Studies in History and Philosophy of Science

September 1987

VOLUME 18 NUMBER 3

STEPHEN PALMQUIST — 255 Kant's Cosmogony Re-evaluated

P. F. H. LAUXTERMANN — 271 Five Decisive Years: Schopenhauer's Epistemology as Reflected in his Theory of Colour

PETER ACHINSTEIN — 293 Light Hypotheses

RICHARD F. KITCHENER — 339 Genetic Epistemology, Equilibration and the Rationality of Scientific Change

GIORA HON — 367 H. Hertz: 'The electrostatic and electromagnetic properties of the cathode rays are either *nil* or very feeble.' (1883) A Case-study of an Experimental Error

383 Books Received

ISSN 0039–3681
SHPSB5 18(3) 255–384 1987
Stud. Hist. Phil. Sci., **18**, no. 3, 1987

Published by
Pergamon Journals Ltd.
Printed in Great Britain by Avon Litho Ltd.,
Stratford-upon-Avon

*STEPHEN PALMQUIST**

KANT'S COSMOGONY RE-EVALUATED

IMMANUEL Kant's pre-Critical career is often described as that of a scientist, or perhaps a philosopher of science, whose interests gradually turned to pure philosophy. Without expecting any fundamental change in the traditional view of Kant's scientific expertise, several years ago the world of philosophy joined hands with the world of science to welcome onto the shelves of its libraries and bookstores a new translation of the greatest of Kant's works in the philosophy of science, *Allgemeine Naturgeschichte und Theorie des Himmels* (1755). As a scientist, the new translator re-evaluates Kant's scientific merit and comes up with a number of surprisingly negative conclusions. Lest these conclusions be accepted prematurely, we must critically examine the details of this new analysis of Kant's work. Only in this way can we determine the extent to which such a re-evaluation of Kant should be accepted in the scientific and philosophical worlds.

Kant's *Allgemeine Naturgeschichte* was first translated into English in 1900 by the Reverend William Hastie.[1] Hastie used his expertise in German to translate a work written in the rather obscure style for which Kant is infamous into a clear, though sometimes idiomatic, style which reads far more smoothly than the original. In approaching the text, Hastie assumed that Kant had some intelligible meaning in mind as he wrote. By immersing himself in the German text and in Kant's presuppositions as he saw them, he hoped to discover such meaning wherever possible. Then, resuming a more objective point of view, his goal was to convey that meaning as accurately as possible in each passage, even if this required a loose translation of the original text. He hoped in this way to reinforce the positive estimation of Kant's achievement made by many scientists and to insure for it a permanent place in the "hall of fame" of philosophical theories of the nature and origin of the universe.

*St. Peter's College, Oxford OX1 2DL, U.K.
Received 24 *October* 1986.

[1] Translated in his book, *Kant's Cosmogony as in His Essay on the Retardation of the Rotation of the Earth and His Natural History and Theory of the Heavens...* (Glasgow: James Maclehose). Reprint edited by Willy Ley (New York: Greenwood, 1968).

Stud. Hist. Phil. Sci., Vol. 18, No. 3, pp. 255–269, 1987. 0039–3681/87 $3.00 + 0.00
Printed in Great Britain.

For eight decades Hastie's evaluation of Kant as a scientist has enjoyed wide acceptance among philosophers and scientists alike; but in 1981 Stanley Jaki published a new translation of Kant's *Allgemeine Naturgeschichte*,[2] together with a re-evaluation of its scientific merit, which threatens to explode the traditional myth that has developed concerning Kant's scientific genius. It consists of a 76 page Introduction to and 86 pages of detailed notes on his 116 page translation of Kant's work. Jaki begins his Introduction with an attack on Hastie's translation which points up its lack of faithfulness to the original text and its scientific ineptitude. He proposes an extreme alternative, and follows it closely in his brutally literal translation of the German. Down to the last detail his goal as a translator is scientific accuracy: he "aims above all at utmost faithfulness to the often cumbersome and convoluted, and at places unintelligible, original" (p. 9), even though by doing so he has also, no doubt, passed on "enduring headaches" to his readers — headaches the causes for which "Hastie kept silent" (p. 9), but which Jaki has now faithfully brought to light for the English reader to suffer. Thus, in place of Hastie's smoothly flowing phraseology, which always tries to give Kant the benefit of the doubt, Jaki goes so far as to preserve errors which are due almost certainly to carelessness on the part of the printer or proofreader.[3] Indeed, he apparently works on the assumption that a passage is translated most accurately when it is made to appear to contradict with itself, with another passage, or with a scientific fact subsequently discovered.

Hastie's treatment of Kant's text admittedly suffers from what Jaki calls the romantic tendency to be "enamored of Kant the champion of pure scientific reason" (p. 10). Yet, if we are to regard Hastie as viewing Kant through the distorted eyes of an infatuated *lover*, so also should we regard Jaki as viewing him through the equally distorted eyes of a *rapist*. For Jaki treads heavily and with little respect on the virgin pages of the German text, both in his translation and (as we shall see) in his Introduction and Notes. No consideration is given to the possibility that Kant might have something of

[2] *Universal Natural History and Theory of the Heavens* (Edinburgh: Scottish Academic Press, 1981). To avoid excessive footnoting, page numbers referring to Jaki's book will be given in parentheses in the text, and will be followed (where applicable) by square brackets enclosing the corresponding page number of the German text, or the number of the note to which reference is being made.

