Supplementary Information to accompany the In Retrospect article on James Hutton’s

*The Principles of Knowledge*

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It was E. B. Bailey\textsuperscript{1,2} who first described Hutton’s accounts of natural selection from the *Elements of Agriculture*. A few subsequent references to this have appeared, but most key works on the history of evolutionary thought make no mention of Bailey’s paper. Apparently, Jones\textsuperscript{3} was the first to quote from *The Principles of Knowledge*, suggesting the influence of Erasmus Darwin. Subsequently Dean\textsuperscript{4} reproduced the quote from Jones, retaining a mistake in the pagination. On looking up this quotation, I was surprised to find a long, structured account of the selection theory. A preliminary account was published in a specialist newsletter\textsuperscript{5}.

The text of Chapter 3 of Section 13 in Book 2 from *The Principles of Knowledge* is reproduced in full here, with original page numbers and page breaks indicated in square brackets. Further relevant extracts from the *Elements of Agriculture* follow.

[p. 497]

CHAP. III.

Human Wisdom Exemplified, in Man's employing the Powers of Nature for the Purpose of his Oeconomy and Pleasure.

1. IN order to illustrate the nature of human wisdom, we are now to examine the conduct of man in relation to the laws of nature; for, where man suits his conduct to those laws, he must necessarily have understood them. But, nobody will dispute that this is science, when man perceives the order of nature, that is, the laws by which things come to pass; and if, upon this knowledge, he shall so shape his conduct, as to attain the end in view, his wisdom will then appear as evidence of his science.

It will first be necessary to state some of those laws of nature, which man observes; in order to point out the wisdom of those laws, in being so well adapted to the purpose of this world. It will then be made to appear, that man has wisdom, in availing himself of the nature of things, which must have been discovered in the exercise of science or his proper understanding.
2. It is not in the works of nature, as it is in those of man; where the artist follows a pattern, and thus copies its defects as well as imitates its beauties. Nature, in continuing the species of things by generation, or preserving the excellence of the species in the continual succession of individuals, acts always on the same principle, and forms an animal or a plant of the same species, that is, the same in general, although admitting of many special varieties. For, what [497/498] is a species but many different beings, each of which have properties similar to those of all the rest, although not in equal respect. Thus, for example, that genus of being called animal, has the properties of sensation and spontaneous motion; but, though those two properties be essential to every individual being which is an animal, yet, every animal has not those properties in the same degree, or in equal proportions. The same thing holds with regard to the special as to the generic properties; each species of plant and animal has distinctive properties, which in each individual are similar, though by no means equal. Thus, there will appear to be certain properties in a species, which are not distinctive or characteristic of that species; but are distinctive of a race within that species, as the species is contained in one more general or a genus.

The essential property of a species, among living bodies, consists of this, that each individual have the capacity of breeding with the rest, in such a manner as the offspring may continue to augment the race. Great variety may be admitted among the individuals of a species, provided that they have this property; and, without this property, different individuals may resemble much, without being both of the same species. Even this essential property, in a species, may exist in various degrees; for, as two species approach in their distinctive properties, they also may be found to have in some degree the power of breeding together in a mixed race. This, however, from the experience of man, goes but a little way; and it is not certain, if ever any new species had been thus produced, or any lasting confusion thus introduced among distinct species. Whatever, therefore, may be the law of nature with regard to the production of new species, or to the preservation of a certain number which should thus be limited, we may reason concerning the special varieties in the production of things; varieties may be admitted of, without confounding species which are distinct. [498/499]

3. As originally the species, of each plant or animal, is supposed to have been perfect, so, had the individual variation of the race any particular rule, or end to which it were directed, the species would, in the course of time, or the repeated act of propagation, have
been debased in nature, or become imperfect. Whereas, if this seminal variation has no particular end in view, but only a variety which is general as it is minute, it must be evident, that the natural course of things will bring no confusion to the species, or any degradation to the nature of the subject. This may be illustrated, in the varied orbit of the earth.

