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Intersections

The Gold OA Landscape 2011-2014

This issue consists of an excerpted version of *The Gold OA Landscape 2011-2014*, published September 10, 2015 as a PDF ebook for $55.00 and on September 11, 2015 as a paperback book for $60.00. Both are currently available at Lulu.com (use the links, repeated here: http://www.lulu.com/content/e-book/the-gold-oa-landscape-2011-2014/17262336 for the ebook, http://www.lulu.com/content/paperback-book/the-gold-oa-landscape-2011-2014/17264390 for the paperback book. Both editions have ISBNs: 978-1-329-54713-1 for the PDF, 978-1-329-54762-9 for the paperback. The paperback should eventually be available through Amazon, Ingram or Barnes & Noble, but I don't know when that will happen.

This book represents the first overview of essentially all of serious gold OA—that is, what's published by the journals listed in the *Directory of Open Access Journals*. I believe it's important for all OA publishers and for many libraries and OA advocates. If it does well, or if there's some form of alternative funding, I'll continue tracking the field in the future.

The issue—starting with the first numbered section below—includes a little more than one-third of what's in the book (a little more than half the text, but none of the 69 graphs, and probably less than half of the many, many tables), I believe these excerpts are useful on their own, and enough to provide a reasonably good picture of gold OA in 2011-2014—but they're not the whole story. For that, you'll have to buy the book. I've annotated the excerpts by adding "[**See the book for omitted section.**]" whenever something's been omitted—and what's missing can be as brief as a figure and its caption or as long as almost all of a subject chapter.

I'm sure there are one or two grammatical errors or missing words in this text; by the time I was done with the analysis and preparation, reading through it a third or fourth time just didn't seem worthwhile. As for the numbers, however, they're essentially all copied-and-pasted from Excel, so there should be few if any transcription errors. I have not attempted to keep tables within a single page or column for this issue.

For this issue, the single-column version (civ15i9on.pdf) is distinctly easier to read and probably the preferred version; I have had to shrink type and sometimes delete columns to make tables fit into these narrower columns. I have not tried for elegant page breaks, and the last page is very short. (When I've deleted a column from a table, the caption ends wit [partial]; the full table is in the book and the single-column C&I version.)

1. Background and Overview

How many open access (OA) articles are published each year? How many open access (OA) journals publish how many OA articles? What proportion of those journals and articles involve fees (usually called Article Processing Charges or APCs)?

Those seemingly-simple questions don't have simple answers. The first one may not have an answer at all. This report provides a reasonably complete set of answers to the second and third questions and provides a detailed picture of the Gold OA landscape—that is, journals that make all refereed articles immediately available for anybody to read and download from the Internet, at no cost and with no barriers.

This report is based on an exhaustive study of Gold OA journals as represented by the *Directory of Open Access Journals* (DOAJ) as of June 8, 2015, excluding journals that began publishing in 2015 (and two accidental duplications in DOAJ). I visited (or tried to visit) each journal's home page and answer these questions:

- Does the journal exist?
- Does it charge APCs (or did it in 2014) and, if so, what are they?
- How many articles did it publish in 2011, 2012, 2013 and 2014?
- Are the articles actually available?
- Is there anything about the home page or the articles that would suggest that the journal may have mild issues or, worse, should be avoided entirely?

My hope is that this report will help answer some or all of the following questions:

- Is gold OA a significant portion of scholarly publishing—and, if so, how big is it and how fast is it growing?
- How do subject areas differ in terms of gold OA publishing?
- How much money might be involved in gold OA APCs? (That's really two questions: How much do journals charge per article and how much revenue might journals be gaining from those charges?)
- How many articles are published in a typical OA journal (or, realistically, in various sorts of OA journals)?
- How do OA journals and their policies differ by starting date?
- Are there useful things to say about claimed country of publication?
- Beyond major subject areas, do OA journals differ significantly by narrower subject categories?

Key Definitions

When I say "OA journals" in this report, I mean Gold OA journals as commonly defined: journals that make all peer-reviewed articles freely available for online reading as soon as they're published, without requiring fees or registration to read those articles.

More specifically, I mean Gold OA journals listed in the *Directory of Open Access Journals*—but using a slightly tighter set of criteria than DOAJ does. Chapter 2 discusses those criteria, exclusions that result and some other aspects of what is and isn't here. It also discusses changes in definitions and grading between the previous reports discussed below and this report.

Broadly, this report does *not* include articles appearing in so-called "hybrid" journals, or green OA articles deposited in subject or institutional repositories, or "delayed OA" articles with embargos.

The Investigations

Much of this research carried over from an earlier investigation (based on DOAJ as of May 7, 2014) reported in *Open-Access Journals: Idealism and Opportunism*, published as the August/September 2015 issue of *Library Technology Reports*. I strongly recommend that issue for its compact coverage of the field and especially for Chapters 6, 7 and 8, which deal with issues not repeated here.

That study omitted journals that did not appear to have English-language interface options (I'm monolingual) and, given its deadline, only covered the first six months of 2014 (along with all of 2011, 2012 and 2013). In all, the study covered 7,301 journals, of which 6,490 received full coverage (811 were excluded for various reasons).

After completing that study, I returned to the 6,490 journals, filling in article counts for all of 2014 (and revisiting and refining some cases where I'd estimated article counts). The results of that revisit appeared as a series of blog posts at *Walt at Random* for each of some 28 broad subject categories. Those posts remain available.

In the summer of 2015—beginning June 15, 2015 and ending around August 15, 2015—I expanded the study once again, as follows:

- I downloaded DOAJ metadata on June 15, 2015. Where URLs in the previous study's master worksheet (including only fully analyzed journals—those with grades A through D) matched the new metadata, or a manual comparison of titles yielded clear matches with minor changes in URLs, I retained the previous data (with current URLs). That left 80 journals in the older study that don't seem to be in DOAJ as of June 2015; these have either changed names or disappeared. (Chapter 2 discusses these briefly.)
- For *all* remaining rows in the DOAJ metadata, including those that would match excluded journals in the previous study (such as journals I couldn't reach, that didn't appear to be OA or that had garbled archives), I redid the analysis from scratch. In the process, I marked the "excluded" spreadsheet from the earlier study, flagging 702 of the 811 excluded journals. The other 109 have presumably disappeared; many of them were already unreachable. (Chapter 2 discusses these briefly.)
- I used Chrome as my browser for this work (under Windows 8.1) for a simple reason: it includes Google translation tools. I was hoping to be able

to make sense of some of the 2,400 to 3,000 journals lacking English-language interfaces. In the end, I was able to analyze all but 20 reachable journals, although some of those required a two-step process (copying text from the website into a separate Google Translate page, usually because the site's language codes prevented translation).

There's a little more to it, discussed in Chapter 2. Suffice it to say that, of 10,603 journals that began in 2014 or earlier, I was able to fully analyze 9,824 as compared to 6,490 in the earlier report: in other words, 51% more journals.

Most of this report does *not* include all 9,824 journals. Instead, it includes 9,512 journals graded A and B: journals that appear to be appropriate OA resources, a few of them with very mild caveats. Except for some discussion in Chapter 2, I ignore 312 journals graded C—journals with at least one obvious problem that makes them, in my opinion, questionable publications probably best avoided. The comparable figure for the earlier study is 6.196 journals (graded A, B or D); thus, the bulk of this report covers 53.5% more journals than the previous study. That's 90% of what was in DOAJ when downloaded and 97% of all journals that could plausibly be included. It is, as far as I can tell, the broadest survey of OA journals and their article counts.

The Biggest Numbers

How many OA articles appeared in 2014?

Here are three partial numbers:

- 482,361 articles in the 9,512 journals discussed throughout this report
- 505,992 articles in 9,824 journals including "C" journals (which appear questionable and are discussed in Chapter 2).
- *At least* 526,092 including DOAJ-listed journals excluded from this study for various reasons (see Chapter 2).

Plus some unknown number of green OA articles and "hybrid" journal articles. Is the total 530,000? 550,000? 600,000 or more? I wouldn't hazard a guess.

In any case, 482,361 appears to be roughly 20% of all peer-reviewed articles (assuming around 2.4 million such articles), which I'd call a significant portion of the field. The key numbers for the rest of this report (except Chapter 2) are 9,512 journals and 482,361 articles.

Of those 9,512 journals, 7,039 (74%) are free (do not charge APCs). Of the 482,361 articles, 206,588 (43%) appeared in free journals. But the 9,512 journals include quite a few that didn't publish any articles in 2014, for various reasons: 752 of them in all.

Of the 8,760 journals that actually published articles in 2014, 6,383 (73%) are free.

To complete the biggest numbers, for journals actually publishing articles in 2014: free journals averaged 32 articles per journal, while APC-charging journals averaged 116, with an overall average of 55 articles per journal. (Those averages don't mean much, of course, since there's such a wide variation, but it does appear to be true that, in general, APC-charging journals publish a lot more articles than free journals.)

	Journals	Active 2014	Articles	Art/Jrnl
Free	7,039	6,383	206,588	32.4
Pay	2,473	2,377	275,773	116.0
Total	9,512	8,760	482,361	55.1
Free percent	74.0%	72.9%	42.8%	

Table 1.1. Journals and articles, overall

Table 1.1 summarizes these figures. Note that, here and throughout the report, "free" and "pay" as applied to articles means those that appear in free journals or journals that charge APCs, respectively.

Those are the biggest numbers. The rest of this report is details.

Grades and Subgrades

Table 1.1 combines journals graded A and B, as does most of the rest of this report. Journals graded B have something that might cause some authors or readers mild discomfort (or might not), but nothing that makes them questionable. It seems reasonable to lump A and B together in most cases.

There are relatively few B journals: 780 (8% of the total), of which 727 published articles in 2014. Oddly enough, most of those journals (58%) charge APCs. They published 54,355 articles in 2014 (11% of the total), of which 78% were in APC-charging journals. Free B journals averaged more articles per journal than free A journals, while APC-charging B journals averaged *fewer* articles per journal than APC-charging A journals.

Table 1.2 summarizes this situation. It's the last place A and B grades will be mentioned—*except* for the subgrades.

Grade	Jrnls	Act. 2014	Articles	%	Art/Jrnl
A	8,732	8,033	428,006	89%	53.3
Free	6,709	6,095	194,534	45%	31.9
Pay	2,023	1,938	233,472	55%	120.5
B	780	727	54,355	11%	74.8
Free	330	288	12,054	22%	41.9
Pay	450	439	42,301	78%	96.4

Table 1.2. Journals and articles by grade and APC status [partial]

The percentage figures for A and B rows are percentages of the total row (which is the same as for Table 1.1 and not repeated). Percentage figures for Free and Pay rows are percentages of that grade.

A Subgrades

Those who've seen the previous reports should note that what were D subgrades are now A subgrades. There's nothing wrong with these journals, but they have certain publishing patterns that might (or might not) eliminate them from DOAJ in the future.

