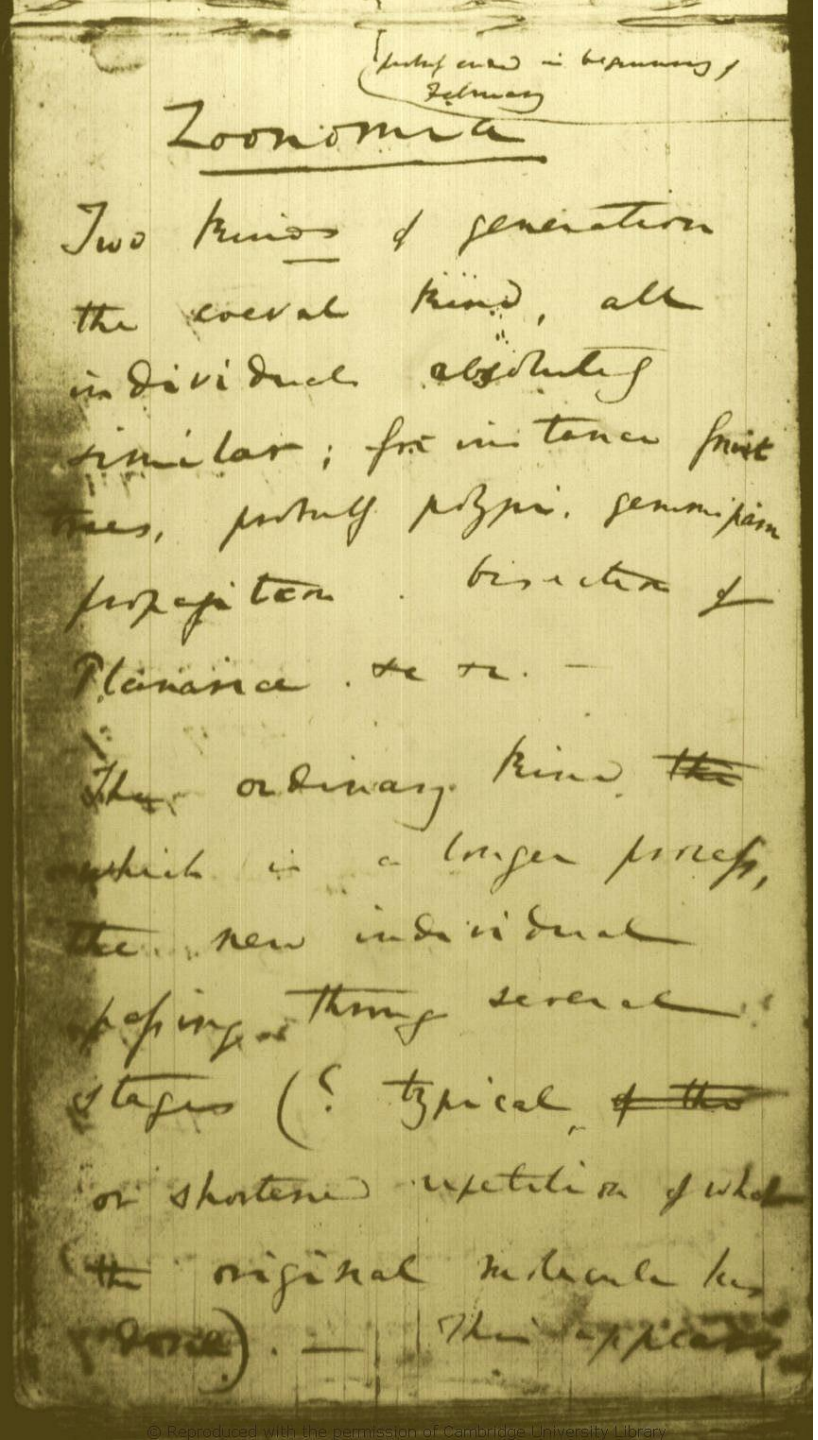


Zoonomia

Two kinds of generation the coeval kind, all individuals absolutely similar; for instance fruit trees, probably polypi, gemmipares propagation, bisection of Planariae, etc. etc.
The ordinary kind which is longer process, the new individual passing through several stages (?typical [of the] or shortened repetition of what the original molecule has done.).

