LITTERATURKRITIK & ROMANTIKSTUDIER - SKRIFTRÆKKE 7

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Wie ist Form möglich?
The concept of Nature in Kant: the third Critique and the Opus Postumum

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Wie ist Form möglich?

The concept of Nature in Kant: the third Critique and the *Opus Postumum*

Frederik Stjernfelt

In two of his final major works, *Kritik der Urteilskraft* (KdU) and the*Opus Postumum* (OP), Kant returns to the concept of Nature, so thoroughly treated in the first Critique and in the *Metaphysische Anfangsgründe der Naturwissenschaft* (MAdN)

The reason I shall here try to yield an answer to the question of why Kant takes up again the concept of Nature towards the end of his life, is that I believe his late deliberations on Nature have certain bearings on the way the concept of Nature is conceived in present day natural science and philosophy.

The texts I shall concentrate on are thus the latter half of *Kritik der Urteilskraft*, the so-called *Kritik der teleologischen Urteilskraft,* and the manuscripts called *Opus Postumum* from the latter half of the nineties, mostly unknown until their publication in 1936 - they have recently been translated in abridged versions into English as well as into French.

Nature, in the *Kritik der reinen Vernunft* (KdrV), was conceived as follows: "Natur ist das Dasein der Dinge, sofern es nach allgemeinen Gesetzen bestimmt ist." (par. 14) - elsewhere described as "nach notwendigen Regeln".

These rules are what gives nature its quality of being a unity; Kant talks about the "Inbegriff der Erscheinungen, so fern diese vermöge eines inneren Prinzips der Kausalität durchgängig zusammenhängen" (p. 446 A), which makes it "ein dynamischen Ganzen". Formally conceived, nature becomes the essence of these rules making the Erscheinungen a whole, that is, the formal concept of Nature is defined by way of "Gesetzmässigkeit" - this of course being the opposite to the other large Kantian field of thought, Freedom. It is well known how Kant splits these rules into two bundles, a priori and empirical, respectively, so that the "reine Naturgesetze" equals the very "Gesetzmässigkeit", the very being governed by a rule. The Verstand is of course the source of these laws, so that Nature as a whole is an a priori unity of the Erscheinungen. This has the also the well known consequences that, in Kant, the sciences of Nature have never direct access to Nature, but only to the laws constructed by the legislation of understanding, so that "ins Innere der Natur dringt Beobachtung und Zergliederung der Erscheinungen und man kann nicht wissen, wie weit dieses mit der Zeit gehen werde" (334): even if it pushes this limits forward, this knowledge is always only formal, or as some of the neo-Kantians would put it, it is only functional, not substantial, it concerns only the predicates of the object, constructed by understanding and its Gesetzgebung.

This concept of Nature in the KdrV is the result of the Kantian urge to heal the split between the successful Newtonian mechanics on the one hand and the skepticist British attacks on rationalism - that is, the brand of rationalism which Kant was to condemn as dogmaticism - on the other hand. Of course, the crucial point in this definition of nature as *Gesetzmässigkeit* imposes itself: what is, actually, *Gesetzmässigkeit*? To achieve this lawfulness, understandig has but one road to follow, the road of the *Schematismus*. This procedure aims

at reconciling the two Kantian faculties understanding and intuition, *Verstand und Anschauung*. This is achieved by "eine Regel der Bestimmung unserer Anschauung, gemäss einem gewissen allgemeinen Begriffe."; the reason why this procedure is so crucial is twofold, first the difference between the generality of the concepts and the specificity of the intuitions, which makes it necessary to have a procedure for subsuming the various intuitions under one concept - second, the difference between the discursivity of concepts and the representationality of intutions. It is moreover well known how Kant places this schematism at the core of the possibility of science and in the deepest heart of human thought, yet gives up the task of defining it intrinsically: "Dieser Schematismus unseres Verstandes, in Ansehung der Erscheinungen und ihrer blossen Form, ist eine verborgene Kunst in den Tiefen der menschlichen Seele, deren wahre Handgriffe wir der Natur schwerlich jemals abraten, und sie unverdeckt vor Augen legen werden." (181) The typical example is that of the pure image of quantity which is space; the corresponding scheme to which is number, "nichts anderes, als die Einheit der Synthesis des Mannigfaltigen einer gleichartigen Anschauung überhaupt ..." (182)