Subgrade	Journals	Act/2014	Articles	Art/Jrnl
C: ceased	339	109	1,280	11.7
D: dying?	72	25	74	3.0
E: erratic	379	336	5,471	16.3
H: hiatus?	155	5	71	14.2
O: oneshot?	9			
S: small	340	328	1,490	4.5

Table 1.3: A subgrades

Table 1.3 summarizes the relatively few A journals with subgrades, most or all of which would fall into the D grade in the previous reports. A few more words about each subgrade may be helpful:

- **C: Ceased**. These journals have either explicitly shut down, merged into other journals (the bulk of the 109 that had 2014 articles), or apparently vanished based on no articles later than 2012. A few may come back; most won't.
- **D**: **Dying?** Journals with publication patterns suggesting that they're dying out. Nearly two-thirds of these had no 2014 articles; the remainder had very few. Some may spring back to life. These journals published a total of 471 articles in 2013, 1,111 in 2012, and 986 in 2011.
- E: **Erratic**. These journals tend to skip years or have some years with fewer than five articles while others have more than ten. Some explicitly publish in alternate years. Technically, they violate DOAJ listing criteria.
- **H: Hiatus**. These journals either had formally announced pauses in publication (the five with 2014 articles) or had no articles in 2014 (the other 150 journals), but earlier publication patterns that don't suggest they're dying. In a few cases, that's clear: they have articles in 2015.
- **O**: **Oneshot?** These journals began earlier than 2014 and only have articles in one year (2012 or 2013—otherwise they'd be in C), most commonly only in one issue for that year. Eight of these published a total of 38 articles in 2013, none before and none after; the ninth published five articles in 2012. None of them published articles in 2014, and they may or may not be defunct.
- **S: Small**. One area where I've questioned DOAJ's new standards (which could change). That is, these journals are pretty clearly ongoing—but they're *small*: never publishing more tha*n ten articles per year and frequently publishing fewer than five. For journals devoted to a particular author or philosopher, that may be quite reasonable.

B Subgrades

These subgrades attempt to show why I felt that certain journals deserved slightly longer attention. In no case are these faults that would cause me to call the journal questionable or deceptive; they're just things that made me slightly uneasy or, in some cases, have been used by others to question journals. Table 1.4 summarizes the situation, and the annotations that follow Table 1.4 are especially important.

Subgrade	Journals	Act/2014	Articles	Art/Jrnl
A: author rep.	17	15	475	31.7
E: English	124	117	8,593	73.4
G: garish/site	145	134	12,169	90.8
I: impact	239	239	21,081	88.2
M: minimal	94	84	2,747	32.7
O: other	40	21	1,740	82.9
P: peer	33	30	2,305	76.8
Q: q. claims	85	84	5,188	61.8
T: titles	3	3	57	19.0

Table 1.4. B subgrades

Fuller explanations of the B subgrades:

- **A: Author repetition**. The same author's name appeared more than once in an issue in two or

three issues checked. It wasn't a major issue, and some journals don't consider it bad practice. (A fair number of OA journals explicitly bar this practice, sometimes limiting an author to one article per year.)

- E: **Problematic English**. The web site and author guidelines contained English so sloppy or indicative of non-English speakers that it was distracting (but not fatally so). This subgrade was *only* applied to journals that welcomed papers in English and offered English-language interface options. I was more likely to flag it if a journal insisted on English-language manuscripts.
- G: **Garish or other site problems**. At one point I was calling this the "Bollywood syndrome"—sites with multiple moving text areas, frequently moving in different directions, peculiar typefaces, flashing icons and other stuff that seemed to undermine an assumption of professionalism on the part of the journal. Realistically, more of these had other site problems, ones that were irritating but by no means fatal or suggesting a deceptive journal. (Note that 48 of these journals are from India: the "Bollywood" name is there for a reason.)
- I: **Questionable impact factors**. Only here because some people have made a big stink about journals using anything other than the Thomson Reuters "official" Impact Factor. These journals put some other number in a prominent position on the journal's home page, without having an official IF above it. I don't know enough about journal metrics to distinguish deliberately phony factors (if there are any) from entirely legitimate attempts to provide measures for newer journals and those not chosen for official IFs; I regard this as possibly the silliest reason for a journal to get a B grade and would prefer to disregard it. Note, for example, that almost every recently-launched Elsevier Gold OA journal is graded BI.
- M: **Minimal information**. The website didn't have as complete a range of journal information and author guidance as I'd like to see. Also a very minor issue.
- O: **Other factors**. Either a mix of minor issues or something that didn't fall into other slots. Most of these are journals where archives consisted of full-issue PDFs (with no separate tables of contents) or had other issues making articles difficult to count, but where the articles showed up in DOAJ, so I was able to count them. (Otherwise, those journals would be in subgrade XO and excluded as uncountable.)
- P: **Peer review and turnaround issues**. Journals that seemed to promise peer review turnaround in time periods I'd consider fairly short—but not so short as to be implausible. (Those latter fell into subgrade P of grade C.)
- Q: **Questionable claims**. A variety of odd issues—journals that claim to be Canadian with no Canadian editorial board members, as one example. Not questionable enough to make the journal deceptive, but mildly unsettling.
- T: **Questionable titles**. Some of the observed article titles seemed a little odd, but not in the "out there" category. Note that there are almost no journals or articles in this category.

Enumerating these categories makes them seem even sillier than they seemed at first glance, and I think it's reasonable to say that they're mostly such minor issues that you can ignore them. That's particularly true for subgrades E, G, and I—and if you remove those journals, there's almost nothing left: 272 journals of which 237 published 12,512 articles in 2014.

Revenues and Costs

While later chapters go into more detail about the potential revenues from, and charges for, articles in APC-charging journals, here's a quick overview.

If there were no waivers and no discounts, APC-charging journals would have collected a total of $305,429,140 in 2014. Of the 2,473 APC-charging journals, 2,377 actually published articles in 2014, for a total of 275,773 articles.

That yields an average of $128,494 revenue per journal (a truly meaningless average, since the most prolific single journal accounts for more than 14% of all revenues), or an average of $1,108 per article in APC-charging journals. The average cost per article, including articles in free journals, comes out to $633.

	2014	2013	2012
Revenue	$305,429,140	$241,859,280	$195,451,775
Pay articles	275,773	234,282	195,822
$/article	$1,107.54	$1,032.34	$998.11
Tot. article	482,361	440,843	394,374
$/article	$633.20	$548.63	$495.60

Table 1.5. Possible revenues and cost per article, 2011-2014 [partial: 2011 omitted]*

Table 1.5 shows similar numbers for the four years discussed here—but that asterisk next to "revenues" in the caption is for a large caveat. To wit, journals may have changed APCs during that period: some publishers vary APCs over time and some offer free introductory periods. Thus, these numbers make an unreasonable assumption: that APCs were constant throughout the four years (and that there were no waivers or discounts). They may, however, be useful indicators.

Article and Journal Volume per Year

While there's quite a bit more to say about the overall picture—when journals started, distribution of journals by article volume or by revenue, where journals are published—the rest, along with subject-oriented breakdowns, comes after discussions of methodology, changes and exclusions. This chapter ends with one more table and a graph—the first breaking down journal activity and article volume (paid and free) year by year, the second showing article volume and free/pay graphically.

	2014	2013	2012	2011
Journals	8,760	8,965	8,420	7,639
Free%	73%	74%	75%	77%
Articles	482,361	440,843	394,374	321,312
Free%	43%	47%	50%	55%

Table 1.6. Journal and article volume by year

Table 1.6, which includes only those journals actually publishing articles in any given year, is fairly startling. Essentially, while the percentage of free *journals* has declined slowly over time, the percentage of free *articles* has declined more substantially: a majority of Gold OA articles were free in 2011 and 2012 (the more detailed percentage is 50.346%, so it's a true but small majority), while that's shrunk to 43% in the past two years.

[See the book for omitted section.]

How many journals grew from 2013 to 2014 and how many shrank?

In absolute terms, 4,422 journals (46.5%) published more articles in 2014 than in 2013 (including those that published none in 2013); 874 (9.2%) published the same number of articles; 4,216 (44.3%) published fewer articles in 2013. So, technically, more journals grew than shrank, but it's a close call.

In terms of significant change, 3,721 journals (39.1%) published at least 10% more articles in 2014 than in 2013; 2,302 journals (24.2%) stayed about the same; and 3,491 (36.7%) published at least 10% fewer articles in 2014 than in 2013.

2. Exclusions and Changes

You might think of this chapter as one giant footnote to the rest of the book—and you could even skip over it. It's important for several reasons: to provide transparency on my research techniques, to explain changes in those techniques (and in grading and the like) since previous reports, and to spell out clearly what journals are excluded from this report.

The sections on changes only matter if you've read some of the earlier reports—either *Open-Access Journals: Idealism and Opportunism*, *The OA Landscape 2011-2014: An Interim Subject View* (which almost nobody has read, although many have read the partial excerpts at *Walt at Random*), or one or more of the reports in *Cites & Insights*, appearing in the October/November 2014, December 2014, January 2015 and March 2015 issues.

The Basics

"The Investigations" in Chapter 1 offers the essentials as to how this research proceeded. I won't repeat that text here. Some added notes:

- Any journals that I had difficulty reaching (whether 404s or other internet problems) were tried at least twice, with efforts at least a week apart.
- On the other hand, I assumed that journals should be professional enough either to report an accurate URL to the *Directory of Open Access Journals* or, if it became necessary to change that URL, to provide a redirect. Failing to do so implies incompetence to publish an online journal. Therefore, if the Excel-to-Chrome link did not yield a journal's home page, I pasted the URL directly into the Chrome address bar. If that yielded a 404 or other problem, I did *not* attempt to find the journal by searching title words or using other techniques. (I did try at least once more, however.) Redirects are easy; it's just not reasonable to leave readers hanging.
- The best journal sites have clear statements of APCs or author charges or fees, with a label implying one of those things, either directly on the home page, on the OJS "About" page for journals using Open Journal System software, or in an "About This Journal" or Author Guidelines page.

If I was unable to find a clearly-stated fee or an assurance that there was no such fee (a number of OJS-based journals use the Fee link, which I suspect is part of the basic template, to state clearly that there are no fees), I proceeded as follows:

1. If the journal had text indicating that the author or institution might be expected to pay a fee, I flagged the journal as "C/A" (APC Missing or Hidden).
2. Otherwise, if the journal was published by a university or association/society, or if it had a clear statement of sponsorship, I assumed that the journal was free.
3. Otherwise—published by a commercial publisher and without either a statement on fees or an explicit statement of sponsorship—I assumed a hidden fee and flagged the journal as "C/A." It's worth noting here that there were only 154 C/A cases in all, of which more than half—78—had text indicating that a fee would be charged but failing to say what that fee was. ("Send email to the editor" and "we'll let you know what the fee is when the article's accepted" are both, in my opinion, unacceptable; the second is far worse than the first.)

- In attempting to count articles by year, I did—of course—take advantage of any shortcuts available on the site; see the first essay in the June 2015 *Cites & Insights* for some notes on this process. When direct processes seemed cumbersome, I also checked *DOAJ*; if it had article counts by year *and those counts appeared to be plausible* (they aren't always), I used those counts.
- If I had to count articles in each issue, one by one, I would typically ignore overhead (editorials, tables of contents) and material assumed not to be peer reviewed based on information on the site (e.g., book reviews and in some cases short reports). I would also ignore conference-special issues and conference reporting in other issues. (See below on exclusions.)
- In a relatively small number of cases, I estimated articles based on selective counts—e.g., if a journal published 48 issues a year, I might sample six issues and, if the range of papers per number was not large, extrapolate. This didn't happen very often, and I went back to rethink most cases where it did happen. In all such cases, *DOAJ* was used as an alternative resource. I would suggest that overall numbers may be off by as much as 1% to 2% because of estimation; it's unlikely to be much more than that.
- If the journal site did not offer tables of contents or any other chronological approach to viewing articles, I would check *DOAJ* for possibilities. This was particularly true for what I called "opaque" journals, most of them only offering full-issue PDF downloads. If that worked, I graded the journals B/O, retrieving more than three dozen of more than 140 cases. Worth noting: although this report includes more than half again as many journals as the earlier *LTR* report, there are significantly *fewer* exclusions because of opacity.
- In many cases, I opened or downloaded an article to make sure they were actually readable without requiring registration or some other barrier. This was always the case if there was wording suggesting the need for registration and usually the case *except* for journals in platforms where it was clear that such barriers do not occur (e.g. SciELO, Redalyc, J-Stage and most commercial publishers of OA journals).
- If articles are available in both HTML and PDF form, I opened the HTML version—and, while I do not regard it as acceptable OA practice to require registration, I *do* regard it as acceptable to offer at least one fully-readable full-text version for free and require membership or an embargo for what may be a more convenient form (a few dozen journals do this).
- Subject assignments were made based on subjects and keywords as assigned in *DOAJ* but also based on journal title and table of contents. There are some ambiguous cases, of course.

