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Introduction – Points of Contact between Biology and History

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It might seem a surprising project with disputable merits to edit a volume that aims to conjoining the debates about explanation in the philosophy of biology and in the philosophy of history. People with these kinds of reservations may have in mind the opposition between nature and history¹ or between natural history and human history.² They might also remember that countless philosophers have argued that history or historiography is a part of what is often called “the humanities” (*Geisteswissenschaften, sciences humaines*), rather than being a part of “the sciences”. They may reminisce about old battles on scientific versus hermeneutic approaches or debates on explanation versus *Verstehen* (understanding) in the philosophy of the social sciences. Some might even believe that ‘natural history’ is an ontological contradiction, and that its replacement by ‘historical science’, ‘science of history’, or ‘natural historiography’ would not be any better in methodological respects. Without much exaggeration, even the following picture seems to have admirers in some quarters: unlike scientists (e.g., biologists) who produce empirically tested and at least approximately true theories about the world which exists independently of us, historians are men and women of letters who do not engage in scientific theory construction, but in the *writing* of history, that is, in the writing of some form of literature or what is frequently called “narratives“. Historians do not scientifically reconstruct or model the independently existing world. Rather,

¹ The term ‘history’ is ambiguous. It refers at least to three different things: first, to something ontic (e.g., to the history of an object), second, to some discipline (e.g., historiography), and third, to the results obtained by some scholar and/or its presentation in form of a text (e.g., the Cambridge History of x).

² Oppositions like these may be due to the fact that history/historiography is traditionally concerned only with the study of human, cultural, or social phenomena. Hence, traditional philosophy of history has not included the philosophy of *natural* history so far (but this may change in the future; see, e.g., this volume, Part III and IV, and Cleland 2002, 2009, 2011).

they are often said to construct it altogether by their writing, which is why their mode of comprehension is said to be fictional and not scientific.³

History, some say, is an art, not a science. (Louch 1969, 61)

We believe that this picture is flawed, and that there are good reasons for setting aside the reservations one might have against our project of conjoining biology and history/historiography. Accordingly, we speak of “the historical sciences”⁴ and treat it as a part of the so called “special sciences”⁵, just as the biological sciences. This does not imply to blur the differences between these two disciplines. We agree that there are significant disparities among these two fields (e.g., concerning the role of experiments, the nature of the “empirical data”, or the kinds of theories/generalizations that are developed). And we are aware of the fact that a much more elaborate discussion about questions such as “In which respect is history/historiography a science?” and “What is historical science?” is needed than the one we can provide here (cf. Kitcher and Immerwahr, this volume, Chapter 14; for a discussion of the peculiarities of historical sciences see Scholz, this volume, Chapter 11 and Tucker, this volume, Chapter 16). However, we are convinced that treating biology and history/historiography as siblings, rather than strangers, enables us and the contributors to this volume to establish fruitful connections between the two disciplines and to work out relevant differences.

There are *two major points of contact* between the debates about explanation in the philosophy of biology and in the philosophy of history that we think are worth being emphasized: first, the question of whether *historical explanations* can be found in biology and what it is that makes an explanation “historical” in character, and second, the recent emphasis on mechanisms and *mechanistic explanation* that can be observed in both fields. We successively elaborate these two points of contact in the next sections. In doing so, we introduce significant questions and theses that enable and, as we think, *demand* a joint and mutually stimulated discussion, by philosophers of history *and* by philosophers of biology.

³ “Postmodern” philosophers of history might be said to come close to this caricature (see, e.g., Jenkins 1991 and Munslow 2007). Even scholars who do not believe in a fundamental difference between history/historiography and the sciences constantly use phrases such as the “writing of history” when referring to what historians do or to history as a discipline (the most recent example is Leuridan and Froeyman 2012, 172). For the most recent and explicit oppositions to such expressions, see Kosso 2001 and Tucker 2004.

⁴ However, we are aware of the fact that expressions such as “historical science” or “science of history” (contrary to the term ‘Geschichtswissenschaft’ in German) are hardly ever used in the philosophy of history. This fact is remarkable, but, as one might be willing to say, due to the history of the field.

⁵ We use the term ‘special science’ merely because it is an established way to refer to everything else except physics. Apart from that we are not completely happy with this term because it might convey the implicit message that disciplines like biology and history/historiography are “special” and thus inferior to physics.

1.1 Historical Explanation in Biology

The first point of contact is the thesis that *historical explanations* are not restricted to the (human) historical sciences, but can also be found in other sciences, for instance, in cosmology, geology, paleontology, and also in the biological sciences, particularly in evolutionary biology (see, e.g., Goudge 1961, Mayr 1982, Rosenberg 2001, 2006; see Scholz, this volume, Chapter 11, on the spectrum of the historical sciences).

Some philosophers of biology, most notably Alex Rosenberg (2001, 2006), even claim that *all* biological explanations are (at least implicitly) “historical” in character. Rosenberg’s argument relies on two main assumptions: first, on the controversial claim that, in biology, there exists only one law, namely the “principle of natural selection (PNS)” (2006, 150), which is a *historical* law (cf. Reutlinger, this volume, Chapter 6)⁶; second, on the thesis that all explanations require the description of laws in order to be explanatory. From this Rosenberg concludes that all biological explanations must, at least implicitly, refer to PNS and hence that “biological explanation is historical, all the way down to the molecules” (2006, 152). According to Rosenberg, PNS comes into play as soon as an explanation refers to biological types: since biological types are functionally individuated and since functions must be understood etiologically (2006, 17-20), any reference to biological types implicitly invokes evolutionary theory (more specifically, the description of *past* evolutionary processes). Even biological explanations, such as the molecular explanation of how DNA is replicated during cell division, implicitly appeal to evolutionary theory because they contain statements about biological types (e.g., DNA polymerase, nucleotides, etc.) which are individuated with reference to their past selective effects. Rosenberg concludes:

Any subdiscipline of biology... can uncover at best historical patterns, owing to the fact that (1) its kind vocabulary picks out items generated by a historical process, and (2) its generalizations are always open to being overtaken by evolutionary events. (2006, 153)

We do not share Rosenberg’s radical view that *any* biological explanation is an (at least implicit) evolutionary explanation, and thus a historical explanation. However, what is interesting about his view is the tight connection between evolutionary and historical explanation that he and others envisage. The overall question to which authors like Rosenberg provide an affirmative answer is:

Do there exist types of explanation in biology (e.g., in evolutionary biology) that are *historical*?

