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About the Institute

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 4

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For morph. book p. 82

birds which do not swim

p. 83. Absam, diff. ; spgy. p. 84 par.
of Avery on E. vac. leaf

9th worth 60.

Book of Small Notations

Agnes Robertson

[Begin 1903. First part rewritten Jan 1904]

Agnes Arber

52 Huntingdon R
Cambridge

Baly. Sunward of the Unlike 80

General on Manual leaves 83

Economy in the bulb form — 61

Tree or herbaceous habit of Dicots 105

Defin. Professor of spec. Law of Assoc. 118

D. W. Chapman Growth Form 123

Russell 'Form & Function' 151

Osborn 'Age of man' 125.

Jenkinson 'Vitalism' 157

Schiller "Discrim. Logical Prof" 160.

Harber on Pangenesis & Origin of Phases 147

Woodward Valabute Palaeontology 161

Bergson Creature Evolution 162

Emile & Comparative Zoology 184

Organic Selection (Baldwin, Osborn, Morgan) 169

Special advantages of a tuberous habit would probably be

- ① Chance of coming on quickly in a short growing season
- ② chance of growing in drought, & of standing desiccation when resting
- ③ Chance of providing vegetatively produced offspring with a store of food e.g. young lilies budded off parent tuber of Arum; young crocus corms from parent corm etc.

Economy: — A crocus ~~corm~~ plant that has seeded & produced young corms for next year ~~is~~ ^{is} practically used up, all its substance is provided for the next generation — nothing left over as waste, much more conspicuous the case in any large annual plant, a perennial in this case where the root system of shoots dies in the autumn

Low spec.ⁿ of Monocots & tuberous habit 62

Can the possession of comparatively low specialisation by monocots be due to their tuberosness being often correlated with some form of vegetative reproduction. This would lengthen the generation, & so reduce the number of variations for natural selection to work upon, & so slow down the evolution. It might cause the spec.ⁿ of monocots to lag behind that of dicots altho' monocots are derived from dicots. But on the other hand this lengthening of the period between the appearance of sexually produced offspring would increase the likelihood of the formation of local races. Any variation which did arise would be vegetatively propagated, whether it was particularly well fitted to survive or not. I think Ranunculus ficaria goes in for local races in a mild way, & this may be from this cause. [See notes on some green R. ficaria from Grantchester meadows] If this were the case we might expect to find the least highly specialised monocots among bulbous forms, & the most highly specialised among the non-bulbous. Amongst the Liliaceae are Ruscus, Asparagus, Polygonatum, Maranthemum, Convallaria, Simethis, Narthecium, Topfieldia, & Paris or the whole

more specialized than Allium, Muscari,
Ornithogalum, Lilium, fritillaria, Tulipa,
Gagea & Lloydia?

The Juncus are generally considered to be
spec. d. from the Lily type & they are non-bulbous.

The non-bulbous grasses seem very sophisticated
monocots, which wd fit in well.

Arum & Ilex don't seem to fit in.

Amongst Dicots we should expect a family
char. by veg. rep. to consist of rather closely
allied members, as their chances of affecting
departures from the original type will have
been reduced. The Gramineae are an instance
of a very uniform family char. by veg. rep.

In the same way we should expect monocots on
the whole to be more of one type than Dicots; but
it is difficult to know how far the points about
local races mentioned above militate against
this.

Bud variations are known, but on the whole
sexual reproduction is more likely to lead to mutation

Seedlings of English plants which might be interesting :-

Genus *Campanula*.

Rootstock may be stout & woody; creeping & stemless; fleshy & branched; or the plant may apparently be annual.

The det^l of the rootstock shd be watched

Is there a tendency for perfoliate plants to have
united cotyledons?

Sep. 03. Seedlings of *Chloa perfoliata* on
Southport sand dunes show cotyledons not united & first
leaves not perfoliate.

Climacortuzgy + Lirkhizgy

- ① Is the fact that in dicots the innermost layer of the epidermis persists + becomes the peridermis layer, while in monocots all the epidermis exfoliates, due to the roots of monocots being not required to pass thro' the winter + so needing less protection?

② Absence of starch in monocot. leaves Stahl (Pflanz. Jahr. 1900) shows that the presence or absence of starch in leaves is a symptom of a strong or weak transpiration current, & divides plants into starch leaved - strong transpirers, & sugar leaved, - weak transpirers. He then shows that there is great competition amongst plants for the salts in the soil, & that fungi have a wonderful power of coming off well in this struggle - their work is extraordinarily rich in mineral matter. One way for an ordinary plant to succeed in the struggle for salts is to have a very strong transpiration current, so as to secure a great amount of water. This is the method adopted by the starch leaved plant. The other method is to live symbiotically with a fungus, & to profit by its power of securing salts. Stahl finds about one half of the vegetable kingdom to be mycotrophic! Stahl finds that a great many of the monocotyledonous characters belong to the sugar leaved, mycotrophic class, especially the Liliiflorae (the Gramineae on the other hand are starch leaved & not mycotrophic)

It seems as if in the case of a Geophyte which has to produce a fresh root system every growing season, & which needs to get its


life processes into full swing or the shortest
 possible return; it cannot be possible to top so
 large an area for salts as in the case of an
 ordinary plain with a perennial root system.
 Also even if it topped an equal area
 it would need to take in salts much more
 quickly, to make up for its short growth
 period. This seems to indicate that the
 aid of a mycorrhiza would be particularly
 valuable, as a more effective & much less
 extravagant method of obtaining salts, than
 a very highly dev. root system. The absence
 of epidermis in the roots would facilitate
 the entrance of the fungus, of this character
 (tho' it may have been ~~been~~ ^{arisen} independently,
 & have simply been retained in the connection
 myc. ^{consequently} ~~consequently~~ have been evolved in
 connection with the mycophilic habit of
 life, & retained in the gramineae etc, as a
 hereditary character, though there have
 become strong transpirans & lost the necessity
 for fungal aid with the loss of the geophylic
 habit.

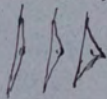
Ternate symmetry of monocotyledones

- ① Are monocot flower stems, especially the more geophytes types, - triangular in section for purposes of getting easily thru' the soil, & would there be any connection between 3-symmetry of flower & triangular form of stem?
- ② It is apparently char: of monocots to poke straight up with their flowers (of snowdrops coming up in spring) (Dicks seem more inclined, when they are geophytes to come up ^{upside down} & an argument which supported the idea of the triangular stem being good for making a way thru' the soil would apply equally to a ternate flower.

1 Steele's Studies

NW

Mr. Fran tells me that the bayonet
is three sided  "for the sake of
strength" a blade like a thin knife
would penetrate best if hard and strong
enough (the best leaf of the purple iris
is hard) If that is so, the cylindrical
being the most removed from the thin
blade should logically be the worst
from ^{the transition} * to the three
sided ^{for the sake of adding strength} side
from the blade ^{could} come
about easily from the thickening of the
midrib of the leaf



The work of the wedge is done by
its straight edge a triangular form



H.P.

* I fancy the purple iris is one of those
something of the sort if sections of the leaf
were made at intervals.

Insects &
Insects &
Insects &

NEWNHAM COLLEGE,
CAMBRIDGE. Nov. 18th 1902

Dear Miss Robertson,

The question you raise is a most interesting one but not easy! You see the resistance offered by the ground to a growing plant must be so much more complex than ^{any that} can be expressed mathematically. Were the resistance just a uniform one it would be independent of the shape of the area of the X section of the cylinder - but such a supposition is only mathematical ideal.