This planet never moves in the same path around the sun; but, as its variations, or occasional aberrations from its original course, have no peculiar intention by which the change in general should be continued in any particular direction, the continuance of this variable aberration brings no disorder to the general end or purpose of the orbit, nor ever can transgress its principle. In like manner, when a plant or animal is produced by the propagation of the species, the individual is never precisely the same as that which had preceded it; but, while it thus varies according to contingent circumstances from the parent, it does not transgress the order observed in the species. So far, therefore, as the nature of things admits, the species may be changed in continuing the race, that so it may be always properly adapted for the purpose of its existence, in a world where varying circumstances would require a certain difference of constitution for the individuals, who have to find their sustenance amidst extreme difficulties, occasioned by a changing state in the circumstances of their life and manners.

This world, which is the habitation of plants and animals, is composed of an indefinite variety of soils as well as climates, both of which have necessarily an influence on the living being which is by [499/500] means of them sustained. There is, therefore, necessarily required, a certain constitution in the growing body, which is to be adapted to the particular situation and circumstances, in which the living being is to find its growth and nourishment. But, in every particular circumstance and situation of living beings, there must be one constitution of the animal best adapted to the purpose of that particular race; consequently, were there no varying power in propagating bodies, there would be only one situation, in which a species could be with perfect wisdom adapted to the manner of its life in every change; and, in every other situation, this species would be ill adapted, or not with perfect wisdom, to the circumstances of its being or existence in this world. But, if there be a varying power in the seminal production of organised bodies; and, if this varying power proceeds upon the changing circumstances of acting and reacting things, then, perfect wisdom may appear in the imperfectly adapted state of individuals, always
tending to change their constitutions according to the requisite conditions of their sustenance and propagation.

We are not here to indulge in the romantic fancy of a Telliamed, forming fowls of flying fish, and men of mermaids or some aquatic animal. But, so far as we find, in the different regions of the earth, considerable difference in the species of organised bodies, whether animals or plants, we may reason upon this matter of fact, in seeking for the physical cause; and also, in supposing this physical cause, we may reason in the rule of final causes, and conclude the existence of wisdom, in the adapting of those ends and means.

4. This wisdom of nature, in the seminal variation of organised bodies, is now the object of our contemplation, with a view to see that the acknowledged variation, however small a thing in general it may appear, is truly calculated for the preservation of things, in all that perfection with which they had been, in the bounty of nature, first designed. Now, this will be evident, when we consider, that if an organised body is not in the situation and circumstances best adapted to its sustenance and propagation, then, in conceiving an indefinite variety among the individuals of that species, we must be assured, that, on the one hand, those which depart most from the best adapted constitution, will be most liable to perish, while, on the other hand, those organised bodies, which most approach to the best constitution for the present circumstances, will be best adapted to continue, in preserving themselves and multiplying the individuals of their race.

Let us, for example, suppose that a race of dogs are so situated, that nothing but swiftness of foot and quickness of sight could be useful, in procuring to them the necessities of life; it must be evident, that the most defective in respect of those necessary qualities, would be the most subject to perish, and that those who employed them in greatest perfection would be best preserved, consequently, would be those who would remain, to preserve themselves, and to continue the race; and, this race would continue, in those circumstances, to preserve itself in all its perfection. But, let us change the circumstances of this race, and let us suppose, that the acuteness of his smell were more necessary to the sustenance of the animal, than the sharpness of his sight, or the swiftness of his feet, in that case, the natural tendency of the race, acting upon the same principle of seminal variation, would be to change the qualities of the animal, and to produce a race of well scented hounds, instead of those who catch their prey by swiftness.
The same principle of variation must influence every species of plant, whether growing in a forest or a meadow; The plant which is the best adapted to the climate, and the soil, will continue to prosper in the place. But, the most prosperous plant must be that which will furnish, with its maturated seed, a vigorous race of fertile plants; and, these will be more and more accommodated, in the varying power of vegetation, to the soil and circumstances in which they grow.