Changes

These are primarily changes from *Open-Access Journals: Idealism and Opportunism*. Grades and methods have been refined during several stages of research, as noted in various reports.

[See the book for omitted section.]

Exclusions: Grade X and its Subgrades

[See the book for omitted section.]

The International Journal Morass

When I looked at journals and "journals" in Beall's lists in 2014, I found an astonishing number of journals with names beginning "International Journal"—more than 2,200, most of them "journals" with no actual articles.

Within this study, 480 such journals have A grades (about 5.5%)—and 43 have X grades (also 5.5). On the other hand, 128 have B grades, or 16% of all B journals—and 67 are in Grade C, or 21% of all C journals.

What Happened to Previous Exclusions?

Some quick notes on journals that were excluded from the previous study for specific reasons and how they fared on retesting:

- 193 of them now show up as A journals. That includes 11 that had been empty but now show articles; 29 that I'd flagged as not OA that now seem to be OK (including half a dozen cases where former required registration no longer seems to be present); 28 previously flagged as opaque that I was able to analyze; but mostly 125 that weren't available or were parking pages when I looked previously but are now (including one that had malware last time but not this time).
- Seven show up as ceased, but with some articles between 2011 and 2013, that previously were excluded for various reasons. Three now show up as probably dying, all of which were unreachable last time around.
- Thirteen are now graded as erratic that were formerly either empty, not OA, opaque or (mostly) unreachable. Five more with various problems last time are now apparently on hiatus.
- Nineteen are now called small that were previously either opaque (mostly), unreachable or tagged as not OA.
- Five that were previously either opaque or unreachable are now analyzed, but with problematic English. Another five previously opaque or unreachable now have garish sites or other mild site problems. Eight more—again, either opaque (three) or unreachable (five)—are now flagged for questionable impact factors. Finally, four split between opaque and unreachable are now graded B/M for minimal information.
- A dozen journals with various fatal problems last time now show as B/P, for problematic peer review or turnaround, while fifteen (nearly all with fatally defective archives in the past) are now B/Q for questionable claims.
- Eleven formerly-excluded journals are now C/A (missing or hidden APC), including two that formerly showed as malware. A dozen—most of which were excluded last time because multiple pop-up ads appeared with each and every action, making them useless—now appear as C/P, with implausible peer review turnaround times. One previously-unworkable journal is still incompetent but just a little better, while two that formerly were entirely unworkable now seem to be full of absurd article titles.

Finally, among those that are *still* excluded: six continue to be empty; a dozen that now appear to have malware were formerly either unreachable or not OA or, in three cases, malware then as well. One hundred eleven (111) now flagged as not OA were mostly flagged that way before (88), with a few that were formerly opaque or unreachable. One hundred forty-three (143) that are now opaque include 115 that were that way before (not surprisingly), but also 16 that were formerly unreachable and a few miscellaneous cases. Five journals now parking or ad pages were mostly the same back then. Curiously, seven of the 20 translation problems were also excluded journals in the previous study, most of them unreachable at the time. Six unworkable sites were all unreachable last time around. And 96 unreachable journals were also excluded the last time around, in 80 cases because they were also unreachable (or parking pages) then, with a few that weren't open access and a few others that were opaque.

Omissions: Other Journals in Previous Studies

What of the 80 "good" journals from DOAJ in May 2014 that I couldn't find in the June 2015 spreadsheet—and the 110 excluded journals from May 2014 that I couldn't match this time around?

A quick check of DOAJ's "journals added and removed" spreadsheet shows that all but 24 of these 190 journals were removed from DOAJ for various good reasons. That does leave 24 mysterious cases—but of those, 18 were unreachable or otherwise excluded anyway, and the other six have titles that either duplicate or are quite similar to other journals, and had very few articles. It's not enough of a mystery to be worth pursuing further.

3. Journals by Article Volume

Journals, no matter how they're funded, vary wildly in terms of number of articles per year. "Average articles per journal" is almost meaningless as an overall figure, becoming only slightly more meaningful as you narrow the frame of reference.

This chapter looks at journals by article volume, using either 2014 volume or the peak of the period 2011-2014. It should help to clarify what's out there and how pay-versus-free varies by article volume. There are several ways of determining appropriate groups of journals by volume; this chapter uses two of them.

The Three Segments

First, it's time to introduce three broad subject segments, which will crop up in the next few chapters and form the basis for most of the rest of the book. While patterns of OA publication and fees vary substantially by individual subject, the three segments seem to have distinctly different characteristics. Most discussions, tables and graphs use abbreviations to refer to the three segments:

- **Biomed**: All of human biology and medicine, the area with by far the most fee revenue.
- **STEM**: Journals in hard sciences (other than human biology), technology, engineering and mathematics
- **HSS**: Humanities and social sciences, as well as those journals that cross over many scientific and other areas.

Note that *PLOS One* is excluded from segment tables and discussions.

Journals and Articles by Segment

To get a sense of the size of each segment, Table 3.1 breaks out Table 1.1 into the three segments.

	Journals	Act. 2014	Articles	Art/Jrnl
Biomed/Free	1,471	1,365	66,057	48.4
Biomed/Pay	1,145	1,113	110,841	99.6
Biomed/Tot	2,616	2,478	176,898	71.4
Biomed/Free%	56.2%	55.1%	37.3%	
STEM/Free	1,876	1,719	65,088	37.9
STEM/Pay	982	938	108,722	115.9
STEM/Total	2,857	2,657	173,810	65.4
STEM/Free%	65.6%	64.7%	37.4%	
HSS/Free	3,692	3,299	75,443	22.9
HSS/Pay	345	325	24,328	74.9
HSS/Total	4,038	3,624	99,771	27.5
HSS/Free%	91.5%	91.0%	75.6%	

Table 3.1. Journals and articles by segmemt

[See the book for omitted section.]

Article Volume: Defined Levels

There are at least three plausible ways to divide article volume (that is, number of articles in each journal in a given year) into a workable set of chunks:

- **Defined chunks**: Levels set arbitrarily, albeit based on scanning the actual data, splitting journals either based on peak year or on 2014.
- **Percentiles by peak year or current year**: That is, to get five rows of data, break them at the 80th, 60th 40th, and 20th percentile of the ordered list of article volumes (either peak or 2014). Think of this as "the fifth most prolific journals have from X to Y articles per year."
- **Percentiles by cumulative volume in one year**: That is, working from a highest-to-lowest list of article volumes in, say, 2014, add all the figures up to any given journal, then set chunks based on that addition. Think of this as "one-fifth of articles appear in journals with from X to Y articles."

While the first way seems arbitrary, it's easy to understand. The second approach *seems* desirable—but OA journals tend toward low article volumes, such that the quintiles (fifths) using this approach would be 64+, 36 to 63, 23 to 35, 14 to 22, and 1 to 13 articles respectively.

Both of the other methods appear to provide useful breakdowns. For the first method, defined chunks, I used the same levels as in *Open-Access Journals: Idealism and Opportunism*, based on the journal's peak year, allowing some level of comparison between Tables 3.2 and 3.3 here and Tables 2.4 and 2.5 in that report. Those levels are 1-19 articles, 20-59, 60-199, 200-999, and 1,000 or more respectively in a journal's peak year within the 2011-2014 period. (Note that the Total column includes *PLOS One* but segment columns do not.)

Peak articles	Biomed	STEM	HSS	Total
1,000+	14	20	5	40
Free	14.3%	5.0%	20.0%	10.0%
200-999	183	186	46	415
Free	24.0%	25.3%	39.1%	26.3%
60-199	751	611	323	1,685
Free	52.9%	54.2%	71.5%	56.9%
20-59	1,146	1,302	1,858	4,306
Free	64.7%	72.4%	92.6%	79.1%
1-19	522	739	1,805	3,066
Free	55.0%	75.1%	95.3%	83.6%

Table 3.2. Journals by highest year article volume

Table 3.2 says a lot, much of it possibly expected. There are very few very large HSS journals (but there are some). Even in HSS, most journals publishing 200 or more articles a year charge APCs (but even in Biomed and STEM, there are some at all size levels that do not). There are more journals in the 20-59 article range than in any other (45% of all journals). There are proportionally many more very small journals in HSS than in any other segment.

	Biomed	STEM	HSS	Total
1,000+	19,605	32,561	4,267	88,315
Free	12.2%	3.3%	12.7%	4.5%
200-999	59,495	56,538	13,205	129,238
Free	18.4%	18.5%	28.2%	19.4%
60-199	62,049	45,238	22,102	129,389
Free	48.8%	54.6%	69.0%	54.3%
20-59	31,464	33,197	45,132	109,793
Free	63.5%	72.8%	92.1%	78.1%
1-19	4,285	6,276	15,065	25,626
Free	57.6%	75.3%	95.3%	84.1%

Table 3.3. Articles in 2014 journals grouped by highest year article volume

Noting again that the columns for 1,000+ do not add up to the total (because *PLOS One* is in the latter but not the former), Table 3.3 shows some differences: to wit, free percentages in higher-volume journals are even *lower* at the article level, substantially so for the two highest-volume levels.

Article Volume: Cumulative Volume

What if we divide journals not by peak article volume and arbitrary levels, but by 2014 volume and by cumulative volume within 2014? The breakpoints change quite a bit, as you'll see in the following tables.

2014	Biomed	STEM	HSS	Total
800+	17	23	5	46
Free	5.9%	4.3%	0.0%	4.3%
377-799	123	104	25	252
Free	20.3%	17.3%	36.0%	20.6%
91-376	365	270	106	741
Free	44.9%	51.5%	61.3%	49.7%
35-90	698	633	543	1,874
Free	60.2%	62.2%	85.3%	68.1%
0-34	1,413	1,828	3,358	6,599
Free	60.9%	72.4%	94.0%	80.9%

Table 3.4. Journals grouped by cumulative article volume in 2014

Some of you will look at Table 3.4, comparing it to Table 3.2, and say "how is that possible?"—specifically, that while Table 3.2 shows 20% of prolific HSS journals being free, Table 3.4—while showing the same number of journals, albeit in a broader volume range—shows *none* of the journals being free.

Here's the situation: five OA journals in the humanities and social sciences published 1,000 or more articles in their biggest year between 2011 and 2014, and one of them doesn't charge APCs. Five OA journals in the humanities and social sciences published more than 800 articles in 2014—but only three of the five journals are the same, and the one that doesn't charge APCs published fewer than 800 articles in 2014.

Note that two-thirds of the journals are in the bottom quintile, publishing fewer than 35 articles in 2014—and, although four out of five of those journals overall are free, nearly 40% of the smallest journals in biomed charge APCs.

