

# *The Transmutation Notebooks of Charles Darwin*

## *Extracts*

### *B Notebook: Transmutation of Species*

This Book was commenced about July, 1837. p. 235 was written in January 1838, perhaps ended in beginning of February.

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### *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.—

B2

The ordinary kind which is a longer process, the new individual passing through several stages (?typical <of the> or shortened repetition of what the original molecules has done).—This appears I highest office in organization (especially in lower animals, where mind, & therefore relation to other life has not come into play)—see Zoonomia<sup>1</sup> arguments, fails in hybrids where every thing else is perfect: mother apparently only born to breed.—annuals rendered perennial. etc etc.—((Yet Eunuch, nor /cut/ Stallions, nor nuns are longer lived))

Why is life short, why such high object—generation.—

B3

We *know* world subject to cycle of change, temperature & all circumstances which I influence living beings.—

B4

we see <living things> 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.— I child of savage not civilized man.— birds rendered wild through generations acquire ideas ditto. V. Zoonomia.—

There may be unknown difficulty with *full grown* individual /with fixed organisation/ thus being modified,—therefore generation to adapt & alter the race to *changing* world.—

B5

On other hand, generation destroys the effect of accidental injuries, which if animals lived for ever would be endless I (that is with our present systems of body & universe.—therefore final cause of life

With this tendency to vary by generation, why are species all constant over whole country. beautiful law of intermarriages <separating> partaking of characters of both parents, & then *infinite* in number

B6

In man it has been I said, there is instinct for opposites to like each other

Aegyptian cats & dogs ibis same as formerly but separate a pair & place them on fresh isl<sup>d</sup> it is very doubtful whether they would remain constant; is it not said that marrying in *deteriorates* a race, that is alters it from some end which is good for man.— I

B7

Let a pair be introduced & increase slowly, from many enemies, so as often to intermarry who will dare say what result

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According to this view animals, on separate islands, ought to become different if kept long enough /apart, with slightly differ[ent] circumstances/.—Now Galapagos Tortoises, Mocking birds, Falkland Fox, Chiloe fox.—English & Irish Hare.— I

B8

As we thus believe species vary, in changing climate we ought to find representative species; this we do in South America closely approaching.— but as they inosculate, we must suppose the change is effected at once,—

something like a variety produced— (every grade in that case surely is not I produced?—

B9

<Granting> Species according to Lamarck<sup>2</sup> disappear as collection made perfect.—truer even than in Lamarck's time. Gray's<sup>3</sup> remark, best known species (as some common land shells) most difficult to separate. Every character continues to vanish, bones, instinct etc etc etc I

B10

Non-fertility of hybridity etc etc

B11

<assuming all> if species (1) may be derived from form (2) etc.,—then (remembering Lyells arguments of transportal) <continent> island near continents might have some species same as nearest land, which were late arrivals I others old ones, (of which none of same kind had in interval arrived) might have grown altered Hence the type would be of the continent though species all different.

In cases as Galapagos and Juan Fernandez. I

B17

As I have before said *isolate* species, <& give even less change> especially with some change probably <change> vary quicker.—

B18

Unknown causes of change. Volcanic isl<sup>d</sup>—Electricity. I Each species changes does it progress.

man gains ideas.

the simplest cannot help becoming more complicated; & if we look to first origin there must be progress.

B19

if we suppose monads are /constantly/ formed, ?would they not be pretty similar over whole world under I similar climates & as far as world has been uniform, at former epoch. How is this Ehrenberg?<sup>4</sup>

B20

every successive animal is branching upwards different types of organization improving as Owen<sup>5</sup> says simplest coming in & most perfect (& others) occasionally dying out; for instance, secondary terebratula may I have propagated recent terebratula, but Megatherium nothing.

We may look at Megatherium, armadillos & sloths as all off-springs of some still older types. some of the branches dying out.—

B21

with this tendency to change (& to multiplication when isolated,) requires deaths of species to keep numbers I /of forms/equable. ((but is there any reason for supposing number of forms

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equable: this being due to subdivisions & amount of differences, so forms would be about equally numerous.))

changes not result of will of animal, but law of adaptation as much as acid & alkali.

B22

Organized beings represent a tree, *irregularly branched* some branches far more branched,—Hence Genera.—As many terminal buds dying, as new one generated. I There is nothing stranger in death of species, than individuals

B23

If we suppose monad definite existence, as we may suppose in this case, their creation being dependent on definite laws; then those which have changed most, /owing to the accident of positions/ must in each state of existence have shortest I life. Hence shortness of life of Mammalia.—

B24

Would there not be a triple branching in the tree of life owing to three elements air, land & water, & the endeavour of each typical class to extend his domain into the other domains & subdivision <six> three more, double arrangement,— I If each main stem of the tree is adapted for these three elements, there will be certainly points of affinity in each branch.

A species as soon as once formed by separation or change in part of country, repugnance to intermarriage <increases>—settles it. I

B25

?We need not think that fish & penguins really pass into each other.—

B26

The tree of life should perhaps be called the coral of life, base of branches dead; so that passages cannot be seen.—

this again offers I ((no only makes it excessively complicated)) contradiction to constant succession of germs in progress. [Tree Diagram. See page 142 above]

Is it thus fish can be traced right down to simple organization.—birds—not. I [Tree Diagram. See page 142 above]

B27

We may fancy according to shortness of life of species that in perfection, the bottom of branches deader—so that in mammalian /birds/ it would only appear like circles; & insects amongst articulata—but in lower classes perhaps a more linear arrangement.—<sup>6</sup> I

B28

?How is it there come aberrant species in each genus ((with well characterized parts belonging to each)) approaching another.

<Petrels have divided themselves into many species, so have the awks, there is particular circumstances, to which.> is it an index of the point whence two favourable points of organization commenced branching.— I

B29

As all the species of some genera have died, have they all one determinate life dependent on genus, the genus upon another, whole class would die out therefore I

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B30

B31

In isl<sup>d</sup> neighbouring continent where some species have passed over, & where other species have "air" of that place, will it be said those have been then created there:— I Are not all our /British/ shrews diff[erent] species from the continent. Look over Bell<sup>7</sup> and L. Jenyns.<sup>8</sup> Falkland rabbit may perhaps be instance of domesticated animals having effected, a change which the Fr. naturalists thought was species. Study Lesson<sup>9</sup>—Voyage of Coquille.— I

B32

Dr Smith<sup>10</sup> say he is certain that when White Men & Hottentots or Negroes cross at C. of Good Hope the children cannot be made intermediate. the first children partake more of the mother, the later ones of the father; ((is not this owing to each copulation producing its effect; as when bitches' puppies are less purely bred owing to having once born mongrels.)) he has thus seen the black blood come out from the grandfather (when the mother was nearly quite white) in the two first children. How is this in West Indies— ((Humboldt,<sup>11</sup> New Spain.—)) I

