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External Teleology and Functionalism: Hegel, Life Science and the Organism–Environment Relation

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Abstract

In the chapter on Observing Reason in the *Phenomenology*, as well as in §368 of the *Philosophy of Nature*, Hegel deals with the life sciences of his time. There, he labels the methodology of its representatives, namely zoology and comparative anatomy, as external teleology. In this paper I want to show that by doing so he is actually discussing a general kind of functionalism. Thereby, I want to highlight a line of thought in Hegel's texts which represents a *productive reading* of external teleology contrary to a *destructive reading* on which scholars have mainly focussed.

I. Hegel and the methodology of the life sciences

Recent scholarship has pointed out that in his relationship to the *Naturforschung* of his time, Hegel did not 'confine […] himself to observing and judging it, demonstrating his ability to grasp its main features', but, on the contrary, actually 'took active part in such debates by publicly siding with some strands of contemporaneous natural science against others' (Ferrini 2009a: 93).[1] Additionally, it is a commonly accepted fact that Hegel's philosophy and the construction of his system is—at least partly—strongly influenced by certain developments in *Naturforschung*. This holds especially true when it comes to his concepts of life and organism (Illetterati 1995: 6–10; Sell 2013: 92, 168–75). Concerning the latter, Hegel was reflecting on the methodologies used to investigate organic or living beings within the life sciences of his time.[2] In order to discover his relation to these endeavours and their methodologies, I will turn to those passages in his works where he explicitly refers to them—even though he does not always name the authors he is referring to. This is particularly the case in the section on Observing Reason, more precisely the chapter on Observing Nature, found in the *Phenomenology of Spirit*. Beyond that, we can find references in the *Philosophy of Nature*.

The first part of my essay will be dedicated to Observing Reason and the second part will deal with the *Philosophy of Nature*. I thus set myself a very narrow remit, confining myself to the specific discussion regarding the methodology of the life sciences, namely zoology and comparative anatomy. For Hegel, this methodology clearly involves the application of external teleological explanations.

While scholars mainly focus on the *destructive reading* of external teleological explanations (e.g., Chiereghin 1990: 176–81; Illetterati 1995: 206–9; Stern 2002: 108; Pierini 2008: 316– 17), i.e., Hegel's criticism of their application, I want to highlight a line of thought in his texts which represents a *productive reading*.[3] The final aim of this essay is to show that this *productive* form of external teleological explanation is a general kind of functionalism that was commonly applied in the life sciences and therefore deliberately taken up by Hegel. With this a different understanding of external teleology in Hegel, contrasted to that commonly associated with it, would be discovered that has so far not been considered in scholarly debate.[4]

The following text will be divided into three sections. The second section will investigate the way in which Hegel discussed external teleological explanations as a kind of functionalism, in Observing Reason, and that the discipline of the life sciences he particularly referred to is zoology. By looking at the *Philosophy of Nature* in the third section (of my text) we will confirm the impression evoked by the *Phenomenology*, since in the former Hegel again relates the same themes with functional explanations but with an additional focus on comparative anatomy. In a short fourth and final section I will ask if the results of this study ought to change our conception of (external) teleology in Hegel and give an outlook on how my thesis has to be developed further.[5]

II. Observing reason and teleology

In the chapter on Observing Reason Hegel attends to different strands of the *Naturforschung* of his time (Illetterati 1995: 191–204; Siep 2000: 124; Ferrini 2009a: 39–40). Observing consciousness no longer approaches objects in a purely negative fashion, as do desiring consciousness, scepticism or the unhappy consciousness. Instead, it now tries to explore persisting determinations in the flux of the world, which in their permanence hold 'an interest for it' (*PhG*: ¶232/133).[6] It tries to unveil those persisting determinations as 'the essence of things *qua* things' (*PhG*: ¶242/138) by systematically making '*its own* observations and experiments' (*PhG*: ¶240/137).[7] This reference to experiments should, in my view, be understood as evidence that Hegel is concentrating on those research endeavours that can be ascribed to a certain line of experimental Newtonianism in contrast to mathematical Newtonianism.[8]

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The observing consciousness, when turning to organic beings, tries to identify their persisting aspects by distinguishing between 'what is essential and what is unessential', whereby the former is understood as specific '*differentiae*' (*PhG*: ¶246/140) or characteristics. It makes this distinction by considering only 'what enables things to be intelligently apprehended' (*PhG*: ¶246/140). The distinguished differentiae then, however, should not only be differentiae for cognition, but should rather 'accord with the essential characteristics of things' (*PhG*: ¶246/140). It is only then that a cognition of the considered living being is given and only then can it be assigned to a certain class, species or kind, i.e., classified. Or as Hegel puts it, the thereby generated 'artificial system is supposed to accord with Nature's own system' (*PhG*: ¶246/140). As a felicitous case of a systematization, which expresses the system of nature adequately, Hegel mentions the differentiation of animals by means of their 'claws and teeth' (*PhG*: ¶246/140). It is successful because through the reference to those 'distinguishing marks' (*PhG*: ¶246/140), the respective animals are not merely distinguished through cognition itself. On the contrary, 'by means of these weapons' (*PhG*: ¶246/140) they actually distinguish themselves, since these weapons are used e.g., for the defence against predators or for hunting prey.[9]