[3] A rather ironic degree of rigor expected by someone whose own proofreading skill is shown to be far from perfect by the numerous grammatical and typographical errors which the careful reader will find in his Introduction and Notes.

value to give to him, the translator, as well as to us, the readers — or at least, no attempt is made to shed any light on what such a contribution might be.

The merits of these two approaches to the task of translation are both partial: neither can claim to wield authority over the other, because they approach the text from different perspectives. For the logician and the scientist, or indeed for any rigorously *analytic* thinker, the accuracy of Jaki's translation would establish it as far superior to Hastie's idiomatic treatment of the text. Yet for the poet and the philosopher (at least, some types of philosopher), or for anyone more concerned with the artistic or systematic modes of *synthetic* thinking, Hastie's translation maintains its supremacy. Thus, in the case of the two examples before us, the logical and the aesthetic methods, each has its own advantages and disadvantages; each indeed should be understood as succeeding in the goals set by its authors; and each has its own value in its own context.

An ideal translation, perhaps, would be one which somehow combined both logical rigor and aesthetic understanding to produce a text which conveys the meaning of the original without straying haphazardly from the literal wording. But this is not the place to debate about the merits of various methods of translation. Rather, two points can be made before moving on. First, it is relevant to note that Kant himself regarded synthetic thinking as the primary method by which his Critical philosophy operates; hence it is not surprising than an analytical thinker such as Jaki finds little sympathy with Kant, whether it be in regards to early works such as the one we are considering here, or to his more mature treatises. By refusing to adopt Kant's own presuppositions and perspectives, as he admits early on (pp. 8–9), and adopting instead those of "a historian of science" (p. 51), Jaki stands little chance of grasping what Kant is trying to say. The second point is that, so far as the style of translation is concerned, Jaki has *not* succeeded in relegating Hastie's translation to the scrap heap, as he believes he has; rather he has complemented it with an equally extreme, and equally one-sided, version of his own.

We can now turn to the more important discussion of the *content* of Jaki's commentary on Kant, where he commits a similar error: by expending all his effort in saying "no" to the opposition, he falls victim to the same presuppositional errors as do his opponents. By spending all his effort, as it were, boxing his shadow (viz. Hastie, and the traditional estimate of Kant's scientific achievement), he fails to consider the possibility that Kant himself may have had something rather different in mind. For both Hastie and Jaki assume Kant was trying to write a rigorously *scientific* treatise (see e.g. pp. 1–12, 291 [n. 16]): Hastie concludes that he has succeeded admirably; Jaki objects with ample proof that he has failed miserably. Yet neither bothers to provide evidence that their supposition is based on Kant's own account of his

intentions. By contrast, we shall see that such a supposition requires one to turn a blind eye to many warnings Kant gives *against* viewing his work in this way.[4]

Before discussing Kant's own account of the intentions and presuppositions of his cosmogony, it will be helpful to discuss a sampling of the many criticisms Jaki raises against Kant's work. Jaki's main points can be summarized as follows:

1. Kant relies on source material more than he sometimes lets on, thus (intentionally?) giving the impression of a work more original than it really is.
2. Kant is often careless both (a) in his writing style and (b) in his mathematical calculations and statements of scientific fact.
3. Kant repeatedly puts forward two contradictory claims with respect to his various theories and conclusions: (a) that he has provided us with certain proofs; and (b) that all his conclusions are tentative and hypothetical.
4. Kant gives too much importance to his own subjective beliefs and opinions, without backing them up with objective arguments.

We shall consider these four points in turn, the third and fourth of which will bring us back to the question of Kant's own assumptions. We shall find that these criticisms, which Jaki dresses up to look like certain proof of the worthlessness of Kant's *Allgemeine Naturgeschichte*, are for the most part either irrelevant, misconceived, or else already well-known criticisms of Kant's work in general.

The characteristic of Jaki's Introduction and Notes which outshines all others (good and bad) is his extraordinary grasp of the history of cosmogonies, of the history of science in general, and of the various influences on Kant's cosmogony in particular.[5] This devotion to detailed research enables him on the one hand to trace a significant number of Kant's comments (in about 43 instances) to sources available prior to 1755, and on the other hand to prove the inaccuracy of many other comments, based on subsequent discoveries. By calling into question either the originality or the truth of many of the details of Kant's exposition, Jaki does succeed in casting doubt on the traditional view of Kant as a budding scientific genius who decided in his middle age to focus his efforts on philosophy instead. Kant's change of emphasis comes to look more like the only way of escape from a dead end. However, Jaki does tend to

[4] Jaki's reference on pp. 9, 214 [n. 36] to Kant's comments on p. 190 [188] is unargued and unconvincing. Far from claiming to be writing a "physical treatise" — a phrase which Kant does use in passing, but with no hint that it is to be taken literally — Kant is here at the height of his intentionally hypothetical, or even *mythical*, account of the nature of the universe. This point will be expanded below.