B33

Dr. Smith always urges the distinct locality or metropolis of every species: believes in repugnance in crossing of species in wild state.—

B34

No doubt /C.D./ wild men do not cross readily, distinctness of tribes in T. del Fuego.<sup>12</sup> the existence of whiter tribes in centre of S. America shows this.<sup>13</sup>—Is there a tendency in plants hybrids to go back?—If so man & plants together would establish law. as above stated: no one can doubt that less trifling differences are blended by I intermarriages, then the black & white is so far gone, that the species (for species they certainly are according to all common language) will keep to their type: in animals so far removed with instinct in lieu of reason, there would probably be repugnance & art required to make marriage.—As Dr Smith remarked man and /wild/ animals in this respect are differently circumstanced.— I

B35

?Is the shortness of life of *species* in certain orders connected with gaps in the *series of connection*? ((if starting from same epoch *certainly*)) The

absolute end of certain forms from considering S. America (*independent of external causes*) does appear very probably:—Mem.: Horse, Llama, etc etc—

If we <suppose> grant similarity of animals in one country owing to springing from one branch, & the monucle has definite life, then all die at one period, which is not case . . MONUCLE NOT DEFINITE LIFE<sup>14</sup> I

I think [Tree Diagram. See page 143 above]

B36

((Case must be that one generation then should have as many living as now To do this & to have many species in same genus (as is), REQUIRES extinction.))

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B37

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 I to ancient types,—with several extinct forms, for if each species /as ancient (1) / is capable of making, 13 recent forms.—Twelve of the contemporaries must have left no offspring at all, so as to keep number of species constant.—

B38

With respect to extinction we can easily see that variety of ostrich Petise may not be well adapted, & thus perish out, or on other hand like Orpheus being favourable, I many might be produced. This requires principle that the permanent varieties produced by <inter> confined breeding & changing circumstances are continued & produce according to the adaptation of such circumstances, & therefore that death of species is a consequence (contrary to what would appear from America) I of non-adaptation of circumstances.—

B39

Vide two pages back Diagram.

The largeness of present genera renders it probable that many contemporary, would have left scarcely any type of their existence in the present world.—or we may suppose only each species in each generation only breeds, *like* individuals in a country not rapidly increasing.— I

B40

B41

If we thus go very 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, I it will be chances 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 <descen> 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.— I

B42

B43

Hence if this is true, that the *greater the groups the greater the gaps* (or *solutions of continuous structure*) /between them./—for nstance there would be great gap between birds & mammalia, Still greater between I vertebrate & articulata, still greater between animals & Plants

B44

But yet besides affinities from three elements, from the /infinite/ variation, & all coming from one stock & obeying one law, they may approach,—some birds may approach animals, & some of the vertebrate invertebrate.—Such a few on each side will yet present some anomaly & bearing I stamp of <some> great main type, & the gradation will be sudden.—

Heaven know whether this agrees with Nature: *Cuidado* I

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B84

When one sees nipple on man's breast, one does not say some use, but sex not having been determined.—so with useless wings under elytra of beetles.—born from beetles with wings & modified —if simple creation, surely would have been born without them.— I

893



Man has no *hereditary prejudices* /or instinct/ to conquer or breed together.—Man has no limits to desire, in proportion instinct more, reason less, so will aversion be I

8101

Astronomers might formely have said that God ordered, each planet to move in its particular destiny.—In same manner God orders each animal created with certain form in certain country, but how much more simple, & sublime power let attraction act according to certain law such are inevitable consequences let animal be created, then by the fixed laws of generation, such will be their successors I

B102

Let the powers of transportal be such & so will be the forms of one country to another.—let geological changes go at such a rate, so will be the number & distribution of the species!! I

B118

F. Cuvier<sup>15</sup> says, "But we could only produce domestic individuals & not races, without the occurrence of one of the most general laws of life, the transmission of a fortuitous modification, into a durable form, of a fugitive want into a fundamental propensity, of an accidental habit into an instinct." Ed. N. Phi. J., p. 297, No. 8, Jan.—Apr. 1828.—I take higher grounds & say life is short for this object & others, viz. not too much change.I

B119

In number 6 ? of Ed. n. Phil. Journ. Paper by Crawford<sup>16</sup> on Mission to Ava, account of HAIRY /because ancestors hairy/ man with one hairy child, and of *albino* /DISEASE/ being banished, & given to Portuguese priest.—In first settling a country, people very apt to be split into many isolated races! are there any instances of peculiar people banished by rest?—∴ Most monstrous form has tendency to propagate as well as diseases. I

B142

Parasites of negroes different from European.—Horse & ox have different parasites in different climates.—<sup>17</sup> I

B146

If population of place be constant /say 2000/ and at present day, every ten living souls on average are related to the (200d<sup>dth</sup> year) degree. Then 200 years ago, there were 200 people living who now have successors. Then the chance of 200 people, <might be> being related within 200 years backward might be calculated & this number eliminated say 150 people four hundred years since were progenitors of present people, and so on backwards to one progenitor, who might have continued breeding from eternity backwards.— I

B147

If population was increasing between each lustrum, the number

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related at the first start must be greater, & this number would vary at each lustrum, & the calculation of chance of the relationship of the progenitors would have different formula for each lustrum.—

B148

We may conclude that there will be a period though long distant, when of the present men (of all races) not more than a few will have successors. At present day in looking at two fine families one will I [have] successors /for/ centuries, the other will become extinct.—Who can analyse causes, dislike to marriage. hereditary disease, affects of contagions & accidents: yet some causes are evident, as for instance one man killing another.—So is it with *varying* races of man: then races may be overlooked mere variations consequent on climate etc.—the whole races act towards each other, and are acted on, just like the two families ((no doubt a different set of causes must act in the two cases)). I

B169

<Angels> (<Races>) Man in *savage* state may be called <species> /races/ in *domesticated*<species> /races/—If all men were dead then monkeys make men.—Men make angels.— I

B207

B208

People often talk of the wonderful event of intellectual man appearing.—the appearance of insects with other senses is more wonderful. its mind more different probably & introduction of man nothing compared to the first

thinking being, although hard to draw line— I not so great as between perfect insects & Forms hard to tell whether articulate or intestinal, or even a mite.—A bee /compared with cheese mite/ with its wonderful instincts, <might well say know> The difference is that there is wide gap between man & next animals in mind, more than in structures.

