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ARTICLE V.

QUATREFAGES AND GODRON IN REPLY TO AGASSIZ ON THE ORIGIN AND DISTRIBUTION OF MANKIND.

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It is about twelve years since Professor Agassiz startled both the religious and the scientific world with his theory of the multiple origin of mankind, through the creation of different races in distinct zoölogical zones. This theory contradicts the biblical account of the derivation of all men from a single pair, and the distibution of mankind into communities and nations from a common centre in Western Asia; and therefore its announcement by so eminent a scientist startled the religious world. The theory also contravenes the generally received doctrine of naturalists, that *species* is defined by lineal descent from a single pair, and supposes multiple protoplasts of one and the same species; therefore it was regarded with surprise and incredulity by the scientific world. The revolutionary bearing of the theory upon the common doctrine of species, is clearly set forth in a recent essay upon "The Origin of Species," by Professor Asa Gray, of Cambridge.[1]

"The orthodox conception of species is that of lineal descent; all the descendants of a common parent, and no other, constitute a species; they have a certain identity, because of their descent, by which they are supposed to be recognizable. So naturalists had a distinct idea of what they meant by the term "species," and a practical rule which was hardly the less useful because difficult to apply in many cases, and because its application was indirect, — that is, the community of origin had to be inferred from the likeness; that degree of similarity, and that only, being held to be conspecific, which could be shown or reasonably inferred to be compatible with a common origin. And the usual concurrence of the whole body of naturalists (having the same data before them), as to what forms are species, attests the value of the rule, and also indicates some real foundation for it in nature. But if species were created in numberless individuals

[1] American Journal of Science and Arts, March 1860.

over broad spaces of territory, these individuals are connected only in idea, and species differ from varieties on the one hand, and from genera, tribes, etc., on the other, only in degree; and no obvious natural reason remains for fixing upon this or that degree as specific, at least no natural standard, by which the opinions of different naturalists may be correlated. Species, upon this view, are enduring, but subjective and ideal. Any three or more of the human races, for example, are species, or not species, according to the bent of the naturalist's mind.

"The ordinary and generally received view assumes the independent specific creation of each kind of plant and animal in a primitive stock, which reproduces its like from generation to generation, and so continues the species. Taking the idea of species from this perennial succession of essentially similar individuals, the chain is logically traceable back to a local origin in a single stock, a single pair, or a single individual, from which all the individuals composing the species have proceeded by natural generation. . . . . From this generally accepted view the theory of Agassiz differs fundamentally in this, that it discards the idea of a common descent as the real bond of union among the individuals of a species, and also the idea of a local origin, — supposing, instead, that each species originated simultaneously, generally speaking, over the whole geographical area it now occupies or has occupied, and in perhaps as many individuals as it numbered at any subsequent period."

Professor Agassiz broached this theory, in this country, first through the pages of the Christian Examiner, for March and July, 1850; and afterwards in 1854, in an essay on "The Natural Provinces of the Animal World, and their Relation to the Different Types of Man," published in the volume of Nott and Gliddon, entitled "Types of Mankind," — the Cambridge Professor having unwittingly allowed his name to be associated with two of the veriest charlatans that ever sought to impose upon the ignorance and credulity of the public with "science falsely so-called." The object of this essay, as defined by its author, is "to show that the boundaries within which the different natural combinations of animals are known to be circumscribed upon the surface of our earth, coincide with the natural range of distinct types of man." Regarding the local circumscription of *faunae*, with the special adaptations of each *fauna* to its zoölogical zone, as proof that every such zone was a distinct centre of creation, Professor Agassiz argues that "the laws which regulate the diversity of animals, and

their distribution upon the earth, apply equally to man, *within the same limits* and *in the same degree;*" and in view of such alleged facts, he insists upon "the probability of an independence of origin of all nations; or, at least, of the independent origin of a primitive stock for each, with which at some future period migrating or conquering tribes have more or less completely amalgamated, as in the case of mixed nationalities." Yet the essay also maintains that the unity of mankind is compatible with such diversity of origin, since "unity is determinal by a typical structure, and by the similarity of natural abilities and propensities."

The following extracts from the Christian Examiner for July, 1850, more fully define his view:

"The circumstance that, wherever we find a human race naturally circumscribed, it is connected in its limitation with what we call, in natural history, a zoölogical and botanical province, — that is to say, with the natural limitation of a particular association of animals and plants, — shows most unequivocally the intimate relation existing between mankind and the animal kingdom in their adaptation to the physical world. The arctic race of men, covering the treeless region near the Arctics in Europe, Asia, and America, is circumscribed in the three continents within limits very similar to those occupied by that particular combination of animals which are peculiar to the same tracts of land and sea. ..... Such identical circumscriptions between the limits of two series of organized beings so widely differing as man and animals and plants, and so entirely unconnected in point of descent, would, to the mind of a naturalist, amount to a demonstration that they originated together within the districts which they now inhabit. We say that such an accumulation of evidence would amount to demonstration; for how could it, on the contrary, be supposed that man alone would assume new peculiarities, and features so different from his primitive characteristics, whilst the animals and plants circumscribed within the same limits would continue to preserve their natural relations to the fauna and flora of other parts of the world?

"If the creator of one set of these living beings had not been also the creator of the other, and if we did not trace the same general laws throughout nature, there might be room left for the supposition that, while men inhabiting different parts of the world originated from a common centre, the plants and animals now associated with them in the same countries originated on the spot. But such inconsistencies do not occur in the laws of nature.

