance he compares the forefeet of quadrupeds and the hands. Historia Animalium ii c 1, s.2. (Look this up).

Might say which satisfies our minds, just as it satisfied the mind of Aristotle to put the forefeet of quadrupeds and the hands of man into the same category.

MIND—UNIVERSE

In treating classification of structures as a mental function we may seem to be coming dangerously near to the pragmatic theory that utility and convenience are the only test of truth; or that there is no such thing as truth, there is only utility. But this approach to pragmatism is only apparent. We may recognise that our classification depends on the structure of our minds and yet regard it as possible, [even if unproven,] that a classificatory category which by all the mental tests we can apply to it, seems sound, corresponds to an external reality. Though this is unproven it is highly probable, because our minds are, after all, only part of the structure of the universe, and hence in imposing our mental framework upon the universe, we are not imposing anything alien.. But with the degree of probability of our conceptions, we are not concerned, , for we cannot get outside or beyond our own minds, and our task is to make the fullest use of the framework given us, bearing with the proviso that the degree to which it corresponds to reality cannot in the nature of things be known to us.

The shoot, comparison of flowering plant & mammal

#74

(Copy of notes made when in bed with inflamed eye, Aug. 8, 1935
copied & modified during the next week)

The shoot produces by branching repetitions of itself - other shoots: [or members which are repetitive of itself in so far as they are shoots, but they may be reproductive or vegetative.] Either type of shoot can give rise to the other, though normally the order in time is that the vegetative gives rise to the reproductive. Or the original seedling shoot may be vegetative in its earlier part and reproductive in its later part - e.g. ephemerals which flower with little vegetative region between the cotyledons and flower. R.S = continuation of apical V.S. — or rep. shoots may be lateral to V.S.

The title "shoot" cannot be denied either to an inflorescence as a whole, or to a flower. The shoot is the basic constructional unit of the above ground part of the plant : - [or, excluding the root from consideration.]

In the mammal the body reaches a definite form at maturity in which the number of parts is strictly limited. Each organ arrives by a fixed developmental history at a fixed result. The final scheme of form is in all essentials laid down in the embryo.

In the plant shoot, branching is a function both of axis and leaves - the bud is axillary - it is a mistake to regard the branches as "outgrowth of the axis". They are shoot structures occupying a fixed position in relation to the shoot from which they arise - a position determined by the leaves. or arising in a fixed relation [or a definite relation] to the leaves.

In the plant, the budding of the shoot system, and the production of branch roots (from the radicle) and of adventitious roots from the shoot, gives a body system which is more remote in size and complexity from that of the seedling, than the mature mammal is from the new born. If we take the series :—

embryo in acorn; seedling oak; mature oak tree

and compare it with the series :—

human embryo; new born infant; mature human being

we see in the oak tree, the result of the endless repetition of shoot and root -

The shoot + Comparison of flowering plant + mammal cont. 75

the organs of which the embryo and seedling were made up, whereas no such repetition of units is seen in the mammal.

We have also in the oak tree the growth (length + diameter) of main axis and branches, which though it has its limits, is indefinite when compared with the growth of the human being.

The unit structures in the mammal are strictly limited in number and their future is defined in the embryo.

There is not in the plant the sharp segregation of reproductive organs from the rest of the body that we find in mammals, where the nutritive and respiratory functions are sharply marked off from the reproductive. In mammals a large number of parts may be considered separately and for various purposes treated as units, but there is nothing to correspond to the two great units from which the plant body is constructed - shoot and root. The shoot may be either purely vegetative, partly vegetative and partly reproductive, or purely reproductive. The ultimate shoot unit in the reproductive phase is the flower, but by the process of shoot branching these units may be combined into higher and higher degrees of complexity, cf. spikelets of grasses and Restionaceae in which reduced flowers, each with its bract and bracteole (grass), are crowded together into partial inflorescences, which are again combined into complicated branched inflorescences (panicles (grass)) Moreover the spikelets (grass) may not merely be grouped into an inflorescence; they are sometimes grouped first into pesudospikelets structures externally spikelet -like, but themselves consisting of an axis bearing bracts with spikelets in their axils. It is this repetitive tendency + the resulting accumulation of branches (shoots of higher higher orders) which produces the extreme complexity both of vegetative and reproductive system in the flowering plant.

Inflorescences of Grasses & Composites. This is fuller than the Bot Rev reference

Grass panicle = shoot system in which each ultimate member is a partial inflorescence (spikelet). It differs from an inflorescence (in the strict sense) in the fact that each ultimate unit which it bears is a minor inflorescence and not a flower. A grass panicle may be compared with the branched inflorescen of a Composite (e.g. Lapsana communis L.) —

There may be a still further degree of complication. In the bamboo genus Schizostachyum, it has recently been shown by McClure, F.A. (1934) XII that the ultimate inflorescence branches are not mere spikelets, as was formerly supposed, but something more complicated. In their younger stages they are bract-covered and spikelet-like externally; but they differ from true spikelets in structure; for distinction they have been called "pseudo-spikelets". Each terminates in a spikelet, but is also capable of giving rise to a succession of spikelet-bearing branches from the axils of the bracts below the terminal spikelet. These branches repeat the characters of the parent pseudo-spikelet. A pseudo-spikelet may thus contain within itself a series of axes of different orders, whereas a normal spikelet includes only its own main axis (rachilla) and the axes of ~~the second ordr belonging to~~ the individual flowers, which are of the second ordr relative to the rachilla. A pseudo-spikelet of Schizostacnyum bears the same relation to a normal grass spikelet that a Hen and Chicken daisy, in which secondary capitula arise in the axils of the involucral bracts, bears to a normal daisy.

In Composites the partial inflorescecnes (capitula) may be reduced to one-flowered structures, each enclosed in a small involucre, and these one-flowered capitula may be grouped into secondary capitula. If we take as an example Echinops globifer Jacк (E. and P. p. 314) we may find a close term of comparison in the female plants of the grass genus Spinifex, in which the one-flowered spikelets, enclosed in the two outer empty glumes, are grouped into a spherical had. (E and P, p. 39)

stipules

Examples: Hydrocharis, Najas, Alisma, some sp. of Smilax, Ruppia etc.

10. Sheath completely absent. Leaves inserted without enlargement on axis, wh. they do not clasp: with or without petiole.

Examples: Dioscorea, some dilleaced, etc.

Note (p. 158) Sometimes all modifications of leaves follow one type: in other species type may alter in passage fm. primary leaves to bracts.

Compensatory growth

We are also indebted to Professor McLean Thompson for bringing into prominence another principle familiar to the earlier morphologists, but somewhat neglected in recent years - the principle of compensatory growth. Though I am not altogether convinced that this principle will bear all the weight that Professor McLean Thompson puts upon it, I think that it has its use in certain directions which he does not follow - particularly in connexion with the effects of pressure during development. There is, for instance, an undoubted correlation between elaborate inflorescence branching, crowding in development, and reduction in the parts of the flower. I have been particularly impressed with this correlation in grasses because I happen to have examined a good many examples of this order, but there is little doubt that it is equally conspicuous in other groups. But, though the correlation is clear enough, we find, as so often in morphology, that we leave *terra firma* as soon as we go beyond the fact of correlation, and try to fit our results into a rigid framework of cause and effect. For we cannot be by any means certain whether reduction of the perianth and other flower parts set free energy for branching, and thus caused crowding, or whether, on the other hand, it was branching which produced the crowding, which, in its turn, induced floral reduction.

