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Essay review

Towards a historical ontology?

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Biographies of Scientific Objects
Lorraine Daston (Ed.); The University of Chicago Press, Chicago & London, 2000, pp. 312, Price £35.00 US$55.00 hardback, ISBN 0226136701. Price £12.00 US$19.00 paperback, ISBN 0226136728.

In *Nausea*, Sartre's masterpiece, the existentialist hero suddenly 'realized that there was no half-way house between non-existence and this flaunting abundance [of things]. If you existed, you had to *exist all the way* . . .' (Sartre, 1964, 128). This absolutist metaphysics, by no means confined to existentialist literature, comes under attack in *Biographies of Scientific Objects*, which is based on the assumption that 'reality is a matter of degree' (p. 1). When scientific entities are born, their reality is usually the subject of considerable debate. Gradually they become entrenched in scientific practice and, in this sense, grow more real. Sometimes they may even pass away.

Since the early 1960s and the rise of historicist philosophy of science it has been widely accepted that styles of reasoning, patterns of explanation, forms of argumentation, methods of theoretical and experimental inquiry, and criteria of theory appraisal have evolved over time. This aspect of the development of the sciences has opened up space for historicizing epistemology, the philosophical sub-discipline that examines the source and validity of knowledge claims (cf. Daston, 1994). In this stimulating collection of essays, however, Lorraine Daston and (some of) the contributors argue that the time is ripe for historicizing even ontology, the philosophical sub-discipline that examines the fundamental furniture of the world.

Usually, one would describe the historicity of scientific entities by focusing exclusively on the evolving beliefs about them and the human practices associated with them. On such an interpretation, the history of the sciences does not warrant any

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radical ontological claims about the historicity of the scientific entities themselves. What changes over time is how these entities are represented and not the entities *per se*. The main claim of this volume, however, is that such an interpretation cannot do justice to the evolving ontology of the sciences; but more on this below.

In this review I want to do three things. First, I will sketch briefly each of the essays that comprise this collection and give an overall description of the methodological framework of the book. I will restrict my comments to some of the historiographical and philosophical issues raised and addressed in the book. Second, I will discuss critically the philosophical underpinnings of this attempt to relativize ontology, focusing on Bruno Latour's essay. Finally, I will argue that for the historical analysis of scientific beliefs and practices one need not get entangled in metaphysical issues.

1. Telling lives of scientific objects

1.1. Contents

The book spans a very wide spectrum of scientific entities, in the natural and the human sciences, from the early modern period to the twentieth century. The first essay, by the editor, examines how various rare, strange and irregular phenomena were grouped together under the category of the 'preternatural' and became an object of investigation from the mid-sixteenth till the early eighteenth century. The next chapter, by Rivka Feldhay, offers a cultural history of the construction and reception of a seventeenth century treatise on the motion of the earth, written by Paulus Guldin, a Jesuit mathematician. The center of gravity of the earth was the main mathematical object of the text in question and Feldhay discusses how that object was formed. Doris Kaufmann examines the birth of dreams, *qua* objects of 'empirical psychology' in the late eighteenth and early nineteenth centuries. Even though dreams had always been familiar entities, they only came under scientific scrutiny and, thus, became scientific objects during the Enlightenment. This belated concern with dreams can be understood, according to Kaufmann, by taking into account the wider historical context. Jan Goldstein investigates how the self became a scientific object in eighteenth and nineteenth century France, focusing her analysis on the vicissitudes of the personal pronoun *moi*. Gérard Jorland traces the life of value, from its birth as an object of economics in the late eighteenth century till its 'death' two hundred years later. Peter Wagner follows the career of 'society' and examines its role in the formation of the discipline of sociology. In a partisan essay Marshall Sahlins argues for the persistence of culture as the perennial (though evolving) object of anthropology. Drawing on the history of anthropology, he defends culture from recent attacks within the discipline of anthropology, which have portrayed it as part and parcel of the colonialist suppression of indigenous peoples. Sahlins disputes the connection between anthropology and capitalist domination and shows that culture became an instrument of liberation for many indigenous peoples. Culture became a manifest entity to them through their confrontation with global forces, like capitalist expan-

sion. They then became conscious of their own cultural practices, which they tried to preserve. Ironically, while culture has become an actors' category, its status as a scientific object has been undermined.

