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ADDITIONAL OBSERVATIONS  
ON  
HYBRIDITY IN ANIMALS,  
AND ON SOME  
COLLATERAL SUBJECTS;  
BEING  
A REPLY  
TO THE OBJECTIONS OF THE REV. JOHN BACHMAN, D.D.

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[FROM THE CHARLESTON MEDICAL JOURNAL AND REVIEW.]

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BY SAMUEL GEORGE MORTON, M.D.,  
Penn. and Edinb., President of the Academy of Natural Sciences of Philadelphia.

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ALPHABETICAL INDEX

# HYBRIDITY IN ANIMALS

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### A BIRD

The first part of the work is devoted to a study of the habits and life history of a certain bird, which is found in the mountains of the Himalayas. The author has spent several years in the field, and has collected a large number of specimens, which he has examined with the most careful attention. The result of his researches is here presented in a series of chapters, which will be found interesting and instructive to all who are interested in the natural history of the Himalayas.

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## ADDITIONAL OBSERVATIONS

ON

# HYBRIDITY IN ANIMALS.

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### INTRODUCTORY REMARKS.

My ethnological studies long since led me to investigate the subject of Hybridity in Animals; but I was greatly surprised to find that no collective account of this class of facts had ever been published—at least, I could discover none, and was, therefore, placed somewhat in the position of a pioneer in a new field of inquiry. I made diligent search for materials, and, at the same time, interested some of my friends in the pursuit of them, and was thus enabled to read before the Academy of Natural Sciences, in 1846, my “Essay on Hybridity,” which was published, in two parts, in the American Journal of Science for the following year. From that date to the present, my attention has been given to this subject, as time and health would permit, with a view to careful revision and republication. Since the appearance, however, of Dr. Bachman’s second criticism, in this Journal, I feel called upon to continue my observations, through the same medium, and now proceed to my task.

It is with extreme regret that I must, in the first place, defend myself from some remarks, which neither truth nor justice nor the interests of Science will permit me to pass unnoticed. Dr. Bachman speaks of “the crudities of M. Chevreul, contained in a work *which is locked up in your library*, and which I have no means of obtaining.” I never owned the book here alluded to, nor do I know of a copy in this city. It was lent me by a gentleman from a distance, who marked the passage on hybrids,

for my use. The paragraph was copied and the book returned. Strange to say, Dr. Bachman never asked me to loan it to him. In a letter, now before me, dated October 15, 1849, he names two books, and two only, which he is desirous of seeing. A postscript informs me that he had been so fortunate as to obtain one of them in Charleston; the other—Rudolphi's "Anthropologie"—I would cheerfully have sent him, had he designated the means by which it was to be conveyed a distance of five hundred miles.

I pass over, at least for the present, various instances of assertion, denial and invective, to notice one in particular. When I admit my mistake in not recognizing the *Capra Ægagrus*\* as the source of the common goat, Dr. Bachman remarks: "I am glad to see this admission, more especially as it is the only error which you have acknowledged as existing in your two papers; although I have clearly shown—and you have not ventured to deny the fact—that it abounds with errors in every paragraph."

I am here censured for not denying an allegation that I was not conscious had ever been made. I have re-perused Dr. Bachman's first criticism, (to which the above paragraph alludes,) and certainly nothing of the kind is contained in it. On the contrary, he therein speaks of my Essay as composed "of two ingenious and elaborate articles, presenting all the *facts* which were then available on Hybridity in Animals." Now, this highly commendatory opinion was not hastily expressed; for, at the time it was published, my Essay had already been in Dr. Bachman's hands between two and three years. But, to the point: I now emphatically deny Dr. Bachman's allegation, and will, moreover, prove it to be incorrect.

Dr. Bachman asserts that he *has shown* my Essay to "abound in errors in every paragraph." I count ninety-seven paragraphs, and of about thirty of these I do not perceive that any notice has been taken; others have been commented on, without other objection than mere difference of opinion; and some, again, embrace but a single proposition, which, even if it were erroneous, would not prove the paragraph to "abound in errors."

I must again enter my protest against Dr. Bachman's disparagement of various authors whom I have quoted, simply because their facts are at variance with his theory. Some of them are too "old," as if age, or antiquity itself, could invalidate truth; while others, having erred in

\* Yet, even this opinion, though generally, is by no means unanimously received by zoologists, as I will hereafter show.

some matters of observation or opinion, are held up to absolute derision. Among these are Aristotle,\* Azara and Hamilton Smith.

Dr. Bachman, in view of a proposed excursion into the fields, has the following remarkable sentence :

“ We will carry with us some of those old authors—Chevreul and Rudolphi, Bewick, Beckstein, and the works of the author on the new race of martin cats—and thus be enabled to compare old, musty books with fresh, truth-telling nature.”

Would the reader believe that all these ancient authors either are, or have been, contemporaneous with Dr. Bachman? That every one of them has lived within the present century, and that Chevreul—*venerabile nomen!*—published his memoir in 1846?

Dr. Bachman's letter contains the following paragraph :

“ You inform me that, in your publication in Silliman's Journal, three years ago, you announced your conviction of your faith in the plurality of origin. I cannot even find it announced there; for your articles on Hybridity are only intended to prove that the fertility of the races of men is no proof of the unity.”

I thought, and yet think that the following note, printed on the second page of my Essay,† was all-sufficient to convey my meaning: Further researches into ethnographic affinities may render it probable that what are now termed the *five races* of men would be more appropriately called *groups*; that each of these groups is again divisible into a greater or smaller number of primary races, *each of which has expanded from an aboriginal nucleus or centre*. Thus, I conceive that there were several centres for the American group of races, of which the highest in the scale are the Toltecan nations—the lowest the Fuegians. Nor does this view conflict with the general principle that all these nations and tribes have had—as I have elsewhere expressed it—a common origin; inasmuch as by this term is only meant an indigenous relation to the country they inhabit, and that collective identity of physical traits, mental and moral endowments, language, &c., which characterize all the American races. The same remarks are applicable to all the other human

\* It is as unreasonable to reject the evidence of Aristotle on account of a few errors of judgment, as it would be to discard the testimony of the Book of Joshua, because its author alludes to the sun, and not the earth, as the revolving body. Mr. T. Bell calls Hamilton Smith a “high authority” in matters of science.

† See American Journal of Science and Arts, vol. III. new series, 1847, and my Essay as published in a separate form.

racés ; but, in the present infant state of ethnographic science, the designation of these primitive centres is a task of equal delicacy and difficulty.

I can see no ambiguity in this proposition, nor do I know that, by altering the phraseology, I could make it plainer ; but, I will cheerfully, with this view, furnish an extract from a letter addressed by me to J. R. Bartlett, Esq., dated, December 1, 1846, and published in the Transactions of the Ethnological Society of New-York.\*

“I do not use it [the word *race*] to imply that all its divisions are derived from a single pair. On the contrary, I believe that they have originated from several, perhaps even from many pairs, which were adapted, from the beginning, to the varied localities they were designed to occupy. In other words, I regard the American nations as the true *autochthones*—the primeval inhabitants of this vast continent.”

I trust that the preceding extracts, collectively considered, will sufficiently explain my meaning.

Again : I am severely censured for having quoted Azara for a matter of fact in respect to certain hybrid cats ; whereas, it appears, on a perusal of the text, that the circumstances had only reached him by report from others. Persons who know me will take my word for it that this error arose from mere inadvertence. Such mistakes will occasionally and unavoidably occur in quoting a multitude of authorities. Let us see if Dr. Bachman is himself infallible.

In his letter to me, (Journal, p. 507,) I find the following paragraph :

“You scarcely commence your career, as an expounder of Scripture, before you evidence a disposition to become a perverter of its simple and expressive language. The Bible tells us that the whole human race descended from a single pair—Adam and Eve—and you significantly ask, ‘Did it never occur to you that the text might be safely interpreted, *at least two?*’”

Strange to say, I have never written, spoken, or dreamed of the opinion here attributed to me. I made no allusion to Adam or Eve, or to any human being, but only to the inferior animals, in connexion with the Deluge. The reader may judge for himself ; for the following paragraph embraces all that I *did* there say on the subject :

“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?*”

\* Vol. 2, p. 218.

This is a perversion, indeed, and comes oddly enough from a person who follows up my error with nearly three pages of useless commentary, mingled with invective. I quoted Azara in haste, from a borrowed book; but Dr. Bachman sits down to answer a letter addressed to him, with that letter before his eyes, and then does me this signal and deliberate injustice.

I should be an unworthy member of the most benevolent and self-denying profession known among men if I were to allow to pass unnoticed the gratuitous imputation of Dr. Bachman, that the science of medicine "has slaughtered more of the human race, and shed more innocent blood, by its numerous theories and rash practice, than was inflicted by all the armies of Cæsar and Napoleon."

That my profession has had its full share of visionaries and empirics, I am free to acknowledge; nor am I blind to the evil consequences that have often resulted from the crude theories of these misguided persons. But, let me ask the Rev. Dr. Bachman if his own profession is free from them? Whence have arisen three hundred Christian sects, to perplex the thoughts and confound the judgment of the inquirer after truth? Physicians differ about the blood, the nervous fluid, and the *modus operandi* of medicines; but, are the clergy any more unite on the Trinity, Baptism and Regeneration? Religion is an emanation from the Supreme Being. It is a holy thing; and I venerate its consistent teachers. But, what is mis-called *Theology* is a Protean compound, that has probably made as little progress, in ten centuries, as any branch of human knowledge, and, in my belief, much less than Medicine itself; and, if motives and results, as revealed by authentic history, were fairly analyzed in both, I have no fear that my profession would suffer by the comparison. The most beneficent gifts of Providence have been the most abused by man; and we may exclaim of Religion as Madame Roland did of Liberty—

"How many crimes have been committed in thy name!"

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#### *What constitutes a Species?*

On this point, there is great diversity of opinion among naturalists. Some deny the law of specific distinctions—at least, their arguments lead to this inference. Thus, Lamarck and Geoffroy St. Hilaire insist upon the uninterrupted succession of the animal kingdom,—the gradual



mergence of one species into another, from the earliest ages of time ; and they suppose that the fossil animals whose remains are preserved in the various geological strata, however different from those of our own time, may, nevertheless, have been the ancestors of those now in being. Sir Charles Lyell has opposed this theory, with great ingenuity and general success ; yet, whoever will examine the facts and arguments employed by its authors, may be disposed to admit that it is not altogether devoid of foundation in some exceptions to the general law of Nature.

Somewhat allied to this is the opinion of Swainson and others, that permanent varieties constitute species ; or, in other words, that variations of climate, food and treatment produce specific distinctions.

Species is defined by Buffon, "a succession of similar individuals which re-produce each other." Cuvier's definition is nearly the same ; but he adds that "the apparent differences of the races of our domestic species are stronger than those of any species of the same genus. The fact of the *succession*, therefore, and of the constant succession, constitutes alone the unity of the species."

An objection to these definitions arises from the fact that they apply as readily to mere varieties as to acknowledged species. Certain albino animals re-produce, *inter se*, to an indefinite extent ; such also is the case with some fanciful varieties of the dog, pigeon, &c., which are capable of multiplying by the law of succession, and yet have no claim to specific distinction. in the restricted acceptation of that term.

I have brought together these definitions, in the first place, to show that naturalists are by no means agreed upon what constitutes a species, and, secondly, to offer some views of my own.

As the result of much observation and reflection, I now submit a definition, which I hope will obviate at least some of the objections to which I have alluded : SPECIES—a *primordial organic form*. It will be justly remarked that a difficulty presents itself, at the outset, in determining what forms are primordial ; but, independently of various other sources of evidence, we may be greatly assisted in the inquiry by those monumental records, both of Egypt and Assyria, of which we are now happily possessed, of the proximate dates. My view may be briefly explained by saying, that, if certain existing organic types can be traced back into "the night of time," as dissimilar as we see them now, is it not more reasonable to regard them as aboriginal than to suppose them the mere accidental derivations of an isolated patriarchal stem of which we know nothing ? Hence, for example, I believe the dog family not to have originated from one primitive form, but in many forms. Again, what I call a species may be regarded by some naturalists as a *primi-*

*tive variety*; but, as the difference is only in name, and in no way influences the zoological question, it is unnecessary to notice it further.

These views appear to correspond with those of Mr. Linnæus Martin, who expresses himself in the following terms :

“ We are among those who believe that, as there are degrees in the relationship of species to species, some may, although distinct, approximate so nearly as not only to produce, *inter se*, mules incapable of interbreeding, but a *progeny of fertile hybrids, capable of admixture, perhaps even to the most unlimited extent?*” \*

Species may, therefore, be classed, according to their disparity or affinity, in the following provisional manner :

*Remote species*, of the same genus, are those among which hybrids are never produced.

*Allied species* produce, *inter se*, an infertile offspring.

*Proximate species* produce, with each other, a fertile offspring.†

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### *Hybridity.*

Hybridity, whether in plants or animals, has been singularly neglected by naturalists. It has generally been regarded as a *unit*: whereas, its facts are as susceptible of classification as any other series of physiological phenomena. Hence, I have, on a former occasion, proposed *four degrees* of hybridity, which I will briefly recapitulate in this place.

*The 1st degree* is that in which the hybrids never reproduce; in other words, where the mixed progeny begins and ends with the first cross.

*The 2d degree* is that in which the hybrids are incapable of reproducing, *inter se*, but multiply by union with the parent stock.

*The 3d degree* is that in which animals of unquestionably distinct species produce a progeny which is prolific, *inter se*.