⁶ Reutlinger (this volume, Chapter 6) examines the question of whether and in which sense biological generalizations can be characterized as being “historical” and “contingent”.

Answering this question with “yes” presupposes at least a rough idea about what a *historical explanation* is. In other words, it requires that the following question is answered:

What makes an explanation a specifically *historical* explanation?

Unsurprisingly, there is no consensus in the philosophy of biology about what a historical explanation is (or, to speak with Craver, what the “norms” are that distinguish historical from non-historical explanation; this volume, Chapter 2). Rosenberg, for instance, sides with Hempel (1942) and argues that historical explanations in biology are explanatory not because they redescribe the explanandum or because they link the explanans to the explanandum through the operation of implicit necessary truths about rational action (2001, 748). Historical explanations in biology rather explain because they (at least implicitly) appeal to the only biological law that we have, namely to the principle of natural selection (PNS). Hence, Rosenberg agrees with Hempel that most historical explanations are incomplete “explanation sketch[es]” (1942, 42) that do not explicitly refer to laws, but invoke them as background information.⁷

Historical explanations are *sketches of covering-law explanations* that implicitly appeal to historical laws.⁸

Contrary to Hempel and Rosenberg, Thomas A. Goudge (1961), the first philosopher of biology who addressed this issue, denies that historical explanations in evolutionary biology are explanatory because they deduce the explanandum event from a law or set of laws (e.g., PNS). Instead, he characterizes them as *narratives* which show “how existing states of affairs are the result of the combined action of sequences of past events” (1961, 68).⁹ For example, the eye spot on the wings of peacock butterflies is explained by the story of how certain events have led to the selection of this trait in populations of peacock butterflies.¹⁰ Goudge stresses that

⁷ In philosophy of history, the notion of an explanation sketch is one of the most negatively connoted doctrines. The reason is that it seems to imply the immaturity of history that produces “mere” sketches of explanations, rather than complete explanations. But, of course, others believe that the doctrine of explanation sketches shows how “scientific” history was even in 1942, and that it did not and does not provide “mere” fables.

⁸ In philosophy of history, connections between the alleged historicity of laws (or generalizations) and a specific type of historical explanation were already drawn by Terence Ball (1972, 184): “An historical explanation (...) is (...) one in which at least one ‘law’ (or better, perhaps, quasi-law) in the explanans is tensed or temporally located.”

⁹ A similar view can be found in Hull 1975, 1989.

¹⁰ The events that are described in the explanans include, for instance, the predators’ eating of butterflies without spots, the predators’ being scared off by some of these butterflies due to their wing spots, and the predators’ being hunted by owls that have eyes resembling the wing spots of peacock butterflies.

in evolutionary biology, explanations are not covering-law explanations, but rather “narrative explanations” (1961, 75) that establish an “intelligible, broadly continuous series of occurrences which leads up to the event in question” (1961, 77). According to Goudge, evolutionary biologists do the same as historians do when they explain: they tell a “likely story” (1961, 75), that is, they represent a number of possible events in an intelligible, coherent sequence.

Historical explanations are *narrative* explanations.

At this point one might query whether the picture that philosophers of biology like Rosenberg and Goudge draw is an adequate view of what historians do and how they explain (and one might wonder which of them is right). Reason enough to have a look at what philosophers of history say about this issue. In philosophy of history the question of what counts as a *historical explanation* has been a frequent matter of dispute. Hence, this seems to be one point at which the philosophy of biology can benefit from the philosophy of history (and *vice versa*).

The understanding of ‘historical explanation’ that is most prevalent is that historical explanations are those explanations that are offered by people who are legitimately called historians. However, this thesis is either uninformative (if historians happen to be those people working in, say, departments of history) or calls for a clarification of notions such as “historical science”, “historical studies” or “historical method”.¹¹

Another suggestion as to what makes an explanation historical has been provided by Gordon Graham. He argues that:

“[A] historical explanation is one which explains a fact by *giving its history*.” (Graham 1983, 65, our emphasis)

But this answer raises follow-up questions. Most importantly, it leaves open what it means to describe the “history” of the explanandum, and what the explanandum of a historical explanation is at all. It therefore seems as if this answer only shifts the focus of the question from the needed explication of ‘historical’ to a specification of ‘history’.

One possible way to get a more specific notion of “historicity” in theories of historical explanation has been to reserve specific explananda for such explana-

¹¹ Some scholars even hold the view that there is just no specifically historical type of explanation (e.g., Hempel 1942, White 1943). May Brodbeck is responsible for one of the most famous quotes in this context: “There is no such thing as ‘historical explanation’, only the explanation of historical events.” (1962, 254) However, it remains unclear what a historical event is and whether there is something special about historical events that makes them different to, say, natural events. If there exist specifically historical events one might even argue that the fact that there is a class of explanations that explain specifically historical events suffices to call them specifically historical explanations.

tions. Thus, various philosophers of human historical science identified *historical explanations* with explanations of individual actions.

Historical explanations are *explanations of individual actions*.