[5] Over 40% of Jaki's notes to the translation (198 out of 475; see Table I) display Jaki's breadth of knowledge in these areas.

be rather too strict with Kant, expecting him to adopt twentieth-century standards by referring to every source and by including in his text explicit mathematical calculations to demonstrate how he has arrived at each figure he mentions. As a result he ends up viewing "Kant the scientist" as little else than a bad joke: for all Kant gives us is "wilful and often confused speculations, not science" (p. 8); it just happens that he had "a lucky guess or two" (p. 8).

A good example of how Jaki goes wrong in some of his criticisms with regard to Kant's originality is his whole treatment of how Kant regarded his relation to Newton. He assumes the traditional view (perpetrated by Hastie and others) that Kant "looked upon himself as another Newton" (p. 12). Yet he never gives references to comments of Kant's which would indicate such a self-appraisal. Kant does admit that he has "borrowed from the Newtonian philosophy of nature" (p. 91[c8r]), but at no point does he claim to be an expert on it. Moreover, Jaki suggests that Newton was always "highly praised by Kant" (p. 292 [n. 35]), without mentioning the fact that Kant himself argues explicitly *against* Newton in several instances (see pp. 94[d2v], 95[d4r], 120-121[40-42]). As a result of his one-sided view, Jaki chides Kant for his carelessness or inconsistency whenever he makes an "un-Newtonian" remark (see e.g. pp. 250 [n. 28], 258 [n. 17]). He shows no awareness of the possibility that Kant viewed his cosmogony as one which "transcended the Newtonian explanation of the world."*14* Instead, Jaki's treatment of Kant's relation to Newton is just one example of how he twists Kant's meaning to make it look ambiguous, inconsistent, or simply incorrect.

A similar limitation can be put on both parts of the second of Jaki's major criticisms mentioned above. Anyone who has even a cursory acquaintance with Kant's works is bound to be aware that his writing style is obscure. Yet the resulting difficulties have not led other translators to preserve every last ambiguity in the text. Rather, the usual approach is to smooth over the rough spots, and to refer to the original in the notes where necessary. By refusing to do so, Jaki is actually able to make the text look worse than it is, thus twisting the stylistic criticism to carry more weight than it should. Since we have already discussed the drawbacks of Jaki's method of translating, we can move directly to a consideration of the second type of carelessness which Jaki criticizes.

Kant's careless treatment of scientific facts and mathematical calculations (or the lack thereof) would certainly be most detrimental to a treatise in exact science. But if Kant is not attempting to write such a treatise, most of the mathematical and scientific ineptitudes which Jaki calls to our attention (in no

[6] Herman-J. de Vleeschauwer, *L'Évolution de la Pensée Kantienne*, 1939. Tr. A.R.C. Duncan as *The Development of Kantian Thought* (London: Thomas Nelson, 1962), p. 20. Vleeschauwer continues: "This transcendence...marks the metaphysical orientation of a cosmogonical essay which is not lacking in greatness."

less than 95 different notes) would be excusable. Many of Jaki's complaints could be explained simply as the result of rough estimations or approximations on Kant's part. (Jaki himself approximates 850 by referring to it as "almost 1000" (p. 292 [n. 34]), a sufficiently large difference for Jaki to have criticized as "inexact", had *Kant* made such an approximation.) Reading between the lines, Jaki assures us that Kant wants us to believe that he himself is capable of working out a detailed mathematical defence of many of the theories he discusses (see e.g. pp. 252 [n. 45], 257 [n. 10]). This, according to Jaki, is the heart of "the great cover-up of fallacies" in Kant's *Allgemeine Naturgeschichte* (p. 268 [n. 34]; see also p. 276 [n. 51]). But there is no justification for such an assumption. On the contrary, Kant specifically requests his reader, out of a sense of "fairness", *not* to judge his work "according to the greatest mathematical rigor which anyhow in this kind of considerations cannot be had" (p. 92[d1v]).

Unfortunately, Kant never actually states why such elaborate mathematical explanations "cannot be had". If asked, he may well have answered that his main reason for not supplying them was that he is incapable of doing so, or perhaps that it is possible to do so in principle, but only if the equipment for observing and measuring astronomical events and magnitudes were improved sometime in the future.[7] But he appeals more often to its inappropriateness in "an essay of this sort" (p. 92[c8v]). Along these lines Kant would probably have answered: "I did not wish to burden my reader with mathematical calculations and scientific exactitudes because I was not attempting to write a treatise in exact physical science." Although Jaki hastily rejects such comments as appealing to "a most unreasonable excuse" (p. 252 [n. 45]), they will come to look rather more plausible when we examine Kant's expressed intentions. So let us turn now to the third of Jaki's major criticisms, where we will see that what is unreasonable is not Kant's open explanation of his own formal and stylistic presuppositions, but rather Jaki's refusal to put aside his own assumptions long enough to hear what Kant has to say.