2014	Biomed	STEM	HSS	Total
800+	22,923	36,438	5,286	96,529
Free	7.7%	2.9%	0.0%	2.9%
377-799	46,631	40,336	9,367	96,334
Free	18.2%	14.1%	34.4%	18.1%
91-376	47,679	36,299	12,583	96,561
Free	41.7%	49.7%	55.9%	46.5%
35-90	37,275	33,061	26,687	97,023
Free	59.3%	61.3%	83.8%	66.7%
0-34	22,390	27,676	45,848	95,914
Free	61.6%	72.4%	93.4%	79.9%

Table 3.5. Articles grouped by cumulative article volume in 2014

Table 3.5 shows articles by cumulative volume—and the rightmost column may help you understand what I mean by cumulative volume: the article count for each row is roughly the same (because I couldn't break among journals with the same number of articles, it's not *precisely* the same).

I believe there are some interesting inferences in these tables that I haven't spelled out.

4. Fees and Revenues

Most gold OA journals (not quite three-quarters) are funded by societies, universities and colleges, libraries, government agencies, grants or subsumed costs, without charging APCs (although some of those are using temporary no-APC periods to boost article submissions).

But the 26% of journals that *do* charge APCs (and are clear about them) published 57% of the OA articles (in reputable journals) in 2014, and assuming level APCs, pay journals have published a majority of OA articles since 2013. It makes sense to look more closely at fee levels for individual journals and possible revenues, especially since such revenues have grown rapidly (as shown in Table 1.5). This chapter looks at fees and revenues in some detail.

As always, note that revenue figures assume that there are no waivers or discounts and that all papers published in a journal yielded the full APC. Where APCs vary depending on type of paper, length of paper, or the author(s) involved, I made worst-case assumptions: the most expensive kind of paper (usually full research papers), the most expensive kind of authors (usually a "foreign" author from a developed nation who is not a member, if there's a society involved), and a moderately long paper (I used ten pages, but with no color graphics). Realistically, almost all actual revenue numbers are lower, possibly considerably lower.

Revenue Ranges

Table 4.1 shows the number of journals and articles in each of a fairly large range of revenue segments—the only time we'll break out revenues beyond four large segments.

Revenue	Journals	Cum J	Articles	Art/J
$43 million	1		31,882	31,882
$4 to $6.2 million	5	6	16,635	3,327
$2 to $3.7 million	13	19	16,826	1,294
$1 to $1.94 million	29	48	21,473	740
$750,000 to $999,999	27	75	11,905	441
$500,000 to $749,999	43	118	15,361	357
$400,000 to $499,999	32	150	7,555	236
$300,000 to $399,999	52	202	15,451	297
$250,000 to $299,999	25	227	5,974	239
$200,000 to $249,999	56	283	11,240	201
$150,000 to $199,999	45	328	7,407	165
$100,000 to $149,999	88	416	13,771	156
$75,000 to $99,999	91	507	9,724	107
$50,000 to $74,999	158	665	17,577	111
$40,000 to $49,999	88	753	6,550	74
$30,000 to $39,999	130	883	10,230	79
$25,000 to $29,999	84	967	8,199	98
$20,000 to $24,999	144	1,111	8,477	59
$15,000 to $19,999	168	1,279	7,550	45
$10,000 to $14,999	197	1,476	9,541	48
$7,500 to $9,999	122	1,598	4,809	39
$5,000 to $7,499	185	1,783	5,534	30
$2,500 to $4,999	276	2,059	7,238	26
$1,000 to $2,499	200	2,259	3,537	18
$1 to $999	118	2,377	1,327	11
$0 (no 2014 articles)	96	2,473	0	

Table 4.1 Revenue by journal, detailed breakdown

What's clear from Table 4.1, I think, is that APC-based OA publishing isn't an easy way to strike it rich. Only 416 journals could have revenues of $100,000 or

more in 2014, and only 665 could have $50,000 or more. Almost a majority of APC-charging journals took in less than $15,000 in 2014.

Free for Now

This might be a good place to mention a subgroup of *free* journals: those where I added the annotation "for now," indicating that the website showed fees as being waived for some period, rather than permanently zero. Actually, there are two groups: one group that doesn't charge at present but shows signs that this will change—and one group that *does* have APCs, with indications that they represent temporary discounts.

The second group, those with APCs that are likely to change soon, is small: 19 journals publishing 835 articles in 2014. (Of course, other journals may well change APCs but hadn't announced an intention to do so.)

The first group, currently free but likely to change to APC-charging, includes 331 journals, which published a total of 7,320 articles in 2014. That's only 3.5% of the OA journals and 1.5% of the 2014 articles (in many cases, the journals are clearly offering a free period to increase article submission), so moving all of them to APC status wouldn't change percentages enormously.

APC Breakdowns by APC Levels

There are several ways of grouping APC-charging journals into a small number of clumps. Two seem interesting enough to show. In both cases, the clumps are based on quadrants of actual data, not arbitrary breakpoints. The first and probably most obvious breakdown is by APC levels—that is, grouping journals based on the 25% of APC journals with the highest APCs, the next 25%, and so on. For this dataset, that yields the following levels: High, $1,420 and up; Medium, $600 to $1,415; Low: $200 to $595; Nominal: Less than $200.

Table 4.2 shows journals and articles by subject segment using these four levels. Note that *PLOS One* (with medium APC) is omitted from this table, and that journal counts are for journals that actually published articles in 2014 (but the breakpoints were calculated including those that did not).

	High	Med	Low	Nom	None
Biomed	520	281	175	137	1,365
Art.	67,238	18,434	12,477	12,692	66,057
STEM	80	300	286	272	1,719
Art.	17,785	35,453	26,074	29,410	65,088
HSS	8	46	137	134	3,299
Art.	1,736	2,133	8,691	11,768	75,443

Table 4.2. Journals and articles by APC levels, based on APC quadrants

Table 4.2 is, I believe, very revealing. Given that the overall number of journals is roughly the same for each of the first four columns, it's notable that nearly all of the high-priced journals are in biomed, while what few APC-charging HSS journals there are mostly have low or nominal fees. It's also interesting (and speaks to funding agency practices, I suspect) that such a huge portion of all biomed articles appear in the most expensive journals, where STEM is spread more evenly, with the largest number of articles in medium-priced journals.

APC Breakdowns by Cumulative Revenue

This one's a little tricky: going through the journals, in order by APC level, but establishing breakpoints at quarters of the potential cumulative 2014 revenue (that is, around $76.3 million in each quarter). In this case, the quadrants are: $2,215 and up; $1,827 to $2,200; $1,350 to $1,800; $1 to $1,345.

	$2.215+	$1,827-$2,200	$1,350-$1,800	$1-$1,345
Biomed	183	203	143	584
Art.	30,508	23,102	14,212	43,019
STEM	12	33	45	848
Art.	2,757	9,594	10,950	85,421
HSS	1	4	6	314
Art.	18	1,669	92	22,549

Table 4.3. Journals and articles by APC level based on cumulative revenue

Table 4.3 shows even more startling differences between the segments. While STEM articles seem reasonably evenly distributed among medium, low and nominal APCs, in fact more than three-quarters of them (78.6%) fall into the bottom quadrant of revenue (as do 92.7% of the relatively few HSS articles with APCs). If *PLOS One* was added into the STEM group, it would lower that percentage (since the $1,350 APC just barely makes it into the third quadrant—and,

since *PLOS One* was included in the cumulative revenue clustering, it heavily influences that quadrant), but the fourth quadrant would still dominate.

Additional Notes

The differences between segments when it comes to APCs and revenue are so huge that it probably doesn't make sense to use overall measures when looking at segments and subjects. Therefore, this is the last you'll see of the High, Medium, Low, and Nominal figures as used here or of the four cumulative-revenue quadrants: when looking at subjects, divisions will be made based on the overall segment.

Meanwhile, some summary facts on the potential revenue in each segment and the average charge per article (for articles published in APC-charging journals in 2014):

- **Biomed**: $167,813,590 potential revenue, or $949 per article.
- **STEM**: $85,052,934 potential revenue, or $489 per article.
- **HSS**: $9,521,916 potential revenue, or $95 per article.

Note that *even for biology and medicine*, the average APC per 2014 article is well below the overall average cost: *PLOS One* really does influence averages that heavily.

But STEM's per-article figure is just over half that of biomed—and the humanities and social sciences barely average one-tenth the cost.

5. Starting Dates

In earlier reports, I suggested that there was a gold rush of APC-charging journals between 2006 and 2010, based on the rapid increase in such journals during that period. This report includes many more journals and quite a few journals that began publishing in 2014 but weren't included in *DOAJ* by May 2014. That may change the situation.

[See the book for omitted section.]

6. Country of Publication

Where do open access journals come from? In most cases, *DOAJ* includes the country of publication as stated by the publisher. In all, 121 nations and territories have at least one Gold OA journal that appears to be a good publication (that is, is graded A or B). Here's the full list, in descending order by total number of A and B OA journals, with the percentage of journals that are free.

[See the book for omitted section.]

That's a very long list; additional tables will still be long, but limited to countries publishing at least ten OA journals graded A or B.

First, consider the countries most involved in truly free OA. Table 6.2 shows countries that publish ten or more gold OA journals, ranked in descending order by the percentage of free journals (and by the number of free journals in case of ties). It's a *very* different list.

Country	Free	Pay	Free %
Cuba	61		100.0%
Venezuela, Bolivarian Republic of	47		100.0%
Denmark	41		100.0%
Costa Rica	37		100.0%
Estonia	23		100.0%
Philippines	12		100.0%
Sri Lanka	11		100.0%
Ecuador	10		100.0%
Colombia	239	3	98.8%
Spain	507	10	98.1%
Slovenia	44	1	97.8%
Norway	39	1	97.5%
Serbia	92	3	96.8%
France	160	6	96.4%
Belgium	23	1	95.8%
Peru	42	2	95.5%
Mexico	139	7	95.2%
Croatia	92	5	94.8%
Austria	36	2	94.7%
Brazil	877	52	94.4%
Slovakia	31	2	93.9%
Lithuania	30	2	93.8%
Hungary	29	2	93.5%
Russian Federation	93	7	93.0%
Chile	128	10	92.8%
Ireland	12	1	92.3%
Ukraine	57	5	91.9%
Argentina	134	12	91.8%

Poland	235	23	91.1%
Italy	251	26	90.6%
Iran, Islamic Republic of	242	27	90.0%
Portugal	68	8	89.5%
Turkey	231	29	88.8%
Romania	253	32	88.8%
Greece	35	5	87.5%
Australia	97	14	87.4%
Bosnia and Herzegovina	13	2	86.7%
Macedonia, the Former Yugoslav Republic of	13	2	86.7%
Israel	11	2	84.6%
Thailand	11	2	84.6%
Nepal	14	3	82.4%
Czech Republic	68	16	81.0%
Malaysia	51	16	76.1%
Taiwan, Province of China	18	7	72.0%
Finland	25	11	69.4%
Japan	64	30	68.1%
Germany	214	101	67.9%
China	27	13	67.5%
Bangladesh	20	10	66.7%
Bulgaria	19	10	65.5%
South Africa	45	25	64.3%
Canada	162	92	63.8%
United States	621	375	62.3%
Indonesia	84	52	61.8%
Sweden	37	26	58.7%
Pakistan	42	33	56.0%
Hong Kong	20	16	55.6%
Netherlands	53	46	53.5%
India	203	235	46.3%
Egypt	228	265	46.2%
Switzerland	93	123	43.1%
Singapore	13	18	41.9%
South Korea	14	28	33.3%
United Kingdom	187	462	28.8%
United Arab Emirates	3	10	23.1%
New Zealand	25	90	21.7%
Nigeria	5	25	16.7%

Table 6.2. Countries with highest percentage of free OA journals

Cuba and Venezuela may not be surprising; Denmark and Costa Rica, somewhat more so. Do note Brazil and Spain—while not the highest *percentage* of free OA journals, these two nations have the largest *number* of free OA journals, considerably more than the U.S.

