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Author(s): HHC

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analysis of Mr. Bell's geographical labours. We consider our duty to have been accomplished in recommending the work ; but, as a proof of their originality, we would request a perusal of any of the chapters, for example, the account of Iceland, in the faithful description of which, excepting a few of the leading physical features, as its spouting springs, mountains of snow, and volcanoes, it would be almost impossible to recognize the former undefined pictures given of a country, where literature dwelt amid bleak rocks and a stunted vegetation—when she was degraded in the rest of Europe, and had been forced to abandon the forum and academic groves of a much fairer sky.

The next volume will embrace countries whose geographical or statistical details it will not be so impossible for us to enter upon ; and we shall therefore make a point of noticing the progress of this system, and pointing out the critical opinions of a man who has made geography a constant, an arduous, and a successful study.

Review of the Recent Discussion, before the Academy of Sciences in Paris, on the "Unity of Organization."—Part II. M. GEOFFROY ST. HILAIRE'S ANSWER to BARON CUVIER.

M. CUVIER, having analytically considered the theory of M. St. Hilaire, as detailed in our last Number, required a rigorous determination of the language employed by M. Geoffroy, pleading that if, by "unity of composition," *identity* in its strict sense be meant, the statement is opposed by the evidence of our senses ; whilst if it convey an idea of *resemblance, analogy* alone, it is true to a certain extent, but as old in principle as zoology itself.

At the next sitting of the Academy, M. Geoffroy was prepared with an explanation and advocacy of his views, in answer to M. Cuvier's interrogatory strictures. The author of the "theory of analogies" has never made any distinction between the two ideas, "unity of composition" and "unity of plan," and did not employ the terms in their rigorous acceptation. Conducted by observation alone to the conclusion that animals are formed upon the same system of composition, he has called the principle which expresses this idea, the principle of *unity of organic composition*. "Doubtless," observed M. Geoffroy, "to be perfectly exact, it would have been better to name it a principle of 'unity of system in the composition and arrangement of organic parts.' But I wanted a name, and I could only obtain one by the contraction of this phrase, in the same manner as we employ 'criminal tribunal,' instead of a 'tribunal established for the trial of criminal causes.'" Much might be said in favour of the expression "unity of organic composition," even to justify the *unity*, more particularly attacked. Did not Leibnitz use this term in the same sense when he defined the universe "unity in variety ?" but, continued the Academician, let us leave the words and occupy ourselves with things.

Whether the expression of M. Geoffroy be exact or not, his meaning could not be mistaken. He wished to say, that all animals are the products of the same system of composition, and result from an assemblage of organic parts which are constantly repeated.

But, "explain yourself," it has been said. "Do you speak of absolute identity, or simply of analogies of resemblance?" M. Geoffroy answers, that he has never pretended to speak of anything but analogies of resemblance. "Then you have told us nothing new. And, far from having placed zoology on a new foundation, as you pretend, you have only repeated a principle known to Aristotle, and the confirmation of which has been the object of all naturalists worthy of the name."

That the first germ of the *theory of analogies* may be found in Aristotle, M. Geoffroy is far from wishing to deny. Indeed he has always been careful to point out the writings of this great man as the first source of the doctrines which he proclaims; and, as M. Cuvier has remarked, he is by no means the first who has sought to develop and apply the ideas entertained by the Greek philosopher.

In the year 1555, Belon placed together the skeleton of a man and that of a bird, with the view of observing the correspondence of parts between the two species.

Bacon, in his *Novum Organon*, declared the most indispensable quality of a naturalist to be "a certain active sagacity which would enable him to seize physical *conformities*."

Newton, who had embraced with so much genius the relations of conformity in the planetary masses, did not doubt that the animal organization was regulated by a similar uniformity. *In corporibus animalium*, he said, *in omnibus fere similiter posita omnia*.

Must we conclude from these concessions that MM. Cuvier and Geoffroy are almost agreed? Certainly not; and the difference between them is greater than even M. Cuvier supposes.

