

## Lamarck, *Zoological Philosophy* (tr. Hugh Elliot)

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### Chapter II: IMPORTANCE OF THE CONSIDERATION OF AFFINITIES

Among living bodies the name **affinity** has been given to features of **analogy or resemblance between two objects**, that are compared in their **totality**, but with special stress on the **most essential parts**. The closer and more extensive the resemblance, the greater the affinities. They indicate a sort of **kinship** between the living bodies which exhibit them; and oblige us in our **classification** to place these bodies in a **proximity proportional to their affinities**.

How great has been the progress of natural science since serious attention began to be given to affinities, and especially since their true underlying principles have been determined!

Before this change, our botanical classifications were entirely at the mercy of **arbitrary opinion**, and of **artificial systems** of any author. In the animal kingdom, the **invertebrate** animals comprising the larger part of all known animals were classified into the most **heterogeneous** groups, some under the name of **insects**, some under the name of **worms**; where the animals included are from the point of view of affinity **widely different** from one another.

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We must then be guided everywhere by natural affinities in composing the groups which result by dividing each kingdom into classes, each class into orders, each order into sections or families, each family into genera, and each genus into different species if there is occasion for it.

There is **thorough justification** for the belief that the complete series of beings making up a kingdom **represents the actual order of nature, when it is classified with direct reference to affinities**; but, as I have already pointed out, the different kinds of divisions which have to be set up in that series to help us distinguish objects with greater ease do not belong to nature at all. They are truly artificial although they exhibit natural portions of the actual order instituted by nature.

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### Chapter III: OF SPECIES AMONG LIVING BODIES AND THE IDEA THAT WE SHOULD ATTACH TO THAT WORD

It is not a futile purpose to decide definitely what we mean by the so-called *species* among living bodies, and to enquire if it is true that species are of absolute constancy, as old as nature, and have all existed from the beginning just as we see them to-day; or if, as a result of changes in their environment, albeit extremely slow, they have not in course of time changed their characters and shape.

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Any collection of like individuals which were produced by others similar to themselves is called a species.

This definition is exact: for every individual possessing life always resembles very closely those from which it sprang; but to this definition is added the allegation that the individuals composing a species never vary in their specific characters, and consequently that species have an **absolute constancy** in nature.

It is just this allegation that I propose to attack, since **clear proofs drawn from observation** show that it is ill-founded.

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How great the difficulty now is of studying and satisfactorily deciding on species among that multitude of every kind of polyps, radiarians, worms, and especially insects, such as butterflies, *Phalaena*, *Noctua*, *Tinea*, flies, *Ichneumon*, *Curculio*, *Cerambyx*, chafers, rose-chafers, etc.! These genera alone possess so many species which **merge indefinitely into one another**.

What a swarm of mollusc shells are furnished by every country and every sea, eluding our means of distinction and draining our resources.

Consider again, fishes, reptiles, birds and even mammals; you will see that except for gaps still to be filled, neighbouring species and even genera are separated by the finest differences, so that we have scarcely any foothold for setting up sound distinctions.

Is there not an exactly similar state of affairs in the case of botany, which deals with the other series, consisting of plants?

How great indeed are the difficulties of the study and determination of species in the genera *Lichen*, *Fucus*, *Carex*, *Poa*, *Piper*, *Euphorbia*, *Erica*, *Hieracium*, *Solanum*, *Geranium*, *Mimosa*, etc., etc.

When these genera were constituted only a small number of species belonging to them were known, and it was then easy to distinguish them; but now that nearly all the gaps are filled, our specific differences are necessarily minute and usually inadequate.

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The idea of bringing together under the name of species a collection of like individuals, which perpetuate themselves unchanged by reproduction and are as old as nature, involved the assumption that the individuals of one species could not unite in reproductive acts with individuals of another species.

Unfortunately, observation has proved and continues every day to prove that this assumption is unwarranted; for the **hybrids** so common among plants, and the copulations so often noticed **between animals of very different species**, disclose the fact that the boundaries between these alleged constant species are not so impassable as had been imagined.

It is true that often nothing results from these strange copulations, especially when the animals are very disparate; and when anything does happen the resulting individuals are usually infertile; but we also know that when there is less disparity these defects do not occur. **Now this cause is by itself sufficient gradually to create varieties, which then become races, and in the course of time constitute what we call species.**

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Thus, among living bodies, nature, as I have already said, definitely contains nothing but individuals which succeed one another by reproduction and spring from one another; but the species among them have only a **relative constancy** and are only **invariable temporarily**.

