

Morton (S. G.)
LETTER

TO THE

REV. JOHN BACHMAN, D. D.,

ON THE QUESTION OF

HYBRIDITY IN ANIMALS,

CONSIDERED IN REFERENCE TO

THE UNITY OF THE HUMAN SPECIES.

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LETTER TO DR. BACHMAN.

PHILADELPHIA, MARCH 30, 1850.

Dear Sir :—Having read your review of my “Essay on Hybridity,” in the last number of this Journal, I feel called upon to offer some observations in reply ; and I take this step with the more pleasure, because it does not appear to me that you have refuted any one of my *six propositions*. On the contrary, the perusal of your criticism only confirms me in them all.

Permit me to commence, by saying that I fully reciprocate the kind sentiments you have expressed with respect to myself ; for no difference of opinion can diminish my esteem for you as a man, or lessen my admiration for one who, by common consent, stands in the front rank of American Zoology. Yet, I cannot suppress my surprise that you should reject all my authorities, because they conflict with your own views ; for if such men as Buffon, Temminck, Hamilton Smith, and others whom I have cited, are not to be believed in questions of science, then I confess we may as well reject all human testimony at once, and rely, for the future, solely on our own observation ; which, like the others, and by the same rule, will in turn be denied and discarded by those who follow us.

I cannot concur in your strictures on Hamilton Smith. I see in him a man who has grown gray in the pursuit of Science. He has attained his honors, and is deserving of the gratitude of the present age and of posterity. In fact, in the philosophy of Natural History, he appears to me to be a century in advance of most of his contemporaries. If one who has accomplished so much has committed some errors of judgment, let us be gentle in our censure. Let us review our own works and see if we have done better. For my own part, I must confess to various errors both of fact and opinion ; and these things have made me more circumspect in myself and more charitable to others.

And here it is necessary for me to correct an impression of yours with respect to a passage of De Azzara, quoted in my essay. You have not been able to find it in the French edition ; but in Hunter's translation, London, 1838, page 173, after some preliminary observations, you will see the following paragraph, which is the one from which mine was abridged :

“ I have heard that on the plains, my black cat, the *yaguarundi* and the *eyra*, all unite with the domestic cat. From this connection crossed breeds will necessarily result ; and if, in the course of time, these countries should become populous, and these wild-cats, as would infallibly be the case, should be extirpated, could it then, with any propriety, be affirmed that all the domestic races proceeded from one species which had remained wild, as the naturalists of the old world maintain ?”

I cite this passage entire for several reasons : 1st. To show that it *does* exist in De Azzara ; 2d. Because it proves him an advocate for the principle of fertile hybridity ; and 3d. Because it appears that I had attached too much importance to the statement, inasmuch as the great naturalist does not record the facts from his personal knowledge, but merely on the information of others, who may possibly have been mistaken.

I consider my statement respecting hybrids of the sheep and goat, to be a perfectly authenticated fact ; nor do I think you justified in the following expressions : “ The *Journal des Savants*, in which these *crudities* are published, has not reached us ; and as the author states that in order to keep up the breed they must resort to the original stock, and thus nature prevents the creation of a new race, it is unnecessary for us to hunt up and comment on the authority.” In what respect the facts of M. Chevreul are *crudities*, I cannot see ; and if you were to *hunt up* the authority, I think you would find the statement precisely as I have given it. I am the more astonished at your summary disposal of M. Chevreul's facts, inasmuch as similar statements have been on record for a century, and are fully admitted by Buffon ; and if you will turn to Cuvier's description of the genus *Ovis*, you will find him remark, in reference to the sheep and the goat, “ the two produce a prolific offspring ;” and for this very reason, as would appear, he considers them to be but slightly entitled to a generic separation. Did it never occur to you, when you journeyed ten miles of your road to see “ a large ram with a hairy fleece and rather strait horns,” that the animal was a cross-breed of the very kind of which we have just spoken ?

There are some questions in science that must always remain a mat-

ter of opinion; and among these is the origin of the domestic sheep; some referring all its varieties to the *Argali*, (*Ovis ammon*), others to the *Moufflon*, (*Ovis musmon*;) and the great Cuvier seems not to have made up his opinion on this point; for he says, "*it is supposed that from the Moufflon, or from the Argali, are derived the innumerable races of our woolly animals.*" You remark, that "it remains for our opponents to prove that our different varieties of sheep have been derived from commingled species." Permit me to say that I believe it equally difficult to prove the converse of this proposition; for even those naturalists who consider them all as the descendants of one species, refer us to at least two distinct species for the origin of the race.