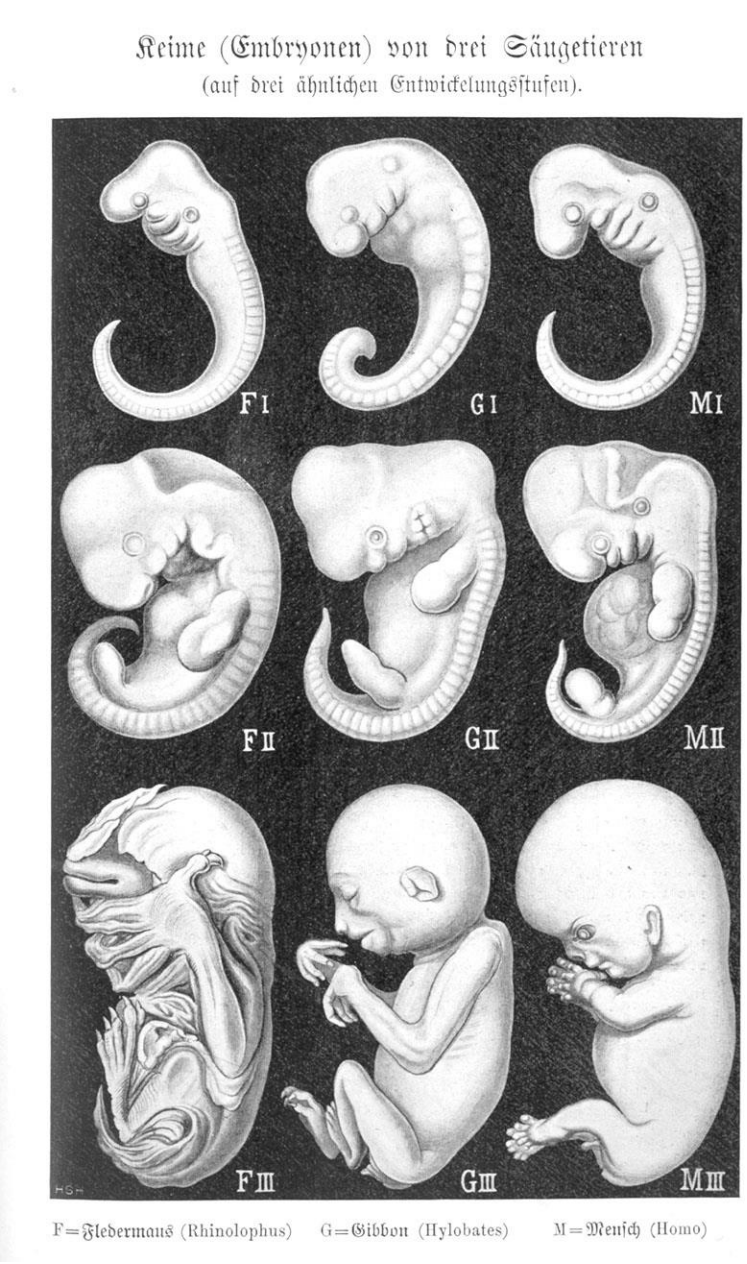


Illustration of the biogenetic law, from Haeckel's lecture in 1905

First Theory: One Species Gives Birth Abruptly to Another

He pens in March, 1837: "Tempted to believe animals created for a definite time—not extinguished by change of circumstance: The same kind of relation that common ostrich bears to (Petisse [small ostrich] & diff kinds of Fourmillier [ant-bird]): extinct Guanaco [Giant Llama] to recent: in former case position, in later time. (or changes consequent on lapse) being the relation. – As in first cases distinct species inosculate, so must we believe ancient ones: not gradual change or degeneration from circumstances: if one species does change into another it must be per saltum—or species may perish." (*Red Notebook*, MS pp. 129-30)

Second Theory—Direct Effects on Young

"the young of living beings, become permanently changed or subject to variety, according [to] circumstance,--seeds of plants sown in rich soil, many kinds, are produced, though new individuals produced by buds are constant, hence we see generation here seems a means to vary or adaptation—Again we [believe] [[know]] in course of generations even mind & instinct becomes influenced.--… There may be unknown difficulty with full grown individual [[with fixed organization]]being modified. Therefore generation to adapt & alter the race to *changing* world." (B Notebook, MS, 3-4).

Third Theory: Habit-Instinct to Alter Structures

"Reflect much over my view of particular instinct being memory transmitted without consciousness [[a most possible thing see man walking in sleep]]. An action becomes habitual is probably first stage, & an habitual action implies want of consciousness & will & therefore may be called instinctive.—But why do some actions become hereditary & instinctive & not others. –We even see they must be done often [to be habitual] or of great importance to cause long memory,--structure is only gained slowly, therefore it can only be those actions which many successive generations are impelled to do in same way.—The improvement of reason implies diversity & therefore would banish individual but general ones might yet be transmitted." (Notebook C 171)