In this line of thought, the famous philosopher of history, William Dray, stepped into Robin Collingwood's (1994 [1946]) shoes by claiming that

the objects of historical study are fundamentally different from those, for example, of the natural sciences, because they are the actions of beings like ourselves (Dray 1957, 118).

In the classic Hempel-Dray-Scriven debate and in this variety of philosophy of history it is controversial whether such explanations contain empirical laws (e.g., Hempel 1962, 1963), truisms or “normic statements” (e.g., Scriven 1959), or “principles of action” (Dray 1957, 1963), and whether such explanations are varieties of causal explanation or whether they are “reason explanations” *sui generis* (for an overview see Dray 2000). One might want to claim that the “intentional” or “rational” character of social or historical phenomena makes them special in a more significant way. The primary problem with such positions has been stated variously. For many philosophers and social scientists several social or historical phenomena or changes in social systems are neither intended nor rational, but unintended outcomes of myriads of perhaps rational individual actions.

Be that as it may, the question remains of whether action explanation provides us with material that leads to an adequate understanding of the concept of *historical* explanation.¹² We are skeptical. The reason is that, although it is a contingent truth that history/historiography traditionally has been restricted to the study of human, cultural, or social phenomena, restricting the concept of historical explanation to the explanation of one type of phenomenon or events (namely to individual human action explanations) seems to be too arbitrary. One might easily find arguments for Dray's thesis that the kinds of phenomena that historians or social scientists investigate are fundamentally different from phenomena of the natural world (e.g., the assertion that formations of rocks, which are the result of some “historical” processes, do not think about their “history”, since they do not think at all).¹³ Nevertheless, a concept of historical explanations that identifies them with explanations of singular actions of humans is too narrow to be convincing. Such a

¹² One of Dray's papers on the topic has the revealing, yet ambiguous title “The Historical Explanation of Actions Reconsidered”; see Dray 1963. Whereas Graham (1983, Chapter 4) is right in discussing Dray's position as a paradigm for debates about historical explanation, Dray meanders between an understanding of historical explanation as (i) a label that encompasses all explanations that historians develop, and as (ii) a type of explanation that is historical. For another example of this problem, see Martin 1977.

¹³ One possible source of arguments in favor of the existence of a fundamental difference between social/historical and natural phenomena is the debate about what has often been called the question of “naturalism”, that is, the question of whether human or social phenomena are of a kind that prohibits their being studied “scientifically”. For a famous contribution to this debate see Bhaskar 1979.

narrow concept would have at least two implausible consequences: first, explanations of social phenomena, such as wars, inequality or economic decline, would not count as *historical* because they do not explain *singular* actions (see also Section 1.2); second, explanations of events that involve no humans at all (e.g., the explanation of the extinction of the dinosaurs) would be excluded from the set of historical explanations, too. And many “historical” phenomena are, of course, inseparably mixed, that is, natural-social or biological-social (e.g., climate change or the “Black Death”). Thus, explanations of singular human actions might be *an* important subtype of historical explanation, but not *the only* existing kind of historical explanation.¹⁴

Let us return to the idea that what makes explanations specifically *historical* is their *narrative* character. As we have seen, narrative explanations are at times characterized as describing the continuous series of events by which the explanandum event came about. This claim cannot only be found in philosophy of biology, but is popular in philosophy of history as well.¹⁵ The “model of a continuous series” of events, proposed by William H. Dray, is similar to the views about narrative explanations expressed by philosophers of biology, such as Goudge. According to Dray, these models explain an event by enabling the enquirer to “trace the course of events by which it [the explanandum event] came about” (Dray 1957, 68). This view is frequently presented as an alternative to the view that explanations require the description of general laws (i.e., must be covering-law explanations).¹⁶ However, just as its counter position, the idea that historical explanations are narratives faces objections, too. For instance, the question arises of what exactly a “historical narrative” (Hull 1975, 253) or a “likely story” (Goudge 1961, 75) is and what makes them explanatory, rather than merely descriptive.¹⁷ This con-

¹⁴ Somebody who rejects this claim is, for example, J. O. Wisdom 1987.

¹⁵ Despite the popularity of this view it is important to note that not every historian holds that historical explanations (i.e. explanations in historiography) are narratives (cf. Hull 1975, 254). Furthermore, one should notice that various meanings of the term ‘narrative’ are used in the literature. Classics of this genre are Dray 1954 and White 1963. While some of the early narrativists believed, roughly, that “narratives” track event sequences, more recent narrativists understand the concept of a narrative and of a narrative explanation in a much broader sense, that is, as referring to literary features, artistic means, and rhetorical devices applied in “history”, or to any kind of text that creates “meaning”. For recent critical discussion, see for example Day 2009, Frings 2008, Murphey 2009, and Brzechczyn 2009. For an anthology of the debate about narratives in philosophy of history, see Roberts 2001.

¹⁶ As is well known, Dray’s claim that such explanations by descriptions of continuous series do not require or imply laws was countered by Maurice Mandelbaum (1961). Later Mandelbaum (1977) uses the same notion (i.e., “continuous process”) in explanatory contexts or what he terms “concrete causal analysis”.

¹⁷ Famously, Hempel argued against similar views by writing that “the mere enumeration in a yearbook of ‘the year’s important events’ in the order of their occurrence clearly is not a genetic explanation of the final event or of anything else” (Hempel, 1962, 23). “Genetic explanation” is Hempel’s model of what he assumes to be an “explanatory procedure, which is widely used in history” (1965, 447). He explicates this model as follows:

ceptual vagueness is particularly surprising in light of the huge amount of narratives that are on the market in philosophy of history.

