

## FORUM

MEDIZINHISTORISCHES JOURNAL 55, 2020/3, 290–293

DOI 10.25162/MHJ-2020-0011

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# Quantitative Analysis and Plagued Assumptions: A Response to Mischa Meier<sup>1</sup>

In his response to our *PNAS* paper, Mischa Meier is critical of our quantitative approach. While he is aware that authors Mordechai and Eisenberg published a paper in the history journal *Past & Present* (*P&P*) focusing on a qualitative evaluation of the evidence, he critiques only the *PNAS* paper because of its methodology and media coverage. This misses four key points. First, the articles complement each other by representing two approaches to the same questions about the impact of the Justinianic Plague (JP). Second, science articles are the main link between academia and the media. Third, *PNAS*' largely scientific readership will not engage in contextualized reading of historical sources. And fourth, *PNAS* articles must conform to a rigid format.

A key feature of science articles is their Supporting Information (SI), an appendix that contains methodological discussions and the data. Reading the SI is essential for a productive discussion. Although Meier read our main paper, he never refers to or mentions our article's 31-page SI, which would have provided answers to several of his "unanswered" questions (e.g. on pollen) and content that would resolve some of his concerns (e.g. compare his footnote 24 to *PNAS* SI: 4–6). It therefore seems that Meier did not read it.

Throughout his review, Meier adopts a conventional historian's stance and is uncomfortable with our collaborative interdisciplinary approach. We agree with his assertion that "the quantitative approach cannot replace a qualitative analysis" (15–16) – but the *P&P* paper (and an app in development<sup>2</sup>) features exactly that analysis! Skepticism towards "scientific" (quantitative) methods is not surprising for a late antique historian, although Meier is far less skeptical towards quantitative data that agrees with his argument, e.g. when using Peter Sarris' work (here and in Meier 2016; Meier 2005). Yet it appears that Meier neither examined Banaji's underlying data (upon which Sarris based his work) nor engaged with our own critique of that data and its interpretation. E.g. in his response, Meier cites Banaji 2007 as proof for data showing that "people in Egypt be-

1 The editors limited the response to ca. 1000 characters.

2 <https://cchri.princeton.edu/justinianic-plague-app>

gan to conclude long-term leases in the middle of the 6th century” (11). Yet Banaji does not have a “mid-century” category and his data show that indefinite leases begin in the late 4th c., and pick up in the late 5th c. Similarly, Meier does not seem to be aware of the importance of annual resolution in our datasets. How else to understand his arguments that group legislation again over several decades (9) or build an argument on the weak low-resolution (half-century) measure of Egyptian leases (11)? Here and elsewhere Meier shows he is uncritical of his own evidence and has not read our critiques carefully.

On other occasions, Meier uses a completely unfounded quantitative approach, e.g. when he considers “plausible” the death of 25 % of eastern Mediterranean people (note 8), a number he supports with absolutely no evidence. He could just as easily have said 1 % or 50 %. In his aDNA and pollen sections, Meier attempts to engage with our methodology and data, but offers no useful critique. He seems not to understand the methods and therefore simply rejects the analysis. Meier’s remark on “high lethality” (15) reveals his unfamiliarity with plague ecology, epidemiology, and evolution – complex issues that require collaboration beyond the humanities and social sciences. Plague was acute on an individual basis in late antiquity – but the key question is transmission. Regarding the “attenuation” (gene decay) Keller et al (2019) identified, the point is that its significance is uncertain, as we stressed. We do not argue for minimalism, but instead show that uncritical assumptions and narrow understandings of the evidence and of plague inform the maximalist narrative that late antique plague killed many millions.

Meier’s review ultimately offers few new ideas and no new evidence. Old literature is reiterated without acknowledging the problems we raised (e.g. circular thinking in the sources of Benovitz 2014; the low number of, and lenient criteria for, “mass graves” in McCormick 2015–2016 – critique of both in Mordechai and Eisenberg 2019). Problematically, Meier uses the entire last quarter of his review to rehearse his own argument, again, on the cultural and religious changes he associates with the JP (compare Meier 2016: 283–284 with Meier 2020a: 16–17; also Meier 2003, 2005, 2020b). His argument, however intriguing, is unrejectable and unprovable. Meier implies that by deploying quantitative methods we ignore the cultural historical aspects of the impact of the JP. That clearly misconstrues the purpose of the *PNAS* article. We do not attempt to assess the cultural effects of the JP. Rather, we challenge how scholars have reached conclusions about the JP’s demographic and other impacts.

Meier’s COVID-19 comparison is timely but facile (e.g. its “long-term effects”: 22) as little connects the two outbreaks. The point about the absence of epidemic references in cookbooks<sup>3</sup>, romance<sup>4</sup> and crime novels<sup>5</sup> (6) is irrelevant (and incorrect, as the links show). Is it really that unreasonable to expect that rich contemporary literary genres such

3 <https://www.amazon.com/Coronavirus-ebook-Cooking-through-Quarantine-ebook/dp/Bo8668KWR5>

4 <https://www.amazon.com/Quarantine-Cooking-Romance-Quarantine-ebook/dp/Bo86P8Q3LS>

5 <https://www.amazon.com/COVID-19-Crime-Castleman-ebook/dp/Bo89FM3H6R>

as hagiography, sermons and responsa would contain more than a handful of plague references if plague killed tens of millions in the Mediterranean?

To conclude, by disregarding our key finding that all the independent datasets we have analyzed – however flawed – point at the same conclusion, it appears that Meier believes plague must have an effect because it is “The Plague” and, therefore, by its existence and definition *must* cause historical change. This is an uncritical position that starts with an assumption and searches for correlations to make the case. We suggest that Meier and other interested scholars make use of the publicly available interdisciplinary datasets that we collected (or develop their own) to ask new questions about the JP or other topics in late antique history. Returning to the same old sources and refuted arguments does not move the debate forward.

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