According to the editors of volume 9 of the *Gesammelte Werke*, Hegel probably received his knowledge on classification and zoology mainly through Blumenbach's *Naturgeschichte*, in which the latter also refers to Aristotle and Linnaeus, who developed the methods of differentiation by claws and teeth (*GW* 9: 498).[10] Blumenbach also discusses the problem of artificial and natural systems:

> There are different artificial systems, according to which famous men have tried to order the mammals. Aristotle's division e.g. is grounded in the difference of toes and claws, and this has been taken up by Ray, amongst others, and elaborated further. But thereby the most relative and in their entirety ever so similar genera of anteater, sloth etc. have to be separated, and have to be redeployed in completely different orders, just because the one of them has more, and the other fewer, toes. Linnaeus chose the teeth as the ground of classification, a way, however, in which one traces not fewer occasion of on the one hand the most unnatural separations, on the other hand the oddest conjunctions. (*HdN*: 48, my translation)

Blumenbach, thereupon, contends that he instead aims to build a 'natural system of mammals' by considering 'all external characteristics, the whole habitus' (*HdN*: 49, my translation).[11]

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Hegel tells us another way of distinguishing specific characteristics of animals for classification, which is to relate them to their respective environments. Reason considers '*organic* Nature and *inorganic* Nature in their relation to one another' (*PhG*: ¶255/145). This inorganic environment, Hegel elucidates, is comprised of '*loosely connected* determinatenesses', which he also calls 'universal elements' and specifies them as '[a]ir, water, earth, zones, and climate' (*PhG*: ¶255/145):

> Here, then, we have law as the connection of a [universal] element with the formative process of the organism which, on the one hand, has the elementary being over against it, and, on the other hand, exhibits it within its organic reflection. (*PhG*: ¶255/145)

The observing consciousness is trying to express the relationship between the organic and the inorganic in terms of a law—or better, a regularity—according to which the habitus or form of the former mirrors the influence of the latter. Therewith, consciousness receives regularities like 'animals belonging to the air have the nature of birds, those belonging to water have the nature of fish, animals in northern latitudes have thick, hairy pelts' (*PhG*: ¶255/145). Hegel, however, attests that this kind of law is a 'poverty which does not do justice to the manifold variety of organic Nature' (*PhG*: ¶255/145). This is because nature comprises many exemptions from such laws—consider e.g., ostriches—and even the cases which seem to be governed by this regularity do not exhibit a strict necessity—consider e.g., bichirs, which due to their anatomy can walk on land and breathe air due to a simple lung. One can actually just speak of a '*great influence*' (*PhG*: ¶255/145) of the environment on the individual. Hegel infers, therefore, that this relationship cannot be expressed by a regularity in the sense of a conceptual necessity. The 'Notion of north' does not imply 'the Notion of a thick, hairy pelt' and neither does the notion of the sea imply the form of a fish, independently of how often 'we may find' (*PhG*: ¶255/146) thick, hairy pelts in northern areas or the structure of a fish in the water. The 'necessity' (*PhG*: ¶255/146) of this relation is not something that can be observed:

> Finding thus no place in the actual creature, it [the necessity] is what is called a teleological relation, a relation which is external to the related terms, and therefore really the antithesis of a law. (*PhG*: ¶255/146)

Hegel calls a connection of two elements that is actually external to those elements a 'teleological relation'. The relationship between the form of an animal and its environment is for Hegel, as we see, a case of such a teleological relation. This connection he concludes does not, however, express the essence of the organic, whereas 'the notion of End' (*PhG*: ¶256/146) does.

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It is noteworthy, in my view, that here Hegel is not talking about 'classical' examples of 'bad' external teleological explanations, such as those Kant is invoking in the *Critique of Judgement*—e.g., the sediment of sand at the beach has the purpose of providing fertile soil for the growth of spruces (*CJ*: 245–46/B281–82) or other examples normally associated with and criticized as 'bad' external teleology, e.g., *cork oaks exist in order to serve us for the production of stops* or *god created bedbugs in order to prevent us from sleeping too long.*

Instead, he is talking about the aptness of animals to their environment or their teeth and claws being functional for hunting and eating. Even Blumenbach, in his *Naturgeschichte*, at the end of each elaboration on a specific class, lists the usefulness (*Brauchbarkeit*) and the harm (*Schaden*) of the respective class for humanity and the rest of nature.[12] Consider e.g., how comprehensively he writes about the usefulness of the class of birds:

> The birds are tremendously important creatures for nature's household in its entirety, albeit their immediate usefulness for mankind is not as manifold as the ones of mammals. To begin with, it is certainly not one of their least assets, that amongst all and all animals they spread the most life and chirpiness in the whole of creation. Furthermore, they exterminate countless insects and the total extinction of some allegedly detrimental birds, the sparrow, crows etc. in some areas, had the consequence of the unlikely more detrimental reproduction of vermin and similar mischievous outcomes. Others consume bigger animals, bats, snakes, frogs, lizards etc. or scavenger and by the means of that prevent miss-growth [*Misswachs*] as well as the infection of the air. Likewise it is the purpose [*Bestimmung*] of countless birds to extinct various weeds and to prevent its proliferation. On the other hand also the breeding and reproduction of animals as well as plants is advanced by birds. One knows e.g. that wild geese carry fertilized roe into distant ponds thereby making them occasionally richer with fish. A lot of birds swallow seeds which they later regurgitate and thereby advance their diffusion: e.g. pigeons which in this way procreate the nutmegs on the Spice Islands etc. The dung of the seabirds fertilizes bare rocky cliffs and coasts, so that afterwards the healing plants, scurvy grass etc. can grow. Falcons and other various seabirds can be trained for hunting of other animals etc. A lot of birds, their eggs, their fat, and the bird nests serve as food. All the coats of the seabirds for the clothing of

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> some of the most northern people. The feathers to fill beds, to write, to fledge [*Verkielen*] musical instruments, for muffs and exquisitely for various kinds of finery, which is why for many wild people, especially in America and on the islands of the silent ocean they represent one of the most important forms of merchandise. For medicine, however, no significant use can be made from this class of animals.[13] (*HdN*: 149–50, my translation)

Considering that the *GW* 9 editors' contention that Hegel got his knowledge of zoology and the classification of animals from the reading of Blumenbach's book is correct, why did he not stick to the obvious and cited passages like the one just quoted to criticize the application of 'bad' external teleological explanations in those research endeavours? And, if he did not want to criticize those examples, what kind of explanation is the named *teleological relation*? I want to suggest that he actually was referring to functional explanations. An example would be: *carnivores must have sharp claws and teeth in order to be able to hunt their prey* or *animals in cold regions have thick, hairy pelts by means of which they protect themselves from cold*.[14] These functional characteristics can then be used to assign animals to certain classes. Formulations of this type are present in the writings of Blumenbach, such as when he talks about apes: 'Mammals with four hands, as it is required by their way of life and their inhabitation of the trees' (*HdN*: 57, my translation); or the sloth: 'Generally they have few toes at the forefoot, which, however, are furnished with long and crooked claws, which serve to climb trees' (*HdN*: 63, my translation).

The same is true for Treviranus, to whom, according to the editors (*GW* 9: 500), Hegel is referring when enumerating the regularities governing the relation of organic beings and their inorganic environment:

> *The form of the external limbs.* On all animals which are equipped with those organs, whose element is the water, and which move along in it by swimming, those parts are shorter as compared to the land animals, and their toes are connected by webbing. (*BoP*: 170, my translation)

Animals living in trees must have certain hands or claws in order to be able to climb, and fish, who move by swimming through water, must have external limbs which are apt for this purpose. I want to suggest that, when Hegel is talking about 'teleological relations' in the sense of external teleological explanations, he is actually referring to a general kind of functionalism. This naïve understanding of function, in the sense of aptness to environmental conditions or circumstances, was used in the zoology—and anatomy, as we will see in the next section—of Hegel's time. To use a formulation Ferrini uses concerning a

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different theme, these kinds of functional discourse were 'the issue at stake in the scientific debate of the time' (Ferrini 2009a: 99). Even though life scientists like Treviranus or Blumenbach were aware of the problematic status of the results those approaches delivered,[15] they applied them anyway.[16] Hegel, most likely, referred to those discourses by the term 'external teleology' because he was missing the elaborated functional terminology available to us today.

Hegel's critical remarks on the methodology of zoology are therefore not to be confused with a critique of the application of functional or external teleological explanations as such. Rather they concern the inadequacy of the method of induction applied by the observing consciousness for the purpose of finding reason in the world. That is why Hegel writes that the necessity cannot be observed. The observing consciousness as reason is searching for itself in the world and therefore is in fact searching for something conceptual (*PhG*: ¶242/138). In order to grasp this conceptuality further steps are required. This happens, for example, when reason purifies the laws or regularities step by step into a conceptual necessity (*PhG*: ¶¶248–53/142–45; Ferrini 2009a: 100–4; Quante 2008: 97). There the truth of 'experimenting consciousness' (*PhG*: ¶253/144), which proceeds 'to *refine* the law and its moments into a Notion' (*PhG*: ¶251/143), is the '*pure law*' or 'a *Notion*' (*PhG*: ¶253/144).