I stand corrected with respect to the *Capra ægagrus*, which is by general consent admitted to be the source of the common goat; but look into Cuvier, genus *CAPRA*, and you will there observe that he describes two very distinct species, the *C. ibex* and *C. caucasica*; and he concludes his remarks in these words: "The two species mix with the domestic goat." He further states, in some preceding remarks, that "there is a race of goats in upper Egypt, with short hair, convex chauf-rin, and projecting lower jaw, which possibly is hybrid." In these examples Cuvier sustains Hamilton Smith.

Your remarks upon the hybrid between the Finland ram and Sardinian doe, are of the dogmatical class; and so also those respecting the *Camels*. The best Zoologists, with Cuvier at the head of them, divide the camels into *two species*. This authority is sufficient for me, and I have always adopted it. Buffon and others, you remark, have regarded them "only as varieties of the same species." I will give you the reason of Buffon's opinion. He maintained the postulate of Ray,— "any two animals that can procreate together, and whose issue can procreate, are specifically the same." Now, since the two camels produce, *inter se*, a mixed offspring, he for that reason and for that alone, referred them to the same species. The following are his words, which I translate as literally as possible:

"The two kinds of Camel produce together, and the individuals derived from this cross possess more vigor than the original stocks, and are consequently more highly valued than the others. These hybrids, the issue of the dromedary and the camel, constitute a *secondary race* which is equally prolific, (qui se multiplie pareillement) and mixes with the primitive races."*

Buffon was a most industrious and at the same time a very cautious, and I may add, conscientious collector of facts; but like other men of

* Buffon, Hist. Naturelle: ed. Sonnini, T. xxix, v. 5, 8.

genius, he sometimes erred in opinion for the sake of hypothesis; and the justice of this remark may be shown by a single example. The great naturalist absolutely classed all the ox-tribe into one species because they were capable of re-producing among themselves a hybrid offspring that could perpetuate itself by union with the parent stocks! And in this category he includes the domestic cattle, the ox of Europe, that of Asia and Africa, the Bison of America, the auroch and the zebu!* So completely was Buffon blinded by this hypothesis, that it led him into errors of judgment in which he is not sustained by a single zoologist of the present day.

In another place you take exception to my remark that the fecundity of the progeny of the horse and the ass "depends much on temperature," and you add a doubt whether these phenomena occur more frequently in hot than in cold climates. Mules have been most fertile in St. Domingo, Spain, Italy and New Holland. "Ces faits, qui me paraissent bien constatés, nous demontrent que, *dans les climats chauds*, la mule peut non seulement concevoir, mais perfectionner et porter à terme son fruit."†

While on this subject I may add the remarkable fact, that in the city of Valencia, in Spain, a horse and she mule produced colts on five different occasions; and the same mule subsequently bore another colt by another horse.‡

I regret to observe that when I quote Prof. Owen for the fact of a mule between a bull and a sheep,§ you quote the adverse opinion of that distinguished man on the question of fertile hybridity, just as if such an opinion would do away with the fact which he had himself recorded. In the passage quoted from Prof. Owen he observes that "*the individuals of different species do not voluntarily copulate.*"

This statement only goes to prove the correctness of the proverbial saying that a man cannot be equally great in every thing; for while naturalists,

* Opus citat. Tome xxix, p. 120, 124, 137, 153.

† Buffon, *ut supra* T. xxii, p. 421. For the fact of the prolific character of the mule in New Holland, see also Trans. of Entomolog Soc. of London, I, p. 267.

‡ Buffon, *op. citat.* T. xxix, p. 577.

§ Dr. Shaw, in his travels in Algiers, states that he saw the hybrid offspring of an ass and a cow. He describes it as a small animal, with the head and tail of the cow, but with a solid foot like the ass, and destitute of horns. This cross is called by the French *jumar*, and is said to have repeatedly occurred in Southern France. Another hybrid bearing the same name is declared to have been more than once derived from the bull and she ass.—Sonini, in Buffon, xxii. p. 449.

by common consent, admit Professor Owen to be the lineal heir of the mantle of Cuvier, it is also manifest that some persons have enquired into the present subject more deeply than that eminent naturalist has done. Independently of the evidence derived from the family of birds (which will be stated hereafter) that different species of animals *do* voluntarily unite even in the wild state, I will now give some examples from the mammiferous class.