In the first place, what is found in the works of Aristotle relative to this principle, is evidently confined to an expression of very confused generalities, some true and others false. Superior minds appropriate the former, and labour to develop them; but the latter have only been echoed by those who confine themselves to the study of differences.

As to M. Geoffroy, he has not limited himself to the reception of his ideas from Aristotle; he has sought the truth from nature herself; he has interrogated facts, and has descended into the examination of the most minute details, and his conviction is the fruit of personal study. A more attentive examination, and a new mode of investigation have shown him resemblances where heretofore nothing but differences had been perceived. The differences between the naturalists who still maintain the ancient ideas of the Aristotelian school, and those who adopt the theory of analogies as taught by M. St. Hilaire, are immense. The ancient school admits, with M. Cuvier, the analogy of organs only to a certain extent. M. Geoffroy, on the contrary, sees no exception to his great law.

Where M. Cuvier believes the chain to be broken, M. Geoffroy finds always the same relations, but more difficult to be seized.

But this is not all. The elements upon which M. Geoffroy thinks that the resemblances of organization ought to be established are altogether different from those which have been elsewhere adopted: the *forms* of parts and their *functions* have been with others the especial objects of examination. Hence it resulted that the veterinary surgeons, the ichthyologists, indeed all those who treat of particular animals, constantly make use of different language, under the supposition that they are occupied with organs peculiar to the animals which are the objects of their study.

Every one knows that things were in this state when M. Geoffroy St. Hilaire proclaimed a principle, which far from enlarging the received bases of zoology, far from confirming or perfecting the received opinions, tended to their entire overthrow. This principle consisted, in short, in the total rejection of every deduction drawn from the consideration of forms and functions, and in regarding anatomy as the only true foundation of all zoological research. Form, said he, is fugitive from one animal to another, and functions are no less so, since they increase with the bulk, whilst all other things remain the same in the animal which undergoes this change.

Man, at his birth, has the same parts as the adult; what a difference, however, in the functions which these parts fulfil! Let us give another more striking example, which will show how accurately it may be said that there is a *unity of composition* in certain parts which exist under very varied forms, and perform different functions. The composition of the lower part of the anterior limb of the mammalia is regarded as identical in the theory of analogies: a similar use for the phalanges, the same arrangement, the same disposition to form fingers, the same muscular apparatus to extend and bend them; "why, then," said M. Geoffroy, "may we not say that there is an uniform repetition of materials? why may we not call it 'unity of composition?'" Observe, however, how the function varies; for this same trunk of the anterior limb becomes the foot of the dog, the claw of the cat, the hand of the ape, a wing in the bat, an oar in the seal; and, lastly, a part of the leg in the ruminants.

The theory of analogies differs, then, essentially from the Aristotelian doctrine, in recognizing peculiar principles, and in introducing into the study of organic systems anatomical considerations as the only groundwork of a truly scientific classification. It has not enlarged the base on which zoology rested; it has not augmented the resources for classification which science possessed, since instead of admitting three elements, it considers one alone, regarding it sufficient to establish identity when the examination of form and function led to nothing but difference and opposition. It recognizes other principles; for it does not draw its analogies from the organs in their *totality*, (which is only to be found analogous in very similar animals), but from the materials of which the organs are composed.

This is a fundamental point in the new doctrine, and may be thus illustrated. We designate under the name *organ*, a part of the body serving for the operations and sensations of the animal. The same organ differs in different animals, either by a variation in the respective size, or by the addition of new parts ; but size ought not to be considered in the determination of resemblances,—we must only attend to the addition or suppression of parts. The hyoid bone of man, for example, is composed of five small bones, that of the cat of nine ; are these two parts, designated by a similar term, analogous in both these species ? For an affirmative answer to this question, according to the ancient doctrine, it would be sufficient that they performed the same function in both ; but, according to the doctrine of analogies, a different view is taken of the matter. That part alone of the hyoid of the cat, which corresponds to the five little bones of the hyoid of man, is considered to be analogous to it. This doctrine, in short, makes the analogy exist exclusively in the identity of the constituent materials.