Articles by Country

Country	Articles	Free%
United States	89,485	17.3%
United Kingdom	60,838	7.3%
India	42,227	22.3%
Brazil	38,069	88.1%
Switzerland	25,039	9.3%
Egypt	20,000	20.9%
Germany	14,755	34.9%
Iran, Islamic Republic of	12,181	81.6%
Turkey	10,950	87.6%
Spain	10,602	95.8%
Canada	10,431	30.1%
Romania	10,185	74.0%
Poland	8,996	80.7%
Russian Federation	7,328	88.3%
Italy	6,030	82.2%
Colombia	5,847	99.0%
Netherlands	5,532	48.4%
Japan	5,323	54.3%
Indonesia	4,814	37.3%
Ukraine	4,794	75.1%
Chile	4,597	86.9%
South Korea	4,537	8.4%
China	4,417	57.9%
Pakistan	4,218	32.9%
Mexico	4,158	96.2%
Serbia	3,294	93.0%
France	3,122	94.2%
Australia	2,806	54.6%
South Africa	2,757	59.9%
Argentina	2,747	90.0%
Czech Republic	2,733	62.3%

Croatia	2,552	93.9%
Cuba	2,542	100.0%
Hong Kong	2,414	47.4%
Singapore	2,364	19.0%
Finland	2,097	19.0%
Malaysia	1,918	84.4%
Nigeria	1,778	5.2%
Bangladesh	1,723	28.6%
Sweden	1,531	54.1%
Austria	1,466	83.3%
Bulgaria	1,412	47.7%
United Arab Emirates	1,400	10.6%
Portugal	1,389	86.5%
Venezuela, Bolivarian Republic of	1,345	100.0%
New Zealand	1,322	30.0%
Macedonia, the Former Yugoslav Republic of	1,228	21.3%
Uganda	1,227	12.1%
Slovenia	1,164	95.2%
Greece	1,134	81.3%
Morocco	1,110	39.8%
Lithuania	1,012	88.7%
Peru	1,001	94.2%

Table 6.3. OA articles by country of publication

Table 6.3 shows countries with more than 1,000 OA articles in 2014. In some ways, the actual numbers are less interesting than the free percentages, including the very low free percentage in the UK and surprisingly low percentage in India, compared to the very high free percentages in Brazil, Iran, Turkey and Spain.

Biomed Articles by Country

[See the book for omitted section.]

Table 6.4 shows the number of 2014 articles in biology and medicine from each country with at least 1,000 such articles—22 of them, as compared to 52 overall. It also shows the percentage of articles that appeared in no-fee journals, astonishingly low for the UK and Switzerland (and, oddly enough, higher for the U.S. than its overall free-article percentage).

STEM Articles by Country

[See the book for omitted section.]

Table 6.5 shows the number of science, technology, engineering and mathematics articles for each of the 33 countries with more than 1,000 such articles in gold OA journals in 2014, and the usual free percentage.

There may not be a lot more to say here; I do note the UK's astonishing low free-article percentage.

HSS Articles by Country

[See the book for omitted section.]

Finally, Table 6.6 shows 2014 OA articles in the humanities and social sciences for the 22 nations publishing more than 1,000 such articles—which, oddly enough, is the same number of countries as for medicine, although the numbers and percentages are very different.

Brazil publishes more OA humanities and social sciences articles than any other country—and all but a few appear in no-fee journals. Two-thirds of the U.S. articles also appear in no-fee journals. Note that the UK, first or third in volume of biomed and STEM articles, drops down to eighth for HSS. Meanwhile, Spain—14th in biomed and 21st in STEM—jumps to third place, with considerably more HSS articles than in the other two segments combined.

7. Segments and Subjects

Most of the rest of this report focuses on the three segments and 28 subject, how each of them looks in terms of gold OA and how they differ from the norm.

The three segments are sufficiently distinctive that it makes sense to alter what looks like the norm for individual subjects, specifically the bracketing of journal volume and APC levels.

The first chapter for each segment offers a little information on the segment itself, in addition to segment-specific tables and discussion in earlier chapters, and also notes segment-specific brackets for volume and APC levels. After that comes one chapter for each subject in the segment, somewhat similar to the blog posts at *Walt at Random* and chapters in *The OA Landscape 2011-2014: An Interim Subject View* but including many more journals. How many more? Tables later in this chapter show the increases—noting again that Megajournals in the earlier report has been split between Other Sciences and Miscellany, with *PLOS One* removed altogether, and that Miscellany (with some journals switched to Other Sciences) has been added to the Humanities and Social Sciences segment.

First, five pie charts—a graphic form I usually avoid because it takes up so much space and can only

deal effectively with a few figures, but one that seems to make sense in this instance.

[See the book for omitted section.]

Changes in Journal and Article Numbers

These last two tables show the differences in journal coverage between *Open-Access Journals: Idealism and Opportunism* and this report and in article coverage between the interim report (which covered the same journals) and this report. (If you're doing direct comparisons, note that the old numbers included journals graded C, which I've removed from the new discussion.)

[See the book for omitted section.]

8. Biology and Medicine

Biomed—subjects related to human biology and the many subjects related to medicine, including pharmacies, some aspects of nutrition and most aspects of sports and sports medicine—is distinctly where the money is.

Of the three segments, this one has the fewest journals. It's roughly tied with STEM for most number of articles and percentage of articles in APC-charging journals (although that's without *PLOS One*). But it has *by far* the most revenue, possibly as much as $167.8 million in 2014, nearly two-thirds of all OA APC revenue. This overview adds tables and graphs not already included in other chapters, then looks at APC and volume brackets based on this segment rather than on the overall field.

Cost per Article

	2014	2013	2012
Revenue	$167,813,590	$122,361,263	$98,525,112
Pay Articles	110,841	85,518	70,595
$/article	$1,514.00	$1,430.82	$1,395.64
Tot. Articles	176,898	150,253	134,006
$/article	$948.65	$814.37	$735.23

Table 8.1. Possible revenues and cost per article, biomed, 2011-2014 [partial, 2011 omitted]*

Table 8.1 shows the possible revenues and cost per particle (for pay articles and for all articles) with two huge assumptions: that there were no waivers or discounts and that APCs for each journal were the same throughout the four years. Assumptions or no assumptions, these are much higher figures than for other segments.

Journal and Article Volume per Year

	2014	2013	2012	2011
Journals	2,478	2,469	2,275	2,069
Free%	55%	56%	58%	59%
Articles	176,898	150,253	134,006	114,711
Free%	37%	43%	47%	50%

Table 8.2. Biomed journal and article volume and free% per year

Table 8.2 includes only those journals that actually published articles each year, a figure that grows close to 10% in 2012 and 2013 but essentially stays unchanged for 2014—while article volume continues to grow at a healthy rate. Meanwhile, a literature that was half-free (on the author side) as recently as 2011 is now 63% based on APCs.

[See the book for omitted section.]

Figure 8.1 makes the trend clearer: while article volume in no-fee OA biomed journals has grown slowly (but it has grown every year), volume in APC-charging journals has grown rapidly, and is 94% higher in 2014 than in 2011.

Of the 2,616 biomed gold OA journals, 1,349 (52%) published more articles in 2014 than in 2013; 162 (6%) published the same number; and 1,105 (42%) published fewer articles. Looking at significant changes, 1,118 journals (43%) published at least 10% more articles in 2014; 615 (24%) stayed about the same; and 883 (34%) shrank by at least 10%.

Revenue Brackets

Revenue	Journals	Cum J	Articles	Art/J
$2 million +	8		11,563	1,445
$1 to $1.94 million	26	34	18,890	727
$500,000-$999,999	52	86	17,134	330
$300,000-$499,999	59	145	11,741	199
$200,000-$299,999	48	193	6,990	146
$100,000-$199,999	92	285	9,575	104
$50,000-$99,999	151	436	10,401	69
$30,000-$49,999	120	556	6,196	52
$20,000-$30,000	117	673	5,739	49
$10,000-$19,999	159	832	6,112	38
$5,000-$9,999	114	946	2,804	25
$2,500 to $4,999	78	1,024	2,348	30
$1 to $2,499	88	1,112	1,307	15
$0	33	1,145		

Table 8.3. Journals by revenue bracket

If OA journals in general aren't easy get-rich-quick schemes, are biomed journals better? Yes, but not all that much, as shown in Table 8.3. Only 34 journals had at least $1 million potential revenue in 2014, and only 285 had at least $100,000. The steady decline in average articles per journal as revenues decline (except for an anomaly in the $2,500 to $4,999 bracket) may seem entirely reasonable.

New Volume and APC Brackets

Before moving on to subject chapters (only two in this case), it seems plausible to arrive at different article volume and APC-level brackets based on biomed rather than on all gold OA journals.

Article Volume Quintiles

Sorting by descending 2014 volume and looking at cumulative totals, the breakpoints for one-fifth of the articles (around 35,380, breaking between numbers) are 519 articles and up; 216-518 articles; 105-215 articles; 49-104 articles; and 0-48 articles. Note that these are lower numbers in the top three quintiles than the overall numbers, with a much narrower central quintile. Table 8.4 shows the breakdown.

	Journals	%Free	Articles	%Free
Largest: 519+	36	11%	35,521	10%
Large: 216-518	110	22%	35,361	20%
Med.: 105-215	242	39%	35,408	37%
Small: 49-104	508	57%	35,617	57%
Smallest: 0-48	1,720	62%	34,991	63%

Table 8.4. Article volume quintiles based on biomed cumulative articles

Even in biomed, most journals are quite small—and, as usual, the free percentage falls as the volume rises.

APC Quartiles

Using the same two methods as in Chapter 4 yields very different results if biomed is taken as the universe. Table 8.5 shows the journal and article counts breaking down the APC-charging journals to as close as possible to one-quarter in each group, by descending APC (as usual, it's not possible to get exact quarters: in this case, quite a few journals charge $1,960.) I think it's odd to call a $491 APC "nominal" or a $1,049 charge "low," but within the high-priced biomed universe, that's where things fall out.

	Journals	Articles
High: $1,960+	302	49,695
Medium: $1,050-$1,959	275	23,554
Low: $492-$1,049	281	14,807
Nominal: $1-$491	287	22,785

Table 8.5. APC-charging biomed journals by APC level

Table 8.6 is fairly startling: breaking down quarters of total revenue, sorting by decreasing APC, then by journal revenue. Note the incredibly narrow second bracket ($2,187 to $2,249) and the very high brackets in general. This breakdown won't be used for subject chapters.

	Journals	Articles
Top: $2,250+	103	14,212
Next: $2,187-$2,249	93	18,262
Mid: $1,750-$2,186	219	22,593
Bottom: $1-$1,749	730	55,774

Table 8.6. APC-charging biomed journals by cumulative revenue levels

9. Biology

Biology includes most everything with "bio" in the title and more specifically all aspects of human biology, biochemistry and the like. Some areas such as marine biology are included in zoology. This subject includes 399 journals, which published a total of 24,710 articles in 2013 and a considerably higher 30,844 in 2014.