A crucial point is how the idea of causality is dealt with in this schematism unifying understanding and intuition by means of imagination.Kant: "Das Schema der Ursache und der Kausalität eines Dinges überhaupt ist das Reale, worauf, wenn es nach Belieben gesetzt wird, jederzeit etwas anderes folgt. Es besteht also in der Sukzession des Mannigfaltigen, insofern sie einer Regel unterworfen ist." (183) The schema of causality is the lawgoverned succession in time, and Kant concludes in a general mode: "Die Schemate sind daher nichts als Zeitbestimmungen a priori nach Regeln." (184) It is interesting from our point of view to note that immediately after this passage on causality in KdrV follows the first part of this statement: "Das

Schema der Gemeinschaft (Wechselwirkung), oder der wechselseitigen Kausalität der Substanzen in Ansehung ihrer Akzidenzen, ist das Zugleichsein der Bestimmungen der Einen, mit denen der Anderen, nach einer allgemeinene Regel." Here a kind of interaction-like causality is noted in the passing. It is noteworthy moreover, that schematism is to this extent tied up with the Anschauungsform of time ("nichts als Zeitbestimmungen") - why is not space, the other reine Anschauung, an equal partner in this definition of schematism? The reason is of course that to Kant, time is the a priori form of "die innere Sinn", necessary to the synthesis of the successive apperceptions of the object (184) and therefore the "Inbegriff von allem Sein" (300). But is not space necessary, even "before", so to speak, to each of these successive apperceptions? In Kant, space is only - like time - the form of the "äussere Sinne"; it is not clear why space should not be a presupposition to the innere Sinn, which is the ability for the mind to conceive of itself or of its own state (49) - does the mind's conception of itself not include spatial representations? We shall return to this.

All in all, schematism is what makes possible the a priori determination of the general object of science by connecting categories and hence concepts to intuition. Now, how is this idea of the possibility of science implemented in the construal of the basis of the one and only candidate for philosophically based science in Kant's time: physics? To clarify this question, Kant wrote the *Metaphysische Anfangsgründe der Naturwissenschaft in* 1786. Here, the concept of Konstruktion plays a central role. It was already defined in KdrV as follows: "Einen Begriff (...) konstruieren, heisst: die ihm korrespondierenden Aschauung a priori darstellen." - the production of the intuitions corresponding to a concept. Kants example is, as was the case in the discussion of schematism, a triangle, which can be construed and yield an empirical

intuition. This process has general validity insofar all possible triangles can be construed. As is evident, the process of construction has much in common with schematism: while the first, however, is general and philosophical, the second is scpecific and mathematical. This procedure, Kant now maintains in MAN, is crucial to the definition of natural science: "Ich behaupte aber, dass in jeder besonderen Naturlehre nur so viel *eigentliche* Wissenschaft angetroffen werden könne, als darin *Mathematik* ist" AVIII - "... eine reine Naturlehre über bestimmte Naturdinge (Körperlehre und Seelenlehre [NB! - FS]) ist nur vermittelst der Mathematik möglich ..."

The basic object of physics is of course matter, but to Kant, science can never investigate into the substance of anything; the crucial point here is thus to decide how to research into the qualities of matter: "Die Grundbestimmung eines Etwas, das ein Gegenstand äusserer Sinne sein soll, musste Bewegung sein; denn dadurch allein können die Sinne affiziert werden" (it is surprising that this a priori argument rests on a sketchy theory of sensation; the proper argument ought to be rather: anything that happens to anyone, requires motion ...) Kant continues: "Auf diese führt auch der Verstand alle übrige Prädikate der Materie, die zu ihrer Natur gehören, zurück, und so ist die Naturwissenschaft durchgängig eine entweder reine oder angewandte *Bewegungslehre*. " Now, Kant takes the concept of movement through his categorical treatment, exposing it with respect to quantity, quality, relation, and modality. One sees the prerequisite of this step: the concept of movement can be treated categorically, because it depends on the schematism of space and time (movement as a succession of states in a space), describable as a Grösse, as a quantity, and because it is a possible departure for mathematical construction.

We shall not here go into Kant's deliberations on the natural sciences dealing with movement - just consider the fact that to many a present-day physician, this metaphysical tour-de-force in some positivist updating might easily be the last word said on the foundations of physics. What more is needed than some matter in motion?

