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Gender, Institutional Inequality, and Institutional Diversity in Archaeology Articles in Major Journals and *Sapiens*

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Abstract

Studies in the sociopolitics of archaeology have shown patterns of inequality in publishing. Because this inequality affects the richness of perspectives on the past, the extent of unevenness requires continual documentation. This article explores gendered and institutionally based patterns of authorship in prominent archaeology journals, archaeology papers in general science journals, and *Sapiens*, a public-facing web magazine, from 2016 to 2021. We find that the representation of women is similar across these two types of journals, for authors both in the United States and abroad. Men still publish significantly more than women though the gap is narrowing due to the publication activity of recent PhDs. Using a large database of PhDs as a baseline for comparison, we find that women publish less in these venues than expected, resulting in an imbalance. Some archaeology programs have a larger presence in journal publishing than others, but this imbalance is not as pervasive as what has been observed in hiring practices. Archaeology journals exhibit healthier measures of diversity, compared to *Science*, in terms of the institutional affiliation of authors.

Resumen

Estudios sociopolíticos de arqueología han demostrado patrones de desigualdad en publicaciones académicas. Dado que esta desigualdad afecta la riqueza de perspectivas sobre el pasado, el alcance de la desigualdad necesita documentación continua. Este estudio investiga patrones de género y afiliación institucional de autores en revistas arqueológicas como *American Antiquity* y revistas más generales como *Science* de 2016 hasta 2021. Entre otras cosas, encontramos que la cantidad de autoras es semejante en estos dos tipos de publicación. Sin embargo, los hombres publican significativamente más que las mujeres. Usando un base de datos de arqueólogos con doctorados como base de comparación, encontramos que las mujeres publican menos de lo esperado, lo cual indica un desequilibrio. Con respecto a instituciones, algunos programas académicos de arqueología tienen una presencia desproporcionadamente más grande en revistas académicas, lo cual también se encuentra en subvenciones para investigaciones. En el primer estudio de este tipo, nuestra investigación descubre que revistas académicas de arqueología tienen cantidades proporcionables a la diversidad con relación a la afiliación institucional de autores.

Keywords: inequality; archaeological sociopolitics; gender; institutional prestige; journal publishing

Palabras clave: desigualdad; sociopolítica arqueológica; género; prestigio institucional; revistas académicas

We live in an increasingly unequal world. Recent events within and beyond archaeology, such as Black Lives Matter and breaking the culture of silence regarding sexual harassment, have not only highlighted inequality but also engendered meaningful recommendations for progress (d'Alpoim Guedes et al. 2021; Flewellen et al. 2021; Meyers et al. 2018; Voss 2021a). Today, as in the past, there are serious repercussions of rising inequality (Hung 2021; Paynter 1989; Stiglitz 2012; Wilkinson and Pickett

2009). The COVID-19 pandemic underscores this point by exacerbating health disparities for the working class and disadvantaged people of color (Whitehead et al. 2021). Systematic research on inequality in the practice of archaeology began four decades ago (Baker et al. 1990; Gero et al. 1983; Shanks and Tilley 1988; Tilley 1989a, 1989b). This research has shown that inequality takes many forms, including but not limited to underrepresentation of and obstacles to participation for people of color, Indigenous groups, and those minoritized based on sexuality, disability, and more (D'alpoim Guedes et al. 2021; Franklin et al. 2020; Heath-Stout 2020a).

In this article we focus on gender inequality and institutional inequality. Gender inequality in archaeology manifests in lower pay for women (Reyman 1994; Zeder 1997:74–82), longer time to promotion (Reyman 1994), imbalance in publishing, less grant money (Bowman and Ulm 2009; Goldstein et al. 2018; Kramer and Stark 1988; Yellen 1994; Zeder 1997:172–174), fewer citations (Hutson 2002), unequal access to fieldwork opportunities (Gero 1985), sexual harassment (Voss 2021a, 2021b), and other forms of a chilly climate along career paths (Overholtzer and Jalbert 2021; Wylie 1994). Institutional inequality has been less well documented in archaeology but includes the outsized influence on academic hiring wielded by certain graduate programs (Hutson 1998; Speakman et al. 2018¹).

We participated in a 2022 SAA symposium on publishing dynamics, organized by Jess Beck and Rowan Flad (see Beck et al. 2023), where we explored gender and institutional inequality by looking at data on publishing in major journals. In the realm of publishing, the chief consequence of gender and institutional inequality is the impoverishment of discourse. When certain voices are systematically underrepresented, the discipline as a whole suffers from a lack of disparate perspectives and expertise. Such limitations on multivocality, on who contributes to the base of knowledge, hinder a variety of agendas, such as antiracism, decolonizing the discipline, and disrupting epistemic injustice (Atalay 2006; Conkey 2007; Flewellen et al. 2021; Fulkerson 2017; Fulkerson and Tushingham 2019). The inseparable connection between knowledge and power means that the norms surrounding prestige (Beck et al. 2021) and systems of rewards will always channel academic discourse in certain directions and favor certain positions (Bourdieu 1988; Foucault 1972). Even so, documenting inequality promotes critical reflection on how to make the discipline more equitable.

Though gender inequality and institutional equality are interrelated in ways we discuss later, we begin by treating them separately. The study of gender imbalance in archaeology journals gained prominence 30 years ago (Bardolph 2014, 2018; Beaudry and White 1994; Bradley and Dahl 1994; Claassen et al. 1999; Fulkerson and Tushingham 2019; Heath-Stout 2020a, 2020b; Rautman 2012; Stark et al. 1997; Tushingham et al. 2017; Victor and Beaudry 1992). Our article adds to this literature in four ways. First, we explore new baseline data (completed PhDs) for assessing imbalance in gendered publication and evaluating the professional age of authors. Second, we compare gendered publication in three outlets: archaeology-specific journals, archaeology papers in general science journals, and a public-facing venue (*Sapiens*). Third, we assess differences in gender representation in publications from authors affiliated with US institutions versus non-US institutions. Fourth, we examine gender balance in the prominence of single-authored papers and the number and gender of coauthors.

Regarding institutional inequality, we assess the degree to which institutions are overrepresented in terms of the number of papers published and grants received by their faculty. Another line of inquiry, unique within archaeology as far as we know, includes an assessment of whether some journals tend to be more exclusive in terms of the diversity of institutions represented by their contributors. A final question regards the degree of institutional overlap among journals. More specifically, we wanted to see whether the set of institutions well represented in major peer-reviewed journals was different from the set of institutions well represented in the more public-facing, non-peer-reviewed periodical *Sapiens*.