"The coincidence of the geographical distribution of the human races with that of animals, the disconnection of the climatic conditions where we

have similar races, and the connection of climatic conditions where we have different human races, show, further, that the adaptation of different races of men to different parts of the world must be intentional, as well as that of other beings; that men were primitive by being located in the various parts of the world they inhabit, and that they arose everywhere in those harmonious numeric proportions with other living beings, which would at once secure their preservation and contribute to their welfare. To suppose that all men originated from Adam and Eve is to assume that the order of creation has been changed in the course of historical times, and to give to the Mosaic record a meaning that it was never intended to have. On that ground, we would particularly insist upon the propriety of considering Genesis as chiefly relating to the history of the white race, with special reference to the history of the Jews."

Finally, in his *Contributions to the Natural History of the United States*, in the preliminary essay on Classification, Agassiz seeks "to remove from the philosophic definition of species the idea of a community of origin, and consequently, also, the idea of a necessary genealogical connection." Assuming that his theory of multiple protoplasts in distinct zoölogical zones is established, he asserts that "the evidence that all animals have originated in large numbers, is growing so strong, that the idea that every species existed in the beginning in single pairs, may be said to be given up almost entirely by naturalists." And again he speaks of it as becoming "more apparent that species did not originate in single pairs, but were created in large numbers in those numeric proportions which constitute the natural harmonies between organized beings."[1]

Notwithstanding the confident tone of these last citations, the theory of distinct geographical centres of creation, especially as applied to the human races, finds little favor with men of science. Indeed, since the theory was broached, the weight of scientific evidence and authority has been most decidedly in the opposite direction; and luminous and conclusive replies have been made to the speculations of Agassiz by men of the first repute in scientific circles. The object of this Article is to lay before the readers of the Bibliotheca Sacra, in the form of a condensed translation,

[1] Essay, Sec. vi., on Species.

the substance of the criticisms upon this theory lately published by two eminent French savans, Messrs. A. De Quatrefages and D. A. Godron. Quatrefages, a member of the Institute (Academy of Sciences) holds the Professorship of Ethnology in the Museum of Natural History, in the Jardin des Plantes, Paris; Godron, Doctor of Medicine and Science, is Dean of the Faculty of Sciences at Nancy, Professor of Natural History in the same Faculty, and director of the Jardin des Plantes in that city. He is also a chevalier of the Legion of Honor.

Mons. De Quatrefages has lately published a volume of four hundred pages, entitled "*Unité de L'Espèce Humaine.*[1] He discusses the question, *What is man?* as viewed purely in the light of natural history. After a preliminary chapter upon the inorganic and organic "empires" of nature, each of which he subdivides into "kingdoms," he separates man into a distinct *kingdom* (*le règne homminal* ou *règne humain*) differing from the animal as much, and in the same way, as that differs from the vegetable. "Man is an organized being, living, sentient, with the power of spontaneous action, endowed with morality and religiosity." The anthropologic characteristics which distinguish and ennoble this kingdom, are "the idea of *right*, which springs from intellectual superiority, and the idea of *duty*, which springs from morality and religiosity,"—endowments which belong only to man in the wide empire of organized nature. In defining *species*, Quatrefages adheres to what Professor Gray styles the "orthodox doctrine" of lineal succession from a single primitive pair, indicated by the permanent reproduction of certain resemblances. "L'espèce est l'ensemble des individus, plus ou moins semblables entre eux, qui sont descendus ou qui peuvent être regardis comme descendus d'une paire primitive unique par une succession ininterrumpue de familles." Upon this ground he maintains the fixity of species as something primitive and fundamental in nature, varieties and races being marked by

[1] Paris, Librairie de L. Hachette et Co. 1861.

certain exceptional characteristics among the members of the same species. These variations are induced largely by a combination of influences which the author expresses by the term *milieu*, for which *media* is the nearest equivalent, —"the sum of all conditions or influences whatever, physical, intellectual, or moral, which can act upon organized beings." Next follows a chapter upon vegetable and animal races, with an application to the natural history of man. Here the author uses the recent results of exploration in inner Africa to illustrate the gradual transition from one race to another. The nature and the extent of variations in the animal races and in the groups of mankind are then considered; after which the origin of varieties, and the formation of animal and human races are discussed at length. Several succeeding chapters are devoted to the discussion of hybridization and the crossing of races in the vegetable and animal kingdoms, with a special application of the principles evolved to the human races. The conclusion of the author from this line of argument is, that "Humanity throughout forms but one *species;* the groups we there discover are only *races of that species.* To this conclusion we are led, not by a theory, nor by a preconceived idea, nor by a dogma, but solely by scientific observation and experience, applied to the study of man as those are applied to the study of other living creatures; not an observation of a few years upon a small number of isolated facts, an experience bearing upon certain races, animal or vegetable, but observation and experience covering centuries, embracing all species, animal or vegetable, subjected to the action of man. If this method is just, if there is really but one universal physiology, subjecting all organized beings to the same laws, *then there exists but one species of men.*"

From this point Quatrefages proceeds to an examination of objections to the doctrine of monogenism. He shows that the question is one of *taxonomy*, and that by the almost universal accord of naturalists, species, both in the vegetable and in the animal kingdom, is regarded as something fundamental, and essential to organized nature in our geological

era. He considers various examples of crossed races, and analyzes the effects of "milieu" in inducing varieties and races in the one species of man. At length, in Chapter Twenty-one, he discusses the theory of Agassiz, as given above. This portion of the work we shall present almost entire.