*The 4th degree* is that which takes place between closely proximate species—among mankind, for example, and among those domestic animals most essential to their wants and happiness.

There is, moreover, what may be called a mixed form of hybridity, which certainly has had a very great influence in modifying some do-

\* W. C. L. Martin, *History of the Dog*, p. 7; London, 1845.

† See Proceedings of the Academy of Natural Sciences of Philadelphia, for September and October, 1850.

mestic animals, and which I cannot so well express as in the language of Hamilton Smith :

“ The advances towards hybrid races are always made by the domestic species to the wild ; and, when thus obtained, if kept by itself, and the cross-breed gradually becomes sterile, it does not prevent repeated intermixture of one or the other ; and therefore the admission of a great proportion of alien blood, which may again be crossed upon by hybrids of another source, whether it be a wolf, pariah, jackal, or dingo.” \*

Dr. Harlan, at a much earlier period, had taken a similar view of this question ; for, after admitting our domestic dogs to be derived, in part, from the wolf, fox and jackal, he adds :

“ A prolific hybrid, of this kind, once produced, the progeny would more readily unite with the congeners of either parent and with each other, and, in this manner, give rise to the innumerable varieties which, at the present day, are found scattered over the face of the earth.” †

I regard these propositions as explanatory of a large class of the phenomena of hybridity.

But, it was thought by Ray, Buffon, John Hunter, and other naturalists of the past century, and is yet maintained by some learned men of the present day, that the hybrid offspring of two distinct species of animals are incapable of reproducing their kind ; thus making hybridity the test of specific character. It follows, according to this supposed law of Nature, that, if mankind embraced several species, the intermixture of these could go no further than to produce a sterile hybrid variety ; but, since all the races are capable of producing, with each other, a progeny more or less fertile, it is inferred that they all belong to one and the same species. This is the question at issue. ‡

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#### *Doctrine of Specific Centres.*

“ The actual zoology and botany of the earth’s surface exhibit several distinct regions, in each of which the indigenous animals and plants are, at least as to species, and, to a considerable amount, as to genera, different from those of other zoological and botanical regions. They are respectively adapted to certain conditions of existence, such as climate, temperature, mutual relations, and, no doubt, other circumstances of favourable influence which men have not yet discovered, and which

\* Canidæ, I. p. 104. † Fauna Americana, p. 77. ‡ Essay on Hybridity, p. 8.

never may be discovered in the present state. These conditions cannot be transferred to other situations. The habitation proper to one description of vegetable or animal families would be intolerable and speedily fatal to others. Even when, as in many parts of the two hemispheres, and on the contrary side of the equator, there is apparently a similarity of climate, we find not an identity, but only an analogy of animal and vegetable species." \*

The opinions expressed in these remarks of a learned and most exemplary divine have met with violent opposition from some prejudiced minds; but, the more these views are examined, the more self-evident they become; whence Sir Charles Lyell's observation, that naturalists have been led "to adopt, very generally, the doctrine of specific centres; or, in other words, to believe that each species, whether of plant or animal, originated in a single birth-place." †

De Candolle has suggested twenty-seven of these independent regions for plants, and the Rev. J. S. Henslow forty-five.

For the inferior animals, Dr. Prichard, "a distinguished Christian physiologist and philosopher," proposes seven regions. Mr. Swainson five; Prof. Hitchcock eleven; Mr. Waterhouse also eleven, but with some geographical differences; and Sir Charles Lyell, Prof. Agassiz, and many, if not nearly all of the continental zoologists of the present day, are united in sentiment on this principle. How gratuitous—how unjust, therefore—it is to attempt to brand as infidels those who adopt an opinion irresistibly derived from an examination of the truths of Nature, and which has the sanction and support of such names as those we have enumerated!

It is necessary, however, to add that most of these authorities make the human species an exception, and the sole exception, to this doctrine of independent creations; but, it appears to me that, if it can be demonstrated with respect to the inferior animals, reason and analogy will lead us to apply it also to man. ‡

It is evident that some naturalists more and more lean to the opinion that even our domestic animals have been created, not in one centre only, but in several centres; and, perhaps further investigation may here also establish certain types as the indigenous productions of particular regions; and hence, as before remarked, what we have been ac-

\* Rev. J. Pye Smith. *The Relation of the Holy Scriptures and Geological Science*, p. 48.

† *Principles of Geology*, p. 608.

‡ See Prof. Agassiz's admirable exposition of this subject in the *Christian Examiner* for July, 1850.

customed to regard as mere derivatives of a single pair may prove to be primeval forms, no matter what position we may assign them in our zoological nomenclature.

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*Origin of the Races of Domestic Dogs.*

In order to show that my views respecting these animals are neither peculiar in themselves nor heterodox in science, I propose briefly to notice the opinions of some of the best and latest zoologists who have written on this question; shewing that, so far from being settled, it yet demands elaborate investigation.

“Whether the numberless breeds of dogs were originally descended from one common stock, and owe their infinite varieties solely to their complete domestication; whether, on the contrary, they are derived from the intermixture of different species, now so completely blended together as to render it impossible to trace out the line of their descent; and whether, on either supposition, the primeval race or races still exist in a state of nature, are questions which have baffled the ingenuity of the most celebrated naturalists.”\*

In the *Faune Française*, now just completed, and written by Derma-rest, Blainville, and other eminent zoologists, the section on the Domestic Dogs commences as follows:

“Their origin is wholly unknown; but there is reason to believe that these animals have descended from many wild species, reduced to subjection by man, and which, by their mixture, have produced the multitude of existing races.” †

So, also, Fischer, in his *Synopsis Mammalium*, ‡ remarks—

“*Canis familiaris* — animal notissimum, procul dubio originis mixtæ.”

And Schinz, in his list of primeval dogs, (*Canes primævi*), gives five species, viz.: *C. dingo*, *C. novæ Hiberniæ*, *C. primævus*, *C. simensis*, and *C. rutilans*; § every one of which has equal claims to the paternity of the whole race.

So, also, Azara, Pallas, Tchudi, Ehrenberg, Harlan and Blyth, adopt the doctrine of a plurality of specific origins.

Desmoulins supposes “the dog, the wolf, the jackal and the corsac to

\* Bennett, Menagerie, I, p. 51.

† Tome I, p. 65.

‡ P. 173, 1829.

§ Synop. Mammalium, I. p. 394.

be, in fact, but modifications of the same species ; or, that the races of the domestic dog ought to be referred, each in its proper country, to a corresponding indigenous wild species ; and that the species thus domesticated have, in the course of their migrations in the train of man, produced various crosses with each other, with their offspring, and with their prototypes, causing a still further increase of distinct races." \*

On the other hand, those naturalists who have contended for a common ancestry for the dog family are by no means united on the question of the primitive type. Mr. Hodgson, a gentleman remarkable for the extent and accuracy of his zoological researches, seems to regard his *Canis primævus* as the origin of the whole race. Prof. Kretchmar, of Frankfort, endeavours to trace the ancient Egyptian dogs to the Nilotic jackal, the *Canis anthus* of the systems. Buffon, at one time, supposed the shepherd's dog to have been this "grand progenitor;" while Mr. T. Bell sees this important type in the European wolf—(*C. lupus*.) After Buffon had referred them all to the shepherd's dog, and after denying that the wolf and dog would breed together, he lived to prove the contrary by his own experiments; for he found "the offspring to be prolific, indeed; but that, in four generations, the hybrid type, though not obliterated, had not passed into a domesticated race."

Tilesius refers all the European dogs to the jackal of the Caucasus; and others have considered the *C. cancrivorus*, of Dermarest, as the source of the charib race.

These advocates for canine unity, however, appear not to have studied the aboriginal dogs of America, nor to have made themselves acquainted with the evidences to be derived from the monuments and other remains of antiquity. Dr. Hodgkin, of London, however, in dividing the dog family into three groups, expressly omits the Australian dingo and all the wild dogs of America.

In view of these very diverse opinions, and others which might be added, I presume every one will concede this to be a perfectly open question. My own convictions are, that the origin of the domesticated races of dogs are at least three-fold :

1. From several species of lupine and vulpine animals.
2. From various species of wild dogs.
3. From the blending of these together, with, perhaps, occasional admixture of the jackal, under the influence of domestication.

\* Richardson, in Parry's second Voyage, p. 296.

*Some Dogs partly of Wolf Origin.*

The name "Wolf" is a vague one, "because there are various species of wolves in Europe, Asia and America; and, further, if each of these species has given rise to a breed of dogs in the different countries where they are found, then, as all domestic dogs promiscuously breed together, the advocate of the non-admixture of species is plunged into a dilemma." \*

The celebrated Blainville has written yet more recently upon this subject, and in a most learned and elaborate manner; and the result of his investigations may be summed up as follows: He admits that the experiments of Buffon prove the fertility of the cross between the wolf and dog; that the domestic dogs constitute one species, in the restricted, or Linnean sense of the term, but that they are distinct from certain wild species and from wolves; and he gives, as a principal reason for the latter conclusion, that the European "dog, which has been wild in America for two hundred years, always remains a dog and never returns to a wolf." †

In all these particulars, I might agree with M. Blainville, even to unity of species, *in the strict Linnean sense*, for the common dogs of Europe. But I do not find that this great naturalist indicates any one form for the original stock; and we may therefore presume that he regards them as derived from various primeval varieties; in which case the difference between us would only be in names.

For the present, let us confine ourselves to the cross between the dog and wolf in Europe; and in the first place, I find that Buffon sent two of his hybrids (of which I have, on a former occasion, given the history) to M. Le Roi, Inspector of the Park at Versailles. Here they bred together, producing three pups. Two were given to the Prince de Condé, and I can find no account of them; the third, which was retained by M. Le Roi, was killed at a boar hunt. The father of these pups was then mated with a she wolf, and bore three pups; and here the report closes, although the cross had not given out. ‡

"I have seen at Moscow," says Pallas, "about twenty spurious animals from dogs and black wolves, (*C. lycæon*.) They are, for the most part, like wolves, except that they carry their tails higher and have a kind of hoarse barking. They multiply among themselves; and some

\*Martin, History of the Dog, p. 19.

† Osteographie, p. 76, 142.

‡ Sonnini's Buffon Quad., xxxiii., p. 321, Supp.

of the whelps are grayish, rusty, or even of the whitish hue of the Artic wolves.”\*

Crosses of this kind have been known from a remote antiquity, and are called *wolf-dogs*, (*C. pomeranus*.) One of them is figured on an Etruscan medal, of the second or third century before Christ. Ovid, in describing the pack of Acteon, enumerates some thirty dogs, which appear to represent many different breeds : and he is careful to observe that one of them, Napé, was sprung from a wolf ; while another, Lycisca, is evidently the dog which Pliny refers to the same mixed origin.

My friend, M. Kœppen, who has resided many years in Greece, informs me that the mountainous districts of that country are infested by dogs, which are supposed, both from their form and instincts, to be of this race.

Such, also, are the feral dogs of Natolia, in Asia Minor, which are more fierce than the wolves of the same districts, yet distinguished from them without difficulty. With respect to the Iceland, Norwegian, Russian, Siberian, and other dogs of the present class, I must refer for satisfactory details of habits and origin, to the admirable work of Mr. Martin, who remarks that some of these may yet be classed with “ real wild dogs ;” † that is to say, with dogs which have never been domesticated ; or, having been domesticated, have resumed the feral state.

What is the *dingo* of New Holland, but a reclaimed lupine dog ? The same animal is yet wild in that country. Some naturalists consider him a distinct species, or an aboriginal dog ; others, a variety of the common dog, with which last he is capable of inter-breeding. In this remarkable country, the *fauna* is unlike that of any other, and constitutes in itself one of those primal zoological centres, of which we have spoken, and of which, the *Canis dingo*, or Australian dog, is obviously the peculiar and aboriginal canine element. So long as the dingo was isolated from other species of the genus, so long he continued to possess the same exterior characters, both in his wild and tame state, over the vast continent of New Holland ; but he has slowly, but certainly, begun to mingle with the European species, and will, no doubt, soon establish some modification of form, perhaps also of instinct, in the mixed race. ‡

While the dogs of North America appear to be derived from at least two species of wolves, § both of which I regard, with Gray, Agassiz,

\* Pennant's Artic Zool., i., p. 42.

† Page, 108, &c.

‡ The *Canis rutilans*, the wild dog of Timor, appears to have been recently introduced into the northern part of New Holland.

§ The systems of zoology mostly limit the North American wolves, exclusive of those of Mexico and California, to two species—*Canis lupus* and *C. latrans*. But



Richardson and other zoologists, as peculiar to our own continent, the European race, though, in some instances, largely crossed by another wolf, is, for the most part, devoid of any such mixture. In proof of this position, I again appeal to the recent elaborate investigations of Blainville, and to the many other authorities already quoted in this memoir. I also appeal to the fact that the domestic dogs of Europe, even when they resume the feral state, do not become true wolves, as we will see more particularly hereafter; and finally, I appeal to the oldest monuments of the human race, the sepulchres of Gizeh, wherein the wolf, the dog and the jackal are figured, side by side, on tablets that date 3,500 years before Christ; and they can be traced yet further back into the primitive dawn of civilization, for they constitute component parts of the hieroglyphic alphabet itself.

Cuvier expresses no decided opinion on this question. "Some naturalists," says he, "think the dog is a wolf, and others that he is a domesticated jackal; and yet those dogs, which have become wild again in desert islands, resemble neither the one nor the other." And Sir Charles Lyell adds, "that when any of their whelps are caught and brought from the woods to the towns, they grew up in the most perfect submission to man."