Lindley cen. (1817) COMPENSATORY GROWTH (2)

The perianth may be inhibited by bract formation e.g. the spathe of the Spathiflorae & the Colocasia petal-like bracts of *Euphorbia fulgens*, ~~predominate over the flowers themselves~~. are associated with flowers that are individually reduced.

hair is another example. [illegible] (1875) footnote p 310 p312 Drawer II [illegible] [illegible] on the false analogy w animal tissues. (Unsatisfactory terminology in anatomy)

far otherwise, for our language had set into its permanent mould before any desire was felt for words with which to distinguish the internal components of plants. The need for such terms arose at too late a date for the unconscious advent of new words, but yet too early for a consciously scientific terminology based on full comprehension. The result is that we are faced with a peculiarly unsatisfactory series of expressions, either crystallising some misleading analogy with the animal body, such as 'vessel' and 'vascular', or with some man-made product, such as 'cord', or 'bundle'. 'Vascular bundle' and 'vascular strand' - absurd as they are - have become the least harmful of these terms, because long use has given them their own secondary significance, in which their origin has been well-nigh forgotten; but 'cord', having been little used in modern scientific writing, still carries with it the primary idea of a tough, alien body threaded through the tissues, and thus encourages the false conception of the bundle as an independent entity. But we have to remember that when 'cord' was first used, it seemed, no doubt, less inappropriate, because laboratory technique was then so crude that there could be little knowledge of any part of the vascular bundle except the lignified and fibrous elements. In the eighteenth century, ~~various~~ almost magical properties were ascribed to the "spiral vessels", on account of their remarkable, spring-like appearance, and even today botanists have not altogether outgrown a tendency to exalt the xylem at the expense of the phloem. It is probable that this tendency has been encouraged, sub-consciously, by the sight of sharply defined lignified elements in stained sections; the vivid contrast which they present to the rest of the tissues endows them with a certain factitious importance. The result of this preoccupation with the most obvious part of the vascular system, is that statements purporting to describe the course of the bundles will often be found to relate, in fact, to the xylem alone, the phloem being ignored. How

The danger of applying to the "lower" plants conceptions derived from the "higher" has long been recognised; but I think that the converse danger of explaining the "higher" plants on the basis of some selected groups which we ~~are pleased~~ choose to call "lower", is even more insidious, since it seems at first sight to be sanctioned by evolutionary doctrine. Interpreting the Angiosperm flower on the basis of our limited information about the ~~Pteridosperms~~ reproductive structures of the Pteridosperms their supposed descendants resembles an attempt to explain the mentality of the modern inhabitants of the New World on the basis of our slender knowledge of the ancient civilisations of Mexico and Peru. It seems to me that the flower, if it is to be understood at all, must be considered on its own merits; when ~~crushed~~ forced into the mould presented by ~~the~~ ~~Caytoniales, any other Jurassic group~~ ~~Pteridosperms,~~ any one of the Jurassic groups at present known it is "belied with false compare". The utmost which can be conceded is that the fruit bodies of the ~~Jurassic~~ Caytoniales, and, still, more, the hermaphrodite strobili of the Bennettitales with their basal bracts, show ~~interesting~~ certain parallelisms with the Angiospermous shoot. [illegible]

The enormous multiplicity of floral structure in Angiosperms is such that with a little ingenuity & the careful selection of modern examples from diverse botanical backgrounds, one can create the greatest possible variety of hypothetical ancestors.

Flower parts = homologues / leaves a
os organs sui generis

... It is true that to some extent the ~~differences~~ points at issue between Professor Grégoire and those who do not agree with him, are merely the ~~differences between the two sides of the shield.~~ If one concentrates one's attention on the divergences between the parts of the flower and the foliage leaves, it may seem appropriate to call the floral members organs sui generis - for this expression is itself somewhat ambiguous, and, in a certain sense, may be used of any member which has a character of its own. On the other hand, if one concentrates upon their resemblances, it may well seem reasonable to assign both foliage leaves and flower parts to the same general category.

Morphology without phylogeny
Systematics "

The introduction of alien historical ideas into morphology has sometimes been justified on the pragmatical ground that, without a leaven of phylogeny, morphology is emptied of interest. But neither Goethe nor A.P.de Candolle had phylogeny in view, and yet it is evident from their autobiographies how deeply they were both enthralled by the application of the principles

they had discovered to such facts as were accessible at that time - limitrd as those facts were. And now that more than a century has passed, and the ever-widening botanical field offers endless scope for the study of the comparative structure and ontogeny, the fascination of the search for the principls expressed in form is more potent than ever, and needs no adventitious aid from phylogeny. Nor is it by any means true that the exclusion of phylogenetics from morphology undermines the study of the affinities of the Angiosperms of plant groups. Engler, who regarded the Cohorts as, for the most part, independent "Formenkreisen", yet maintained that this standpoint did not preclude the unravelling of their relations - relations which retain their reality, even though we recognise that they are purely morphological and do not imply derivation in the historical sense.

Physics + Determinism

...ut the general position which he takes up - which is, I think, typical of German theoretical biology today - seems to me to be open to two serious objections. One of these objections is that this position involves the belief that the New Physics has put out of court causality and determinism - using these terms (being used in the sense in which they are commonly employed in biological thought. This belief may seem, at first sight, to receive support from Eddington's recent Address on The Decline of Determinism (21). For an outsider to question Eddington's mathematical and physical reasoning would obviously be ludicrous; but, when he leaves his own domain and enters that of metaphysics, the biologist is entitled to criticise his argument as freely as that of any other worker whose results are held to have a bearing on the study of living things. If then we scrutinise Eddington's argument without prejudice, we must, I think, recognise that it confuses the undetermined with the unpredictable. But even if such criticism be discounted as an impertinence, and if all Eddington's conclusions be accepted, they will not, in practice, be found to affect the biological standpoint. For, in his own words, there is "one unified system of secondary law throughout physics, and a continuous gradation from phenomena predictable with overwhelming probability to phenomena which are altogether indeterminate". Now it seems clear that biological conceptions - owing to the highly complex and synthetic nature of the material from which they originate - are confined to the field of "phenomena predictable with overwhelming probability"; and with the question of indeterminism outside that field, the biologist has no direct concern. We find indeed nothing in Eddington's Address to invalidate the statement made last year by Jeans, that the "laws of probability provide something which is ... equivalent to a strict physical determinism" (27). This statement gives all that the biologist needs to ask; he does not pretend to approach the

individual atom or electron, and a statistical determinism is amply sufficient to justify his habitual reference - within his own province - to the cause-and-effect relation. And if this relation is to be retained as an essential part of the scaffolding of our thought, it displaces much of the fabric of modern German theoretical biology. For anyone who turns over the pages of Troll 's study of the flower - which we have taken as an example - will see how essentially his whole argument is bound up with the idea that causality has no place in morphological reasoning.