The theory of Agassiz is at bottom nothing but that of La Peyrère.[1] The nature of the theory is not changed by adding arguments supposed to be furnished by modern science, to the Biblical arguments upon which the gentleman-theologian almost exclusively rested it in his day. Certainly it is not one of the least curious results of anthropological discussions, that after more than three hundred years of labor, accomplished in the natural sciences, they have led men of unquestionable merit, friends of philosophy and of progress, but carried away by a system, to go back to the opinions of a theologian of the seventeenth century. However, there might be reasons for such a theory in any age; and any opinion revived and advocated in the name of science by a naturalist such as Agassiz, deserves serious examination.

From that exclusively scientific point of view where we have taken our stand, the doctrine of La Peyrère might at first sight appear seductive. It explains quite naturally the diversity of human groups; it contradicts none of the facts that we have set forth; there is in it nothing repugnant to general physiology, our supreme guide in this discussion. Observation, experience, teach us nothing as to the *fact* of the existence of one or many primitive pairs. Scientifically speaking, either alternative is equally possible. If we suppose that several pairs appeared at once, either they were precisely alike, or they presented just the differences that we now remark between races. On this last hypothesis, the distinctive characteristics of race and species already laid down, are found none the less in these original groups.

[1] Isaac de La Peyrère, of Bordeaux, was a gentleman of the house of Condé. He published, in 1655, a book on Preadamite races of men. It made a great noise, and the doctrine being condemned as heretical, he was obliged to retract it.

The question is evidently the same, whether we suppose these groups centred upon one single spot of the globe, or admit that they originated in regions more or less remote, more or less multiplied. Physiology, equally satisfied by all these hypotheses, cannot decide between them. The considerations which have thus far guided our discussion are here entirely at fault, and to invalidate or to establish the hypothesis of La Peyrère, it is necessary to have recourse to quite another circle of ideas. This, Agassiz has done. Reproducing the opinion of his predecessor, or rather, doubtless, having arrived at the same belief by an entirely different method, he founds his whole doctrine upon *zoölogical geography*.

This doctrine has placed this distinguished naturalist in a singular position. Agassiz resolutely insists that in his view there is but one species of men. He ought, then, it would seem, to be welcome among the advocates of the unity, and in bad repute among those who believe in the multiplicity of species. Well, just the opposite has happened. He is enthusiastically extolled by the polygenists, and most vigorously assailed by the monogenists. The latter openly denounce Agassiz as a turncoat, and give him to understand that, in order to gain with the Southern States the high position that he has held for several years, he has not hesitated to modify the opinions he had avowed in Europe; that at least he has endeavored by a sort of subterfuge, to conciliate passions which are so much the more exacting because they have at bottom very positive interests.

For ourselves, we do not hesitate to say that these imputations are without foundation. The whole life of Agassiz is a protest against the motives that are imputed to him. In Europe, he has made for science material sacrifices that his friends had a right to consider extreme; quite recently, he has refused the high position that the French government would not have failed to give him, if he had consented to come and occupy the Museum. We are fully convinced that calculations of interest have not

in any way influenced the opinions of a *confrère* as honorable as he is justly celebrated. Besides, to look at it from that point of view, what would Agassiz have lost by avowing the purest monogenism, if such had been his conviction? A professor's chair in the Slave States? But he would quickly have found another in some university of the Free States, and surely these would have been happy to welcome and indemnify the *savant*, who, by his lectures and his writings, has diffused throughout the United States the taste—the passion, one might say—for natural science.

It must be obvious, however, that to be hailed with transport by the polygenist, and rejected even with violence by the monogenist, a doctrine which admits the unity of the human species must at least involve obscurities and contradictions. Both in fact are found in it; and to explain such defects in a theory emanating from a man of so much consideration, it is necessary to go back to his previous works. There we discover that Agassiz has never given an exact description of *species*, *race*, *variety*. This naturalist begins where Cuvier ended, with Palaeontology; and in those of his works whose object is the study of living animals, we find almost always something of the first impressions which extinct animals have left upon him. Here, without doubt, is the first cause of all that one can object to in the anthropological writings of Agassiz.[1]

In 1840, in his *Principles of Zoölogy*, Agassiz appears to

[1] The proneness of Prof. Agassiz to theorize is at once evident in his lectures and his published works; and one can trace in these the influence of his Palaeontological studies upon his speculations touching the species of our own geological era. The reader may verify this statement of Quatrefages, by examining the views of Agassiz on species, in Chap. II. sect. vi. of his Essay on Classification, in his "Contributions to the Natural History of the United States," and again in the Atlantic Monthly for April, 1862, p. 455. While he objects to the prominence given to species in scientific classification, and denies that "sexual connexion, resulting even in fertile offspring, is a trustworthy evidence of specific identity," and while he enumerates some nine or ten characteristics of species, he nowhere gives a scientific definition of the term. Yet after underrating species as a basis of scientific study, he affirms that "species are created by God," and asserts their immutability during immense cosmic periods. It is difficult to obtain from Agassiz's writings his own idea of species.

define species as "the last term of classification, at which naturalists stop." Certainly no botanist, no zoölogist, *practised in living species*, would accept this general statement. Its author takes the effect for the cause. Species existed before naturalists were arrested by it. The classifier stops when he finds it; he does not make it. The terms used by Agassiz, on the contrary, would make species nothing but a consequence of classification, a conventional group, resting only upon slight morphologic differences. In the same work, Agassiz regards man as belonging to one *species;* but at the same time he admits *races* distinguished from each other by slight *primitive differences*, becoming more and more pronounced under the influence of diversity of food, of climate, of customs, etc. To a mind disposed to see, in species, nothing but a group almost artificial, existing only in form, what could races be, separated by *original differences*, but *species of species?* Even then it might have been said that Agassiz was oscillating between the doctrine of unity and that of multiplicity, and attempting to mix two ideas that reciprocally exclude each other.