If the skeleton of a negro had been found, what would Anatomists have said.— I

B214

The difference [in] intellect of man & animals not so great as between living thing without thought (plants) & living thing with thoughts (animal).

((∴ My theory very distinct from Lamarcks))

B215

Without *two* species will generate common kind, which is not probable, then monkeys will never produce man, but I both monkeys & man may produce other species, man already has produced marked varieties & may someday produce something else, but not probable owing to mixture of races.—When all mixed & physical changes (?intellectual being acquired alters case) other species or angels produced. I

B216

Has the Creator since the Cambrian formation gone on creating animals with same general structure.—Miserable limited view.—

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With respect to how species are, Lamarcks "willing" doctrine absurd (as equally are arguments against it—namely how did otter live before being made otter—why to be sure there were a thousand intermediate forms. I

B227

B228

B229

With belief of <change> transmutation & geographical grouping we are led to endeavour to discover *causes* of change,—the manner of adaptation (wish

of parents??), instinct & structure become full of speculation & line of observation.—View of generation being condensation, test of highest organization intelligible.— May look to first germ, I —led to comprehend true affinities. My theory would give zest to /recent & fossil/ Comparative Anatomy: it would lead to study of instincts, heredity & mind heredity, whole metaphysics.—it would lead to closest examination of hybridity,—& generation, causes of change /in order/ to know what we have come from & to what we tend.—to what circumstances favour crossing & what prevents it this & /direct/ examination of direct passages of <species> structure in species might lead to laws of change, which would then be main object of study, to guide our speculations I with respect to past and future.

((The grand Question which every naturalist ought to have before him when dissecting a whale or classifying a mite, a fungus or an infusorian is "What are the Laws of Life")) I

B231

Animals whom we have made our slaves we do not like to consider our equals.— ((Do not slave-holders wish to make the black man other kind)) animals with affections, imitation, fear of death, pain, sorrow for the dead—respect I

We have no more reason to expect the father of man kind, than Macrauchenia yet it may be found:—We must not compare /chance of embedment in/ man in present state with what he is as former species. His arts would not then have taken him over whole world.— I

B232

((The soul by consent of all is superadded, animals not got it, not look forward)) if we choose to let conjecture run wild, then animals our fellow brethren in pain, disease death & suffering /& famine/, our slaves in the most laborious work, our companion in our amusements, they may partake, from our origin in one common ancestor we may be all netted together.— I

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C55

Whewell<sup>18</sup> thinks (p. 642) /anniversary/ speech /Feb. 1838/ thinks gradation between man & animals small point in tracing history of man.—granted.— but if all other animals have been so

C56

formed, then man may be a miracle, but induction leads to other views.— I  
Till we know uses of organs clearly, we cannot guess causes of change.—  
hump on back of cow!! etc. etc. I

C61

Whether species may not be made by a little more vigour being given to the  
chance offspring who have any slight peculiarity of structure. ((hence seals  
take victorious seals, hence deer victorious deer, hence males armed &  
pugnacious all orders; cocks all war-like)) I

C62

C63

All the discussion about affinity & how one order first becomes developed &  
then another— (according as parent types are present) must follow after  
there is proof of the non creation of animals.—then argument may be,—  
subterranean lakes, hot springs etc etc inhabited therefore mud wood  
[would] be inhabited, then how is this effected by—for instance, fish being  
excessively abundant I & tempting the Jaguar to use its feet much in  
swimming, & every developement giving greater vigour to the parent  
tending to produce effect on offspring—but WHOLE race of that species must  
take to that particular habitat.—All structures either direct effect of habit, or  
hereditary /& combined/ effect of habit, perhaps in process of change.—Are  
any men born with any peculiarity, or any race of plants.—Lamarck's willing  
absurd, ∴ not applicable to plants I

C70

Once grant my theory, & the examination of species from distant countries  
may give thread to conduct to laws of change of organization!

The little turtle, without its parent running to the water, is a good instance of  
innate instinct, better than child sucking or even duckling & fowls—

When talking of races of men,—black men, black bull finches—from linseed—  
not solely effects of climate on some antecedent race, perhaps not one now  
existing. I

C73

C74

Study the wars of organic being.—the fact of guavas having overrun Tahiti, thistle Pampas show how nicely things adapted—Then /aberrant/ varieties will be formed in any kingdom of nature, where scheme not filled up (most false to say no passages; nature is full off them,—Wading birds partially webbed etc etc)—& in round of chances every family will have some aberrant groups,—but as for number five in each group absurd.—The mere fact of division of lesser & more power (2. typical 3. subtypical) I where power arbitrary, leaves door open for Quinarians to deceive himself.—

Give the case of Apterix split, depress & elevate & enlarge New Zealand, a division of nature of Apterix, many genera & species—

The believing that monkey would breed (if mankind destroyed)

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some intellectual being though not MAN,—is as difficult to understand as Lyells doctrine of slow movements &c &c I

C75

This multiplication of little means & bringing the mind to grapple with great effect produced is a most laborious & painful effort of the mind (although this may appear an absurd saying) & will never be conquered by anyone (if has any kind of prejudices) <without> who just takes up & lays down the subject without long meditation—His best chance is to have [thought] profoundly over the enormous difficulty of reproduction of species & certainly of destruction; then he will choose & firmly believe in his new faith. of the lesser of the difficulties. I

C76

C77

C78

C79

Once grant that /species/ [of] one genus may pass into each other,—grant that one instinct to be acquired (if the medullary point in ovum has such

organization as to force in one man the developement of a brain capable of producing more glowing imagery or more profound reasoning than other—if this be granted!!) & whole fabric totters & falls.—look abroad study gradation study unity of type study geographical distribution I study relation of fossil with recent, the fabric falls! But man—wonderful man "divino ore versum coelum attentior" is an exception.—He is mammalian,—his origin has not been indefinite—he is not a deity his end /under present form/ will come. (or how dreadfully we are deceived) then he is no exception.—he possesses some of the same general instincts, & <moral> feelings as animals.—they on other hand can reason—but man has reasoning powers in excess, instead of I definite instincts—this is a replacement in mental machinery, so analogous to what we see in bodily, that it does not stagger me.—What circumstances may have been necessary to have made man! Seclusion want etc & perhaps a train of animals of hundred generations of species to produce contingents proper.—Present monkeys might not,—but probably would,—the world I now being fit, for such an animal—man, (rude uncivilized man) might not have lived when certain other animals were alive, which have perished.