In the last few years, movements have crystalized and steps have been taken along several fault lines of inequality in archaeology (d'Alpoim Guedes et al. 2021; Flewellen et al. 2021). Tensions within publishing—who profits, who is excluded, who is exploited—and how to mitigate them are also coming into clearer focus (Beck et al. 2023). Although the history of the field conditions us to be cynical, we began this study with the optimism that there could be stories of improvement in who gets published in major journals. The following pages take stock of improvements and shortcomings, suggest interpretations, and pose new questions. Among other things, we find that gender equity in publishing

remains unbalanced but has improved due to publishing by recent PhDs in tenure tracks. We also find intriguing discrepancies in who writes as a single author and in the genders of coauthors. Institutional inequality is less dominant than expected from hiring practices, and journals feature relatively diverse sets of institutions.

Methods

This study covers publications from 2016 to 2021 in three types of periodicals: (1) major peer-reviewed, archaeology-specific journals (*American Antiquity* [AQ], *Latin American Antiquity* [LAQ], and the *Journal of Archaeological Research* [JAR]); (2) archaeology papers in high-prestige general science journals (*Science*, *Proceedings of the National Academy of Sciences* [PNAS], and *Science Advances*); and (3) the archaeology section of a public-facing web-based magazine, *Sapiens* (see Supplemental Tables 1 and 2). We chose these three types of publication strategically to see whether there were different patterns in archaeology publishing within high-prestige general science journals as opposed to major journals that focus solely on archaeology and a venue with broad readership (*Sapiens*). We chose AQ and LAQ for their broad regional coverage and to get a sense of macro-regional differences: LAQ represents scholarship in Latin America, whereas AQ represents work in the rest of the world, though with a strong focus on archaeology in the United States. We include JAR because its editors solicit articles (as opposed to voluntary submissions in the five other academic journals), and we wanted to see what effects this might produce (see also Heath-Stout 2020a:421). For journals focusing on smaller regions or non-peer-reviewed venues, several studies (Bardolph and Vanderwarker 2016; Fulkerson 2017; Fulkerson and Tushingham 2019; Tushingham et al. 2017) found, among other things, that women and compliance archaeologists publish more often in nonrefereed venues and participation in conferences exceeds peer-reviewed publication rates. Factors responsible for less engagement in refereed publications (and grant submissions; Goldstein et al. 2018) include job settings; leaky pipelines; family commitments; women shouldering larger teaching loads, service burdens, and other hidden labor; perceived microaggressions in peer review; and mentorship lacunae.

We chose the 2016–2021 range because it is recent and updates previous studies, many of which stop near the beginning of this range (e.g., Bardolph 2014; Fulkerson and Tushingham 2019). For AQ, we included 2022 while revising this article to follow a trend of publications by recent PhDs. Though all seven periodicals are based in the United States, these journals have an important international reach given that authors based outside the United States make up the majority in four of the seven journals. In total, 47.7% of all first authors are affiliated with institutions outside the United States (see Table 1). For each journal, Table 1 provides three bibliometric scores (impact factor, h-index, and SCImago Journal Rankings), each essentially tied to how much they are cited. Though *Science* and *PNAS* have much higher scores than, for example, AQ, Beck and coauthors' (2021) survey shows that archaeologists perceive archaeology-specific journals such as *Antiquity* and AQ to be more important than *Science* and *PNAS*.

For AQ and LAQ, we included articles, reports, and forums in our database because all three are substantial in terms of length, compared to the much shorter book reviews and comments. For the general science journals, we included most articles dealing with humans in the past. For *Science* and *Science Advances* we filtered using “archaeology,” and for *PNAS* we sifted through articles listed under the “anthropology” topic. The resulting sample included several papers whose first authors were geneticists, ecologists, and other researchers not traditionally considered archaeologists. From *Science*, only “Reports” and “Research Articles” were included. From *PNAS*, only “Research Reports” were included. *Sapiens* publishes newsworthy pieces for a more general audience. Its authors consist of scholars as well as journalists. For *Sapiens*, we included all articles that the magazine itself placed in the “Archaeology” tab. For recurring columns in *Sapiens*, each columnist was credited with a single *Sapiens* publication. For each publication in all seven periodicals, we recorded, when possible, the name, gender, and institutional affiliation of the first author; number of authors; title; number of pages; publication year, volume, and issue; and publication type. We classify institutional affiliation into five categories: (1) university, (2) museum, (3) private sector, (4) government, and (5) tribal agency (journalists writing for *Sapiens* are discussed separately). Given our lack of familiarity with

Table 1. Bibliometric Scores and Gender Information for Each Publication.

Journal	H-index	SCImago Ranking	Impact Factor	% Non-US Authors	Papers by Women	Papers by Men	% Papers by Women	Papers by US Women	Papers by US Men	% Papers by US Women
<i>Science</i>	1229	14.589	47.728	73.7	18	35	34.0	3	12	20
<i>Science Advances</i>	178	4.586	14.140	64.2	37	53	41.1	10	24	29
<i>PNAS</i>	805	4.184	11.200	62.2	70	99	41.4	26	39	40
<i>AQ</i>	82	1.249	1.961	16.7	87	145	37.5	77	117	40
<i>LAQ</i>	43	0.673	0.960	57.3	120	133	47.4	56	52	52
<i>JAR</i>	58	1.867	4.364	35.9	27	37	42.2	10	24	29
<i>Sapiens</i>	n/a	n/a	n/a	46.4	82	70	53.9	41	41	50

many foreign, non-university institutions, we were not able to classify many authors outside the United States and Canada. For this reason, we restrict our analysis of institution type to the United States and Canada. Using the system of tiered rankings developed by Speakman and coauthors (2018), we further subdivided universities into seven tiers. Tiers 1 through 6 consist of universities with a PhD program (tier 1 contains universities with the most success in placing PhDs into tenure-track jobs, tier 6 contains universities with the least success, tiers 2 through 5 represent gradations in between), and tier 7 consists of universities without a PhD program.

We use completed dissertations as a baseline for comparison with publication rates. In other words, we contextualize the proportions of publications by men and women with the proportions of PhDs received by men and women. The parallel hinges on the idea that most dissertations are produced in an academic context (as opposed to a compliance archaeology context), just as more than 80% of the articles in major peer-reviewed journals are written by academic archaeologists (Fulkerson and Tushingham 2019:388). PhD data also enable calculation of authors' professional ages (by subtracting the date of earning the PhD from the date of publication). By far the largest source of completed archaeology dissertations is the American Anthropological Association's yearly *Guide to Anthropology Departments* (see Supplemental Tables 3 and 4). Data from the *Guide* have two major shortcomings, both of which can be mitigated. First, many authors received degrees from non-anglophone institutions but the *Guide* lists mostly anglophone institutions. Our best solution to this problem is to narrow the scope to dissertations awarded by US institutions and journal articles written by authors based at US institutions.