Kant himself takes up this problem in the last paragraph in MAdN where he concludes that the spirit "... weder beim Bedingten stehen bleiben, noch sich das Unbedingte fasslich machen kan ..." - the only procedure left after this dilemma is a continuation of the Copernican turn: "... ihr <die Vernunft> nichts übrig bleibt, als von den Gegenständen auf sich selbst zurückzukehren, um, anstatt der letzten Grenze der Dinge, die letzte Grenze ihres eigenen sich selbst überlassenen Vermögens zu erforschen und zu bestimmen." This program can be said to be at stake in the late Kantian writings on nature.

In a small text "Über den Gebrauch teleologischer Prinzipien in der Philosophie", he states amongst other problems (the variety of the human race interpreted as teleology?) he problems of transgressing the concept of motion: "Von einer Grundkraft aber (da wir sie nicht anders als durch die Beziehung einer Ursache auf eine Wirkung kennen) können wir keinen andern Begriff geben und keinen Namen dafür ausfinden, als der von der Wirkung hergenommen ist und gerade nur diese Beziehung ausdrückt." (A 129) Of course the movements going on in nature must be thought as being themselves caused by some instance - but as we do not know this instance except as precisely the connection between cause and effect, it is impossible to ask further and say anything about it. Likewise, the problem of organisms in nature is not to be dealt with mechanically, even if it is clear that organized beings are matter just as any other matter: the answer to this question lies

outside the scope of physics, that is, in metaphysics (A128) It is not possible a priori to see that there must exist teleology in nature. Already here, we find an interesting duality in the problem of the existence of organisms: on the one hand, the problem of teleology once again throws the spirit back onto itself: only reason can give laws for itself and hence give itself purposes - but on the other hand, teleology in nature also imposes itself on us as an empirical fact, calling us to speculate.

These are the problems taken up at length in the second part of the KdU, KdtU. Let me here give an outline of the overall argument in this treatise. It is transcendentally possible to let the human faculties of mind find *Zweckmässigkeit* - purposefulness - in nature - this is what the first part of KdU has just presented for us, the famous definition of beauty as *Zweckmässigkeit ohne Zweck*. Quite another question is if there really be purposes in nature, "Naturzwecke": we have no reasons in the general idea of nature to assume that the objects in nature can serve each other as purposes. This conclusion is stated on the first page of KdtU, and thus the case seems settled. Nevertheless, Kant does not hesitate to spend another 150 pages taking this argument home. The reason why is of course that he is somehow obsessed by the fact that we possess a constant tendency to ascribe to nature, unrightfully so, purposes.

Purposiveness is very far from necessity, crucial to the Kantian definition of nature. What we do when we ascribe purposes to nature is using the faculties of the mind in another way than in science. This is now explained by means of the central distinction within the *Urteilskraft*, already widely argued in the first part of KdU: the difference between the determinative and the reflexive judgment. Whilst the judgment used scientifically to decide

whether a specific case follows a certain rule is *bestimmende*, results in explanation by means of a derivation from a principle, and thus constitutes the objectivity of the object in question - the reflective judgment lacks all these features. It does not proceed by explanation, but by analogy, it is not constitutive, but merely regulative, it does not prove anything, but merely judges, and it has no principle of reason to rest its head upon, just the judgment very itself. These ideas are elaborated throughout the KdtU.

In the "Analytik der teleologischen Urteilskraft", Kant gradually approaches the question: first is treated the merely formal *Zweckmässigkeit*: for instance geometry is purposeful, in so far as it can objectively be put to use to many ends - but this is still a purpose we ascribe it. Moreover, nature itself is ripe with purposeful relations beyond our ascription: rivers which carry fertile soil with them, apt for trees and herbs to grow in - this kind of purposefulness is - even if objective - not intrinsic: "Sie ist ein bloss relative, dem Dinge selbst, dem sie beigelegt wird, bloss zufällige Zweckmässigkeit" (282) . By the exterminations of these alternatives, Kant reaches the core definition of a thing which is only possible as a purpose: "Dass seine Form nicht nach blossen Naturgesetzen möglich sei, d.i. solchen, welche von uns durch den Verstand allein, auf Gegenstände der Sinne angewandt, erkannt werden können; sondern dass selbst ihr empirisches Erkenntnis, ihrer Ursache und Wirkung nach, Begriffe der Vernunft voraussetze." - a veritable "Zufälligkeit seiner Form" (232) If causes are perceived as a chain, then these contingencies can only be thought as small causal circles not connected to the chain, that is, as things being their own cause - hence Kant's definition: "ein Ding existiert als Naturzweck, wenn es von sich selbst Ursache und Wirkung ist" .This can, in fact, be thought without contradiction, maintains Kant, but not conceived (begriffen). This definition is now exposed: "Dinge als Naturzwecke