	2014	2013	2012	2011
Journals	374	378	339	297
%Free	43%	44%	44%	45%
Articles	30,844	24,710	23,183	20,605
%Free	20%	26%	25%	26%

Table 9.1. Biology journals and articles by year

Table 9.1 shows journals that actually published articles each year, the number of articles published, and the free percentages. The always-low free percentage of journals (considerably lower than medicine) declined only slightly over these four years, but the percentage of articles in free journals—always much lower than in most fields, including medicine-dropped sharply in 2014. (It's not that there were fewer articles in no-fee journals—that number has grown each

year—but that there were *many* more articles in APC-charging journals, a jump of 34%.)

On a journal-by-journal basis, 182 journals (46%) published more articles in 2014 than in 2013; 17 (4%) published the same number; and 200 (50%) published fewer articles. Looking at significant changes, 153 journals (38%) published at least 10% more articles; 77 (19%) stayed about the same; and 169 (42%) published at least 10% fewer articles.

Figure 9.1 shows pay-vs.-free articles over the years graphically.

[See the book for omitted section.]

Other Details

	Journals	%Free	Articles	%Free
Largest: 519+	11	9%	11,740	5%
Large: 216-518	17	6%	5,529	5%
Med.: 105-215	30	30%	4,634	32%
Small: 49-104	58	38%	4,005	39%
Smallest: 1-48	283	50%	4,936	46%

Table 9.2. Biology journals by article volume

Table 9.2 shows the number of journals in each size category as adjusted for biomed journals, 2014 articles for those journals, and free percentages. The biggest journals—all but one of them with APCs—especially dominate biology, with more than twice as many articles as any other group. The second largest journals (also with only one free) also publish more articles than might be expected—and in both cases almost none of the articles appear in free journals.

	Jour.	%APC	%All	Art.	%APC	%All
High	62	28%	16%	11,741	48%	38%
Medium	58	26%	15%	7,736	31%	25%
Low	49	22%	12%	1,998	8%	6%
Nominal	56	25%	14%	3,114	13%	10%
None	174		44%	6,255		20%

Table 9.3. Biology journals and articles by fee range

Table 9.3 shows the number of journals and articles in each fee range, with fee ranges based on overall biomed APC levels (that is, roughly a quarter of fee-charging journals in each level): high, $1,960 and up; medium: $1,080 to $1,959; low: $492 to $1,079; nominal: $1 to $491.

Nearly half of all articles in fee-charging journals are in the most expensive group of journals—and only 21% of the articles are in the two least expensive levels.

APCs could have totaled $43,116,330 in 2014, with no waivers or discounts. Average charge per article for all articles in fee-charging journals in 2014 is $1,753. Average charge per article for *all* articles is $1,398, an extremely high figure.

Biology OA journals are somewhat unusual in almost all respects, including the possibility of a "gold rush." While it's certainly true that many more APC-charging journals began in 2009-2012, such journals outpaced free journals in some earlier periods as well. Figure 9.2 shows the patterns.

[See the book for omitted section.]

Country	Articles
United Kingdom	8,549
United States	5,649
Egypt	4,886
Switzerland	3,014
Brazil	1,628
India	1,061
Bangladesh	800
Iran, Islamic Republic of	507
Netherlands	490
Japan	340
Turkey	305
Serbia	281
South Korea	252
Poland	249
Romania	221

Table 9.4. Articles by country of publication

Biology journals claiming to be published in more than 50 countries published articles in 2014; Table 9.4 shows the article counts for the fifteen countries with at least 200 articles.

Summing Up

Rapidly growing between 2013 and 2014, with nearly all that growth in fee-charging journals, which dominate this field more than most: That's the overall story for biology, where the fees are high and the biggest journals dominate.

10. Medicine

Medicine includes all aspects of *human* health, including exercise (and sports medicine) and some aspects of nutrition (where they don't seem to be

related to agriculture). It is by far the largest subject area in terms of journal count, article count and potential revenue; I haven't subdivided it into narrower subjects because I lack enough knowledge to create a small set of subdivisions. This subject includes 2,217 gold OA journals, which published 125,543 articles in 2013 and 146,054 articles in 2014.

[See the book for omitted section.]

11. Science, Technology, Engineering and Mathematics

STEM—in this case, excluding human biology and medicine, as well as social sciences—includes slightly more gold OA journals than biomed, almost the same number of 2014 articles, almost the same percentage of APC-charging journals and articles in those journals—but a *lot* less revenue than biomed. (Note once again that *PLOS One* is *not* included in these discussions.)

As in Chapter 8 for biomed, this chapter adds tables and figures relating to STEM journals not already included in other chapters, then looks at volume and APC brackets based on this segment.

Cost per Article

	2014	2013	2012
Revenue	$85,052,934	$69,255,939	$58,688,265
Pay Articles	108,722	95,984	82,093
$/article	$782.30	$721.54	$714.90
Tot. Articles	173,810	160,621	141,678
$/article	$489.34	$431.18	$414.24

Figure 11.1. Possible revenues and cost per article, STEM, 2011-2014 [partial, 2011 omitted]*

Table 11.1 shows the possible revenues and cost per article with two huge assumptions: that there were no waivers or discounts and that APCs stayed constant. Note that both revenues and cost per article are a little more than half as high as for biomed.

Journal and Article Volume per Year

	2014	2013	2012	2011
Journals	2,657	2,711	2,486	2,217
Free%	65%	66%	67%	69%
Articles	173,810	160,621	141,678	111,644
Free%	37%	40%	42%	47%

Table 11.2 STEM journal and article volume and free% per year

Table 11.2 includes only those journals that actually publish articles in any given year—a figure that actually dropped slightly in 2014, although article volume rose 8%.

[See the book for omitted section.]

As Figure 11.1 shows, no-fee journals have published more articles each year (growing 23% over this period), but APC-charging journals have grown much faster (growing by 85% over this period). In all, 1,286 STEM journals (45%) published more articles in 2014 than in 2013; 228 (8%) published the same number; 1,344 (47%) published fewer. In terms of significant changes, 1,079 (38%) published at least 10% more articles in 2014; 671 (23%) stayed about the same; 1,108 (39%) published at least 10% fewer articles.

Revenue Brackets

Revenue	Journals	Cum J	Articles	Art/J
$2 million +	9		20,393	2,266
$1 to $1.94 million	3	12	2,583	861
$500,000-$999,999	18	30	10,132	563
$300,000-$499,999	23	53	10,154	441
$200,000-$299,999	31	84	9,519	307
$100,000-$199,999	34	118	9,232	272
$50,000-$99,999	76	194	11,389	150
$30,000-$49,999	79	273	8,004	101
$20,000-$30,000	87	360	8,154	94
$10,000-$19,999	159	519	8,205	52
$5,000-$9,999	134	653	5,181	39
$2,500 to $4,999	138	791	3,094	22
$1 to $2,499	147	938	2,232	15
$0	43	981		

Table 11.3. STEM journals by revenue bracket

While it's perhaps worth pointing out that, as with Table 8.3, Table 11.3 includes only journals that charge APCs (thus, the "$0" row means those 43 journals didn't publish any 2014 articles), it's also worth noting that only 12 STEM journals (as compared to 34 biomed) potentially earned $1 million or more in 2014, and that only 30 (compared to 86) potentially earned at least half a million. On the other hand, the nine big earners averaged many more articles than the eight big biomed earners—and all the way down to the $5,000-$9,999 bracket, STEM journals had more articles per journal.

New Volume and APC Brackets

The subject chapters that follow (for STEM subjects) will use the article volume quintiles and APC-level quartiles below, since they differ significantly from overall figures. For the record, I'm also offering the alternative APC quartiles (Table 11.6), based on combined revenues.

Article Volume Quintiles

	Journals	%Free	Articles	%Free
Largest: 900+	20	5%	33,939	3%
Large: 280-899	78	8%	35,545	7%
Med.: 108-279	203	49%	34,527	47%
Small: 42-107	541	60%	35,006	59%
Smallest: 0-41	2,016	72%	34,793	71%

Table 11.4. Article volume quintiles based on STEM cumulative articles

The largest journals are somewhat larger than overall figures (that is, those with 900 or more articles make up a quarter of all the 2014 publishing). The one large non-APC journal published fewer articles than most of the large journals; otherwise, the patterns are typical.

APC Quartiles

STEM journals tend to be a *lot* cheaper than biomed journals. Table 11.5 shows the journal and article counts for APC-charging journals broken down to put roughly one-quarter of the journals in each category by descending APC (as usual, because you can't divide within the same dollar amount, the number of journals isn't exactly 245 or 246 per category). I'd say it's reasonable to call an APC smaller than $136 fairly nominal, and APCs between $136 and $430 low—noting that the lowest quartile for biomed goes up to $491, including more than half of all STEM journals that charge fees. Notably, while the higher-priced journals publish more articles than any two of the other quartiles, the two lower-priced brackets each includes more articles than the medium-priced bracket.

	Journals	Articles
High: $705+	239	48,567
Medium: $345-$700	251	15,534
Low: $136-$340	247	21,529
Nominal: $1-$135	245	23,092

Table 11.5. APC-charging STEM journals by APC level

Table 11.6 is included for comparison purposes, breaking down journals by quarters of potential 2014 revenue. The categories aren't as narrow as in biomed, but still high enough that the APC-level categories seem more useful for subject-level discussions. It is noteworthy that the top two brackets include so few journals—where it took 196 journals to make up half of biomed revenue, STEM only needs 92.

	Journals	Articles
Top: $1,865+	43	8,998
Next: $1,350-$1,864	49	14,303
Mid: $1,091-$1,349	63	17,999
Bottom: $1-$1,091	827	67,422

Table 11.6. APC-charging STEM journals by cumulative revenue levels

12. Agriculture

Agriculture includes acquaculture, fisheries and other aspects of raising and processing plants and food, including some aspects of nutrition. The topic includes 418 journals, which published 20,802 articles in 2013—and declined slightly to 19,861 articles in 2014.

[See the book for omitted section.]

13. Chemistry

Chemistry doesn't require much explanation—except that biochemistry was treated as part of biology. It's a relatively compact field within gold OA, with just 155 journals publishing 13,353 articles in 2013 and a barely perceptible increase to 13,400 in 2014.

	2014	2013	2012	2011
Journals	149	148	127	108
%Free	59%	61%	59%	59%
Articles	13,400	13,353	12,263	9,847
%Free	33%	34%	34%	39%

Table 13.1. Chemistry journals and articles by year

Table 13.1 shows the journals that actually published articles each year, articles published and free percentages. The percentage of free journals has held pretty much steady while articles in APC-charging journals took a big jump in 2012 and have grown slowly since. (As you'll see in Figure 13.1, articles in

free journals peaked in 2012 and have been dropping since then.)

Seventy-three journals (47%) published more articles in 2014 than in 2013; seven (5%) published the same number; and 77 (50%) published fewer articles. For significant changes, 59 journals (38%) published at least 10% more articles; 37 (24%) stayed about the same; and 59 (38%) published at least 10% fewer, an unusual symmetry.

Figure 13.1 shows pay and free articles over the years.

[See the book for omitted section.]

Other Details

	Journals	%Free	Articles	%Free
Largest: 900+	2	0%	2,709	0%
Large: 280-899	9	11%	4,084	8%
Med.: 108-279	19	58%	3,078	56%
Small: 42-107	25	60%	1,714	60%
Smallest: 0-41	100	67%	1,815	70%

Table 13.2. Chemistry journals by article volume

Table 13.2 shows journals and articles in size brackets adjusted for STEM journals in general. Notably, the two biggest journals are just as expected, publishing about one-quarter of the articles—but the nine large journals right behind them, only one free, publish considerably more than you'd expect, while smaller journals publish fewer articles in chemistry than in STEM as a whole.