The second major shortcoming of the *Guide* data is that the annual lists of dissertations are incomplete. Anthropology departments self-report completed PhDs to the *Guide*, and in the most recent editions of the guide, fewer institutions than in the past submitted information on completed degrees. This shortcoming can be seen in Figure 1a, where the total number of dissertations reported per year begins to decline around 2005. We mitigated this shortcoming for the years 2011 and more recently by using data from the National Science Foundation's National Center for Science and Engineering Statistics (NCSES) Survey of Earned Doctorates. When compared to *Guide* data (see Supplemental Table 4), the NCSES survey grossly underrepresents the number of archaeology PhDs prior to 2008, but by 2011 the NCSES survey reports more doctorates than can be found in the *Guide*. Therefore, our database of PhDs consists of *Guide* data up to and including 2010 and NCSES data from 2011 onward. The question remains as to the cutoff date for completed dissertations in this study: 2015, which represents the beginning of our run of journal data, or 2021, representing the end. We proceeded with both PhD cutoff dates: 2015 and 2021. From 1976 to 2015, our database contains 3,574 gender-identified dissertation authors from US institutions (see Supplemental Table 3). From 1976 to 2021, our database includes 4,301 gender-identified dissertation authors from US institutions. We recognize that some authors in our 2016–2021 publications database received their PhDs before 1976 (or do not have PhDs), but we believe our 3,574/4,301 dissertations provide a strong sample.

Following several similar studies, we used first names to identify gender, and in cases where gender was not clear from the first name (androgynous names, unusual names, names in languages not familiar to us), we went online to gain additional information about gender. We recognize that this method of gender assignment suffers from several disadvantages (Bardolph 2014:526; Fulkerson and Tushingham 2019; Heath-Stout 2020a:410). It follows a binary system and therefore incorrectly categorizes non-binary authors. Of the 1,028 publications in our study, we excluded 15 because gender was not clear. Alternative methods of gender identification such as survey-based research (e.g., Heath-Stout 2020a), in which respondents self-report gender, resolve this problem, although surveys often run the risk of nonrepresentative samples due to self-selection (Heath-Stout and Jalbert 2023). Institutional affiliation allows for assessment of an author's occupational context (academic, museum, etc.) as well as country. In this study, we reduced country to United States or non-United States.

To summarize our methods for the analysis of gender, we were able to explore gender and how it is linked with professional age, type of institution, and, to a limited degree, nationality. Our approach to gender therefore expands beyond a single-issue analysis, though we regret that our database does not allow us to intersect gender with sexuality, ethnicity, and class. A shortcoming of not being able to include these aspects of identity is that this article cannot address the fullest range of inequalities.

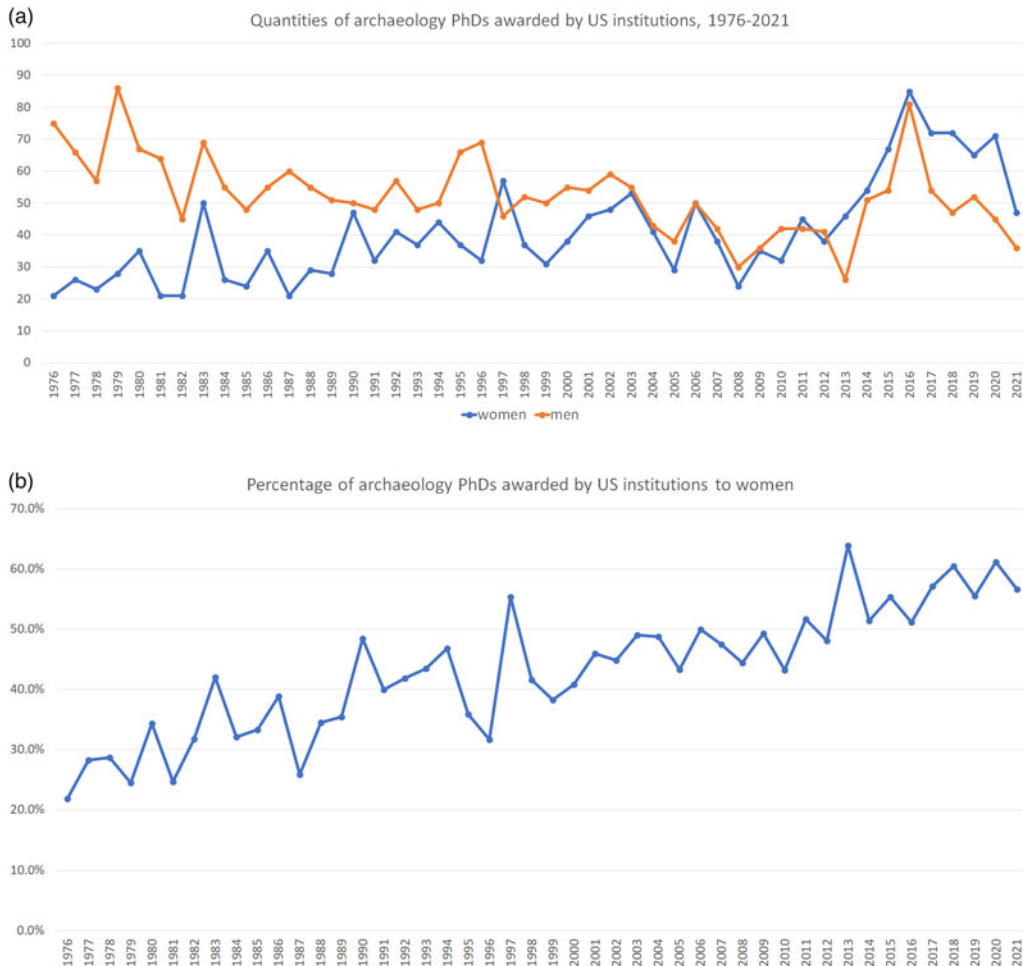


Figure 1. (a) Quantities of archaeology PhDs awarded by US institutions to men and women by year; (b) percentage of archaeology PhDs awarded by US institutions to women.

Alas, we do not address the impact of racism, ableism, heteronormativity, and other forms of discrimination on research productivity. Nevertheless, recent investigations of gender in the practice of archaeology, such as the question of why fewer women apply for senior-level grants (Goldstein et al. 2018) and the prominence of men and women in lab versus field projects (Heath-Stout and Jalbert 2023), succeeded without access to data on sexuality, ethnicity, or class.