Another interesting point of discussion concerning narrative explanations emerged in philosophy of biology. Several authors, most notably Stephen J. Gould and Richard C. Lewontin (1979), have claimed that adaptive explanations in evolutionary biology must be more than “just-so-stories”, that is, more than merely plausible stories about how a trait could *possibly* have evolved in a possible environment. Accordingly, one could argue that:

Historical explanations must be more than “just-so-stories” or *how-possible explanations*.

In line with this, Rosenberg argues that historical how-possible explanations must be “made adequate” by converting them into historical why-necessary explanations (2006, 47-55). In Rosenberg’s writings it remains unclear how exactly this transformation shall proceed. What he does mention is that it includes the filling up of crucial links in the causal chains of the original explanation. Rosenberg’s argumentation suggests that historical explanations are adequate only if they consist in more than in the telling of possible stories. Rather than describing what *could* have happened, adequate historical explanations, so Rosenberg, tell the story of what has *actually* happened and why this must have happened. In short, historical explanations are adequate only if they are why-necessary explanations. In a similar vein, Glennan claims that “to the extent that a narrative fails to show the necessity of the outcome, it fails to explain” (2010, 262). More generally, Craver (this volume, Chapter 2) argues that a philosophical theory of explanation must distinguish how-actually explanations from mere how-possibly models.

However, this view is far from being uncontested – among philosophers of biology *and* among philosophers of history. In the philosophy of biology some authors defend the view that the evolutionary explanations that are given in practice are often not more than how-possible explanations. For example, Schurz (this volume, Chapter 7) argues that evolutionary explanations are considered to be adequate only if they specify at least some plausible mechanisms (of variation and of selection). Since these plausible mechanisms need not be empirically confirmed to a high degree, he concludes that evolutionary explanations are often mere how-possible explanations, rather than full causal explanations. In the philosophy of history, it is disputed in which sense historians can even explain by showing that an event was necessary, since history is claimed to be “contingent” (Little 2010).¹⁸

In order to make the occurrence of a historical phenomenon intelligible, a historian will frequently offer a ‘genetic explanation’ aimed at exhibiting the principal stages in a sequence of events which led up to the given phenomenon. (Hempel 1962, 21)

These stages were, of course, to be covered loosely by laws. Saliently enough, this model is not very different from what Arthur Danto (1965) later referred to as narrative explanation.

¹⁸ Stephan J. Gould wrote: “the central principle of all history - *contingency*” (2000, 283).

Moreover, it is questioned whether historians can access enough evidence to fill in the links of the causal chains that lead up to an event (cf. Tucker, this volume, Chapter 16). If it turns out that historians have to provide such information to explain, facing the fact that often they cannot do so again leads to a philosophical scenario in which it would be challenged whether historians provide explanations at all.

Rosenberg's claim that one can get historical why-necessary explanations by adding causal information to historical how-possible explanations gives rise to another interesting question: Are *historical explanations* a special kind of causal explanations, or are they opposed to them? Let us consider the former alternative:

Historical explanations are special kinds of *causal explanations*.

In philosophy of history, the terms 'narrative explanation', 'historical explanation', and 'causal explanation' are often used interchangeably. We find an example for this even beyond the disciplinary boundaries. Daniel Athearn, who cannot be claimed to have been preoccupied with history or biology, writes of "narrative (historical or causal) explanation" (1994, 5). He argues in favor of a place for narrative explanations even outside the special sciences (e.g., in physics): "to produce explanations in science is to produce narrative causal explanations" (1994, 61). These explanations, which he also calls "productionistic explanations" (1994, 59), seem to be similar to the mechanistic explanations that have been frequently discussed in philosophy of biology during the last decade (see Section 1.2).¹⁹ Although causation is an understudied field in philosophy of history and although causal accounts of explanation are far less frequent than one might expect, quite a few authors argue that explanations in history are causal explanations (see, e.g., Gerber, this volume, Chapter 9 and the discussion of causal explanations of historical trends by Turner, this volume, Chapter 12). Connections between narratives and causal explanations are sometimes also drawn.²⁰

However, other philosophers of history have argued that causation has no central place in history and that historical/narrative explanations are *opposed to* causal explanations (this literature ranges from, e.g., Louch 1969 to Gorman 2007 more recently). A particularly sharp contrast between historical/narrative explanations, on the one hand, and causal explanations, on the other hand,²¹ is drawn by those scholars who paint the picture that we referred to at the beginning: scientists gather empirical data and develop theories about the world, whereas historians are men

¹⁹ "A 'productionistic' explanation is a causal explanation of which the only essential components are events arising out of one another in succession and/or giving rise to (in a perfectly innocent and literal sense) the fact, entity, or phenomenon that the particular story explains." (Athearn 1994, 59)

²⁰ For accounts using causation in theorizing about explanations in history, see, e.g. Topolski 1976, Mandelbaum 1977, McCullagh 1998, Day 2009, Frings 2008, Murphey 2009.

²¹ Of course, back in those days the enemy of those who endorsed a strong opposition between history and natural science was the covering-law model of explanation.

and women of letters who *write* history; accordingly, what has often been called “historical interpretation” is supposed to be fundamentally different from any scientific causal explanation.²² Moreover, debates about hermeneutic understanding vs. causal explanation are another central and classic place where such contrasts are emphasized (for an overview, see Martin 2000). Kitcher and Immerwahr (this volume, Chapter 14) argue that many of these older debates and recent revivals are mistaken because they battle the wrong philosophies of science in general and of explanation in particular. Further counterpositions to this tradition can be found in Scholz, Turner, Glennan, Steel, and Tucker (this volume, Chapters 11-16).

To sum up, the claim that there also exist historical explanations in other sciences (e.g., in biology) gives rise to the question of what makes an explanation specifically historical. We have shown that a satisfying answer to this question is missing (although several answers are discussed) and that philosophy of biology and philosophy of history can fruitfully work together to specify the concept of a historical explanation and to determine its scope.