When Mr. Bell asserts that "there is not a single character which belongs to all the varieties [of the dog,] which is not applicable to the wolf"—he might have added—to *all the wolves*. Hence, his observation only tends to complicate the question; for if it proves all the dogs to be of one type with the wolf, it would equally prove all the wolves to be of one species; a proposition which, perhaps, neither Mr. Bell nor any other zoologist would contend for. It must be conceded, however, that in the greater part of the old world, the species and races of dogs have been so long and so intimately blended, that it is very difficult to distinguish the extent of the lupine element among them. Thousands and tens of thousands of years (for even Blainville admits that Schmerling has found the domestic dog in the fossil state) have contributed to this admixture; and it is chiefly in America, where also the same

I have no question that the grey wolf of Canada and other northern countries, is a different species from any of the old world, and I adopt for it the name of *C. occidentalis*, (Rich.) Dr. Richardson long ago expressed his doubts about its relation to the *C. lupus*, for they differ both in conformation and character. Dr. Townsend, who, as is well known, has crossed the continent of America to Oregon, has described the *giant wolf* as a distinct species, by the name of *C. gigas*; a distinction which had been already noticed by Mr. Peale, who, however, gave it the pre-occupied name of *C. occidentalis*.—See Jour. Acad. Nat. Sciences, vol. ii, 1850.

changes are taking place, that this question can be examined with a greater degree of precision.

My object will be to show that the Indian dogs of North America are derived from at least two distinct species of wolves; that these two species have combined to form a third or hybrid race; and that this last unites again with the European dog.

For the following facts, I am largely indebted to Dr. (now Sir John) Richardson, the distinguished author of the *Fauna Boreali-Americana*. This gentleman informs us, that in the course of his travels in the northern regions of America, he traversed 30° of latitude and more than 50° of longitude; and that during the seven years in which he was thus occupied, the aggregate of his various expeditions was equal to a distance of twenty thousand miles.\* No individual, before or since, has devoted to this subject the same amount of talent and practical observation. Let him speak:

THE ESQUIMAUX DOG—(*Canis familiaris borealis*, *Desm.*)—"The great resemblance which the domesticated dogs of the aboriginal Americans bear to the wolves of the same country, was remarked by the earliest settlers from Europe, and has induced some naturalists of much observation to consider them to be merely half-tamed wolves. Without entering at all into the question of the origin of the domestic dog, I may state that the resemblance between the wolves and the dogs of those Indian nations who still preserve their ancient mode of life, continues to be very remarkable; and it is nowhere more so than at the very northern extremity of the continent, the Esquimaux dogs being not only extremely like the grey wolf of the Arctic circle, in form and colour, but also nearly equalling them in size."

And he adds, that he has seen a family of these wolves, when playing together, occasionally carry their tails curved upwards; † which character, if I remember rightly, is the principal one which Linnæus supposed to distinguish the dog from the wolf.

Captain Parry informs us that his officers saw thirteen wolves in a single pack, and mistook them for Esquimaux dogs, so complete was the resemblance between them. He adds, that when the wolf is tamed, the two animals will breed readily together. ‡

This intelligent navigator further observes, "that some of his female Esquimaux dogs, during his first voyage, strayed from his ships, and returned after a few days pregnant by wolves. Sir J. Franklin states, that the Indians attached to one of his expeditions, upon destroying a female

\* *Fauna Boreali-Americana*, *Mamm.* p. 61.

† *Idem*, p. 75.

‡ *First Voy.*, *Supp.* p. 186.

wolf, carried away three of her whelps to improve the breed; and that in the month of March, the female grey wolves frequently entice the domestic dogs from the forts, though, at other seasons, a strong antipathy seemed to subsist between them. In the Museum of the Zoological Society of London is a fine specimen of the Esquimaux dog, in contact with a gray wolf from the northern wilds of America; and any one would suppose, unless informed to the contrary, that the two animals were of the same species.”\*

Without introducing any additional facts, I think we are justified in regarding the Esquimaux dog as a reclaimed northern wolf, (*Canis occidentalis*.) So variable are the external characters of the latter animal,† both as to size and colour, that naturalists have, at different times, endeavoured to establish, as we have seen, no less than five species in the northern part of America alone. Two of these, however, (*C. ater* and *C. nubilus*) are more generally regarded as mere varieties of the common grey wolf; but it would naturally follow that the domestication of these several varieties would lead to a corresponding difference between the northern Indian dogs and those of the Esquimaux, although both may claim, in part at least, the same specific origin. When speaking of the wolves of the Saskatchewan and Copper-mine rivers, Dr. Richardson makes the following remark :

“The resemblance between the northern wolves and the domestic dog of the Indians is so great, that the size and strength of the wolf seems to be the only difference. I have more than once mistaken a band of wolves for the dogs of a party of Indians; and the howl of the animals of both species is prolonged so exactly in the same key, that even the practised ear of an Indian fails at times to discriminate them.”‡ “At certain seasons,” he adds, “they breed freely with the she wolf,” while on other occasions, “both male and female wolves devour the dogs as they would any other prey.”

THE HARE-INDIAN DOG—(*Canis familiaris lagopus*.)—The author just quoted, observes, that the resemblance between this animal and the prairie wolf, (*C. latrans*) “is so great, that on comparing live specimens, I could detect no difference in form, (except the smallness of its cranium)

\* *Martin*, on the Dog, p. 115, 116.

† The common American wolf sometimes shows a remarkable diversity of color. “On the banks of the Mackenzie, I saw five young wolves leaping and tumbling over each other with all the playfulness of the puppies of the domestic dog, and it is not improbable that they were all of one litter. One of them was pied, another entirely black, and the rest showed the colors of the common grey wolves.”—*Richardson*.

‡ *Fauna*, p. 65.

nor in the fineness of its fur, and the arrangement of its spots and colour. It, in fact, bears the same relation to the prairie wolf, (*C. latrans*) that the Esquimaux dog does to the great grey wolf,"\* (*C. occidentalis*.)

These dogs, like the cognate wolf, vary considerably in colour, size and form.† Those on the Mackenzie River are remarkably small, and have sometimes been compared to the Arctic fox. Those in the Mandan country are larger, and are also compared by Say, the Prince de Wied, and other travellers, to the prairie wolf. In other localities, also, this breed appears to be preserved unmixed.

"During my residence in the Michigan Territory, in the years 1831-32," says my friend, Dr. J. C. Fisher, in a note addressed to me, "I on several different occasions, shot the Ojibeway, or Indian dogs, by mistake, for the prairie wolf, and supposed that I knew it well; but, after the frequent mistakes I made, I became very cautious about shooting them, lest I should kill more dogs. They were the common dogs of the Ojibeway, Pottowatomic and Ottawa tribes."

THE NORTH AMERICAN, OR COMMON INDIAN DOG—(*Canis familiaris canadensis*).—"By the above title," says Dr. Richardson, "I wish to designate the kind of dog which is most generally cultivated by the native tribes of Canada and the Hudson's Bay countries. It is intermediate, in size and form, between the two preceding varieties; and by those who consider the domestic races of dogs to be derived from wild animals, this might be termed a cross between the prairie and grey wolves."

Subsequently, in the Appendix to Capt. Back's Narrative, Dr. Richardson further observes, that "the offspring of the wolf and Indian dog are prolific, and are prized by the voyagers as beasts of draught, being much stronger than the ordinary dog."‡

This fact is corroborated by my friend, Dr. John Evans, who has recently passed some time in the Mandan country, where the dogs, however, appear to be derived from the prairie wolf; and he assures me that the frequent and spontaneous intercourse between these dogs and the wolf of that country, (which is now almost exclusively the *Canis occidentalis*, or common grey wolf) is a fact known to every one.

Again, the *Canis Mexicanus*, or Tichichi of the Mexicans, is said by Humboldt to be very much like this dog of the northern Indians, and is also supposed to derive its parentage from a wolf.

The intermixture of these two species was indeed so manifest to Dr. Richardson himself, that he remarks, that it "seems to support the opi-

\* Fauna, p. 79.

† Idem, p. 74.

‡ Amer. Edition, p. 365.

nion of Buffon,\* lately advocated by Desmoulins, that the dog, the wolf, the jackal and corsac, are, in fact, but modifications of the same species; or, that the races of domestic dogs ought to be referred, each in its proper country, to a corresponding *indigenous wild species*; and that the species thus domesticated have, in the course of their migrations in the train of man, produced by their various crosses with each other, with their offspring, and with their prototypes, a still farther increase of different races, of which about fifty or sixty are at present cultivated."

This doctrine, it will be seen, accords with that I have adopted; and I repeat it here, in order to take exception to the mode in which the word *species* is first used; a vagueness which is corrected, however, in its second application, and which I have marked with italics.

The collective evidence derived from the preceding facts, is summed up by Dr. Richardson in a single paragraph, wherein, after describing the Mackenzie River dog, he goes on to say that "it was, perhaps, formerly spread over the northern parts of America, but being fitted only for the chase, it has, since the introduction of guns, given way to the mongrel race sprung from the Esquimaux, Newfoundland and this very breed, with occasional intermixture of European kinds."<sup>†</sup>

The natural, and, to me, unavoidable conclusion, is simply this: that two species of wolves, (acknowledged to be distinct from each other, by all the zoologists, not excepting Dr. Bachman<sup>‡</sup> himself,) has each been trained into a domestic dog; that these dogs have re-produced, not only with each other, but with the parent stocks, and even with the European dog, until a widely extended hybrid race has arisen, in which it is often impossible to tell a wolf from a dog, or the dogs from each other.

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*Aboriginal American dogs from Vulpine and other sources.*

Besides the two indigenous wolf-dogs of the North, of which we have spoken, (the Hare-Indian and Esquimaux races,) and the third or mixed species, (the common Indian dog,) the continent of America

\* Vol. xiv., p. 350. It would, therefore, appear that Buffon held, at different times, *three different opinions* on this subject; for he also referred all the domestic dogs to the shepherd's dog, and gives us a genealogical table to illustrate this idea; and still later, he gave the wolf the place he had before assigned to the shepherd's dog.

† Quoted by Martin, loco citat., p. 14.

‡ Dr. Bachman, however, in common with many other zoologists, regards the American grey wolf as of the same species as the *C. lupus* of the old world.

possesses a number of other aboriginal forms, which terminate only in the inter-tropical regions of South-America. One of these was observed by Columbus, on landing in the Antilles, A. D. 1492. "These," says Buffon, "had the head and ears very long, and resembled a fox in appearance." They are called *Aguara dogs* in Mexico, and *Alcos* in Peru.

"There are many species," adds Buffon, "which the natives of Guiana have called *dogs of the woods*, (*chiées des bois*) because they are not yet reduced, like our dogs, to a state of domestication; and they are thus rightly named, because they breed together with domestic races."

The wild Aguaras, I believe, are classed by most naturalists with the fox-tribe; but Hamilton Smith has embraced them in a generic group, called *Dascyion*, to which he and Mr. Martin refer four species. The latter zoologist sums up a series of critical inquiries with the following remarks:

"It is almost incontestibly proved, that the aboriginal Aguara tame dogs, and others of the American continent, which, on the discovery of its different regions, were in subjugation to the savage or semi-civilized nations, were not only indigenous, but are the descendants of several wild Aguara dogs, existing contemporary with themselves, in the woods or plains; and granting that a European race (as is the case since) had, by some chance, contributed to their production, the case is not altered, but the theory of the blending of species confirmed."\*

Dr. Tchudi, one of the most distinguished zoologists of the present day, has paid especial attention to the character and history of two domesticated dogs of South America, which he regards as distinct species.

1. *Canis Ingæ*. *Perro-dog*, or *Alco*.—The dog to which Tchudi gives this name, is the same which the Peruvians possessed and worshipped before the arrival of the Spaniards, and is found in the tumuli of those people of the oldest epoch. It is so inferior, however, to the exotic breeds, that it is rapidly giving way to them, and an unmixed individual is now seldom seen; and they present "the undetermined form of the mixture of all the breeds that have been imported from Europe, and thus assume the shape of cur-dogs, or of a primitive species."† Is this dog, (*Canis ingæ*) the type of the Aguara race?

2. *Canis caribæus*.—Desmarest has given this name to the hairless dog, which, as Humboldt remarks, was found by Columbus, in the Antilles, by Cortez, in Mexico, and by Pizarro, in Peru. Desmarest, if I

\* Martin, Nat. Hist. of the Dog, p. 30.

† Hamilton Smith, *Canidæ*, ii, p. 123. Tchudi, in his *Fauna Peruana*, attributes the great variety of colours now remarkable in these dogs, to their cross with European breeds.

mistake not, supposes this dog to be descended from the *C. cancrivorus*, a native species, which, according to Blainville, belongs to the section of true wolves. But Rengger, who had ample opportunities of deciding this question, regards it as an aboriginal wild dog, which the Indians have reduced to domestication; and he adds, in explanation, that it does not readily mix with the European species, and that the Indian tribes have, in their respective languages, a particular name for it, but none for any domestic animal of exotic derivation.\*

I need not be told that this animal so resembles the Barbary dog, (*Canis ægyptiæus*) that some suppose it to have been brought from the old world. In the absence of all proof, however, it is more reasonable, with Tchudi and Desmarest, to regard it as an indigenous animal.

Here then, again, we have two aboriginal dogs, one seemingly derived from the fox-tribe, or at least from fox-like wild dogs; the other from an unknown source; yet both unite more or less readily with the exotic stocks, producing a hybrid race, partly peculiar in appearance, and partly resembling the mongrel races of Europe.