Perhaps Jaki's harshest criticism is directed against Kant's apparently contradictory tendencies to speak as if he has demonstrated his conclusions by certain proofs, and yet to plead that we regard all his comments as tentative and hypothetical. On the surface this does indeed look as if it can be nothing but a patent contradiction. But in fact the interpreter has two other options as well. He could either try to explain the latter set of comments in terms of the former (e.g. by arguing that "hypothetical" is understood by Kant to be a step on the way to "certain proof"), or vice versa (e.g. by arguing that "certain proof" is being used rhetorically as a phrase intended merely to emphasize that the argument under consideration provides sufficient conviction within the

[7]Kant did give such an excuse in certain instances (see e.g. p. 141[85–86]).

context of the system into which it fits, a system which itself must always remain hypothetical). Jaki shows no awareness of either of these two options; instead, assuming that "Kant the scientist" (see e.g. pp. 7, 283 [n. 13]) is doing his best to establish objective, scientific proofs in his cosmogony, Jaki concludes at several points that Kant is making blatant, inexcusable, and downright irrational comments when he refers to the tentative and hypothetical nature of his treatise (see p. 252 [n. 42], and other examples mentioned below). Yet he also shows little sympathy for Kant's apparent self-assuredness: "The disgrace of the *Allgemeine Naturgeschichte* is...that boastful attitude in the face of grave scientific and philosophical difficulties", for which, in Jaki's opinion, "an unclear style...was the [only] cover" (p. 76).

If Kant really had claimed to be a physical scientist, then Jaki's assessment of Kant's cosmogony as a miserable failure would be substantially correct. For if Jaki has succeeded in anything it is in showing that Kant's scientific and mathematical abilities were mediocre rather than expertise. However, when Kant's comments are allowed to stand on their own, it seems likely that Jaki has been swayed by Hastie and the traditional view to bark up the wrong tree. For I have found no passage in the *Allgemeine Naturgeschichte*, or in any of Kant's other "scientific" writings, in which he comes right out and says that he is attempting to do physical science. Rather, the phrase he prefers to use to describe his work is "natural philosophy".[8] Questions which are answered by means of *a posteriori* observation by the physical scientist are, for Kant as a natural philosopher, "to be decided *a priori*".[9] Because he is not tied exclusively to empirical observation, Kant advocates the need "to judge according to analogy".[10]

The guidelines followed by Kant in his other works in *a priori* natural philosophy are precisely those which he perfects and employs in his *Allgemeine Naturgeschichte*. From the very beginning Kant readily admits that he is venturing forth "on the basis of a slight conjecture" (p. 81[a5v]). Thus, many of his points are presented explicitly as being based on such "conjecture" (see

[8]Immanuel Kant, *Something on the Influence of the Moon on the Temperature of the Air*, p. 83; see also his essay, *History and Physiography of the Most Remarkable Cases of the Earthquake which towards the end of 1755 Shook a Great Part of the Earth*, p. 138. Both these essays are translated anonymously, in *Essays and Treatises on Moral, Political, Religious and Various Philosophical Subjects*, 2 vols. (London: William Richardson, 1798–1799). Page numbers refer to this translation. Jaki wrongly identifies the translator of this book as A.F.M. Willich (p.232[n.76]). In fact, the translator was John Richardson, as William Wallace points out in *Kant* (London: William Blackwood, 1901), p. 78. Jaki must have been misled by the fact that the title page of the work in question states that it is translated "by the translator of the Principles of Critical Philosophy" (a work of J.S. Beck's translated in 1798 by John Richardson), whereas A.F.M. Willich published a book in the same year entitled "*Elements* of the Critical Philosophy".

[9]Kant, *Something...*, *op. cit.*, p. 83.

[10]Kant, *History and Physiography...*, *op. cit.*, p. 149.

e.g. pp. 93[d2r], 134[69]), and as resulting in a theory which "is still imperfect" (p. 136[73]). He admits his essay is largely concerned with "opinions" and "hypotheses" of a type which "are usually in no higher regard than are philosophical dreams" (p. 91[c7r]). Moreover, nearly every time he refers to a convincing "proof", or to the attainment of "certainty", he is careful either to modify such statements with adjectives such as "almost" (e.g. p. 149[102]; cf. p. 92[d1v]) or to connect such terms directly — usually in the same sentence — with the key principle of the entire treatise, conviction by "analogy".[11] Because Kant intentionally argues not only "from principles of nature", but also "from analogy" (p. 106[11]), he is well aware of the inevitably tentative nature of the overall system he is constructing. Indeed, his *expressed hope* is that his conjectures will "stimulate the attention of the investigators of nature in order to bring it to fulfilment" (p. 102[3]; see also p. 141[86]).