This tendency became more evident in a *Sketch of the Geography of Animals*, published in 1845. "All organized beings," Agassiz then said, "have a limited area. Man alone is spread over the entire surface of the earth; animals as well as plants are restricted within fixed boundaries," while man inhabits every climate. The totality of plants and of animals inhabiting any such region are known as its *flora* and *fauna*. From that time Agassiz has believed it possible to establish a certain coincidence between the limits of faunae and the space occupied by certain human groups; he already ascribed to one identical primordial cause the distribution of animals in *species*, of humanity in *races*, upon a given territory, and allied thus intimately the diversity of human populations with that of faunae. "But," he added, "this diversity, which has the same origin, has it the same signification with man as with animals? Plainly not. While animals are distinct species in the different zoölogical provinces to which they belong, man, in spite of the diver-

sity of his races, constitutes but one and the same species over the entire globe. In this respect, as in so many others, man appears as an exceptional being in that creation, of which he is at once the object and the end."[1]

Here the author affirms, more distinctly than before, the two opposite opinions that he strives to combine. Thus the contradiction becomes more palpable; and in order to harmonize his theory with the facts, he is obliged to admit that man is an *exceptional* being, in a question purely of natural history and of physiology. This work, published in Europe, contained the germ of the whole doctrine which Agassiz has since developed in America.[2]

Reduced to simple terms, the theory of the Cambridge professor contains nothing, we repeat, incongruous with the ideas we have expressed upon race and species. If in all other respects it were found to accord with the facts furnished by observation and experience, we should be compelled to regard it as an ingenious hypothesis, no doubt very difficult to demonstrate, but no less difficult to contradict; it would be put in the category of those *possibilities* with regard to which one would not pronounce with confidence. But on the one hand, this accordance does not exist, and the opinions of Agassiz are in diametrical opposition to the laws of that department of science by which he believes them to be sustained — the laws of *zoölogical geography;* and on the other hand, the manner in which he presents his opinions as a whole, the arguments that he uses to prove their correctness, make of his doctrine a true polygenism, hardly disguised by the contradiction that we have already detected, and that here becomes striking. No one in America is deceived by it, and the disciples of Morton least of all. So Nott and Gliddon have welcomed, with open arms, the eminent auxiliary who has gone over to them. The memoir of Agassiz figures in the place of honor, at the head of their great work. In this essay we meet, at the outset, a fault

[1] Revue Suisse de Neuchâtel.

[2] As this theory has already been given in the words of Agassiz, we here omit the statement of it by Quatrefages.

easy to foresee, the absence of precise notions of *species*, *race*, and *variety*. The author states the question well, and in the fairest manner, but he answers it in a vague and unsatisfactory way, little in harmony with the actual state of science.

Agassiz formally excludes from the definition of species all idea of reproduction. He sneeringly rejects the idea of the *filiation of existences*, of which all great minds since Linnaeus and Buffon have so well comprehended the importance. He does not distinguish mongrels (*métis*) from *hybrids;* and speaking of the latter, he says in so many words: "it matters nothing for the question, whether hybrids have or have not an indefinite fecundity between themselves." Now from Buffon to Müller and to M. Chevreul, all zoölogists, all physiologists, all the thinkers who have touched upon these questions, have admitted, as one of the most fundamental points, the necessity of knowing whether this fecundity was or was not unlimited. In advancing opinions so contrary to those which *all* the princes of science have professed, he should at least have given the reader some good reason for this new manner of viewing the subject. On this point Agassiz says not a word.

The notions of time, of filiation, of degrees of fecundity, being thus pruned from the idea of species, Agassiz renounces his old definition and adopts that of Morton, which he develops in the following terms: "*Species* are distinct forms of organic life, whose origin is lost in the primitive establishment of the existing order of things; and *varieties* are such modifications of species as may return to the typical form, under temporary influences." Here we see that *form*, only, the *actual* form, is all that in the eyes of Agassiz constitutes species. In all this part of his work, the author speaks like the most decided polygenists, and is open to precisely the same charges.

But here is something still more grave. Agassiz well puts the question: What is race? But he does not answer it. Like all polygenists, he does not define the word upon which the whole discussion hinges, and yet he avows him-

self ready to prove "that the differences existing between the human *races* are of the same nature with those that separate the families, genus, and species of simia or other animals." He develops this idea and adds: "the chimpanze and the gorilla do not differ from each other more than the mandingo from the negro of Guinea; and neither differ more from the orang than the malay and the white differ from the negro." In the mouth of a *naturalist* who has reduced the idea of species to a question of forms, is not this language as explicit as possible? Is it not evident that these *human races* are nothing else than *species*, and that nothing remains but to divide humanity into families and genus, as is done with *simia*, which do not differ from each other any more, nor in any other respects, than do men? No, indeed! For Agassiz declares yet once more that, in spite of all these differences, men are none the less of the same species; but this profession of faith in absolute contradiction to all that precedes it, cannot remove from his work its essentially polygenistic meaning. But placing ourselves on the ground chosen by Agassiz, upon the ground of *zoölogical geography*, accepting for a moment all his ideas, however contradictory they may be, is it possible to harmonize his theory with the results reached by science, apart from all anthropologic pre-occupation? By no means. This we shall now endeavor to prove in approaching the geographical question.