Now that I have got this far it seems to me extremely probable that this is the case but you may know it not to be the case.*

Of course the reason why we drive a thing in this way is to compress the wood sideways as well as longitudinally in order to make room for our foot, & of course the plant would wish to do the same with the soil.

A shape such as a Δ with edges seems to be the most effectual for pushing aside the surrounding soil but this is quite distinct from the effect in making the fission in the plant easy.

NEWNHAM COLLEGE,
CAMBRIDGE.

Further that you have observed a Δ cross section in some such stem.

I think the strength of the whole stem to resist bending would be very little affected by the shape of the cross section provided it is symmetrical about the centre i.e. Δ , pentagon, circular etc.

* Power of movement. Darwin
p 226

"We may admit without much doubt that all growing flower-stems circumnutate"

List of Trimerous Diets in British Flora

Impatiens nigrum - Flowers minute, sessile
[Impatiens acc. to Asa Gray - Reduced
Ericaceae]

Tillex mucosa Flowers minute, sub-sessile,
[Cranulaceae] 3-merous.

Senecioium 12

Dioscorea rhizophora. Usually 6 merous.

Lythrum?

Peplis. (Lythraceae) Flowers minute,
6-merous. Stem 6 or 12

Rumex

~~Asa Gray~~

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¶ Panels contain instances of trimery.

Vessels by lateral fusion

73

Hillebr. ~~has~~ described very large vessels
prod^d by lateral fusion of elements in
spiny roots of Dioscorea.

Roots of *Hedera vulgaris* have a very
large central x vessel.

Cut microtome series of top to see if it
arises by fusion of several sideways

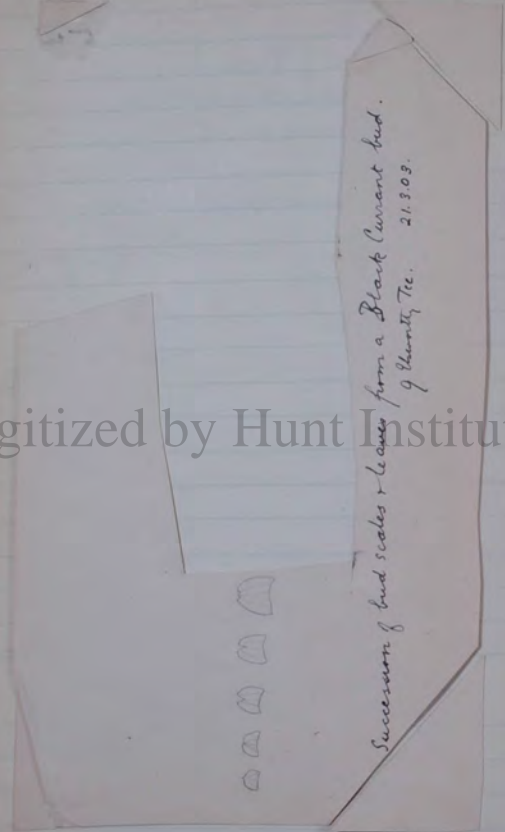
— This was done, there is no sign of such
a thing.

Homologies of Monocot leaf

Can the ordinary type of sessile monocot leaf e.g. hyacinth, be homologous with the petiole of dicot. leaf?

Examine with this in view the petiole of *Ranunculus ficaria*. [In one lot which I picked there were 2 leaves on different flowering shoots which looked much like monocot leaves, not of the hyacinth type, but of the Alisma type. These two types are on this view morphologically distinct; the Alisma type being possibly a further development of the reduced hyacinth type.] For the gradual disappearance of the blade of Black Currant (drawn 21.3.03) which shows every transition from a scale leaf like broad petiole with no blade, to an ordinary leaf. In Geophytes the leaf sheath would tend to become important as a protection to the bud in its upward passage thro' the soil; thus the petiole wings would be dev'd & enlarged. Also the leaf would pierce the ground better without a blade, or it might gradually lose the latter. In proof of this one would

Succession of bud scales & leaves from a Black Currant bud.
9 Kennedy Tce. 21.3.03.



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Feb. 7. 1912
* This actually occurs in the genus *Oxalis*.
See Treasury of Botany.

Stems in most of genus reduced to rhizome
or bulb or tuber. Leaves of most species
consist of 3 leaflets, or these may be reduced
to two or one ... "finally a few have
even the solitary petiole deficient, which
occurs in such species as *O. fruticosa* & *O.*
leptopoda, which have flat = dilated
leaf-like petioles.

75
want to find instances of reduction of leaf to
leaf sheath in *Geophytes*.*

Cambridge Bot garden. Feb. 7. 1912.
In the hot tank a plant marked "Fontederia
sp" with a small blade, & an enormously
developed leaf sheath.

Note that the Ranunculaceae are char^d by
broadly sheathing leaf bases.

Of the transitions between ribbon leaves
& leaves with blade petiole in such
plants as *Alisma plantago*,
Sagittaria - in these cases, the ribbon
leaf seems obviously homologous with the
petiole.

The reversed monost leaves on the
Meyen would correspond to blades of
ordinary dicot. leaves.

? Stem Anatomy of dicots with broad
sheathing leaf bases.

Cyclamen-like leaves & their Venation

Now take the 24 British dicots which seem most nearly to approach Cyclamen leaf form we find that 3 of these are water plants - the remaining 21 can be referred to 14 genera, of these 14, no less than 12 are herbs with perennial root-stocks & radical leaves

Ranunculus ficaria Per. L. chiefly radical
Caltha palustris Per. with thick down-tuberos root-stock. Leaves mostly radical.

Hympyphaca alba Hympyphaca lutea

Cochlearia officinalis Liver l. stalked orbicular reniform. glabrous perennial

Viola palustris

arvensis

syriaca

odorata

hirta

canina

Cucis - alpina L. not radical

himalaya

Saxifraga gerani Perennial radical

Chrysosplenium attenuifolium p. "

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Panarsia palestina per:

Tursileps tafara
" petasites } per:

Gonium Pardanchos Rad. hairy

Arctium lappa

Campanula rapunculoides. per-rad heart shaped

" stundifolia

Limonanthemum. water

Cyclamen europaeum (per said)

Repeta plectra

Asarum europaeum

Vernation of Colamen-like leaves
(See drawings)

Conclusion:—

These seem characteristically to be either rolled
[e.g. *R. Ficus*, *Calthea palestina*, violet, *Coltfoot*]
or folded [e.g. *Cyclamen*, *Asarum*] In the
first case the petiole is erect, in the second
curved, as far as I have yet seen. So the
rolled form seems the rule when the tip
pierces vertically thro' the soil, & the folded
form when the base neck of the petiole
bears the brunt of the pushing.

Aceras. (orchis) longibractea

Darwin says "insects seem to suck nectar out of minute open cells in the honey combed surface of the labellum." What microscopic structure would this be?

Coleoptile tip in grasses

Darwin & Rolfe showed that tip of
coleoptile was sensitive to heliotropine stimulus
the movement goes on lower down.

Is the mass of tracheids in any way connected
with this sensitiveness?

? is it connected with a water pore.

Bailey, L The Survival of the Unlike

Perceived a whole arrangement of the organs primary both in animals & vegetables. This in animals the progressive or regressive type appeared in the worms which were flat and + more a low longitudinal. This oldest form leads to the cephalic type of evolution.

