

## Heraclitus, Rivers and Ecosystems

Heraklit, rzeki i ekosystemy

### Robin Attfield

Cardiff University, Great Britain

ORCID <https://orcid.org/0000-0002-3387-0251> • [AttfieldR@cardiff.ac.uk](mailto:AttfieldR@cardiff.ac.uk)

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**Abstract:** Heraclitus is interpreted not as holding that rivers exist only on a momentary basis, but as holding that the basis of their identity is problematic. The identity of rivers is discussed through examples, including cases where the identity of rivers depends on the inclusion of one or more of their tributaries, or of none at all. The family-resemblance approach cannot answer questions about the sameness of rivers, answers to which remain far from clear. This may seem unimportant, except that rivers are agreed to be ecosystems, which some hold to have a good of their own and therefore to have moral standing. But the loose nature of their identity, as articulated when the concept of ecosystem was introduced by Sir Arthur Tansley, belies this view. Besides, “the Amazon” matters (enormously) because it is an endangered regional system, liable to morph into a savannah, and thus to trigger a domino effect among other regional systems; this is quite different from an ecosystem consisting of one particular river (or part thereof), or even of its watershed.

**Keywords:** Heraclitus, identity of rivers, tributaries, concept of ecosystems, regional systems, nature of “the Amazon”

**Streszczenie:** Interpretacje Heraklita nie wskazują, że rzeki istnieją jedynie chwilowo, ale jedynie, że podstawy ich tożsamości są problematyczne. Tożsamość rzek omówiono na przykładach, włączając przypadki, w których tożsamość rzek zależy od uwzględnienia jednego lub większej liczby ich dopływów lub żadnego z nich. Podejście oparte na podobieństwie rodzinnym nie daje odpowiedzi na pytania o identyczność rzek, odpowiedzi te wciąż pozostają niejasne. Może się to wydawać nieistotne, z wyjątkiem tego, że rzeki są uznawane za ekosystemy, które według niektórych są dobre jako takie i dlatego posiadają moralne odniesienie. Jednak luźny charakter ich tożsamości, wyrażony w momencie wprowadzenia koncepcji ekosystemu przez Sir Arthura Tansleya, zaprzecza temu pogładowi. Ponadto „Amazonka” ma (ogromne) znaczenie, ponieważ jest zagrożonym systemem regionalnym, który może przekształcić się w sawannę i tym samym wywołać efekt domina wśród innych systemów regionalnych; różni się to zupełnie od ekosystemu składającego się z jednej konkretnej rzeki (lub jej części) lub nawet z jej działu wodnego.

**Słowa kluczowe:** Heraklit, tożsamość rzek, dopływy, koncepcja ekosystemów, układy regionalne, przyroda Amazonki

## **Introduction**

This essay opens by revisiting “the universal ancient interpretation” of what Heraclitus of Ephesus was saying about rivers (section 1: Heraclitus on Rivers: the Universal Ancient Interpretation Revisited). If, despite that interpretation, he actually had no qualms about speaking of “the same river,” but was puzzled about the criteria of sameness, we need to reflect on the problem that he bequeathed to us, that of what it is for a river still to be the same river (section 2: On Being the Same River). In section 3 (Rivers as Ecosystems; and the Systems We Need to Preserve), it emerges that parallel problems arise about the nature of ecosystems, which are widely agreed to include rivers. Given the very unclear criteria for the identity of ecosystems (rivers included), and the lack of grounds for regarding them as having a good of their own, the importance of preserving regional systems, and of the basis for doing so, become all the more crucial (section 4: Some Conclusions), even though we use the same name (“the Amazon”) for a river, for its watershed, and for a pivotal regional rain-forest system.

### **1. Heraclitus on Rivers: the Universal Ancient Interpretation Revisited**

The universal classical and post-classical interpretation of Heraclitus’s view of rivers, entrenched in the accounts supplied by Plato (*Cratylus* 402a) and Aristotle (*Metaphysics* 1010a), represents Heraclitus as holding that no-one can enter the same river twice, because (like everything else) rivers are in a constant state of change, and are never the same river from moment to moment. Indeed Plato’s *Cratylus* claims that this belief in radical flux means that you cannot even step into the same river once, because there is no such stable entity as a river to step into. The stance of *Cratylus* implies that there are no criteria of identity for rivers, and raises the issue of what *Cratylus* himself could mean by “the same river,” unless his use of the phrase “the same river” was regarded as in quotation marks, or unless perhaps his remark was intended a self-undermining jest.