sind organisierte Wesen." This implies that Naturzwecke must possess a certain construction: the parts of such a thing must be possible only through their relation the the whole. - and, second, the parts must actively connect themselves into this whole. The corresponding idea is of course the idea of a Whole, which is necessary in order to pass judgment on any empirical organism. Every part of a whole is in the manner it is determined by all the other - so a *Naturzweck* is only possible as "organisiertes und sich selbst organisierendes Wesen". This is in fact the metaphysics of self-organization! - defined by not merely moving force, but the famous "bildende Kraft", so beloved and hypostasized by the later German philosophy of nature. It is analogous to art, but without the artist. This implies an interesting consequence: even if we conceive of these organized beings by analogy to our own soul, these beings cannot be organized by means of a soul (if they did, an artist was added or the organized matter was already there for the artist to collect) And it is not explainable - *erklärlich* - through the analogy with our art, Kant adds in an interesting remark, because we oúrselves - including our own *Zwecke* - in this respect belong to nature (we are so to say a part of the problem not of the solution!)

This leads to Kant's final definition: an organized being is that in which all alternatingly is ends and means. This definition lacks a constitutive concept of understanding - like the concept of movement for mechanics - and can hence not reach the status of a principle but must remain merely a "maxime" (296). Nothing in such a creature is in vain (Umsonst). Kant takes care to note that this definition need not be restricted to the beings - animals - which we spontaneously tend to judge as purposeful: "dieser Begriff führt nun notwendig auf die Idee der gesamten Natur als einer Systems nach der Regel der Zwecke, welcher Idee nun aller Mechanism der Natur nach Prinzipien der Vernunft (...)

untergeordnet werden muss." (300). The idea of natural purposes thus entails that there might exist a "plan" in nature rendering processes which we have all reasons to disgust purposeful for us. In this vision, teleology in fact embraces causality - and even art: "Auch Schönheit der Natur, d.i. ihre Zusammenstimmung mit dem freien Spiele unsere Erkenntnisvermögen in der Auffassung und Beurteilung ihrer Erscheinung kann auf die Art als objektive Zweckmässsigkeit der natur in ihrem Ganzen als System, worin der Mensch ein Glied ist, betrachtet werden." (303) As is evident in these passages, the assumption of purposes inherent in nature bears on a whole series of related topics. First of all, biology. This text is of course on of the principle texts of theroretical biology, sadly enough concluding by condemning biology never to be able to reach the status of science. Second, ecology: theories like James Lovelock's *Gaia* belongs to this same metaphysical domain; it is not metaphysically decidable which size the organized system must possess - even if a neo-Kantian like Ch. Peirce a hundred years later was to answer this question in the negative in the paper "Can animals have any size?" Third, human biology: the human race is itself a mere part of this all-embracing purposeful nature, and our various deeds - including history and our problems with critical philosophy - is a mere part of this (which all of a sudden makes art a subject for scientific investigation!). Finally, which shall not interest us here, theology.

Purposes inherent in nature is of course an untenable position, and its place is now researched in the traditional Kantian discipline the *Dialektik*. This dialectics reveals an antinomy of judgment. The *bestimmende Urteilskraft* has no principle but acts according to a given principle, guided by which it subsumes objects under concepts. In this way, it presupposes schematism, which exposes the concept in intuition. On the other hand, the reflective

judgment must, lacking appropriate concepts, serve as its own principle (what is meant by this seemingly strange idea is that judgment is in itself a purposeful use of the faculties of mind). These two opposed types of judgment form the antinomy of judgment: 1) all material things and their forms must be judged according to mechanical laws 2) Certain material beings can not be judged by mechanical laws only (314) These two maximes are of course not contradictory, but they become so if converted into constitutional assertations: *all material things can (can not, respectively) be constituted by mechanical laws.*