Jed Buchwald analyzes the practices associated with the main object of nineteenth century natural philosophy, the ether, and argues that they eventually led to the creation of microphysics in the late nineteenth century. He shows that theoretical concepts and laboratory tools, originally developed for the investigation of the ether, were carried over in microphysical practice. Ted Porter's essay examines mortality tables and blood pressure, their birth as scientific objects and their uses by American life-insurance companies. He points out that the needs of those companies, and not strictly medical reasons, turned blood pressure into a medical diagnostic tool. The following paper, by Bruno Latour, draws radical philosophical conclusions from the Pasteur–Pouchet debate over spontaneous generation. He argues that new scientific objects come into being within a specific laboratory setting as a result of the emergence and stabilization of new experimental practices. In his view, their existence is bound to those practices and cannot transcend them. Finally Hans-Jörg Rheinberger traces the career of cytoplasmic particles during the 1940s and 1950s, in the context of the investigation of protein synthesis.

1.2. Methodological issues

In an illuminating introduction the editor lays out the book's historiographical and philosophical framework, what she calls 'applied metaphysics'. Applied metaphysics investigates the evolving ontology of the sciences, how and why various real phenomena capture the scientists' attention, are grouped together and become the object of scientific scrutiny. When this happens, a new scientific object is born. Are these classifications inherent in nature; in other words, are these objects real? This is, of course, an issue that has exercised philosophers for more than two millennia. Its more recent version is the all too familiar debate between realists and constructionists. Realists think of the world as inherently structured in natural kinds and of science as gradually discovering that structure. Scientific objects, on a realist view, reflect a preexisting natural order. Constructionists, on the other hand, portray scientific activity as one of construction, as opposed to discovery. Scientific objects, on this view, are contingent creations out of local cultural and material resources; to put it another way, scientific practices are constitutive of scientific objects, which do not simply exist 'out there' (cf. Hacking, 1999).

This book is meant to overcome the categories informing this debate and to portray 'scientific objects . . . [as] simultaneously real and historical' (p. 3). Daston seems to accept that 'the sciences furnish us with the best candidates for the real' (p. 5). Her difference with traditional scientific realism is that she feels obliged to 'take the historicity of scientific objects seriously' (ibid.). Scientific entities are historical in the sense that they come into being, evolve, and may even pass away. This may happen in several ways. First, phenomena that are directly accessible to us through experience may capture the attention of scientists and become objects of scientific investigation. In those cases what is born is not some completely novel object, but

rather a grouping together of already existing phenomena or entities. The birth of a new object amounts to the consolidation of the belief that certain phenomena are bound with each other and form a coherent whole. As long as this grouping stays intact, the object in question remains alive. Death comes when the bonds that tie those phenomena together start to dissolve, even when the existence of the phenomena themselves is not questioned. As Daston shows, the demise of preternatural philosophy, by the middle of the eighteenth century, was not due exclusively (or even mainly) to skepticism about its objects; rather it was due to the dissolution of preternatural kinds. This, in turn, was the outcome of a new sensibility, which emphasized diligence and utility, as opposed to wonder, and was tied with changes in the wider historical context.

Second, new phenomena or processes may appear and come to be considered manifestations of a new scientific object. For example, Peter Wagner describes how 'society' emerged in the nineteenth century as an intermediary space of human interactions between the state and the family. Here the metaphor of birth is very appropriate, because human practices or institutions literally came into being. Death, in this case, would amount to the disappearance of those phenomena, i.e., to the transformation of social reality. As Wagner points out, the concept of society may become obsolete as a result of current processes, namely internationalization and individualization (pp. 156–157). He does not distinguish the concept of society from society *qua* entity. This ambiguity is partly due to the historical actors themselves. As he notes, 'the new term 'society' was meant by some important participants in the debate to denote a structure of such connections [among human beings], which did not exist before a certain time, or which could not well be described by earlier languages (or both)' (p. 153). If such connections did not exist then one may literally describe the birth of society as the coming into being of a novel entity. If, however, the connections always existed, but could not be described by earlier languages, it would be preferable to speak about the birth of a new concept, which captured pre-existing social connections.