Sir W. Jardine, speaking of the domestic cat, has the following paragraph :

“ We have no doubt that since its (the Egyptian cat’s) introduction into Great Britain and more particularly to the north of Scotland, there has been occasional crossing with our own native species, and that the results of these crosses have been kept in our houses. We have seen many cats closely resembling the wild cat, and one or two that were very tame, which could scarcely be distinguished from it.”*

Bewick also observes, that the wild cat of Europe (*Felis cattus*) is said not unfrequently to cross with the common cat, which last rears a family; and he adds, that this explains the not unusual resemblance of the tame to the wild species.† Nor does it seem that these hybrids are any less prolific than the parent stocks.

Cuvier himself suggests that the *Bos frontalis* of Lambert, a domestic breed of cattle in the north-west of India, may be descended from a union of the buffalo (*Bos bubalus*) the indigenus animal of that country, and the common species.‡ Thus Cuvier suspects the *Bos frontalis*, now so numerous in Hindostan, to be a prolific hybrid; and it may be relevantly added that the same great naturalist records his suspicion that the singular varieties of the domestic pigeon are derived not solely from one species, the *columba livia*, but that they have arisen from the union of that species with another but unknown bird of the same genus.

Buffon states that in Champagne, in the year 1776, eight young wolves were found, which were satisfactorily traced to the parentage of a common dog and she wolf. They were all killed wild in the forest, while young; thus preventing any chance of their re-producing among themselves. A wild cross was also found near Metz, in the year 1784; and another in Normandy ten years earlier.§

The ancients averred, without hesitation, that the dog, in some coun-

* Naturalist’s Library, vol. ii, p. 243. *Felinæ*.

† Quadrupeds, p. 228.

‡ Animal Kingdom, I. p. 201.

§ Buffon op. citat. xxxii, p. 231, 329, 333.

tries and under some circumstances, was accustomed to breed with the wolf and fox. "In Cyrenensi agro," says Aristotle, "lupi cum canibus coeunt; et laconici canes ex vulpe et cane generantur."*

These and many other examples quoted by Buffon and Sonnini, establish two propositions: 1st. *That certain different species of animals copulate voluntarily with each other; and 2d. That new races have been formed by the union of such species.*

Some remarkable confirmations of these principles will be adduced hereafter, when adverting to the *bird-hybrids*.

In the next place, I observe with surprise that your review of my essay extends no farther than the mammiferous class. Why were not the birds examined also? For here the evidence is even stronger, and I presume will not and cannot be set aside by any argument whatever.

You admit that "in two or three species a progeny has been produced, where the hybrids were fertile for a few generations, and then became sterile." And at the close of your inquiry you exclaim of your opponents—"have they gone farther than merely to indulge in speculation and conjectures, and in endeavoring to throw the shadows of doubt on opinions long entertained by the world of naturalists?" These remarks appear to me to be incompatible with each other; and in order to prove it, and at the same time to bring forward some facts obtained since my essay was published, I propose, in the next place, to state and defend each of my six propositions as originally announced.

1. *A latent power of hybridity exists in many animals in the wild state, in which state, also, hybrids are sometimes produced.*

By a *latent power of hybridity in the wild state*, I mean a power that seems only to be evolved by domestication. For example, the several species of *Hocos*, (genus *Crax*) unite freely with each other in Holland; and yet there is no proof that they do so in their native forests of South America. And I believe the same remark holds good with respect to the common fowl; yet Temminck has shown that no less than five species of this genus (*Gallus*) produce freely with each other in the domesticated state.†

That some animals, in a *wild state*, intermix with each other and produce a hybrid offspring, is now admitted by every candid observer. I have heretofore recorded abundant evidence under this head, nor does it

* *De Animalibus*, lib. viii., 28.

† *Gallus bankiva*, *G. giganteus*, *G. morio*, *G. crispus* and *G. furcatus*. He adds that *G. lanatus* produces with the others a sterile progeny.—*Pigeons et Gallinaces*, II., p. 275, 276.

seem necessary to add to it. Some further examples, however, may not be inappropriate on the present occasion.

You yourself inform me that you have in your possession the mounted skins of two hybrid hares, between the American gray rabbit, *Lepus sylvaticus*, and the marsh hare, *Lepus palustris*. In an obliging letter to me, you make the following remark: "At the time of finding these animals, I supposed they would prove to belong to an undescribed species; but I am now quite sure that they are the hybrid product of the above named hares." I believe this is one of the first fully authenticated examples of hybridity in the *wild state* that has been noticed on our continent, and I have great pleasure in referring to you for the fact.