With respect to the jackal, as an element of the European dogs, I may merely remark, that Professor Cretschmar, who appears to regard them as the mixture of various species, supposes the jackal of Nubia to be one of these original sources. Other naturalists look on the jackal as one of those merely casual admixtures which has left its impress on some varieties of the dog; for the female jackal has repeatedly paired with it, and, in an instance recorded by Hunter, produced six pups; and one of these again brought forth five others from a terrier dog. No difficulty occurred, excepting the proverbial one of keeping these hybrid animals from associating with the common dog; and the experiment was consequently restricted to two hybrid generations.†

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*Antiquity of some Races of Dogs. †*

In tracing back the age of certain canine breeds and species, I avail myself of the chronology of Prof. Lepsius, which has happily revealed the proximate dates of the Egyptian monuments, and thus enabled us to refer both man and animals to their respective epochs of time. Of this chronology, I may speak in another part of this memoir, and, for

\* Nat. Hist. of Paraguay, p. 151.

† Trans. of the Roy. Soc. 1787, p. 263.

‡ From the Proceedings of the Academy of Natural Sciences of Philadelphia, for September and October, 1850.

the present, I shall briefly offer some new and remarkable facts on the subject before us.

1. THE FOX-DOG—(*C. lupaster?*)—This animal is of the middle size, with erect ears and somewhat bushy tail. It appears to be the oldest dog of which the Egyptians have left an effigy; for it represents a symbol in their alphabet,\* with which it must be coeval, and therefore demonstrably not less than six thousand years old. This same dog is again represented on the paintings in the tomb of Roti, at Beni Hassan, which date with the XIIth dynasty, or the 23rd century B. C.; and he can thence be traced downwards, through the successive monumental periods, until these cease to record the affairs of Egypt. It is found, embalmed, in great numbers, in various parts of that country; and, lastly, it appears to have been “the parent stock of the modern red wild dog so common at Cairo and the other towns of the lower country.” † Clot-Bey observes that it now leads a nomadic life, and generally without a master, and, like the jackal and the fox, frequents the confines of the desert. It does not usually associate with other dogs, but is capable of re-producing with them; but this cross-breed is of no use or value. Ehrenberg, who calls this animal *Canis lupaster*, supposes it to have been primitively a wolf; but as, in its present wild state, it nowhere becomes a true wolf, we may more safely refer its origin to some feral stock, once, and perhaps yet, indigenous to the region of the Nile.

2. THE GREYHOUND—(*C. † grains.*)—There are three varieties of this animal represented on the monuments of Egypt; but the oldest has long, erect ears, with a smooth, short (and probably cropped) tail. I first detect it in the paintings in a tomb of the IIIrd dynasty, (where it occurs in several different places,) and is, consequently, upwards of five thousand years old; thence, I have traced it down the VIth and XIIth dynasties, where my researches stop for the present, for want of the requisite leisure. But this same dog appears to be represented by the Roumelian greyhound of the present day, which, however, I know only from description.

3. Another greyhound first appears in the tomb of Roti, at Beni Hassan, in the 23rd century before Christ. § It has all the characters of the pendant-eared greyhound of the present day, as figured by Buffon, but is represented with cropped ears. Now, the present Nubian

\* Bunsen, Egypt's place in the History of the World, p. 417.

† Manners and Customs of the Ancient Egyptians, III, p. 38.

‡ I have used the generic term, *Canis*, both for dogs and wolves; the latter are now often comprised in a separate genus, called *Lupus*.

§ Rossellini, Mon. Tav. XVII, fig. 3.



greyhound, as seen in the beautiful plates of M. Prisse's *Oriental Album*, appears to be the very same animal; and it is a curious fact, mentioned to me by Mr. Gliddon, that the modern Nubians habitually crop the ears of this dog.

4. The third form of antique greyhound has a bushy tail. It is figured by Hamilton Smith from the monuments; but I have not yet met with it, and consequently cannot at present determine its age. A similar form, called the Akaba greyhound, is yet common in Syria and Arabia.\*

But, what is not less remarkable than the permanence and vast antiquity of some of the preceding forms, is the fact that what we call the English greyhound is figured, with every distinctive characteristic, even to the semi-pendant ears, on a supposed antique statue now preserved in the Vatican at Rome.†

The first three of this series are, probably, primordial forms; but the English greyhound may be a derivative from some partial intermixture, in the same manner that the Irish greyhound is said to be derived from an infusion of the great Danish dog with the common breed.‡

5. THE BLOODHOUND—(*C. sagax*).—Several varieties of the stag and bloodhound are very closely allied. In the tomb of Roti, at Beni Hassan, is a painting representing a spirited deer-hunt, and the dogs—two of which are represented, are admirable illustrations of this variety. They are common on the later monuments; for example, in the *Grand Procession* of Thotmes III, (B. C. 1700,) where several of them are associated with people and productions of the interior of Africa. § Again, yet later, in a tomb at Gourneh, near Thebes; and, if I mistake not, through various later epochs. Now, if we compare the oldest of these delineations—viz.: those of Beni Hassan, with the blood-hounds of Africa lately (and, perhaps, yet) living in the Tower Menagerie in London, we cannot deny their identity, so complete is the resemblance of form and instinct. ||

6. THE TURNSPIT—(*C. vertagus*).—Wilkinson and Blainville have both acknowledged that a variety of this dog is figured in the tomb of Roti, at Beni Hassan. ¶ It is yet common both in Europe and Asia.

7. THE WATCH DOG—(*C. ———*).—Several of these animals, or, at least, their analogies, are figured in the tomb, just mentioned.\*\* They

\* La Borde, Trav. through Arabia Petraea, p. 118. Russell's Aleppo, II, p. 179.

† Blainville, Osteography, Canis, pl. XIV.

‡ Bell, British Quadrupeds, p. 241.

§ Hoskins's Ethiopia, Grand Procession, Part I.

|| Bennett. Tower Menagerie, p. 83.

¶ Rosellini, Tab. XVII, fig. 4.

\*\* Idem. Tab. XVII, fig. 2, 4, 9. See also Martin, p. 49.

bear a striking resemblance to one figured on a Roman mosaic pavement at Pompeii, and are frequently met with in the East. It is, possibly, this dog which represents a second canine symbol in the hieroglyphic alphabet; but the figure is too small to enable me to speak with confidence.\*

8. HOUSE DOG.—(*C. hybridus*.)—I take this identification and provisional specific name, as I have also most of the others of this series, from Blainville.† We find this animal also on the monuments of the XIIth dynasty, where it presents some modifications, much as we see them in the present day.‡

9. THE WOLF-DOG.—(*C. pomeranus*.)—This animal is also well represented at Beni Hassan, with all the characteristics that can be embraced in a drawing that is little more than an outline.§ It is also figured on an ancient Etruscan? medal of the second or third century B. C. ||

It will be observed that two of the preceding varieties of dog are coeval with the earliest hieroglyphic symbols; and, as these last cannot be later than the age of Menes, the first king of Egypt, we may safely date them, on the chronology of Lepsius, as far back as that epoch, viz. 3893 B. C., or 5743 years from our own time—how much further, we have not, at present, even the means of forming a reasonable conjecture.

One other form—the long-eared greyhound—dates, as we have seen, with the 3rd dynasty—about 3500 years B. C. Six additional forms date with the 12th dynasty, which ended B. C. 2124; and, as the tombs of Roti and Nevopth belong to the reign of Osortasen II<sup>nd</sup>, they are placed by Lepsius in the twenty-third century before Christ.

I give these pictorial data as a part only of the series; for, of the eight hundred plates announced by Dr. Lepsius as in progress of publication, but thirty-five have yet reached this country; and, for these, I am indebted to the kindness of that distinguished scholar who has at length raised the “veil of Isis,” and given dates to the hitherto chaotic monuments of the Nile.

Dr. Bachman quotes Hamilton Smith, with some degree of triumph, to show that, three thousand years ago, two varieties only of the dog were known. This was excusable in a naturalist who, at the time of

\* Bunsen, ut supra, p. 417.

† Osteographie, Canis, pl. XIV. Blainville calls it *chien domestique*. It is also the *Roguet* of the French.

‡ Rosellini, Mon. Tav. XVI, fig. 5.

§ Rosellini, Mon. Tav. XVII, fig. 5.

|| Blainville, Osteographie, Canis, pl. XIV.

publishing his *Canidæ*, (1839,) could not have seen the complete iconography of either Champollion or Rosellini; and, again, at that period, the earliest sculptures and paintings were unknown, nor had the whole series been chronologically arranged—a consummation that gives them nearly their whole value, in a zoological sense. The Hebrew chronology ascribes the Deluge to the year 2340 B. C. Now, three of these dogs date nearly a thousand years earlier in time, and all the rest belong to the twenty-third century before our era. Col. Smith's view were in accordance with the knowledge of the coëxistent time; but, any one who had taken the pains even to look over Rosellini's plates, might have obtained additional information on this question.

10. THE BULL-DOG—(*C. molossus*.)—This animal is admirably figured on a piece of antique Greek sculpture in the Vatican. The form and expression of the head are perfectly characteristic, even to the peculiar arrangement of the teeth.\*

11. MASTIFF—(*C. lanarius*.)—I have not yet detected this dog on the Nilotic monuments; but, it is mentioned by Aristotle and seen on two ancient Greek medals, one of which, that of Segestus of Sicily, dates with the 4th or 5th century B. C.—the other, which is of Aquileia Severa, Dictator of Crete, is about two centuries later.†

12. SHEPHERD'S DOG—(*C. domesticus*.)—The earliest effigy of this animal, which is also mentioned by Aristotle, is preserved on an ancient Etruscan medal of unknown date. The probability is that it was familiar to man in the earliest ages, and may yet be found on the Egyptian monuments.

In allusion to the illustrations derived from the latter source, Blainville truly remarks that “we here see a large number of our existing breeds of dogs;” and, inasmuch as they have preserved their identity through such vast periods of time, not only in the most diversified climates, but also under the influence of the greatest variety of circumstances, is it not reasonable to believe that a part, at least, of these forms constitute essentially primeval types? We trace them back into the “night of time,” and find them as distinct as they yet are in the living *fauna*; and it remains for those persons who insist that they have all been derived from an aboriginal pair, to give us something more than analogical reasoning, or inferences drawn from arbitrary views of the laws of Nature.

But, an evidence of the great antiquity of the animal we call the do-

\* Blainville, *Osteographie, Canis*, p. 74. This is yet the common dog of Albania

† Idem.

mestic dog, and to which I have already alluded, is the fact that it has been recently found, *in a fossil state*, in two localities very remote from each other. First, in Germany, by Schmerling, and, secondly, in New-Zealand, by Mr. W. Mantell, (son of the celebrated geologist), who there observed it associated with the bones of the gigantic *Dinornis*. Now, from these facts, I conceive we must conclude, either that certain forms of this animal are primordial and independent of human domestication, or, that man himself, having existed contemporaneously with these now fossilized animals, claims a vast antiquity as a denizen of the earth.

It is shrewdly observed by Azara that, if the differences among dogs were the result of climate, all the dogs of each separate country should be alike. To this I may add, that, if they are all descended from a primal type, they ought, on resuming the wild state, to return to that type. Yet, in America, where the experiment has been observed, on the largest and most unequivocal scale, we see no such result. In Jamaica, they have, in some instances, reverted to the shepherd's dog—in others, to the great Danish dog; and this last variety is the dominant one in the wild packs of Paraguay. In Cuba, they have sometimes resembled greyhounds; and, in the pampas of Brazil, they are more like terriers. *In other words, they constantly tend to recur to that primitive element which is most dominant in their physical constitution*; and it is remarkable that, in the old world, this restored type is never the wolf, although it is sometimes, as we have seen, a lupine dog, owing to the cause just mentioned.

The blending of the opposite extremes of these types, and these hybrids again with each other, gives rise, as every one knows, to those degenerate animals known as pugs, shocks, spaniels, &c., which Cuvier justly calls "the most degenerate productions," and which are found "to possess a short and fleeting existence—the common lot of all types of modern origin."

Among the North American Indians, the original forms are very few and closely allied; whence it happens that these grotesque varieties never appear. Neither have they any approximation to that marked family we call hounds; and this fact is the more remarkable since the Indian dogs are employed in the same manner of hunting as the hounds of Europe, Asia and Africa. Yet, this similarity of employment has caused no analogy of exterior form. No varieties, like those so familiar in Europe, spring up, *inter se*, among them. They are as homogeneous as wolf races from whom they have descended; and Dr. Richardson quotes Theodat to show that the *common Indian dog* has not materially changed during two hundred and twenty years. Again, the same re-

mark applies to the indigenous aguara, also and techichi dogs of Mexico and South America, which, before their admixture with European breeds, conformed to the types or species from whence they sprung, without branching into the thirty *varieties* of Buffon, or the sixty of Brown. The dog of New-Caledonia, in the western regions of Arctic America, cannot be regarded as an exception, for he is a strictly lupine animal, although too little is known of him to enable us to suggest his relative position to the other American races. The Indian dog of Florida partakes, largely, also of the wolf, and is supposed by Hamilton Smith to be intermediate between the wolf (*C. occidentalis*,) and the Newfoundland dog. And, finally, the latter animal, which appears to belong to the same great dog family, is, by some naturalists, regarded as a cross between the Esquimaux dog and some exotic breed. To this latter question, I have not yet given attention.

What is true of forms, is equally true of instincts.

“It is undoubtedly true (observes Sir C. Lyell) that many new habits and qualities have not only been acquired, in recent times, by certain races of dogs, but have been transmitted to their offspring. But, in these cases, it will be observed that the new peculiarities have an intimate relation to the habits of the animal in a wild state, and therefore do not attest any tendency to departure, to an indefinite extent, from the original type of the species.”