For information on grants, we used the publicly available spreadsheet of awards from the National Science Foundation (NSF) granted under the auspices of Archaeology Program manager John Yellen. Though the vast majority of these awards are indeed from the Archaeology Program, other programs include Data Infrastructure, Biological Anthropology, Archaeometry, and Major Research instrumentation. We considered 1,123 awards granted from 2010 to 2021. We use a larger range of years than for publications (2016–2021) because many of the publications from 2016 to 2021 result from grants acquired earlier than 2016.

Gender Proportionality

Of the 1,013 papers in our database, women as lead authors published 441 (43.5%) and men published 572 (56.5%). This result is somewhat misleading because women's publishing is boosted by the inclusion of *Sapiens*, whose outreach purpose distinguishes it from the other six publications. Table 1 and

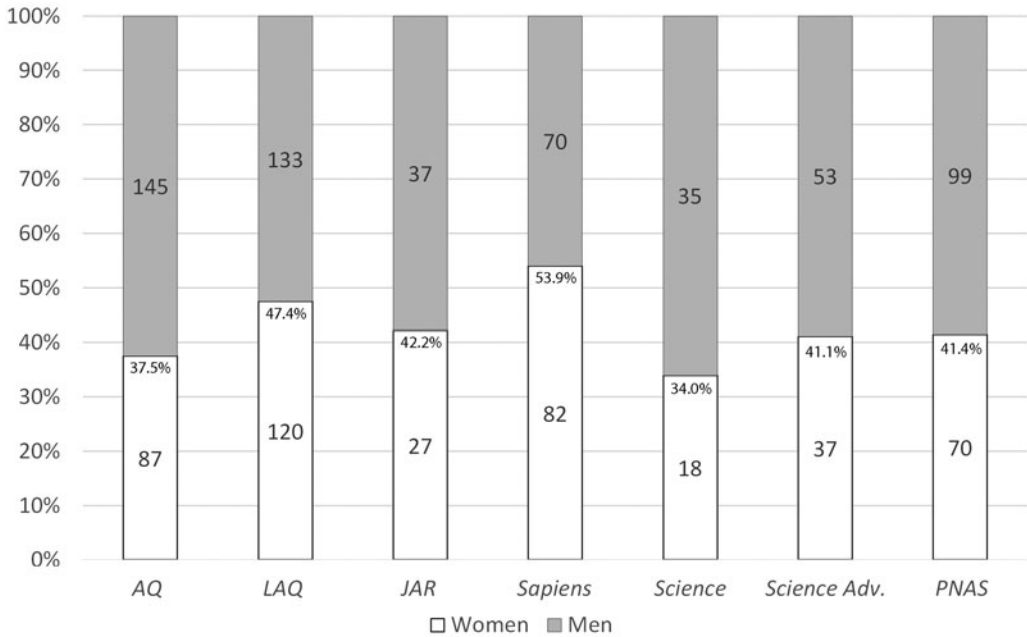


Figure 2. Quantities and percentages of articles by men and women first authors in the seven periodicals under study.

Figure 2 show that *Sapiens*, which features both journalists and archaeologists, stands alone in having greater than 50% women as first authors. If we remove journalists, of whom 61.8% (21 of 34) are women, the percentage of women authors in *Sapiens* drops slightly, from 53.9% to 51.7%. The higher proportion of women in *Sapiens* aligns with other research that shows greater female participation in non-peer-reviewed venues (Fulkerson and Tushingham 2019). These data may suggest that women archaeologists engage more often in popular dissemination. Interestingly, only 35% (7 of 20) of the authors who publish in both *Sapiens* and one or more of the six academic journals are women.

If we focus only on the six academic journals, the percentage of female first authors drops to 41.7% (Figure 2). Previous studies have shown that lower numbers of publications by women result not from “sexist bias in peer review” (Heath-Stout 2020b:135) but from fewer submissions from women (Bardolph and Vanderwarker 2016; Beaudry and White 1994; Rautman 2012; see also Goldstein et al. [2018] regarding grants). In an historical context, 41.7% authorship by women in academic journals represents a small shift toward parity (see also Rodríguez-Álvarez and Lozano 2018), given that Bardolph’s data on peer-reviewed journals from 1990 to 2013 exhibit a 29% first-author rate for women and Fulkerson and Tushingham’s data from 2000 to 2017 show a 27% first-author rate for women.

Notably, the percentage of articles first-authored by women in AQ—37.5%—has increased after remaining stuck at about 25% for nearly five decades, from 1967 to 2013 (Victor and Beaudry 1992; Bardolph 2014). We believe that the factors underlying this jump are critical for understanding changes in equity. We therefore dove more deeply into AQ, adding the year 2022 and going onto the internet to find the PhD degree year for every woman first author (many authors were not in the *Guides*). The percentages of women first authors per year from 2016 to 2020 range from 31% to 36% but increase to 53% and 41% in 2021 and 2022, respectively. We propose that the jump from 25% to 37.5% has to do with three factors. First, beginning in 2013, the number of women receiving PhDs increased notably, permanently overtaking the number of men receiving PhDs in archaeology (see Figure 1). Second, recent PhDs (which we define as earned in 2010 or later) make up a very large share of the 87 papers in AQ with a woman first author from 2016 to 2021. Specifically, in the 85 (of 87) papers for which we located biographical information, 55 (65%) first authors received

their PhD in 2010 or later (or had not yet completed the PhD at the time of publication). Thus, professional age matters. Third, beginning in 2010, 50% or more of new faculty positions in archaeology went to women as compared to the 40% share from 1990 to 2009 (Speakman et al. 2018:Figure 1b). Given the need for tenure-track faculty to publish in major journals, the boost in women in tenure-track positions in the first half of the 2010s likely resulted in more AQ submissions by women in the latter half of the 2010s. Indeed, many of the papers were written by assistant professors. These findings suggest that, despite leaks caused by sexual harassment and other factors, there is indeed a growing pipeline of women from PhD programs to the pages of major journals and to faculty positions. Though data presented by Bardolph (2014:530) suggest that the gender of the editor of AQ prior to 2013 has no effect on the gender of authors, it is worth noting that the two most recent editors are both women, representing the first episode of back-to-back women editors since the 1980s.

Regarding the institutional setting of the authors in this study, universities employ the vast majority (91.3%) of those situated in the United States and Canada. There is a small amount of variation in the amount of university representation from journal to journal. The percentage of university-affiliated authors in AQ increased from 74% in the span between 2000 and 2017 (Fulkerson and Tushingham 2019:Figure 5) to 87% in the span between 2016 and 2021. The next most common institutional settings are museums (4.2%, dominated by the Smithsonian) and the private sector, comprising research centers (2.3%) and CRM firms (0.9%). Women in this study are about as likely to work in universities as men (93% versus 90%). Regarding the tiered rankings of universities with PhD programs, authors show a tendency to work at higher-ranked institutions, though this tendency is not strong. A substantial proportion of papers (27.7%) come from authors at universities without a PhD program. Women publishing in this study are just as likely as men to work at higher-ranked universities and lower-ranked universities ($\chi^2 = 1.27$, $p = 0.94$, $df = 5$). In sum, the women and men who publish in the journals examined in this study essentially work at the same types of institutions.