The species of *Birds* are so vastly more numerous than those of quadrupeds, that it is among these that we should expect a corresponding frequency of hybrid productions. In addition to the extended series embraced in my Essay, I now submit the following additional examples all of which occur in the *wild state*.

The *Tetrao urogallus*, or wood-grouse, breeds with the black-grouse, *Tetrix*, and the hybrids are called in Sweden *Racklehanen*. It is, indeed, so common in that country and in Norway, that among a single lot of grouse brought thence to London for sale, Mr. Yarrell detected no less than seven of these hybrids. It was long regarded by naturalists as a distinct species under the name of *Tetrao medius*,* but it is now pretty generally admitted to be a mule bird. I have examined two of them in the *Wilson Collection*, in the Academy of Natural Sciences of Philadelphia; and similar examples are common in all ornithological cabinets.

The celebrated Temminck, however, considers the *Tetrao medius* a true species independently of its exterior characteristics: first, because it is produced in the wild state, and secondly, because the forests of northern Europe, in which it is found, are equally peopled by both the species of which this bird is the supposed hybrid. But these objections are no longer availing; for the concurrent testimony of all the later ornithologists proves this bird to be a mixture of two species, and confirms the opinion of Linnæus, published a century ago and expressed in his name of *Tetrao hybridus*. It would be difficult to prove that these cross breeds are prolific *inter se*, but that they are so with the parent stock may be safely inferred from the many grades of intermediate plumage; and it is a curious fact that Klein, in his *ova avium*,

* Pigeons et Gallinaces, iii, 131.

(Leipsic, 1766,) has figured what is supposed to be the egg of this bird, because its markings are made up of those of both original species.

The following species also produce hybrids in the *wild state*: the Black grouse, *Tetrao tetrix*, with the English pheasant,* the *T. tetrix* with the *T. subalpina*,† and the *T. urogallus* with the *T. scoticus*.

The *hooded crow* pairs and produces with the *carrion crow*,‡ and the same is true of the two species of *circus*, commonly called harriers.§

So much for my first proposition. I now proceed to the second:

2. *Hybridity not only exists among different species, but among different genera, and the cross-breeds have been prolific in both cases.*

In support of the first part of this proposition, that animals of different species are capable of producing prolific hybrids, I shall now add the celebrated experiments of Buffon, which were omitted from my Essay for the simple reason that I could not, at the time of writing it, obtain an authentic account of them.

1. Buffon brought together a cur-dog and a she-wolf, and the result of this union was a litter of four pups, two male and two female. No difficulty occurred in procuring this cross.

2. A male and female of the first generation were coupled, and four pups were born, of which two lived to maturity—a male and a female.

3. This second generation crossed, and produced a generation of seven pups.

4. A female of the third generation was crossed by her sire, and four pups were produced, of which a male and a female lived.||

With these facts the history ceases; not from any difficulty, it would seem, between the animals themselves, but on account of the constant care requisite to prevent the union of the common dog with these hybrids, so that the experiment became fatiguing after its continuance for several years, and it was discontinued on that account. It thus appears that the dog and wolf bred *inter se* through three generations; nor was either one of the parent animals permitted to unite with the pure hybrid until the fourth generation.

The young animals, says Buffon, both in number and strength of constitution, compared well with other dogs—for those that did not attain to adult age were mostly killed by some accident, and not by

* Yarrell. *British Birds*, pp. 307-312.

† Nilsson. *Ornithologia Suecica*, p. 303.

‡ Proceedings of the Zoological Society of London, 1836.

§ Yarrell. *Ut Supra*, ii., p. 87.

|| Buffon. *Ut supra*, xxii., p. 257-320.

disease. Nor is there any circumstance connected with these experiments to cause a doubt that, had it been continued with equal care, and on an enlarged scale, these hybrids would have multiplied to an indefinite extent.

But does it not occur to you that this experiment, with all its precautionary attendants, was a faulty one? And why? Because it was on *too small a scale* to afford a fair chance of complete success. We may readily conceive that the result would have been far more satisfactory, if the offspring of several couples of the dog and wolf had been obtained and allowed to mix with each other.