Third, in an important sense, concepts can be scientific objects, i.e. they can be the focus of scientific analysis. So when new concepts emerge in an attempt to describe and explain various novel or already established phenomena, a new scientific object comes into being. A prominent example discussed in the book is the ether in nineteenth century physics. In such cases what is born is an explanatory representation of some hidden entity, which in turn becomes the object of intense theoretical and experimental scrutiny.

Finally, new theories can be constructed as problem-solving tools (see the essay by Jorland on economic theories of value). As long as they remain fruitful investigative tools, they remain alive and well. They pass away when they lose their fertility and/or give rise to persistent empirical or conceptual difficulties. For instance, Jorland shows how the labor theory of value collapsed in the late 1970s under the weight of the paradoxes it created. Typically, the death of a theory is accompanied by the birth of another theory.

This cursory classification of scientific objects indicates that the idea of historicizing ontology is more or less plausible with respect to different kinds of entities. With

the exception of 'social-scientific' objects, which may indeed change as a result of the emergence of new practices or institutions, none of the above cases seems to imply the historicity of ontology. Take, for instance, the third case. The birth of new representations of hidden entities does not mean that those entities themselves come into being, unless of course one considers the representations as constitutive of the entities. Only if there were 'no reality without representation', changes in representation would amount to changes in reality.[1] That seems to be the view of Latour and Rheinberger, and it would provide a philosophical justification for a central aim of *Biographies of Scientific Objects*, namely to historicize metaphysics. It is unclear, however, if the rest of the authors share that view. Some even reject it outright. Porter, for instance, concludes his essay with these words:

> It would be about as helpful to argue that the blood had no pressure before insurance companies began pushing the use of sphygmomanometers as it would be to claim there was no mortality before there were actuaries. The 'coming into being' of quantitative entities like these should rather be understood in terms of a selection among alternative ways of knowing. (p. 246)

The study of 'ways of knowing', however, belongs to historical epistemology and not to historical ontology. Even Latour vacillates, at times, between epistemological and ontological historicity: 'Why is time, if it is a good enough repository for animal bodies, for particles, for Big Bangs, not deemed stable enough for the knowledge claims made about those entities themselves?' (emphasis added; pp. 268–269). Again, the historicity of knowledge claims about an entity does not imply the historicity of the entity itself.

To avoid this difficulty, one may interpret Daston's applied or, I would prefer, historical metaphysics as a descriptive project, whose aim is to trace the evolving ontological commitments of the sciences. And, indeed, most of the case studies in this volume discuss attributions of existence, as opposed to existence itself. Now, whether the entities themselves, to which existence was attributed, evolved is not, in my view, a historiographically significant question. Of course, some scientific entities have changed (e.g., various organisms, the earth, the universe, etc.), but others have not (e.g. electrons), at least if we take at face value what contemporary science tells about them. In general, I think that whether an object has evolved is a question that concerns primarily the sciences studying the object.

I think that different historiographical questions may be asked with respect to different kinds of objects. First, in the case of scientific objects qua collections of directly accessible phenomena, the crucial issues are 'coherence' and 'salience'. Why (and how) do these phenomena come to be grouped together and form a coherent category? And how is this 'coherence' lost, when these objects fade away? If the objects in question are well known (e.g., dreams), how do they become 'salient' as the focus of scientific investigation? Sometimes, an answer to this question can be

[1] The quote is from Latour (1999), p. 304.

found in the wider historical context of scientific practice. For instance, as Kaufmann shows, at the end of the eighteenth century the German middle-class faced an identity crisis that led to its preoccupation with free will and, more generally, the nature of the human psyche. The significance of dreams for investigating those issues accounts for their emergence as scientific objects.