Let man visit Ourang-outang in domestication, hear expressive whine, see its intelligence when spoken, as if it understood every word said—see its affection to those it knows,—see its passion & rage, sulkiness & every action of despair; ((let him look at savage, roasting his parent, naked, artless, not improving, yet improvable)) & then let him dare to boast of his proud preeminence.—((Not understanding language of Fuegian puts on par with monkeys)) I

C83

Peculiarities of structure, as six-fingered people are sometimes hereditary,—yet these not adaptations—((they are counteracted by nature by crossing with other varieties)) but <accidental>

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changes after birth do not affect progeny. Many dogs in England must have been lopped off & sheeps tails cut yet there is no record of any effect.—New Hollanders have gone on boring their noses, etc & This congenital changes show that grandson is determined when child is.— I

C123

What the Frenchman did for *species* between England & France, I will do with *forms*. —

C124

Mention persecution of early Astronomers,—then add chief good of individual scientific men is to push their science a few years in advance only of their age, (differently from literary men,) must remember that if they *believe* & do not openly avow their belief they do as much to retard as those whose opinion they believe have endeavoured to advance cause of truth. | It is of the utmost importance to show that habits sometimes go before structure.— the only argument can be a bird practising imperfectly some habit, which the whole rest of other family practise with a peculiar structure, thus <Milvulus forficatus> /Tyrannus sulphureus/ if compelled solely to fish, structure would alter.— |

C154

Animals have voice, so has man. not *saltus*, but *hiatus* animals expression of countenance. They may convey much thus. ((hence if sickness death, unequal life—stimulated by same passions, brought into the world same way)) Man has expression.—animals signals, (rabbit stamping ground) man signals.—animals understand the language. they know the cry of pain as well as we.—

C155

It is our arrogance, to raise on the same shelf to (look at common ancestor. scarcely conceivable in savages) Has not the white man, who has debased /& violated every such instinctive feeling/ his nature by making slave of his fellow Black, often wished to consider him as other animal.—it is the way of mankind & I believe those who soar above such prejudices yet have I justly exalted nature of man. like to think his origin godlike, at least every nation has done so as yet.—

We know what is the natural arrangement. It is the classification of <arrangement> relationship, latter word meaning descent.— |

C165

habits become important element in classification, because structure has tendency to follow it, or it may be hereditary & strictly point out affinities. conduct of Gould,<sup>19</sup> remark of D'Orbigny<sup>20</sup> point out importance of habits in classification.— |

C166



Thought (or desires more properly) being hereditary it is difficult to imagine it anything but structure of brain hereditary, analogy points out to this.—love of the deity effect of organization, oh you materialist!—Read Barclay<sup>21</sup> on organization!! Avitism in

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mental structure a disposition & avitism in corporeal structure are facts full of meaning.—Why is thought being a secretion of brain, more wonderful than gravity a property of matter? It is our arrogance, it our admiration of ourselves.— I

C171

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.— I

C172

C173

Memory springing up after long intervals of forgetfulness,—after sleep /strong/ analogies with memory in offspring.—some association in such cases recall the idea—it is scarcely more wonderful that it should be remembered in next generation. ((or simply structure in brain people in fever recollecting things utterly forgotten)) [ (N.B. What are those marvellous cases, when you feel sure you have heard conversation before, is strong association recalling up image which had been past—so great an anomaly in structure of brain not probable) put note Sir W. Scott has written about it]<sup>CD</sup> If we saw a child do some action, which its father had done habitually we should exclaim it was instinct, even if savage take or was given a great coat & this he put on & we afterwards could understand /language better instance/ he had done this without reflection or consciousness of reasoning to tell back from front etc or use of button holes it would I be instinctive.—My view of instinct explains its loss ? if it explains its acquirement.—analogy a bird can swim without being web footed, yet

with much practice & led on by circumstance it becomes web footed. now man by effort of memory can remember how to swim after having once learnt, & if that was a regular contingency the brain would become webfooted & there would be no act of memory.—

[There is no corelation between individual objects as Ichneumon & caterpillar though our ignorance may make us think so, but only between laws.]<sup>CD</sup> I

C174

Many diseases in common between man & animals. Hydrophobia etc cowpox, proof of common origin of man.—different contagious diseases, where habits of people nearly similar. Curious instance of difference in races of men.—

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Wax of Ear, bitter perhaps to prevent insects lodging there, now these exquisite adaptations can hardly be accounted for by my method of breeding there must be some corelation, but the whole mechanism is so beautiful. The corelations are not, however, perfect, else one animal would not cause misery to other,—else smell of man would be disagreeable to mosquitoes. I

C175

We never may be able to trace the steps by which the organization of the eye passed from simpler stage to more perfect preserving its relations.—the wonderful power of adaptation given to organization.—This really perhaps greatest difficulty to whole theory.— I

C190

try to trace from simplest reasoning in lower animals many times produced, a general tendency produced, such as man getting habitually into passion becomes habitually passionate.—the key to affections might perhaps thus be found—a person who is habitually kind to children increases general instinctive feeling.— I

C196

C197

Man in his arrogance thinks himself a great work worthy the interposition of a deity. More humble & I believe truer to I consider him created from animals.

Insects shamming death. most difficult case to imagine how art acquired.—They reason however on this to a degree. Mem Spider only dropping where growth thick.—Shamming death it is but being motionless. How is instinctive dread ((it is exceedingly doubtful whether animals have any fear of death, only of pain)) of death acquired? The S. American dung beetles will each become the father of many species, a few eggs transported to the St. of Magellan.—Change of habits in Van Diemen's Land. I

C198

Study Mr. Blyth's papers on Instinct.<sup>22</sup>—His distinction between reason & instinct very just, but these faculties being viewed as replacing each other it is hiatus & not saltus.—

The greater individuality of mind in man is analogous to greater individuality of bodies of some animals over those of others.—the mind of different animals less divided.—But as man has hereditary tendencies, his mind is still only a divided body.

P. 3 language seems to supply instincts,—& those powers which allow of acquirement of language, hereditary, acquirable.—therefore man's mind not so different from that of brutes

Hard to say, what is instinct in animals /& what reason/ in precisely same way not possible to say what habitual in man & what reasonable—Some actions may be either in same individual. I

C204

The *races* of men differ chiefly in <size> colour, form of head /& features/ (hence intellect?) & what kinds of intellect) quantity & kind of hair forms of legs—hence the father of mankind probably possessed a structure in these points for a less time than

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other points.—((female genital organs.—make abstract on this subject from Lawrence,<sup>23</sup> Blumenbach<sup>24</sup> & Prichard.<sup>25</sup>)) ((In some monkeys clitoris wonderfully produced))—Now we might expect that animal half way between men & monkey would have differed in hair, colour & form of head /&

features/; but likewise in length of extremities, /how are races in this respect/ upper & lower, which I do not know whether it differs in present races, & form of feet.—Negro /or father of negro/ probably was first black at base of nails & on white of eyes.— I

C212

A monkey (Baboon) at Z. Garden upon being beaten behaved very differently from a dog.—more like a man. continued long in a passion & looked out for him to come again very differently from dog. perhaps being in passion chief difference I

C216e

C217

... It is capable of demonstration that all animals have never at any one time formed chain, since if cretaceous period assumed, then some perished before. carboniferous some perished I before, then there always have been gaps, & there now must be, ∴ extinction of species bears relation to existence of general etc etc

Discussion useless, until it were fixed what a species means Two savages, two species,—civilized man may exclaim with Christian /we are all/ Brothers in spirit, all children of one father,—yet differences carried a long way.