How comes it, then, you will inquire, that there is no new race derived from the dog and wolf, or the dog and fox? I answer, because they are not wanted. Wolves and foxes are destroyed without mercy; and such also has been the fate, as we have already shown, of those animals which have accidentally resulted from their mixture with the common dog. The experiment has never been tried except from mere curiosity; and its success has been complete when we consider the disadvantages by which it was surrounded; for the mere process of breeding *in and in*, from the progeny of a single pair of any animal, has by uniform experience tended to deterioration and extinction. On this point I purpose to make some remarks in the sequel.

I presume that the facts just mentioned, together with those cited in my Essay from both quadrupeds and birds, are sufficient to establish, beyond cavil, the simple fact—that animals of *different species* are capable of producing a fertile hybrid offspring.

Now for the second part of my first proposition—that animals belonging to *different genera* do also unite with like results. I consider myself sufficiently sustained in this instance by the facts already adduced with respect to the sheep and the goat. I have the testimony of Buffon, Cuvier and Chevreul that the progeny is fertile; nor does any one of these authorities state that the hybrids will not reproduce *inter se*; and M. Chevreul notices the necessity of admitting one of the parent animals merely for the purpose of obtaining a finer fleece.

I do not abandon the asserted fertile hybrids between the Marten, *Mustela martes*, and the common cat. I am willing with yourself to receive the statement *with caution*; but the details are too explicit to permit us to deny them without further investigation.

The only example of this class of hybrids that has occurred in my readings since my Essay was published, is that of the *Thrush*, (*Merula vulgaris*) and *Blackbird*, (*Turdus merula*), which have been observed to

pair in England, and to produce strongly marked hybrids during two successive years.*

3. *Domestication does not cause this faculty, but merely evolves it.*

This is a self-evident proposition, as the preceding facts amply testify; and my reasons for bringing it forward were to show, that what Temminck and Prichard have termed the *natural repugnance* of different species to intermingle, has many exceptions; and further, that Dr. Prichard is not correct when he assumes the law of the case to be that this repugnance is "overcome *in the state of domestication*, in which the natural propensities cease, in a great measure, to direct their actions." This is one of the several postulates respecting hybridity, that must now be abandoned; for the evidence I have given is conclusive against it.

4. *The capacity for fertile hybridity, ceteris paribus, exists in animals in proportion to their aptitude for domesticity and cultivation.*

This proposition, like the preceding one, is an obvious truth, requiring no further elucidation; and man, in the language of Blumenbach, being the most perfect of animals, this faculty is perhaps the most perfectly evolved in him. I reserve some remarks on this subject for the sequel.

5. *Since various different species of animals are capable of producing together a prolific hybrid offspring, hybridity ceases to be a test of specific affiliation.*

This proposition is certainly borne out by the facts above stated, and by those of my Essay. I do not deny that the *general law* of Nature is opposed to the remoter degrees of hybridity; but the exceptions are so remarkable, even with regard to these, that they invalidate the rule.

6. *Consequently, the mere fact that the several races of Mankind produce with each other a more or less fertile progeny, constitutes, in itself, no proof of the unity of the human species.*

Your strictures do not show me the necessity of relinquishing, or even of modifying, any one of these propositions; but there are some differences of opinion between us, and I next proceed, as briefly as possible, to examine them; not with a view to criticise the belief of others, but merely to state my own convictions on a subject which has occupied no small share of inquiry and reflection.

Hybridity is divisible into four degrees or grades, which may be explained in the following manner.

The first degree is that in which the hybrids never re-produce; in

* Barry, in Mag. of Nat. Hist. vol. viii., quoted by Mr. Yarrell.

other words, the mixed progeny begins and ends with the first cross. A large proportion of the known mixed breeds belong to this class, and they embrace animals of entirely different genera. Several of them have been indicated in the foregoing pages ; and for some curious information on this head, the reader is referred to the researches of M. Selys-Longchamps, who has recorded authenticated examples of hybrids of twenty-four crosses between different species of swan, goose and duck, all of which proved sterile excepting those between *Anser cygnoides* and *A. cinereus*, *Cygnus olor* and *C. mutabilis*, and *Anas boschas* and *A. acuta*.* Indeed, nearly all domesticated birds, however different in generic relations, are capable of producing a mule offspring by mingling with each other.

The second degree of hybridity is that in which the hybrids, whether generic or specific, are incapable of re-producing *inter se*, but multiply, to any extent, by uniting the hybrid with a full-blood animal of either of the parent stocks. The American bison, *Bos Americanus*, reproduces in this way with the common breed of cattle, as you have fully shown ; and Kalm, the Swedish traveller, states that these animals mixed with each other independently of the influence of domestication.