1.2 Mechanistic Explanation in the Historical Sciences

The *second* major point of contact is the increasing attention to mechanisms and mechanistic explanations that can be observed in both fields: in the philosophy of biology (e.g., Machamer et al. 2000; Craver 2007; Glennan 1996, 2002, this volume, Chapter 13; Bechtel 2006, 2008; see also Gebharder and Kaiser, this volume, Chapter 3, and Müller-Strahl, this volume, Chapter 5) and in the philosophy of history, of historical sociology (e.g., Norkus 2005, 2007; Lloyd 1986; see also Plenge, this volume, Chapter 10), and in social science in general.²³

The “new mechanistic philosophy” (Skipper and Millstein 2005, 327) has been primarily developed with regard to the life sciences. Accordingly, most proponents of the mechanistic account concede that mechanistic explanations are an important, but not the *only* kind of biological explanation (e.g., there might be what Krohs calls “semiotic explanations”, too; this volume, Chapter 4). However, in recent years, there has been a tendency to extend the boundaries of the scope of the mechanistic account. Most notably, Stuart Glennan (2010; this volume, Chapter 13) argues that historical explanations also fall under the category of mechanistic

²² A paradigmatic example of such a view is the following: “The starting-point of the present study is the claim, common to almost all critical philosophers of history [sic!], that historical study aims at a kind of understanding quite different from that which is characteristic of the natural sciences.” (Gallie 1964, 11) In a similar vein this idea can be found in Mink 1966.

²³ Many authors do not differentiate between historical and social sciences. Although such terminology can be criticized, we neither want to take a stand on whether history and social science are distinct fields or whether they are closely related, nor do we take a stance on whether they have differing methods or not. For discussions concerning these points, see Glennan (this volume, Chapter 13) and Tucker (this volume, Chapter 16).

explanations – even if they describe mechanisms that are less stable than other mechanisms (so-called “ephemeral mechanisms”). At the same time there emerged a, mostly independent, debate about mechanisms and mechanistic explanations in the philosophy of history, in philosophy of the social sciences, and within history/historiography and sociology itself.²⁴

One might want to dispute that this is a fruitful point of contact by arguing that what philosophers of the historical and the social sciences mean by mechanisms and mechanistic explanation is different from the concept of mechanism and mechanistic explanation that is established in the philosophy of biology.

Biological mechanisms are *fundamentally different* from historical/social mechanisms.

To support this claim one might, for instance, point to the putatively categorical difference between the mechanism of a clock or of photosynthesis, on the one hand, and the mechanism of a particular children’s birthday party, of a social thing like a university, or mechanisms that could have been responsible for the fall of the Roman Empire²⁵, on the other hand. This line of argumentation might be motivated by the intuition, similar to Dray’s position hinted at above, that the explanation of human actions and of social phenomena cannot be “of a piece with the explanation of the working of clocks or other mechanical devices” (Norkus 2005, 372). However, we think that the questions of whether there is a fundamental difference between biological mechanisms and historical or social mechanisms²⁶ and whether mechanistic explanations encompass biological, historical and social explanations as well are still open for discussion. One might convincingly argue that there is a fundamental difference between the social and the natural world, or the arguments in favor of the entanglement of the social and the natural world might turn out to be more plausible (cf. Steel’s investigation of “coupled human and natural systems (CHANS)”, this volume, Chapter 15). Future discussion will show. We see no convincing arguments for nipping the discussion in the bud.

Mechanistic explanations, as they are understood in the philosophy of the life sciences, are descriptions of how the components of a mechanism are organized and how they interact with each other in order to bring about the explanandum phenomenon (cf. Machamer et al. 2000; Craver 2007; Glennan 1996, 2002; Bechtel 2006, 2008). For instance, the phenomenon of muscle contraction is mechanistically explained by describing how certain molecules and cell organelles (e.g., calcium ions, myosin and actin filaments, the sarcoplasmic reticulum, tro-

²⁴ The literature in this field is large and still growing (see, e.g. Hedström and Swedberg 1998, Tilly 2004, 2008, Schmid 2006, Manicas 2006, Demeulenaere 2011, Wan 2011).

²⁵ For a detailed analysis of the mechanisms that might be relevant to explain the histories of the Roman Republic and the Roman Empire, see Berry (this volume, Chapter 8).

²⁶ For some suggestions on how to explicate the concepts historical mechanism and social mechanisms, compare Glennan (this volume, Chapter 13) and Plenge (this volume, Chapter 10).

pomyosin molecules, etc.) interact with each other in a certain way (or, as others prefer to say, perform certain activities or operations, e.g., binding, releasing, tipping over, converting, etc.) so that they together produce the shortening of the muscle fiber. Some proponents of the mechanistic account (e.g., Craver, this volume, Chapter 2) argue that the causal mechanisms in the world itself, rather than our representations of them, are the explanations. Though there is considerable consent with regard to the main features of biological mechanism, there is also a lot of disagreement among the mechanists. What, for instance, is the ontological nature of the components of mechanisms (e.g., Müller-Strahl develops a mechanistic ontology for disease entities, in which the concept of a mechanistic base occupies center stage; this volume, Chapter 5)? Must mechanisms produce a phenomenon regularly, or can there be mechanisms that bring about a phenomenon only once? Must the parts of a mechanism be located on a lower ontological level than the mechanism as a whole, or can there be such thing that Craver (2007) calls “etiologic mechanistic explanations”, too? Is the mechanistic view committed to a special theory of causation, e.g., one that accounts for the “productive” character of activities? Finally, how are biological mechanisms adequately represented (e.g., Gebharter and Kaiser argue that biological mechanisms can be represented by causal graph theory and that the resulting quantitative, probabilistic models are useful for certain scientific purposes; this volume, Chapter 3)?