The author then instances a peculiar mode in which a certain breed of dogs attack the deer on the platform of Santa Fé, in Mexico, and adds, that other European hunting dogs, though of superior strength and general sagacity, are destitute of this instinct, and often, in consequence, are killed by the deer.

I explain this phenomenon, not on the supposition of a new, but of a latent instinct, which circumstances have merely developed; and as, by crossing dissimilar species or varieties of dogs, we obtain the blended and opposite liniaments of both, so, by the same process, we may combine a double or modified instinct.\*

I may add, that, when speaking of Buffon's thirty varieties of dogs as embracing a large proportion of true species, I supposed, and still suppose, that those which he attributes to the sole influence of climate, (about two-thirds of the whole number,) might be regarded as proto-

\* Dr. Bachman alludes to the *Pointer*, as if I considered it a primitive species. Both sportsmen and naturalists know it to be “of mixed blood, and no doubt largely indebted to both hound and spaniel for his distinct existence.”—*Dr. Lewis, in Youatt on the Dog*, p. 140.

types of primordial forms, although even these are more or less modified by the many influences of domestication.

In view of the preceding facts, I continue to regard the great canine race of the old and new world as constituted of many species of primordial dogs; of three, at least, (and perhaps more) species of wolves; of some accessions from the fox tribe, and a less certain infusion of the jackal.

It will now be seen that my object in the preceding observations has not been to devise new views in zoology, but to sustain old ones by some new facts, derived both from Nature and from the monuments of antiquity.

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### *Feline Hybrids.*

Dr. Ruppell "decided that all our varieties of the domestic cat were derived from one species, (*Felis maniculata*), and this is the decision of *all our naturalists*." Who "*all our naturalists*" are is a large question; but I can mention some who do not agree with Dr. Bachman in this matter.

Fischer and Schinz, who are among the latest authors on synoptical mammalogy, refer the above species, (which is yet wild in Nubia, and appears to have been the parent of the common Egyptian house cat) and the domestic cat of Europe, to different species; and Fischer further calls the *F. maniculata* "the parent of *some varieties* of the domestic cat."\*

Temminck, after admitting the Egyptian species as the common ancestor of our house cats, adds that "it is altogether probable that the crossing of the Egyptian race with the wild one of our forests may have given rise to an intermediate breed," but which, he adds, it would be impossible to prove by demonstrable evidence. Again: "It appears to me probable that our house cats are derived from Egypt; but that the original race of Russia, known by the name of the Angora cat, (*F. angorensis*.) has been produced from another wild type, yet unknown and inhabiting the Northern regions of Asia." †

Now, it is this Angora cat which resembles so closely the Persian and Chartreuse cats that there is little or no difference between them, except

\* Synop. Mamm. p. 207.—"Non dubium hanc speciem esse matrem varietatum quarundam *Felis domesticæ*."

† Mammalogie, I, p. 78.

that of colour ; and, since they interbreed with the common cat, we are able to explain much of the variety observable in the cats of Europe and Asia.

Milne Edwards and the learned editors of the new *Faune Francaise* still insist on the identity of the wild cat of Europe and the domestic animal ; and, should this view of the case ever be substantiated, we shall have to admit at least three wild species for the source of our familiar variety—*Felis angorensis*, *F. catus*, and *F. maniculata*. But, the difficulty does not end here ; for Blainville states that, among a numerous series of cat mummies brought from Egypt by the French commission, he has identified, not only the *F. maniculata*, but also the *F. chaus* and *F. bubastis*—all indigenous African species, and all reduced, in ancient times, to the domesticated state. And, I was the more gratified at this discovery because I had already observed, in the Chevalier Bunsen's Hieroglyphic Alphabet, *three different cats*, each possessing a different symbolic value. I do not pretend to have any evidence of hybrid crosses between these animals ; but these and other facts show us that we may yet have to modify some of our zoological impressions from a study of the catacombs and monuments of Egypt.\*

Since Dr. Bachman is not satisfied with the proofs I gave with respect to the intermixture of the wild cat of Europe and the domestic variety, I may insert the following confirmation from Buffon ; “The wild cat couples with the domestic kind, and, consequently, they belong to the same species. It is not uncommon to see both males and females quit their houses, in the season of love, go to the woods in quest of wild cats, and afterwards return to their former habitations. It is for this reason that some domestic cats so perfectly resemble the wild cat. The latter, however, is larger and stronger, his lips are always black, his ears are stiffer, his tail larger, and his colours more constant.” † And these facts are all corroborated by the learned editors of the new *Faune Francaise*.

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#### *Musteline Hybrids.*

“The *Mustela furo*,” says Dr. Bachman, “is the albino ferret of the

\* The *Felis chaus* is now spread from Nubia and Egypt to India, thus extending itself into Asia as the *F. maniculata* has in Europe. “It is possible,” observes Schinz, “that the domestic cat has had several origins, because it gives rise to several constant varieties.”—*Synopsis Mammalium*, I, p. 453. Nor have I a doubt that this will be the established result of further investigation.

† Quadrupeds, English edition, vol. 10, p. 408.

*M. putorius*. This is admitted by all recent naturalists, and is, therefore, no more of a different species than Voltaire's albino man.\*

Let us see how far this statement is correct. Mr. Bell, who is always and justly quoted with great confidence by Dr. Bachman, expresses himself in the following manner. After mentioning several instances in which the two species of *Mustela* have produced together, Mr. Bell adds that Buffon's figure "is probably an animal of this mixed breed. Allowing, as there appears to be no reason to doubt, that the *Ferret* (*M. furo*) bred with the *Fitchet*, (*M. putorius*), it proves nothing further than the mere fact, and is no more a proof that they are varieties of the same species than in the case of the lion and the tiger, or of the wolf or the dog, which are well known frequently to interbreed. Of the assertion that breeders of ferrets have recourse to the polecat to improve the breed, I can obtain no authentic information; and there are sufficient distinctive characters and circumstances appertaining to them to warrant us in considering them as differing specifically." †

Pennant, who fifty years ago, expresses similar views, states that the albino animal (which is brought from Africa) depreciates in Europe and requires a cross with the allied species. ‡

Schinz, Milne Edwards, Jenyns and Brown all agree with Mr. Bell in regarding them as two species. Fleming, however, in his *British Animals*, considers them one, and adds that the ferrets "breed freely with the dark individuals;" and I presume that Brown alludes to these hybrids when he describes some varieties as of a "black, white and fawn colour." §

So much for "all recent naturalists." With respect to the feline and musteline hybrids of my Essay, I am content to let them remain where they are until their authenticity is fairly disproved.

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#### *Camelline Hybrids.*

"Some of the naturalists," says Dr. Bachman, "consider them [the

\*This learned divine has twice quoted Voltaire in connection with my name not to say invidiously. My answer is this: that Dr. Bachman has taught me all I know of the French philosopher's opinions respecting the origin of the human race; for I have no recollection of having ever read a line of his on the subject. If Voltaire happens to be on my side of the question, Volney is on Dr. Bachman's; so that, in this respect, at least, we are equal.

† *British Quadrupeds*, d. 162.

‡ *Synopsis of Quadrupeds*, p. 215.

§ *Zoologists' Text Book*, p. 71.



camels] two species, and Hamilton Smith is doubtful whether they breed together. Buffon considered them as only one species, and prolific."

Who the naturalists are who regard them as one species, (excepting Buffon,) I cannot discover. The latter supposed them to be a single species, *because* of this very fertility, which he admits without reservation and explains in detail. But Linnaeus, Cuvier, Fischer, Ranzani, H. Smith, Lesson, Dumeril, Desmarest, Quatrefages, Bory, Fleming, and every naturalist whom I have been able to consult, except Buffon alone, describes them as of two distinct species; and with respect to their fertility, Buffon gives what I consider unquestionable testimony.

Here, again, the monuments come to our aid. If any one will look over the splendid plates of *Layard's Nineveh*, he will there find the camel and the dromedary as admirably figured as if done by Landseer but yesterday;\* and these remains of ancient art date, in the opinion of Mr. Layard, 2,600 years before our era. But since Dr. Bachman calls upon us to wait "five years" longer, to see them "decided as constituting only one species," let us have patience, and see whether these five years will overturn the experience of perhaps forty centuries. Meanwhile, I shall regard the camels as two species, fertile *inter se*, and this mixed progeny as constituting a great intermediate race.

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#### *Bovine Hybrids.*

Dr. Bachman, on this head, has the following paragraph :

"Cuvier, and *all our naturalists of authority*, refer all the domesticated cattle of Europe and America to be one species, *Bos taurus*. The ancient *B. urus* is a fossil species."

On the other hand, let us hear what Prof. Owen says :

"My esteemed friend, Prof. Bell, who has written the History of existing British Quadrupeds, is disposed to believe, with Cuvier, and *most other naturalists*, that our domestic cattle are the degenerate descendants of the great *Urus*. But it seems to me more probable that the herds of the newly conquered regions would be derived from the already domesticated cattle of the Roman colonists, of those *Boves nostri*, for example, by comparison with which, Cæsar endeavoured to convey to his countrymen, an idea of the stupendous and formidable *Uri* of the Hyrcinian forests.†

\* The *C. bactrianus* on the Ninevite obelisk, plate 53 and 55, and the *C. dromedarius* on plate 61.

† British Fossil Mammalia, p. 500.

Let us concede the patriarchal palm to the *Bos taurus*; but what and where is this venerable type? Milne Edwards supposes him to be an ancient wild species, (not the *auroch*) which has not been seen in its native state since the 16th century.

With respect to the *Bos frontalis* of Lambert, or *gayal*,\* Dr. Bachman remarks:

“I have possessed very favourable opportunities of comparing it in a living state. I have concluded that it is no other than one of the numerous varieties of our common species; and you will perceive that Cuvier’s views scarcely differed from mine.”

They differed in this, that Cuvier suspected the *gayal* for a hybrid between the Indian buffalo (*Bos bubalus*) and the common herd of cattle.

Roulin, in his monograph of the genus *Bos*, in D’Orbigny’s new Dictionary of Natural History, enumerates twelve species; and among others, regards the *Bos gaurus*, *B. bantang* and *B. gayal*, as distinct species; “and from the marks which he gives of their skulls, this seems to be indeed the case.”†

With respect to the degree of productiveness between this animal and the ordinary breed, I can obtain no positive information. I quoted Cuvier’s suspicion that it is a mixture of that race with the Indian buffalo. Now, I concede that the *gayal* is a distinct species, and not a cross; but that a cross does yet exist in upper India, is by no means improbable. From the *Bos gavæus*, (or *gayal*) says M. Roulin, the Hindoos have a domesticated race, they call *Gobah-gayal*. Some of these animals have again become wild, and with them in the same forests is seen “the *Jungly-gau* of F. Cuvier, which, as Hardwicke had remarked, is very distinct from the *Gobah-gayal*, and may be the result of a cross with the common cattle.”‡ Here I will let this mooted question rest, in the hope of obtaining further light from Mr. Blyth, who, if I mistake not, is now pursuing his scientific researches in India.§

My friend, Dr. Hufnagel, also, now in India, has obtained the first cross between the buffalo of that region and the common breed of cattle, and has promised to make full inquiries on my behalf. Meanwhile, Buffon quotes M. de la Nux for the fact, that these two animals breed

\* *Bos gavæus* of most systematic writers

† Report of the Progress of Zoology and Botany, p. 66, London, 1844.

‡ D’Orbigny’s Dict., *loco citat.*

§ Hodgson has made a new genus, *Bibos*, of the *Bos frontalis*, which he decides to be intermediate between the *Bos* and the *Bison*.—Journ. Asiatic Soc. of Bengal, vi., p. 745.

freely in the Isle of Bourbon, where they have produced an interminably mixed race.\*

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*Caprine Hybrids.*

Mr. Hodgson remarks of his new species of goat, *Capra jharal*, of Nepaul, that it breeds with the domestic goat; and adds, that it more closely resembles the ordinary model of the tame race, than any wild species yet discovered.† Dr. Bachman may be disposed to insist, for the latter reason, that the *C. jharal* is not a distinct species; but he will find it “endorsed” as such in all the late systems of mammalogy, (at least, I find no exception) and by the Proceedings of the Zoological Society of London,‡ and the Annales des Sciences Naturelles,§ (Paris.)

Mr. Bell observes, that “the large goats which are reported to have been brought from the Alps and Pyrenees to the Garden of Plants, in Paris, were probably the progeny of the ibex (*Capra ibex*) with the common goat, (*C. aegagrus*) as there is no proof of the existence of the true *aegagrus* in Europe.”|| And this corresponds with the brief observation of Fischer—*Capra ibex miscetur capris.*¶

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*Caprine and Ovine Hybrids.*

Dr. Bachman, after stating that he has “no access to Chevreul,” (the much-abused authority for my facts in this grade of hybridity) goes on to assert that “we have not one authenticated case of a fertile hybrid produced by the sheep and goat.”

It occurred to me to look into Molina, the celebrated author of the Natural History of Chili, in order to ascertain whether any reference

\* Buffon, Quad., xxv., p. 14.

† Journ. of the Asiatic Soc. of Bengal, 1835, p. 492.

‡ Part 2, for 1834, p. 107.

§ 2d Series, 1836.

|| British Quadrupeds, p. 433. I have admitted the probability of the *Capra aegagrus* being the source of our domestic goat; but I may here again remind Dr. Bachman, that “all the authors” which he has consulted, give only his side of the question. “The opinions of naturalists,” says Mr. Bell, “have been much divided respecting the original stock of the domestic goat; some referring it to the *ibex*, others to *aegagrus*; but most modern zoologists have leaned to the belief, that the wild goat of Caucasus and Persia is the true original stock.”—British Quad., p. 433.