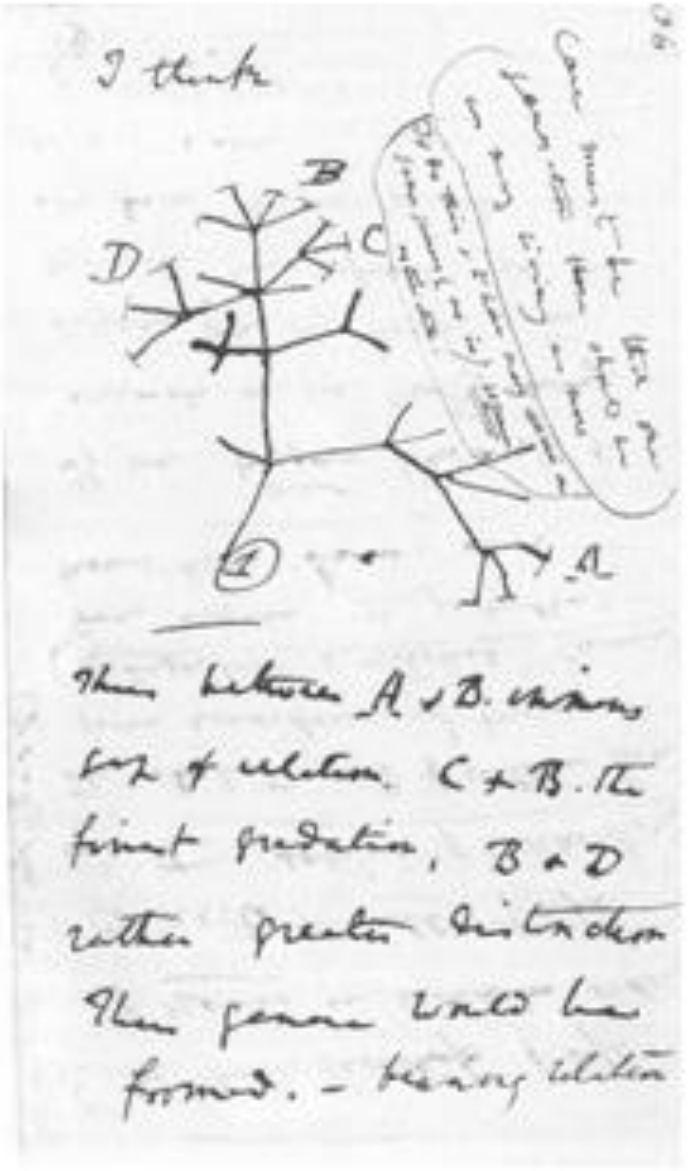
Problem of Divergence

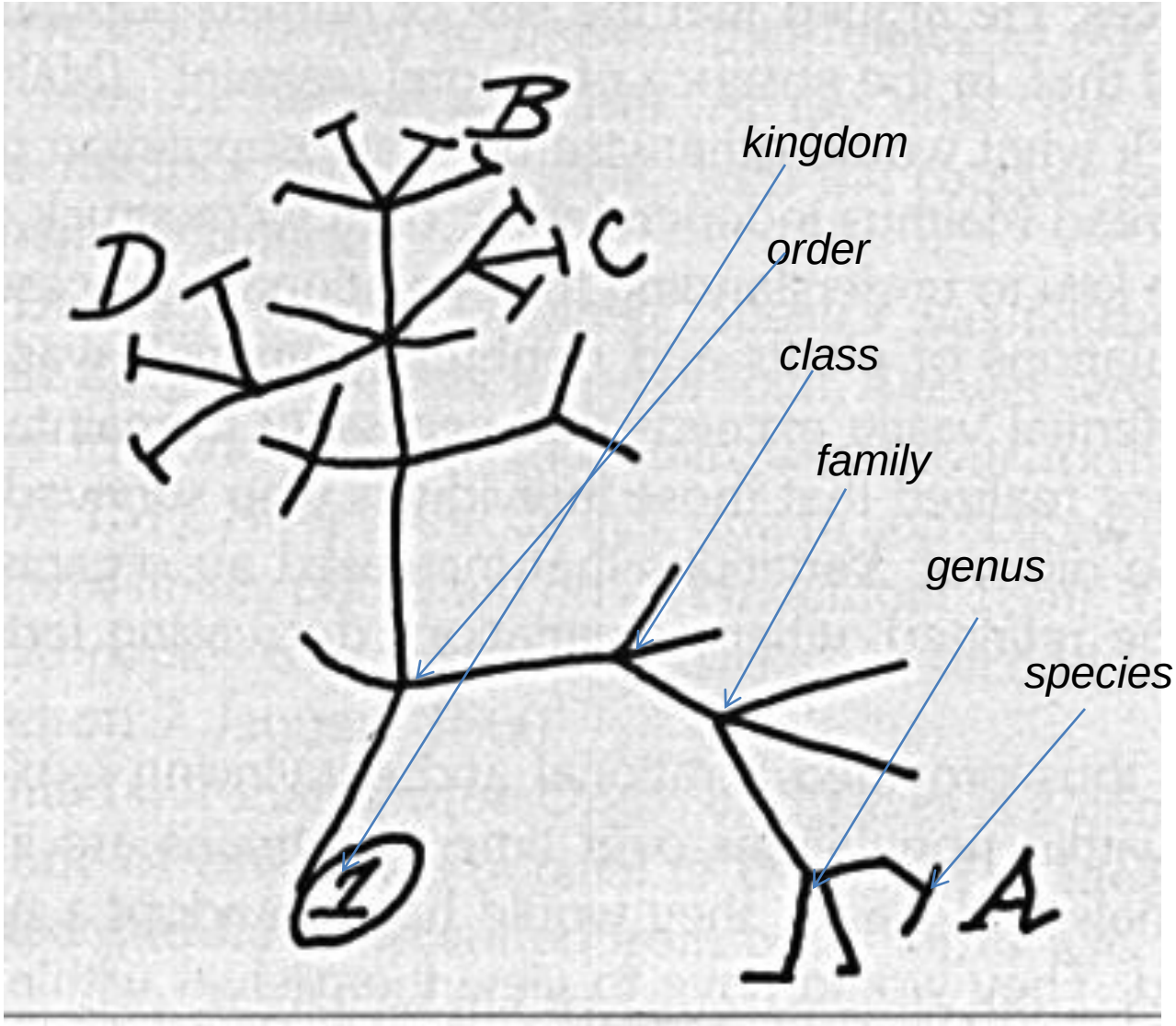
“But at that time I overlooked one problem of great importance; and it is astonishing to me, except on the principle of Columbus and his egg, how I could have overlooked it and its solution. This problem is the tendency in organic beings descended from the same stock to diverge in character as they become modified. That they have diverged greatly is obvious from the manner in which species of all kinds can be classed under genera, genera under families, families, under sub-orders and so forth; and I can remember the very spot in the road, whilst in my carriage, when to my joy the solution occurred to me; and this was long after I had come to Down. The solution, as I believe, is that the modified offspring of all dominant and increasing forms tend to become adapted to many and highly diversified places in the economy of nature.”

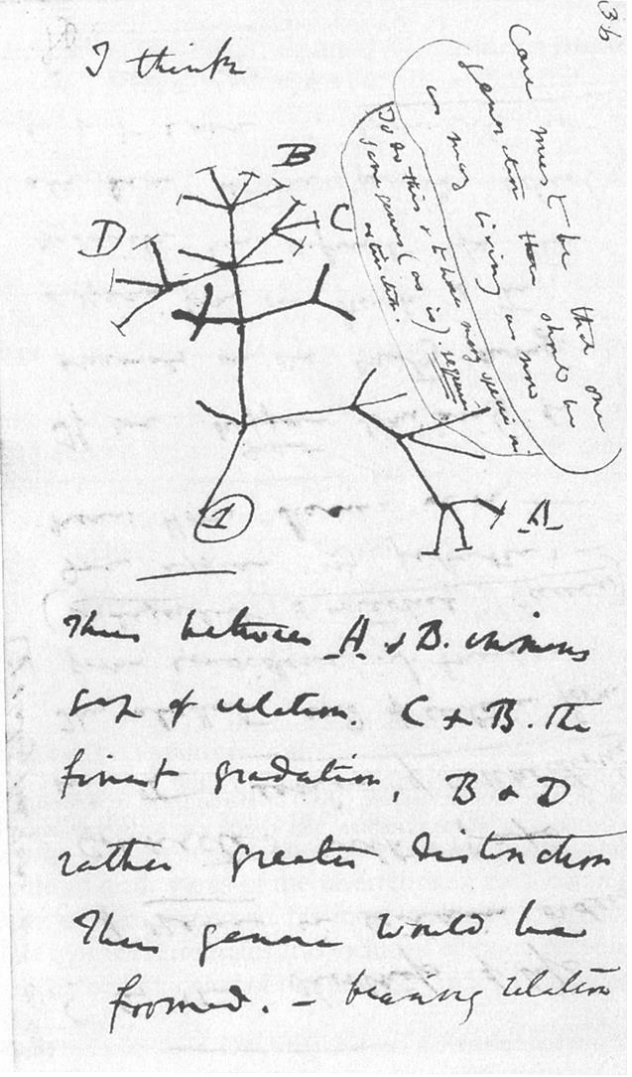
Darwin, *Autobiography*

"I think case must be that one generation should be as many living as now. To do this & to have many species in same genus (as is), requires extinction."