We can now ask whether there are (specific types of) historical explanations that are similar to the mechanistic explanations that can be found in biology and that might be termed mechanistic explanations as well. In other words, an interesting working hypothesis is:

There exist *mechanistic explanations* in the historical sciences, too.

This hypothesis is supported by the examples of historical mechanistic explanation that are presented by Berry (this volume, Chapter 8). But in what follows we focus on the philosophical arguments that have been or can be provided in favor or against this hypothesis. We discuss three lines of argumentation. Two of them support the above thesis; the other one denies that the concept of mechanistic explanation can be applied to historical explanation²⁷ as well.

First, Glennan (2010 and this volume, Chapter 13) claims that historical explanations (or, as he sometimes calls them, “historiographic explanations”) describe mechanisms, too. This claim presupposes that the notion of a mechanism is understood in a broad way. Glennan accepts Phyllis McKay Illari’s and Jon Williamson’s general definitions of mechanisms, according to which

[a] mechanism for a phenomenon consists of entities and activities organized in such a way that they are responsible for the phenomenon. (2012, 120)

²⁷ In this context ‘historical explanation’ can be understood either as a specific type of explanation or as the explanations that historians typically give (which leaves open which types of explanation they offer).

Glennan argues that what makes “historical mechanisms” (2010, 260) similar to other kinds of mechanisms is that they bring about events, too (namely “historical events”, 2010, 264), and that descriptions of how the parts of historical mechanisms interact with each other explain the historical event. In Glennan’s view, the only major difference between historical mechanisms and mechanisms for, say, DNA replication is that the former are less stable than the latter. He argues that, whereas biologists and other natural scientists study relatively stable systems, the mechanisms that figure in historical explanations are “ephemeral and capricious” (2010, 251). This means that the specific configuration of the parts of a historical mechanism (i.e., their coming together) is short-lived and may be contingent.²⁸ For this reason, Glennan refrains from calling such mechanisms “systems”, but claims that they are better conceived of as “processes”. However, Glennan emphasizes that despite the ephemeral nature of historical mechanisms, the interactions between their parts have a robust and reliable nature, too. Hence, they can also be described by “direct, invariant change relating generalizations” (2010, 260; see also 2002) – just as in case of traditional mechanisms. Glennan concludes that historical explanation is a subtype of mechanistic explanation.

Historical explanations are descriptions of *ephemeral mechanisms*.

Glennan stresses that even the characterization of historical explanations as narrative explanations does not render this thesis implausible since narratives are nothing but descriptions of ephemeral mechanisms.

Second, bringing together the debate about explanation in philosophy of biology and in philosophy of history reveals an interesting similarity, namely the one between *mechanistic explanations* in biology and historical explanations as *narrative explanations* understood in a narrow way (this similarity is also recognized by Glennan 2010, this volume, Chapter 13) As we have pointed out before, some scholars characterize explanations in history/historiography as historical narratives, for instance, as “models of continuous series” (Dray 1957) of events that bring about the explanandum event. In Goudge’s words (recall Section 1), a narrative explanation establishes an “intelligible, broadly continuous series of occurrences which leads up to the event in question” (1961, 77). Some authors specify this claim by pointing out that historical narratives explain an event by “integrating it into an organized whole” (Hull 1975, 273), or that “[t]he aim is to make the sequence of events intelligible as a relatively independent whole” (Goudge 1961, 75). Claims like these are prevalent in the philosophy of history. It seems as if historical narrative explanations *understood in this way* are quite similar to the mech-

²⁸ On this basis, one might even argue that the mechanism of natural selection is an ephemeral historical mechanism. This is exactly what Skipper and Millstein (2005) deny in their renowned paper. On the contrary, Illari and Williamson (2010) claim that mechanistic explanations by protein synthesis and by natural selection are more closely analogous than they appear.

anistic explanations or models that are typical of the life sciences. The similarity rests on the fact that in both cases what is important for the explanation is some kind of integration of something into a “whole”. Hence, one could argue that:

Historical explanations are mechanistic explanations because they are *narrative* explanations.

We think that especially two possible analogies between mechanistic explanations in biology and narrative explanations in history/historiography understood in this way are worth being examined more closely: first, that explanations of both kinds specify part-whole relations, and second, that both of them explain a phenomenon (or event) by describing how a continuous sequence of events (or processes) brings about (or leads to) the explanandum phenomenon. We elaborate these aspects one after another.

An important idea, in the literature about mechanisms in the life sciences, is that mechanistic explanations “span multiple levels” (e.g., Craver 2007, 163; Gebharder and Kaiser, this volume, Chapter 3). This means that they explain a particular behavior or feature of a mechanism as a whole by appealing to the entities and activities that compose the mechanism (which are said to be located on a lower level of organization). In other words, mechanistic explanations require that a certain kind of *part-whole relations* are specified, namely the ones between a mechanism and its components (e.g., between the mechanism for protein synthesis and the ribosomes, the m-RNAs, the amino acids, their binding, moving, and linking, etc.). Interestingly, the idea that something is integrated into a whole and that it is important to figure out what belongs to this whole and what does not seems to be central to the concept of a narrative explanation in history, too. According to a prominent view, historical narratives also explain a particular event or phenomenon by representing only those events that are *relevant* (Hull 1975, 274), that is, that together form a *coherent, continuous whole* that culminates in the event to be explained (Goudge 1961, 73–75). Hence, both mechanistic explanations in biology and narrative explanations in history/historiography seem to be models that involve representations of part-whole or constitutive relations.