Agassiz bases his theory upon the application, to man, of the doctrine of *centres of creation*. That doctrine we accept as well as he. Indeed, whoever will keep aloof from every consideration foreign to science, and hold himself to what observation and experience teach, will admit that all animals and plants could not have originated at one and the same spot on the globe.[1] Observation teaches that every extensive region has its species, its genera, its peculiar types; and experience continually proves that certain species can be transported from one region to another, and there live and

[1] In this concession Quatrefages is not sustained by such naturalists as Sir Charles Lyell and the late Professor Edward Forbes.

thrive. In that case, the conditions of life in the new region agree with them; and if man has not found certain species in any given region, it is because they could never have existed there. To explain the actual distribution of animals by supposing *one common centre of creation*, we must choose between two hypotheses equally untenable scientifically. Either we must admit the transformation of primitive species, and the formation of new species under the force of present conditions (and Darwin himself does not go to that extreme), or we must admit the total extinction of a multitude of species which disappeared between the point *de départ* and the point *d'arrivée*, — a view which palaeontology expressly contradicts. In fine, physiology and experience teach that the polar species could not have lived for a moment, by the side of the equatorial species; *a fortiori*, therefore, all existing species could not have lived together, side by side, during the time necessary to bring about the separation and the distribution (*cantonnement*[1]) of each. Thus everything concurs to prove that, from the beginning of the present era, animals have appeared at different points, in *multiple centres of creation.* But in accepting this doctrine, one cannot divorce from it the results admitted beyond controversy by naturalists who, without thinking of man, have laid down the principles of *zoölogical geography* in works bearing upon several of the great divisions of the animal kingdom. Such naturalists and such works are numerous. In the first rank we still place Buffon, with his admirable researches upon mammifers, extended and confirmed by those of Geoffrey St. Hilare, Desmarets, Isidore Geoffrey, etc. Then follow Mons. Duméril and Bibron, master and pupil, who have studied reptiles from the same point of view; Fabricius and Latreille, those two princes in entomology; Maclay, Spence, Kirby, Lacordaire, who have also made insects the object of their investigations; Mons. Edwards, whose work upon the geographical distribution of crustacea is a true model; and a host of other savans whose

[1] *Cantonnement*, a word derived from the distribution of troops in quarters: "The troops were *cantoned* in various villages."

studies have borne upon less extended groups. From the whole range of these researches a certain number of general facts or laws may be selected, which ought to bear out the theory of Agassiz, if that is true. But so far is this from being so, that it is easy to establish an entire disagreement between these laws and the proposed theory.

And first, Agassiz conceives of the centres of creation themselves as something much too absolute. With him the influence of these centres is general; it extends to *all* the products of a region, and establishes between them direct relations, whether they belong to the land, to rivers, or to shores. In his idea, men, plants, birds, mammifers, insects, fishes, and crustacea, whether marine or fluvial, are all brethren, in the sense of being children of the same soil. He seems to see in forms, human, animal, or vegetable, the product of a unique local force impressing upon all existences a kind of *cachet*, which attests their community of origin.

This *datum* is inexact. If it seems to be verified at certain points of the globe, and when one examines only a very small number of groups, it is at fault as soon as one takes *all* into account. New Holland, for example, whose mammifers are separated so distictly from those that one sees anywhere else, and which in this point of view forms, with some little islands, a region so special, loses this character when one compares its insects with those of New Zealand and of New Caledonia. In its mammalogy, it forms a centre perfectly distinct and isolated; but by its entomology, Mons. Lacordaire has united it with the whole Archipelago. Such facts become still more striking when we compare the tenants of the air with those that live in the water, or even the latter among themselves, when two different seas are separated by a small extent of land. At the isthmus of Suez, the aerial faunae are almost identical upon the coasts of the Red Sea and of the Mediterranean; the marine faunae, on the contrary, are extremely unlike upon the opposite coasts. M. Edwards has not found a single crustacea common to both. Thus tested by facts derived

from animals alone, the fundamental idea in the doctrine of Agassiz is contradicted by the result of observation.[1] Let us see, then, how it fares when applied to the history of man.

Among the facts universally admitted in zoölogical geography, — facts which Agassiz himself states in this work, are the two following: (1) all the great centres of creation are characterized by certain *types*, — embracing a number of species, of genera more or less considerable, — types which are peculiar to them or hardly represented elsewhere. Thus New Holland is essentially the country of *marsupialia*, America of *edentata*. (2) Between two centres of creation really distinct, there are almost no common *genera*, still fewer common *species*, and the characteristic differences are more and more marked in proportion as one examines the higher groups. For example, taking the the old continent and the new throughout, we have two zoölogical regions, the most extended that it is possible to compare. Now these two regions possess, in common, only five or six genera of bats, and but one species of the same group. Not a single genus, much less a single species, of simia is found, at the same time, in both. New Holland forms, with these two regions, a contrast still more striking. But one finds men none the less in America and in Australia, as well as in Asia, in Africa, and in Europe. Now these men, according to the polygenists, form a genus composed of several species. If this were well founded, it would follow that the *genus*, or rather the *type*, the most profoundly marked, will have produced itself in *all* the centres of creation, instead of characterizing one only, like the source of the edentata or the marsupialia. According to Agassiz, man forms only *one species*, but his *multiplied races* have originated at all points of the globe. If Agassiz were in the right, this *species*, the most exceptional of all that organized nature presents, has

[1] Since the work of Quatrefages was published, a highly interesting sketch of the fauna of the Red Sea has appeared in Petermann's Mittheilungen (Jan. 1861), th. v. Heuglin's Forschungen über die Fauna des Rothen Meeres und der Somáli-Küste. The geology of the isthmus is well treated in the "Percement de L'Isthme de Suez," par M. Ferdinand de Lesseps.

appeared in zoölogical regions the most distinct: in the old and the new continents, which have not a single simia in common, as well as in Australia, which has no simia at all!