"Thus between A & B immense gap of relation, C & B, the finest gradation, B& D rather greater distinction. Thus genera would be formed—bearing relation to ancient types." (Darwin, *Notebook B*, MS36)



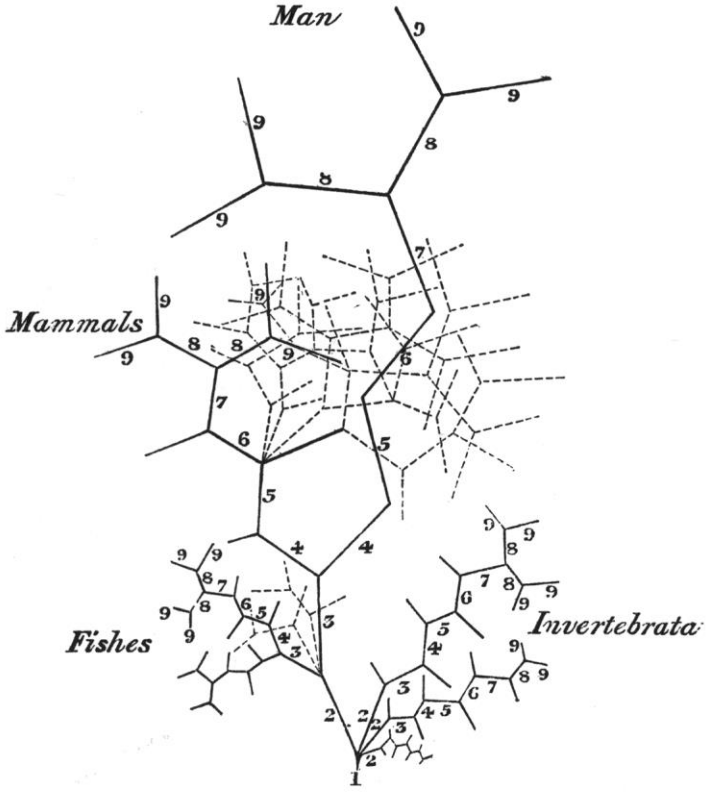

B
C
D
kingdom
order
class
family
genus
species
A



"Thus between A. & B. immense gap of relation, C & B, the finest gradation, B & D rather greater distinction. Thus genera would be formed,--bearing relation (to ancient types.)

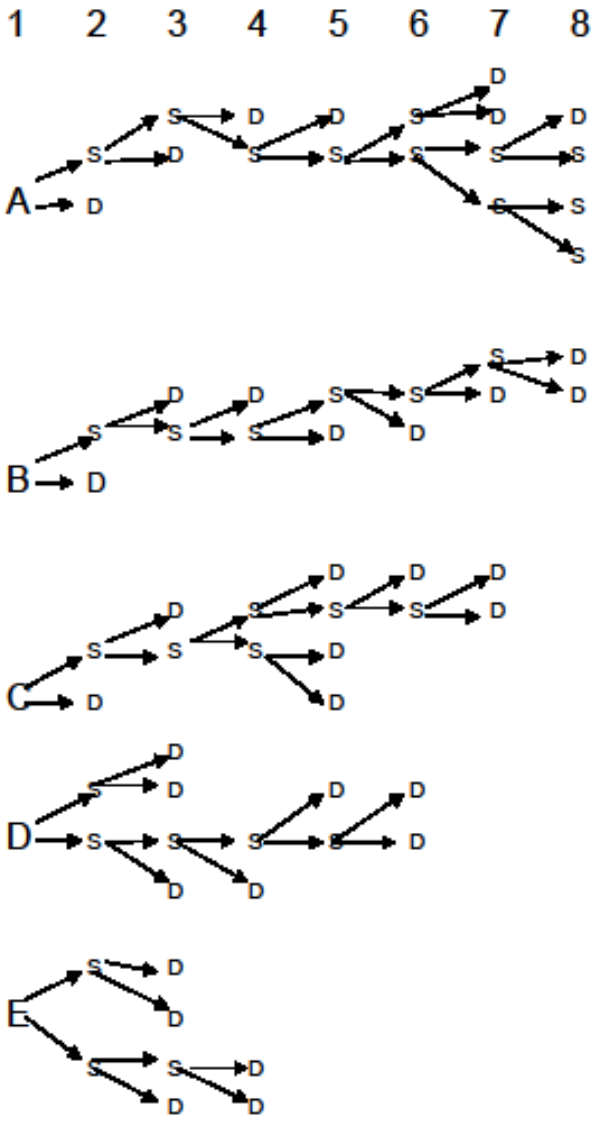
The Tree of Animal Development ;
Shewing fundamental Unity in Structure, and the causes of variety ; the latter consisting in *Direction* and *Degree* of development.

Fig. 12.