C218

L<sup>d</sup> Jeffrey<sup>26</sup> (Life of Mackintosh, Vol. II, p. 495) —["] in fact in all reasoning, of which human nature is the object, there is really no natural starting place, because there is nothing more elementary than that complex nature itself with which our speculations must end as well as being" &c &c. their centre is everywhere & their circumference nowhere as long as this is so—!!  
Metaphysics!!! I

C220

Educate all classes, avoid the contamination of castes. improve the women. (double influence) & mankind must improve—

C237e

∴ Those animals, which only propagate by scission can not alter much?!

C238e

Mr. Brown showed me Bauer's<sup>27</sup> drawings of a curious plant where a tube consisting of pistils & stamens united into long organ, moved on being touched, so as to protect itself, one segment of the corolla being (probably) small to allow it to lie on one side.—but in other species, this segment is converted into hood which possesses power of movement, & not the organ itself I How except by direct adaptation has such a change been effected.—the consciousness of the plant that this part must be protected however it may be effected.— I

C241e

I suspect some valuable analogies might be drawn between habitual actions of plants (when exciting cause is absent) &

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C242e

memory of animals.— (surely in plants I movements effects of irritability, though means injection of fluid different from contraction of fibre)—it is most remarkable habitual action in plants, it allows of any degree in lowest animals—habitual action in intestines subject to sympathetic nerves—

The vividness of first <thoughts> memory in childhood or rather their memory. Very remarkable—scenes in themselves accidental—my first thought of sea side— I

C243

Study Bell on Expression<sup>28</sup> & the Zoonomia, for if the former shows that a man grinning is to expose his canine teeth ((this may be made a capital argument. if man does move muscles for uncovering canines)) no doubt a habit gained by formerly being a baboon with great canine teeth.—((Blend this argument with his having canine teeth at all.—)) This way of viewing the subject important.—Laughing modified barking, smiling modified laughing. Barking to tell other animals in associated kinds of good news, discovery of prey.—arising no doubt from want of assistance. —crying is a puzzler.— Under this point of view expression /of all animals/ becomes very curious—a dog snarling in play.— I

C244

Hensleigh says the love of the deity & thought of him /or eternity/ only difference between the mind of man & animals.—yet how faint in a Fuegian or Australian! Why not gradation.—no greater difficulty for Deity to choose. when perfect enough for future state, that when good enough for Heaven or bad enough for Hell.— (Glimpses bursting on mind & giving rise to the wildest imagination & superstition.—York Minster story of storm of snow after his brothers murder.—good anecdote.<sup>29</sup> I

C257e

In Holme's History of Man at Maer,<sup>30</sup> it is said the Samoyed women, (?North end of the Oural mountains) have black nipples to their breasts.— I

*D Notebook: Transmutation of Species*

D36

16<sup>th</sup> Aug. What a magnificent view one can take of the world Astronomical causes, modified by unknown ones. cause changes in geography & changes of climate superadded to change of climate from physical causes,—then superadded changes of form in the organic world, as adaptation, & these changing affect each other, & their bodies by certain laws of harmony keep perfect in these themselves.—instincts alter, reason is formed & the world peopled /with myriads of distinct forms/ from a period short of eternity

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D37

to the present time, to the future.—How far grander than idea from cramped I imagination that God created (warring against those very laws he established in all <nature> organic nature) the Rhinoceros of Java & Sumatra that since the time of the Silurian he has made a long succession of vile molluscos animals. How beneath the dignity of him, who /is supposed to have/ said let there be light & there was light ((whom it has been declared "he said let there be light & there was light"—/bad taste/))

D38

D39

With respect to future destinies of mankind, some of species or varieties are becoming extinct, others though the negro of Africa is not loosing ground, yet, as the tribes of the interior are pushing into each other from slave trade

& colonization of S. Africa, so must the tribes become blended & prevent the strong separation which I otherwise would have taken place otherwise in 10,000 years negro probably a distinct species—We know how long a Mammal may go on as one species from Egyptian mummies & from the existing animals found fossil when Europe must have worn a quite different figure

19<sup>th</sup> With respect to the Deluge, it may be worth adding in note that amongst the Mammalia of Europe the shells of do—shells of N. America—shells of S. America.—there is no appearance of sudden termination of existence,—nor is there in the Tertiary <older> geological epochs.— I

D49

... Mayo<sup>31</sup> (Philosophy of Living) quotes Whewell<sup>32</sup> as profound because he says length of days adapted to duration of sleep in man!! whole universe so adapted!!! & not man to Planets.— instance of arrogance!! I

D111

... How long will the wretched inhabitants of N. W. Australia, go on blinking their eyes without extermination, & change of structure.—When will the musquitoes of S. America take an effect—would perfect impunity from muskitoes bite influence propagation of species.—

Case of association very disagreeable hearing maid servant cleaning door outside, as often as she touched handle, though really fully aware she was not coming in,—could not help being perfectly disturbed referred to Book M. I

D134e

Sept. 28<sup>th</sup> We ought to be far from wondering of changes in numbers of species, from small changes in nature of locality. (I do not doubt every one till he thinks deeply has assumed that increase of animals exactly proportionate to the number that can live.—) Even the energetic language of <Malthus> Decandoelle does not convey the warring of the species as inference from Malthus.—(increase of brutes must be prevented solely by positive checks, excepting that famine may stop desire.—) in nature pro-

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duction does not increase, whilst no check prevail, but the positive check of famine & consequently death.<sup>33</sup> I

D135e

population in increase at geometrical ratio in FAR SHORTER time than 25 years—yet until the one sentence of Malthus<sup>34</sup> no one clearly perceived the great check amongst men.—(there is spring, like food used for other purposes as wheat for making brandy.—) Even a *few* years plenty, makes population in men increase, & an *ordinary* crops causes a dearth) take Europe on an average every species must have same number killed year with year, by hawks, by colds etc—even one species of hawk decreasing in number must affect instantaneously all the rest.— (The final cause of all this wedging, must be to sort out proper structure, & adapt it to change. —to do that for form, which Malthus shows is the final effect (by means however of volition) of this populousness, or the energy of man) One may say there is a force like a hundred thousand wedges trying force every kind of adapted structure into the gaps in the oeconomy of nature, or rather forming gaps by thrusting out weaker ones.—