But then reason is no longer merely observing. When Hegel then tells us that the result of the experimenting consciousness presents itself to the observing consciousness 'as a *particular kind* of object' (*PhG*: ¶253/145), i.e., the organic, he is more or less stating that observing reason is confronted with an object for which its manner of inductive observation is useless. It cannot observe the essence—i.e., the inner purposiveness, or 'the real End itself'—of the organic as such (*PhG*: ¶256/146). This is in fact the process of self-preservation of the individual and its genus (*PhG*: ¶256, ¶¶259–60/146, 148–49). Since the method of pure observation only 'seeks the moments in the form […] of enduring being' it cannot grasp the true unity of the organic as such, which 'is essentially the inner movement […] and can only be grasped as Notion' (*PhG*: ¶261/149). Inner purposiveness, for Hegel, has the sense of self- preservation, which is something processual (*PhG*: ¶256/146). Observing reason with its fixed determinations cannot cope with this processuality. This does not mean however, that the form of functional explanations described above is in any way useless. In the *Philosophy of Nature* the assumption that Hegel is actually discussing a kind of functionalism can be confirmed. We will also see in which way these functional explanations are of use and why they are yet closely related to the method of observation.

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III. Zoology and comparative anatomy in the *Philosophy of Nature*

In §368 of the 1830 *Encyclopaedia*,[17] which is located in the Organic Physics section and has the title *Die Gattung und die Arten* in the German original, but significantly was translated by Petry to *Zoology* (*The Genus and the species*), Hegel discusses the classification of animals as it is conducted in zoology. Or, in Hegel's words, it considers how 'the genus in its implicit universality simply *particularizes* itself into *species*' (*PN*: §370, 177 footnote one/§368, 367). Animals, he states, are distinguished by means of their '*forms*', i.e., their habitus or external appearance, into different '*orders of animals*' (*PN*: §370, 177/§368, 367). The basis of these forms and orders is the 'universal *type of the animal*' (*PN*: §370, 177/§368, 367),[18] which in turn is determined by the concept. The type of the animal expresses itself in 'the various *stages of its development*', which are different degrees of complexity, and 'in the various *circumstances* and *conditions* of *elemental nature*' (*PN*: §370, 177/ §368, 367). Different genera and various species are therefore different modes of how the type of the animal manifests itself in differing degrees of complexity and in its relation to its environment. In the remark to this paragraph Hegel praises a new 'science', which in recent times made greater progress than nearly any other:

> In recent times, all the empirical sciences have made great advances in the accumulation of observations, but in the extent to which its material has tended to conform to the Notion, scarcely one of them has advanced as much as zoology has by means of its auxiliary science, *comparative anatomy*. (*PN*: §370R, 178/§368R, 367–68)

In earlier times, we are told, zoology distinguished the animal's characteristics for classification for subjective cognition only. It, therefore, just established 'artificial systems' (*PN*: §370R, 178/§368R, 367). This changed, however, because it took the 'wider prospect' of focusing on 'the objective nature of the forms themselves' (*PN*: §370R, 177/§368R, 367).

Zoology achieved this change in perspective by the means of comparative anatomy. The latter proceeded in the manner of grasping 'the significance of the interrelated organs and functions' and thereby inferred the universal type of the animal. The 'illustrious founder' of this discipline, Cuvier, could, thus, take pride in the boast 'that from a single bone, he could make out the essential nature of the entire animal' (*PN*: §370R, 178/§368R, 368). Hegel further specifies the procedure of comparative anatomy by two aspects: The main feature of its approach, he tells us, 'is the recognition of the way in which nature shapes and adapts this organism to the particular element in which it places it, to climate, to

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a range of nutrition, and in general, to the environment which it finds about it' (*PN*: §370R, 178/§368R, 368).

Furthermore, it was 'a happy intuition' for the determination of the species to take 'the animal's weapons, i.e., its teeth and claws etc.' as its distinguishing characteristics, since by the means of these it distinguishes itself from others and 'establishes and preserves itself as a being-for-self' (*PN*: §370R, 178/§368R, 368).[19]

We can see that Hegel is obviously again talking about the same endeavours of the life sciences as he did in the *Phenomenology*. He is once more describing a procedure of determining animals by the means of the function of their body parts and their aptness to their respective environment. While the elaborations on functionality and aptness to environmental conditions are repeated, Hegel admittedly is not talking about external teleology in the main text or the remark of the paragraph. This, however, changes in the additions, where it is apparent that the functionalism is applied in comparative anatomy.[20]