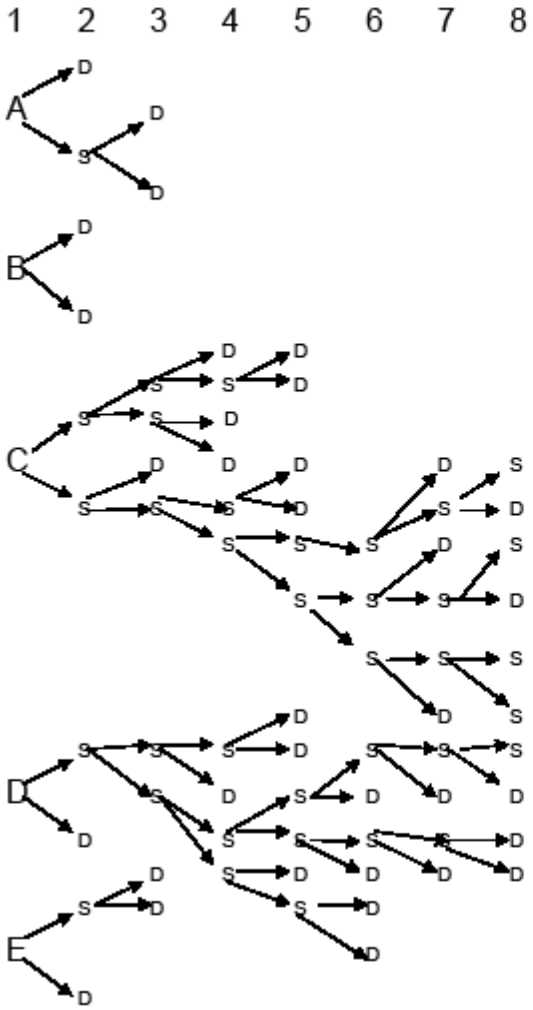
Martin Barry's (April, 1837) developmental tree to the vertebrate architype and the various invertebrate archetypes, stemming from original monad.

“If we thus go vary far back to look to the source of the Mammalian type of organization; it is extremely improbable that any of [his relations shall likewise] the successors of his relations shall now exist. –In same manner if we take [[a man from]] any large family of 12 brothers & sisters in a state which does not increase, it will be chance against any one [[of them]] having progeny living ten thousand years hence; because at present day many are relatives, so that by tracing back the [descent] fathers would be reduced to small percentage: therefore the chances are excessively great against any two of the 12 having progeny after that distant period.” (B40-41)



Survival of Five Families after Eight Generations (Survival or Death determined by flip of coin)

Mom

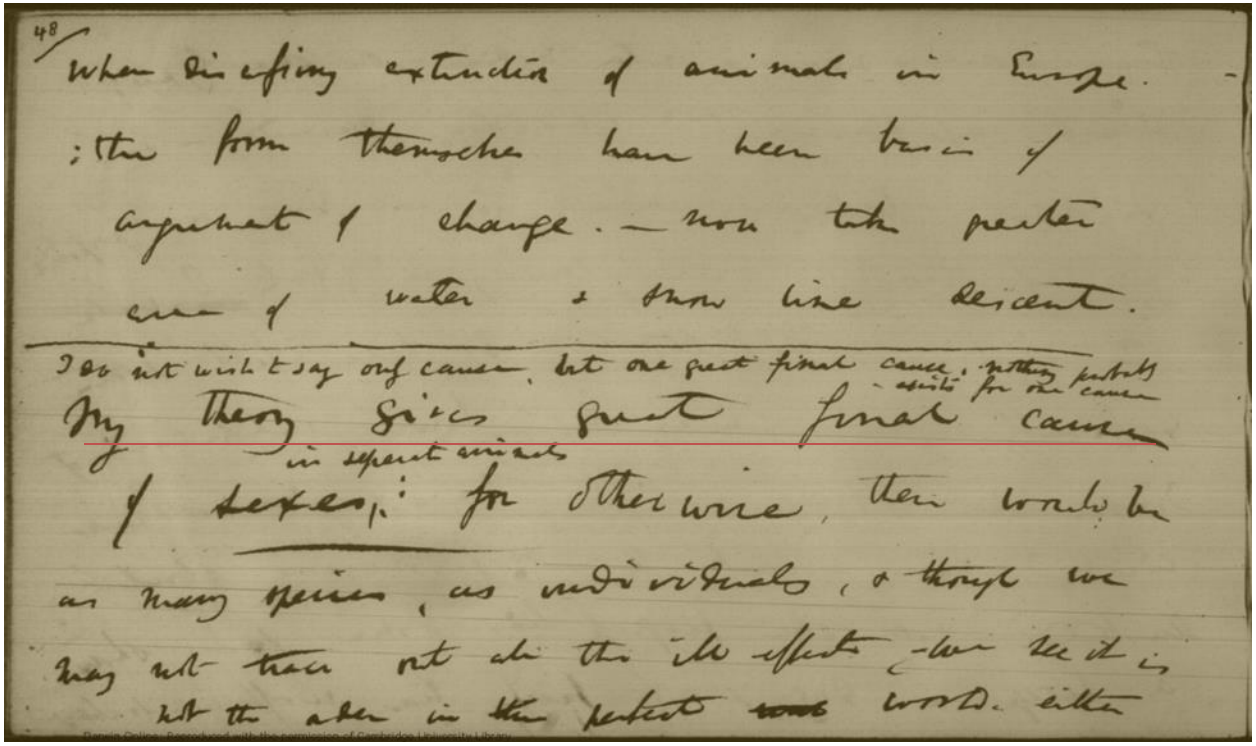


Progenitor gives birth to five offspring; the environment can sustain only five. Survival by chance (using lottery). After eight generations, one family has moved almost to fixity, the remaining has only 20% chance to move to next generation.

B43: “Hence if this is true, that the greater the groups the greater the gaps (or solutions of continuous structure) [between them]—for instance there would be great gap between birds & mammalia, still greater between vertebrate & articulata, still greater between animals & Plants.

In the northern states of America, where the means of subsistence have been more ample . . . the population has been found to double itself, for above a century and half successively, in less than twenty-five years. . . It may safely be pronounced, therefore, that population, when unchecked, goes on doubling itself every twenty-five years, or increases in a geometrical ratio. . . But the food to support the increase from the greater number will by no means be obtained with the same facility. Man is necessarily confined in room (Malthus, 1826, 5-7).