¶ Synop. Mammalium.

was there made to the facts of Chevreul; and it was with great pleasure that I found the following passage:

“The Pehuenches, a nation inhabiting these mountains, [the Chilian Andes] have crossed the sheep with goats; and this intermediate race is much larger than the other sheep. Their wool is less curled, is soft and fine, and often two feet in length, resembling the fleece of the Angora goat.”\*

After the lapse of about eighty years, during all which time this mixed race has probably flourished in Chili, Chevreul publishes the detailed method by which these hybrids are yet obtained and propagated. Persons who entertain any further doubts on this subject are welcome to them. I have none.

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#### *Ovine Hybrids.*

Dr. Bachman asserts that “the *Ovis musmon* is the only species that has ever submitted to domestication, and no fertile progeny has been produced with the argali, or any other.”

Inasmuch as Mr. Blyth appears to have paid more attention to the *Ovide*, than any other living naturalist, and moreover, as he is quoted with respect by Dr. Bachman, I cheerfully submit the present question to his decision.

Among fifteen *species* of sheep, he makes the following remarks in reference to the *Ovis aries*, a collective, specific name for the common breeds:

“Assuming that different species have commingled to produce this animal, as appears to be very evident in the instance of the dog, it is still remarkable that we have certainly not yet discovered the *principal* wild type. Some experience in the deduction of the specified characters of sheep horns, enables me to state with confidence that the normal character of the long-tailed domestic breeds is intermediate to that of the *Rass*, (*O. Poli*) and that of the *moufflon* (*O. musmon*); combining the flexure and the prolongation of the former, with the section of the latter, but becoming proportionately broader at the base than in either; more as in the *argalis* of Siberia, Kamstchatka and North America. That *O. aries*, (the domestic sheep) is totally distinct from all, I have been long perfectly satisfied.”†

Thus, Mr. Blyth regards the *O. musmon* of Linnæus, the *moufflon*

\* French edition, p. 312.

† Proceedings of the Zool. Soc. of London, 1846, p. 74, 75. Jenyns derives all the domestic sheep from the Siberian argali, (*Ovis argali*.)

of Corsica and Sardinia, as a separate species, and adds the following remarks :

“ It *inter-breeds freely* with any tame race, under circumstances of restraint, as is well known ; but we have no information of hybrids, or *umbri*, as they are called, being ever raised from wild moufflons, though the flocks of the latter sometimes graze in the same pasture with domestic sheep.”

Now, here the hybrid mixture is unreservedly admitted by Mr. Blyth ; the only condition appears to be that the animals must be “ under circumstances of restraint.” Here, then, is an illustration of one of my conclusions, against which, Dr. Bachman has wasted a series of physiological comments :—*Domestication does not cause hybridity, but merely evolves it.* The idea that I designed to convey by this proposition is obviously this : that power of hybrid re-production may remain latent, until domestication, or if I may so express it, the restraints of domestication, bring it into action. Whence, also, another of my conclusions,—that the capacity for fertile hybridity, *cæteris paribus*, exists in animals in proportion to their aptitude for domesticity and cultivation.\*

Do not the Cyprian moufflon (*O. ophion*) and the *O. vignii*, which is closely allied to the Corsican species, breed also with the domestic animal ? It may be said that all these species designated by Mr. Blyth, are not generally admitted by naturalists. If so, I am not aware of the fact. They are published and “ endorsed ” by the Zoological Society of London, and are admitted into the *Synopsis Mammalium* of Schinz, one of the latest and most accurate works of its class.

If I am not mistaken in his use of terms, Buffon regarded the large-tailed sheep, called the *Barbary breed*, as a different species from the European ;† and it really appears to be distinct from the fat-rumped sheep. The rudiments of their peculiar organization are increased or diminished by climate and pasture ; for Pallas states, that while the *urophygium*, or fatty cushion of the Tartar breed, will weigh from 20 to 40 pounds, it shrinks to a diminutive size in certain parts of Siberia. We may reasonably suppose that an organization which was obscure and rudimentary in some primitive races, becomes developed by the various processes of domestication and the attendant influences of climate ; and such appears to be the case with the sheep of Africa and those of Asia.

\* Essay on Hybridity, p. 23.

† Edition Sonnini. Quad., xxiii., p. 85.

*Surine hybrids.*

I quoted Hamilton Smith as favourable to the idea that our domestic swine are derived from a plurality of species; whereupon Dr. Bachman, with his accustomed dogmatism, makes the following assertion:

“All naturalists, including Hamilton Smith, have regarded all our species as derived from the wild hog.”

Whatever Hamilton Smith may have once thought or said on this question, I will now quote in full his last impressions, (at least I know of none later,) published in 1839:

“It is admitted that in the forests, they (the domestic hogs,) occasionally breed with the wild boar, and that their offspring is as prolific as if it were the result of breeding from the same race. This is also known to be the fact in the mixed produce of the Chinese and European hog. We have had opportunities of seeing the Spanish and domestic breed become wild in South America and Jamaica, resuming the characters of the wild boar of Europe; even the young becoming striped, like the *marcassins* of France. Yet if the observations of T. C. Eyton, Esq., reported in the Proceedings of the Zoological Society, for Feb., 1837, are correct, the vertebræ of the back, loins and sacrum differ, between the wild boar, the English and Chinese pigs, from 15 to 14, from 6 to 4, and from 5 to 4; so that taking the totals of vertebræ, they run 50, 55, 49, and the French 53. Surely it is allowing too much to the semi-domestication of such animals, and denying the same to the plastic powers of creation, to prop up our artificial maxims in Zoology. On the contrary, we may justly suspect this to be a case of providential arrangement for a given purpose; and that there are three, if not four, original species, including the African, with powers to mix.”\*

Independently of the preceding replies to Dr. Bachman's criticisms, I may repeat, once for all, that in my essay on hybridity, I introduced a number of oxamples of casual cross-breeds, *merely as such*, and not to sustain my “theory of fertile hybrids.” Hence, the following appears among the initiatory paragraphs of my essay:

“It may, at first view, appear superfluous to go over the whole ground of inquiry; but apart from its ethnographic relations, it is my wish to call attention to a branch of science that has hitherto been singularly neglected, and perhaps more so than any other.”†

Among these collateral examples, were the equine, the cervine and ovine, bovine and cervine, and bovine and ovine hybrids among quadrupeds, and several among birds. For all these I have given my authorities. If my republication of these supposed facts should tend to prove

\* *Canida*, i, p. 93, 94.

† Essay on Hybridity, p. 3.

them erroneous, I conceive I shall thereby render a service to science. This, however, is a point for further investigation.

#### MISCELLANEOUS REMARKS.

I must here notice an interesting fact, mentioned by Dr. Bachman, viz: the change of the black rat, *Mus rattus*, in the Southern States, from its natural, characteristic colour to a yellow hue. Here is a change of colour, but none of *form*; and I cannot, therefore, see how it has any bearing upon the varieties of the dog, any one of which may be of a single, or of many colours, without altering its typical character. A greyhound may be black, white or pied, and yet it is not the less a greyhound.

But I have an objection to another part of Dr. Bachman's inferences; for in this account of the rat, he appears to suppose that the fact of there being no intermediate varieties of colour in the same nest, all being either white or yellow, was an evidence of their being all of one species. This is readily admissible, as a simple fact, in this case; but when it is subsequently applied, somewhat in the way of a general principle, to prove that some birds, (the Curassows for example,) are of one species, because their offspring present a similar phenomenon of unmixed colours, it becomes a mere analogical dogma of no possible value. I propose to recur to this question in another place; and for the present will merely observe, that if such a rule obtained in nature, we ought to see the offspring of a white father and a black mother, or the reverse, always black, or always white, without that almost invariable blending of colours, which is familiar to every one.

Apropos to this subject, I find that the Norway rat has been seen in changed colours in England, not of one colour, *but mottled or pied*. Donovan has figured one of them.\* Dr. Bachman's rule, therefore, does not hold good even with the rats.

Dr. Bachman takes exception to my remark, that the *Hyena venatica* connects the dog with the hyena almost without an interval. I derived my first impression from Cuvier, who describes this animal as having the dental system of the dog, and not of the hyena. Cuvier has, moreover, called it *Chien hyenoide*, and it is now placed, by general consent, in the genus *Canis*; and Blainville calls it the great wild dog of Africa.† Is not this animal figured among the dogs on the monuments of Beni Hassan?‡

\* British Quadrupeds, page 45.

† Ostrographie, page 73.

‡ See Rosellini, Monumenti Civili, Pl. xvii, fig. 7.

## Birds.

*Hybrid of the WOOD-GROUSE (T. urogallus,) and the BLACK-GROUSE (T. tetrix,) etc.*—Of this bird called *Tetrao medius* by some authors, Dr. Bachman remarks as follows:

“It so happens that every writer of authority, who published since the days of Temminck, that I have consulted, has set it down as an undoubtedly true species, and not as a hybrid. These naturalists had opportunities of examining these birds in their native haunts, and possessed specimens in the flesh. They were, therefore, infinitely better prepared to pronounce a decision than either of us would venture to do. *Temminck pronounced it a true species.*”

Dr. Bachman’s authorities (whom he gives in detail, and they certainly are eminent ornithologists,) were very fortunately grouped in order to give a unanimous assent to his own opinions. Let us look a little further, and see how this matter stands.

Now it happens that Temminck, yes, Prof. Temminck himself, after holding out for twenty-seven years\* that this hybrid was a true species, has at last admitted his error, and with the magnanimity of a great mind, published it to the world. He shall speak for himself:

“The testimony of *all the naturalists of the North* is remarkably unanimous in considering this bird (*Tetrao medius*), a hybrid product of two different species, the female of the *urogallus* with the male of the *tetrix*; and we concede to their opinion respecting this mule bird with the greater confidence, because Prof. Nilsson has applied himself especially to this inquiry in the northern countries, wherein the two parent species inhabit in great number. The observations made by this learned naturalist, prove in the most satisfactory manner that the *Rakelhan* (*T. medius*), *is a hybrid of the two species above cited*. The opinion of M. Naumann, who has examined many examples (deponilles) of this hybrid, no longer leaves a doubt.”†

This evidence calls for no comment; yet it is curious to compare it with Dr. Bachman’s concluding *dictum*, as expressed in the following oracular manner:

“*All our recent authors have described this supposed hybrid as a true species, and not as a hybrid!*”

For my own part, I am content to adopt the opinion of those ornithologists “who have examined these birds in their native haunts, and possessed specimens in the flesh.” They are certainly better judges than either Dr. Bachman or myself. Meanwhile, I shall regard this as an example of a cross between two proximate species in the wild state,

\* *Pigeons et Gallinacés*, 1813, and *Manuel d’Ornithologie*, 1820.

† Temminck’s *Manuel d’Ornithologie*, 2me edit. Tome iv, page 318. 1840.



producing a great hybrid race, now widely and spontaneously extended over the region of Northern Europe. Schlegel, who is justly considered one of the most able ornithologists of the age, in his *Révue critique des oiseaux d'Europe*,\* takes the same view with Temminck; and Degland, in his excellent *Ornithologie Européenne*,† published during the past year, confirms this opinion, and adds that the *Tetrao tetrax* also crosses with the common pheasant‡ (Phasianus colchicus,) and with the *T. subalpina*; and, moreover, that the *Tetrao nanus* of Gmelin, figured by Sparmann, is nothing more than one of these latter hybrids.

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*Hybrids among domestic fowls.*

In consequence of my defective knowledge of Ornithology, and a difficulty of obtaining the requisite books of reference when my Essay was written, I was misled in stating that our domestic fowls had been traced to ten different species. I should have said that this genus of birds (Gallus,) embraces ten species, five of which, according to Temminck, are capable of breeding *inter se*.

Sir William Jardine, when describing them, makes the following observations :

“It is from these birds that we are indebted for the domestic poultry of our farm yards. Many native species are at the present time known, and we consider it very difficult to determine which is the origin of our reclaimed fowls. They may have reached their present state from a mixture of many; but with Temminck we are inclined to give the preference to two species, the *G. giganteus* and *G. bankiva*, (both natives of Java,) on account of the domestic females bearing the greatest resemblance to those in a wild state, by the similarity of the form and structure of the feathers, and by the males of those possessing the greatest development of comb and wattles.”§

The same eminent naturalist quotes Temminck for the fact, that the *Gallus furcatus*, or fork-tailed cock, although not strictly domesticated, occasionally breeds with the tame hens; a curious fact, and showing the uncertainty with which the true origin is clouded.”|| As to the

\* Leyden, 1844.

† Tome ii, page 28. See also Nilsson's *Ornithologia Suecica*, page 303.

‡ And this, too, adds Temminck, “en pleine liberté et à l'état sauvage.” *Loco citat.*

§ Naturalist's Lib. *Ornithology*, iii, page 171.

|| *Idem*, page 185.

appearance of the *rumpless fowl* originating among other varieties, I am disposed to regard this as the mere reproduction of a primitive type from former crosses between two different species of *Gallus*, viz: the *G. ecaudatus* of Temminck, and some other, probably the *G. bankiva*.