Researchers across a variety of fields have investigated the impact of the COVID-19 pandemic. Surveys have found that women in academia, particularly those with young children, lost a significant amount of research time (Myers et al. 2020), resulting in a drop in new research projects (Gao et al. 2021). Lost research time has led to disproportionate decreases in women's publishing productivity in some fields but not all (Jemiłniak et al. 2022; King and Frederickson 2021). A survey of 570 archaeologists conducted by Hoggarth and coauthors (2021) showed that women more often than men reported a greater loss of jobs, larger declines in income, and increased workload due to the pandemic (see also Jalbert and Overholtzer 2021). However, Hoggarth and coauthors (2021) showed little gendered impact on research activities. To assess the impact of COVID-19 on research productivity, we separated 2021 from 2016 to 2020 to check for a difference in gendered publishing. We found that women's publications actually increased in 2021 compared to the previous years, buoyed by the large portion of women in AQ (see the earlier discussion). Nevertheless, we suspect the full impact of COVID-19 will surface in the coming years.

Separating archaeology papers in general science journals from papers in major archaeology-specific journals (excluding *Sapiens*) reveals a small difference. The percentage of articles published by women in archaeology journals—42.3%—is larger than the percentage of archaeology articles published by women in general science journals—40.1% (Figure 3; $\chi^2 = 0.401$, $p = 0.39$, $df = 1$).

Women make up 42.7% of US-based first authors as compared to 44.2% of non-US based first authors (Figure 3, including *Sapiens* [$\chi^2 = 0.235$, $df = 1$]). If we look at the interplay between gender and US-based versus non-US-based institutions within each archaeology-specific publication (AQ, LAQ, JAR, *Sapiens*) as opposed to archaeology papers in general science journals, we also fail to find significant differences.

PhDs Granted as a Baseline for Inferring Gender Imbalance in Publishing

Does this lack of parity—women wrote only 41.7% of the papers in six peer-reviewed journals—represent an imbalance? Answering this question requires a baseline for comparison. Many potential baselines exist: the gender breakdown of Society for American Archaeology (SAA) members, of

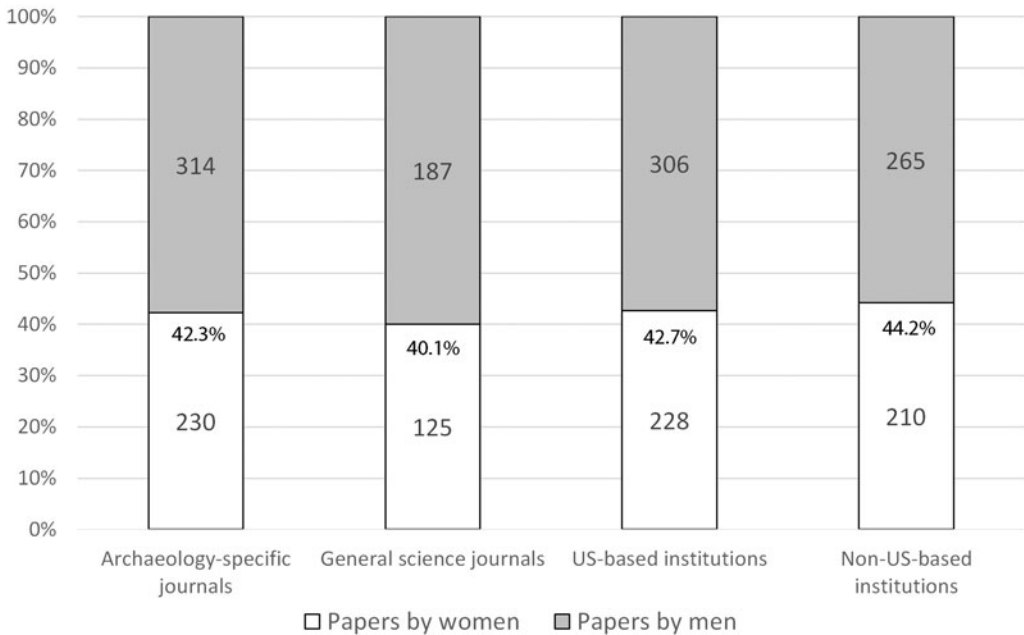


Figure 3. Gender breakdowns of first-authored articles by journal type and nationality.

archaeologists presenting research at conferences, of enrollments in graduate or undergraduate programs, and so on. Membership in professional organizations is trending toward parity (Fulkerson and Tushingham 2019); Bardolph (2014) found that 47% of SAA members in the 2013 SAA membership directory are women. Using SAA membership as a baseline, there is a clear imbalance. Yet because publishing in journals appeals more to the system of rewards of academic archaeologists and because academic archaeologists represent only a portion of SAA members (and a small minority of practicing archaeologists; Sebastian 2009), we use completed dissertations as the baseline, acknowledging a parallel between PhD research and peer-reviewed publishing in major journals.

Women wrote 41.0% (1,467 of 3,574) of the US-based dissertations from 1976 to 2015 and 43.7% (1,879 of 4,301) of the dissertations from 1976 to 2021. Women wrote 43.0% (232 of 539) of the papers published by authors at US-based institutions from 2016 to 2021. This drops to 41.8% if we exclude *Sapiens*. Thus, the rate of women's production is roughly proportional to the demographic baseline of PhD recipients. Yet, as noted earlier, we found that for one of the journals—AQ—a large portion of the articles in this study are written by relatively recent PhDs. Thus, the entire run of PhDs going back to 1976 may not be an appropriate baseline. By combining the PhD database with the author database, we determined the dates of PhDs of 136 authors. This amount does not include the women whose PhD dates we looked up specifically for our deep dive into AQ. This amount is also low because many authors received degrees outside anthropology or at institutions not represented in the *Guide*. For this sample of 136 authors, the mean and median professional ages (years elapsed between PhD and publication) for men and women are nearly the same: 19.1 and 19.5 years for women and 20.6 and 19 years for men. As our exploration of the professional age of women authors in AQ shows, the actual professional ages are likely to be lower than what we see in this sample. The PhD dates show that archaeologists receiving their PhDs between 1994 and 2015 produced more than twice as many articles (from 2016 to 2021) as those who received their PhDs before 1994. Therefore, dissertations from 1994 to 2015 (and 1994 to 2021) might make a more accurate baseline for measuring gender imbalance in publishing between 2016 and 2021.