One might challenge this analogy by denying that historical narrative explanations appeal to part-whole relations, and thus span multiple levels. The argumentation could proceed as follows: even if narratives represent some “historical process”²⁹ as being an integrated whole, this does not imply that there really exists a whole (i.e., the historical process) in the world that is located on a higher ontological level than the events that compose it.³⁰ These processes, which historians are

²⁹ Most philosophers of history use terms such as ‘historical process’ in an innocent way. However, at second sight, it becomes clear that these concepts can be problematic (e.g., because they might imply a difference between “historical” processes and something else, e.g., “natural” processes) and need to be specified.

³⁰ Actually, “narrativist” philosophers of history would claim that the “wholes” historians claim to investigate are literally artifacts constructed in the narrative, which do not represent anything

supposed to investigate, are mere sequences of events and the event to be explained is just the final event/the end of this sequence (e.g., the outbreak of a war), rather than being located on a higher ontological level. Moreover, the putative “wholes” represented in historical explanations are not as robust as biological mechanisms and do not regularly and repeatedly lead to the explanandum event. Thus, they are not real wholes after all. Although this line of argumentation has some convincing aspects, it also seems to overstate the ontological differences between biological mechanisms and historical “processes” (for a view that emphasizes the similarities, see Glennan 2010, this volume, Chapter 13). In addition, there might be convincing arguments available for why historical processes should be conceived as wholes that are located on a higher ontological level and that bring about or lead to the explanandum event (even if most of them do not regularly do so).³¹ For instance, historians may be social realists and believe that there exist social processes (e.g., economic decline) or social systems (like the Roman Empire or the Credit Suisse), and that they are in a sense located on a higher ontological level than individuals and their actions. Furthermore, individualist historians might want to argue that when it comes to the explanation of historical events and social processes, one has to focus on a lower level. That is, one has to go down to the level of interacting people in order to explain the behavior of the whole (for recurring debates around notions such as “social process”, “social structure” and “social system” and “history”, see Plenge, this volume, Chapter 10). If historians want to explain the stability of some system, they might even want to refer to social processes that are somewhat regular (i.e., not unique and not totally contingent), like production in a factory or training in a sports team. Furthermore, biological processes like gastrulation, neurulation, or other developmental processes are also mere sequences of certain kinds of events (which, however, proceed regularly). Nevertheless, they are often referred to as wholes (sometimes even as mechanisms) that are located on a higher level of organization as their parts. So, why should historical processes not be characterized as wholes, too? In current philosophy of history ontological inquiries like this are not of high repute. However, some authors in this volume take steps towards rehabilitating ontological issues in philosophy of history (cf. Gerber, this volume, Chapter 9; Plenge, this volume, Chapter 10; and Scholz, this volume, Chapter 11).

The second respect in which the concept of a narrative explanation (in the sense explicated above) seems to be similar to the concept of a mechanistic explanation is that both of them stress the importance of describing the *continuity* between the components of a mechanism or historical process. Revealing this continuity is es-

real. For counterpositions to “narrativism”, see Gerber (this volume, Chapter 9) and Scholz (this volume, Chapter 10).

³¹ Even if such arguments were not at hand one could still stick to the claim that narrative explanations in history/historiography are a special kind of mechanistic explanations. One only needs to agree with Carl Craver that there exist types of mechanistic explanations that are not *constitutive* mechanistic explanations, but rather *etiological* mechanistic explanations (i.e., descriptions of the antecedent causes of the explanandum event; Craver 2007, 107).

essential to the explanatory power of both kinds of explanation. Mechanistic explanations in biology represent how one stage of a mechanism gives rise to another and how one activity of an entity causes another activity of another entity (e.g., how the transport of the mRNA from the nucleus into the cytoplasm enables the binding of the ribosome subunits, which in turn causes the start of the translation). Similarly, narrative explanations in history/historiography describe how one event leads to another via one or many processes (e.g., how the implementation of a new policy by constructing new social systems and thereby instigating myriads of individual activities leads some social groups into disaster). What some philosophers of history call “continuous series of events” is called “productive continuity” (Machamer et al. 2000, 3) by philosophers of biology.³²

In sum, revealing the similarities between mechanistic explanations in biology and narrative explanations in history/historiography seems to be a promising, although not unproblematic, way to question the traditional opposition between a “scientific” way of representing and explaining the world, on the one hand, and a specific “historical” mode of describing and understanding the world, on the other.

Third, a possible challenge to the assumption that historical explanation is a special kind of mechanistic explanation is the claim that historical explanations explain *particular* events, whereas mechanistic explanations explain how a certain *type* of event or behavior (also called phenomenon) is *regularly* produced by a mechanism. In short, one might hold that:

The explananda of historical explanations are *tokens*, whereas mechanistic explanations explain *types*.

According to this view, there would be no mechanistic explanation at all; neither of how Michael bumped his Ferrari into Ralf’s Toyota, nor of why Michael’s Ferrari with which he won the Monaco Gran Prix in 1999 worked properly (by contrast, both explanations could perhaps be characterized as historical explanations). Instead, a mechanistic explanation describes, for instance, how the Ferrari as a type of car works or how Ferraris like Michael’s behave.

This challenge should be taken particularly serious because the view that historians are, by essence, concerned with the description of idiographic detail or concrete phenomena, is widespread in the philosophy of history and elsewhere. It is often claimed that they would otherwise lose membership in their profession.³³

³² The only important difference in this context, which should not be swept under the table, concerns the *organization* of the parts of biological mechanisms and of historical processes. Whereas the events described in narrative explanations are always ordered sequentially (at least if they are token events), the entities and activities described in mechanistic explanations in biology frequently do exhibit more complex forms of organization (like positive and negative feedback).

³³ Even thinkers as Mandelbaum (1977) advocated this position.