The same remark is true with respect to all the known species of the genus *Bos*, whether in Asia, Africa or America ; and this second remove from the original stock, is capable, so far as my knowledge goes, of breeding *inter se* and without limit, provided a sufficient number of hybrids of the same grade are brought together, to prevent the stock from being destroyed by too close inter-breeding. Races might be formed and perpetuated in this way, were they worth the trouble ; but this not being the case, the hybrids are permitted to breed with the parent stocks, in which they soon become lost, on account of the great preponderance of individuals of those stocks. The several species of goats, as we have seen, belong to this class of hybrid-forming animals. So also various other animals capable of domestication, as I have already pointed out, especially in my Essay. I will now only add two other examples. Two species of ferrets, *Mustela furo* and *M. putorius*, are often crossed in England, in order to obtain improved breeds ;† and two doves, the common turtle, *Columba turtur*, and the collared turtle, *C. risoria*, though specifically and remarkably different from each other, unite together, and, according to Beckstein, produce fruitful hybrids.‡

* Hybrides des Anatidees. Bulletin de l'Acad. Roy. de Bruxelles. T. XII.

† Bewick. Quadrupeds, p. 252.

‡ Singing Birds, p. 287.

The third degree of hybridity is that in which animals of unquestionably distinct species, unite and produce a progeny that is prolific *inter se*. Such is the case with respect to the dog and wolf in the experiments of Buffon; and such also, I believe, was the result in the dog and fox, as coupled by John Hunter, and in the dog and jackal, as obtained by others. Several species of birds further illustrate this proposition; although the examples are very limited, and, as we have heretofore admitted, contrary to the *general law* of nature. If Buffon's statement, therefore, is true, (and no one has ever questioned it, and it appears to have been accomplished to his own surprise and even to his regret) then his aphorism is *not* true, viz: that all animals capable of producing an offspring which can again re-produce among themselves, are necessarily of the same species.

"We may take the law of sterility in the commixture of different species," observes Hamilton Smith, "to have its limits where the forms cease to be sufficiently homogeneous; a law unquestionably ordained for the wisest purposes, but marked by exceptional modifications for purposes not less beneficent."*

This may be received as an axiom in science; and I further believe, with Azzara,† that many species or varieties of animals are so entirely homogeneous in their organization, that, although distinct in their origin, they have been endowed with a faculty of fertile intermixture, which is rapidly and almost interminably evolved by domestication; whence arises

The fourth degree of hybridity. This phenomenon is characteristic of man, the ox tribe, horses, sheep, goats, dogs, etc.; thus embracing the head of the zoological series, and those animals most essential to his wants and his happiness.

I am well aware that, to use your own phrase, you will "join issue" with me on these points. They are matters of opinion; you have yours, I have mine. I believe in a plurality of origin for the human species; that they were created, not in one pair, but in many pairs; and that they were adapted, from the beginning, to those varied circumstances of climate and locality which, while congenial to some, are destructive to others. Hence the differences in their physical characteristics, and in their mental and moral endowments. It would be impossible in the limited space allotted to this communication, to examine and discuss a question involving so many facts, both direct and collateral; but I must be permitted briefly to "define my position" in reference to it.

I commenced the study of Ethnology about twenty years since; and

* Equidæ, p. 70.

† Quadrupeds, I, p. 95.

among the first aphorisms taught me by all the books to which I then had access, was this—that all mankind were derived from a single pair; and that the diversities now so remarkable, originated solely from the operations of climate, locality, food and other physical agents. In other words, that man was created a perfect and beautiful being in the first instance, and that chance, *chance* alone has caused all the physical disparity among men, from the noblest Caucasian form to the most degraded Australian and Hottentot.

I approached the subject as one of great difficulty and delicacy; and my first convictions were, that these diversities are not acquired, but have existed *ab origine*. Such is the opinion expressed in my *Crania Americana*; but at that period, (twelve years ago) I had not investigated scriptural Ethnology, and was content to suppose that the distinctive characteristics of the several races had been marked upon the immediate family of Adam.