Yet even the view ascribed to Heraclitus by Plato and Aristotle raises the question of the criteria of identity for rivers, or for being the same river, a question considered further below. Certainly, if everything is in a state of flux, the criteria of identity for rivers in particular are going to be highly elusive. But before that question can be approached, it is worth asking whether Heraclitus did in fact adhere to the stance ascribed to him. Some recent writers have queried whether his stance included either the view that no one can step into the same river twice, or the related beliefs that everything is always changing (*panta rhei*), that nothing ever stays as it was, and that whatever exists does so on a momentary basis only.

Admittedly W.K.C. Guthrie maintained that “in fact, the extant fragments offer no challenge to the universal ancient view” (sc. of Heraclitus) (Guthrie 1962; Mourelatos 1974, 204), which is itself consistent with Heraclitus’ love of parading paradoxes. Yet, as Jyl Gentzler has more recently argued, the two river fragments widely recognised as authentic both use the phrase “the same rivers,” and are consistent with a different interpretation. On that interpretation, we really can step into the same river more than once, but not into the same waters, because the water in the river at any given place is constantly changing and therefore continually different. As Gentzler expresses these matters, “Heraclitus is saying that things are always changing in at least some respect, but, for all that change, may well remain stable in at least some other respect.” (This interpretation is placed within a question in her text, but the context implies that this is Gentzler’s preferred interpretation.)

Here are Gentzler’s translations of the two fragments that are widely regarded as authentic. They are numbered as in H. Diels and W. Kranz (1956). First, in the relevant part of fragment B12 Heraclitus states that “On those who enter the same rivers, ever different waters flow ...” In the other extant river fragment, B49a, what he says is that “We step and do not step into the same rivers, we are and we are not.”

While fragment B49a could indeed be held to fit (as Guthrie puts it) “the universal ancient view,” B12 is a different matter. For it strongly suggests that (on Heraclitus’ view) one *can* step into the same river more than once, but that the waters entered are constantly changing and ever different. There is in this respect constant change, but there is still the same river, whether because it has the same riverbed, or the same source, or the same destination, or some combination of all these. In other words, the very fact of constant change (in some respects) makes it possible for there to be elements of stability across time (in some other respects). It should be added that B49a is consistent with this interpretation, as also, differently, with “the universal ancient view.”

Stephen Aylward upholds similar conclusions in “On Stepping into Rivers: *Ontology in Heraclitus*” (Aylward’s italics). Aylward contests Guthrie’s “radical flux” interpretation of Heraclitus, and argues that, for Heraclitus, it is the soul that is constantly changing, rather than just everything, and rather than rivers. Rivers, like everything else, are governed by an independent *logos* (B2), and are not just their waters, constantly changing as these certainly are (B12). Thus, Cratylus was seriously mistaken in holding that “Heraclitean philosophy was committed to the claim that one cannot step into the same river even once” (Aylward, undated, but no earlier than 2007). Aylward seems right at least about Cratylus; for on Cratylus’ account

of Heraclitus, rivers are at best momentary and at worst illusory, whereas on Aylward's account they (or at least most of them) persist in existence across years and across centuries.

In what follows, I will adopt the interpretation of Gentzler and of Aylward and will treat Heraclitus as recognising talk of "the same river" (existing at different times), but as puzzled about the criteria of sameness, granted that continually different waters flow in rivers from moment to moment. Rivers are not momentary, but their flowingness makes the nature and basis of their identity problematic.

## 2. On Being the Same River

If Jantzler and Aylward are right, then Heraclitus could join the rest of us in wondering what it is to be the same river. All of us who use (or even talk about) fords tacitly assume that the same river can be traversed on different days, and all of us who use (or even speak about) bridges assume that the same river can be crossed on more than one occasion. But what are the criteria of sameness?

Having a determinate destination will hardly serve, as some rivers dry up seasonally, and at one place or another cease to flow as they enter a desert like the Gobi or the Sahara. Having a determinate source is also problematic; there are disputes about the source of the Shannon (some even claiming that it flows underground after first arising in Ulster, rather as the River Mellte does in the Brecon Beacons in Wales, but for a greater distance), while the source of the Nile was the subject of a long controversy. There again, some hillside streams (like those in a wood in which I often walk) flow from springs further or less far uphill depending on whether there has been recent rainfall.