Now, if those organised bodies shall thus multiply, in varying continually according to the particular circumstances in which are found the necessary conditions for their life and propagation, we might expect to see, in this world, a variety in the species of things, which we might term a race; varieties which do not affect the species of things, but which, upon many occasions, might appear to us as being a different race of the same species, whether of plant or animal. But, such things are everywhere observed; consequently, we have reason to conclude, it is truly in this manner, that are naturally produced those various races of plants and animals, which we find naturally upon the surface of this earth. Each of those races of things, therefore, would appear to us to be wisely calculated, by nature, for the purpose of this world.

Here is, therefore, the wisdom of nature, observed in those general laws of action and effect, by which the continual succession of things is ordered in Almighty power. Here is the general order of things, by which the common occurrences of life, or natural phenomena, are submitted to the understanding of man, or explained to the human intellect. It is now proper to consider, how man avails himself, in his wisdom, of this natural order of things, with a view to see the excellency of this wisdom of man, as a being acting in a world where things mutually affect each other, and as a wise being, acting from that intelligence which is properly his own.

5. Man, endued with intellect and wisdom, appropriates to his use the gifts of nature, in propagating those which he finds most suitable to his purpose, and thus employing the productive power of nature to fulfil the purposes devised in that wisdom which is properly his own. In this case, where man forms to himself an end to be pursued, and seeks for means to attain those ends of his desire, it naturally occurs to employ those powers of nature in acquiring what he wants; and, finding that there is a power in nature of varying within certain limits her productions, man wisely employs this power, where he wants variety, as well as he employs the general productive power in continuing a race.
The first philosophical observation which man makes, with respect to natural operations, is, that like produces like; the propagated plant or animal is like its parent. Thus, in learning to multiply the individuals of a race, man seeks no farther than merely to continue those properties which he finds useful to his purpose. But, having still become more wise, in the improvement of his science, he observes, that the rule of reproduction is not absolutely fixed and uniform, but that it admits of small varieties, or of a gradual change. He therefore employs his ingenuity, in the breeding of individuals endued more particularly with certain qualities for which he has occasion, or he sets about improving those useful qualities which he finds naturally in the race.

Horses and dogs, cattle and sheep, are the domestic animals which man employs most variously for different purposes of his oeconomy; and, we find the ingenuity of man particularly successful, in varying the qualities of those useful animals, and in adapting to his purpose all the powers of nature in the variability of the species, or in the improvement of a particular race. He even goes farther; for, as much as nature will admit, he mixes different species, in order to procure an animal possessing properties peculiarly adapted to some purpose. It is thus that there may be found, in human art, productions which are not then properly in nature.

6. We have thus given an example of human wisdom, employing the powers of nature in the animal production; we may now illustrate this, by showing the ingenuity of man in discovering the laws of nature, and employing them successfully in propagating useful plants.

Man not only takes advantage of the seminal variation of plants, in procuring divers valuable qualities in his product, as for example, in his apples, his potatoes, &c. He also takes advantage of the casual imperfections of the vegetable production, when this suits his purpose. Such is the case with the breadfruit tree; this vegetable production is imperfect in its kind, although the imperfection of this natural production fits it peculiarly or in high perfection for the use of man. But, without the ingenuity of man, the valuable properties of this fruit, which had occurred in the occasional variety of the vegetating power, would have most certainly been lost; for, the very property which makes this casual production valuable, is the unnatural or accidental barrenness of this fruit.
Man thus improves the natural qualities of things, for his particular purpose. But, it is no less valuable to him, the preservation of those agreeable qualities of objects, which, in the variable productions of nature, he had acquired, whether by accident, or by industry and ingenuity of his art. Accordingly, in studying nature, he finds the means of thus obtaining his desire. As much as there is, in the propagation of plants by seed, a source of variation for the qualities of things, so much, on the contrary, is there, in the propagation of the plant by buds, an invariable sameness in the production. Hence that valuable source of preservation and propagation [504/505] of choice qualities among plants, which, in the art of grafting, &c. the ingenuity of man has procured to his table, and even for his mechanic purposes.