D136e

D137

Sept 29<sup>th</sup> Dr Andrew Smith. (Remarks on extraordinary *curiosity* of Monkeys) The Baboon of which anecdotes have been told is Cynocephalus Porcarius.— this monkey did not like a great coat made for it at first, but in two or three days learn its comfort & though could not put it *on*, yet threw it over l it, & made it meet in front.—Dr. Smith every baboon & monkey, big & little that ever he saw knew women.—he has repeatedly seen them try to pull up petticoats, & if women not afraid, clasp them round waist & look in their faces & make the st. st noise.—The Cercopithecus *chinensis*? (or bonnet face) monkey he has seen do this.—These monkey had no curiosity to pull up trousers of men. Evidently knew <men> women, thinks perhaps by smell,—but monkeys examine sexes of every l

D138

Has repeatedly seen one he kept pull up feathers of tail of Hen, which lived with it,—also of dogs *but did not seem to evince more lewdness for bitch than dog*: monkeys thus examine each other sexes /by taking up tail/— Mem.: Ourang Jenny with Tommy.—Good evidence of knowledge of woman.—

D139



The noise st st which the C. Sphynx makes is also made by the C. porcarius, together with a grunting noise, the former signifies recognition with pleasure as when food is offered, as much as to I say give me—the other when Dr Smith more distant.—But he thinks other monkeys make st.—noise.

In case of woman instinctive desire may be said more definite than with bitch, for some feeling must urge them to these actions. ((These facts may be turned to ridicule, or may be thought disgusting, but to philosophic naturalist pregnant with interest))

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Hyaena, thinks, when pleased cocks his ears, when frightened depresses them.—

England was united to Continent when elephants lived, & when present animals lived—we know the great time necessary to form channel & (& Basset St.) yet no change in English species—time no element in *making* change, only in *fixing* it: only circumstances a contingency of time. I

D140

When we multiply the effects of <earthquakes>, elevating forces in raising continents, & forming mountain-chains, when we estimate the matter removed by the waves of the sea, on beaches, we really measure the rapidity of change of forms, & instincts in the animal kingdom.—It is the unit of our calendar—epochs & creations reduce themselves to the revolutions of one system in the Heavens.—

Is not *puma* same colour as *lion* because inhabitant of *plain* & Jaguar of woods etc like ground birds. I

D158

D159e

Hunter<sup>35</sup> shows almost all animals subject to Hermaphroditism, —those organs which perform nearly same function in both sexes, are never double, only modified, those which perform very different, are both present in very shade of perfection.—How comes it nipples though abortive, are so plain in man, & yet no trace of abortive womb, or ovarium,—or testicles in female.—the presence of both testes & ovaries in Hermaphrodite—but not of penis & clitoris, shows to my mind, that both are present in every animal, but

unequally developed.—surely analogy of Molluscs & neuter bee would shew this. (Do any male animals give milk)—But this not distinctly stated by Hunter,—Do testes, & ovaria when I they first appear occupy their *proper* positions,—this would be argument for developement of either.—(Mammae or sheath of Horses penis reduced to extreme degree of abortion).—Insecta.—hermaphrodite. being not only dimidiate, but quarter grown seems to show whole body imbued with possibility of becoming either sex.—

In my theory I must allude to separation of sexes as very great difficulty, then give speculation to show that it is not overwhelming.— I

D162

Theory of sexes (woman makes bud, man puts primordial vivifying principle) one individual secretes two substances, although organs for the double purpose are not distinguished. (yet may be presumed from hybridity of ferns) afterwards they can be seen distinct (in dioecious plants in their abortive sexual organs?): they then become so related to each other as never to be able to impregnate themselves (this never happens in plants) /only in subordinate manner in the plants which have male & female flowers on same stem.—/ so that Molluscous hermaphroditism takes place.

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—thus one organ in each becomes obliterated, & sexes as in Vertebrates take place.— ∴ every man & woman is hermaphrodite:— ∴ developed instincts of capon & power of assuming male plumage in females, & female plumage in castrated male.—Men giving milk— I

D170

There is an analogy between caterpillars with respect to moths, & monkeys & men,—each man passes through its caterpillar state. The monkey represents this state.— I

*E Notebook: Transmutation of Species*

E46

The dog being so much more intellectual than fox, wolf etc etc —is precisely analogous case to man exceeding monkeys.— I

E47

Having proved mens & brutes bodies on one type: almost superfluous to consider minds.—as difference between mind of a dog & a porpoise was not thought overwhelming.—yet I will not shirk difficulty—I have felt some difficulty in conceiving how inhabitant of Tierra del Fuego is to be converted into civilized man.—ask the Missionaries about Australian yet slow progress has done so.—show a savage a dog, & ask him how wolf was so changed. I

E48

When discussing extinction of animals in Europe, the forms themselves have been basis of argument of change.—now take greater area of water & snow-line descent.

E49

My theory gives great final cause ((I do not wish to say only cause, but one great final cause, nothing probably exists for one cause)) of sexes /in separate animals/: for otherwise there would be as many species, as individuals, & though we may not trace out all the ill effects,—we see it is not the order in this perfect world, either I at the present, or many anterior epochs.—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—etc ((this is stated too strongly. for there would be innumerable species, & hence few only social there could not be one body of animals, living with certainty on others))

If man is *one* great object, ((Whether he was or not. He is present a social animal)) for which the world was brought into present state,—a feat few will dispute, [although, that it was the sole object, I will dispute, when I hear from the geologist the history, & from the Astronomer that the moon probably is uninhabited]<sup>CD</sup> & if my theory be true then the formation of sexes rigidly necessary.— I

E50

Without sexual crossing, there would be endless changes, &

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E51

hence no feature would be deeply impressed on it, & hence could not be *improvement* /& hence not in higher animals/—it was absolutely

necessary that Physical changes should act not on individuals, but on masses of individuals.—so that the changes should be slow & bear relation to the whole changes of country, & not to the local | changes—this could only be effected by sexes. All the above should follow after discussion of crossing of <species> individuals with respect to representative species, when going North & South |

E58

Three principles will account for all

- (1) Grandchildren like grandfathers
- (2) Tendency to small change. (especially with physical change)
- (3) Great fertility in proportion to support of parents |

E59

Herschel<sup>36</sup> calls the appearance of new species the mystery of mysteries, & has grand passage upon the problem.! Hurrah—"intermediate causes" |

E63

Are the feet of water-dogs at all more webbed than those of other dogs.—if nature had had the picking she would make <them> such a variety far more easily than man,—though *man's practiced* judgment even without time can do much.—(yet one cross, & the permanence of his breed is destroyed).