The second point

EDDINGTON, A. The Decline of Determinism. Presid. Add. to Math. Assoc. , Nature, 129, pp. 233-240, 1932.

JEANS, J. Discussion on the Evolution of the Universe. Brit. Ass. for the Advancement of Science, Report of the Centenary Meeting, pp. 573-579, 1931.

Saunders ½ 1 ½ carpels

84

My work on the Fumarioideae shows

that the androecium in this tribe cannot be used

to lend colour by analogy to the existence of the

"½ 1 ½" carpel combinations which Ethel Saunders

postulates for certain gynaecia

Appendix) de Candolle

Guérin, Maurice de. Journal, Lettres et Poèmes. Paris, 1864. [Oo.38.10] 85

Avril 24. 1833.

"Achevé de lire la Physiologie végétale, par Candolle, 3 vol. in-8°. ... Malgré la chimie, qui est pour beaucoup dans cet ouvrage, ... et dont je n'entends pas un mot, j'ai pris un vif plaisir à cette lecture. Un monde tout nouveau s'est ouvert devant moi, un peu vague, il est vrai, et sans que j'y aie fait plus d'un demi-pas; mais pour qu'il en soit, ce n'est pas un petit bonheur que de s'ouvrir une nouvelle perspective dans la contemplation de ce monde et de savoir quelque chose de la vie et de la beauté de nature. Un nombre infini de détails m'ont échappé, mais l'impression qui me reste est précieuse. Elle a redoublé mon attrait pour l'observation des choses naturelles et m'a fait pencher vers une source inépuisable de consolations — de poésie. Ah! quel bonheur ce doit être dans le ciel, puisque la plus petite vue de l'âme et de l'énergie vitale de notre globe si mesquin nous délecte si profondément.

Grew on classification
& description of
on the importance of
full & clear description of familiar
things
See preface of "Catalogue".
I have of reform to this very shortly in
notices of British botany.
Also on the importance of measurement
in description. [this was dis. ~~inculcated~~ by
Bacon]
Difficulty of clear. tendency of
linear classif. Gr. VII 65

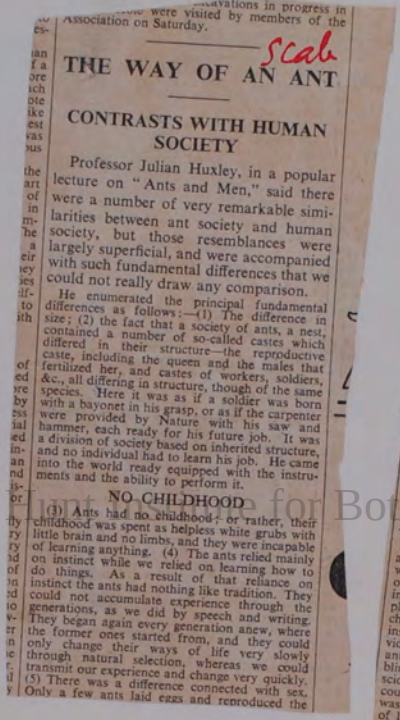
87

A. A

Does the root cap hinder branching for the meristematic apex? AA. Fig 2.34

Root & shoot

88
Ap 79



...avations in progress in ... were visited by members of the Association on Saturday.

Scab

THE WAY OF AN ANT

CONTRASTS WITH HUMAN SOCIETY

Professor Julian Huxley, in a popular lecture on "Ants and Men," said there were a number of very remarkable similarities between ant society and human society, but those resemblances were largely superficial, and were accompanied with such fundamental differences that we could not really draw any comparison.

He enumerated the principal fundamental differences as follows:—(1) The difference in size; (2) the fact that a society of ants, a nest, contained a number of so-called castes which differed in their structure—the reproductive caste, including the queen and the males that fertilized her, and castes of workers, soldiers, &c., all differing in structure, though of the same species. Here it was as if a soldier was born with a bayonet in his grasp, or as if the carpenter were provided by Nature with his saw and hammer, each ready for his future job. It was a division of society based on inherited structure, and no individual had to learn his job. He came into the world ready equipped with the instruments and the ability to perform it.

NO CHILDHOOD

(3) Ants had no childhood; or rather, their childhood was spent as helpless white grubs with little brain and no limbs, and they were incapable of learning anything. (4) The ants relied mainly on instinct while we relied on learning how to do things. As a result of that reliance on instinct the ants had nothing like tradition. They could not accumulate experience through the generations, as we did by speech and writing. They began again every generation anew, where the former ones started from, and they could only change their ways of life very slowly through natural selection, whereas we could transmit our experience and change very quickly. (5) There was a difference connected with sex. Only a few ants laid eggs and reproduced the colony. The great mass of the colony were neuters, and sterile. (6) Another difference was that whereas there was only one species of man in the biological sense, all of whose members of one sex were fertile with any other member of the opposite sex, which was the definition of a species, there were about 3,500 different species of ants, as different as the horse from the zebra and the zebra from the ass.

Finally (7) there was the very interesting difference that the ants seemed to have finished their evolution, whereas man was just about beginning his. This was proved so far as the ant was concerned by the occurrence in amber which was at least 20,000,000 years old of ants beautifully preserved with every detail of their structure, and these ants differed in no particulars at all from the ants of to-day. Modern man was only a few hundreds of thousands of years old.

Maeterlinck's view was quite erroneous. The white ant was not cleverer than human beings, and the ordinary ant could not be a "worker" or a "soldier" at will. These insects did not consciously control their lives and actions, which were determined solely by heredity and evolution.

He offered as a speculation as to why the ant had come to the end of its evolution, the fact that, like all insects, it seemed to be very limited in size. The biggest ant was not as big as an ordinary mouse, and most were much smaller. This was due to their system of breathing by microscopic air tubes running all over the body—wonderfully effective, and probably better than lungs, so long as the organism was small, but less efficient, because of the less perfect diffusion of the air, with increase of size. An insect the size of a rat would suffocate because it could not breathe properly. But if it were otherwise, if there could have been ants as large as fox terriers, it was probable that neither men, nor any other vertebrate, would ever have existed on this planet. The vertebrates would never have had a look in.

A further consequence of the small size of the ants was that they had a small size of brain, with comparatively few cells. We and most of our mammalian relations had a capacity of learning by experience dependent on the size and complexity of our brains. A small number of rigid channels of behaviour, which were the basis of instincts, were all that the brain of the ant provided for. Also we were self-conscious, which the ants could not be. All other animals were merely blind products of evolution; man was the conscious trustee of the evolutionary process and could take it further in his own person. That was something quite new in the whole history of life.