Even the energetic language of <Malthus> <<Decandoelle>> does not convey the warring of the species as inference from Malthus. . . population in increase at geometrical ratio in FAR SHORTER time than 25 years—yet until the one sentence of Malthus no one clearly perceived the great check amongst men. . . One may say there is a force like a hundred thousand wedges trying force <into> every kind of adapted structure into the gaps <of> in the oeconomy of Nature, or rather forming gaps by thrusting out weaker ones. <<The final cause of all this wedging, must be to sort out proper structure & adapt it to change (*Notebooks*, 375-76).



"My theory gives great final cause of sexes in separate animals: for otherwise there would be as many species, as individuals, . . . but we can see if all species, there would not be social animals, hence not social instincts, which as I hope to show is probably the foundation of all that is most beautiful in the moral sentiments of the animated beings. If man is one great object, for which the world was brought into present state.--& if my theory be true then the formation of sexes rigidly necessary.".

Charles Darwin, *E Notebook,* pp. 48-49

First Pencil Sketch

of Species Theory

Written at Maer & Shrewsbury

during May & June

1842.

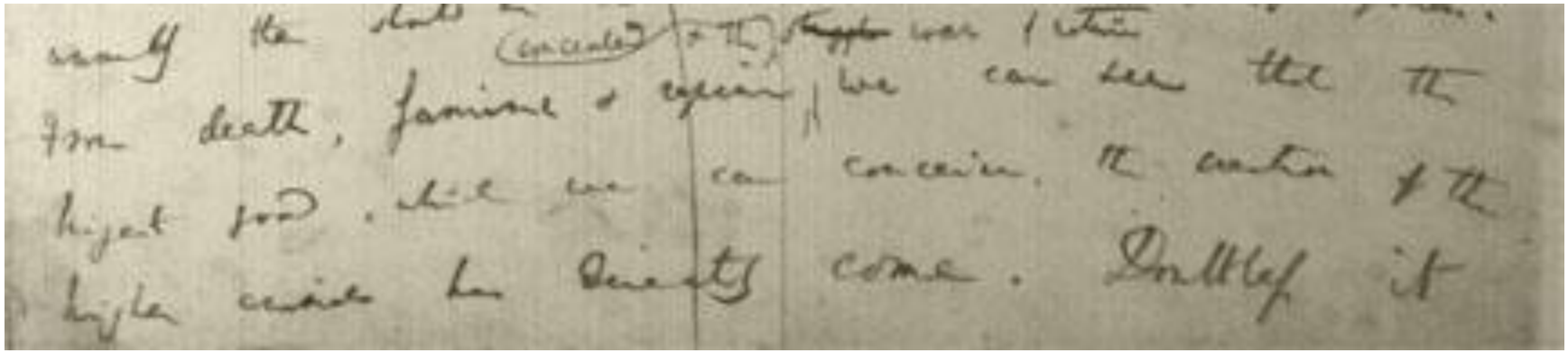
(A)