On page 125[50] Kant refers to "an analogy which...can raise the present theory...above the probability of hypothesis into a formal certainty." It is crucial to a proper understanding of Kant's intentions that this "formal certainty" is to be equated neither with the "material certainty" established by the scientist or mathematician (a synthetic *a posteriori* certainty, based on observation or calculation), nor with the "formal certainty" established by the logician (an analytic *a priori* certainty, based on the operation of logical laws), nor even with the "transcendental certainty" established by the critical philosopher (a synthetic *a priori* certainty, based on the necessary conditions for the possibility of experience). For Kant is here thinking of a radically different type of certainty, a certainty established by *analogy* with respect to a given system (see p. 174[157]), which can be regarded as being analytic ("from analogy") yet *a posteriori* ("from principles of nature").[12] If the ordinary types of certainty are regarded as "certainty of *knowledge*", then Kant's special type should be taken as referring to "certainty of *belief*."[13] Thus, when Kant does adopt this rhetorical way of speaking by referring to an argument as a "certain proof" (e.g. p. 145[94]), he does not mean by this a "scientific proof", but only one which carries *conviction* within the context of his

[11] See e.g. pp. 94[d2v], 95[d4r], 170–171[149–150]. If only Kant had been so careful to qualify the rhetorical expressions of certainty which plague the reader of his *Critical* works!

[12] I develop the notion of "analytic *a posteriori*" as it operates in Kant's Critical philosophy in my articles, "Knowledge and Experience — An Examination of the Four Reflective 'Perspectives' in Kant's Critical Philosophy", *Kant-Studien* **78** (1987); and '*A priori* Knowledge in Perspective: (II) Naming, Necessity and the Analytic *a posteriori*', *The Review of Metaphysics* **41** (1987).

[13] For a discussion of the role of faith, or belief (*Glaube*), in Kant's Critical philosophy, which is similar (though not identical) to the sense in which this concept applies to his cosmogony, see my article, 'Faith as Kant's Key to the Justification of Transcendental Reflection', *The Heythrop Journal* **XXV** (1984), 442–455.

system.[14] It is for this reason — and not because of his forgetfulness, as Jaki assumes (p. 287 [n. 11]) — that Kant says "one cannot doubt" the truth of a particular theory (p. 163[132]), yet admits in the next sentence that the theory "must be ascribed with probability...".

Jaki suggests at one point that such references to certainty "should be seen in the light of Kant's repeated assertions...of the unquestionable correctness of his cosmogony" (p. 290 [n. 1]; see also p. 252 [n. 44]; cf. p. 257 [n. 8]). Yet, as usual, Jaki does not specify where any of these "repeated assertions" can be found. He apparently assumes this is unnecessary because of his frequent reference in the notes to this attitude of Kant's. But a few examples will prove the incredibility of such comments. When Kant says "The certainty...will be raised to the highest peak of *conviction* (p. 176[160], emphasis added), Jaki appends the following note: "Clearly, Kant's erstwhile protestations of diffidence were a mere device of rhetoric" (p. 291 [n. 20]). Likewise, when Kant refers to his theory as being based on "an analogy which will be firmly stated" (p. 188[184]), Jaki notes: "Clearly, Kant's declarations of diffidence cannot be taken seriously" (p. 295 [n. 20]). Yet Jaki never gives any *reasons* for such judgments; he simply states them as being "clearly" self-evident. To do so, he often has to twist Kant's wording mercilessly. Thus, his response to Kant's claim that "we can conclude with more than probable confidence..." (p. 189[186]) is: "Practically certain, to wit" (p. 296 [n. 22]).

A more open-minded approach would be to view Kant's boasts of certainty as the device of rhetoric, intended to promote the conviction of the truth of the system, while treating the expressions of uncertainty as honest warnings against regarding the overall system as objectively necessary. What terms such as "certainty" and "conviction" mean in such cases is well expressed by Kant when he closes his "Opening Discourse" (p. 92[d1v]) with the words: "One will invariably find...something more than [what is] purely arbitrary, although always something less than what is undoubted." Or again, as he says elsewhere, he believes his cosmogony "has as much probability as one can expect from a hypothesis".[15] The conviction that results is therefore sufficient to refer to a given theory within the resulting system as "certain". What else can we expect from someone who openly tells us he is using his "imagination"

[14] It is not surprising that Jaki fails to appreciate the implications of the systematic character of Kant's thought (which Kant himself emphasizes on p. 101[1–2]; see also pp. 180–181[169–170]), for Jaki consistently regards this systematic and *a priori* emphasis with disgust, denouncing Kant as "the facile conceptualizer" (p. 259 [n. 36]). For example, when Kant carries his conjecture concerning the formation of Saturn's rings a bit too far for Jaki's taste, the latter chides: "Kant is clearly carried away in the manner of a zealous system-maker" (p. 277 [n.60]).

[15] *Der einzig mögliche Beweisgrund zu einer Demonstration des Daseins Gottes* (1762), excerpt tr. S.L. Jaki in *Universal Natural History* (*op. cit.*), p. 207.

as an important aid to the understanding in constructing his theory?[16] The claims to certainty are purely subjective (with respect to the system); the claims to tentative probability are objective (applicable apart from the system — i.e. as the system relates to other systems and to nature itself).