Thus every improvement of the individual, enlightened with the science which is proper to his species, is communicated to the species to whom he was indebted for his education or his knowledge; and thus, the civil state of human society is enriched with the fruits of that scientific art, which nothing but the social commerce of the species could have produced in the world.

7. The ingenuity and art of man is boundless; nothing can happen in nature that he may not notice; and nothing can be the subject of his observation that may not, in his science, be employed for some valuable purpose. Who would have thought, that his study of a fly should have contributed to the cultivation of his fruit? By the ingenuity of man, the destructive influence of pernicious insects may surely be prevented upon many occasions; but, to employ an insect for the spinning of his thread, and for the ameliorating of his fruit, even when he is ignorant of how that insect operates for his purpose, is an example of the acuteness of the human genius, in observing nature, and reasoning from effect to cause, which perhaps has not its equal. Such an example we have in the practice of caprification.

8. Thus man employs the powers of nature for his purpose. He must have a purpose of his own, in having found a design; and, he must know the powers of nature, in having studied her general laws. Now, this is being a philosopher, so far as natural history is a subject to be properly distinguished. This may be illustrated in an example. [505/506]

The laws of nature in the propagation of light, and in the sense of colour, equally conduct the steps of the animal and the man. But, when man scientifically forms the design of guiding his bewildered steps, and studies the laws of nature in order to find means to
correct his wanderings, he then employs the powers of nature for his proper purpose; and, he sees the nature of his proper powers, when he knows the means by which he is enabled, e.g. to circumnavigate the globe.

9. Man is not satisfied with knowing the most distant objects of the heavens, by means of light, the path of which, through bodies, he has the power to direct according to his purpose, and for the improvement of his sight; he also has conceived the means of measuring the velocity of this fleeting element, as well as to calculate the rules observed in the various affectations of its different species. But, what could all the knowledge of mankind profit the animal, who pursues the purpose of his life in perfect wisdom, and who cannot form, like a man, a purpose in reflecting on his knowledge! And what limits can be set to this wisdom of man, (who has the power to improve his understanding), except the adverse circumstances of his animal situation, and the casual imperfection of his science!

The Elements of Agriculture is an unpublished work of 1,045 pages in two bound handwritten volumes held in the National Library of Scotland, Edinburgh and owned by the Royal Society of Edinburgh. The manuscript was nearly finished at the time of Hutton's death in 1797, but was almost certainly never published. It is written in the hand of a publisher’s amanuensis, and is annotated with corrections and additions in Hutton's hand. The pages are watermarked with their year of production; the dates range from 1794 to 1797. Most of the relevant material is on paper dated 1794, the year in which The Principles of Knowledge was published, suggesting that Hutton’s ideas on selection and variation were the initial focus of the book. Selected extracts that are relevant to the subjects of variation and selection in nature and in agriculture are reproduced here with commentary.

Two sections of the manuscript are not integrated into the general plan or structure, namely “Section 1st, Of the general principles by which the reproduction of animals is conducted, with application to Husbandry of Britain”, and “Section 2, Of sheep as a subject of the Breeding art”. These passages are bound in at the start of the second volume. Both are written on pages watermarked 1794, and are numbered in pencil, the numbering scheme duplicating a second, ink numbering, that applies to the rest of the manuscript. The remainder of the manuscript is watermarked between 1794 and 1797. It seems probable that these sections were written first, before the final chapter plan was established.