Further investigation, however, in connection with zoological science, has led me to take a wider view of this question, of which an outline is given above; but I never fully adopted and announced this conviction until I felt fully satisfied that it was in harmony with the Sacred Text, and reconcilable with the sublime teachings of Genesis.*

Thus in common with many other inquirers, I regard the first chapter of that book to give what may be called a *generic* or general account of the creation of *Man*; and this is expressed in precisely the same terms which are used in reference to the other classes of animals,—“male and female created he them,”—without reference to the number or locality. If we next examine the second chapter of Genesis we find another account of the creation of man in and for a *particular region*; and it further appears that even the vegetable kingdom was at the same time provided with additional elements, in order to render this locality yet more emphatically a paradise for the *Adamic race*, and not a collective centre for the whole human family.

To show that the evidence of facts tends strongly to this view of the case, and to prove that it is not at variance with the record of the Pentateuch, I beg leave to quote a short passage from the writings of a clergyman remarkable alike for his erudition, his piety and his clear perception of the relative position of science and revealed religion.

“If the two first inhabitants of Eden were the progenitors, not of all human beings, but only of the races, whence sprung the Hebrew family, still it would remain the fact, that *all* were formed by the immediate

* Amer. Journal of Science and the Arts, 1847.

power of God, and all their circumstances, stated or implied in the Scriptures, would remain the same as to moral and practical purposes.

“Some difficulties in the Scripture history would be taken away—such as the sons of Adam obtaining wives who were their own sisters; Cain’s acquiring instruments of husbandry, which must have been supplied by miracle immediately from heaven, upon the usual supposition; his apprehensions of summary punishment; his fleeing into another region, of which Josephus so understands the text as to affirm that Cain obtained confederates and became a plunderer and a robber, implying the existence of a population beyond his own family; and his building a ‘city,’ a considerable collection of habitations.

“Thus, if contrary to all reasonable probability, this great question should ever be determined in the way opposite to what we now think the verdict of truth, the highest interests of man will not be affected.”*

Thus we see that this eminent biblical scholar, although himself disposed to adopt the “Unity doctrine,” finds no difficulty in the converse of it; which last, I think, is fully sustained by a critical examination of the other sections of the zoological series. But circumstances preclude the expression, in this place, of the facts and arguments of the case, which I reserve for another occasion. Thus much, however, seems necessary to be said, because mankind, both naturalists and others, have kept aloof from Ethnology, in the fear that its study would bring them into collision with the Mosaic record.

A few words on another point. Many zoologists insist on the origin of all animals from a single pair of each species; so that all the dogs, for example, with their many and remarkable varieties, must have been derived from one male and one female, while chance or accident are appealed to in explanation of their diversities of form, color and instinct.

Now I can find nothing in the account of creation, as contained in the first chapter of Genesis, to sustain a doctrine of this kind; and if it be said that they entered the ark in pairs, I have two replies to make:

1st. That geology proves the Deluge to have been a local phenomenon; and this is the almost unanimous verdict of those persons who have studied that cataclysm in connection with the fossiliferous strata; and I here again refer to the work of Dr. J. Pye Smith, for a full exposition of the evidence.

* Rev. J. Pye Smith, D.D., L.L.D. *Relation between the Holy Scriptures and Geology*, p. 398–400. 3d edition.

I regard this among the most instructive volumes that has issued from the press since the revival of letters, and for this reason—that it constitutes a link between religion and natural science—studies which have hitherto been as isolated as if they were incompatible with each other. Mr. Robert E. Peterson, of Philadelphia, has the work in press, and will shortly publish it in a style not inferior to the English edition.

2d. Some animals are said to have been received into the ark by pairs, others *by sevens*, and among the latter were all birds and all clean beasts. Did it never occur to you that, with this range between two and seven, the text might be safely interpreted *at least two*? Even if we suppose, (what, however, is not necessary to a proper interpretation of Genesis,) that no animals survived the Deluge but those received into the Ark, we may reasonably infer that all *varieties* of domestic animals, even those not strictly *clean*, would have been preserved on account of their usefulness to man? Buffon describes, if I mistake not, thirty different varieties of dogs, (many of which may be regarded as true species,*) and some of these are proved by Egyptian monuments to be as old as the period ascribed to the Deluge by the Hebrew chronology. Why were not these forms in part, at least, primeval? Again, you will observe, on reference to Pye Smith's researches, that there is great probability that the Ark contained few or no animals but those capable of domestication.

With respect to the origin of the human race by a single pair, I always felt that there was a moral objection to it; and I read the Sacred Text with much more satisfaction since I am convinced that it does not require the interpretation usually put upon it.