Let us now isolate yet another of the many cases in which Jaki charges Kant with contradicting himself and examine the extent to which the interpretation presented above exonerates Kant. On page 113[26] Kant says: "...the case can be considered with a considerable manner of approval which raises it above the probability of a hypothesis." To this sentence Jaki appends one of his many notes of harsh, unsupported judgment: "One of the many instances contradicting Kant's repeated assertions that he merely submits a theory or hypothesis" (p. 257 [n. 8]). Yet in the very next sentence Kant leaves no doubt that he is *not* claiming to have raised his entire theory literally to this position: "One *could*, if one were to go into detail, finally arrive [by mathematical calculation]...at the very plan which I lay out..., *but I prefer to present my views in the form of a hypothesis*" (p. 113[26], emphasis added). Contrary to Jaki's undefended charge, Kant is in no sense contradicting himself here. For in light of the second sentence the first must be regarded not as a claim to having *achieved* mathematical certainty, but rather as a suggestion that, since the analogy points so clearly in one direction, such a mathematical defence should be regarded as, in principle, capable of being worked out. Here, as elsewhere,[17] instead of recognizing Kant's many cautious statements for what they are, and adapting his criticism accordingly, Jaki either ignores them or makes fun of them — if necessary, by calling attention to stylistic awkwardness in sentences that are nevertheless perfectly intelligible (e.g. cf. p. 155[116] and p. 285 [n. 32]). Yet Kant himself clearly suggests the interpretation I have put forward of these apparently contradictory statements when he says he intends to proceed "always along the guidelines of analogy and of rational credibility, yet with a certain [rhetorical] boldness" (p. 92[d1r]), thus warning the reader against falling into Jaki's blunder of over-literalizing his statements of confidence.

Once Jaki's third criticism of Kant is seen to be fallacious, his fourth criticism is rendered inapplicable. Jaki's repeated criticism of Kant's

[16] See pp. 155[115], 165[136]. At one point, Jaki criticizes Kant's imaginative use of analogies: "Unfortunately, mere reliance on analogy can be most misleading" (p. 285 [n. 33]). Yet this ignores that Kant is here (pp. 155–156[115–116]) asking the imagination to "help" the understanding, not to take over completely. Kant would readily agree that any reliance on the analogies of the imagination must be balanced with an equal reliance on empirical facts. For he warns: "We do not want to give free rein to the boldness of conjectures, to which we have perhaps allowed too much, to the point of [indulging in] arbitrary fictions" (p. 167[140–141]).

[17] For instance, Jaki makes the same mistake when he assumes that Kant intended the words "One could" to mean "I can" (cf. p. 143[89] and p. 276 [n. 51]).

Table 1. Analysis of the Notes to Jaki's translation of Kant's *Allgemeine Naturgeschichte*

Section	Mere cross-references	General or explanatory notes	Notes of substance: Without criticisms	Notes of substance: With criticisms	Merely critical notes	Total
Opening Discourse	4	9	19	7	7	46
First Part	3	8	8	11	12	42
Second Part:						
II.1	1	4	4	2	31	42
II.2	4	3	3	10	20	40
II.3	2	5	2	9	12	30
II.4	1	4	5	10	14	34
II.5	4	11	12	21	22	70
II.6	0	1	0	3	2	6
II.7	0	4	18	13	18	53
II.7a	0	4	11	4	18	37
II.8	5	2	3	8	23	41
Third Part	6	4	10	5	9	34
Totals	30	59	95	103	188	475

expression of beliefs and opinions and lack of objective evidence to back them up ignores the crucial fact that Kant was purposefully composing a subjective treatise in natural philosophy. But the same cannot be said of Jaki, so we should expect his own work to be free from the taints of subjectivity and careless error. Yet, ironically, we find Jaki committing the very mistakes he often accuses Kant of making. As a result, Jaki condemns himself not only by misinterpreting Kant's intentions, but also by masquerading as a purely objective "historian of science" and yet failing to live up to his own expectations.[18] Let us sample some of Jaki's own delicacies.

Even a cursory glance through Jaki's notes reveals his antagonism towards Kant, a bias which borders at times on hostility. Whereas his expressed purpose is to deal judiciously with Kant, his unexpressed purpose seems to be to do anything he can to cast a dark shadow over him. Kant is given credit only rarely for his real discoveries (see below), and never for his *imaginative* genius. Instead, Jaki engages in largely *ad hominem* argumentation, accusing Kant of making numerous senseless errors, and using loaded phrases such as "lame remark" to describe the comments of those with a more "benevolent" (i.e. fair?) attitude towards Kant (p. 262 [n. 27]). Indeed, out of Jaki's 475 textual notes (see Table 1), nearly two-thirds include scathing criticisms of Kant, and a full 188 (well over one-third) include *nothing but* such unargued judgments.

[18] At least Kant freely admitted his lack of writing skills. See e.g. the preface to the second edition of his *Critique of Pure Reason*, p. Bxliii.

Admittedly, Jaki does include 198 notes which evince an admirable grasp of the history and contemporary development of the subject. But his breadth of knowledge is unable to cover up his repeated, almost neurotic, attempts to throw egg in Kant's face. Such unargued but strongly worded remarks are a tell-tale sign of unconscious insecurity with respect to one's own judgments.