Plant evolution has been cephalic, diffuse or headless

Case of degeneracy in animal. Loss of limbs (acquired from separate)

525 " Most plants have acquired or inherited more from the force than they are able to use because they are held down to certain limitations by the conditions --- I am convinced that many of the members of plants are simply outgrowths resulting from this fourth pressure "

Inheritance of adaptations to climate 81
ref

Barley, L. Bull 31. New Agric.
College

Many all English varieties of onion grown
for seed continued to grow until frost
& failed to "bottom", while the
American varieties sprang up in advance of
frosty weather. This was true even of
two varieties of American origin which
could not have been grown any many
years in England.

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But in the more northern parts of the
western states, seeds of onion are
grown - California for the commercial seed
crop. But the seed is produced is only
useful for getting a crop of onions. The
seedman has to grow ^{four} the seed crop
year after year a crop of seed, because the
plants for the seed grow - California even
after 1 generation have too much
acquired the habit of large continuous growth

1088
actually watched for 4 years the
development of a seedling cherry tree,

P2.

The 1st year 39 buds
2nd year only 19 of these buds gave out
the branches in former period 370
buds. By the end of the 4th year
all the original buds had succeeded in
forming - should have had between 3 or
4 000 branches, whereas actually
had 297, may weakly in fact
not more than 20 probably ultimately
perished.

Rectangle arose by bud variation
in a peach & also has arisen from
pearl seed.

And spots may be reproduced by
seed.

* Appear after writing this (Sept 1917)
I find in one of Hooker's letters
about botanical ^{with him} in Morocco
"Moss recognizes the bulbs by
leaf, however long the tall grass
they grow amongst."

is the internal variety also shown
externally of one has eyes (see)

The Life of Sir Joseph Dalton Hooker by
H. G. Huxley. London 1914 Vol II p
92

new
1918
* The undivided bundles are more
remarkably various in their structure
— more numerous than in Dicot.
I think I met my first example of
"The Evolution of the Vascular
Bundles of the Leaves of Monocotyledons"

Sept 24, 1917

I have been cutting representatives
of a large number of monocot families
for T. J. of leaf, in connection
with phyllode theory + 2 things
have struck me:—

(1) The frequent absence of differentiated
palisade + spongy parenchyma.
This occurs even in such a highly
evolved family as the Orchidaceae.
(? is this at all related to the question of the
slough on sugar leaf)

(2) The astonishing variety of leaf
anatomy. It seems to me that
it requires a sufficiently detailed
acquaintance with leaf structure
sections to enable one to spot almost
Monocotyledonous genera for
ready in the way as by their external
features. ? is this to a great extent
the case among
Dicotyledons? I imagine that
was not, but I have my indirect
evidence. The curious thing is that
the anatomical variety goes with
a curious monotony in the extent from

W. B. Yeats. Ideas of Good and
"all art is, indeed, a morality
in extended terms" for the sake of an
interior variety

84
*
eg. in the Orchidaceae
* In some cases a ^{cohort} family seems
characterised certain special features,
eg. Scitamineae & ? glumiflorae,
while in other cases, eg. Liliaceae,
there is remarkable variety (of the
various seedly structure in the Scitamineae)
* The leaves, Dofford & Palla
are so different externally, remarkably
different internally.

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The Comparative Anatomy of the
Leaves of Dicotyledonous
with special reference to the question whether
their structure is determined by
adaptation
|| with special reference to the
|| validity of an adaptive interpretation
|| of their structure
with special reference
consider: reference to their interpretation
on anatomical lines
* with special reference to
the bearing on the study of adaptation

May 1920

Baluca - I wawurka (1892-3)
Ind leaf paper

135-5. Shows that many of the
ancestral characters of the I wawurka
cannot possibly be explained as
adaptations to the present environment.
He calls them "phylogenetic characters"
regards them as "des adaptations
anciennes et désormais en
inertie"

This seems to me quite an
unnecessary supposition. In my
case I found many characters which
can well be explained as

See W.P. f. 100 of specimen
specimens in leaf analysis.
my drawings show same thing
in June I wawurka

85

The anatomy of the main vein
leaf must be done thoroughly &
other Triadaceae included to make
a general comparative account of the
Triadaceae.

Is the Herbaceous a Tree Habit
 primitive for Dicots?

The ancestor is probably - the Pteridosperm
 - Bennettitales, plexus, - not large trees
 but plants with something of the tree fern
 habit, more or less stunted - anyway
 distinctly not herbs
 May the Dicots have sprung from this stock
 as a herbaceous mutation?

Lines of water: -
^{systematic} evolution of the tree habit among the
 Dicotyledons - the fact that the
 primitive groups.

The Monocots, however, were presumably
 derived from very early Dicots and
 essentially herbaceous, - much more
 so than the Dicots.

See pp 137 138 of the book for d'Arcy
 Thompson on the essential difference in kind
 between the phenomenon of form in the larger
 & smaller organisms.

Of course the herb does not become gigantic
 & become a tree, but the whole growth is
 different, - conversely, the herb descendant

the tree is not simply equal in scale.

Sinnett E W 'The 'Age + Area'
Hypothesis & the Problem of Endemism.
Ann Bot xxxI pp 209-216. 1917

p 211

Ceylon plants

	Trees %	Shrubs %	Herbs
Endemic	45	33	22
Ceylon Peninsular Index	25	35	40
W. I. C.	20	26	54

i.e. among endemics trees present in the
may species as herbs & among the 'weeds'
less than $\frac{2}{5}$ as many. Shrubs not included.
& the whole flora of Ceylon herbs preponderate
among the "Common" species in form a
much smaller portion of the "Rare" ones,
while with trees, the reverse is the case.
In other floras the same relative habits of the
ratio of trees & shrubs in the non-endemic
element & then much greater frequency
in the endemic element. This can only be
reconciled with Willis' 'Age + Area' hypothesis
if the production of new species is more

reput any trees shrubs to an among
herbs. The author considers the reverse is
true case (see Sumner EW Comparative
Reproduction & Evolution in Various Plant Types.
American Naturalist Vol I 1916 p 466)

[Sumner] thinks it quite probable that the tree
habit is among Angiosperms a later development
ded. from the gymnosperm herbaceous stock,
which will reconcile Sumner's results on the
preponderance of trees among endemics with
Willis' Age & Area.]

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(Sumner see also Sumner EW Manly The Origin & Dispersal of Herbaceous
Angiosperms. Ann Bot. Vol XXVIII 1914
p 547)

A de Candolle on relative ranges of
trees & herbs

* Same text
"No. well established fact that
some of the large types of terrestrial
animals has been the dominant for
long its supremacy in the course of
geological ages."

p 235-6

"We are in fact permitted by paleontological
evidence to see, and by general
way, even the form forms have
at the same time been highly specialized
and never met with at the inception,
but at the end of branches."

108
Depéret, C 1909. The
Transformations of the Animal
World. ~~Evolution~~

On Size-evolution

p 84

"all the groups of the Carnivora,
of the Ungulates + of the Quadrumana,
known in detail, commence with
types small in size + of young at length"

attributes this law to Cope

Ref. Cope E.