Of course, it is possible that in nature *an sich*, these two relations between things do possess one and the same root, but we are not gifted to tell, so we stand split between determination and reflection. And any idea of an absolute antinomy between the two derives only from our tendency to mistake the reflective judgment for a determination. Nobody doubts the existence of organized beings (!), what is at stake is the possibility to deal with them scientifically. Kant presents a whole range of theories (spinozism, theism, etc.) aimed at the resolution of this - apparent - antinomy and concludes that none of these theories yields what they promise. The reason is simple: "die Unerklärlichkeit eines Naturzwecks". Natural purposes is too much for the determinative judgment which does not possess the means - that is, objective concepts - with which to deal with it. Here a peculiar feature in the metaphysics of organized beings occurs: no concept of natural purposes can be given in experience - on the one hand - but on the other, organized beings are undoubtedly given in experience. Both experience and reason are ready, so to speak, only understanding is weak and cannot partake because of lack of proper concepts.

Here lies a slight twist in Kant's arguments: we saw before that assuming purposes actually existing in nature implied that organisms could exist in any size - but when the idea of a purpose imposes itself empirically, it does not do so in organisms of any size, but first of all in animals. There are so to speak organisms which are more obviously organisms than others?

We need only to look at biology to see the heavy consequences of these deliberations in Kant. On the on hand, biology is evident in so far as organisms exist. On the other, biology will never rise to the heights of science, its attempts at doing so are beforehand delimited, all scientific explanation of organisms is bound to remain mechanical. Taking this line of arguments, it corresponds to present-day reductionism in biology, taking all problems of phenotypical character, morphogenesis, behaviour etc. back to biochemistry. But reductionists need not raise the glass too early, for the other side of the argument is precisely that mechanics will never be able to replace the teleological point of view which is inexterminable in order to understand the organism as such: "Es ist nämlich ganz gewiss dass wir die organisierten Wesen und deren inneren Möglichkeiten nach bloss mechanischen Prinzipien der Natur nicht einmal zureichend kennen lernen, viel weniger erklären können ..." (337) No Newton of the straw of grass is ever to appear ...

Evidently, there is something deeply unsatisfactory in this conclusion which is why most scientists to-day hesitate at adopting it and cling to either reductionism or (the few of them) some brand of vitalism, subjecting themselves to the transcendental illusion and allowing for a Goethe-like intuitive concept without schematisation (some kind of *entelechy, élan vital*, or the like). We need hardly add that the argument easily extends to the humanities: scientifically viewed, these are part of natural sciences in so far as human beings are part of nature, so that the argument goes for any Kantian

Seelenlehre as well. Nature - and culture - *are* organized but we shall never know how ... A higher intelligence than ours *might* know, Kant adds, but thanks to the finitary character of our intelligence, we shall never know. This has to do with an interesting corollary of the overall argument: for human understanding, Kant states, it is important to tell possibility from reality - but this is only motivated by the architecture of our powers of thought: the difference between possible and real is due to the distinction between *Anschauung* and *Verstand*: concepts refer only to the possibility of an object, and intuitions refer only to something leaving its objecthood untold. Both contain possibilities, and an intuitive understanding, if it existed, would perceive only real objects and not imply unreal objects or imagine real non-objects like our two faculties do. This implies something about the possible "higher intelligence" being able to transcend human limitations: this higher mind will conceive of its objects in their *totality*, that is, every aspect of them, even the slightest quality will be known as a necessity, and the object as a whole will be known as a fully determined Leibnizian object - whilst for us finitary beings, only *universality* is possible: we can understand only that which falls under the general legislation of understanding, and the rest is not silence, but *Akzidenze*, accidential qualities, in the object.

It seems obvious that Kant has felt the same irritation as probably any reader of the KdtU. In the strange heap of papers now known as the *Opus Posthumum*, he over and over again attacks the borders he himself built around the inaccessibility of higher characteristics of nature than mechanistic ones. The explicit purpose, repeated over and over, is to establish a so-called *Übergang* from MAdN and to physics. This sounds in the first place as a step down from mechanic principles in metaphysics and down to real physics in the empirical sense of the word - and it is. But it is at the same time a step up from

mechanics and to these aspects of nature excluded by it, but strangely present to the empircal eye. Once again Ideas and empirical physics flirt reflectively together outside the bounds of schematism and construction.