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*Hybrids of the Curassows or Hoecos.*

I see no reason to relinquish any of the very striking facts mentioned in my Essay in reference to the hybrid offspring of the different species of *Craz*, or *Hoeco*. Dr. Bachman, in two paragraphs, disposes of the evidence in his usual summary manner, thus :

“Whilst in Europe in 1838, I continued my inquiries, and ascertained that the naturalists were as much perplexed as myself; they *all* agreed with me that four-fifths of the supposed species must at once be struck off from the roll of species.”

Three, by a singular act of grace on the part of *all* these naturalists, were held over for sentence—“that time and farther experiments might unravel the mystery.”

Again: “It is now nearly decided by recent experiments, that they are all varieties of one species.”

After all this assertion, what is the fact? Simply this—that I cannot find less than six species enumerated in any system of Ornithology; and what was my surprise on looking into *Gray's Genera of Birds*, the latest and most elaborate work of the kind now extant, and published during the past year, to find that it embraces not only the three species which Dr. Bachman and *all* the other naturalists had suspended *sub judice*, but three others, making six in all!\*

It follows that the birds bred between the *Craz alector* and *C. rubra*, reported to the Zoological Society by Sir Robert Heron, and objected to by Dr. Bachman, are to be regarded as true hybrids. I had marked this very paragraph as corroborative of my own views, and shall continue so to regard it until it is finally decided that the Hoecos “are all varieties of one species.”

But inasmuch as twelve years have elapsed since it was resolved to cut the six species down to one, and no reduction of the number has yet been made, we need give ourselves no further anxiety about them; and

\* See also Bennett's Menagerie, page 226. 1835.

Upon looking over Spix, *Avium species Novæ*, T. ii, page 48, 1825, I find he describes seven additional species.

I shall rest content to regard this intermixture of species and consequent prolific reproduction, as an example of a new, varied, and very numerous hybrid race, derived from several distinct species.

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*Pigeon hybrids?*

I am made to say, by Dr. Bachman, that the tame pigeons have not been derived from the *Columba livia* alone, but from a union of some unknown bird of the same genus. I am not aware of ever having published such an opinion. I have looked through my Essay, and my letter to Dr. Bachman, but cannot find it. I only mentioned, without comment, the *suspicion* of Cuvier, that the numerous races of our common pigeon, (of which he regards the *C. livia* as the parent,) may have been modified by mixture with some neighbouring species.\*

So also Selby, when speaking of the *C. livia*, remarks, that it is from this species that *most* of our curious varieties of pigeon have arisen; for some later ones may have been derived from crosses with other species."†

Dr. Bachman, however, lays down the law in the following unqualified terms :

"The tame pigeons have sprung from the *Columba livia*, as now affirmed by every naturalist of authority. No other pigeon has ever produced a fertile hybrid with it."

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*Other hybrid birds.*

Inasmuch as Mr. Gould has proved the supposed hybrid between *Motacilla lugubris* and *M. alba* to be a true species, and described as *M. yarellii*, I, of course, give it up; so also with the identification of the common and the ring-pheasants, there can be no hybrid offspring; and, again, on Mr. Selby's authority, that the progeny of the two doves (*Columba risoria* and *C. turtur*,) never reproduce, I may relinquish the statement I had derived from Bechstein.‡ But with respect to the rest of the astonishing series of hybrid birds, some prolific in greater or less degree, and some sterile, hitherto published by me, I have no reason, except it may be in a very few additional instances, to modify my opinion; but it will be my pleasure to correct every error in the revised edition of my Essay on Hybridity, which I hope to republish

\* Regne Animal. *Columba*.

† British Ornithology, i, page 412.

‡ This celebrated Saxon naturalist is pronounced by Swainson, "one of the best authorities on the Birds of Europe."

in a greatly extended form. The breeders of birds are certainly the best observers and judges as to hybrids which occur in domesticity; and if Dr. Bachman has not been so fortunate in his experiments with the *Fringillidæ* as Bechstein was, it is certainly no proof that the latter was mistaken.

"In the autumn of 1838, says Mr. Cookson, a male bird, the produce of a goldfinch, *F. carduelis*, and a hen Canary bird, *Fringilla canaria*, escaped from my aviary, and was not seen again until the following spring, when we were agreeably surprised by the reappearance of our lost favourite in company with a goldfinch. As the pair were inseparable we at once suspected that they had mated; and in a few days, our suspicions were confirmed by seeing them feed each other and collect materials for building. By watching their movements, we soon discovered their nest in a cedar tree, near the aviary. In due time four eggs were laid, which I carefully removed and placed under a Canary bird; they, however, all proved abortive. In a few days after this disappointment, a second nest was built by them in the same tree, which we left undisturbed, and the result was favourable. Five birds were hatched, which I took from the nest when about ten days old, and brought up by hand. Of this number, two cocks and two hens are still living.

"I am aware that hybrids in a state of captivity and restraint, have not unfrequently proved prolific, when brought to pair with a mate of either of their parent stocks; but I do not remember that I ever heard an instance of an animal of pure breed, in a wild and unrestrained condition, by choice selecting an hybrid mate."

Mr. Cookson then states that he mated one of these young hybrid cocks (which was three parts goldfinch to one part Canary,) with a hen Canary; but the nest was twice destroyed by the male bird, and only one was reared from two sets of eggs.

"I then removed the cock bird and turned him into the aviary, where he immediately selected another Canary bird as his mate. Upon my putting this pair into a breeding cage, a nest was formed in less than a week, and four eggs were laid. I had now taken the precaution to line the nest basket with flannel, so that although the nest was pulled to pieces as on former occasions, the eggs escaped destruction, and upon them the Canary bird is now sitting. I again removed the cock bird, and upon his return to the aviary, he at once made up again to his former mate, and she has this morning laid an egg. In truth, I never saw a bird more ardent for propagation than this hybrid.

"My second experiment has been made by pairing my other hybrid cock bird with an hen of the same sort. The result has been three eggs, one of which was hatched yesterday morning by a Canary bird.

"Now as this second pair have proved prolific, (which are three parts goldfinch to one part Canary bird,) I do not see any reason why I may not obtain next year an equally successful result, by putting together a pair of birds, (if I succeed in rearing a male and a female,) the produce

of my first experiment; and if so, a cross might be perpetuated which would be five parts Canary birds to three parts goldfinches.”\*

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#### MISCELLANEOUS OBSERVATIONS.

My letter to Dr. Bachman having been written under the pressure of exacting professional engagements and ill health, I take this occasion to explain, as briefly as possible, some remarks I then made.

*The Deluge not a universal cataclysm.*—Geologists began their investigations with the full belief in a universal deluge; but the irresistible evidence of the facts of nature is wholly opposed to such a theory, and it is now by almost unanimous consent abandoned. Let the Geologists speak for themselves.

“That a transient deluge,” says Professor Hitchcock, “like that described in the Scriptures, could have produced and brought into its present situation, all the diluvium which is now spread over the surface of this continent, will not, it appears to me, be admitted for a moment by any impartial observers. Many distinguished biblical writers regard the description of the Noachian Deluge, as an example of *the use of universal terms with a limited meaning*; and hence regard the deluge as not universal over the globe, but only over the region inhabited by man.”†

The Rev. Adam Sedgwick expresses himself to the same effect:

“We have not yet found the certain evidences of any great diluvian catastrophe which we can affirm to be within the human period. We saw the clearest traces of diluvial action, and we had, in our Sacred histories, the record of a general deluge. On this double testimony it was, that we gave a unity to a vast succession of phenomena, not one of which we perfectly comprehended, and, under the name *diluvium*, classed them all together. Our errors, however, were natural, and of the same kind which led many excellent observers of a former century to refer all the secondary formations of Geology to the Noachian deluge. Having been myself a believer, and, to the best of my power, a propagator of what I now regard as a philosophic heresy, and having been more than once quoted for opinions which I do not now maintain, I think it right, as one of my last acts before I quit this chair, thus publicly to read my recantation.”‡

Some fourteen years ago, observes Mr. Greenhough,

“I advanced an opinion, founded altogether upon physical and geo-

\* Mr. Cookson, in Jardine and Selby, *Annals of Natural History*, vol. v, page 24. 1840.

† *Geology of Massachusetts*, page 148.

‡ *Proceedings of the Geological Society of London*, pages 312, 314. 1831.

logical considerations, that the entire earth had, at an unknown period (as far as that word implies any determinate portion of time,) been covered by one general, but temporary deluge. The opinion was not hastily formed. My reasoning rested on the facts which had then come before me. My acquaintance with physical and geological nature is now extended; and that more extended acquaintance would be entirely wasted upon me, if the opinions which it will no longer allow me to retain, did not also induce me to rectify. New data have flowed in, and with the frankness of one of my predecessors, I also now read my recantation.\*"

Buckland, Lyell, Elie de Beaumont, Murchison, and so far as I am informed, every other distinguished geologist of the day, have arrived at the same conclusion; and the Rev. J. Pye Smith has shown, with great probability, the proximate barriers by which the Hebrew Deluge was circumscribed in Western Asia. He further adds:

"If we suppose the mass of waters to have been such as would cover all the land of the globe, we present to ourselves an increase of the equatorial diameter, by some eleven or twelve miles. Two new elements would hence accrue to the action of gravity upon our planet. The absolute weight would be greatly increased, and the causes of the nutation of the axis would be varied. To save the physical system from derangements, probably ruinous to the well-being of innumerable sentient natures, would require a series of stupendous and immensely multiplied miracles." "We cannot represent to ourselves the idea of their [the animals] being brought into one small spot, from the polar regions, the torrid zone, and all the other climates of Asia, Africa, Europe, America, Australia, and the thousands of islands; their preservation and provision, and the final disposal of them,—without bringing up the idea of miracles more stupendous than any that are recorded in Scripture, even what appear appalling in comparison. The great decisive miracle of Christianity, the resurrection of the Lord Jesus, sinks down before it."†

Dr. Smith quotes Swainson's estimate of the existing *Fauna* of our globe, from which it appears that there are about 561,000 land and amphibious animals, including insects, and this eminent divine then proceeds as follows:

"Many of the marine fishes and shell animals could not live in fresh water; and the fresh water ones would be destroyed by being kept over a short time in salt water. Thus, in a variety of ways, it is manifest that, upon the interpretation which I conceive to be erroneous, the preservation of animal life in the ark was immensely short of being adequate to what was necessary."

I can only further refer to this most learned and elaborate work for a

\* Address before the Geological Society of London. 1834.

† The Holy Scriptures and Geolog. Science, p. 108.

vast mass of additional zoological and geological testimony in relation to this highly interesting question. But I may add, that the evidence is designed to prove, and it is convincing to my judgment, that the *Creation*, as described in Genesis, only relates to one of the various independent zoological centres; while the *Mosaic Deluge* describes the submersion of that locality only, and the destruction of all its inhabitants, excepting those who were preserved in the Ark; and such was also the opinion long ago expressed by Bishop Stillingfleet.\*

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*Age of the Earth.*

The Rev. Dr. Smith has also enlarged on this sublime question, and I quote from his work the following passages, which are sufficient for my present purpose:

“It is now admitted by all competent persons,” observes Mr. Babbage, “that the formation, even of *those strata which are nearest the surface*, must have occupied vast periods, probably *millions of years*, in arriving at their present state.”†

These formations nearest the surface are only the alluvial and drift (or diluvial) deposits. After these, follow in succession the three great divisions of the tertiary series: the cretaceous group, oolite, the carboniferous strata, the old red sandstone, and the upper and lower silurian. Now, since *every one* of these older formations has its peculiar organic remains piled on each other during a long lapse of ages, and since the *Fauna* of one is distinct from that of all the others, any attempt to estimate their collective antiquity, puts even the imagination itself at defiance.

“Mr. Charles Maclaren estimates *a single period of volcanic quiescence*, during which strata of coal, shell-sandstone and limestone were deposited over the basaltic hill, called Arthur’s Seat at Edinburgh, at 500,000 years. Let it be observed that these are not random guesses, but founded on knowledge and consideration.”‡

\* Quoted by the Rev. J. Pye Smith, *op. citat.*, p. 209.

† Ninth Bridgewater Treatise, p. 78.

‡ Rev. P. J. Smith, *op. citat.*, p. 55. “On the question,—whether these phenomena [of creation] can be comprised within the short period usually assigned to them, (5850 years) the Rev. Samuel Charles Wilks long ago observed: ‘Buckland, Sedgwick, Faber, Chalmers, Conybeare, and many other Christian geologists, strove long with themselves to believe that they could; and they did not give up the hope, or seek for a new interpretation of the sacred text, till they considered themselves driven from their position by such facts as we have stated.’”—*Christian Observ.* Aug., 1834, p. 486.

## Chronology.

Having repeatedly alluded to the revised Chronology of Dr. Lepsius, I have much pleasure in inserting a brief abstract of it, as furnished by that distinguished scholar to Mr. Gliddon :

*Epoch of Menes*—Commencement of *historical* period ; *thirty* Dynasties:

	B. C.
Old <i>Empire</i> :	
1st Dyn.—Accession of Menes, - - - - -	3893
Commencement of <i>Monumental</i> period ; third Dynasty.	
4th Dyn.—Pyramids and Tombs extant—began—	3426
12th Dyn., - - - - - ends—	2124
Invasion of the <i>Hyksos</i> ; comprising the	
15th and 16th Dynasties—from B. C. 2101 to—	1590
New <i>Empire</i> — <i>Restoration</i> .	
17th Dyn., - - - - - began—	1671
30th Dyn.—Ending on the <i>second</i> Persian Invasion—	*340

Inasmuch as the greatest philosopher of the age has given the sanction of his name to these astonishing revelations, I may be permitted to insert in this place, a brief extract from *Cosmos*, to show that I have not adopted them, without a full conviction of their truth. Humboldt, after expressing his obligations to Prof. Lepsius, for making him acquainted with his latest discoveries, quotes the latter for the following facts :

“The valley of the Nile, which has occupied so distinguished a place in the history of Man, yet preserves authentic portraits of kings as far back as the commencement of the fourth dynasty of Manetho. This dynasty, which embraces the constructors of the Great Pyramids of Gizeh,—*Cephren* or *Schafra*, *Cheops-Choufou*, and *Menkara* or *Mene-kerés*,—commences more than 3,400 years before the Christian era, and twenty-three centuries before the invasion of Peloponessus by the Heraclides.”†

Yet more recently, Prof. Lepsius has been enabled to date the ascension of Menes to the throne of Egypt, as given in the above memorandum from Mr. Gliddon, at 3,893 before Christ.