The selection principle is articulated most fully in the first of these extraneous sections. It begins with a general statement about variety in domestic animals:
“When we examine with attention the domestic animals that we breed we find, in each species, certain varieties among the individuals; each species is then to be distinguished by consisting of different races; and in each of these races, we may still perceive varieties among the individuals, all of which have not the precise same form or qualities” (p. 733)

The selection idea is then presented as the second of two explanations as to the origins of variety in nature, the first being that they had been originally created as we find them. Hutton clearly prefers the second explanation:

“…On the other hand, let us suppose only one form originally in a species; and that there had been established in the constitution of the animal, a general law or rule of seminal variation, by which the form of the animal should constantly be changing, more or less, by the influence of external causes, but not with any particular attention. We should thus find varieties in the forms of a species, propagating for a long course of time under the influence of different circumstances, or in different situations; and we should in this see a beautiful contrivance for preserving the perfection of the animal form, in the variety of species. The form of the animal [738/739] would thus always be adapting itself to the instinctive arts with which the species had been induced; and the oeconomy of this animal would always appear to be in perfect wisdom.

To see this beautiful system of animal life (which is also applicable to vegetables) we are to consider, what in the indefinite variation of the breed the form best adapted to the exercise of those instinctive arts, by which the species is to live, will be most certainly continued in the propagation of this animal, and will be always tending more and more to perfect itself by the natural variation which is continually taking place. Thus, for example where dogs are to live by the swiftness of their feet and the sharpness of their sight, the form best adapted to that end will be the most certain of remaining, while those forms that are least adapted to this manner of chase will be the first to [739/740] perish; and the same
will hold with regard to all other forms and faculties of the species, by which the
instinctive arts of procuring its means of subsistence may be pursued.

But now which ever of those two suppositions is the truth or if both should be
actually in nature the practice of our art, for obtaining those variations in perfection, will
be the same. For, in all cases, we must proceed by selecting from among the race those
forms which are to be continued in the propagation, and which are to be improved by
constantly breeding from the most finished of those forms. Here then is the first great
principle in the breeding art, by which a particular race in a species may be preserved, and
that race made continually more and more perfect by a constant attention to the proper
selection of the individuals which are to propagate."

Later on (p. 744), he recapitulates:

“The first or great principle of the breeding art is this, that animals as well as plants,
propagate their like. But in the refined practice of that art, the principle on which we are
to proceed is this, that in the propagation of species there are seminal varieties,—
varieties that may be useful in our oeconomy, and that may be directed in the propagation
by the skilful application of the art. Hence nice distinction is required, in the artist, first to
perceive those useful qualities that may occasionally appear, in the extensive breeding of a
species; secondly to see the value of a nascent quality, which otherwise might be
overlooked or neglected; and lastly to understand the ultimate perfection of that quality or
the extent to which it may be carried in the successive propagation, according to art, of
this distinguished variety in a particular race of a species. It is thus that intelligence directs
[744/745] the art for valuable purposes; and that by the application of a single person, a
valuable acquisition may be made in the practice of a country, of which we have seen a
late example,—an example which I hope will be pursued thro every branch of seminal
propagation. Mr Bakewell has opened the eyes of his country men with regard to the
value of this art; and by the successful application of his genius he has benefited his
country more than if he had added to this kingdom tributary provinces.”
After a discussion of hybridization, Hutton considers the sheep, the cow, and the horse:

“Each of these have [sic] their varieties, which differ in size, in figure, and in certain faculties that may prove useful in our economy. In breeding these animals therefore, the intelligent husbandman should have always something in his view which he is to perfect or improve; if this be conducted with skill it will certainly succeed, and this changing race be gradually made more perfect for the purpose of which it is intended; if on the contrary the propagation of these animals is employed without intelligent design, instead of improving his valuable stock, the husbandman may find his race degenerate from that perfection of its purpose to which the seminal variety of the species had carried it” (p. 752)

In Section 2 (“Of sheep as a subject of the Breeding art”) Hutton repeats some of these principles, specifically to argue that it is possible to obtain good meat and good wool in a single animal by hybridizing breeds with those features and then selecting (he was writing in a period when Robert Bakewell was breeding sheep with carcass quality the principal aim, whereas Lincolnshire breeders were working single-mindedly for fleece weight).