E64

E65

When two races of men meet, they act precisely like two species of animals.—they fight, eat each other, bring diseases to each other etc, but then comes the more deadly struggle, namely which have | the best fitted organization, or instinct (i.e. intellect in man) to gain the day.—In man chiefly intellect, in animals chiefly organization, though Cont. of Africa & West Indies shows organization in Black Race there gives the preponderance, intellect in Australia to the white.—The peculiar skulls of the men on the plains of Bolivia—strictly fossil—/& in Van Diemen's land/—they have been exterminated on *principles*. strictly applicable to the | universe—The range of man is not unlike that of animals transported by floating ice.—I agree with Mr Lyell, man is not an *intruder*—: the geological history of man

is as perfect as the Elephant, if some genus holding same relation as Mastodon to Man were to be discovered.

Man acts on, & is acted on by /the/ organic and inorganic agents of this earth, like every other animal. I

E89

Jan. 6<sup>th</sup>The rudiment of a *tail* shows man was originally *quadru* <manous> (*ped*) ((Hairy—could move his ears))

The head being six metamorphosed vertebrae, the parents of all vertebrate animals—must have been like some molluscous /bisexual/ animal with a vertebra only & no head—!!

Handwriting is determined by most complicated circumstances, as shown by difficulty in forging. Yet handwriting said to be hered-

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itary, shows well what minute details of structure of [i.e., are] hereditary. I

E108

Wonderful as is the possession of voice by Man, we should remember, that even birds can imitate the sounds surprisingly well.— I

E114

E115e

March 12<sup>th</sup>. It is difficult to believe in the dreadful /but quiet/ war of organic beings, going in the peaceful woods, & smiling fields.—we must recollect the multitude of plants introduced into our gardens (opportunities of escape for foreign birds & insects) which are propagated with very little care.—& which might spread themselves as well as our wild plants, we see how full nature, how finely each holds its place.—When we hear from authors (Ramond Hort. Transact. Vol. I, p. 17 Append<sup>37</sup>) that in the Pyrenees that the *Rhododendron ferrugineum* begins at 1600 metres precisely & stops at 2600 & yet know that plant can be cultivated with ease near London—what makes the line, as of trees in Beagle Channel—it is not elements!—We cannot believe in such a line. it is other plants.—a broad border of killed trees would form fringe—but there is a contest & a grain of sand turns the balance.— I

E136

It /may/ be said, that wild animals will vary, according to my Malthusian views, within certain limits, but beyond them not,—argue against this—analogy will certainly allow variation as much as /the/ difference between species,—for instance pigeons—: ((then comes question of genera))

It certainly appears that swallows have decreased in numbers, what cause??  
I

E137

Seeing the beautiful seed of a Bull Rush I thought, surely no "fortuitous" growth could have produced these innumerable seeds, yet if a seed were produced with infinitesimal advantage it would have better chance of being propagated & so etc I

E155

E156

I utterly deny the right to argue against my theory because it makes the world far *older* than what geologists think: it would be doing what I others but fifty years since [did] to geologists,—& what is older—what relation in duration of planet to our lives—Being myself a geologist, I have thus argued to myself, till I can honestly reject such false reasoning I

*Notes by Paul H. Barrett*

1. *Zoonomia*, p. 487: "This paternal offspring of vegetables, I mean their buds and bulbs, is attended with a very curious circumstance; and that is, that they exactly resemble their parents, as is observable in grafting fruit-trees, and in propa-

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gating flower-roots; whereas the seminal offspring of plants, being supplied with nutriment by the mother, is liable to perpetual variation."

2. Lamarck, *op. cit.*: "According as the production of nature are collected and our museums grow richer, we see nearly all the gaps filled up and the lines of demarcation effaced."

3. Gray, John Edward, "Remarks on the Difficulty of Distinguishing Certain Genera of Testaceous Mollusca by Their Shells Alone, and on the Anomalies in Regard to Habitation Observed in Certain Species," *Philosophical Transactions of the Royal Society of London*, 125: 301–310, 1835.

4. Ehrenberg, C. G., "On the Origin of Organic Matter from Simple Perceptible Matter, and on Organic Molecules and Atoms; Together with Some Remarks on the Power of Vision of the

Human Eye," *Scientific Memoirs, Selected from the Transactions of Foreign Academies of Science and Learned Societies, and from Foreign Journals* (R. Taylor, ed.), 1:555–583, 1837. In the article Ehrenberg rejects the belief that the smallest visible animal organisms, which he calls the Monad, could arise by spontaneous generation. The word *monad* also appears in the following passage, in Davy, *op. cit.*: "The external world or matter is to us in fact nothing but a heap or cluster of sensations, and in looking back to the memory of our own being, we find one principle which may be called the *monad*, or *self*, constantly present, intimately associated with a particular class of sensations, which we call our own body or organs ... the monad is always present; we can fix no beginning to its operations, we can fix no limit to them ... human life may be regarded as a type of infinite and immortal life, and its succession of sleep and dreams as a type of the changes of death and birth to which from its nature it is liable." Darwin read Davy on February 12, 1839. See N 62.

5. Probably Richard Owen: in 1836 became first Hunterian Professor of Comparative Anatomy and Physiology at the Royal College of Surgeons; in 1840 authored "Fossil Mammalia," Part I, *Zoology of the Voyage of the Beagle*, Charles Darwin, ed. Following publication of the *Origin of Species*, Owen became one of Darwin's "chief enemies."

6. Darwin drew a vertical line in the margin beside the passage from "it would only appear" to "arrangement."

7. Bell, Thomas, *A History of British Quadrupeds, Including the Cetacea*, Van Voorst, London, 1837.

8. Jenyns, Leonard, *A Manual of British Vertebrate Animals: or, Descriptions of all the Animals ... Observed in the British Islands, etc.*, J. Smith, Cambridge, 1835, and *A Systematic Catalogue of British Vertebrate Animals*, Cambridge, 1835.

9. Lesson, René-Primevère, *Voyage autour du monde ... sur ... la Coquille*, Paris, 1838–1839.

10. Smith, Andrew, author of *Illustrations of the Zoology of South Africa ... Collected During an Expedition into the Interior of South Africa, in the Years 1834–1836; etc.*, 5 pt., Smith, Elder, London, 1849 [38–49]. Darwin visited Smith at Cape Town, South Africa, in June 1836.