It is impossible to imagine a disagreement more complete with the laws that we have brought to mind, laws that may be regarded as the most absolute, the most general of zoölogical geography. The *mitigated* polygenism of Agassiz and his disciples is in contradiction with zoölogical geography, as the *pure* polygenism of Desmoulins, of Morton, and others, is with zoölogy properly so-called, with physiology. Evidently the ideas that we are combatting were formed under the impression produced by certain coincidences that could hardly fail to manifest themselves. The grand centres of creation have in general features (*milieux*) not less characteristic than their fauna or their flora. It is not surprising that these have impressed upon the human race formed under the influence of such surroundings something special. In this sense, this *something* is the product of a local force. The coincidence which the circumscription of fauna and flora presents, in certain cases, with that of human races, is very naturally explained by those influences of *milieu* that are found everywhere in anthropology, and which are so strongly contradictory to the polygenists. These coincidences, which have misled Agassiz, and which afford him an argument almost unique, are very far from being as general and as complete as this *savant* supposes. To satisfy ourselves of this, it is enough to examine upon zoölogical principles (*en zoölogiste*) the chart and diagrams that accompany his memoir.

Agassiz makes eight principle centres of creation, which he calls *zoölogical kingdoms*. These are the Arctic, the Mongolian, the European, the American, the Negro, the Hottentot, the Malay, the Australian. This distribution is arbitrary in certain respects; we nevertheless accept it as the author gives it, thus placing ourselves exactly upon the ground that he has laid down. Thus the American kingdom comprehends the entire new continent; and the red-

skinned man of the United States is, with the author, the human type of that region. But with all zoölogists, with all botanists, America forms at least two centres of creation perfectly distinct. The study of animals and plants leads then to a different distribution of organized existences from that involved in the theory that we oppose. It is true that Agassiz divides these kingdoms into zoölogical *provinces*, and subdivides these yet again. In the course of this work, and especially in his publications which have followed it, he states with reason that *the American man* presents numerous modifications; with him each of these modifications characterizes one of those *races* which he has made as like as possible to *species*. By virtue of his theory, if these races were created on the spot, if they are the product of the same local force which has given birth to animals of the same region, in order to be faithful to the laws of zoölogical geography, they ought to exhibit relations with those of other centres of creation exactly like those which unite the animal species. Yet precisely the contrary appears, and that even in America, where the doctrine that we are combatting had its origin.

In fact, what do zoölogists teach us, who, preoccupied with no theory, have studied the distribution of animals? All agree in declaring that, in the old and the new continents, not only the northern, but the temperate regions also, present striking resemblances in their zoölogical inhabitants. North America possesses a large number of genera, several species even, which are common to Europe on the one hand, and to Asia on the other; in North America, as in Europe and Asia, one finds almost always the same types, and this even among the mamifers, that is to say, the class most elevated in organization. South America, on the contrary, whether compared with Asia or with Africa, constitutes a zoölogical centre far more distinct. Characteristic types appear upon all sides; common genera diminish in a very striking proportion, and we find almost no species in common. Thus, considered as a centre of *animal creation*, North America is almost confounded with Europe and

Asia, while South America is completely separated from both, as well as from Africa.

But when we consider these two halves of the new world as centres of *the creation of man*, precisely the contrary appears. Be it that the red man of the United States is much less isolated from other races than polygenists in general admit, he is none the less the human type most characteristic of the new continent, and therefore Agassiz figures him as the representative of the people of his American zoölogical kingdom.[1] Well, he inhabits precisely that North America where are the fox and the beaver of Europe, and where are found nearly all our principal genera of carnivorous animals. In South America, on the contrary, are found men of a yellow color, with projecting cheek-bones, with eyes contracted and oblique, so like the Asiatics that they themselves recognize the resemblance, and at first sight call the Chinese their uncles. On the same soil live other nations, which, though not so white as an Englishman or a German, have a clearer color than we commonly see in Spain and Italy. Mons. Augrand has also met natives resembling the Canarians. Thus, considered as a centre of *human creation*, North America isolates itself both from Asia and from Europe, while South America almost blends with Asia, and even approaches Europe and Africa. The men of the new continent have, therefore, with the men of the old world geographical affinities, in an order exactly inverted from that established between animals of the same regions. Upon all these most fundamental, most essential points, the theory we are combatting is thus at variance with facts. We might rest here; but it is well to follow out at least one of its applications in detail, the better to demonstrate its weakness.