Second, in the case of novel objects, like society, that emerge within a historical process important questions concern the objects themselves, in addition to how they become targets of scientific study. How (and why) do these objects appear in the first place, before they capture the scientists' attention? Third, in the case of hidden objects not accessible to unaided observation, like the ether, how do they become manifest? How is their existence established and how do observable phenomena come to be considered their manifestations? And what may lead these objects, occasionally, to disappear from the ontology of the sciences? Each of the essays treats these questions historically, offering concrete accounts of the emergence, establishment and dissolution of various scientific objects.

A significant aspect of scientific objects is their active character. They are often recalcitrant entities, which resist manipulation and generate novel and unintended effects. This is true of various scientific objects, from scientific ideas to entities which become manifest in experimental situations. The former, as Jorland argues, 'are objects that one cannot manipulate at will; they have properties that remain for a long while unknown and unfold as ideas are pondered' (p. 128). The agency of the latter is shown strikingly by Rheinberger. Using cytoplasmic particles as a case study he narrates how they obtained a life of their own, from their birth in the context of the medical investigation of cancer, through their movement across several 'experimental systems', to their eventual participation in protein synthesis. Throughout that process they often turned out to be unpredictable and, thus, partially independent from the scientists who attempted to manipulate them. Following Michael Polanyi, Rheinberger elevates the recalcitrance and autonomy of epistemic things to criteria of reality: 'The generic reality of epistemic things is their capacity to give rise to unprecedented events' (p. 294).

I think, however, that this capacity of scientific objects need not come from their being real; rather, it comes from their being embedded in a framework of beliefs and implicit expectations. The unexpected behaviour of an object is manifest in unsuccessful attempts to account for novel experimental situations in terms of the object in question. To that effect, additional properties have to be attributed to the object, which, however, do not fit within its previously established representation. Thus, the representation of the object loses its coherence; and that, in turn, is interpreted as a recalcitrant behaviour of the object.[2] At any rate, as Rheinberger points out, recalcitrance and unpredictability distinguish scientific objects from technological objects. As soon as scientific objects are tamed they cease to be the focus of

[2] For a more detailed discussion of this point, with examples from the early history of the electron, see Arabatzis (1995).

scientific investigation and turn into black-boxed tools. Thus, even though they do not disappear, they die as scientific objects.

If scientific objects have a life of their own, then they can legitimately become the subject of biographies. Since scientific objects cut across disciplinary boundaries, so will the narratives of their lives (Rheinberger). By following their trajectories we can examine how they affect disciplinary boundaries. For instance, as Feldhay shows, the introduction of a new mathematical object, symbolic numbers, in the seventeenth century had immediate repercussions for the boundaries between mathematics and natural philosophy. Symbolic numbers could represent not only discrete, but also continuous magnitudes and, thus, it became possible for algebra to represent physical processes.

2. A labor theory of reality

As I already mentioned, an important philosophical issue concerning scientific objects is their (purported) reality. The only essay that addresses extensively this issue is the one by Bruno Latour, who offers a novel account of the reality of scientific objects. Without doubting that they are real, he argues that their reality is inextricably tied with human practices and institutions. The ontology of science, in Latour's view, is not composed of timeless and universal entities. Rather, it is as much tied to 'the world of where and when' as the world of humans and the world of technological artifacts.[3] The existence of scientific entities, like other human artifacts, is established through a considerable amount of local laboratory work and is maintained not by inertia, but by extending laboratory conditions through space and time. An entity is (considered?) real if the various elements that compose it cohere in a 'durable whole'[4]:

> History of science does not document travel *through* time of an already existing *substance*. . . . History of science documents the modifications of the ingredients composing an association of entities. Pouchet's spontaneous generation, for instance, is made, at the beginning, of many elements: commonsense experience, anti-Darwinism, republicanism . . . etc. . . . In encountering Pasteur's opposition, Pouchet alters many of those elements. . . . To associate elements in a durable whole, and thus gain existence, he has to modify the list that makes up his phenomenon. But the new elements will not necessarily hold with the former ones . . . (p. 257)

What determines whether these elements cohere with each other? This is a question that a coherence theory of existence has to face, but Latour does not answer. Furthermore, even though Pouchet's beliefs about spontaneous generation may have been

[3] I borrow this expression from Toulmin (2001).