Nor does having the same course or the same riverbed serve as at any rate the sole criterion of sameness. For some rivers, like the Yellow River and the Yangtze Kiang, often change their course after periods of flooding. It might be suggested that a disjunction or a conjunction of these possible criteria might suffice (same source, same course and/or same destination), until we consider whether the same river includes tributaries and distributaries, but at this stage the issue becomes even more perplexing.

Distributaries, such as the streams of the deltas of the Ganges and of the Nile, might seem to raise few difficulties. Yet if the Hooghly River, which Kolkata bestrides, is the same river as the Ganges, are the other distributaries (parts of) the *same* river as well, including the ones into which the mighty River Brahmaputra flows? The answer to such questions seems an arbitrary matter; but maybe the problem arises more because this delta is the delta of (at least)

two rivers, rather than one. If so, then perhaps all the distributaries of the Nile delta (to take a less problematic case) are simply parts of the river Nile.

Consider now whether tributaries are part of the river that they enter. When I was young, the longest river on Earth was held to be the Mississippi/Missouri, but this view depended on regarding the Missouri as the same river as the Mississippi, of which it is a tributary. Later the Nile came to be regarded as longer, given that its source is to be found in Uganda, and in one (or more) of the rivers flowing into Lake Albert. But is the White Nile, which has a much longer trajectory than the Blue Nile (joining it at Khartoum) to be considered the same river as the Nile below Khartoum, granted that most of the water in the latter river comes from the Blue Nile, and from Ethiopia? Are there three rivers at Khartoum, or two, or one? (One resident of Khartoum, of whom I recently asked this question, replied “Three, because they are all so different.”) Where the question is that of which is the longest continuous body of flowing water on Earth, it is convenient to hold that the White Nile and the Nile below Khartoum are the same river. But otherwise, the answer to these questions once again seems either indeterminate or arbitrary.

Certainly, other views can be taken about tributaries. Thus, Bedřich Smetana, when writing “*Má vlast*,” regarded the River Vltava (or Moldau) as terminating at its confluence with the Elbe, rather than becoming that river and flowing to the North Sea. Likewise, the River Ver, which flows from the Chilterns to a few miles south of St. Albans, is regarded as ceasing to exist when it joins the River Colne near Watford; and (for its part) the (Hertfordshire) Colne is regarded as completing its course as it flows into the Thames. And if, as some believe, the Thames once flowed (in prehistoric times) into the Rhine, there would still be no tendency to rename it “the Rhine” just because it was once a tributary of that river. Similarly, no one is inclined to call the five major rivers of the Punjab parts of the River Indus simply because they are all tributaries of that river (nor, come to that, to call its lengthy distributaries in the province of Sind parts of the River Indus just because they flow out of that river).

Here the comment could be made that very little turns on whether tributaries are part of the river that they flow into or are distinct, apart from the interest for participants in quiz programmes and for the readers of record-books interested in the question of which rivers are the longest in their countries or continents, or on Earth. For many purposes, such as the amount of chemical seepage flowing from tributaries via major rivers to the sea, or the scope for species of fishlike salmon or trout to travel from upstream rivers to the ocean, or back to the upstream rivers, it matters hardly at all.

It might be suggested in any case that if we adopt Wittgenstein's "family-resemblance" view of rivers, the above problems disappear. (For Wittgenstein's view, see *Philosophical Investigations*, Part I, paragraphs 65-71: Wittgenstein 1953). If, it might be said, a sufficiency of features is present, from among a larger set of relevant characteristics, then what is before us is undoubtedly a river. This approach, while attractive and enticing, hardly solves all the problems, as we would still need to know what makes some bodies of moving water *not* to be rivers, but to be canals, overflows, irrigation channels or aqueducts instead. Nor is this the only plausible account of sortal universal terms; a distinct theory would be that what is necessary is the presence of a disjunction of alternative features, and what is sufficient is a different but related disjunction.