The Progressive

Evolution in relation of the Vertebrates
1884. The Origin of the Fittest 1897

The primitive factors of Organic
evolution 1896

p 93

"The Law of the increase of size in
phylogenetic branches" x x x "It is
observed almost without exception in
all classes of the animal kingdom, but presents
more numerous + clearer applications in
the groups of Vertebrates, than in those of the
Invertebrates. x x x" ^{p 95} Holmstedt's study there.

difficulties, the law of progression in size is yet verified in certain numbers of phyla among the Invertebrates.

p 191
"But it is above all in the mammals that the law of increase of size presents itself more clearly, to the degree of being utilized by modern palaeontologists as a veritable criterion for the reconstruction of phyletic branches."

This seems important in relation to the
~~idea of it.~~

A natural tendency in each line to increase in size while retaining the same general type, means an increase in scale without corresponding variation in proportions. The type may thus become less efficient & thus eventually extinct.

Dr. Henry Thompson in front of him has laid great stress on the real significance of magnitude in organic beings; he thus writes "scale has a very marked effect upon physical phenomena" while concluding on p 1387 in n. book.

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of Guppy on Tree Lobelias - the
Tree Mimosa, the Composite
unbelievable. - there are all the results
of high dependence - Can it be that
the tree is - depends they they are
any more.

Guppy HB Plants, seeds, &
Currents in the West Indies &
Azores. 1917 p 521

"I take, for instance, the monostachyae,
of the Tree Lobelias of Hawaii, of
which a small half a dozen species
have been developed in this group.
They were born there & they will die
there, & they have been unable to
extend their range. These openhead
genera make no effort to conquer
the globe

Guppy HB Observations of a
Naturalist in the Pacific between 1896
1899. Volume II Plants Discovered
1906

T.O.

The endemic genera are supposed
to indicate the First Era of Flowering plants;
~~the latter~~ this is called the Age of
Compositae & Labellaceae. These "early
forms of Compositae & Labellaceae are
often arborescent in habit"

I shall suppose the really Old
"wild" late era of Flowering plants,
both because of the high specialization of
the Compositae & Labellaceae & because
on W. D. C. 's view the endemics are the
most recent

p 244

Of the endemic genera of Compositae ^{in the Hawaiian Islands}
(9 in number) 2 do not occur - one
which is 15 in two, 10 in three, 2 in
four & 1 is generally deep distributed.
These Compositae are, in whole,
arborescent or shrubby.

Ref. Bentham. Journ. Linn. Soc.,
Bot. London. Vol. 13. 1873. On the
Compositae

Hemslay. Introd. Bot. Chall.

Exped. pp 19-24, 66, 68. Part ii
p 61 - iii p 23.

p 255 ^{species of}
 The 58 Hawaiian *Labellaceae* are
 all endemic; 38 species are confined to one
 island; 12 to two; 5 to three; & 3 are
 generally distributed over the islands. There
 belong 6 genera, of which all but one
 (*Labellia*) are endemic (p 254)

p 252. The altitude 24 to 25 feet in height

p 263

The Hawaiian endemic genera (excluding
 Compositae *Labellaceae*) are 23 in
 number, none all trees, shrubs or
 undershrubs except the monotypic
Hillebrandia of the *Begoniaceae* which
 is a herb. *Stenogyne* of the *Urticaceae*
 shrub enters a number of species of trailers
 or climbers.

p 265

The 16 Fijian endemic genera
 include no herbs; all trees or shrubs
 except one climber.

My idea is now rather that the
 primitive angiosperm stock was
 herbaceous as the type in which
 it gave off the monocots. (? has it
 got interfare. etc: I shall say that it

herb, & even the Monocots were a reduction
~~abstract~~ in every line there is an ultimate
 tendency towards a final tree stage. This
 might conceivably sometimes be again reduced
 to a herb, but my idea would be to see
 the ~~tree~~ ^{tree} would no longer be so likely to give
 off fresh races.

See separate notes from Hensley
 (Challenger Expedition) on the
 tree habit. very important

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Opened the Primary Features
 of Organic Evolution, Chicago, 1896
 p 172 Nuttall's Monocots (90c)
 The Law of the Unspecialized
 "the highly developed, or specialized
 types, or perhaps special have not been
 the parents of the types of succeeding
 periods, but that the former has been
 derived from the less specialized of preceding
 ages. & that the validity of this Law is
 due to the fact that the preceding types
 of all periods have been generally incapable
 of adaptation to the changing conditions of
 characterizing treatment of new periods. XXX

Some changes have been effected after exposure
 sever in their effect on species of large
 size, than upon food in large quantities.
 "The time, as known by Marsh, that
 the lines, descent of Mammalia
 have originated or been continued
 through forms of small size. The same is
 true of all other Vertebrata."

Marsh O.C. Prent. Add to Ser. B
 Nat Hist. America Assoc Adv Sci
 Nashville, Tenn. 1878 (f. 1877)
 pp 211-258, 1 pl.
 p 232

"In very vigorous primitive type
 which was destined to survive many
 geological changes, there seems to have
 been a tendency to the loss of lateral
 branches, which become highly specialized,
 soon died out, because they are unable
 to adapt themselves to new conditions."

Deperet C The Transformations
of the Animal World. London 1905

p 162
Variable rate of evolution

of Lingula Lewisii of the Silurian
of Scotland with the long Lingula anatica
from the evolution of the pleurotic
branch of the Lingulae has been almost
null since primary time

p 216

Specialization. Extinction
"no plan that phyletic branches are
subject to a general law - which drives
them more or less rapidly, & often without
any apparent mechanical or functional
cause, towards a more & more marked
stage of specialization. We shall see later
this specialization, far from being a cause
of the perpetuity of the long duration of
a branch, is, on the contrary, a mark
of senility & an herald of its preceding,
or to follow, a space of time, its extinction.
pp 213-4 example, Ammonites -
which progressive specialization of the

119

of the ribs saddles of the internal line
occurs in all the phyla — a normal
phase in the evolution of each branch. But
this does not seem connected with any
improvement in relation to physiological
needs.

The Law of Loss

p 220

"The Chelonidae of pelagic habitat
have lessened by regression the
weight of the bony case that encloses
them ...; but the Athecae, or
Sphingidae, under the influence of
return to 'land' life, have retained
the reduced shield of the Chelones
by replacing it by a secondary shield
composed of polygonal dermic plates
superposed, with an bony welded
together, or the rudiment of the
primary one."

en le remplacement
5

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another more or less distant - are a new
phase of their morphological destiny."
[In this way plants appear to be better
subject than animals. A. A.]

2307

"The higher or Placental Mammals,
whose origin + centre of dispersion
are still at this moment an utterly
unsolvable enigma"

"we are cognizant of no transition, of
no intermediate between the lower
Mammals with no placenta, or the higher
Mammals with complete intra-uterine
development. A possible common origin
of these two great groups is, therefore,
entirely hypothetical."

p 321

The ~~Scorpion~~ Arachnidae of the
Scorpion group found in the Silurian
are the first terrestrial animals with
trachean respiration, seemingly
issued from marine ancestors. First
air breathers.

p 322

The pre-Cambrian world was already
a very old one.

return after resort to other remedies to
repair his losses, namely, the substitution
of parts, & a change of function"

p. 23

"We have not thus far found a single
instance in which a mammal is known
to have been transformed from an
aquatic into a land type; it is always
the reverse. x x x There is some
evidence, however, of arboreal types
secondarily taking up terrestrial
habits, as in the case of many of the
mammals of Australia, which are
believed to have evolved from specialized
arboreal forms."

p 25

"each order of mammals should be
thought of as having a typical mode of life
for which its various members diverge in
various degrees, sometimes so far as to take up
an entirely different mode of life. the typical
life is usually the original, ancestral or
primitive life which characterized the

idea here is first diverged from other orders.
 as a rule it's the typical mode of life
 which gives or has given the dominant or
 profound and domineering character to the
 teeth & skeleton. For example, the
 rodents were originally herbivorous,
 gnawing animals, & this is still typical
 of most rodents, but certain rodents
 have departed as far from this ancestral
 habit as to become not only aquatic
 but fish-eating.