Women account for 46.7% of US-based dissertations (922 of 1,973) from 1994 to 2015, and 49.4% (1,333 of 2,700) for 1994 to 2021. Recall that among authors from US institutions, women wrote 43.0% of papers in all seven venues and 41.8% without *Sapiens*. With or without *Sapiens*, the discrepancies

are not significant for dissertations from 1994 to 2015 ($\chi^2 = 2.22, 3.53, p = 0.16, 0.06$), but are significant for dissertations from 1994 to 2021 ($\chi^2 = 7.20, 8.98, p = 0.008, 0.004$). This imbalance recalls challenges and inequalities experienced by women in many areas of archaeology (Gero 1994; Nelson et al. 1994; Overholtzer and Jalbert 2021; Parezo and Bender 1994; Tushingham et al. 2017; Wylie 1994). Yet our findings show that it may be an overstatement to say that men “dominate archaeological narratives of the human past” (Fulkerson and Tushingham 2019:380; see also Bardolph 2014). The number of papers published by women in prestigious journals represents a substantial quantity of important contributions and a large increase over previous decades.

Gender, Coauthors, and Page Lengths

When women are first authors, we found that they are the only author of the paper 34.8% of the time (152 of 437). In contrast, when men are first authors, they are the only author 23.5% of the time (134 of 57; $\chi^2 = 15.59, p < 0.001, df = 1$). This finding is at odds with the occasional comment that women work more collectively (Gero 2000). The higher numbers of single-authored papers may be tied to reports that some women receive less inclusive mentorship (Baxter et al. 2008; Brown 2018; Fulkerson and Tushingham 2019), perhaps resulting in fewer collaborations. In a study of tenure decisions in economics, Sarsons and coauthors (2021) argue that women receive less credit for collaborative work, particularly when author roles are unclear, thus providing an incentive for women to publish single-authored papers. A survey of US scientists across multiple fields showed a strong association between an author’s number of peer-reviewed articles and the number of collaborators, yet when the number of articles is quantified differently, the relationship between numbers of publications and collaborators is ambiguous (Lee and Bozeman 2005). Thus, it is not clear whether eschewing collaboration leads to lower productivity.

If women more often write as sole authors, do they also write with fewer coauthors? A study across multiple disciplines in the natural and social sciences showed that although men tended to have more collaborators in the late twentieth century, women tend to have more in the twenty-first century (Bozeman and Gaughan 2011). The difference in the average number of coauthors (not counting the first author) in archaeology-specific journals (2.17) versus archaeology papers in general science journals (12.96) is large enough to merit isolating the two journal types and focusing on archaeology-specific journals alone (not counting *Sapiens*) because they have less variability in coauthors. We find that, on average, women who publish with coauthors ($n = 149$) have 2.94 coauthors and men ($n = 235$) have 3.16 coauthors ($t = 0.894, p = 0.371$). A substantial difference, however, resides in the gender of the coauthors. We scrutinized the gender of coauthors in AQ. For multiauthor papers with a man as first author ($n = 123$), 30.7% of coauthors are female (122 of 397), whereas in multiauthor papers with a woman as first author ($n = 59$), 46.5% of coauthors were female (86 of 185; $\chi^2 = 13.64, p < 0.001$). This notable difference aligns with results from broader studies across the humanities, social sciences, and natural sciences: men tend to collaborate more often with other men, whereas women are more “egalitarian” (Araújo et al. 2017).

We found that the gender of the first author has no significant effect on article lengths, which are relatively standardized for many of the journals we examined.

Grants and Journal Publishing

Exploring the distribution of NSF grants provides insight into both institutional inequality and gender imbalance. Because grants presumably lead to research that results in publications, most people would predict that individuals and institutions with more NSF grants also have more publications. The distribution of NSF grants across institutions from 2010 to 2021 indeed confirms this (Figure 4): anthropology departments’ numbers of publications in the seven publication venues we investigated correlate strongly with numbers of NSF grants (Pearson’s $r = 0.685, p < 0.001$) and the total dollar amount of grants received (Pearson’s $r = 0.347, p < 0.001$). Nevertheless, a closer look at the distribution of grants leads to questions about the strength of this relationship. The numbers embedded in the base of each bar of Figure 4 indicate the number of institutions that received the corresponding number of grants. They show that institutions with the most NSF grants do not come anywhere close to dominating

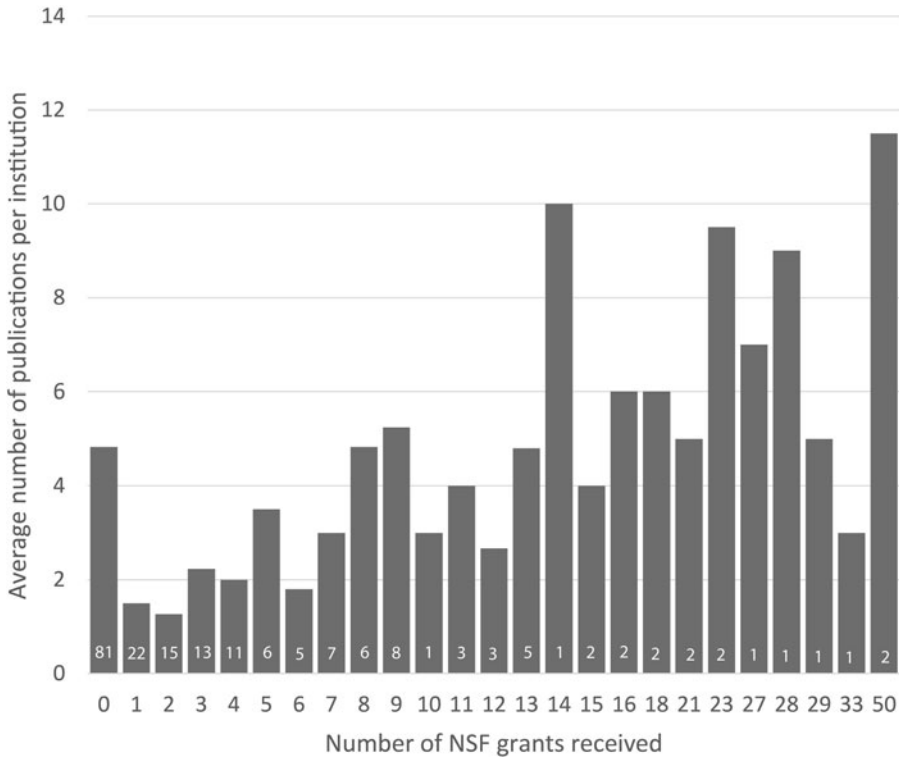


Figure 4. Publications per institution versus number of NSF grants received.

archaeology publishing. For example, half the publications in the major journals in our study come from researchers in departments that have not received NSF grants. The top 15% of institutions in terms of numbers of grants account for only a slightly larger share—21.8%—of peer-reviewed publications. However, the institutions with the most grants also have the most archaeology faculty and the most graduate students receiving NSF dissertation improvement grants. This demographic detail might completely undermine the commonplace assumption that grants presumably lead to research that results in more publications. Rather than more NSF grants “causing” more publications, it may be that institutions with larger numbers of grants and publications are simply those with more archaeologists.