“...we have every reason to believe [sic] that, in proceeding upon the principles of this enlightened art, there is hardly a limit to be set to this improvement in the breeding business.” [p. 753]

“The great principle of the breeding art, viz. that animals beget their like with some little variation, is equally extended to the one of those objects as the other [meat and wool]; and we have every reason to believe that these two qualities, fine wool and a profitable carcase, are far from being incompatible.” [p. 758–9]

“...having thus associated in one race two things which we had found separate in nature we have then only to select, with nice distinction and professional skill, from that new
race, those individuals which are to continue progressively to improve the breed.” [p. 759–760]

Within the main body of the work, there are two further chapters of special interest, namely Part 4, Chapter 1 "Of the causes of variation and degeneracy of seed" and Part 4, Chapter 2 "Botanical and chymical Philosophy of vegetable reproduction and seminal variation". Both chapters are also watermarked 1794. After remarking how plants, “in propagating their kind admit of species varieties” (p. 316) and that it is “the object of agriculture to propagate plants most useful to the purpose of man” (p. 316), Hutton admonishes botanists for not making much progress in understanding the causes of variation, but praises the discovery of plant sexuality.

“I am sorry to observe how little our botanical philosophers have advanced in this part of science. Occupied with the necessary business of distinguishing and describing plants, they seem only hitherto to be preparing the way for this useful part, in which the variations of plants will be the subject of investigation. They have but little penetrated into the laws of vegetable oeconomy, altho this is a tract in which observation is most pleasant, if not easy to be pursued.

The sexual system of plants surely opened up a great field for this discovery; neither have experiments been wanting to show that in the fructification of vegetable bodies, the race is changed by the admission of a different species of male. But this Hebrid [sic] race proceeds not in the propagation of the compound species by seed, no more at least than in the animal oeconomy. We are therefore still left in the dark or reduced to the vague reasoning of analogy and conjecture, in filling up that part of natural history, — the variety of species.” [p. 316–317]

He articulates a similar “species concept” to that given in The Principles of Knowledge:

“... let us consider what it is which constitutes a species. It is only a certain degree of likeness; and that which forms the distinction of species, is a certain degree of unlikeness.
But, between those two extremes which are distinct, there is a considerable latitude in which, from inspection, the case is altogether indeterminate or doubtful. Here for example we have things extremely unlike, which however propagate; and here again, things considerably like which do not continue to preserve a race by propagation. Hence naturalists have been led to lay down this general rule, that those bodies only are of one species, which can propagate; and that those are of different species, which cannot propagate, in continuing that breed” [p. 317–318].

Hutton shows, by way of anecdote, how varieties can not necessarily be considered absolutely good or bad, but rather their usefulness depends on the conditions in which they are cultivated (see also refs. 1,2):

“In conversing with a very intelligent brewer in this City, I found he had a kind of barley from Norfolk which he commended much, altho' he had barley of a large size from East Lothian; but this Norfolk barley was a beautiful grain, and malted very kindly. I begged to have a boll of that barley, which I then sent out to my farm in Berwickshire. I there multiplied it, and it prospered very well. The farmers of the neighbourhood admired the grain, and some of them wished to grow it. Accordingly they sowed it, and it grew to their wish. But they soon found out that, for their use it had a material defect or vice; this was in being tender to the wind, in its green state, and shaky after it was ripe, that is the grain coming easily from the ear. I was afterwards telling this in Norfolk to my friends, who laughed at our considering that a fault, in the corn, which they esteemed an advantage, it being more easily threshed. But that which is a virtue for the sheltered lands of England, may be a serious vice in the corn for the open fields of Scotland situated in a windy region.” [p. 331–332]

As in the *Investigation* and the above quoted discussion of animal breeding, Hutton stresses that variation arises as a natural consequence of reproduction:
‘The principle on which depends the doctrine of seed, is this, That plants in growing, propagate their like. Were plants not to propagate their like that is bodies similar to themselves, there could be no science in the subject of vegetation; the natural history of plants would be an uninteresting list of disjointed particulars, which could have no effect in the generalization of our knowledge.