[4] A similar coherence account of reality is defended by Rheinberger (see p. 274).

tied with his anti-Darwinism, etc., it is not clear how all those 'ingredients' were constitutive of spontaneous generation itself.

Part of the motivation for Latour's proposal comes from his desire to be faithful to the venerable symmetry principle:

> In this very sketchy description, I am not treating Pasteur differently from Pouchet, as if the former were struggling with real uncontaminated phenomena and the second with myths and fancies. Both try their best to hold together as many elements as they can in order to gain reality. But those are not the *same* elements. An anti-Liebig, anti-Pouchet microorganism will authorize Pasteur to maintain the living cause of fermentation . . . (p. 259)

I see two problems here. First, 'the anti-Pouchet microorganism' is portrayed as an element, as opposed to a composite entity. Second, the (absolute?) existence of this entity is, according to Latour, crucial for accounting for Pasteur's victory over Pouchet. A very strong version of realism seems to be required for accounting historically for the outcome of the Pasteur-Pouchet debate. On such a realist account, however, Pasteur and Pouchet cannot be treated symmetrically, because the very existence of the 'anti-Pouchet microorganism' was at the time still contested. (cf. Schaffer, 1991).

The upshot of this view of scientific objects is that existence and reality lose their absolute character:

> Both [Pasteur's entities and Pouchet's entities] are relatively real and relatively existent, that is extant. We never say 'it exists' or 'it does not exist,' but 'this is the collective history that is enveloped by the expression "spontaneous generation" or "germs carried by the air." ' (p. 257)

Notice how different these two statements are. The latter is a prudent suggestion to avoid, at least for historiographical purposes, ontological vocabulary. The former, on the other hand, is a radical ontological claim, which raises methodological difficulties. For one thing, if the existence of scientific entities were relative to time-bound beliefs and practices then any scientific explanation based on those entities could only have a local applicability. We could not appeal to the effects of an entity to explain any event that took place before that entity came into existence. For instance, all the scientific explanations, employing electrons, of events that took place before the late nineteenth century would have to be rejected, since there were no electrons in the universe before their birth in J. J. Thomson's laboratory.

Latour seems, at places, to accept this paradoxical consequence of his position. Thus, he argues that 'Koch bacilli have a local history that limits them to Berlin at the turn of the century. They may be allowed to spread to all the years that come *after* 1882 provided Koch's claim is accepted as a fact and incorporated later into routine practices, but certainly they cannot jump back to the years *before*' (p. 249). But elsewhere in his essay he admits that the existence of an entity can be extended backwards in time. While discussing the attribution of the death of Ramses II to the Koch bacillus, he points out that 'the French surgeons take great pains to bring the

mummy into direct contact with the hospital network so as to expand the existence of the Koch bacillus to span the three-thousand-year stretch and to be made visible inside the brittle bones' (p. 266). Note that here the 'hospital network' is not portrayed as constitutive of the Koch bacillus. The hospital resources are still crucial, but only for making the bacillus visible. Visibility and existence, however, are quite different things. There are more things in the universe than meet the eye.

Latour's claim becomes even less plausible vis-à-vis macroscopic entities, which also became 'visible' as a result of scientific inquiry. Is the past existence of, say, dinosaurs also dependent on the practices of contemporary paleontologists? Of course, their judgments as to the existence of dinosaurs may be mistaken. In that case it would turn out that dinosaurs did not exist. But this dependence of the existence of dinosaurs on the paleontologists' judgments is epistemic and not ontological. Furthermore, judgments about existence have the 'power of retroactive legislation'. As William James pointed out long ago,

> When new experiences lead to retrospective judgments, using the past tense, what these judgments utter was true, even though no past thinker had been led there. We live forwards, a Danish thinker has said, but we understand backwards. The present sheds a backward light on the world's previous processes. (James, 1907, p. 150)[5]

Retroactive legislation is not only unavoidable, but also desirable. We can (and should) capitalize on entities posited by contemporary theories, or made visible by contemporary practices, to explain past events, provided 'that the basic assumptions of those theories hold good in the past . . . [event] in question' (Jardine, 2000, p. 266).