Kant sees that this *Übergang* is the necessary bridge to close his philosophical system, but he is not very sure as to which means to use in building it. He experiments by passing through his four main categories, just like he so successfully did in the treatment of movement in MAdN and the treatment of beauty in first part of KdU, but reaches no definitive result, and his repetitive arguments encircles a small series of recurring themes:

1) the idea of an *ether*, a certain material filling space, of which heat is one of the effects - hence its other name, *caloric*. These are of course traditional names from early speculative physics, but Kant, as always hostile to speculation, has a certain aim by putting them to use. The Ether has to be there, he argues, as a general prerequisite for the space to be perceptible. Now, space is not perceptible in Kant, the counter-argument runs, space is a *reine Anschauung*, which we subjects use to order incoming material from the senses. But how is this projecting of a form onto a substance possible, the ether question seems to be, if not a third term between subject and object carries the responsibility. The idea of an ether is a priori and thus at the same time an unheard-of investigation into the noumenon itself and an investigation into the very origin of appearences. This connects it with four other recurrent themes in the OP:

2) The idea of nature as an organized whole, all nature's laws being bound up in one inextricable unity;

3) The idea of a *Grundkraft*, a basic force, a dynamics lying behind the various mechanical laws of Newtonian physics;

4) the idea of a phenomenon of the phenomenon (*Erscheinung der Erscheinungen*), and finally

5) the general question of organized beings.

The *Übergang* envisaged thus aims at reconquering some of the fields earlier left out of the scope of thought in critical philosophy, and in fact it is sometimes almost undecidable whether this work of an old man is the senile persons falling back into Leibnizian ideas of a dynamic nature in itself (which was what the early reception of the OP saw, due to which is its late publication)[1] or if is a last effort of genius once again reformulating, rearranging, and taking further the basic insigths from KdrV.

But of course the most interesting reading of it is the one which attempts at the latter.

The reason why Kant needs this *Übergang* so desperately is of course the lack of systematicity in physics. Mechanics is all right as far as apodictic certainty, but it does not yield the systematicity of the whole of physics - and as we saw, systematicity is a core Kantian demand for a science. Thus he wants to erect an "elementary system of the moving forces of matter" by means of what is called "mediating concepts which enable the transition from the one doctrine of nature to the other, i.e. the application of a priori concepts to experience in general" (III, VI, 2) One of these concepts are "living forces", a basic force penetrating all matter. The reason why Kant needs this force is interestingly enough macrophysical: the forms of macrophysics cannot be explained by the continuity of matter (cf. Kant's anti-atomism): "When caloric, or a part of it (whose vibration was responsible for mixing together the species of fluid matter) escapes, a moderate form of this vibration of heterogeneous, but, yet,

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[1] After this text was given as a lecture at Filosofisk Forum in Copenhagen, Arno Victor Nielsen wittily remarked: "We usually hear about Kant's pre-critical and his critical writings.Now we have also heard about his uncritical writings."

reciprocally resolved, elementary materials, now produce stratification" "It can be seen from the texture of fibers, laminae and blocks, which is formed by crystallizing minerals..." V, IV, 1. This "bildende Kraft" is also that which stand behind the formation of bodies, which entails that the a priori system of physics must contain a department for this species:

Metaphysics

Physics

General (mechanically acting forces) Particular (organically: How does matter produce a body?))

matter	bodies (repeating the KdtU def.) + natural machines
mechanical, moved from outside	dynamical, moved from inside
given through experience	*only* given through experience

Man is able to see this body physics: "Because man is conscious of himself as a self-moving machine, without being able to further understand such a possibility, he can, and is entitled to, introduce a prior organic-moving forces of bodies into the classification of bodies in general"

The partition above can be taken even further:

bodies

vegetable (for the sake of) animals

men (for the sake of) men of different species

and several places Kant introduces the idea of an evolution: "How many such revolutions (including, certainly, many ancient organic beings, no longer alive on the surface of the earth) preceded the existence of man, and how many (accompanying perhaps a more perfect organization) are still in prospect, is hidden from our inquiring gaze" II VI, 4

Now, Kant is not unanimous in his attempts to find the possibility for this evolution of organized bodies in the OP. Sometimes the ether/caloric is attributed as being responsible for it, other times he states that "the organizing principle of an organic body must be outside space in general" - in another substance, the world-spirit, he adds - pointing towards some of the more obscure parts of the German romanticsm to emerge.