Dollar. L. Les ancêtres des
 Marsupiaux et de certains autres
 Trav. Mus. Zool. Némereux
 T 7 1895 pp 188-600 Pl 12

Thompson, D'Arcy Wentworth.

On growth & Form
Cambridge University Press 1917

"Some air of mind, as has been by way of the
"final cause" by the teleological concept
of "end", of "purpose", or of "design", in one
or another of its many forms (for its words are
many), has ever been chiefly wont to
explain the phenomena of the living world; & it
will be so while men have eyes to see & ears to
hear nature, as with Galen, as with Aristotle, as
with the physicians; with John Ray, as with
Brentano, as with the physicians, as with John
Ray, as with Aristotle, as with the naturalists
way; with Kant, as with Aristotle, as with the
philosophers' way. It was the old Hebrew
way, whose splendid setting in the story
how God made every plant of the field before
was in the earth, & every herb of the field
before a Jew. It is a common way, or a great
way; for a boy with it a glimpse of a
great vision, no less deep as the love, nature
in the heart of men."

"But the use of the teleological principle is two-way, not the whole or the only way; by which we may seek to learn how things came to be, & to take their places in the harmonious complexity of the world. To seek not for ends but for "antecedents" is the way of the physicist, who finds "causes" in fact - he has learned to recognize as fundamental properties, or inseparable concomitants, or unchanging laws, of matter & energy. In Aristotle's parable, the house is there because men may live in it; but it is also there because the builders have laid one stone upon another; ~~but the teleologist~~ ~~is not the physicist~~ construction, ~~is~~ the physicist looks upon the world. Like way, ~~is~~ ~~mechanism~~ & teleology are interwoven together, we must not cleave to the one & despise the other; for their union is "woven in the very nature of totality."

Nevertheless, our philosophy had no hearken & obey the lessons both of mechanical & of teleological interpretation, the precept is hard to follow; so that sometimes, when come to pass, just as in Bacon's day, there leaning to the side of the final cause, "later

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intercepted the severe & diligent enquiry
 of all real & physical causes; & has brought
 about that "the cause of the physical
 cause has been neglected & passed & science"
 so far as "fortuitous variation" & the
 "survival of the fittest" remain engrained
 fundamental & satisfactory hypotheses in
 the philosophy of biology, so long will these
 "satisfactory & specious causes" tend to stay
 "severe & diligent enquiry" "to the great
 arrest & prejudice of future discovery."

----- "Newton did not show the
 cause of the apple falling, but he showed
 a similitude between the apple & the
 stars."

p 16
 Surface $\propto L^2$
 Volume $\propto L^3$

The strength of an iron ruler \propto cross section
 of its members; each cross section \propto square
 of its linear dimension. ~~if 2 beams are~~
~~geometrically~~ \therefore strength $\propto L^2$

But weight $\propto L^3$

\therefore if 2 beams are geometrically similar,
 the larger is the weaker of the two.

"We are apt, & even accustomed, to think that magnitude is so purely relative that differences of magnitude make no other or more essential difference; that Lilliput & Brobdignag are all alike, exactly as we look at them through one end of the glass or the other. But this is by no means so; for scale has a very marked effect upon physical phenomena, & the effect of scale constitutes what is known as the principle of similitude, or of dynamical similitude."

of mass, & of force, & of other proportions to the area of surface, others act in proportion to the mass (or mass to the volume) of the body, & with increase of linear dimensions ~~the~~ ^{as} ex. g. of sphere, the greater the radius, the greater the volume (a mass) in comparison with the superficial area)

p 34

"There is an essential difference in kind between the phenomena of form in the larger & the smaller organisms."

p. 103

"From the whole of the foregoing discussion we see that a certain definite rate of growth is characteristic of a specific phenomenon, deep-seated in the physiology of the organism; that a very large part of the specific morphology of the organism depends upon the fact that there is not only an average, or aggregate, rate of growth common to the whole; but also a variation of rate in different parts of the organism, tending towards a specific rate characteristic of each different part of an organ. The smaller change in the relative magnitude of these partial or local velocities of growth will be manifest in the striking differences of form. This is as much as to say that the home-element, which is implied in the idea of growth, can never (or very seldom) be truly neglected in our consideration of form."

p. 130 onward

Growth & Catalytic action.

Catalytic action occurs when some substance, often in very minute quantity, is present, & by its presence produces or accelerates an action... without the catalytic agent itself

being diminished or used up. But in certain
 cases we have the very remarkable phenomenon
 that a body acting as a catalyst is necessarily
 found as a product, a bye product, of the main
 reaction, in such a case as this the reaction-
 velocity will tend to steadily accelerated.
 ... as we have to see certain products of
 protoplasmic metabolism, such as the enzymes, are
 very powerful catalysts, & we are entitled to
 speak of an autocatalytic action on the part
 of protoplasm itself.

p 133

"The amount of chemical energy available
 well as general features, very closely resembles
 the velocity-curve of chemical autocatalysis."

p 137

"the great function of natural selection is not
 to augment but to remove."

"Except in certain minute organisms - minute parts of organisms, whose form is due to the direct action of molecular forces, we may look upon the form of the organism as a "function of growth" or a direct expression of rate of growth which varies according to its different directions.

Rate of growth is subject to definite laws, the velocities in different directions tend to maintain a ratio which is more or less constant for each specific organism; & this regularity is due the fact that the rate of growth is regulated by regular & constant.

Ternary stems (p 62)

"If we start with a cylinder, --- start it in its own long axis --- it suffers no other distortion. --- Now if a be of any stem whose cross cylindrical the case is quite different, for now the sectional shape tends to alter under the strain of torsion. Thus, if one wd be elliptical in section & begin with, under torsion, become a more elongated ellipse; if a be square, is

angles will become more prominent, & its sides will curve inwards, till at length the square assumes the appearance of a four-pointed star, with rounded angles. Furthermore -- we find experimentally that the resultant figures are more easily twisted, less resistant to torsion, than were the fibrous we evolved them.....

In the hypoderm, or in a very considerable number of other turning or twisting stems, the ribbed or channelled form of the stem is a conspicuous feature. We may safely believe, (1) that such stems are especially susceptible to the action of the plant's own tissues, which is to intensify any such peculiarities of sectional outline which they may possess, though not to initiate them in an originally cylindrical structure.

Phyllotaxis p 611

"When a bricklayer builds a factory chimney, he lays his bricks in a certain steady, and always the same way, with no variation of the spiral pattern, to show the order sequence inevitably leads."