In the additions we can find several citations from the writings of Cuvier. He, we are told, was led to the idea that all limbs of an organism are particularities directed against a distinct inorganic nature which in the end exhibit a certain harmony. He, therefore, was prompted, especially because of his occupation with fossil bones, to study the specific form of limbs and bones and 'to consider the purposiveness of the way in which the individual limbs are related to one another' (*PN*: §370A, 182/§368A, 1583). I want to suggest that the term *purposiveness* here is the same external purposiveness that is discussed in the *Phenomenology* and has to be read as *functionality*. The reason for this will become clear if we take a look at the exemplary passages of Cuvier that are cited in the additions:

> Consequently, if the intestines of an animal are so organized that they are only able to digest raw meat, its jaw-bones must also be adapted to the swallowing of its prey, its claws to the seizure and tearing of it, and its teeth to the biting off and chewing of the flesh. What is more, the animal's whole system of motor organs must enable it to pursue and overtake other animals, just as its eyes must enable it to see them at a distance. It is even necessary that nature should have implanted in the animal's brain the instinct by which it conceals itself and lays traps for its victims. These are the universal requisites of *carnivorous* animals, every one of which has to combine all of them within itself. (*PN*: §370A, 182–83/§368A, 1583)

Cuvier tells us that the prerequisite of being carnivorous is that one is furnished with certain functional body parts to hunt one's prey and to be able to tear them apart. Furthermore, he states:

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> In order that the animal may be able to carry away its prey, there must be a certain strength in the muscles which lift the head […] this in its turn is closely related to the form of vertebrae to which the muscles are attached, and to the form of the occiput, in which they are inserted. The teeth must be sharp in order to bite into the flesh, and must have a firm base to facilitate the crushing of bones. The claws must have certain mobility. (*PN*: §370A, 183/§368A, 1584)

Similar considerations are cited concerning herbivores:

> It is easy to see why animals with hoofs must be *herbivorous*, for they have no claws for seizing anything else. We can also see why they do not need such large shoulderblades, for they can only use their forefeet for supporting their bodies. Their herbivorous diet will necessitate teeth with a flat crown which will enable them to grind grain and grasses. Grinding requires that this crown should move horizontally, so that the condyle of the jaw bone will not constitute such a tight ginglymus as it does in the carnivorous animals. (*PN*: §370A, 183/§368A, 1584)

I think the application of a general kind of functionalism in these citations is obvious. Animals are related to their environment, represented e.g., by their source of nourishment i.e., grass or other animals. A herbivorous cow has to have certain teeth to be able to grind the grass it is eating and the neck of carnivorous lions has to have a certain strength by means of which it is able to pull away its prey. One could argue, now, that what Cuvier is describing here is actually the interrelation of inner purposiveness—where every part has to be understood from the whole and the whole from its parts—especially because he judges the body parts to exhibit a certain 'harmony of the organization' (*PN*: §370A, 182/§368A, 1582). But there are two aspects that Hegel discerns. There are, according to the addition, two ways of determining the differences of animal genera. The first is according to the type, 'which is closer to the Idea', the second that the development of the organic type 'is essentially connected with the elements into which animal life is cast' (*PN*: §370A, 181/§368A, 1581–82).[21] While the type, as the objective nature of all animals can only be conceived conceptually, its particularization falls under the external conditions of nature. As the remark states, it is submitted 'to the manifold conditions and circumstances of external nature' (*PN*: §370R, 179/§368R, 368), which also make 'the genera themselves completely subservient to changes of the external universal life of nature' (*PN*: §370R, 179/§368R, 369). Or as it is put in the addition, the animal as a part of nature is bound 'to the infinitely numerous particularizations of inorganic and vegetable nature, animation

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always exists as limited species' (*PN*: §370A, 179/§368A, 1580). The conceptual 'universal type' is in fact the basis of every animal, but as it exists, 'it does so in a *particularity*' (*PN*: §370A, 182/§368A, 1582–83). While, on the one hand, the organism's 'viscera are determined by the Notion' (*PN*: §370A, 182/§368A, 1583), the mentioned harmony is actually grounded in the 'particular determinations' and 'is mainly present in the limbs, not in the viscera, for the particularity is precisely outward orientation towards a determinate inorganic nature' (*PN*: §370A, 182/§368A, 1583). And Hegel tells us, '[i]t is *Cuvier* who has developed this [latter] aspect of the science' (*PN*: §370A, 182/§368A, 1583). I therefore contend that the harmony invoked here is not the internal interrelation of inner purposiveness, but to the contrary the external purposive or functional aptness of animals to the circumstances they are placed in, which is exhibited by their external characteristics.