Following Popper³⁴, Gordon Graham contrasts historical explanation with what he calls “theoretical explanation” (1983, 48f).³⁵ According to Graham, theoretical scientists are, in contrast to historians, concerned with disclosing general patterns or with finding out and explaining how things regularly work.³⁶ Aviezer Tucker (2004; this volume, Chapter 16) adopts a similar position. One of his main theses is that what historians explain is *token evidence* (e.g., particular documents or fossils) and *token events* (i.e., events that are “unique and unrepeatable”; Sober 1988, 78), like the Rise of Rome or the assassination of Kennedy. Contrary to the historical sciences, so Tucker, the “theoretical sciences” are not concerned with token evidence and events, but rather with theoretical types of replicated evidence and repeated events.³⁷

Other authors adopt a more pluralistic position and allow for a diversity of explananda of historical explanation. In this line, Leuridan and Froeyman (2012) distinguish three possible kinds of explananda (or “aspects”; 2012, 183) of historiographic explanations: singular events, types of events (which they call “general historical events”; 2012, 183), and historical evidence. Hence, the above thesis that the explananda of historical explanations are restricted to tokens, whereas the explananda of mechanistic explanations are types, is far from being uncontested. This objection might even be strengthened. We can ascribe such objections also to Mario Bunge. He explicitly states that there exist “historical explanation[s] of laws” (1998, 43), which he characterizes as one of two existing types of “mechanistic explanation”.

Historical explanation (...) consists in the tracing of the *evolution of a law*, by showing how it arose in the course of time from patterns characterizing earlier stages in an evolutionary process, as when a new pattern of social behavior is given a historical explanation. (Bunge, 1998, vol. II, 38. On Bunge’s theory of mechanisms and mechanistic explanation, see his 1997 and 2004)

However, in order to reject the thesis that historical explanations explain solely tokens, one need not quarrel about Bunge’s use of the term “law”. It suffices to point out that sometimes historians are interested in explaining more than unique, singular occurrences, namely *types* of events (like historical patterns or trends; see also Little 2010). For instance, they explain why absolutist states did well in collecting taxes, or how a Roman emperor managed the finances.

³⁴ “Now the sciences which have an interest in specific events and their explanation may, in contradistinction to the generalizing sciences, be called the historical sciences.” (Popper 1974, 447f).

³⁵ Goudge points to a similar difference when he distinguishes between “systematic” and “historical” modes of explanation (1961, 62).

³⁶ Of course, this does not preclude that these patterns or processes may be “historical” in the sense that they are the result or outcome of some preceding process (e.g., adaptive evolution).

³⁷ The thesis that historical explanations explain singular occurrences is popular among narrativists, too. They frequently emphasize the *uniqueness* of the explananda of historical explanations (e.g., Goudge 1961, 77).

But don't we implicitly alter the question at this point? One might argue that what some token historians do does not affect the answer to the question what a *historical* explanation (as a specific type of explanation) is. In other words, one might say that if a historian explains a historical regularity or law by modeling the mechanism that is responsible for that behavior, he simply does not explain "historically", but provides a different kind of explanation. Accordingly, the set of all historical explanations would overlap, but not coincide with the set of all explanations that historians provide. However, the thesis that historians also offer non-historical explanations is at least a debatable conclusion (for a "liberal" theory of scientific explanation that stresses the diversity of significant research questions in science *and* history alike, see Kitcher and Immerwahr, this volume, Chapter 14)

The above thesis that the explananda of historical explanations are tokens, whereas mechanistic explanations explain types, can also be criticized by questioning its second part. That is, one might argue that although mechanistic explanations explain types of phenomena more frequently, this must not and is not solely the case. The explanatory practice in the life sciences reveals mechanistic explanations of singular occurrences, too (cf. Glennan, 2010, this volume, Chapter 13). Examples are mechanistic explanations of how the genetic disease of a particular patient causes certain symptoms or of how a particular mutation brought about a third leg on the back of an individual *Drosophila melanogaster*.

In conclusion, the aim of this section was not to judge whether historical explanations are a special kind of mechanistic explanations or not. Rather, we wanted to show that much can be said in favor of it, but also to hint at the problems with such a view. All in all, the questions of what a specifically historical explanation is and what the similarities and differences between historical explanations and mechanistic explanations in the life sciences are constitute a promising field for future philosophical research.

1.3 Conclusion

In our view, the project of bringing together debates about explanation from philosophy of biology and from philosophy of history is a fruitful one and the reservations that one might have against it can be rebutted. In order to show this, we identified some major points of contact between these disciplines which had not been obvious at first sight.

The claim, for instance, that some biological explanations (e.g., evolutionary explanations) are historical in character requires an answer to the question of what makes an explanation specifically historical. Is it the fact that they (at least implicitly) invoke historical laws? Or is their historical character due to their status of being narrations, that is, descriptions of continuous series of events that together form an intelligible whole? Examining the peculiarities of historical explanations gives rise to further interesting questions that lie at the intersection between phi-

philosophy of biology and philosophy of history. Are historical explanations “just-so stories” or mere how-possible explanations that should be avoided in the biological science? Or are they special kinds of causal explanations and, if yes, what makes them special?

The second major point of contact that we identified concerned the debate about mechanisms. Is it plausible to claim that both special sciences, the biological and the historical sciences, aim at discovering mechanisms and provide mechanistic explanations? Is the difference between biological mechanisms and historical/social mechanisms just one of degree (e.g., different degrees of stability), or do they constitute fundamentally different kinds of mechanisms (if there can be found mechanisms in history at all)? What are the similarities and differences between narrative explanations in the historical science and mechanistic explanations in biology, and do the similarities warrant characterizing historical explanation as a subtype of mechanistic explanation?

We do not claim that these are the only overlaps of interests, debates, and problems. Rather, we hold that they provide a good starting point for discussion. Many of the issues that we raised are developed more thoroughly in the contributions to this volume. Moreover, the contributions address several equally interesting topics that we could not approach in this introduction.

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