Nevertheless, to facilitate the study and knowledge of so many different bodies it is useful to give the name of species to any collection of like individuals perpetuated by reproduction without change, so long as their environment does not alter enough to cause variations in their habits, character and shape.

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#### OF THE SPECIES ALLEGED TO BE LOST

I am **still doubtful** whether the means adopted by nature to ensure the preservation of species or races have been so inadequate that entire races are now extinct or lost.

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If there really are lost species, it can doubtless only be among the large animals that live on the dry parts of the earth; where man exercises absolute sway, and has compassed the destruction of all the individuals of some species which he has not wished to preserve or domesticate. Hence arises the possibility that animals of the genera *Palaeotherium*, *Anoplotherium*, *Megalonix*, *Megatherium*, *Mastodon*, of M. Cuvier, and some other species of genera previously known, are no longer extant in nature: this however is nothing more than a possibility.

But animals living in the waters, especially the sea waters, and in addition all the races of small sizes living on the surface of the earth and breathing air, are protected from the destruction of their species by man. Their multiplication is so rapid and their means of evading pursuit or traps is so great, that there is no likelihood of his being able to destroy the entire species of any of these animals.

It is then only the large terrestrial animals that are liable to extermination by man. This extermination may actually have occurred; but its existence is not yet completely proved.

Nevertheless, among the fossil remains found of animals which existed in the past, there are a very large number belonging to animals of which no living and exactly similar analogue is known; and among these the majority belong to molluscs with shells, since it is only the shells of these animals which remain to us.

Now, if a quantity of these fossil shells exhibit differences which prevent us, in accordance with prevailing opinion, from regarding them as the representatives of similar species that we know, does it not necessarily follow that these shells belong to species actually lost? Why, moreover, should they be lost, since man cannot have encompassed their destruction? **May it not be possible on the other hand, that the fossils in question belonged to species still existing, but which have changed since that time and become converted into the similar species that we now actually find.**

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Naturalists who did not perceive the changes undergone by most animals in course of time tried to explain the facts connected with fossils, as well as the commotions known to have occurred in different parts of the earth's surface, by the supposition of a **universal catastrophe** which took place on our globe. They imagined that everything had been displaced by it, and that a great number of the species then existing **had been destroyed**.

Unfortunately this facile method of explaining the operations of nature, when we cannot see their causes, has no basis beyond the imagination which created it, and cannot be supported by proof.

But why are we to assume without proof a universal catastrophe, when the better known procedure of nature suffices to account for all the facts which we can observe?

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Chapter V: ON THE TRUE ARRANGEMENT AND CLASSIFICATION OF ANIMALS

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The aim of a **general arrangement** of animals is not only to possess a convenient list for consulting, but it is more particularly to have an order in that list **which represents as nearly as possible the actual order followed by nature in the production of animals**; an order conspicuously indicated by the **affinities** which she has set between them.

The aim of a **classification** of animals, on the other hand, is to furnish points of rest for our imagination, by means of lines of demarcation drawn at intervals in the general series; so that we may be able more easily to identify each race already discovered, to grasp its affinities with other known animals, and to place newly discovered species in their proper position. This device makes up for our shortcomings, facilitates our studies and our knowledge, and is absolutely necessary for us; but I have already shown that it is **a produce of artifice**, and that despite appearances **it corresponds to nothing real in nature**.

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In the animal kingdom such a principle is that *every class should comprise animals distinguished by a special system of organisation*. The strict execution of this principle is quite easy, and attended only with minor inconveniences.

In short, although nature does not pass abruptly from one system of organisation to another, it is possible to draw boundaries between each system, in such a way that there is only a small number of animals near those boundaries and admitting of doubt as to their true class.

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CLASSES SHOULD FORM A SERIES IN THE ARRANGEMENT OF ANIMALS

Man is condemned to exhaust all possible errors when he examines any set of facts before he recognises the truth. Thus it has been denied that the productions of nature in each kingdom of living bodies can really be arranged in a true series according to their affinities; and that there exists any scale in the general arrangement either of animals or plants.

Naturalists, for instance, have noticed that many species, certain genera and even some families appear to a certain extent isolated in their characters; and several have imagined that the affinities among living beings may be represented something after the manner of the different points of a compass. They regard the small well-marked series, called natural families, as being arranged in the form of a reticulation. This idea, which some modern writers think sublime, is clearly a mistake, and certain to be dispelled when we have a deeper and wider knowledge of **organisation**; and especially when the distinction is recognised between what is due to **the greater or less progress in the complexity or perfection of organisation**.

Meanwhile, I shall show that nature, by giving existence in the course of long periods of time to all the animals and plants, **has really formed a true scale** in each of these kingdoms as regards the increasing complexity of organisation; but that the gradations in this scale, which we are bound to recognise when we deal with objects according to their natural affinities, **are only perceptible in the main groups of the general series, and not in the species or even in the genera**.