There is, again, a physiological objection to the propagation of any animals from a single pair, because this incestuous intercourse tends eventually to the deterioration and extinction of the races that are subjected to it. I do not believe that the earth could ever have been furnished with animals on this plan, unless a miracle had been wrought at every stage of it. The process of breeding *in and in* is extremely difficult and often impossible. Sir John Sebright and others have proved this on a large scale with respect to domestic animals; and the same fact is equally familiar in this country. Azara states that the natives of Paraguay have found from experience that their cattle *gradually diminish in size, and lose their fecundity*, unless fresh animals of both sexes are introduced, from time to time from other pastures than their own; † and Mr. Alexander Walker, after a laborious examination of this question, declares that by this process "nearly perfect beings would eventually degenerate." Here, then, even among our domestic animals, we have a degree of that same difficulty that is proverbial among admitted hybrids. As to man, let us suppose the mulatto offspring

* *Species*—a primordial organic form.—S. G. M.

† Quadrupeds of Paraguay, p. 23

of a black man and a white woman (or the reverse) were compelled to marry among themselves, without any access of other individuals of either race, how long do you suppose this mixed breed would last? Not beyond the third or fourth generation.

I repeat my matured conviction that the different species of animals were created in their allotted regions of the earth,—the kangaroo in New Holland, the sloth in Brazil. They did not appear on the earth in pairs, but in many pairs, some more, some less. A few elephants might serve to stock a continent; but when Prof. Baily informs me that hundreds of millions of Polythalmia, (each one as truly organized as an elephant) exist in a single cubic inch of the sea mud of our own coast, it strikes me as very absurd to suppose that they have been derived from a single pair, or had their origin in Mesopotamia. The views I here advance are those of Azara, Swainson, Hamilton Smith, Agassiz and several other eminent zoologists. The recent judicious observations of Prof. Agassiz on this question, in the *Christian Examiner*, preclude the necessity of any further remarks on my part; and I shall conclude what I have to say on this head in the words of St. Augustine: "If animals," says he, "have not been brought to remote islands by angels, or perhaps by the inhabitants of continents addicted to the chase, they must have been spontaneously produced on the earth;" or in other words, in the localities where we now find them. It is difficult for me to imagine that a practical zoologist can entertain a contrary opinion.

It is one of the weaknesses of mankind to delight in mystery, and to be perpetually looking for miracles. They forget or disregard the fact that the laws of Nature were ordained of God, and that a special interposition at every step would disjoint the mighty mechanism and mar the harmony of creation.

I am convinced that the more we study the Mosaic history in connection with Natural Science, the more we shall be instructed by both. Is our faith shaken because Gallileo has shown that the sun does not revolve round the earth, but the earth round the sun? Does it detract from our admiration of Creative Wisdom to be told, as Geology teaches, that past time is an eternity? Should it lessen our admiration of the past, or our hope in the future, to be told that mankind have existed thousands of centuries* upon the earth? Or does our religion suffer detriment because the great Lepsius has deciphered the legends of Memphis,

* "Beyond that event (the arrival of Abraham in Palestine) we can never know how many centuries, nor how many chiliads of years may have elapsed since the first man of clay received the image of God and the breath of life."—*Prichard*.

and proved that they date back three thousand five hundred years before Christ? Yet these things are true; and if the pride of man feels humiliated at his past ignorance, let him be thankful that he has yet lived to see so much light.

In conclusion, I feel that I owe you an apology for this very long and very diffuse communication, which has been written amid the exacting duties of an arduous profession. I have taken this occasion to publish some facts and to express some opinions which I had designed for a supplement to my Essay on Hybridity, and I shall now leave the further investigation of the subject to other and abler hands.

I remain, my dear sir,

Very faithfully your friend and servant,

SAMUEL GEORGE MORTON.

P. S. After I had made considerable progress in the preceding letter I met with a copy of your work on the "Unity of the Human Species," which, with all the interest of its facts and the ingenuity of its argument, would lead me to suppose that Ethnology has stood still while all the other sciences have made such remarkable advances. Ethnology must hereafter be studied in connection with general zoology, geology and chronology; and even astronomy, in the hands of such men as Humboldt and Lepsius, is a collateral aid of great value.

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 some things to say, and if the friends of your
 journal will not mind, let them be printed, but I have not had
 time to see to it.

In conclusion, I feel that I owe you an apology for this very long and
 very diffuse communication, which has been written and the existing
 state of an anxious position. I have had a great deal to say
 upon this and to express some opinions which I had desired for a
 long time to say to you in private, and I shall now have the further
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I remain, my dear sir,

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