11. Humboldt, Friedrich Heinrich Alexander von, *Political Essay on the Kingdom of New Spain*, transl. from the original French by John Black, 2 vols., London, 1811.

12. Darwin, *Voyage of the Beagle*, 1839, *op. cit.*, p. 236: "The tribes have no government or head, yet each is surrounded by other hostile ones, speaking different dialects; and the cause of their warfare would appear to be the means of subsistence."

13. See Barlow, 1934, *op. cit.*, p. 172, for discussion of the Chascas, a tribe of tall, fair-skinned Indians whose young men chose death rather than betray their countrymen.

14. Kirby, 1835, Vol. 2, p. 2, uses the word *Monoculus* in a discussion of the peculiar taxonomic affinities of barnacles. He says that "Linné" considered barnacles as a single genus—*Lepas*—whereas Lamarck regarded them as a Class, the Cirrhipeda. Thus Lamarck, "by the insertion of the aspirate, ... made his term, like *Monoculus*, half Greek and half Latin... ." Here is a possible clue to the origin of Darwin's interest in barnacles, in the research of which he was to spend eight years. Note also that it was to J. E. Gray, mentioned above (n. 3), that Darwin attributed the transfer of his interest from anatomy to the taxonomy of bar-

nacles (see Darwin, Charles, *A Monograph on the Fossil Lepadidae, or Pedunculated Cirripedes of Great Britain*, Palaeontological Society, London, 1851, p. vi).

15. Cuvier, Frédéric, "Essay on the Domestication of Mammiferous Animals, with some Introductory Considerations on the Various States in which we may Study their Actions." *Edinburgh New Philosophical Journal*, 3: 303–308, 1827; 4: 45–60 & 292–298, 1828.

16. Crawford, John, "Account of Mr. Crawford's Mission to Ava," *Edinburgh New Philosophical Journal*, 3: 359–370, 1827.

17. Kirby, *op. cit.*, Vol. 1, p. 85.

18. Whewell, William, "Address to the Geological Society, Delivered at the Anniversary, on the 16th of February, 1838, by the Rev. William Whewell, M.A., F.R.S., President of the Society," *Proceedings of the Geological Society of London*, 2: 624–649, 1838, p. 642: "The gradation in form between man and other animals, a gradation which we all recognise, and which, therefore, need not startle us because it is presented under a new aspect, is but a slight and, as appears to me, un-important feature, in looking at the great subject of man's origin."

19. Gould, John, *The Birds of Europe*, 5 vols., Taylor, London, 1837.

20. d'Orbigny, Alcide Dessalines, *Voyage dans l'Amérique Méridionale, etc.*, 9 vols., Pitois-Levrault, Paris, 1835–1847.

21. Barclay, John, *An Inquiry into the Opinions, Ancient and Modern, Concerning Life and Organization*, Bell & Bradfute, Edinburgh, 1822.

22. Blyth, Edward, "On the Psychological Distinctions between Man and all other Animals; and on the Consequent Diversity of Human Influence over the Inferior Ranks of Creation, from any Mutual and Reciprocal Influence exercised among the Latter." *Magazine of Natural History, and Journal of Zoology, Botany, Mineralogy, etc.* (2nd Series Charlesworth), London, 1: 1–9, 77–85; 131–141, 1837.

23. Lawrence, William, *Lectures on Physiology, Zoology, and the Natural History of Man, Delivered at the Royal College of Surgeons, Callow*, London, 1819.

24. Blumenbach, Johann Friedrich, *A Manual of the Elements of Natural History*, transl. from 10th German ed. by R. T. Gore, Simpkin & Marshall, London, 1825.

25. Prichard, James Cowles, *Researches into the Physical History of Mankind*, 5 vols., 3rd ed., Sherwood, London, 1836–1847.

26. Jeffrey, Lord Francis, in: *Memoirs of the Life of the Right Honourable Sir James Mackintosh*, Robert James Mackintosh, ed., 2 vols., Moxon, London, 1835.

27. Bauer, Ferdinand, in Matthew Flinders, *A Voyage to Terra Australis ... in the Years 1801, 1802 and 1803*, 2 vols., Nicol, London, 1814, Vol. 2.

28. Bell, Charles, *Essays on the Anatomy of Expression in Painting*, Longmans, London, 1806.



29. Darwin, Charles, *The Descent of Man, and Selection in Relation to Sex*, 2 vols., Murray, London, 1871, Vol. 1, p. 67: "[York Minster] related how, when his brother killed a 'wild man,' storms long raged, much rain and snow fell."

30. Home, Lord Kames Henry, *Sketches of the History of Man, Considerably Enlarged, etc.*, 4 vols., Creech, Edinburgh, 1788.

31. Mayo, 1838, *op. cit.*

32. Whewell, William, *On Astronomy and General Physics, Considered with Reference to Natural Theology: The Bridgewater Treatises on the Power Wisdom and Goodness of God as Manifested in the Creation*, Pickering, London, 1836, p. 39.

33. Malthus, *op. cit.*, Vol. 1, p. 15: "The positive checks to population are extremely various, and include every cause, whether arising from vice or misery, which in any degree contributes to shorten the natural duration of human life. Under this head, therefore, may be enumerated all unwholesome occupations, severe labor, bad nursing of children, great towns, excesses of all kinds, the whole train of common diseases and epidemics, wars, plague, and famine."

34. *Ibid.*, p. 6: "It may safely be pronounced, therefore, that the population, when unchecked, goes on doubling itself every twenty-five years, or increases in a geometric ratio."

35. Hunter, *op. cit.*, Vol. 4, p. 36.

36. Babbage, Charles, *The Ninth Bridgewater Treatise: A Fragment*, New Im-

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pression of the Second Edition, Cass, London, 1967 (Original, Murray, London, 1838), extract of letter from Sir J. Hershel to Lyell, February 20, 1836, p. 226: "You have succeeded, too, in adding dignity to a subject already grand ... where it seems impossible to venture without experiencing some degree of that mysterious awe which the sybil appeals to, in the bosom of Aeneas, on entering the confines of the shades—or what the Maid of Avenel suggests to Halbert Glendinning,

'He that on such quest would go, must know nor fear nor failing;

To coward soul or faithless heart the search were unavailing.'

Of course I allude to that mystery of mysteries, the replacement of extinct species by others."

37. Ramond de Carbonnières, Louis-Elizabeth, "On the Vegetation of High Mountains," translated by Richard Anthony Salisbury (read 2nd April, 1811), *Transactions of the Horticultural Society of London*, 1 (Appendix): 15–23, 1812.