Citing examples of Jaki's biased and unargued criticisms is difficult only because of the huge number of instances to choose from. A sampling of comments from a single page (p. 257 [ns 2 – 15]) reveals the level at which Jaki is arguing: "...seems to have its cause ... in Kant's haste or carelessness of which the *Allgemeine Naturgeschichte* provides not a few examples" [n. 2]; "Kant ... should have given credit to ..." [n. 3]; "Kant had in mind ..., a point which could have been stated with no difficulty" [n. 4]; "Kant, who did not know enough ... had no right to state ..." [n. 7]; "One of the many instances contradicting Kant's repeated assertions that ..." [n. 8]; "... contradicts Kant's statement that ..." [n. 9]; "... as Kant implies ... Kant had in mind ..." [n. 10]; "... was a very contrived construct" [n. 11]; "Kant ... is fully confident in the manner of an *a priori* thinker about knowing ..." [n. 12]; "Kant here should have said something about ..." [n. 13]; "Once more Kant fails to sense the pitfalls of his blithe cavorting ..." [n. 14]; "A mere look into his own backyard would have made it clear to Kant that ..." [n. 15]. All these comments refer to just over two pages of Kant's text! Although Jaki does not always pack his notes quite so densely with opinions and uncalled-for judgments, based as they are on a refusal to adopt Kant's presuppositions and a tendency to read between the lines, such comments can be found on virtually every page of his notes. This entire class of comments is typified by Jaki's claim that "The entire reasoning is too arbitrary to deserve criticism" (p. 261 [n. 12]): if he is so sure that Kant commits such gross errors, why does he find it necessary to insult his readers' intelligence by his pedantic, yet undemonstrated judgments?

Finally, an example of one of many typographical errors which are clearly traceable to Jaki is his statement that "Kant is astonishingly oblivious to the fact, all two [sic] well known in his time ..." (p. 277 [n. 61]). Obviously, such a mistake is trivial and should not even have to be pointed out in a critical essay of this type, for it would be wrong to judge the merits of Jaki's work on the basis of his being a less-than-perfect proofreader. Yet this is the extreme to which he takes his own judgment of Kant: he accuses Kant of either "carelessness with figures, or ... not having proofread his work" (p. 262 [n. 28]). Therefore, it is necessary to point out his own poor performance, in order to demonstrate that, if we measure Jaki by the measure with which he measures Kant, he comes out looking rather less consistent than he might hope. (I will not stoop so low as to list at this point the numerous typographical errors I have found in Jaki's Introduction and Notes.) In such

instances, however, it is the standard of measure which needs revision more than the extent of one's conformity to the old standard.

Jaki's four main criticisms of Kant have now been discussed in full, and some of their weaknesses brought into view. In summary, the points I have made are as follows. (1) That Kant relied on source material which he did not always acknowledge has been irrefutably demonstrated; but the relevance of this claim to the question of the overall originality of Kant's treatise is far from clear. (2a) Kant's carelessness in writing is widely known, even by Kant himself. (2b) That some of this carelessness spills over into his treatment of scientific facts and mathematical calculations is not surprising; but it can often be explained as the result of approximation — a habit which is permissible in a work which does not claim to be scientifically exact. (3) The contradiction Jaki believes he has found in Kant's own appraisal of his treatise is entirely due to his failure to adopt Kant's point of view, and to attend to Kant's clearly-expressed warnings. (4) Kant has every right to state his own beliefs and opinions in an intentionally imaginative essay; but Jaki's assaults on Kant ricochet and reveal the unsuitability of his own *ad hominem* remarks.

Aside from his occasional quotation of the views of commentators such as Lovejoy, who regarded Kant's *Allgemeine Naturgeschichte* as "a prose amplification and extension of the First Epistle of [Pope's] *Essay on Man*" (p. 293 [n. 2]), Jaki shows no awareness of the aesthetic, imaginative or rhetorical goals which guide the artistic side of Kant's exposition. With his exclusive concern for scientific judgment, Jaki can see no value in the imaginative — at times even prophetic — postulation of hypotheses without the support of rigorous proofs from observation and mathematical calculation. Indeed, he makes fun of "any uncritical admirer of Kant the scientist" who, for instance, wishes "to present him as a prophetic forerunner of special relativity" (p. 283 [n. 13]), because Kant never proved any of the conjectures he made in a scientifically acceptable way. Yet Jaki seems to have forgotten that even "Einstein did no experiments, gathered no new information, before he created the theory of relativity... [H]e contributed nothing except a new way of looking at information... . The experiments confirming the theory came afterwards."[19] Now I would certainly not wish to place Kant on a level with Einstein, but only to point out that Kant's decision to forgo scientific rigor is no reason to downplay his legitimate insights by regarding them as the "lucky guesses" of a pseudo-thinker.