(I can follow the mathematics of his
 phyllotaxis discussion, but it has become
 clear to me that leaves simply arise
 one after the other ϕ near the g. b. &
 that the spiral is due to the elongation
 of the axis being leaves which have arised
 at different intervals of time. The
 spiral depends on the distance apart
homogeneity of the spots which become
 meristematic & early give rise to a
 leaf. As to why these particular spots at
 certain intervals round the circumference of
 the g. b. become meristematic in
Wright's successive & Wright's
 the dark. Thompson does not formulate
 it in this way. The spiral is merely an
 accident ^{of the} consequence due to the
 elongation of the axis)

p 649

Thompson points out that $\frac{1}{2}, \frac{2}{3}, \frac{3}{5}$
 represent a convergent series, whose
 final term is equal to 0.61803... the
sectio aurea or golden mean of
 unity. Chauncey Wright
 Memoirs of Amer. Acad IX p 389
 emphasizes the fact that of the successive

leaves of the fundamental spiral be placed
 on the particular azimuth which divides
 the circle in two "sectors", - then
 no two leaves will ever be superposed, -
 thus we are said to have "the most thorough
 or equal distribution of the leaves round the
 stem, each new or higher leaf falls over
 the angular space between the two below and
 such an amount in direction, so as to divide
 it in the same ratio (k), as when the first
 two or any successive ones divides the
 circumference.

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is bold
 The condition of stress strain, the
 result of a stress, is direct stimulus
 to growth ~~direct~~
 in inorganic things as railway axle, or any
 other piece of steel, & weakened by
 constant successive & frequently interrupted
 strains; it is said to be "fatigued", & its
 strength is restored by a period of rest. In
 metal wires the mass of twisted sugar
 is pulled out into a rope, folded &
 pulled again & again; & pull it becomes

gradually harder - harder until in last it takes all a man's strength; the rope apparently "adapts itself" to the increased strain which it is called upon to bear.

"In some such ways as these, then, it would seem that we may co-ordinate, or hope to co-ordinate, the phenomenon of growth with certain of the beautiful structural phenomena which present themselves to our eyes as "intricacies," a mechanical adaptation, for the display of strength where strength is most required. Hence, in any one organ, a causation, of the phenomenon would seem to be, partly - the tendency of growth to be accelerated under strain; partly in the automatic effect of shearing strain, by which strands & displaces parts which grow obliquely (to the direct lines) of tension of pressure, which being to be in place that happen to lie parallel or perpendicular to these lines."

p 719

Our own study of organic form, but we call by Swett's name of Morphology, is but a portion of that wider Science of Form which

dict with the forms assumed by matter under all aspects - conditions...

p 61

Fossils

"In a word, the minuteness of our organism brings its conformation as a whole within the range of the molecular forces ... & in the end - upshot, it seems to me by no means certain that the biologist's usual mode of reasoning is appropriate to the case, or that the concept of continuity, but small evolution must necessarily, or by itself, be legitimately employed."

p 225

The sphere is, of all possible figures, the one which encloses the greatest volume with the least area of surface. It is ∴ the form which will be naturally assumed by unicellular organism that is practically homogeneous in homogeneous surroundings.

Hooker on Pangenesis

147

Life & Letters of Sir J.D. Hooker by L. Huxley
1910

Vol II p 113. Letter to Asa Gray

"I must say that the Pangenesis hypothesis is in themselves admirable - so careful & so good; but that he gains by nothing what appears to be a simple, necessary & invariable belief with all who accept the derivative hypothesis as a part of atoms, spores & gemmules I do not see. When I accepted the derivative hypothesis, I accepted the fact that each individual must be derived by a cell or cells progeny more or less of any or all the properties of all its forefathers; & that such properties, or the potentiality to reproduce them, must be diffused from their cell more or less through the mass of the plant. E.g. a single cell of tip of leaf of Malaxis paludosa will reproduce a whole Malaxis paludosa, with any or all the properties of its parents & grand parents so diffused through its mass from the parent cell, & so each of the cells of its leaf will do ditto. This always appears to me a fundamental doctrine in the history of propagation of individuals from parent to offspring.

If you accept this for the propagation of individuals,
& reduce the origin of species to the same category
as the propagation of individuals, comes under,
you must accept it for these too.

Albion contains the Malva is
Pezonia phyllosmaria, better still any cellular
Alga than propagates by any combination cell.
This power of packing into a cell the potentiality
of an indefinite number of the indefinite
properties of its ancestors, is as much based
on impenetrability as atoms, or ethers, on
time, or space, or gravity, or food. And as any
individual cell, or any individual has
only a life by which it emphasizes him or
his attributes, so are our all ideas of the
potentiality to propagate all qualities by a
cell, as well formulated by calling the
contents of the cell atoms, gemmules, &c
forth. My objection is that it is not necessary
to formulate or postulate upon such subjects
at all, better not to do so.

226

"I quite believe the sudden
development of the mass, P. homingens
being due to the introduction of flower-feeding
insects, that we must not try to say
was been in the world may have been
flower-feeding too."

Russell ES Form & function

London 1916 [M.B. 74. 63]

vi + 383 pp, 15 figures.

p 35

Cuvier's famous principle of correlation,
the corner-stone of his work.

"for all the organs of an animal form a single system, the parts of which hang together, & act & re-act upon one another; & no modifications can appear in one part without bringing about corresponding modifications in all the rest."

p 36

"In a word, the form of the tooth implies the form of the condyle; that of the shoulder blade, that of the claws, just as the equation of a curve implies all its qualities"

p 48

Loethe "The parts of the animal, their reciprocal forms, their relations, their particular properties determine the life & habits of the creature." He are not to explain, he says, the tusks of Babirussa by their possible use, but we must ask how

it comes to have tusks. In the same way we must not suppose that a bull has horns in order to gore, hence must investigate the process by which it comes to have the horns to gore with. This is the rigorous morphological view.

p. 77
E. Seiffers: Helaire

"Animals have no habits but these ~~are~~ result from the structure of their organs; if the latter varies, their way in the same manner all their groups of action, ~~their~~ all their faculties, ~~are~~ their actions."
Priority of structure to function.

p. 78
"The contrast between the teleological attitude, with its insistence upon the priority of function to structure, & the morphological attitude, with its conviction of the priority of structure to function, is one of the most fundamental in biology." ✓

* I have looked this up in the original & it
does not seem to have any
botanical ideas.

p 132

Von Baer, K.G. Ueber Entwickel
ungsgeschichte der Thiere. Königsberg
1828 II p 84.

"Ve colligan ead pan trair has by
reason ye form or function a certain
distinctiveness, but this concept is very
indefinite, & passes from a morphological
point of view, little value. For this reason
it seems necessary to introduce into scientific
morphology the concepts of morphological
element & division. X
(The word morphological element
is rather a peculiar sense in animals, but
the idea of morphological units is
necessarily organs in vegetable botany.)

p 173

Schwann, J. Mikroskopische
Untersuchungen über die Uebereinstimmung
in der Struktur und dem Wachstume
der Thiere und Pflanzen.
(auf 29 über bis martius wach
Mead.) T. O.