The particularities the Addition mentions are, it seems to me, the various species as well as the individual animals or, to be precise, their appearance or habitus. This habitus can only be observed. These observations take the animal's aptness to its specific context into consideration: 'Particular conditions such as the size, the species and the haunt of the prey, also result from the particular circumstances within the general forms however' (*PN*: §370A, 183/§368A, 1583–84). The general development of species etc. is, so to speak, predefined by the type, which can only be grasped conceptually. How it will be particularized, however, is, in Hegel's eyes, dependent from external conditions. The neck musculature of a lion and a lynx, e.g., in its general functionality and form is similar, since both are carnivores, but the concrete moulding of it depends whether their possible prey is e.g., gnu or roe deer. But additionally, the existence of carnivores, and therefore muscular necks apt for pulling prey is nothing which can be predicted from the concept of a type. This is why Hegel writes that for the 'specific determination'—*specielle Bestimmung*, which Petry translates as 'determination of the species' (*PN*: §370R, 178/§368R, 368)—it was a happy intuition to choose e.g., the weapons of the animals. And that is also the reason why the method of zoology and anatomy is indeed closely related to observation. Independently of all problems of inductive observation, those particularities, which are used to classify animals, can only be discovered by observing them. There is no way of deducing or predicting mathematically or theoretically the specific form and functionality of the limbs of an animal.[22] In fact, asking about the functionality of the lion's neck musculature only makes sense after seeing a lion pulling an animal.

Of course, there would be more to say, but we must confine ourselves to this. All in all, we could see that also in the *Philosophy of Nature* Hegel is referring to functional explanations applied by life scientists of his time, such as Cuvier.

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IV. A new aspect of external teleology

The scope and extent of this essay only allows the groundwork to be set for what I want to show. I claimed that there can be traced a positive and *productive* reading of Hegel's treatment of external teleological considerations and suggested that this can be shown by investigating Hegel's relationship to the life sciences of his time. I therefore turned to those parts of his *oeuvre* where he—more or less—explicitly deals with the methodology of representatives of those life sciences, namely zoology and comparative anatomy. In section two of this essay we could see that Hegel discussed in Observing Reason the application of external teleological explanations in zoology. I pointed out that with the use of the term 'teleological relation' Hegel referred to explanations in which animals are viewed according to their aptness to their respective environment and not, as one might expect, to 'classical' examples of 'bad' external teleology such as *cork exists so that we have something to make bottle stops out of* or *god created bedbugs in order to prevent us from sleeping too long*. I furthermore suggested that when using external teleology Hegel referred to something like a general kind of functional explanation such as *in order to hunt a prey a lion has to have sharp claws and teeth* or *animals in colder areas have thick, hairy pelts by means of which they are protected from the cold*. By citing chosen passages from Blumenbach and Treviranus, I tried to show that these kinds of functional explanation were generally applied in zoology and that Hegel was deliberately discussing this kind of methodology in the *Phenomenology*. In the third section, I showed that the discussion of the same themes can also be found in the *Philosophy of Nature*. In particular by referring to Cuvier and comparative anatomy, cited in the additions of §368, I tried to show that also there functional considerations occupied an important role.

If it is true that the passages I invoked exemplify cases of the application of a general kind of functionalism, then this would detect an aspect of Hegel's relationship to the life sciences which thus far has not been considered in scholarship. Furthermore, if it is correct that Hegel took up this specific debate when discussing the methodology of the investigation of living or organic beings, this might also lead us to question our understanding of aspects of Hegel's conception of (external) teleology as such. Hegel's discussion of teleology, then, was not only influenced by the philosophical considerations, such as those delivered by Kant in the *Critique of Judgement*, but also by functional explanations used in the life sciences.[23] The fact that Hegel associated these kinds of explanations with external teleology might also lead us to reconsider our view on the chapter on teleology in the *Science of Logic*, which explicitly only deals with external purposiveness as a form of objectivity (*WL*: 653/156).

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Before ending, I want to point out some additional aspects that put my elaborations into a larger context and to give an outlook on how they can be developed further. First, one should consider that similar external teleological explanations were used also in geological debates of that time. Hegel, therefore, did not have to turn exclusively to zoology and anatomy to be aware of such considerations.[24] This is of particular relevance since Hegel's view on geology changed distinctively in the Nuremberg period, a point which could be used to question the continuity I posit between the *Phenomenology* with the later *Philosophy of Nature*. This change can be understood as a shift to a more 'environmental' or 'biophysical' view of the earth as setting the conditions for life and geology describing this relationship—a point convincingly stressed by Ferrini (2010: 124–26) proceeding from Kisner's claims on Hegel's allegedly species-based environmental ethic (Kisner 2008–9: 12–17, 28–43).