All this is not to deny the significance of one of Latour's main points, namely that in modern science the very existence of many phenomena depends on instrumentation. Ian Hacking made a similar point in his classic *Representing and Intervening*, when he pointed out that the laboratory sciences have created new phenomena, which did not previously exist in nature (see Hacking, 1983). There is nothing paradoxical in Hacking's claim, if one realizes that the necessary conditions for the appearance of certain effects may not have existed anywhere in nature. Hacking, however, as far as I can tell, does not extend this point to the entities behind the phenomena. These entities, if they are real, must have existed all along. Latour, on the other hand, claims that even those entities are constituted by laboratory conditions. This is a claim I find objectionable and, at any rate, unnecessary for historiographical purposes.[6]

Finally, one may accept fully Latour's phenomenology of scientific activity and his emphasis on 'embeddedness in 'local, material, and practical networks' as the principal criterion for the reality of all objects' (editor's introduction, p. 12), without

[5] I would like to thank Yemima Ben-Menahem for bringing James's 'retroactive legislation' to my attention.

[6] Of course, there may be entities which appear only in a specific laboratory setting. I am thinking of certain entities in microphysics. What I am disputing is the generality of Latour's claim.

taking the extra step of collapsing 'criteria for reality' with reality itself. It is possible to view human practices as essential conditions for the manifestation of scientific objects, but not as necessarily constitutive of the objects themselves. Nothing historiographically significant would be lost and, more importantly, our historiography would not face the philosophical difficulties I outlined above.[7] I will have more to say on this neutral stance below.

3. Concluding remarks

There have been several philosophers in the recent past who advocated ontological relativity. I am thinking of Nelson Goodman's 'world-making' (Goodman, 1984), Thomas Kuhn's 'world changes' as a result of scientific revolutions (Kuhn, 1970, 1993), and Hilary Putnam's claim that objects are relative to conceptual schemes (Putnam, 1981, 1992). Goodman, for instance, insists that objects are not 'out there', independent of our classificatory practices. In that sense objects are as much made as discovered. The making of an object, say a star, amounts to the drawing of certain boundaries, which are constitutive of the object in question: 'as we . . . make constellations by picking out and putting together certain stars rather than others, so we make stars by drawing certain boundaries rather than others. Nothing dictates whether the skies shall be marked off into constellations or other objects. We have to make what we find . . .' (Goodman, 1984, p. 36) The practices that go into the making of objects are, for Goodman, of a conceptual or linguistic kind.

All of the above philosophical positions might support the central claim of *Biographies*, namely that scientific objects are evolving entities, which can profitably become the focus of historical narratives. The problem, however, with basing historical narratives on those (or similar) views is that history of science would become, not just 'applied metaphysics' but the application of a particular metaphysics, which may or may not be viable. The adequacy of historical narratives would, in turn, depend on the validity of their metaphysical assumptions. For an example of the problems that we may run into, consider how the editor presents Buchwald's essay in her introduction to the volume. The essay in question, according to Daston, provides a historical reconstruction of a metaphysical impossibility, the birth of something (microphysical entities) out of nothing (the ether). My reaction here is twofold. First, it is not at all clear that from the point of view of 'applied metaphysics' the description of the ether as a non-existent entity is legitimate. After all, the ether *was real* for nineteenth century physicists. Second, it sounds paradoxical that a fictitious entity gave rise to real entities, but only because we frame our description in ontological terms. If we describe this situation in a more neutral language, narrating how the conceptual and empirical difficulties generated by the concept of the ether led to the emergence of microphysics, which postulated novel entities, the paradox would disappear.

[7] For further problems of Latour's metaphysical program, see Kusch (2002).