BY SODIUM

Oct. 25. 34

89

Wodehouse, R.P. Shapes of
Pollen grains Practical Microscopy V 1 I.
pp 23–29, 35, 36, 1934
MD. 91. 26
p 23

"the shapes that pollen grains may assume are restricted &, in a way, controlled by their size, for their forms are during those of the small-size world to which they belong. Hence it is that they bear a superficial resemblance to other organisms of similar size as, for example, some of the foraminifera & heliozoa though these are unrelated to them & live in a different environment."

[This comparison occurs in Grantor Form in at least three or of two pollen entries in the index & this is not in either. Is it in Darwin's books(?) on Scale, or is it Wodehouse's own idea? A A) most likely is Wodehouse.

(Gen - Dist - drawer)

Scale

Preformation & Epigenesis

Preformation, Epigenesis & Time

90

Is the diffce between pre-formation & epigenesis the diffs. betw those who are not expressed in time & those who are not

The time or duration feeling leads to belief in gradual devt, where was no lean originally, while if time sees some non-existence, then ~~the~~ the ~~rudiment~~ mature stages seem to be all there in the rudiment — one sees the future in the present.

A.A.
Mar 26. 33

cf Bergson's Creative Evolution

Devt., Time

Extent form & internal structure 91

Using Spinozistic terms, we might call these co-attributes of the whole — "collateral expressions of the same reality."

Form "a disagreeable accident"

Form & Matter Jan 27. 42

Form & matter [the formal & the material cause] are readily distinguishable in artificial products when the form is imposed upon the matter from the outside. The form of a coin impressed upon a lump of gold, is not the expression of the inner nature of gold, though such a shape has to be in some degree conformable to gold nature or the matter will not admit it. In living things form & material cannot be divorced as in the case of the coin — the living thing is one, & it is only by artificial abstraction arising out of the analogy with the products of art, that we are induced to try to separate the two.

In contrasting the products of art & nature we must remember there are some man-made objects which show an approximation to living things in that their form has a certain inevitability arising out of the actual nature of the material; an example is the pot whose form is largely an expression of the plastic nature of clay. We may thus say that the difference between art and nature is not absolute but graded.

Unwarranted assumption of descent (used)

"Post hoc" mistaken for "propter hoc" in argument
≡ "subsequent to" assumed to be same as "descended from"

Biologists sometimes speak of one organism as descended from another, when they have no synonymy more than that it is subsequent to that other. In the same way "propter hoc" often assumes the place of "post-hoc" in argument

Body & Mind

93

Sept-27.35.
Mind & body are abstractions of the whole man, as space & time are abstractions of the space-time continuum.

Sep-27. 35

When we talk about a number of different plants living under the same conditions, we must remember the plants as well as the conditions. A native of Tropical Africa and an Eskimo would find an English summer "cold" and "hot" — conditions, considered in relation to organized beings, are purely relative.

[This sounds terribly platitudinous, but I feel after something!)

Preformation & Epigenesis. Sept-23. 35
after reading Woodger. Biol. Principles

~~Both contain a~~
These views are both abstractions from the truth. Preformation (not of course in the old sense where the ~~creature~~ miniature creature was present in the egg & had only to increase in scale &/or unfold) is so far true that in the hen's egg the hen is determined; — a bird of paradise can never be derived from a hen's egg. "Ye cannot gather grapes of thorns or figs of thistles". Epigenesis is also ~~undoubtedly~~ true so far as it goes. (Cf Woodger p 339 on the early differences made [?] in segmentation of the egg & [illegible] two cells—one). Preformation concentrates attention on the starting point & the goal, while epigenesis concentrates attention on the route or process.

Of a man running a race. You can either consider him as a runner & investigate the muscular & nervous processes involved, or you can regard him simply as a moving object & consider the starting point, the race course & the goal. Both these both define his route. points of view must be ~~[illegible]~~ synthesised if you are to consider the man running the race.
(Looking up Russell again)

Genet evidence for descent w. modificat. 96

Many ~~com~~ common pure genera
ones & be trace for geographic
distribution. ~~Such maps or some~~
Hutchinson's ~~Hotta~~'s Ide-maps are in
of Anonaceae not made to enforce any
particular theory — Area occupied by Guatteria
completely encloses ~~the~~ occupied by Xylopia (?)
Duguetia, & overlaps the small area occupied
by Annona. Again the area occupied by
Annona - Unonopsis - within that occupied by
Asimina other — ~~area~~ relatively primitive
Artabotrys —
extensive genus — Thus
This would lead to the conclusion that the genera
plants the species within genera, & the genera
within a family are genetically connected.

Resources of one branch isolated 97

Sir Charles Lyell quotes de la Harpe of Lausanne as saying, à propos of Heer's work on fossil leaves, "no one who does not make a study of elytra or wings as a separate branch, or of the leaves of plants , can imagine the resources of that branch when isolated."
(The Life ,Letters and Journals of Sir Charles Lyell,Bart.1881)Voll 2 p.213)

External simplicity v. internal variety

External simplicity of Monocots is correlated with internal variety cf. great histological variation in pine needles and their morphological simplicity- a compensation, cf. Dufresnoy ,Bot . Gaz.66,1918 p. 448.

AA

INHERITANCE

By inheritance one means inner nature. One does not talk of a diamond "inheriting" hardness and brilliancy - it is hard and brilliant because it is diamond nature so to be, and when we have baldly said this, we do not flatter ourselves that we have solved the mystery of its qualities. Just in the same way a plant belnging to a given species has the characters of that speciewby inherent right - why it has these characters we shall not know until we solve the mystery - what is a specie? The word inheritance would better be confined to variations - features in which the plant differs from the common run of the species. We may talk of a son inheriting his father's musical gift, or his blue eyes, but not of his inheriting two arms and two legs, features common to the whole human race. We are apt glibly to say that features can be explained either by inheritance or by ~~or~~ due to the influence of the environment. To say that a certain feature is due to responce to the environment is an explanation - though very likely a wrong one - but to say that it is due to heredity is no explanation at all. In science analogies are invaluable so long as we bear in mind that they are merely analogies; but as soon as they have worked their way into common usage, thay are ~~h~~develop an insidious habit of penetrating from language into thought, and there claiming a place which is not ~~right~~ by right — ~~fully~~ their due. To say that a man received a house by inheritance ~~is~~ an explanation of how it came into his possession, but to say that a plant inherits the anatomical structure of its leaves throws not one glimmer of light on the question of how the plant came to possess this type of structure.

Teratology

Its neglect, this ~~due to~~ ~~Fa~~ a subconscious survival of the idea that species were separately created — i.e. that there was something sacred about their very nature, & a repugnance was felt to considering any departures from the fundamental type ~~almost~~ as acute as the religious ~~the distaste~~ of the consideration of ~~any~~ form of immorality

Analogy

~~the~~ argument ~~from~~ analogy.

The science of the middle ages ~~The middle ages~~ came a cropper on analogy. C.S.

Butler certainly succeeds to a remarkable extent in justifying its employment, but this is owing to his deliberate and cautious reserve, and also to the strict restraint in which he holds the imagination, which he calls "that forward, delusive faculty; ever obtruding beyond its sphere; of some assistance indeed to apprehension, but the author of all error

(1) Butler, Joseph. "The Analogy of Religion, Natural and Revealed, to the Constitution and Course of Nature" 1736. There is a handy modern edition of this classical treatise in Everyman's Library (J.M. Dent & Sons, Ltd.).