Yet whatever view is adopted about what makes a river to be a river, the answer to that question barely begins to answer the question of what makes a stretch of moving water to be, or still to be, the *same* river. On the interpretation of Gentzler and Aylward, Heraclitus had much the same intuitive grasp of the concept of "river" as the rest of us, but remained puzzled about how to reidentify the same river. For it is not enough for a stretch of water to display (some of) the same cluster of features, or the same disjunction of characteristics, because these clusters or disjunctions could belong to a large number of other rivers (think of all those who thought they had found the source of the Nile, but erroneously; or of those who thought (many centuries earlier) that a river in Sicily was the same river as the River Alpheus that flows through Arcadia in the Peloponnese in southern Greece). Some kind of spatio-temporal continuity seems further to be required, but how to express this requirement remains elusive. However, there is seldom much practical significance turning on the issue of the identity of a river, apart from that of the chances of rowing or sailing down a given stretch and reaching a lake or the sea where a specific river has its mouth.

### **3. Rivers as Ecosystems; and the Systems We Need to Preserve**

For one other matter, however, the issue of what is involved in a river being the same river may be important, given the widespread agreement (which I am happy to endorse) that rivers are ecosystems (Encyclopedia Britannica 2007), together, for example, with woods, hillsides and cliffs. This is because ecosystems are held by many to have a good of their own, and to be capable of being harmed. But they can scarcely be held to have a good of their own, or to be capable of being harmed, if they have no clear criteria of identity (Sterba 1998), or if their criteria of identity fluctuate between observers with different interests or different specialisms (a circumstance which would also align the names of rivers with the conventionalist

view of the relation of names to objects named, the view eventually favoured by Socrates in the *Cratylus* (435b)). Even if some stretches of rivers are sufficiently stable across time for talk of “the same river,” and of a particular river-name, to be unambiguous, there will be no clarity about what counts as their good if for some the river consists of a main channel and the stream flowing furthest to reach it, and for others it consists of this channel and one or another tributary (or several tributaries), and for yet others it consists of this channel and the full set of its tributaries.

Certainly, there will be ways of damaging a river downstream from a given point, by (for example) pouring into it agricultural run-off or sewage. The damage will affect many of the creatures living in or around the stream, such as (for a stream in north-west Europe) the local micro-organisms, the water-weed, the fish, the dragon-flies and other insects, the herons and dippers and other birds, and the voles and other mammals that live in or beside the stream below that point; and also future creatures, at least until rainfall clears away the noxious effluent. Nor can it be denied that this range of creatures form a loosely inter-connected system, with indeterminate boundaries, which is why they, the waters of the river, and the gravel of its bed and banks, are jointly said to make up an ecosystem; nor that that ecosystem can be placed at risk of disintegration. It can further be agreed that, if the actions of those pouring effluents into the river could have been avoided, they are morally objectionable, because of the harm to these living creatures, and to any human beings that enjoy or use the river in one way or another.

But this does not mean that the river ecosystem is harmed in any way that does not reduce to the harming of the various creatures that are its living or its prospective living components. This would be like saying that blocking a road causes harm, or at least inconvenience, not only to the motorists, cyclists, wheel-chair users and pedestrians who were using it or hoping or likely to use it, but also to the local travelling public. For when we have included all the affected or potentially affected users or prospective users, there is no further community of road-related human beings to include among the actual or potential victims. To return to rivers, the suggestion that a river as an ecosystem can be harmed in itself becomes all the less credible if it is unclear which stream or streams comprise the river in question, or therefore where this ecosystem starts or finishes, or, there again, what is its extent as an ecosystem. Yet if a river (or anything else) lacks a good of its own, it is reasonable to adopt the view, for which Goodpaster has well argued, that it lacks moral considerability (or moral standing) (Goodpaster 1978).

In reflecting on ecosystems, we can fortunately set aside the widespread metaphorical use of “ecosystem” to signify any social constellation, sector, trade or organisation. The fact that some who use “ecosystem” in this metaphorical manner are not aware that their usage is metaphorical and become indignant when asked what bearing the ecosystems of their discourse have on ecology or wild nature, is beside the point. In this usage, the meaning of an ecosystem as a loose assemblage of geographically collocated living and non-living items is set aside, all connection with the natural world is abandoned, and nothing more than social assemblages remains. To make sense of ecosystems, we need to focus on the non-metaphorical meaning of “ecosystems” as employed in the science of ecology.