Another way he tries here to tackle these problems is by introducing the idea of the appearance of an appearance (*Erscheinung einer Erscheinung*): "The appearance of things in space (and time), however, is twofold: 1) that of objects which we ourselves insert in space (a priori), and which is metaphysical; 2) that which is empirically given to us (a posteriori), and which is physical. The latter is direct appearance, the former indirect - that is, appearance of an appearance." (X, VIII, 1) "The appearance of appearance,

thought in the connection of the manifold, is the concept of the object itself." (X, V, 1.)

By this double appearance theory, the *an sich* part of Kant's earlier theories makes its reappearance so to speak: our metaphysical categories are themselves appearances of the empirical appearances; what is thus discussed is all of a sudden the origin of metaphysics out of physics, almost a Copernical contra-revolution inside the system: appearance is perception, but the appearance of appearance is experience. This appearance of appearance is tied up to self-reflection in an interesting manner: through and through, Kant states in the OP, that the possibility of man for experiencing organic bodies stems from his own ability to feel his own body; that is, a certain kind of *bodily Selbstbewusstsein* seems to lie at the root of the appearance of appearance.

Kant does not conclude unambigously this heap of notes of very different quality. To give a feeling of their chaotic appearance, I can but cite the following:

"Vital force in excitability. Motion of the brain (the nerve root), the heart, the lung. Decomposition of air and absorption of oxygen by cold-water fish.

1) The object in the pure a priori intuition 2) in appearance (of oneself) 3 in perception - empirical intuition, 4) in experience (omnimoda determinatio, existentia). Consciousness of one's self precedes a priori all determination of the subject as object. The schematism of the faculty of judgment formally prepares the transition of physics." (XI, V, 4)

This is one of the very few places in OP, in which the schematism is mentioned, and in general no schematism of physics in the broad, ambitious sense of the word (except for mechanics of course) is worked out.

Yet the OP points even sharper than the KdU towards some irritating points in science still actual today: unity as the ultimate goal in physics (the GUT theories are a good example), the emergence of categories out of the phenomenology of a living body (as actual in so-called cognitive semantics), but most of all the *Naturzwecke*, the organic forms as a repressed part of science attempting to make its claim. Why is Kant not able to make the final breakthrough towards the understanding of organic form (and form in general, cf. macrophysics)? A reason might well be what we have remarked earlier, that thanks to Kant's division between mechanics and the rest, so to speak, a very diverse bundle of problems belong to this "rest", ranging from biology to theology, all conceived through the idea of Wholes, of *Naturzwecke*. But maybe this continuity should be broken up?

This is in fact what the French Neo-Kantian Jean Petitot tries to do, and I shal briefly conclude by presenting his idea of an actualization of critical philosophy in present-day philosophy of science. To him, the problem of form (organic form, but also form in general) is the main problem of KdU and of OP, and this problem must be isolated and envisaged as an objectivity in its own right. Doing so, he of course reads Kant through Husserl and his idea of regional or material ontologies, here to be reinterpreted as the possibility of a plurality of objectivities, each of them comprising their own schematism and construction. Thus movement is not the only concept which can be successfully schematized, and Petitot proposes the concept of *qualitative difference* as a candidate to the basic concept for an objectivity of form. This is of course not possible without some reconstruction of the Kantian architecture. First of all, the role of mathematics and construction is revised. Mathematics is not a science close to perfection, as it was a widespread idea amongst the *Aufklärung*

generation; on the other hand, mathematics is still evolving and ripe with generativity. Thus the transcendental aesthetics of form shall be topology, a science not yet born at Kant's time. This objectivity will now comprise not only biology, but all natural phenomena as far as conceived as form or as structure - that is, to Petitot, inclucing macrophysics, phase transitions, morphogenesis, the structural aspects of language, semiotics, culture, and literature. (Just like mechanics in its days suddenly brought together formerly remote fields of experience, apples and planets). Mathematics is thus crucial to construction of the *mediating concepts* so desired by Kant, and schematism without mathematics deals only with the object in general, whilst each specific object - just like Kant pointed out in the case of mechanics - can be made scientific object only in so far as it is treated matemathically. This implies for Petitot a historicity of mathematics (as the only science in which history and truth are not in conflict) implying a historicity of the a priori concepts (not unlike the German neo-Kantians, cf. Cassirer) - without thereby giving in to threat of total Hegelian historicism.