(2) On the abuse of the argument from analogy in the science of the Middle Ages see Singer, Charles, "A Review of the Medical Literature of the Dark Ages." Proc. Roy. Soc. Med. Vol X 1917 pp16,17.

If there's such a thing as specificity of cytoplasm which is unaltered by genic changes, we are bound to believe that it is the cytoplasm ~~which is responsible for macro-evolution~~ which is the seat of the general-organizational features. It must therefore be the tool of macroevolution (if there's such a thing). The nucleus supplies a mechanism for detailed change — the cytoplasm supplies a mechanism of stability. Gene constitution determines eye colour, but the cytoplasm determines ~~the existence of~~ the type of organism and whether eyes are ~~functioning of the eye~~ a normal part. Genic changes may prevent the cytoplasm from functioning in certain directions — [illegible] — but genic change cannot form major [illegible] in origin — but genic change to produce one work outside the cytoplasm framework to produce [illegible] no gene change can transform organism of [illegible] different type e.g. [illegible] an angiosperm into a fern, tho' similar changes in unit characters might follow similar courses in the two groups. ~~Cf Trueman A E (1938) "Similar stages in 'unit characters' may be recognized in different stocks ... the whole skeleton not homoeomorphic."~~ (not quite opposite)

If racial senescence is a fact, can it be that it is the cytoplasm which has a life period and ultimate decline, which is more or less the mercy of the mutant gene as to vigour decrease. Racial senescence demands a beginning as well as an end. A mutant gene change is not a beginning — not in any sense a new start. We can suppose that the cytoplasm changes resent the action of mutant gene, and there is a failure or success on the part of the mutant gene and the cytoplasm, whose business is to maintain the status quo. Goldschmidt's view of the

How can we visualise this if the origin of species is

mutation-gene demands toround "wild type" as its basis. The idea of a single absolute "wild type" for species is, in any rate any plant, a difficult idea to maintain, but we might substitute for it the idea of the ~~racial type~~ cytoplasmic type as the basis thing which can be modified within fixed limits by the genic mechanism.

The racial senescence theory (12) 8 supposes that the origin of a new species is analogous to the birth of a new individual. The origin of a new species from an old one can only mean the birth of a new individual (or possibly simultaneously of a number of individuals) which differs from its parents instead of being identical with them. Does this mean that species production occurs at the period in the life of a race when the stabilizing quality of the cytoplasm has begun to be overcome by the genic apparatus ~~[illegible]~~ so that variations are produced. At this late stage the cytoplasm has lost control of the new forms which is pretty completely the parents, so do the [illegible] pass the [illegible] of correlation in large size, dwarf giantism etc. Loss of control of correlation, changes of individual sensitivity

In what way does the new individual gain a renewed lease of life? It does not appear to be the merging of two cytoplasms that does it, since sometimes the ♂ contributes little or nothing. ~~Can it~~ Is it not the genic equipment; can it be the isolation of a cell (the egg) from the influence of the rest of the body with the haploid* no. of chromosomes during which time the cytoplasm is in a more complete control (fully within!)

If species have arisen from other species, the birth of a species is the birth of an individual or individuals.

See (12) 49, 50

*not haploid after fertn.

Even in mammals with the prolonged connection of fertd. the egg with parent, the embryo develops in considerable independence

Not purely conclusive obtain. Some form of vitalism ~~[illegible]~~ part of man's make up
[illegible]

A moral cowardice — a power beyond which freedom of enquiry is denied.

A man may honestly follow his reason & believe in its results, & at the same time retain some conviction diametrically opposed to the results of the reasoning. In each generation there is some conviction which men are unusually reluctant to disclaim.

In Buffon's day it was the geological being arose as the result of an Act of Creation described in the Bible. (For F. Russell p 25) Buffon checked his evolutionary speculations with this: "Mais non, il est certain par la révélation que tous les animaux ont également participé à la grâce de la Création" — & thus put off the hazardous hypothesis of the origin of all species from single one. Hist. Nat. IV/I p 382

Large part played by society in the atmosphere of any given time, which renders certain beliefs distasteful at certain periods, so that no man will acknowledge the validity, then, if he can avoid doing so without violating his conscience. "Thus far & no further" in each generation. Cf Maeterlinck on the hidden fires, & Tube.

If there is no ~~freedom [illegible]~~ free will, at least the ~~[illegible]~~ illusion that there is, is an essential part of man's ~~[illegible]~~ mental make up. In the same way a sense of ~~essential~~ an essential R of man's attribute purposefulness & some kind of vital urge to all forms of life.

Mar 26. 35

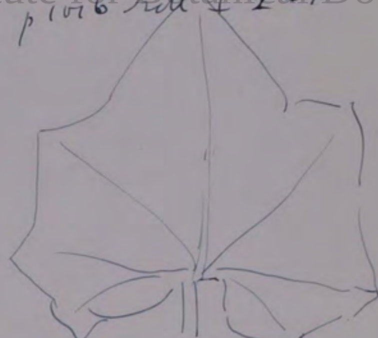
Cf differ leaves
(1) rosette / short shoots — Cf. sessile palmate leaves
(2) long shoots — Cf. stalked pinnate leaves
(3) rosette / short shoots borne on end of an internode — ~~eg. ? Papyrus~~ [~~+ flowers~~] ·sessile leaf + leagin

Mar 27. 35

Any meaning in repetition of leaf base characters on leaf apex. (Cf my leaf types paper) Troll notes the recurrence of the basal ventral meristem at the Vorläuferspitze of Dioscorea. Are the bundles on Dioscorea 3 — ? are there 3 at the base.

The Vorläuferspitze is ~~the~~ ≡ stem g.-p. which however goes over to permanent tissue & remains — — — — X

Cucurbita Pepo p 1016 Troll f 2 #1



Can we suppose that with loss of the apical meristematic capacity, the meristematic power is transferred to the basal region.

Troll makes it clear that the problem of leaf form is ~~correlation~~ largely the problem of relative growth. e.g. pp 1018-9 of dev. of the ~~surface growth~~ surface expansion ~~extension~~ becomes transferred (in general) to the middle region of the lamina, a leaf which is further in parts becomes simple in age, the marginal and points being small, being unimportant when the whole thing is big.

Mar 27 cont. (ideas) 106

Wherever leaf lobes only ... left - ... leaf as more teeth. i.e. no distinction between leaf lobes & teeth

The cuspy & late (marginal) winter leaves (e.g. Begonia Bunchii (Fig. ...) Troll p1021 are examples of exaggerated marginal growth i.e. growth in two regions (junction of extent surface /axis & new internal surface) which is the seat of lamina & leaflet development.