Historically, the term “ecosystem” was originally introduced by Sir Arthur Tansley (1871-1955) in 1935 in order to resist Frederic Clements’ view of groupings of plants as organic communities or as holistic organisms (Tansley 1935; Nash 1989, 57-58). While part of Tansley’s purpose was to reject the anthropomorphic implications of the term “community,” another element was to think of local associations of living and non-living beings without ascribing to these groupings organismic concepts introduced by biologists such as Clements, who wrote as if these groupings were themselves living beings with inbuilt tendencies of growth and maturation, and with a good of their own.

Tansley’s introduction of the concept of “ecosystem” was intended to avoid these associations. He would not have objected to the view that the creatures participating in ecosystems are often inter-dependent, and that the removal or destruction of some could often spell the decline or demise of many of the others. Yet ecosystems were, for him, associations of living and non-living organisms, clustered around some natural feature such as running water, hillsides, inter-tidal zones or cliffs. They were not organisms compounded out of inorganic natural features and of individual creatures. There was, in each case, some kind of relatively persistent system to their mode of association, but these systems lacked the kind of organised living structure that makes it natural to speak of their flourishing or their being harmed.

It is ironic that later generations have sometimes reintroduced into ecosystems the holistic features that Tansley was seeking to deselect, with ecosystems sometimes being regarded as possessed of moral standing, alongside human beings, other animals and plants. Holders of this stance (or ecocentrists) might claim that this tendency reflects an increased awareness of the complex intricacy of ecosystems. Yet alongside this awareness, there is also an increased awareness of their contingency and fluidity, as ecosystems are widely affected by



climate change and associated changing patterns of weather. In view of all this, it is unlikely that, ninety years on, Tansley would modify his concept of “ecosystem” in a more organismic direction.

Rivers are clearly a case in point. The ecosystems of chalk streams are worth preserving for the sake of the creatures that they have long supported, as well as for the rare possibilities that they facilitate for humanity (such as the spring-fed water-cress beds of the village of Park Street, just south of St. Albans in Hertfordshire). Yet even Heraclitus might have been surprised to find that the continuing flow of the waters of these streams, different from moment to moment as they have been for many generations, has in some cases dried up for months together, and that those who step into their courses can in some cases exit dry-shod (Pearce 2014).

There again, many rivers have been straightened, canalised, or (in some places) put into culverts, and their ecosystems considerably modified, making them barely recognisable as the same river. In some cases, this has made flooding more frequent. Accordingly, attempts are being made in many places to “re-wild” some of these rivers by reintroducing the kinds of undulations and meanderings characteristic of previous epochs, not least to slacken the flow of their currents, and reduce the risk of floods downstream. Greater biodiversity is likely to emerge, together with novel and barely recognisable ecosystems (Rewilding Britain 2023).

Elsewhere the melting of glaciers has led to increased river-flow of rivers in India such as the Ganges (Nandi 2019). In other countries again such as Bolivia, where some glaciers are close to exhaustion, the flow of rivers is in places becoming inadequate to supply water to the lands of local farmers, and to cities such as La Paz (Martinez, 2017). Heraclitus was doubtless familiar with floodwaters but could well have found the diminished and sometimes empty glacier-fed rivers of Bolivia stretching his claim that different waters continually flow in our familiar rivers.

Altogether, rivers seem to have very loose and various criteria of identity, rather like flames, like storms, and like epochs, even though it still makes good sense to speak of “the same river.” So loose are the criteria that little sense is made by speaking or thinking of the good of a river as an ecosystem, as opposed to that of riverine communities, human or nonhuman (Encyclopedia Britannica 2007).

Yet a great deal of difference can be made when plans are formed (by local authorities, by water authorities, by governments, or, in the case of international rivers like the Danube, the

Euphrates and the Mekong, by groups of riparian countries) for enhancing their flow and the lands that they water. This can be done sometimes through flood-defences, sometimes through dams (but preferably not through mega-dams, counterproductive as they often prove to be (Asher 2018), and sometimes through re-wilding. When this is contemplated, it is not the river as an ecosystem that the relevant agents should be seeking to benefit (because of the vanishingly elusive nature of this concept), but the affected communities, whether human or nonhuman, and whether they form parts of the current ecosystem of the river or not but stand to be benefited or harmed through these strategies. The word “communities” (as used in the last sentence) admittedly has different (but related) meanings, when used of human (social) or instead of non-human (ecological) communities (Passmore 1974, 116; Attfield 1991 [1983], 157), yet both are relevant when affected groups are being identified.