However, I consider this re-evaluation as a deepening of the insight in the importance of the external relation of the organic with its inorganic environment and, therefore, as setting in accordance the reception of geology with the insights on the functional external relation of the organic expressed in the *Phenomenology*.[25] The external teleological perspective in Hegel's eyes will certainly have to be considered in its relationship to the internal teleological perspective since they both are actually two aspects of the same thing (Ferrini 2009b: 72, 76; 2010: 130). It is especially the task of the philosopher to grasp this connection in its conceptual necessity.[26] However, I wanted to carve out foremost this *productive* and informative side of external teleology and to distinguish it from applications of external teleology which were criticized by Hegel.[27] The external relation remains an independent aspect of the organic. It is precisely the discovery of those kinds of external relations as essential characteristics of concrete organic beings made e.g., by zoology—through observation—which is of philosophical interest. They help to grasp the organic and the inorganic in their systematic unity and will be fully comprehended when related to the internal purposive process of self-preservation and realization of the universal type of the animal. But that is another story.[28]

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Notes

[1] For this, see also Illetterati 1995: 6–10, 200–4.

[2] It should be noted that the application of the term 'science' is ambivalent, for science (*Wissenschaft*) for Hegel is clearly linked to philosophy—e.g., the *Phenomenology*'s original title was *Wissenschaft der Erfahrung des Bewusstseyns* (Jaeschke 2016: 163).

[3] The *destructive* reading of external teleology only considers Hegel's problematization of the latter since it is a bad application of reason and merely understands it as something that should be abandoned in favour of internal teleological considerations. In a *productive* reading, on the contrary, Hegel would identify certain forms of external teleological explanation which have explanatory relevance and can be exploited legitimately.

[4] The only author who mentions something similar, as far as I am aware, is Ferrini (e.g., 2009b: 66, 85; 2010: 130).

[5] Since my focus is on Hegel's reception of the life sciences I will hardly consider the different levels of reason at work in the Observing Reason section or the distinction between phenomenological consciousness and the consciousness of the reader. In doing so, I choose a similar approach to Bach (2006: 69). For the same reason I will not discuss the more specific question of *Naturgeschichte* in the *Phenomenology*, although it would definitely give a more precise picture (see for this also Bach 2006).

[6] Abbreviations used:

References to the German editions of Hegel's works below are to the *Gesammelte Werke*, 31 vols (Hamburg: Meiner, 1968–), abbreviated to *GW* with the relevant volume number.

BoP = Treviranus, *Biologie, oder Philosophie der lebenden Natur für Naturforscher und Aerzte 2*, (Göttingen: J. F. Röwer, 1803).

CJ = Kant, *Critique of Judgment*, trans. W. Pluhar (Indianapolis: Hackett, 1987)/*Kritik der Urteilskraft* (Hamburg: Meiner, 2001).

HdN = Blumenbach, *Handbuch der Naturgeschichte* (Göttingen: H. Dieterich, 1791).

HvA = Blumenbach, *Handbuch der vergleichenden Anatomie* (Göttingen: H. Dieterich, 1805).

PN = Hegel, *Philosophy of Nature Vol. 3*, trans. M. J. Petry (London: George Allen & Unwin, 1970)/*Enzyklopädie der Wissenschaften*, *GW* 20 (Hamburg: Meiner, 1992), cited by paragraph, with abbreviation *R* referring to the *Remarks* (*Anmerkungen*) and *A* to the *Additions* (*Zusätze*), the latter as contained in *GW* 24 (Hamburg: Meiner, 2016).

PhG = Hegel, *Phenomenology of Spirit*, trans. A. V. Miller (Oxford: Oxford University Press, 1977)/*Phänomenologie des Geistes*, *GW* 9 (Hamburg: Meiner, 1980).

WL = Hegel, *Science of Logic*, trans. G. di Giovanni (Cambridge: Cambridge University Press, 2010)/*Wissenschaft der Logik*, *GW* 12 (Hamburg: Meiner, 1981).

VvA = Cuvier, *Vorlesung über vergleichende Anatomie I*, trans. L. H. Froriep and I. F. Meckel (Leipzig: P. G. Kummer, 1809).

[7] The German text actually talks of *Erfahrung* and not of *experiment*. The translation is, however, not misleading, as it is an essential feature of the following description of observing

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consciousness to experiment. One should also mention that Hegel is writing about *Versuche* and not about *Experimente* (e.g., *GW* 9: 143).

[8] Experimental Newtonians tried to develop their theories by conducting experiments while mathematical Newtonians did so by mathematical deduction from first principles (Zammito 2018: 38–68). Zammito has shown that especially the turn to this experimental method was of great influence in the formation of the forerunners of biology: 'More concretely, from the "Queries" to the *Opticks* arose what Thierry Hoquet has aptly termed "nonmathematical *physique*", and this proved the womb in which the nascent science of biology gestated' (Zammito 2018: 38).

[9] One could make the objection that Hegel is actually discussing classification in general, i.e., of all fields of nature. However, the examples Hegel is invoking only refer to the classification of mammals and plants as Bach correctly mentions (Bach 2006: 72–73). For an insight into then contemporaneous discussions on classification in the field of mineralogy and geognosis see e.g., Ferrini (2009a: 94–95).