Were plants, again always to propagate bodies in all respects always the same as themselves, we could have no varieties in plants of the same species. But we have great varieties in plants of the same species; Consequently this conclusion must be admitted, that the plants propagate their species, the race may deviate in some measure from the parent. That is to say, plants, in propagating their kind admit of special varieties.” [p. 315–316]

The spontaneous origin of new varieties is exemplified in another anecdote (also reproduced in refs. 1,2)

‘The following story, independent of its pertinence to the subject in hand, is worth repeating, it is taken from the grand Collection upon agriculture, printed at the Palace 1743.

‘I was walking along’, says the Emperor Hang-Hi, ‘the first days of the sixth moon, in the fields where they had sown rice, which ought not to have been reaped until the ninth; I remarked by chance a stalk of rice which was already in ear, stood above all the rest, and was sufficiently ripe to be gathered. I made it brought to me. The grain of it was very beautiful and well filled. This made me think of preserving it for an assay and to see if it would preserve its earliness the next year. It did preserve it in effect. All the stalks that came from it came into ear before the ordinary time and were gathered at the sixth moon. Every year, since, has multiplied the produce of the preceding harvest; and, these thirty years, it is the rice which has been served upon my table. The grain is long and the colour a little red; but it has a very good flavour and is of an agreeable taste. It is called the Imperial rice, yu-mi, because it was in my garden that it began to be cultivated. It is the
only rice that can be ripened to the north of the Granit Wall, where the frosts finish late and begin early, but in the Provinces of the south, where the climate is more gentle and the earth more fertile, they may easily have two crops of it in the year; and this is a pleasant consolation for me to have procured this advantage for my dear husbandmen.”

Interestingly, Hutton suggested that the degree of seminal variation in some species is greater than in others, and that some plants are not subject to it (although this was “a distinction, however inaccurate, or only in degree”). He cites corn and grass as not subject to much seminal variation, and apples and potatoes in particular as subject to substantial variety “to which we cannot set a limit” (p. 327)

In Section 2 (“of Reproduction by the Seed”), Hutton maintains that seminal variation only occurs in sexual reproduction.

“We are now to observe that there are two kinds of reproduction for continuing the race of every plant that lives. These are the reproduction of continuation, and that of procreation... Here in the reproduction of continuation by which from many parts of the root and stems compleat plants may be produced, similar in every respect to those from which they had proceeded ... It is in this manner also that certain species of animals are reproduced, not by generation or the intercourse of the different sexes, but by the continuation of the living animal, and the division of those bodies by which they may be multiplied.” [p. 395]

Hutton regarded reproduction by continuation as a device for permitting useful plant varieties, once they had been developed, to be maintained indefinitely. The following discussion also hints at a distinction between heritable (genetic) and non-heritable (ecophenotypic) variation:

“I[n] multiplying plants by the reproduction of continuation; that is, by propagating from the bud or branch we have no farther variety that that may be considered as only more or less and as depending upon the more or less nutritious sap from the soil or from the
various administration of the different meteorological influences of the climate...We may thus propagate any particular race of a family or any variety of a race, the same or at least indistinguishably similar so far as we know without end.” [p. 398]

Other passages relate to experiments that Hutton carried out. Although he does not explicitly make the point, the implication appears to argue against the inheritance of acquired characteristics:

“I have made experiments in order to see this beautiful contrivance; [i.e. that plants invest in reproduction ahead of luxuriant vegetation] and with pleasure I have often observed, that in wheat, in barley, and in pease, by diminishing the fertility of the soil, I have had a single stalk of very little length; upon this stalk there grew a single ear or pod, and in that ear there was contained a single grain. But here, the simple reproduction was compleat; the grain was perfect, and fit to produce the most luxuriant vegetation, and to give the greatest multiplicity.” [p. 403–404]

References


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