	Jour.	%APC	%All	Art.	%APC	%All
High	25	41%	16%	5,542	61%	41%
Medium	14	23%	9%	950	11%	7%
Low	10	16%	6%	921	10%	7%
Nominal	12	20%	8%	1,613	18%	12%
None	94		61%	4,374		33%

Table 13.3. Chemistry journals and articles by fee range

Table 13.3 is interesting, given that the four fee brackets represent one-quarter of all fee-charging STEM journals: Chemistry is strong in the most expensive journals (although none of them charge as much as $2,000 per article), and those journals dominate fee-based publishing.

Revenue could have totaled $9,523,065 with no waivers or discounts, yielding a $1,055.07 average charge for articles in APC-charging journals or $710.68 per article overall.

[See the book for omitted section.]

Country	Articles
Switzerland	3,497
India	2,081
Egypt	1,111
Germany	1,026
United States	748
South Korea	702
United Kingdom	604
Brazil	603
Russian Federation	350
Serbia	330
Turkey	233
China	224
Czech Republic	217
Hungary	168
Japan	146
Poland	126
Romania	114
Chile	111
Slovenia	104

Table 13.4. Articles by country of publication

OA chemistry journals in 40 countries published articles in 2014; Table 13.4 shows the 19 with at least 100 articles. While this report doesn't discuss publishers, it should be noted that Switzerland is likely to be mostly MDPI journals (and MDPI published a *lot* of chemistry), and Egypt is likely to be mostly Hindawi journals.

14. Computer Science

Computer Science includes software, data processing, AI, robotics and portions of information science. It includes 369 journals that published 21,085 articles in 2013 and 21,517 articles in 2014.

[See the book for omitted section.]

15. Earth Sciences

Earth Sciences include geography, geology, oceanography, some place-related fields (including aspects of tourism)—and astronomy. This is the first subject so far in which including non-English journals means a

big increase in coverage: 63% more journals and 40% more articles. This subject includes 302 journals which published 9,807 articles in 2013 and 10,433 in 2014.

	2014	2013	2012	2011
Journals	279	283	262	250
%Free	77%	80%	82%	83%
Articles	10,433	9,807	8,585	7,357
%Free	56%	57%	61%	68%

Table 15.1. Earth sciences journals and articles by year

Table 15.1 shows journals that actually published articles in any given year, and it's an interesting table: unlike most of STEM, more than half of the articles appear in free journals (which was *not* the case in the earlier, smaller report), although the percentage has dropped significantly. In this case, as you'll see in Figure 15.1, both free and APC-charging journals have published more articles each year, although APC-charging articles have grown a little more rapidly.

[See the book for omitted section.]

On a journal-by-journal basis, 145 journals (48%) published more articles in 2014 than in 2013; 22 (7%) published the same number (in seven cases, no articles in either year); and 135 (45%) published fewer articles in 2014. Looking at significant changes, 126 journals (42%) published at least 10% more articles in 2014 than in 2013; 61 (20%) stayed about the same; and 115 (38%) published at least 10% fewer articles in 2014.

[See the book for omitted section.]

APCs could have totaled 3,797,288 in 2014 with no waivers or discounts. That averages out to $824.42 per article in APC-charging journals, or $363.97 for all articles.

[See the book for omitted section.]

16. Ecology

Ecology includes environmental fields and any journal where most coverage seemed devoted to ecological issues. The subject includes 246 journals, which published 10,855 articles in 2013 and 11,705 in 2014.

	2014	2013	2012	2011
Journals	229	235	211	189
%Free	65%	65%	65%	67%
Articles	11,705	10,855	9,956	8,341
%Free	40%	38%	39%	40%

Table 16.1. Ecology journals and articles by year

Table 16.1 shows journals and articles for those journals that actually published articles in any given year. This is another subject area with many more journals and articles (70% and 40%) than the earlier mostly-English study. Percentages haven't changed much: around two-thirds of the journals free, publishing around 40% of the articles. As you'll see in Figure 16.1, both free and pay articles have grown each year.

On a journal-by-journal basis, 114 journals (46%) published more articles in 2014 than in 2013; 13 (5%) published the same number; and 119 (48%) published fewer articles in 2014. For significant changes, 109 journals (44%) published at least 10% more articles; 40 (16%) stayed about the same; and 97 (39%) published at least 10% fewer articles.

Figure 16.1 shows pay and free articles graphically.

[See the book for omitted section.]

Other Details

	Journals	%Free	Articles	%Free
Large: 280-899	7	14%	3,217	11%
Med.: 108-279	17	24%	2,742	23%
Small: 42-107	38	55%	2,449	55%
Smallest: 0-41	184	72%	3,297	70%

Table 16.2. Ecology articles by volume

Table 16.2 shows journals and articles by descending volume, as normalized for STEM. There are no very large ecology journals (none has 800 articles a year or more); the large and smallest group both include more articles than might be expected—and, as usual, the large group is almost exclusively APC-charging journals.

Table 16.3 shows journals and articles in each fee range, normalized so that each of the first four rows (across all STEM) has roughly 25% of the APC-charging journals. This group skews away from medium-fee and to low-fee journals—with the high-fee and low-fee dominating article counts.

	Jour.	%APC	%All	Art.	%APC	%All
High	25	29%	10%	3,055	43%	26%
Medium	14	16%	6%	605	9%	5%
Low	30	34%	12%	2,836	40%	24%
Nominal	18	21%	7%	576	8%	5%
None	159			4,633		

Table 16.3. Ecology journals and articles by fee range

APCs for 2014 could total $5,014,563 with no waivers or discounts. That's an average of $709.07 per article in APC-charging journals or $428.41 per article overall.

[See the book for omitted section.]

As Figure 16.2 shows (with triangles on pay datapoints so that early ones are visible), APC-charging journals came late to this subject, and other than the peak in 2011-2012, they've never appeared so much faster than no-fee journals to suggest a gold rush.

Country	Articles
Germany	3,452
United States	1,435
Brazil	1,035
Switzerland	932
United Kingdom	821
Canada	699
Japan	338
Poland	257
Mexico	219
Spain	213
India	177
Italy	172
Turkey	154
France	143
Egypt	138
Croatia	122
Singapore	122
Russian Federation	120
Colombia	119
South Africa	82
Hungary	79
Romania	71
Indonesia	69
Argentina	63
Iran, Islamic Republic of	54

Table 16.5. Articles by country of publication

In all, journals from (or claiming to be from) 53 countries in this subject area published articles in 2014. Table 16.5 shows the 25 countries with more than 50 articles in 2014; it's an interesting list.

17. Engineering

Engineering journals were distinguished from technology journals primarily based on journal titles and narrower subject headings. The group includes 302 journals, which published 21,452 articles in 2013 and 23,520 in 2014.

	2014	2013	2012	2011
Journals	283	295	261	219
%Free	64%	66%	68%	74%
Articles	23,520	21,452	15,142	10,303
%Free	30%	33%	41%	57%

Table 17.1. Engineering journals and articles by year

Table 17.1 shows only journals that actually published articles in a given year. Engineering is interesting for the enormous growth in articles—more than doubling over four years, although journals increased at a slower rate—and the abrupt drop in free percentage from 57% in 2011 to 41% in 2012, dropping further to 30% in 2014. (As you can see from Figure 17.1, while articles in free journals increased significantly through 2013 and dropped a tiny amount in 2014, articles in fee-charging journals nearly quadrupled from 2011 to 2014.)

On a journal-by-journal basis, 139 journals (46%) published more articles in 2014 than in 2013; 31 (10%) published the same number; 132 (44%) published fewer. Looking at significant changes, 110 journals (36%) published at least 10% more articles in 2014; 81 (27%) stayed about the same; and 111 (37%) published at least 10% fewer articles in 2014

Figure 17.1 shows free and paid article changes graphically.

[See the book for omitted section.]

Revenues for APC-charging engineering journals could total $5,916,312 with no waivers or discounts, averaging out to $359.96 per APC-charged article or $251.54 overall, relatively low figures for STEM.

[See the book for omitted section.]

18. Mathematics

Mathematics includes statistics. It's an unusual field, with a very high percentage of free journals for a STEM field, but most articles are in the relatively few APC-charging journals. In all, 274 journals published 12,530 articles in 2013 and 13,907 in 2014.

	2014	2013	2012	2011
Journals	258	258	228	205
%Free	76%	78%	81%	82%
Articles	13,907	12,530	10,896	8,368
%Free	43%	46%	49%	56%

Table 18.1. Mathematics journals and articles by year

Table 18.1 shows journals that actually published articles in any given year. Note the steady (but slowing) drop in free-article percentage and the slower drop in free-journal percentage. As is apparent in Figure 18.1, there are more free articles each year, but the growth in articles in APC-charging journals is much faster.

On a journal-by-journal basis, 123 journals (45%) published more articles in 2014 than in 2013; 30 (11%) published the same number; and 121 (44%) published fewer articles in 2014. Looking at significant changes, 106 journals (39%) published at least 10% more articles in 2014 than in 2013; 70 (26%) stayed about the same; and 98 (36%) published at least 10% fewer articles in 2014.

Figure 18.1 shows pay and fee articles by year in graphic form.

[See the book for omitted section.]

Other Details

	Journals	%Free	Articles	%Free
Largest: 900+	3	0%	4,823	0%
Large: 280-899	3	0%	1,180	0%
Med.: 108-279	9	78%	1,682	70%
Small: 42-107	42	71%	2,606	73%
Smallest: 0-41	217	79%	3,616	80%

Table 18.2. Mathematics journals by article volume

Table 18.2, showing the number of journals in each size category adjusted for STEM, is revealing: three very large journals (two megajournal-size, with more than 1,000 articles in 2014), all with APCs, publish a much higher proportion of articles than might be expected (the norm would be 2,781 per row), with three more large journals, all with APCs, follow close behind—but nearly four out of five journals are very small, with fewer than 42 articles in 2014, and nearly four out of five of those journals are free.

	Jour.	%APC	%All	Art.	%APC	%All
High	11	17%	4%	6,394	80%	46%
Medium	27	42%	10%	841	11%	6%
Low	16	25%	6%	441	6%	3%
Nominal	11	17%	4%	271	3%	2%
None	209		76%	5,960		43%

Table 18.3. Mathematics journals and articles by fee range

Table 18.3 shows journals and articles by fee range, adjusted for STEM so that a "normal" subject would have 25% in each of the top four cells of the first %APC column. Note that mathematics journals tend more toward the medium-priced category ($345-$700)—but that the high-priced journals publish 80% of all articles in APC-charging journals.

APCs could have totaled $7,901,955 in 2014, with no waivers or discounts, yielding an average APC of $994.33 per paid article or $568.20 per article for all articles.

[See the book for omitted section.]

19. Other Sciences

Other Sciences covers a range of sciences that don't seem to fit elsewhere, but is mostly composed of interdisciplinary journals that seem to operate primarily in the sciences, *including* most megajournals (except for *PLOS One*, which publishes more papers than all the rest of this category put together). The group includes 217 journals that published 17,686 articles in 2013 and 24,094 articles in 2014.

	2014	2013	2012	2011
Journals	204	202	186	166
%Free	70%	71%	71%	75%
Articles	24,094	17,686	13,580	10,694
%Free	28%	33%	39%	41%

Table 19.1. Other sciences journals and articles by year

Table 19.1 shows those journals that actually publish articles in any given year. The *percentage* of free journals hasn't changed much—but the APC-charging journals dominate new articles. (2014 saw 53% more no-fee articles than 2011, an increase of 2,272—but also saw 176% more articles in APC journals, an increase of 10,028.)