Regarding gender, the data from 2010 to 2021 show that the patterns documented by Goldstein and coauthors (2018) based on NSF data from 2004, 2008, and 2013 continue: there was approximate parity between men and women for dissertation grants (53.6% of dissertation improvement grants were awarded to women from 2010 to 2021), but women received fewer senior-level grants (38.1% from 2010 to 2021). We lack the data to confirm (as Goldstein and coauthors did) that this lower proportion stems from fewer applications submitted by women.

Institutional Prominence

How prominent are certain institutions in our sample of publications? Among US anthropology departments, the top 15% account for 52.8% of tenure-track anthropology professors (all subfields; Kawa et al. 2019). Looking at archaeology specifically, the top 15% of US programs account for 48.3% of tenure-track archaeology professors who received their degrees from 1994 to 2014 (Cramb et al. 2022; Speakman et al. 2018:Supplemental Table 1). Our dissertation database (Supplemental Table 3) allows us to add that the programs with the 48.3% market share produced 30.7% of all PhDs awarded in these years. Thus, the initial discrepancy—15% of US programs account for

48.3% of professors—overestimates the degree of inequality. Yet inequality remains: 30.7% of PhDs from the top-tier programs acquired a 48.3% share of professorships.

Does a similar degree of inequality exist in the publications in our study? To address this question, we classified each author in the database by the institution listed in their publication as their primary affiliation. In general, the top 15% of institutions (64 out of 427) account for 45.5% of publications (443 of 973). If we limit ourselves to the United States, the top 15% of institutions (30 of 203) account for 43.7% of publications (221 of 506). Using our PhD database, we were able to determine where 136 of the 506 authors at US institutions got their PhDs. The top 15% of institutions in terms of PhD grads with the most publications account for 43.0% of those publications. Thus, the degree of institutional inequality in our database is substantial (15% of institutions account for between 43% and 45% of publications). It is only slightly smaller than the degree of inequality observed in hiring practices among archaeology PhD-granting departments, where 15% of institutions account for 48.3% of hires. In archaeology papers in our study, the Gini coefficient (a measure of inequality ranging from 0 [total equality] to 1 [total inequality]) for all institutions is 0.431. and the coefficient for US institutions is 0.439. In contrast, Kawa and coauthors (2019) calculated a Gini coefficient of 0.64 when looking at which PhD-granting anthropology departments (all subfields) are the most successful in placing their graduates in tenure-track positions.

Incidentally, of the 880 first authors from 2016 to 2021, 11 published a paper under one affiliation and then moved to a different institution where they published a subsequent paper. Of these 11, we successfully tracked the type of movement for nine, all of whom received their PhDs in the 2010s. The types of movement include the following: postdoc to assistant professorship or equivalent ($n = 3$), assistant professorship to assistant professorship ($n = 2$), graduate school to assistant professorship ($n = 1$), graduate school to postdoc ($n = 1$), postdoc to postdoc ($n = 1$), and museum position to adjunct teaching position ($n = 1$). These types of movement illustrate a trend of upward career mobility but, with a single possible exception, do not speak to mobility and precarity among adjunct professors.

Although some institutions are definitely more prominent than others, no institution (or handful of institutions) dominates the discourse. A related question is whether the same institutions are prominent across different periodicals. More specifically, are the institutions whose authors publish in both *American Antiquity* and *Latin American Antiquity* also the institutions whose authors publish in *Sapiens*? The comparison between *Sapiens* and academic journals is potentially revealing because *Sapiens* authors address a wider audience. We were curious to see whether authors from a different set of institutions, perhaps a set more concerned with outreach, write for *Sapiens*. We also wanted to see whether there is greater institutional overlap between AQ and LAQ than between *Sapiens* and either of these journals. Obviously, we would expect relatively few authors to publish in both AQ and LAQ because of the mutually exclusive geographic scope (indeed only two authors between 2016 and 2021 published unique pieces in both journals).

Authors from a total of 263 unique institutions published in AQ and LAQ, and 39 of these institutions are represented by publications in both journals, a 14.8% overlap. There is a similar amount of overlap between AQ and *Sapiens* (15.9%; for *Sapiens* we did not include 28 authors who are journalists). LAQ and *Sapiens* have a lower percentage of overlap (8.6%). If we look only at authors (ignoring institutional affiliation), we found that nine authors had first-authored publications in both *Sapiens* and AQ, whereas only two had publications in both *Sapiens* and LAQ. Thus, the low institutional overlap between *Sapiens* and LAQ is mirrored by low author overlap between *Sapiens* and LAQ. Overall, the similar amount of institutional overlap—14.8%—between the pair of research journals (AQ and LAQ) and between a research journal (AQ) and the more public-facing *Sapiens*—15.9%—could simply reflect individual author preferences or the absence of a strong institutional pattern in favor of or against publishing in these different venues.

Institutional Diversity

Moving beyond inequalities between institutions, we attempted to determine the degree of institutional diversity found among journals. In other words, we asked whether some journals feature articles by

authors from a broader range of institutions than other journals. To assess this, we used a suite of diversity measures. Although ecologists played a major role in developing these measures, archaeologists have demonstrated their applicability in the characterization of a variety of assemblages (for prominent uses of such measures elsewhere in *American Antiquity*, see Eren et al. 2016; Kaufman 1998; Plog and Hegmon 1993). Diversity often encompasses two concepts: richness and evenness (Magurran 1987:7–9). Richness, sometimes called “variety,” refers to the number of unique species present. In the case of the current study, this concept equates to the number of institutions represented in the journals. Two relatively straightforward metrics of richness are Margalef’s and Menhinick’s diversity measures (Table 2). The Margalef and Menhinick measures produce the same rankings of the seven journals, with *Science* as the least rich and *LAQ* as the richest.