March 28. 1939

Muriel suggests to me, when I was explaining to her my view that the way of thinking which relates all leaf forms to a type leaf is better replaced by a way of thinking which regards all leaf forms as partial shoots, & as deriving their resemblances, secondarily, from the fact that they are all derivatives of shoots — that this might be expressed by ~~comparing~~ the fact that the ~~resemblances~~ relation of all the different forms of leaf in a shoot (is the) the indirect relation of ~~brothers~~ the children of a family ~~brothers or sisters~~ to one another, ~~[illegible] than the relation of each form of leaf to the shoot is the relation of [illegible] which is a closer relation [illegible] offspring to parents, which is [illegible] child to child; for [illegible] than the relation of [illegible] [illegible] the [illegible] [illegible] parents [illegible]~~ They do not derive their origin from one another, but they all have a common parentage.

April 12. 39

Palmate venation represents an attempt on the part of the lateral nerves to be as important as the main nerve — reduction of basal "internodes" of leaf axis

March 29. 1939 — cf Narcissus leaf in flatten ellipse of bundles & a flattened stem

Innocent pseudolamina = expansion of rudiment of flattened stem. An ordinary phyllodinous leaf in central rib & merely really bundle be winged stem

True lamina = wings of rudiment — cf leaves

Flattening v. wings

(tensile stress)

Do bundles tend to form in the direction of pull! as a direct effect of the strain

The common character of vascular elements is elongation. They are found in elongated organs. Nov 10.39

Relative emphasis

Can we define a shoot as primarily radial but capable of tending towards dorsiventrality; the leaf is primarily dorsiventral but capable of tending toward radialness. Nov 10.39 The tendency to radialness & the tendency to dorsiventrality are present in both, but they vary in relative emphasis.

Tendency of lateral nerves to take on the importance of the primary nerve in leaves which may range from pinnate to pseudo-dichotomous branching see. Troll, Ficus diversifolia or Boehmeria biloba p. 1082

cf pseudodichotomy in stems.

The only leaf of Cabomba caroliniana (see my drawings) is one to Troll an example where there is a terminal segment, but the others grow to the same length.

March 25. 1935

Looking at a vase of big trumpet daffodils (the Royal Standard, Lyme Regis) it struck me that the face of the face to face orientation of an enation with its foliage leaf, or a corona with its perianth, would be comprehensible on the ground that the relation of enation : foliage leaf or of corona : perianth :: leaf of spore-bearing axis. As in leaf & axis the xylem faces towards the parent axis, & the same thing happens in the enation in which the xylem faces towards the parent leaf.

[Cf the relation of adventitious buds to leaf. [illegible] the (adventitious) ~~axill~~ (axillant) leaf & the axillated leaf. One would expect the [illegible] in its xylem towards the parent leaf, & the adventitious shoot & the axillant leaf. To be thus related normally in regard of the [illegible] is in [illegible] case of [illegible] Is this what happens? Look up [illegible] for Neapond Barley. Look up [illegible] leaf & shoot [illegible] of view]

April 6. 1939

The leaf is formed close to the shoot apex: the lateral shoot is formed after the associated leaf rudiment, & its development may not take place until after a long period of dormancy — the leaves belong to the shoot's first season; the ~~buds~~ lateral branches to ~~and~~ its second or later seasons.

This time relation must be in some way closely related with the differences of leaf & lateral branch. A.A.

Can there be a correlation ~~wit~~ between the precocity of the leaf & its limited capacity for dev^t. — precocity in human beings not associated with ultimate ~~dt~~ dev^t.

AA Apr 8. 39.

April 27. 39

The Gestalt conception of the flower gives a certain validity to the theory of the flower as an inflorescence reduced — not an historical validity but emphasizes the equivalence of a single or a multiple shoot.

cf. leaf & lateral shoot

April 19.39 & Ap 27.39

Belated meristematic region at base of inside of leaf rudiment which affects both inside of leaf base & adjacent region of axis of root rudiment in Watercress.

A leaf is initiated by differential growth producing a fold at the apex or a region which is wholly meristematic.

2 & a bud is initiated at a later stage* as a localized area of growth.

*may be only slightly later

This is an embryonic development [illegible] again which tends to be more advanced i.e. it is more comparable with an embryo. This the time element which makes the leaf a more integral part of the parent shoot than the bud

April 27.39
Phyllodes $\equiv$ (query) flattened axes

Any ribbed axes to correspond to the fluted & winged unvegetated [illegible] leaves?

Importance of lateral nerves in Acacia phyllodes would be of comparison with caryll.

Ap 30.39 How far can the limitation of growth of the leaf (due to its incomplete nature) be associated with its relative ephemeral character? Leaf fall is a more or less universal phenomenon. [perhaps gymnosperms? Dicots] Can I find examples of [illegible] fall, though tree occurs, limited growth then fall? Indeterminate branches; limited shoot [illegible] as long as the tree. Even evergreens, leaves do not live as long as the tree.
The leaves & apical growth stay [illegible] [illegible] short. + in the higher plants intercalary vegetative growth near is then which gives rise to the petiole, never to very much.

The characteristic asymmetry of the stipule due to reduction of the part turned towards the petiole (see Troll, p.1248) may be compared with similar asymmetry, the [illegible] to (?) similar asymmetry of prophylls.

= Can intravaginal scales often all really be stipular, for the hairy glandular stipules (e.g. Coriaria) develop in the leaf axil as well as marginally.

May 3. 35.
? Analogy for winging of stem with leaf base wings
Presumably a stem (lateral) cannot wing the parent stem because it is not bilaterally symmetrical in margins. Can one find any example of a dorsiventral lateral shoot winging — or rather ridging — the axis?
Presumably not because the axillary bud would get in the way. But it might happen in a grass inflorescence where the axillant leaves are reduced to nothing.
How about winged grass inflorescences?

May 7. 35
Troll takes the uniformity [unity of structural type] of form in the flowering plants as given & deduces his interpretations e.g. of the various gynaecial forms from this as basis.
I think it would be more logical, on the other hand, to treat the idea that the forms of the flowering plants is on one uniform plan as a hypothesis, & to regard all his interpretations as proofs of this hypothesis, i.e. as showing that it is possible to explain the form characters of flowering plants on the uniformity hypothesis.

May 1935

Shoots in general begin in bilateral symmetry readily known due to the ~~prophylls~~ paired prophylls in dicots. There is even a certain tendency to dorsiventrality — the prophylls tend to be slightly adaxial in dicots & the same in monocots gives a dorsiventral axis to the shoot.

(See drawing B1 of Berberis dictyophylla long shoot)

June 13.39

Bilateral symmetry characterises the prophyll-system whether it consists of one member or two

There is a Gestalt prophyll form with the bilateral - dorsiventral - character, which may be expressed in one member or two*
(Iris pseudacorus A3 the change from ~~the~~ according to the 2 back calyx members exactly simulating the prophyll halves of ~~the~~ some grasses etc)

* or may even be represented by 2 calyx members.