Schwann begins by contrasting the teleological
 with the materialistic conception of living
 things. In the teleological view, a special
 force works in the living organism, guiding
 & directing its activities toward a purposeful
 end. According to the materialistic view
 there are no other forces at work in the living
 organism than those which act in the inorganic
 realm, or at least there are none but forces, as
 one with these in their blindness & necessity.
 True, the purposiveness of living processes
 cannot be denied; but it is guided, not
 according to the view, not by a vital force
 which guides & rules the individual life, but
 in the original creation & collocation of
 matter according to a rational plan. The
 purposiveness of life is part of the
 purposiveness of the universe; just as
 the stars circle in ever in harmoniously
 adjusted paths, so do the processes of life
 work together toward a common end. Both
 are the inevitable result of the original
 distribution of matter in the primitive
 chaos, a distribution fixed by a rational
 & foreknowing Being (p 222)

Which of the two conceptions is to be adopted in biology? Teleological explanations have long been banished from the physical sciences, & in biology they are only a last resort when physical explanations have proved incomplete (p. 223) And if the ground of the purposiveness of living Nature is the same as the ground of the purposiveness of the universe, & it not reasonable to suppose that explanations which have proved satisfactory for inorganic things will in turn with sufficient knowledge, prove adequate also for organic things?

← p 258

Perhaps Darwin's greater omission was that he did not give any adequate treatment of the problem of functional adaptation & the correlation of parts. It is not too much to say that Darwin not only disregarded these problems almost entirely, but by his insistence upon ecological adaptation & upon certain superficial aspects of correlation succeeded in giving to the word "adaptation" & "correlation" a new significance, thereby bringing

to a large extent their true & original functional meaning.

p 355

O. Hertwig's criticism of the recapitulation theory

"The principal reason why certain stages recur in ontogeny with such constancy & always in essentially the same manner is that they provide under all circumstances the necessary pre-conditions through which alone the later & higher stages of ontogeny can be realized. The unicellular organism can only by natural transformation itself into a multicellular organism only by the method of cell-division. Hence, in all Metazoa, ontogeny must start with a segmentation-process, & a similar statement could be made with regard to all the later stages." (p 57. Handb. vergl. exper. Entwicklungslehre der Wirbeltiere Pt. I. vol I)

p 155 same book Admit that it is just probable that the archetype of a class represents in a general sort of way the ancestral form, but that does not, in

his opinion, justifies in assuming that such generalized types ever existed & gave origin to the present day forms.

He rejects on the same general grounds the evolutionary dogma of monophyletic or almost monophyletic descent, & admits into Hülliker, von Baer, Wyand, Haeckel & others that evolution may quite well have started many times from many different primordial cells.

p 357

Haeckel, even if taken as possible that evolution has taken place along many separate parallel lines, he will explain the correspondences shown by these separate lines by the similarity of the intrinsic laws of evolution.

p 357

As Neumayer, Zittel, Dejean, Steinmann & others have pointed out, the paleontological record gives remarkably little support to the ideal genealogical worked out by morphologists.

Vitalism by J W Jenkinson
Studies in the History & Method of Science
edited by Charles Singer. Oxford. 1917

p 62

Trevarter says. "Das Weizenkorn
hat allerdings Bewusstsein dessen,
was in ihm ist und aus ihm werden
kann, und träumt wirklich davon.
Sein Bewusstsein und seine Träume
müssen dunkel genug sein."

p 62. Driesch's analytical theory
of development:—

"a theory which suggests that while the formation
of the first or elementary organs that appear
in the embryo or larva — such structures as
the larval gut or sense organ, or the germ
-layer — depends upon the presence in the
germ of certain specific organ-forming
substances (& this is a fact that has since
been abundantly demonstrated by experiment), the
origin of parts that appear later in development
may be accounted for by the action of the
first-formed structures upon one another,
these actions being in the nature of physiological

responses & stimuli; & for this also some evidence has been produced. On the view differentiation is a mechanical process, set in motion by fertilization or some other cause, & given a certain initial structure of the germ or ovum, given the presence in it of a certain number of parts or substances capable of acting upon one another with fixed co-ordination or harmony of the stimuli & the responses, given further a proper constitution of the external environment, the definite result must follow, the production of an organism which is the parent that gave it birth.

p 63

Hans Driesch however in *Let a water trace* completely wound. He decides that in all response to stimuli there is an element "inefflicable in chemical & physical terms." "This entity is not a form of energy, but a vital constant, analogous to the constants or ultimate conceptions of mechanics & physics & chemistry - crystallography, but not reducible to these, just as these cannot be translated into one another."

"Driesch describes it as a rudimentary

feeling nothing, a 'psychoid', 'morpho-
 r perceptiveness of transform which is the
 desired end toward which it controls &
 directs all the material elements of differentiation,
 like the grain of wheat of Trevisanus, dreaming
 dimly of its destiny. It is thus a vera causa
 — an unconditional & inviolable antecedent
 — a psychical factor which can interpose
 in the purely physical series of causes &
 effects, & for it he revives the Aristotelian
 term 'Entelechy'.

Schiller, F. C. S. Scientific
Discovery & Logical Proof. In "Studies
in the History & Method of Science" ed. by
Charles Hoyer. Oxford 1917

p 238

"there is no better verification of a theory
than its capacity to bear extension to
analogous cases."

Woodward, A.S. 1858. Outline of
Vertebrate Palaeontology (Part for Lib. Text)
114.511

p xvii

"The skeleton of the Vertebrata is more
intimately connected related to the soft parts
than that of any of the lower forms of life;
hence the greater value of such remains, as
can be furnished in determining the precise nature
of the original animals to which they belonged."

xviii

A highly organized member of any division is
also more liable to any extinction than any
less more generally congeners with certain
exceptions excepted.

162

Beyson, H. Creative Evolution
Trans by Arthur Mitchell. 1911
(Balfour Text Bk. 439)

p 13

"That individuals admit of any number of degrees, & in it is not fully realized anywhere, even in man. ... The biologist who proceeds as a geometer is ready to take advantage here of an inability to give a precise & general definition of individuality. A perfect definition applies only to a completed reality. ^{most vital} properties are never entirely realized, & they always on the way become so. They are not to mean states or tendencies"

p 33

"Any small element of a curve is very near being a straight line. And the smaller it is, the nearer. In the limit, it may be termed a part of the curve or a part of the straight line, as you please for in each of us points a curve coincides with a straight line. So likewise vitality is tangential at any every point, or physical-chemical focus. ... In reality, life is no more made of physico-chemical elements than a curve is composed of straight lines."

p41

According to the "radical mechanism" of Huxley etc, the whole earth would be potentially in the cosmic vapour & the fauna of Gr. Britain in any year could have been predicted from a knowledge of the molecules, & temperature.

Finalism seems to be much the same thing.

p49

"We do not think real time. But we live in it because life transcends intellect. The feeling we have of our evolution is the evolution of all things in pure duration & there, forming around the intellectual concept properly so-called an indistinct form that falls into darkness. Mechanism & finalism agree in being accompaniment of the higher nucleus shining in the centre. They forget that the nucleus has been formed and that the use by condensation of the whole must be used, the fluid as well as the more than the condensed, in order to grasp the inner movement of life."