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*The period of Man's existence upon the earth.*

There is nothing in geology to disprove the existence of man upon the earth for a period vastly longer than has generally been supposed.

\* Hand-book to the Panorama of the Nile, 51. The Chevalier Bunsen (Egypt's place in Univ. History,) ascribes the age of Menes to the year 3643 B. C.

† *Cosmos*, ii., p. 147, French Edit.



Dr. Prichard, who bestowed a part of his great learning and remarkable talents in the investigation of chronology, arrived at the conclusion that the Hebrew annals afford no data of this kind beyond the epoch of Abraham. Hence, according to this view, there can be no antagonism between the Sacred Records and the discoveries of Dr. Lepsius.\*

The facts of geology afford us nothing but *negative evidence* on this point. If the strata "nearest the surface," as heretofore stated, required "millions of years" for their accumulation, we may, at least, be permitted to inquire, how much of this vast period of time can be allotted to the human race? The facts are yet few, but they are impressive, and should stimulate us to search for more.

It will, in the first place, be objected, that no remains of man, in the fossil state, have yet been discovered. This point is not quite decided; for I am disposed to regard the human bones lately found by Dr. Lund, in certain caverns at Minas Geraes, in Brazil, as truly fossilized, and as old as the extinct species of animals that accompany them; nor would there be any hesitation on this point, were it not for the prepossession so generally entertained with respect to the very recent creation of man.

These deposits in Brazil, however, date as low down as the Eocene group; and it would be in the drift (hitherto called *diluvium*) and the alluvial beds that we may hereafter find the remains of man. Of the immense age of these comparatively recent deposits, some idea may be formed from the following statements of Sir Charles Lyell:

"The whole period during which the Mississippi has transported its earthy burthen to the ocean, though perhaps far exceeding one hundred thousand years, *must be insignificant*, in a geological point of view, since the bluffs or cliffs bounding the great valley, (and, therefore, older in date,) and which are from fifty to two hundred and fifty feet in perpendicular height, consist, in great part, of loam, containing land, fluviatile and lacustrine shells of *species still inhabiting the same coun-*

\*"When we consider how small the impression is, that has been made on the ethnology of the world, by the known changes in races and languages that have taken place since Egypt was populous and civilized, we must conclude that the whole of this period belongs to the recent history of mankind; and that the more ancient history, in which the numerous races and languages originally distinct, were developed and spread over the face of the earth, occupied a far longer period. It is at present impossible to say that 8,000 or 10,000 years, or even a less period, would not be sufficient; and it is equally impossible to say that even the greatest era that geology will allow for man's residence upon the globe, is too much. The author of *The Church of the Future*, considers ancient Egyptian history as representing the *Middle Ages* of the ancient world."—J. R. LOGAN, *Ethnology of the Indian Archipelago*, in *Journal of the Indian Archipelago*, 1850, p. 302.

try. These fossil shells are associated with the bones of the mastodon, elephant, tapir, mylodon, and other megatheroid animals; also a species of *horse*, *ox*, and other mammalia, most of them of extinct species."\*

This last, or *drift* deposit, belongs to the series to which, according to the calculations of Prof. Babbage, has been millions of years in formation; and, since it embraces two species of domesticative quadrupeds, it need be no marvel if what Blumenback calls "the most domestic of animals" should hereafter be found among them.

I have already remarked that Geology, as yet, affords only negative evidence with respect to man. The *alluvial* deposits are remarkably destitute of organic remains of any kind; and, for aught we know, man may have lived through their entire epoch; and, that evidences of this fact will yet arise, not only from the alluvium, but also from the vastly older drift or deluvial beds, I feel a reasonable confidence.

It is not many years since it was an axiom in geology that no mammiferous animals coëxisted with the secondary strata, commencing with the chalk deposits. Yet, this opinion has been overturned by the discovery of two marsupial quadrupeds as low down as the oolite.

So, also, it was long supposed that no *quadrumanous* animals—the next in order to man—existed in the fossil state. But, within a few years, several species of monkeys have been found in India, England and Brazil, and, in every instance, if I mistake not, as low as the eocene strata. This discovery was contrary to our preconceived opinions, and may prove the harbinger of a fossil man. †

I now leave the reader to judge for himself whether the facts adduced by me, in my Essay, and extended on this occasion, are "misconceptions, or downright errors." It was objected to me, that I "seemed to have referred to scarcely any authorities that have been published since

\* Silliman's American Journal of Science for 1847, p. 36. The horse and the ox have also been found fossil at Eschcholtz bay, on the northwest coast of America.

† Some curious evidence has been submitted to the British Association, at the meeting of the present year, in Edinburgh, by Mr. Daniel Wilson. This gentleman, in a memoir on *Pre-Celtic Races* in Scotland, records the following curious facts: "In the museum of the University of Edinburgh, there are preserved the remains of a fossil whale, dug up in the Blair-Drummond moss, seven miles above Stirling bridge, and fully twenty miles from the nearest part of the river Forth, where, by any possibility, a whale could now be stranded. Yet, along with this was found the rude harpoon of deer's horn, which proves that this fossil whale pertains to the historic era, and points to a period more recent than the first colonization of the British isles."

the days of Buffon and Temminck." If this was my error before, I trust I have corrected it now. It was also asserted that "not a solitary new race has been produced by any commingling of species." Here, again, I leave the issue to an unprejudiced examination of the many facts now brought together.

As to the assertion of Dr. Bachman, "that, if the Scriptures could, by any possibility, be tortured to prove the plurality of origin for the human species, philosophers and men of science would become infidels," I deny such an inferential conclusion altogether. It is well known that this question has been, at various times, and for a series of years, brought before the Academy of Natural Sciences, in this city, and made the subject of repeated discussion, without, at least, to my knowledge, wounding the feelings or shaking the faith of my associates, among whom are many exemplary members of different religious denominations. I may make the same remark with respect to a number of the clergy with whom I have conversed freely on these questions, and who have appeared to desire information, without apprehending, or, at all events, without expressing, any spiritual apprehension of the result, be it what it may.

I have never felt the slightest hesitation in investigating the facts of Nature—well knowing that "truth will never conflict with itself;" no matter how diversified soever may be the points in which we view it. I am far, however, from desiring to make startling propositions to ignorant minds; but, as I address myself, in this, as in former instances, to educated persons, I cannot conceive that evil consequences will any more result than would follow scientific investigations in astronomy, geology and chronology—each one of which has, in its turn, contended against the inveterate prepossessions, not only of the ignorant, but of many of erwise learned and enlightened individuals.

Finally—Dr. Bachman lays great stress on my having changed my sentiments with respect to the origin of the human race. From one position, however, I have never swerved, viz.: that the diversities existing among the different human families have not been acquired; or, in other words, are not the result of climate, locality, food, and other physical agents, but have existed *ab origine*: and, in the early period of my investigation, I was content, as elsewhere expressed, to suppose that the distinctive characteristics of the several races might have been marked upon the immediate family of Adam. More light on this interesting question has compelled me to change my opinion. I was not aware, however, that this was so great a direliction of propriety as Dr. Bachman considers it. It is always humiliating to our pride to ac-

knowledge our errors; but, at the same time, it is, at least, commendable to do so, and the act may even be regarded as a virtue.

We have seen that a number of distinguished clergymen—Wilks Buckland, Sedgwick, Faber, Chalmers, Coneybeare, Pye Smith, Hitchcock, and others—"strove long with themselves to believe" that the phenomena presented by geological investigations could be embraced within the limited period usually assigned to the Creation; "and they did not give up the hope, nor seek for a new interpretation of the Sacred Text, till they considered themselves driven from their position by such facts as we have stated." I cannot see why the privilege of modifying one's opinions is not equally allowable in Ethnology as in Geology; and, if I must be told that my views conflict with Genesis, I reply, in the words of one of the above-named divines: "The apparent discrepancies between the facts of Science and the words of Scripture must be *understood* before we can make any attempt at their removal."

I regret the necessity I have been placed under of publishing this paper and my letter to Dr. Bachman, at the present time. Controversy seldom allows leisure for deliberate examination and induction; and the restricted limits of a periodical journal must necessarily exclude, as in this instance, a mass of materials that are necessary to a proper understanding the subject; and, much that I have further to say on the questions at issue must be reserved until such time as I may find health and leisure for the revision of my Essay, and for the production of a work I have long contemplated, with the title of *Elements of Ethnology*.

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P. S.—To show, in a single paragraph, what I have called the tendency of recent investigations in reference to hybridity, I cannot avoid quoting the following remarks from the work of a distinguished living zoologist:

"With respect to the sheep and goat, they are *so crossed by different species*, so altered by climate and the breeder's art, that it is no easy matter to know what their original stock really may be. The sheep may be the descendant of *several species* of moufflon, interbreeding with each other; and many wild moufflons exist throughout the mountain chains of Asia and Eastern Europe. In like manner, we may regard the goat as of mixed parentage. The same observations apply to our domestic cattle."\*

\* W. C. Linnæus Martin. Natural History of the Horse, p. 14, 1845.

My friend, Dr. Barnes, U. S. A., has been, for many years, stationed in the interior of Texas, where he has had abundant opportunities of obtaining information in relation to the wolves and dogs of that region, and he has kindly given me the following facts, which came to hand too late to be incorporated with the preceding pages.

The *Chihuahua dog* resembles, in size, form and shape of the head, the English spaniel, but has erect ears, like a wolf, and is an indigenous animal. All the Southern Camanche Indians have a cross between this dog and the dusky wolf, (*Canis nubilus*)\* These mongrel dogs breed again with the European dogs; and a female of the latter is so highly prized, for this purpose, that the Camanches will give a mule in exchange for one of them. Dr. Barnes further informs me that the *hairless dog*, another indigenous form, to which I have heretofore alluded, is common in the mining districts, and is remarkable for *always* having a tuft of whitish hair on the top of the head.

Having embarked in this inquiry, with the intention of pursuing it in all its ramifications, I will feel greatly obliged to any one who will forward me authenticated facts in relation to the wolf, the various Indian dogs and their hybrid offspring, together with the skulls of any or all of them, for comparison. Such materials, it will be observed, afford important collateral aids to Ethnology; and I may, perhaps, be excused for adding my wish to extend yet further my collection of *Human Crania*. This series already embraces nearly nine hundred skulls of all the races of men; and it is on the measurement of six hundred and twenty-one of these that I have formed my *Table*, showing the comparative size of the brain in these various races. Being now engaged in extending this *Table*, for re-publication, I will feel much indebted to those persons who can aid my purpose with additional materials.

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Philadelphia, October 26, 1850.

ADDITIONAL NOTE.—The evidence in support of the views contained in this essay increases on every hand. I have just received, through the kindness of Prince Maximilian de Wied, a copy of the two volumes of the *Astrolabe* and *Zélée*, which embrace the *Anthropology* of that celebrated voyage of discovery. The first of these volumes, from the pen of a distinguished zoologist of the Expedition, is entitled, “De l’homme dans ses rapports avec la création : Par M. Hombron.”

\* *C. nubilus* of Say; by some zoologists regarded as a distinct species; but by most supposed to be only a variety of the *C. occidentalis*.—*Rich.*

I feel called upon to quote a few passages from this work, because the author's opinions coincide so fully with my own, that it might be supposed I had derived them from him, without making the acknowledgements which truth and courtesy dictate on such occasions. Suffice it to say that I never saw M. Hornbron's admirable work until to-day; and I gladly avail myself of the following extracts from it:

"The dog, like other animals, has its special representatives in America: thus, there is no reason why we should not consider [some of] the domestic dogs of those countries as the descendants of their indigenous wild dogs. This supposition, moreover, proves to be the fact; for the *crab-dog* of Cayenne, (*Canis* ———,) is a veritable dog. I say, a *true dog*, because it becomes necessary to make the wolf into a separate genus. His habits, when they come to be more closely studied, in the different parts of the old world, will seem to multiply the number of Asiatic and European species.

"Hybrids of the same family, pertaining to animals of different genera, sub-genera or groups, are not endowed with the power of unlimited reproduction; but it is different with species belonging to the same genera or sub-genera; for their hybrids reproduce with each other.

"The camel and the dromedary form a case in point; such is also the fact with respect to the vigogna, the lama, the alpaca, and the guanaco. Among the *solipedes*, the sub-genus *asinus* probably furnishes an example of prolific hybridity without limit. Such, also, has been the origin of our cattle, our sheep, &c., which constitute the races of domestic animals. Every thing goes to prove that the dog forms no exception among the terrestrial animals, and that he, like the others, has had his special source; and I will go further, and say that each one of his various species was separately created."—pp. 85-86.

I have no comment to offer on the preceding propositions. The hybridity of the several species of lama (*Auchenia*) had not before come under my notice; and whether these species be two, three, or four, (and naturalists are divided in opinion on this question,) the facts shall have my early attention.