Nevertheless deforestation, it should be acknowledged, can have much more extensive effects than on the communities (human or nonhuman) of a forest or of its principal river. When major forest systems, such as boreal forests, or the forest that has come to be known as “the Amazon,” are deforested beyond a certain extent, worldwide weather systems can be severely impacted, and there is even a risk of a chain effect extending to other regional systems such as the ice-caps of West Antarctica, Greenland and the Arctic (Caldecott 2022). Yet there is little inclination to represent these ice-caps or ice-fields as eco-systems, not least because large parts of them appear to be lifeless. It is not ecosystems that are crucial in themselves, as opposed to their living constituents; yet there are systems that need to be preserved, in the form of regional systems, the undermining of any of which could possibly generate a domino effect among several of the others (Lenton et al. 2012; Lenton et al. 2019; Caldecott 2022).

### **Some Conclusions**

So, it should be recognised that the conclusion that ecosystems lack a good of their own has no tendency to show that strenuous national and international efforts should not be made to preserve the Amazon rainforest. It should also be borne in mind that what needs to be preserved is not just the area of forest watered by the Amazon and its tributaries, but also the adjacent areas watered by rivers such as the Orinoco, and adjacent afforested high ground such as the Guyana Highlands, including parts within the watershed of the Amazon and parts outside it. It should also be borne in mind that at least one river, the Casiquiare River in Venezuela, flows some of the time towards the Amazon and some of the time towards the Orinoco, which means that it is unclear where the watershed of the Amazon and its tributaries is actually to be found.

But there is no implication that the rainforest of Venezuela and of the Guyanas is any the less a part of the regional system of forest that needs to be preserved and protected than the other parts. However, it is best not to think of this system as the ecosystem of the River Amazon, but as a crucial regional system of which “the Amazon” has come to be the name.

The boreal forests comprise another such regional system. But in this case, there is no inclination to represent them as a single ecosystem, because they are to be found in three distinct areas, North America, Scandinavia and Siberia. It is the entire regional system that needs to be protected and preserved, rather than particular ecosystems, just as is the case with the regional system of “the Amazon.” Both of these systems (like other forests such as those of central Africa and of Indonesia) need to be preserved because of their crucial importance to humanity as a whole and also to all the nonhuman inhabitants and species of our planet, as well as to the inhabitants and species of the Amazon region. Preserving both the tropical rainforests and the boreal forests of our planet has also become urgent, because human actions (and perverse human policies and practices) are increasing the risk of these systems reaching their tipping-points, and of one or another triggering a chain-reaction in which several other regional systems could become implicated as well (Lenton et al. 2012; Lenton et al. 2019; Caldecott 2022). Some of the ethical implications have been discussed by Rupert Read, and by Attfield (Reed 2022; Attfield 2024).

Thus, it is not because it comprises an ecosystem that “the Amazon” matters; this name has become the designation of a crucial regional system, as well as remaining the name of a river, the watershed of which occupies only part of the regional system that carries the same name. The Amazon as a river and as an ecosystem, I have argued, does not have a good of its own, not least because ecosystems lack clear criteria of identity. The same applies to rivers in general, which (like flames, storms and epochs) can be identified and re-identified, but only with considerable difficulty, because of the diversity of the relevant criteria and the lack of agreement about them. This, as we have seen, may also be the problem that Heraclitus brought to light, particularly if we set aside the universal classical interpretation of his river fragments, and adopt the interpretation of Gentzler and Aylward instead.

Whether Heraclitus would have included these conclusions within the shared (and universal) “logos” that he upheld but believed most people to disregard (Diels and Kranz 1956, B1, B2; Johnstone 2014) cannot any longer be securely discerned. But as the coast to the west of Ephesus (Miletus Bay) gradually silted up, he might well have recognised some of the complexities and the resulting issues discussed here with regard to the nearby River Caÿster,

more recently the Küçük Menderes (Little Meander) River, and the more celebrated River Meander, more recently the Büyük Menderes (Great Meander) River, as they changed and extended their courses on the way to the Aegean Sea.

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