We have seen that Agassiz divides the terrestrial globe into eight zoölogical kingdoms, and that the first of these grand divisions is the *Arctic kingdom*. This comprises all the barren lands which, both in the old and in the new continent, lie beyond the limits of the forests. It is bounded

[1] See the zoölogical chart furnished by Agassiz for Nott and Gliddon's "Types of Mankind."

on the south by an undulating line lying mainly between the sixtieth and the sixty-fifth degree of latitude. Certainly no region presents a combination of circumstances more in harmony with the views of Agassiz; the general conditions of life are almost identical over this vast extent, because *cold* controls and dominates all others. Yet no more there than elsewhere do we find confirmed the coincidences promised by this theory. Agassiz characterizes this kingdom by the presence of five mammifers and a bird, which are consequently with him the *corresponding geographical limits* of the Esquimaux, regarded by the author as the type of *the boreal man.*

The Esquimaux and the races which have the most general resemblance to them, are in fact pretty much restricted within the limits indicated by our author; but whoever will rightly estimate the action, at once so uniform and so powerful, which the polar climate must have upon man, will see that this could not be otherwise. That climate does not act only in a direct way by its temperature, it imposes upon all its inhabitants manners, habits, a mode of life, a diet, almost entirely the same. Is it surprising, then, that there should be among those inhabitants very strong resemblances, a likeness almost complete? Plainly the doctrine of the influence of *milieu* is sufficient to account for this fact, which we admit without reservation. But does it follow from this that the boreal human races are connected with the animals that surround them, in the way that Agassiz maintains — that they so intimately approach the fauna? No. Among the mammalogical species that Agassiz has selected as the most suitable representatives of the polar fauna, two only, the white bear and the walrus, really belong, in type and as species, to the glacial regions. As a species, the *phoca* of Greenland belongs equally to those regions; but the genus of which it is a part is found in all the seas of Europe, and its type exists throughout the globe. The reindeer and the true whale are still more unfortunate selections. The latter belongs to a genus which has its direct representatives in nearly all seas, and in the Middle Ages it

frequented the coast of France. If at this day it is found only within the polar zone, it is because it has been hunted out from every other. The same is true of the reindeer, which in the time of Caesar inhabited the forests of Germany, and which even now, where it has not been exterminated, descends more than twenty degrees south of the limits assigned to it by the theory we are combatting. As to the eider, selected as representing the birds of the pole, it builds its nest every year in Denmark, twelve or fifteen degrees south of the polar circle. Thus of the six animal species sketched in the chart of Agassiz, and which are supposed to represent most faithfully the fauna of the Arctic kingdom, three at least may be regarded as belonging almost equally to the region which he calls the European kingdom. However, Agassiz has certainly selected the examples best fitted to support his doctrine, and science could offer nothing better to his choice. That a naturalist so eminent has succeeded no better, is evidence that the thing was impossible.

In fact, notwithstanding a small number of special traits, the fauna of the polar regions is plainly but an extension of the fauna belonging to the great centres, in Europe, in Asia, in America, which lie contiguous to those regions. This is the result obtained even from the small number of examples chosen by Agassiz among mammifers and birds. The study of insects leads to exactly the same results. Says Mons. Lacordaire, in his *Introduction to Entomology*: "the polar region is characterized less by the *spécialité* of its entomological products than by their small number." Hence we see that, in spite of certain appearances almost purely local, no more at the pole than at the equator is there a real accordance between the geographical distribution of animals and that of human races.

Quatrefages next speaks of the temptation of Agassiz to depart from purely scientific argumentation, through his laudable desire to popularize science in America; and more than hints that, had he been writing for the scientific world, he would not have deigned to resort to the arguments which

he addresses to the general public in his letter to Nott and Gliddon. He also replies briefly to the unscientific view of human language into which Agassiz is betrayed by his theory of multiple centres of creation — a point which we shall notice further on. In conclusion, he says: "Man comes under the general laws that govern all living beings. All the great centres are characterized by some special type. The zoölogical provinces, the secondary centres even, have their genera, their species which are peculiar to them. Man, that type apart, that species privileged among all, even if we see in him nothing but a physical being, — could he have originated at the same time in every place? No; for then he would have constituted an altogether unique exception, of which we do not yet know an example. Therefore, when we have affirmed — what zoölogy and physiology demonstrate — that 'all men form but one species;' we can add, 'This species originated in one single country of the globe, and *probably* that country was proportionally limited.'

"Where is that corner of the earth from which came forth the being who should subdue all other creatures, and even constrain to his service the brute forces that govern inanimate matter? This is not the place to examine this question in detail. We are restricted to the answer that everything points toward central Asia as the first cradle of man, as the point whence, radiating upon every side, the tribes of men took their departure to people the most distant solitudes."

Turning from Quatrefages to Godron, we find some additional thoughts of value, in reply to the theory of Agassiz. Godron's work is in two volumes octavo, of more than four hundred pages each. It discusses the question of species and of races in organic nature, and with special reference to the differences between plants and animals in a wild state, and when domesticated by the hand of man. It demonstrates the fixity of species in the geological periods that preceded the creation of man, and also in all wild plants and animals since man appeared upon the globe. It then proves that, notwithstanding the modifications produced by domestication, the species of animals and plants still retain their most

important and exclusive characteristics; that man, while he forms a class, and psychologically a kingdom apart, is subject to the same physiological laws with the animal creation; that the organic and physiological differences observed in different varieties of men, are analogous to those which exist under every species of domestic animals, and which, being neither primitive nor permanent, do not invalidate the unity and continuity of the species itself; therefore, there is but one single species of man. After this elaborate and masterly discussion, the author takes up the theory of Agassiz, and replies to it as follows (II. 408 – 412):

"Zoological geography, whose testimony is invoked in support of this theory, proves, as it seems to us, quite the contrary of that which it is brought forward to establish. If some authors deny that all men belong to one and the same species, there is no one who would refuse to admit that all human varieties form one, and only one, natural genus. But what genus of mammifers is met with, all at once and originally, in every country of the globe? Of two hundred genera of mammifers there are one hundred and sixty which have their habitat limited to a single country and under a single zone. There are twenty that inhabit both the torrid and the temperate zones, but which are excluded from the northern zone. There are twenty, however, which are spread over all zones, and which seem to constitute an exception; but this exception is only apparent; for these genera are not indigenous in every place where we find them, and they consist of domestic animals, or of small mammifers, such as rats, mice, etc., which man unwittingly has everywhere introduced with himself. It is not only as species that the mammifers of Australia differ from those of other continents; it is as genera, and even as families. Whence we should conclude, with as much reason as the advocates of the opinion we are combatting, that the Australian man ought to be of another genus from ours, if he was really autochthonous.