This has the same title as

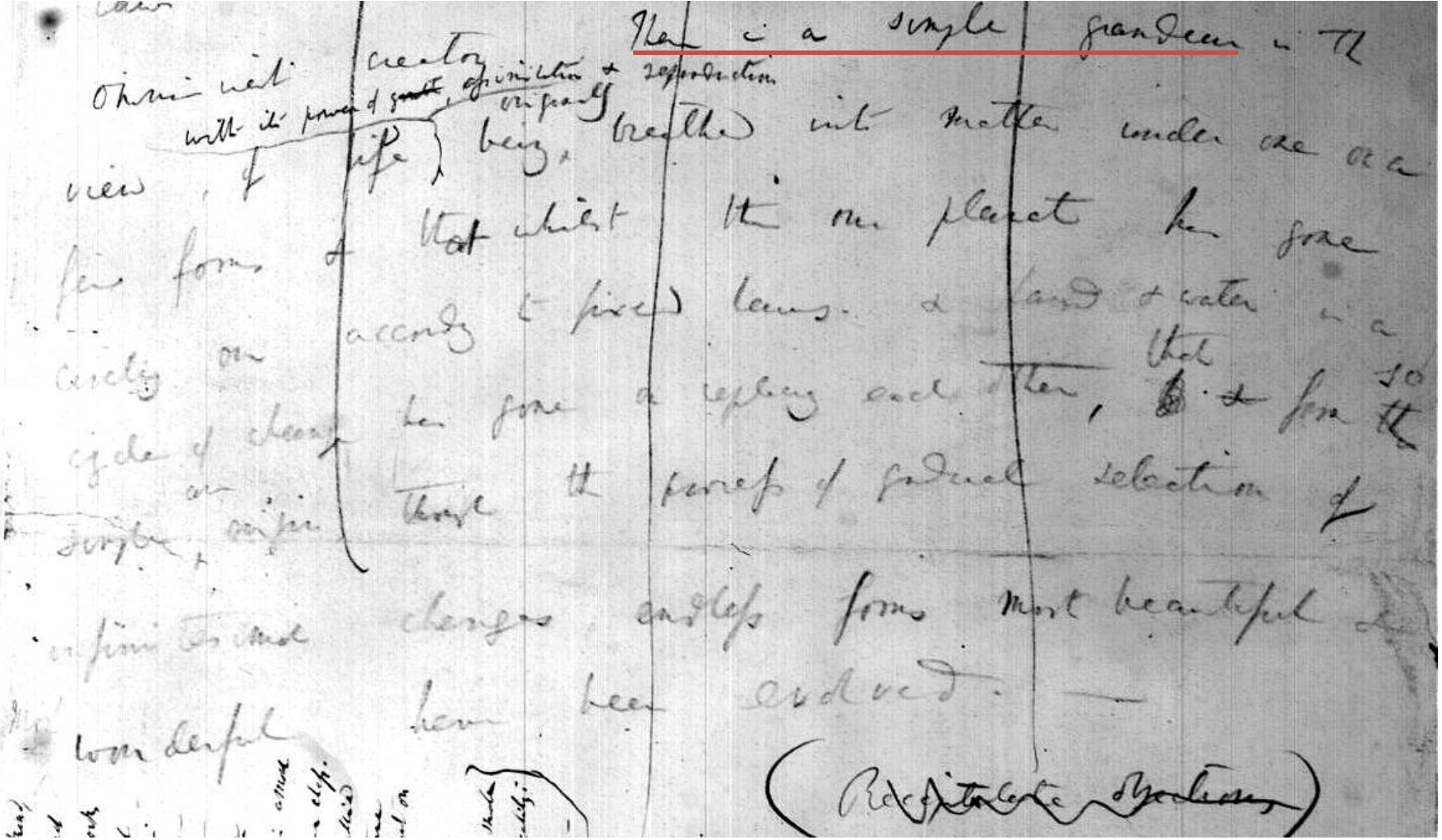
Ch i of the Bound version

one in. 35 p/p which

written in pencil



From death, famine, rapine, and the concealed war of nature we can see that the highest good, which we can conceive, the creation of the higher animals has directly come. (P. 52 of Francis Darwin edition)



“There is a simple grandeur in the view of life with its powers of growth, assimilation and reproduction, being originally breathed into matter under one or a few forms, and that whilst this our planet has gone circling on according to fixed laws, and land and water, in a cycle of change, have gone on replacing each other, that from so simple an origin, through the process of gradual selection of infinitesimal changes, endless forms most beautiful and most wonderful have been evolved.” (Darwin, Essay of 1842)

From the laws of life, Variability, Divergence of Character, and Natural Selection

“*the most exalted object* which we are capable of conceiving, namely, the production of the higher animals directly follows. There is grandeur in this view of life, with its several powers, having been originally breathed into a few forms or into one; and that, whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been and are being evolved.”

On the Origin of Species (1859), p. 490.

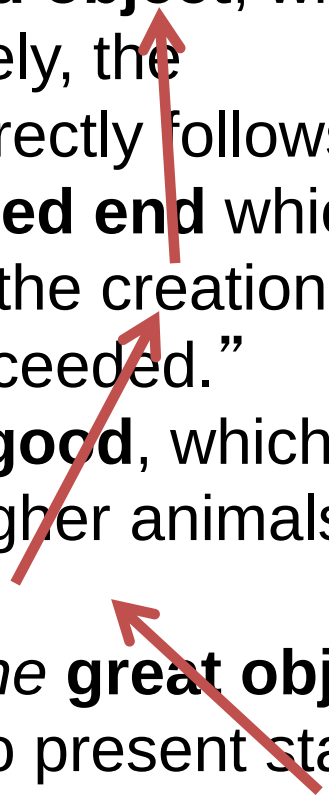
The Trajectory of Evolution
From the struggle for existence and natural selection,

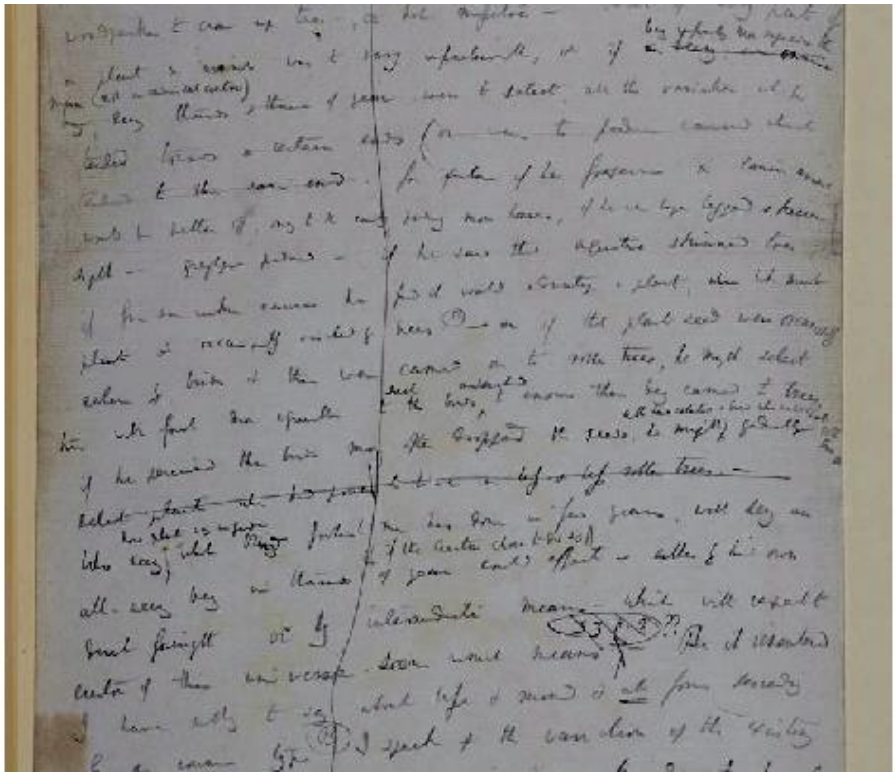
4. 1859 (*Origin*): “the most **exalted object**, which we are capable of conceiving, namely, the production of the higher animals, directly follows.”

3.1844 (Essay): “… the most **exalted end** which we are capable of conceiving, namely, the creation of the higher animals, has directly proceeded.”

2. 1842 (Essay): “… the **highest good**, which we can conceive, the creation of the higher animals has directly come.”

1.1838 (*E Notebook*): “… man is *one* **great object**, for which the world was brought into present state.”