The stipules of the 1st leaf of the branch, standing ~~in~~ in Lathyrus pratensis right & left, may be held to replace the absent prophylls in the scheme of things.

undoing of leaf versus shoot — June 21. 1939 — one bundle or an arc involves dorsiventrality — 116

An organ supplied by one bundle or an arc of bundles tends to retain the same dorsiventral symmetry, because it has phloem below & xylem above, if one of the constituent bundles branches in the simplest & most obvious way, the bundle branches are similarly related to the xylem & phloem of the structure as a whole. In the bud, on the other hand, the primary scheme seems to be of two vascular bundles or masses [facing one another] & enclosure of ~~the phloem radial ... ~~, a body of more or less circular outline, so there bundle tends towards the natural result of branching of these bundles? ... & thus to radialise the structure in a ... way.

The existence of paired (opposite) prophylls may be related to prophylls & axillary ... characteristic of the basic 2-bundle symmetry, this is characteristic of leaves. The bud as in the dorsiventral bilateral symmetry of many ... leaf bundle tends to give off two primary laterals, not is main ... to stipules.

Differentiation between leaf & shoot

// The leaf is related to its parent axis [in] one face is turned towards the ... in such a way, ... "parent" ~~axis~~ ... always; it has thereby an intent to ... on extend face. The bud & bracteoles stand between two ... be called its parent's structure ... in a sense, be the base ... the leaf & the axis — it thus has not as ... face that can be called truly external.

// ~~Extent~~ Daughter shoots arising ~~away~~ from one face of parent shoot — ~~An axis~~ A shoot can only ~~...~~ give rise to offspring from one side — ... would ... be a ... perfect symmetry ... latter ... of the axis ∴ ... later ... bilateral symmetry — ... can begin ... ... leaf structure

June 26. 39

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A dangerous feature of Tidd's work is the assumption of the unity of the gyn. — complete correspondence between & hypogynes (see his class: (10) 52 & (14) 26

But this should not be an assumption but a hypothesis which needs proof.

See my note & similar effect in (14) 27

uniformity of nature of gyn. a special case of this

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July 7th & 11 1939

Whole plant = shoot & its repetitions, complete & incomplete.

Is root an incomplete repetition of incomplete ∴ represents the "core" of the plant.

Repetition—reproduction of life.

Repetition follows a specific mode — tends to occur at a specific point e.g. leaf axil but this is of a tendency, not an absolute law

On July 5. 1939 Dr Stanley, looking at the outer flowers of an umbellifer with their enlarged petals asked "Why?" & I said was supposed to be due to pressure in development & said known, but the outsides of the inflorescence free. Dr Stanley said this was then the geometrical possibilities of developing but this does not answer the question why.

There is a genuine mental difficulty in thinking of the leaf (a) as one of the elements making up the whole-shoot which it belongs to (b) as itself an incomplete whole-shoot.

July 20. 35.

We have to think of the leaf under one or two aspects

(a) as one of the elements making up the whole-shoot (imperfect attempt at a whole-shoot) which, though its tendency towards completeness is clear, remains incomplete.

Aug 28.39 Comparison of certain forms, leaf versus certain forms of shoot

In leaf reduction to scales we may either have a scale which is primarily Oberblatt, or primarily Unterblatt. A leaf which is primarily Unterblatt ≡ a short-shoot which is primarily branch-base e.g. a stem thorn (? Bougainvillea Troll p557 Bd 430); Oberblatt ≡ a short-shoot i.e. leaf shoot is primarily leaves e.g. a leaf rosette

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Sept-10.39 Treating the leaf as the principal unit in the vegetative body is one way of regarding (analysing) the vegetative body. These different ways can in no sense be regarded as right or wrong in an absolute sense (or as possessing absolute reality) Each way of looking at the matter has its own value, but it is more fruitful to concentrate on the other which is the less usual, & "adequate" in Spenger's sense, & fits in more naturally with other conceptions

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Sept-21.39 A leaf may be wholly stipular, as a shoot may be wholly prophyllar.

examples of a short-shoot in prophylls some of the Ruscaceae, phylloclades of Semele, or something else (e.g. ? sterile phylloclades of Myriophyllum, Danae see Morrow p. 136 etc) may be compared in such hypsophylls as leaves of Althaea rosea, in which the leaf is reduced to thorns on stipules alone (Troll II 2 p1371), or the paired stipules of Pithecellobium dulce (Inga dulcis) Mimosaceae p1372 which are primarily stipular. [the difference to be borne in mind]

Oct. 9. 39 Oct. 10-11. 1939 Physiological explanation of coronas

Notes on meaning of Passiflora corona

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In an hypogynous flower giving off its members in one succession from a central column, the nutrient sap not [absorbed] [needed] by the perianth finds its surplus in the essential organs. The nutriment-stream in the case of a flower with a receptacular cup (bearing sepals & petals) and a central continuation of the floral axis (bearing stamens & carpels), must be divided into two [supplies, one for the external cup, one for the central column], on the level on which the gynoandrophore separates from the calyx-corolla cup. The stream passing up the cup, having no essential organs to supply has, as it were, not sufficient outlet, so the excess passes into continued growth on the inner side of the corolla, where in many flowers stamens might satisfy its demand. This explanation might also be applied in modified form to Narcissus, in which the tube has to supply the stamens, but above the stamens there is nothing further to be done with the excess of food.

The obstruction of the floral axis must mean a temporary excess of certain products of assimilation passing to the floral shoot; these will no doubt all be needed after fertilisation when the seeds are ripening, but there must be a period when there is little for excess. This may perhaps result in the formation of coronal outgrowths of various kinds, forming in the tongues which carry penny[?] of the flower. When the route to the perianth diverges from the route to the essential organs, the effect of the excess is most clearly seen.

See drawings of Passiflora capsularis flowers D1 & D2

Oct 10. 39

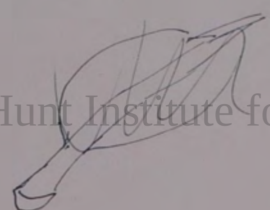
Stipules may be compared with __simplified__ prophylls, many don't

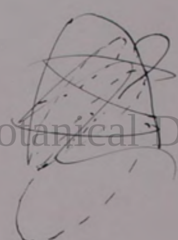
Leaf dorsiventral — common often complete radialness, but in previous conditions under which a radial organ can be formed

relation of leaf & shoot

Oct. 17. 19 35

~~Dorsiventrality = a fixed upper & lower surface~~
~~Anti-spiralness = a continuous change in~~
~~shoot in upper & lower~~. The dorsiventral leaf is
limited to the direction of its growth to boundary between
In most leaves the boundary line lies more or less in one plane
its two surfaces. The ~~axis~~ shoot apex has one surface
only & produces its outgrowths (in spiral sequence or
some modification of spiral) from all parts of this
surface. A continuous spiral in the shoot is
limited to a single junction line in the leaf. — the
junction line of upper & lower surface.