"But can an organic structure be likened to an imprint? We have already called attention to the ambiguity of the term "adaptation". The gradual implication of form such as being better & better adapted to the mould of various circumstances & one thing, the increasing complex structure of an organism that derives more & more advantage from these circumstances & another. In the former case, the matter merely occurs as an imprint; in the second, it results positively, it solves a problem. However, it is ^{the second sense} ~~the second~~ the word "adapt" that we wish to use, ^{in the sense of} ~~in the sense of~~ better & better adapted is the influence of light. But one passes more or less unconsciously from this sense to the other, & a purely mechanistic biology will strive to make the passive adaptation of an insect matter, when submit to the influence of its environment, mean the same as the active adaptation of an organism which derives from this influence an advantage it can appropriate. It must be noted, indeed, that Nature herself appears to invite our mind to confuse these two kinds of

adaptation, if she usually begins by a passive adaptation, here, later on, she will build up a mechanism for active response. x x x
 Now, long matter seems to have no other means of turning circumstances to good account than by adapting itself to them passively, as the insect. When it has to direct movement, it begins by adapting it. Life proceeds by assimilation.

p 84 "puppae" after "they appear to have been ambiged by Cuvier"
 La Havelle Thémis Transformiste.
 Rev. gen. de sciences 1874

p 112

"There is no manifestation of life which does not contain, in a rudimentary state either a latent or potential, — the essential character of mon other manifestations. The difference in the proportions. x x x
 word, the genus must not be defined by the possession of certain characters, but by its tendency to emphasize them. From this point of view, both tendencies rather than states must account, ----.

p 118
 "Now, it seems to us more probable than
 the animal cell & the vegetable cell are
 derived from a common stock, than the
 first living organisms oscillated between the
 vegetable & animal form, participating in
 both at once. Indeed, we have just seen that
 the characteristic tendencies of the evolution
 of the two kingdoms, although divergent,
 coexist even now, both in the plant & in the
 animal. The preparation alone differs.
 Ordinarily, one of the two tendencies covers
 or crushes down the other, but in
 exceptional circumstances the suppressed one
 starts up & regains the place & the lost. The
 mobility & consciousness of the vegetable
 cell are not to mind asleep, as they
 cannot rob of themselves. In circumstances
 permit or demand it; & on the other
 hand, the evolution of the animal
 kingdom has long been retarded, or
 stopped, or dragged back, by the tendency to
 keep toward the vegetative life. However
 full, however we flung the advent of an
 animal species may appear, temper &
 unconsciousness are always lying in wait
 for it. It keeps up its life as by effort,

in the price of fatigue"

p 174

"We are at ease only in the discontinuous, in the immobile, in the dead. The intellect's character seized by a natural instability & comprehended life"

p 279, ed 0, 281

"Life, we have said, transcends finality & transcends the other categories. It is essentially a current seen through matter, drawn from a chaotic sea. x x x

From an point of view, life appears in its entirety as an immense wave which starts from a centre, spreads inwards, which on almost the whole of its circumference is stopped & converted into oscillations: as one single point the obstacle has been forced, the impulsion has passed freely. x x x Everywhere but in man consciousness has had to come to a stand; x x x On other lines of evolution there have travelled other tendencies such life implied, & of which, since everything interpenetrates, man has, doubtless, kept something, but of which he has kept only very little. This is of a vague & formless being,

From our my call, & our will, man a
 superman, had sought to realize himself,
 had accidentally be abandoning a part of
 himself on the way. The losses compensated
 by the rest of the animal world, even
 by the vegetable world, as bear it that there
 have to a in positive & above the accident
 of evolution.

x x x. The animals, however
 distant they may be from our species,
 x x x have none the less been useful
 throughly comparisons, in their consciousness
 has undoubted that we encountered
 "was dragging along", & that the
 to rise, in man, to heights far above it
 sees an unlimited horizon open & gain
 before it.

It is true that man has not only abandoned
 cumbersome baggage on the way; he has
 also had to give up valuable goods. Concerning
 a man, is pre-eminently intellect. His
 my part have been x x x also intuition. x x x
 A complete & perfect humanity would be
 that in these two forms of conscious
 activity should attain their full development."

Baldwin, J M 1902
Development & Evolution.

"Organic Selection" due to Baldwin,
C Lloyd Morgan & H F Osborn

The hypothesis is as follows:-
p 336 (This statement is by H.F. Osborn
not Baldwin)

"That ontogenetic adaptation is of a very
profound character. It enables animals &
plants to survive very critical changes in
their environment. Thus all the individuals
of a race are similarly modified over
short long periods of time than very
gradually essential or phylogenetic variations,
that happen to coincide with ontogenetic
adaptive variations, are selected. Thus
there would result an apparent but not
real transmission of acquired characters.

This hypothesis, if it has no limitations
lays down a very unexpected harmony
between the Lamarckian & Darwinian
aspects of evolution, by u. c. While it
abandons the transmission of acquired
characters, it places individual adaptation
first, & fortuitous variations second, as
Lamarckians have always contended, instead

instead of being survival conditions by
fantastic variations from "foreman", as
selectionists have contended."

p 370. Statement by H.W. Conn

"It has long been felt that the theory of
evolution by the selection of more toptagan
variations presents great difficulties, &
if you were possible to find some more
distinctly purely force the process
difficulties of natural ~~and~~ selection
would disappear. It is for this reason that
the Lamarckians must upon acquired
variations as a purely force, & others
claim that variations occur along
definite lines. This new fact in organic
selection thus is that ~~the~~ acquired
variations, although not directly inherited,
do furnish such a purely force, since they
preserve the life of the individual by
adapting him to his new conditions, with
time, after many generations perhaps, the
same congenital variation ~~is~~ perpetuated
througout a species. xxx Wherever acquired
variations occur, organic selection will apply.
Wherever environments, either food, climate,
or consumption, produce direct modifications

of the body of animal or plant, these acquired variations will aid in preserving the individual until the proper congenital variations appear. Organic selection would therefore seem to apply wherever the environment produces a direct adaptive variation in the body of the individual.

[This doesn't seem so important to me. It is conceivable that organic selection may slightly assist natural selection in the case of animals capable of developing habits such as the catbird habit. The adaptation of plants to much more serious conditions apparently in this case has not been considered in detail by the authors. Suppose a plant goes into the water; it may by direct adaptation (if so be) develop an articulation of some degree. We should then have to wait for favorable fortuitous variation to develop an elaborate system such as that of a diving system of theappers, or it is not clear how the fortuitous variation, the individual adaptations are going to work together. This is altogether I can't see that organic selection is of any real value - but a lesson requires the great difficulty of being no joint force. A.A.]

L. Emeric.

Pointes et Papiers de la
Botanique systématique
Recueil d'oeuvres de Léo Emeric
Bot.-Gen. I 1908 Bruxelles.

p 287

Les Compositae "devenant ainsi comme
les Primates du règne végétal"

"Les Compositées sont aussi prépondérantes
par le nombre que supérieures par la
strucure. C'en est beaucoup la famille
la plus nombreuse qui existe; elles
forment les deux cinquièmes de la flore
partie (10000 espèces) des Phanérogames.
Après elles, viennent probablement les
Orchidées (6000 ? espèces d'après
Lévlé) puis sans de même les
Mnoscylètes dans la plus élevée en
organisation. Au point de vue de la
flore la période géologique actuelle
devrait s'appeler: l'âge des
Compositées et des Orchidées."

History Methods of Palaeontological
Discovery. An Address delivered before
the Amer. Assoc. of the Adv. of Science.

Saratoga N.Y. Aug 20. 1879
[B.M. 7 203. d. 1.]

[Among the occurrences of plants, paleontol.
in part ref. to the early workers, including
fossil plants.]

p 37 Term "petrifactus"
given by Lescner in his work from 1758

p 11
He had the very numerous Colaptes
really a whole new fauna from fossils published
in the 17th cent.

p 4
Zenophanes of Colophon about 560
B.C. mentions the remains of fishes &
other animals in the stone quarries near
Syracuse. He concluded from the
surface of the earth had never been a
soft condition as the bottom of the sea.

D

H