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Chapter VII: OF THE INFLUENCE OF THE ENVIRONMENT ON THE ACTIVITIES AND HABITS OF ANIMALS, AND THE INFLUENCE OF THE ACTIVITIES AND HABITS OF THESE LIVING BODIES IN MODIFYING THEIR ORGANISATION AND STRUCTURE

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Thus to obtain a knowledge of the **true causes** of that great **diversity of shapes and habits** found in the various known animals, we must reflect that the infinitely diversified but **slowly changing environment** in which the animals of each race have successively been placed, has involved each of them in **new needs** and corresponding **alterations in their habits**. This is a truth which, once recognised, cannot be disputed. Now we shall easily discern how the new needs may have been satisfied, and the new habits acquired, if we pay attention to the two following **laws of nature**, which are always **verified by observation**.

FIRST LAW

*In every animal which **has not passed the limit of its development**, a more frequent and continuous **use** of any organ gradually strengthens, develops and enlarges that organ, and gives it a power proportional to the length of time it has been so used; while the permanent **disuse** of any organ imperceptibly weakens and deteriorates it, and progressively diminishes its functional capacity, until it finally disappears.*

SECOND LAW

*All the acquisitions or losses wrought by nature on individuals, through the **influence of the environment** in which their race has long been placed, and hence through the **influence of the predominant use or permanent disuse of any organ**; all these are **preserved by reproduction** to the new individuals which arise, provided that the acquired modifications are common to both sexes, or at least to the individuals which produce the young.*

Here we have two permanent truths, which can only be doubted by those who have never observed or followed the operations of nature, or by those who have allowed themselves to be drawn into the error which I shall now proceed to combat.

Naturalists have remarked that the structure of animals is always in **perfect adaptation to their functions**, and have inferred that the shape and condition of their parts have determined the use of them. Now this is a mistake: for it may be easily proved by observation that **it is on the contrary the needs and uses of the parts which have caused the development of these same parts**, which have even given birth to them when they did not exist, and which consequently have given rise to the condition we find in each animal.

If this were not so, nature would have had to create as many different kinds of structure in animals, as there are different kinds of environments in which they have to live; and neither structure nor environment would ever have varied.

This is indeed very far from the true order of things. If things were really so, we should not have the **race-horses** shaped like those in England; we should not have big **draught-horses** so heavy and different from the former, for none such are produced in nature; in the same way we should not have **basset-hounds** with crooked legs, nor **grey hounds** so fleet of foot, nor **water-spaniels**, etc.; we should not have **fowls without tails, fantail pigeons**, etc.; finally, we should be able to cultivate wild **plants** as long as we liked in the rich and fertile soil of our gardens, without the fear of seeing them change under long cultivation.

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*Conclusion adopted hitherto:* Nature (or her Author) in creating animals, foresaw all the possible kinds of environment in which they would have to live, and endowed each species with a fixed organisation and with a definite and invariable shape, which compel each species to live in the places and climates where we actually find them, and there to maintain the habits which we know in them.

*My individual conclusion:* Nature has produced all the species of animals in succession, beginning with the most imperfect or simplest, and ending her work with the most perfect, so as to create a gradually increasing complexity in their organisation; these animals have spread at large throughout all the habitable regions of the globe, and every species has derived from its environment the habits that we find in it and the structural modifications which observation shows us.

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In order to show that this second conclusion is baseless, it must first be proved that no point on the surface of the earth ever undergoes variation as to its nature, exposure, high or low situation, climate, etc., etc.; it must then be proved that no part of animals undergoes even after long periods of time any modification due to a change of kind of life or to the necessity which forces them into a different kind of life and activity from what has been customary to them.

Now if a single case is sufficient to prove that an animal which has long been in **domestication** differs from the **wild species** whence it sprang, and if in any such domesticated species, great differences of conformation are found between the individuals exposed to such habit and those which are forced into different habits, it will then be **certain that the first conclusion is not consistent with the laws of nature, while the second, on the contrary, is entirely in accordance with them.**

Everything then combines to prove my statement, namely: that it is not the shape either of the body or its parts which gives rise to the habits of animals and their mode of life; but that it is, on the contrary, the habits, mode of life and all the other influences of the environment which have in the course of time built up the shape of the body and of the parts of animals. With new shapes, new faculties have been acquired, and little by little nature has succeeded in fashioning animals as we actually see them.

Can there be any more important conclusion in the range of natural history, or any to which more attention cannot be paid than that which I have just set forth?