By far Jaki's most fundamental mistake was to ignore Kant's perspective in favor of his own. As a result he was able to discount the validity of anything *a*

[19] Edward de Bono, *The Use of Lateral Thinking* (Harmondsworth, Middlesex: Penguin Books, 1967), p. 17.

priori,[20] anything imaginative or emotional, anything approximate, etc. With his historical-critical surgeon's knife he was able to dissect and dispose of virtually all of Kant's text. All he has shown, therefore, is that the *Allgemeine Naturgeschichte* does not meet the rigorous standards of the twentieth-century historian of science. The danger is that scientists and philosophers (particularly philosophers of science) may not realize the one-sidedness of Jaki's assumptions and the resulting triviality of his judgments, and that the pendulum of popular opinion may now swing to the opposite position, so that Kant is regarded as an inept scientist who decided to channel his apriorism into philosophy once he failed in the former discipline. But "Kant the scientist" is a bogus image created by his commentators and critics — an image which Kant himself never encouraged.[21]

Surely a middle road is the most viable stance for a philosopher to take on the issue of Kant's scientific merit. For the single contribution of Jaki's book to Kant-studies is that it drives home the mediocrity of Kant's scientific ability. Yet its downfall is in assuming that Kant would not have readily confessed such a shortcoming to a critical guest at his dinner table. We have seen instead that Kant purposefully wrote as an *a priori* natural philosopher, putting forward to the scientist a possible system for consideration. The evidence of his success is that a significant number of his conjectures have turned out to be correct.

Jaki himself reluctantly confesses at the end of his Introduction that there is "some justification" for regarding Kant as a great "cosmogonist-scientist" (p. 68) — a remarkably positive comment when compared with Jaki's extreme negativity throughout the rest of the book. Indeed, he continues by listing the achievements of no small merit:

> Kant was certainly one of the first to propose the correct idea of the Milky Way, and the very first to claim that nebulous stars or nebulae are so many stellar systems similar to our own galaxy. Although some before him went on record as supporters of a mechanical explanation of the universe ..., it was in the *Allgemeine Naturgeschichte* that there appeared in print for the first time a mechanical genesis of the entire universe with an unmistakably modern ring and sweep. (p. 69)

[20] Jaki compares Kant's cosmogony to that of Descartes or Aristotle (see e.g. p. 287 [n. 2]), all three being "markedly *a priori* cosmologies." Yet he does not use this as a reason to deny the significance of the latter two, but only as another example of the "second-rate" (p. 34) nature of Kant's effort.

[21] Encouragement of such an image is what Jaki seems to be looking for in his discussion of the "Century of Silence" which followed the publication of Kant's *Allgemeine Naturgeschichte* (see pp. 35–51). Jaki heightens the impression of a widespread silence by tucking away most of the references to Kant's work in the footnotes (see pp. 225–232, [ns 12, 16, 29, 32, 49, 64, 68, 76, 78]). Nevertheless, he does rightly point out that Kant "must have known in his heart that silence on that work was, in no small extent, his own making" (p. 48). But unfortunately, he fails to bring out Kant's *philosophical* reasons for not promoting his own work — viz. that he was fully aware of the fundamental difference between his cosmogony and those of the natural scientists.

Lest these remarkably positive comments be seen as direct contradictions of Jaki's extremely negative judgments throughout the rest of the Introduction and Notes, he quickly qualifies his remarks by saying Kant deserves recognition not for the actual discovery of such cosmogonical facts, but in each case merely for "the anticipation of a great scientific idea" (p. 69). Although he claims at this point that he will not attempt to settle the question of Kant's "scientific genius", he clearly says this with tongue in cheek, fully aware of the scathing criticisms he has made. For any "small valuable part" in Kant's treatise, according to Jaki, "remained a barren seed."[22]

In conclusion it can be suggested that Jaki's book may simply reflect the author's dislike of non-empirical philosophers in general. His work seems to say to Kant and all "*a priori*" philosophers: "Spin your wheels in *a priori* sophistries if you wish, but keep your noses out of natural science!" With men like Jaki guarding the frontiers of natural science, it is no wonder that many a philosopher shies away from the form of art which Kant was attempting, not altogether successfully, to master. Nevertheless, if we put this message a bit more gently, it has no shortage of value for philosophers and scientists alike, insofar as it warns against a careless blurring of the perspectives proper to each discipline. Such a blurring is what Kant attempted in his cosmogony, but not unintentionally. Thus, the judgment of Eberhard, quoted by Jaki,[23] stands in spite of Jaki's negative intentions in referring to it: "Kant's theory, he [Eberhard] wrote, 'makes the impression of a grandiose phantasy, of a work of sheer prophecy, or unconscious [?] anticipation of the future' ", and for this reason, despite Jaki's protestations as to its lack of raw scientific value, it " 'will remain one of the milestones in the history of our knowledge of the system of the world and in the evolution of human thought in general.' "

[22] Page 69. Compare the judgment made on p. 53: "Forged in the workshops of patriotic fervor, the glory of Kant the scientist could only be hollow."

[23] Quoted on p. 63 from Eberhard, *Die Cosmogonie von Kant* (Wien: K.K. Hofbuchhandlung Wilhelm Frick, 1893), p. XXVI.