…if a being infinitely more sagacious than man (not an omniscient creator) during thousands and thousands of years were to select all the variations which tended towards certain ends ([or were to produce causes which tended to the same end]), for instance, if he foresaw a canine animal would be better off, owing to the country producing more hares, if he were longer legged and keener sight,--greyhound produced. If he saw that aquatic (animal would need) skinned toes. . . . Who seeing how plants vary in garden, what blind foolish man has done in a few years, will deny an all-seeing being in thousands of years could effect (if the Creator chose to do so), either by his own direct foresight or by intermediate means, --which will represent the creator of this universe.
Pencil Sketch of 1842

“Let us now suppose a Being with penetration sufficient to perceive differences in the outer and innermost organization quite imperceptible to man, and with forethought extending over future centuries to watch with unerring care and select for any object the offspring of an organism produced under the foregoing circumstances; I can see no conceivable reason why he could not form a new race (or several were he to separate the stock of the original organism and work on several islands) adapted to new ends. As we assume his discrimination, and his forethought, and his steadiness of object, to be incomparably greater than those qualities in man, so we may suppose the beauty and complications of the adaptations of the new races and their difference from the original stock to be greater than in the domestic races produced by man’s agency.”

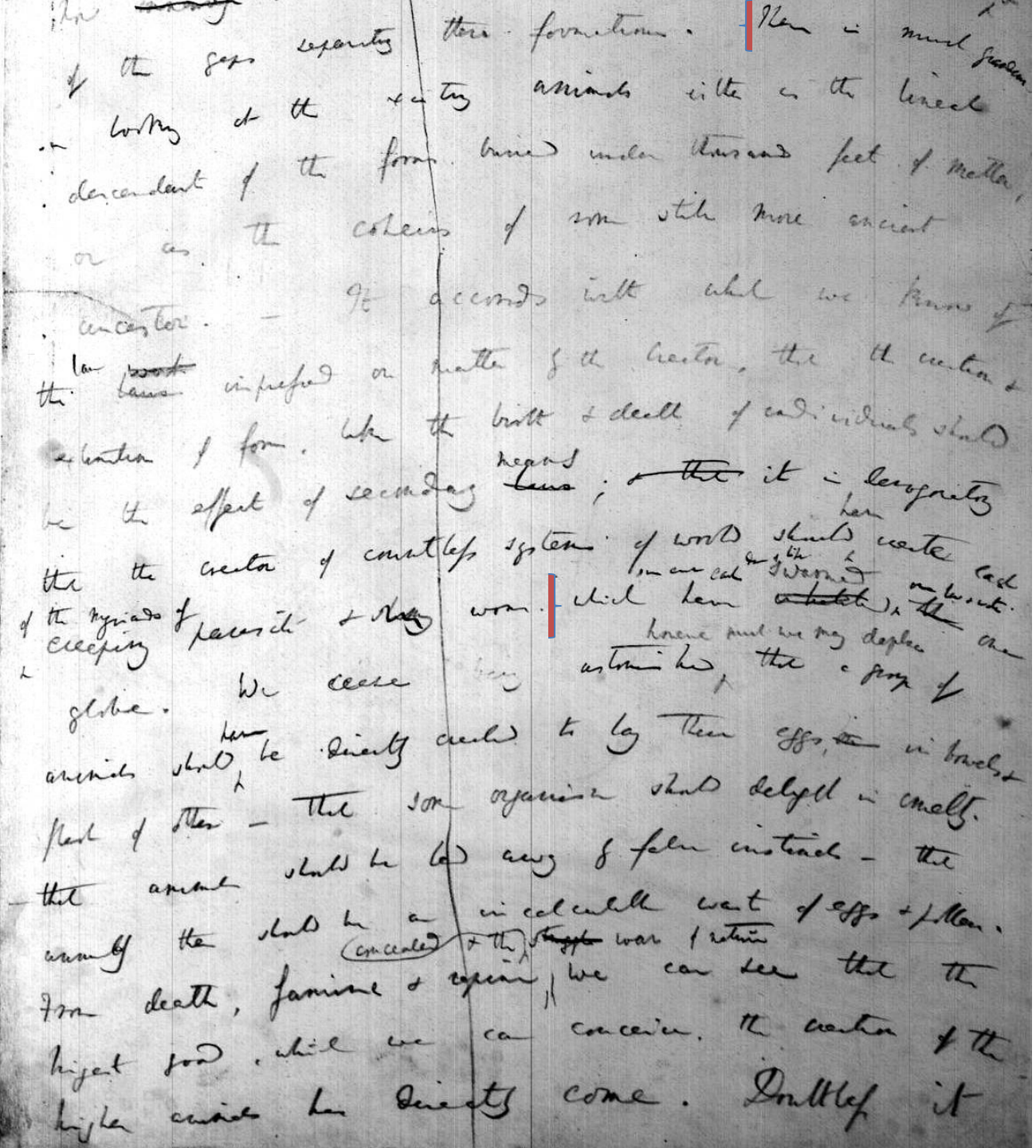
Darwin, *Essay of 1844*

“Man can act only on external and visible characters: nature cares nothing for appearances, except in so far as they may be useful to any being. She can act on every internal organ, on every shade of constitutional difference, on the whole machinery of life. Man selects only for his own good; Nature only for that of the being which she tends. . . . Can we wonder, then, that nature’s productions should be far “truer” in character than man’s productions; that they should be infinitely better adapted to the most complex conditions of life, and should plainly bear the stamp of far higher workmanship? . . . It may be said that natural selection is daily and hourly scrutinizing, throughout the world, every variation, even the slightest; rejecting that which is bad, preserving and adding up all this is good; silently and insensibly working whenever and wherever opportunity offers, at the improvement of each organic being.”

Darwin, *Origin of Species*, pp. 83-84.

“And as Natural Selection works by and for the good of each individual, all corporeal and mental endowments will tend to progress toward perfection.”

Charles Darwin, *On the Origin of Species*, p. 489.



MS page from Darwin's Essay of 1842

There is much grandeur in looking at the existing animals either as the lineal descendants of the forms buried under thousand feet of mater, or as the coheirs of some still more ancient ancestor. It accords with what we know of the law impressed on matter by the Creator, that the creation and extinction of forms, like the birth and death of individuals should be the effect of secondary [laws] means. It is derogatory that the Creator of countless systems of worlds should have created each of the myriads of creeping parasites and [slimy worms…" (Francis Darwin, *Foundations of the Origin of Species* (1908), p. 51.