Yet simply ranking these seven journals by the number of articles published between 2016 and 2021 reveals results identical to the Margalef and Menhinick richness rankings. In other words, *LAQ* may have more institutions because it published more articles, implying that the Margalef and Menhinick measures do not do enough to account for sample size. In such a case, Hurlbert’s (1971) rarefaction formula aids in controlling for sample size. Taking as a baseline the number of different institutions (40) represented in the journal with the smallest sample (*Science*, with 57 total papers), rarefaction calculates how many institutions would be present in the other journals if their sample sizes were equal. Rarefaction reveals that all the other six publication venues are more rich than *Science* and have relatively similar richness scores (Table 2). Whereas *Science* has 40 institutions represented, the other venues would have between 47.7 (*AQ* and *Sapiens*) and 50.4 institutions represented (*Journal of Archaeological Research*) if these six venues had the same sample size as *Science* (57 papers). Thus, the number of institutions represented in the other six journals is higher than in *Science*. With the exception of *Science*, institutional representation in the publications we examined is relatively rich. It may be that *Science* is less institutionally rich because fewer facilities support the types of research (genetics, for example) that commonly appear in archaeology articles in *Science*.

Evenness, sometimes called abundance, takes account of how many individuals from each species are present. A case where authors from a small number of institutions have a high number of articles is less diverse than a case where the number of articles is more evenly distributed among the institutions represented. The Shannon equitability index provides a measure of evenness that ranges between 0 and 1, with 1 being completely even and 0 being completely uneven. All seven journals have high scores for evenness, ranging from 0.957 for *AQ* to 0.983 for the *JAR*. Thus, there are small differences between journals in terms how evenly institutions within them are represented, but in general the journals feature authors from a relatively diverse set of institutions.

Conclusion

Gender and institutional inequality persist, though they are improving. From 2016 to 2021, the percentage of women first authors in top-tier peer-reviewed archaeology journals increased compared to previous time periods, although women are not yet at parity with men. This holds both within and beyond the United States and in archaeology-specific journals and general science journals. Our use of completed dissertations as a baseline shows that this disparity between men and women is indeed an imbalance: given the number of women who have completed PhDs, journals should contain more publications by women. Our closer look at *AQ* illuminates how the numbers can increase. Because many papers in *AQ* from 2016 to 2021 were written by women who got their PhDs in the 2010s, and because there has been a boom in PhDs awarded to women in the last 10 years, the very recent increase in papers published by women in *AQ* clearly reflects the research output of this new wave of PhDs. Many of these women have tenure-track positions, reflecting a degree of gender parity in academic hiring. The demographic pipeline here is clear, but the imbalance we document testifies to a persistent leak.

This is where the two forms of inequality—gender and institutional—converge. We can show that there are not enough women among the archaeology faculty of top-tier graduate programs (42.7%), but our data do not allow us to do anything more than speculate on what others have also noticed regarding the institutional context of gender inequality: even when women make it to tenure-track

Table 2. Diversity Indexes for Each Publication.

Journal	Total Articles	Total Institutions	Articles per Institution	Margalef Index	Margalef Rank	Menhinick Index	Menhinick Rank	Shannon Equitability Index	Equitability Rank	Hurlbert's Rarefaction	Rarefaction Rank
<i>Science</i>	57	40	1.43	9.65	7	5.30	7	0.958	6	40.0	7
<i>JAR</i>	64	56	1.14	13.22	6	7.00	6	0.983	1	50.4	1
<i>Science Advances</i>	95	73	1.30	15.81	5	7.49	5	0.977	2	48.1	3
<i>Sapiens</i>	104	77	1.35	16.36	4	7.55	4	0.975	3	47.7	6
<i>PNAS</i>	173	116	1.49	22.32	3	8.82	3	0.962	5	48.0	4
<i>AQ</i>	227	136	1.67	24.89	2	9.03	2	0.957	7	47.7	5
<i>LAQ</i>	253	166	1.52	29.82	1	10.44	1	0.963	4	49.9	2

positions, they may be at institutions where, due to a lack of graduate students, larger teaching loads, and heavier service burdens, research and publishing are harder to pursue. This requires adjustments, such as publishing in venues that require less time commitment (Fulkerson and Tushingham 2019).

Regarding institutional inequality, our data show that inequality regarding which institutions have the most success in job placement does not carry as strongly into other realms. For example, although it is no surprise that the amount of NSF grants an institution receives correlates positively with the number of publications by authors from those institutions, this correlation says little about inequality. Simply put, the bigger programs with more people (particularly graduate students) get more grants. It is refreshing to know that large numbers of publications come from scholars without NSF grants and from scholars at lower-ranking institutions. In other words, quality research comes from many quarters. Surely many writers get grants from beyond the NSF, and a future research question could explore, in the midst of the curation crisis, publications stemming from legacy collections as opposed to new field projects. Without a doubt there is inequality in the sense that 15% of the institutions account for 43% of the publications, but 64 different institutions comprise that 15%.

The conclusion that publishing in the journals we analyzed is decentered across institutions also shows in measures of institutional diversity for journals. We found that the archaeology papers in the journal *Science* are the least diverse in terms of richness (the number of different institutions represented by its authors), not a surprise given what others have reported (Beck et al. 2021). Regarding evenness, a second measure of diversity, all the periodicals examined have relatively high evenness scores. Finally, our data show that the set of institutions well represented in *AQ* was not particularly different from the set of institutions well represented in a more public-facing, non-peer-reviewed periodical: *Sapiens*.

This article ends with a variety of questions. When will the effects of COVID-19 become more visible, and what scale and shape will they take? Why are women more likely than men to write as single authors? When men collaborate, why are most of their coauthors men whereas women's coauthors are almost equally split between men and women? With more women publishing in prestigious journals, are obstacles loosening for scholars with underrepresented racial, sexual, or class identities? Why is institutional inequality more pronounced in hiring than in publishing? Do gendered personal networks matter more for jobs than for journals? What role does mentoring play in these discussions? Richer responses to these questions require surveys like the one that helped Goldstein and others (2018) shed light on why fewer women apply for grants. In comparison with Goldstein and coauthors' results, the rate at which women write in major journals is slightly higher than the rates at which they get grants. When we add to this the even higher rates at which women publish in less-prestigious venues and a lack of institutional dominance, the realm of publication is getting more democratic. In sum, amid a climate of continuing concern where much work remains to be done, we find small reasons for optimism.

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Supplemental Table 1. Authors.

Supplemental Table 2. Publications.

Supplemental Table 3. Dissertations Reported in the Guides to Anthropology Departments.

Supplemental Table 4. Dissertations Awarded by US Institutions per Year by Gender.

Note

1. Robert Speakman was arrested in 2019 for violating a protective order granted because of allegations of sexual battery.

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