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In devl. the front of the leaf rudiment faces the apical cone of ~~axis~~ shoot, while the back of the rudiment is free.* As then in the earlier stages the upper & lower faces are exposed to different environmental influences; the axillary bud, on the other hand, faces the shoot ~~apex~~ in front, while its back is turned to the upper surface of its axillant leaf that stands behind it; there being in this instance of existence ~~enclosed~~ enclosed between two surfaces, a great degree of protection, so that there is little difference in the influences to which abaxial & adaxial faces are exposed. ~~extern~~ environment of it is

These facts may be correlated with the dorsiventral symmetry of bilateral symmetry of leaf & the radial symmetry of shoot.

The root, which starts its existence deep in the tissues, has from its origin uniform environment all round, & is consequently radially symmetrical.

Radial & Dorsiventral symmetry in leaf shoot & root.

* hardly exactly true because of ... leaves

Nov 3. 35

The reduction or absence of the terminal pinna of a compound pinnate leaf seems more likely to happen in an acropetally dev. leaf, in which the terminal pinna would be the last thing to develop.* In the basipetal leaf (so called) we begin with the terminal pinna & then the laterals are formed, & branch out to side away from the apex. The basipetal leaf is thus a development of the ternate. The acropetal leaf corresponds to a racemose inflorescence, & the basipetal to a cymose inflorescence. The acropetal leaf may be regarded as ternate, with terminal pinna [illegible] acropetal. This is in the two [illegible] unchanged [illegible] that the 2 types (basipetal & divergent) are [illegible] Troll's view.

(* Troll also mentions in acropetally dev. leaves) Many acropetal digitate leaf he mentions is Caragana frutescens & he notes that it is unusual among digitate leaves in having the end pinna suppressed.)

Troll p. 95 says there is general rule (p145-1) than the pinnae of the second order in basipetally branched Fiederblätter arise in acropetal succession. Of this kind are many inflorescences whose main axes are cymose, but the ultimate branches racemose. Can I find such an example.

Troll considers the basipetal leaf type the primary thing (p 152a) both for acropetal & divergent pinnate leaves, but by turn this way. (By contrast) Troll's views see especially T (10) pp ~~99–109~~ 97–107, 103, 110, 111, 112, 113

Oct. 18. 35 ~~EF~~ 126

Lamina : petiole or rachis or midrib

leaf : axis

relat. of leaf to short

Zwischenfiedern alternating with normal pinnae may be compared with the rhythmic alternation of scale leaves + foliage leaves along an axis — tho' this comparison is of course a remote one

Sep. 30. 39

To appreciate the true character of a problem is of more importance than a solution

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Nov 30. 39. Modern morphology ~~considers~~ deals with relations between structures, rather than with these structures considered in isolation. This is much safer ground on which to build, for our conception of ~~however~~ ~~features~~ characters ~~the nature of~~ nature of things in themselves ~~ways~~ ~~things~~ ~~different~~ ~~may be~~ ~~mistaken~~ — whereas things can be considered relatively & not absolutely

does not relate as things

Nov 20.35.

According to my view leaves are <u>equivalent</u> to partial branch systems, but this is not the same thing as saying that they are <u>derived historically</u> from such systems. There is no need to suppose that the leaf ever went ancestrally through a branch system stage, & then was reduced from this. Being essentially derivative, it was never at any stage more than an incomplete branch system — this is part of its very nature.

// The leaf is at the present moment an incomplete shoot, & there is no reason to postulate earlier stages in which it was a complete one.

used

~~When~~ two floral members are "concrescent" we do not find that they arise independently from two rudiments.

We cannot interpret a petal or sepal as consisting of two members in a state of fusion without assuming that its arose independently of 2 rudiments; there is not necessarily any fusion of 2 rudiments in ~~the~~ [illegible] stages.

used

Dec 11. 39

Causality is linear in time sequence (of stratigraphy as a historical subject) while relations form a ~~[illegible]~~ network which may be horizontal. Morphological explanation is the tracing of relationships, not linear causes — such tracing may all be done in a contemporaneous field.

Causality involves endless regress, but the tracing of relations answers the quest "what" or "how" structures related? not "why" are they related.

better :— What is the nature of these relations rather than what is the cause"; June 13.43

August 1941 : possible combination of reticulum & tree.

In connection with the evolution of ~~[illegible]~~ animals & plants was graphically represented by tree-like diagrams, in which the living species formed the ultimate twigs. We no longer take this naive tree form ~~tree-like picture~~ to ~~[illegible]~~, after long modification into bundles of dismembered trees, has been replaced by something very different — a four dimensional reticulum of extreme complexity. But the tree picture, if not taken literally, has its value as ~~[illegible]~~ emphasizing the main lines along which the mind can conceive evolution, & thus ensuring a conception which, if not representing an historical truth, at least represents a way in which the mind can deal with the phenomena presented to it.

In the same way the history of science, when dealt with by modern specialists, each department being treated in detail, gives the effect mainly of a chaotic reticulum, but there are strands which can be discerned in any of the reticulum which form guiding lines from period to period, but they can only be detected by drastic simplification & ~~removal~~ expunging of detail. Tree picture & reticulum picture in phylogeny & in history of science.

Picnic on this side of the hare's field, May 10, 1942

A propos of Goethe, de Candolle, etc., Bohney "The analysis of differences is chiefly valuable for the light which it throws upon significance of resemblances

Analysis must come first - one must first get clear about the leaf and the stem considered as discrete units, before one can treat the more complex problem of the shoot.

relation of parts, is followed by the relation of the relation of parts.

When Goethe talks about the relation of

The simpler type of relation is seen in the relation of a series of e.g. the leaf succession on an ultimate lateral shoot appendages, which do not form part of one another; the more complex type is, for example, that of the ultimate lateral shoot to the shoot complex of which it forms a part. In this relationsip the ultimate lateral shoot comes in as it were on both sides of the equation; it is considered as a discrete unit, and it also forms an element in the whole shoot complex. You see the same thing in comparing the succession of children in a family; this is a simple type of relationship, and on the other hand, the relation of the family as a whole to the nation - the family here being consired on the one hand as a discrete unit, and on the other hand as an element of a larger unit, with which it is being related

The simpler type of relation means comparing things of the same order; whereas in the more complex types, we are relating things of different orders. — a phenomenon considered in itself, to the same phenomenon considered as part of a larger order.

May 24, 1942 - May 28. Mere factual knowledge

The knowledge of plants began in Aristotelian botany with general ideas, and the contribution of successive workers after this has tended rather to the progressive acquirement of elaborate detailed knowledge. This has reacted on the basic framework of ideas, and has to some extent modified altered them; but the extreme elaboration of detail has been liable to involve a breach (or unconformity) between the theoretical and factual knowledge. A capacity for minute technical detail demands another and more frequently occurring type of mind than that required for theoretical grasp, and the capacity to deal with theory, & subject- knowledge of detail is thus apt to outstrip the broader concepts

the broader concepts {fail to keep up with the (show a tendency to compare)

fa ~~theoretical framework.~~ knowledge of detail

of the relative position of theoretical & ~~practical~~ factual knowledge now ~~and then~~ in classical times.

June 2.42 Analogy

Has the analogy of the machine since Descartes day had a distorting influence on ~~biology~~ (plant biology) comparable with the analogy of the animal ~~in plant~~ from classical times onwards.