"It is true, indeed, that wild animals have geographical limits, clearly defined for each species; limits which they do

not pass over, at least not of their own accord. This stability is a law applicable to wild animals, which, following only the impulse of their natural instincts, have no motive to leave the places of their birth; and yet it is necessary to except several species that perform regular migrations. But this law does not apply to domestic animals, now spread over all parts of our planet, a great number of whose species are certainly not indigenous. It is by the agency of man that the ox, the goat, the sheep, the horse, the ass, the hog, the dog, the cat, the hen, have been disseminated in all inhabited lands. But if man has been able to modify the laws of zoölogical geography in that which respects the animals subject to his dominion, why may he not have done this in that which concerns himself? The laws of zoölogical geography could not fetter the will and the liberty of man, nor hinder the workings of his adventurous spirit. History and tradition have preserved the memory of great migrations of people, and the colonies established within three centuries, in almost all countries of the globe, are flagrant exceptions to the law upon which this novel doctrine professes to rest. The reasoning upon which its advocates rely, is based entirely upon the idea that all parts of the earth were primitively and originally peopled by the nations now found upon them, — an hypothesis which should first be transformed into a rigorous demonstration. To prove that the American man is primitive in the new world, that the Australian had in New Holland his special centre of creation, that the Polynesian is autochthonous in his islands, it is at least necessary to prove that the presence of man in these countries is not the result of migrations, which have taken place in all ages. The instinct which attaches the animal to the soil, in man is conquered by intelligence, by the passion for discovery, by the desire of wealth, by the need of procuring, more easily, the means of subsistence; in fine, by some imperious necessity." From this point Godron gives the evidence of human migrations, and concludes that the whole earth was peopled from a common center.

The scientific reader will be interested in a recent essay

upon the permanence of species, by the Bavarian naturalist H. Wagner, published in the *Sitzungsberichte* of the Royal Academy of Munich for 1861 (I. Heft III., pp. 308 – 853). The writer discusses at length the views of Nathusius, Darwin, Geoffrey St. Hilare, and Agassiz; and gives his conclusion in favor of the commonly-received doctrine, — that in the idea of species are included all those individuals that are derived from their like, and that reproduce their like. Or, defining the term somewhat more sharply with reference to organized beings, "the collective total of individuals which are capable of producing, one with another, an uninterruptedly fertile progeny, constitutes a species." Wagner repudiates the views of Agassiz, and declares his hearty agreement with Godron, especially upon the important question of the unity of mankind. The theory of Agassiz, in the twelve years in which it has been before the public, has signally failed to receive the suffrages of leading men of science. Indeed, the principles laid down by Prof. J. D. Dana, in his Thoughts on Species (in the Bib. Sacra, vol. xiv. p. 866), seem conclusive upon the whole subject. The grounds upon which Agassiz denies community of origin to mankind, would compel us to regard the different races of men as distinct *species*. But, says Dana: "Man, by receiving a plastic body, in accordance with a law that species most capable of domestication should necessarily be most pliant, was fitted to take the whole earth as his dominion, and live under every zone. And surely it would have been a very clumsy method of accomplishing the same result, to have made him of many species, all admitting of indefinite, or nearly indefinite, hybridization, in direct opposition to a grand principle elsewhere recognized in the organic kingdoms. It would have been using a process that produces impotence or nothing among animals for the perpetuation and progress of the human race."

It remains only to say a word touching the cavilling tone in which Professor Agassiz has seen fit to speak of the evidence that language affords of the unity of mankind. In his essays in the Christian Examiner, in his letter to Nott and

Gliddon, and more recently in his Articles in the Atlantic Monthly, Agassiz speaks of "the evidence adduced from the affinities of the languages of different nations in favor of a community of origin," as having no scientific value. He compares such affinities to the resemblances in the notes or cries of birds and animals of different species. "Similarity of vocal utterance among animals is not indicative of identity of species; I doubt, therefore, whether similarity of speech proves community of origin among men."[1] He thus ignores the intellectual characteristics of language as the vehicle of thought, and its philosophical structure in the various and often complicated systems of grammar, — in a word, all that makes it language, — and reduces this most marvellous creation of the human mind to a merely instinctive and physical process of vocalization! In reply to such a view of language, it is enough to quote the noble, the inspiring words of one of its greatest masters: "However much the frontiers of the animal kingdom have been pushed forward, so that at one time the line of demarcation between animal and man seemed to depend on a mere fold in the brain, there is *one* barrier which no one has yet ventured to touch, — the barrier of language. . . . . We cannot tell, as yet, what language is. It may be a production of nature, a work of human art, or a divine gift. But to whatever sphere it belongs, it would seem to stand unsurpassed — nay, unequalled in it — by anything else. If it be a production of nature, it is her last and crowning production, which she reserved for man alone. If it be a work of human art, it would seem to lift the human artist almost to the level of a divine creator. If it be the gift of God, it is God's greatest gift; for through it God spake to man and man speaks to God in worship, prayer, and meditation."[2]

[1] Atlantic Monthly, April, 1862.

[2] Max Müller, Lectures on the Science of Language, Introduction.