This new objectivity will be *as natural as any* - but not mechanistic. This has as a consequence the need for a *reinterpretation* of the Kantian *Gesetzmässigkeit* which now ceases to be identical with predictability. A present day science pointing in this direction is chaos theory, in which determinism and predictability are no longer identical - it now being possible to retain the first without assuming the latter. The so-called chaotic processes are considered determinist through and through, but are necessarily unpredictable, that is, in Kantian terms, for any finite mind. This does not imply, however, that it is not possible to yield an objective, *qualitative* description of the chaotic process, a task undertaken by the branch of physics known as qualitative dynamics. To this science, a qualitative description (by

means of types of attractors, of bifurcations, of roads to chaos etc. - all of them spatialle describable) is the possible way to map sufficiently complex physical systems.

Thus, to Petitot, Kant's critical philosophy is of paramount importance in a reformulation of contemporary science - to avoid the ever threatening dangers of empiricism and dogmatism, respectively. A large work lies before us, shall we take this actual version of the questions of KdU and of OP seriously: the critical examination of a whole range of new objectivities which might overthrow many existing borders in the scientific landscape - including the beloved and sentimental one between *Natur- und Geisteswissenschaften*. But this is no subversion of Kant. Did he not himself speak, as quoted earlier in this speech, of the possibility of *Seelenlehre* as *Naturwissenschaft* (just like, in fact, the neo-Kantians against the Diltheyans maintained the possibility of psychology as a nomothetical science). Although, of course, this will be a *Naturwissenschaft* which is not merely mechanical and reductionistic, yet apodictic, general, and objective.

Here, we return to our wondering why the schematism in the KdrV was only defined by means of one of the to *Anschauungsformen*, that is, time, but not space. Structures, organisations, *Baupläne, Gestalten*, all which is conceived of by Petitot's supposed structural objectivity demand space as their immediate a priori form[2]. The schematism needed to make form an objective notion must

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[2]Actually, the Kantian privilege to time over space might be subversed in so far as physics long ago has ceased talking about efficient causes and instead prefers to see causality as being mapped by a whole formal system of differential equations in which no component can be singled out as efficient cause; the whole system rather acting as a formal cause. But this formal cause of n parameters is describable in n-dimensional space; maybe three-dimensional space ends up as a much more sophisticated notion than one-dimensional time which must always be thought of in spatial metaphors (cf. Kant's synthesis as a "Reihe").

necessarily take space as its point of departure, because the objective is to conceive of phenomena *apart from* their being determined by an efficient cause. Of course, this schematism must be one, more comprehensive than the schematism of cause, which presupposes causality but can be pursued in the cases in which causal explanation for practical or principal reasons must give in. In this way, Kant's neverending insistence on the aim of physics as being more than Newtonian mechanics, his stubborn pointing to the evidence of the existence of organized beings in KdU and OP - without on the other hand allowing for any vitalist extra-physical poser to explain them - provides a brilliant and early effort in the attempts of establishing the status of not only a theoretical biology, but a metaphysics of self-organisation. What he needed so badly, but did miss - would be the Petitotian argument - was the apt mathematical tools for this second schematism: topology.

Maybe it is possible to go further in this direction to-day, in a Kantian spirit, if not Kantian letters.

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Det er med følgende forbehold, at ovenstående tekst nu ser trykken. Den er et kun ganske lidet redigeret foredragsmanuskript til et foredrag på Centret "Menneske og natur" i Odense, 1993, der senere blev gentaget i Filosofisk Forum i København. Det fremstår således i mit eget ubehjælpsomme skoleengelsk, ligesom argumentationen adskillige steder burde kontrolleres, uddybes og annoteres. I mangel af en sober litteraturliste kan jeg anføre, at sidehenvisningerne til Kant-udgaverne følger den tyske standard; hvad OP angår er både det engelske udvalg og den tyske udgave anvendt.