Let us show, without quitting the example, how the theory of analogies may become an instrument of discovery. The naturalist, remarking the deficiency of the hyoid of man to make it complete, will inquire what has become of the little bones which he finds in the cat. He will necessarily seek for them near the defective organ ; but to find these parts, he will have recourse to another principle of the new doctrine, to that of *connexions*, a sort of Ariadne's thread, which will guide him surely in such researches. The application of this principle will lead him to discover that the parts of the hyoid bone which are wanting in man, are no other than the needle-like prominences to which anatomists have given the name *styloid processes*.

Such is M. Geoffroy's exposition of his ingenious doctrine. Still the subject of contention between M. Cuvier and himself, it will shortly be determined by the test of facts. The example of the hyoid bone, has led M. Cuvier into a long discussion on its analogies, and the sternum has also served for the basis of many objections ; whilst, on the other hand, M. St. Hilaire has supported his opinions by lengthy elucidations from the organization of fishes.

In the class of fishes, M. St. Hilaire caught the earliest glimpse of his extended views. Appointed in 1804 to describe the *tetraodons* for the great work on Egypt, he found it necessary to *determine* a very singular part, which gives to these fishes the faculty of changing their usually lengthy form into a spherical ball. He fancied that the bone which served for this purpose, corresponded to the *coracoid*.

From this apparatus he passed to others, and successively sought to determine the relation of each of the parts of this animal with those of the other vertebrata ; but he was unable to discover the entire coincidence, and was entirely stopped when he came to the *operculum*.

This difficulty was insurmountable, and led M. Geoffroy to de-

spair of the success of his researches, till the year 1817, when the great problem was at length resolved, and he recognized, in the bones of the operculum of fishes, the analogy which they bear to the bones of the ear. From this moment he returned with increased ardour to his labours relative to the establishment of the theory of analogies, never again to be abandoned.

The peaceful members of the Academy of Sciences, have sought to terminate this philosophical contention, on the pretence that there is no point of difference between the combatants. "Both," say they, "are devoted to the study of zoology, both consider and compare the different organs in the chain of beings; but whilst one seeks for the analogies, the other more especially directs his attention to the differences." And they see, moreover, that one party must be wrong, and whichever fails, the error will lie with one of the first naturalists of the age. M. St. Hilaire has consented to relinquish the discussion in the Academy; but, confident in the truth and novelty of his conclusions, he has determined to write a work, wherein he will controvert the opinions of M. Cuvier. The discussion has expanded beyond the primitive considerations which led to it, and will consequently require an extension of our review.

On the present state of Science abroad.

No. I. *Scientific Coteries of Paris.*

It will be some consolation to you who make yourselves our foes, to find that your neighbours are the victims of the same conflicting passions with yourselves. To see your betters fall into the same human tricks,—to mark the most high of the philosophical, the *spirituel* nation, begin to exhibit the same writhings and totterings on the seat of power, is a comfortable assurance that there may be those who will not speak contempt of your unworthy doings. And, on the other hand, we feel proud to see that France the volatile, has spirits as determined as our own.

The arrangements which were made for the direction of the *Bulletin Universel des Sciences*, being contrary to the views of MM. Saigey and Raspail, two of the French *savans* connected with that periodical, they associated themselves, in 1828, in the publication of a scientific miscellany, entitled *Annales des Sciences d'Observation*, and entered into an agreement with M. Baudouin, a bookseller.

We were very much surprized to find, at the conclusion of the second volume, that the work, which appeared from its liberal character, calculated to render the most important services to science, was abruptly discontinued. The first part of the third volume, just published, acquaints us with the cause.

It appears that the publisher having for some time withstood the