[10] Hegel owned the fourth edition of Blumenbach's *Naturgeschichte* (*GW* 31, 2: 1379–80).

[11] The 'habitus' is the appearance, so to speak, or external look of the animal (Toepfer 2011c: 447–48).

[12] In his overview of relevant literature Blumenbach also lists four books on physico-theology, among them J. Ray's (1750) *Wisdom of God Manifested in the Works of the Creation* and W. Derham's (1716) *Physicotheology* (*HdN*: 8).

[13] For further examples see 45–48 (usefulness and harm of mammals), 316–17 (insects), 412– 14 (worms).

[14] To be clear, I use 'functionalism' in a very general and, so to speak, naïve sense. I do not want to be assigned to a specific position in contemporary debates on functionalism. I rather use it in the trivial sense that something is functional or apt for a situation.

[15] When Hegel is rendering the relation of organic and environment as something problematic because one can only identify a great influence he most likely is citing Treviranus, who himself writes 'of the great influence' (*BoP*: 171, my translation) and points out that the formulated regularities have a lot of exemptions—e.g., 'However, there are also exceptions to this (rule)' (*BoP*: 160, my translation)—as the editors of *GW* 9 invoke (*GW* 9: 500).

[16] See e.g., Blumenbach in his *Handbuch der vergleichenden Anatomie*, a book also owned by Hegel (*GW* 31, 2: 1380), where the former admits that he knows that the system of functions (*functiones naturales*, *functiones vitales*, *functiones animales*, *functiones genitales*) he is using to structure his book is not grounded in nature, but makes use of it anyway (*HvA*: XI–XII).

[17] §370 in the 1827 version and Petry's translation.

[18] Hegel is referring to the concept of a universal type of the animal introduced by Goethe 1795 in e.g., his *Introduction into the comparative anatomy* (*GW* 9: 663).

[19] I disagree with Heuer that this statement has to be read ironically (see Heuer 2009: 113).

[20] Granted, one can consider the status of the additions as problematic since they were not authorized by Hegel. But even if the following quotations are not genuinely Hegel's words,

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they at least indicate that in the 1820s these kinds of functional explanation were still associated with Hegel's deliberations.

[21] These two perspectives are also present in Cuvier's writings and not a mere projection by Hegel (*VvA*: 51–52). Heuer, following Rawls, calls it a reflective equilibrium between an a posteriori, bottom-up and an a priori, top-down method (Heuer 2009: 116).

[22] Maybe only after having observed several carnivores and thereby having realized how their necks are generally built up, but definitely not from the scratch.

[23] It is not at all far-fetched to assume that, in particular if we take the influence of debates in *Naturforschung* on other parts of his system for granted. On Hegel's relation to Kant's *Critique of Judgement*, see Chiereghin's powerful essay (1990: 156–75).

[24] Hegel did in fact discuss geological theories in the years before the completion of the *Phenomenology* (e.g., *GW* 8: 299–300).

[25] I have kept these considerations aside since I wanted to confine myself to Hegel's reception of the life sciences and did not want to get entangled into an additional sub-debate on his relation to geology. On Hegel's reception of geology, see Rühling (1998) and Levere (1986).

[26] I thank an anonymous reviewer for pushing me to consider these important points.

[27] Such as the reference to another otherworldly intellect as the designer of this aptness, an idea already criticized by the pre-critical Kant (Ferrini 2009a: 106), or the naïve assertion *cork trees exist for us to make stops out of them*.

[28] I have left it open how I understand internal purposiveness and in what way my reading of external teleology has consequences for the role the former plays. I lack the space to develop this properly, but I will mention some examples of inner purposiveness. There is the case, for example, of the relation of two individuals of the opposite sex of the same kind (*PN*: §368A, 173/§369A, 1576), or, as indicated above, between the internal organs of an organism (*PN*: §370A, 182/§368A, 1583). Following the *Science of Logic*, inner purposiveness expresses the structure of life or of the idea (*WL*: 654/157). What connects these examples seems to be that they express an internal relation between moments of a larger whole that is governed by a common concept and that this relation only concerns aspects established by this concept. The larger wholes mentioned in the chapter on Life in the *Science of Logic* are the living individual and the genus. The relation between two individuals of the opposite sex is for Hegel something that happens between two exemplars of the same kind and is only concerned with something, that is determined by their quality of belonging to this kind. But since with internal purposiveness one finds oneself in the realm of the idea, one might be emboldened to make the stronger claim that internal purposiveness paves the way for spirit and that instances of internal purposiveness in the strict sense—i.e., that something can only be understood as a moment of the whole to which it belongs and that whole in turn only in the relation of its moments—seem only to be realizable in the realm of spirit.

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