Thus, I would opt for a more neutral historiographical approach, which would abstain, to the extent possible, from any particular metaphysical position (cf. Friedman, 1998). I think that the historian would be much better off if she tried to construct narratives that would be acceptable to audiences of different philosophical persuasions. This could happen by bracketing ontological issues in discussing the discourse and practices of the historical actors. That is, by the way, what most of the authors in *Biographies* do. The metaphysical framework laid out by Daston and developed by Latour is not adopted, either explicitly or implicitly, by most of the other contributors.

To conclude, this book is worth reading as a valuable attempt to trace the evolving ontological commitments of the sciences. As for its potential to reconfigure traditional metaphysics, I am more sceptical. The ontology of the sciences may have been in flux, but this fact can be accommodated within a more traditional metaphysical picture, where entities do not pop in and out of existence.

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The University of Chicago Press, Chicago & London, 2000, pp. 312, Price Â£35.00 US$55.00 hardback, ISBN 0226136701. Price Â£12.00 US$19.00 paperback, ISBN 0226136728. In Nausea, Sartreâ€™s masterpiece, the existentialist hero suddenly â€˜realized that there was no half-way house between non-existence and this flaunting abundance [of things].Â This cursory classification of scientific objects indicates that the idea of historiciz- ing ontology is more or less plausible with respect to different kinds of entities. With T. Arabatzis / Stud. Hist. Phil. Sci. 34 (2003) 431â€“442 435 the exception of â€˜social-scientificâ€™ objects, which may indeed change as a result of the emergence of new practices or institutions, none of the above cases seems to imply the historicity of ontology. Publisher: University of Chicago Press. Pages: 312. Binding: PAP.Â item 5 Biographies of Scientific Objects - Paperback NEW Daston, L 2000-06-15 5 -Biographies of Scientific Objects - Paperback NEW Daston, L 2000-06-15. Â£28.95. Free postage. item 6 Biographies of Scientific Objects, Paperback by Lorraine J. Daston 6 -Biographies of Scientific Objects, Paperback by Lorraine J. Daston. Â£29.23. Free postage. item 7 Biographies of Scientific Objects. Daston 9780226136721 Fast Free Shipping<| 7 -Biographies of Scientific Objects. Daston 9780226136721 Fast Free Shipping<|. Â£39.28. Free postage.Â Chicago, Il. Genre. Science: General & Reference. Edition Statement. 2nd Ed. Pagination. 288. (ed) - Folklore An Encyclopedia.pdf (3.7MB) Harvey - Wallis - Historical Dictionary of Shamanism.pdf (3.0MB) Hinde - Bending the Rules.pdf (2.6MB) Howart - The Twelver Shia.pdf (1.0MB) Jacobs - Hanrahan (eds) - Companion To The Sociology Of Culture.pdf (3.9MB) Jupp - The SAGE Dictionary of Social Research Methods.pdf (2.1MB) Karsten - Encyclopedia of War. and American Society.pdf (25.7MB) Khazanov (ed) - Nomads in the sedentary world.pdf (124.7MB) Krapp - Deja Vu Aberrations of Cultural Memory.pdf (1.7MB) Laming - Understanding human motivation.pdf (2.9MB) Landes - Encyclopedia of Millennialism and Millennial Movements.pdf (8.1MB) Lawson - Closure- A Story of Everything.pdf (1.3MB) Lianeri - Zajko (eds) - Translation and. The University of Chicago Press, Chicago 60637 The University of Chicago Press, Ltd., London Â© 2000 by The University of Chicago All rights reserved. Published 2000 Printed in the United States of America 0908070605 0403 020100 12 34 5 ISBN:0-226-13670-1 (cloth) ISBN: 0-226-13672-8 (paper) Library of Congress Cataloging-in-Publication Data Biographies of scientific objects I edited by Lorraine Daston. p. em.Â Lorraine Daston INTRODUCTION. The Coming into Being of Scientific Objects This is a book about applied metaphysics. It is about how whole domains of phenomena-dreams, atoms, monsters, culture, mortality, centers of gravity, value, cytoplasmic particles, the self, tuberculosis-come into being and pass away as objects of scientific inquiry.