On a journal-by-journal basis, 109 journals (50%) published more articles in 2014 than in 2013; 19 (9%) published the same number; and 89 (41%) published fewer articles. Looking at significant changes, 98 journals (45%) published at least 10% more articles in 2014 than in 2013; 45 (21%) stayed about the same; and 74 (34%) declined by 10% or more.

[See the book for omitted section.]

20. Physics

Physics includes optics (including one of the most prolific journals). The field includes 160 OA journals, which published 12,133 articles in 2013 and 13,558 in 2014.

	2014	2013	2012	2011
Journals	152	151	131	115
%Free	53%	54%	56%	56%
Articles	13,558	12,133	11,110	10,583
%Free	28%	33%	36%	34%

Table 20.1. Physics journals and articles by year

Table 20.1 shows journals that actually published articles each year. The percentage of free journals has declined only slightly since 2011, and the percentage of articles in those journals was already low, declining still further. In this case, articles in free journals did decline slightly from 2013 to 2014.

Of the 160 journals, 79 (49%) published fewer articles in 2014 than in 2013; five (3%) published the same number; and 76 (48%) published fewer articles in 2014. Looking at significant changes, 69 journals (43%) grew by at least 10% in 2014; 26 (16%) stayed about the same; and 65 (41%) published at least 10% fewer articles in 2014.

[See the book for omitted section.]

Other Details

	Journals	%Free	Articles	%Free
Largest: 900+	1	0%	3,332	0%
Large: 280-899	8	0%	3,136	0%
Med.: 108-279	17	47%	2,936	48%
Small: 42-107	40	53%	2,583	55%
Smallest: 0-41	94	59%	1,571	62%

Table 20.2. Physics journals by article volume

If physics followed the STEM norm, each row in Table 20.2 would have roughly 2,712 articles—but as it is, one APC-charging megajournal and eight large journals, all with APCs, account for 48% of the articles, with the many smallest journals underrepresented.

	Jour.	%APC	%All	Art.	%APC	%All
High	33	43%	21%	8,420	86%	62%
Medium	28	37%	18%	866	9%	6%
Low	11	14%	7%	248	3%	2%
Nominal	4	5%	3%	217	2%	2%
None	84		53%	3,807		28%

Table 20.3. Physics journals and articles by fee range

Physics OA journals tend toward high APCs—and those high-APC journals publish six out of seven articles involving APCs, with little left over for less-expensive journals.

APCs could have totaled $14,260,551 in 2014, with no discounts or waivers; that averages out to a very high $1,462.47 per article in APC-charging journals, $1,051.82 per article overall.

[See the book for omitted section.]

Figure 20.2 shows triangles at pay-journal points because some (actually, one: the single journal in 1993-94) wouldn't be visible otherwise. This is another case where the bulk of APC-charging journals appeared quite recently: 60 of 76 such journals began in 2009 or later.

21. Technology

Technology journals were distinguished from engineering journals (and physics or chemistry journals) by journal title or apparent focus: it's a fuzzy distinction. The 201 journals in this field published 11,221 articles in 2013 and 12,138 in 2014.

	2014	2013	2012	2011
Journals	187	186	175	149
%Free	63%	65%	67%	68%
Articles	12,138	11,221	9,496	6,841
%Free	58%	58%	55%	62%

Table 21.1. Technology journals and articles by year

As Table 21.1 shows, technology OA journals don't follow the standard pattern of STEM and biomed journals: That is, not only are the majority of journals free, those journals publish the majority of articles—and after a sharp drop in 2012, that majority is growing.

On a journal-by-journal basis, 97 of the journals (48%) published more articles in 2014 than in 2013; 22 (11%) published the same number; and 82 (41%) published fewer. For significant differences, 85 journals (42%) grew at least 10% or began in 2014; 50 (25%) stayed about the same; and 66 (33%) published at least 10% fewer articles in 2014.

[See the book for omitted section.]

22. Zoology

As used in this project, zoology includes veterinary medicine and marine biology. Unusually, the 213 journals in this group published fewer articles in 2014 than in 2013 (and *considerably* fewer than in 2012): 9,677 in 2014 and 9,697 in 2013.

	2014	2013	2012	2011
Journals	199	202	194	183
%Free	62%	64%	65%	66%
Articles	9,677	9,697	10,972	9,086
%Free	48%	51%	46%	53%

Table 22.1. Zoology journals and articles by year

As usual, Table 22.1 includes only journals that actually published articles in any given year; as usual, most journals don't charge fees but most articles—in 2014 and 2012 at least—appear in journals that do.

On a journal-by-journal basis, 95 journals (45%) published more articles in 2014 than in 2013; 12 (6%) published the same number; and 106 (50%) published fewer articles in 2014. Looking at significant changes, 66 journals (31%) grew by at least 10%; 57 (27%) stayed about the same; and 90 (42%) shrank by 10% or more.

[See the book for omitted section.]

Country	Articles
Brazil	1,879
United Kingdom	827
India	756
Bulgaria	616
Romania	551
United States	504
Japan	483
Turkey	449
Colombia	401
Iran, Islamic Republic of	278
Pakistan	239
Italy	228
Egypt	205
Spain	190
South Africa	179
Switzerland	160
Argentina	120
Poland	117
South Korea	117
Peru	102
Czech Republic	85
Bangladesh	83
Chile	82
Indonesia	77
Mexico	74

Table 22.4. Zoology articles by country of publication

Zoology journals said to be from 48 different countries published articles in 2014; Table 22.4 shows the 25 countries with more than 70 articles. It's another somewhat unusual list.

23. Humanities and Social Sciences

The humanities and social sciences (HSS) have more gold OA journals than other segments (more than 4,000 in all), but they're mostly smaller journals—and very few charge APCs. Total potential revenue is a tiny fraction of either of the other segments, less than one-seventeenth that of biomed. This overview adds tables and graphs not already included in Chapters 1-7, then looks at APC and volume brackets based on this segment, which will be used for the 15 subject chapters that follow.

Cost per Article

	2014	2013	2012
Revenue	$9,521,916	$7,704,928	$6,593,048
Pay Articles	24,328	21,271	19,693
$/article	$391.40	$362.23	$334.79
Tot. Articles	99,771	98,460	95,249
$/article	$95.44	$78.25	$69.22

Table 23.1. Possible revenues and cost per article, HSS, 2011-2014 [partial, 2011 omitted]

Table 23.1 shows the possible revenues and cost per article (for articles with APCs and for all articles) with two huge assumptions: that there were no waivers or discounts and that APCs for each journal remained constant across the four years. Pay articles did grow at a much faster rate than articles in free journals, leading to a rapid increase in the overall average cost per article—but at less than $100, it's still very low.

Journal and Article Volume per Year

	2014	2013	2012	2011
Journals	3,624	3,784	3,659	3,353
Free%	91%	91%	92%	93%
Articles	99,771	98,460	95,249	81,190
Free%	76%	78%	79%	83%

Table 23.2. HSS journal and article volume per year

Table 23.2 includes only those journals that actually published articles in any given year, a figure that's dropped from 2013 to 2014 (some very small annuals may post 2014 articles in late 2015). Article volume continues to grow, although much more slowly since 2012—and the percentage of free articles has dropped significantly, but is still more than three-quarters. The fundamental message: for HSS, more than three out of four papers appear in journals that don't charge APCs.

[See the book for omitted section.]

Of the 4,038 HSS journals, 1,786 (44%) published more articles in 2014 than in 2013; 484 (12%) published the same number of articles; and 1,768 (44%) published fewer articles in 2014. Looking at significant changes, 1,524 journals (38%) grew by 10% or more (including new journals); 1,014 (25%) stayed about the same; and 1,500 (37%) published at least 10% fewer articles in 2014.

Revenue Brackets

Revenue	Journals	Cum J	Articles	Art/J
$2 million +	1		1,505	1,505
$300,000-$499,999	2	3	1,081	541
$200,000-$299,999	2	5	705	353
$100,000-$199,999	7	12	2,371	339
$50,000-$99,999	22	34	5,061	230
$30,000-$49,999	19	53	2,580	136
$20,000-$30,000	24	77	2,783	116
$10,000-$19,999	47	124	2,774	59
$5,000-$9,999	59	183	2,378	40
$2,500 to $4,999	60	243	1,796	30
$1 to $2,499	80	323	1,258	16
$0	22	345		

Table 23.3. Journals by revenue bracket

Except for one outlying psychology journal, no HSS OA journal could have brought in half a million dollars or more in 2014 (note the two missing lines in Table 23.3, covering the range $500,000 to $1.99 million), and only 35 could have earned even $50,000. As usual, there's a steady decline in journals per article as APCs go down. (Note: The bottom row is journals that charge APCs but didn't publish any articles in 2014, thus having $0 revenue.)

New Volume and APC Brackets

Clearly, HSS journals generally have lower APCs and fewer articles than journals in biomed and STEM, so it makes sense to provide new brackets or categories for journals by APC and journals by article volume.

Article Volume Quintiles

	Journals	%Free	Articles	%Free
Largest: 121+	62	35%	19,885	26%
Large: 51-120	269	76%	19,695	75%
Med.: 31-50	507	90%	19,506	90%
Small: 19-30	871	92%	20,611	92%
Smallest: 0-18	2,329	95%	20,074	95%

Table 23.4. Article volume quintiles based on HSS cumulative articles

While there are three HSS journals with more than 1,000 articles in 2014, the vast majority of HSS journals are very small. Table 23.4 breaks as close as possible to the same number of articles in each row—that is, as close to 19,951 as you can get without breaking, say, within the set of journals with 30 articles.

As usual, the percentage of non-APC journals and articles goes down as the size of journals goes up, but in this case only the largest journals have a majority of APC-charging journals and articles.

"Largest" and "Larger" are odd terms, given that the "large" group would mostly be in the "small" group in STEM or biomed, but I'll retain them for consistency. The smallest bracket in STEM or biomed would encompass smallest, small and much of the medium bracket in HSS.

APC Quartiles

	Journals	Articles
High: $353+	84	6,768
Medium: $214-$352	88	4,836
Low: $110-$213	86	3,631
Nominal: $1-$109	87	9,093

Table 23.5. APC-charging HSS journals by APC level

Table 23.5 shows journal and article counts for APC-charging journals bracketed by price, with each bracket having as close to the same number of journals as possible. Although there are a few expensive journals in HSS, most of what's "High" here would be "Medium" in other segments, and all of HSS' "Medium" would be "Low" in other segments.

What's especially interesting here is that more articles appear in journals with nominal fees than in any other bracket.

The alternative calculation—breaking down brackets by a quarter of cumulative 2014 revenue—is as absurd here as in biomed, with the top bracket having all of two journals ($2,177+) and the second ($1,179-$2,145) only 21. Here's the table, for what it's worth:

	Journals	Articles
Top: $2,177+	2	1,523
Next: $1,179-$2,145	21	806
Mid: $331-$1,178	73	5,276
Bottom: $1-$330	229	16,723

Table 23.6. APC-charging journals by cumulative revenue levels

24. Anthropology

Anthropology includes archæology and sports sciences. It's one of several HSS areas that grew enormously by adding non-English journals, nearly doubling in journal count. The 263 journals published 5,525 articles in 2013 and 5,703 in 2014.

	2014	2013	2012	2011
Journals	232	247	235	208
%Free	91%	92%	92%	93%
Articles	5,703	5,525	5,547	4,704
%Free	87%	90%	89%	89%

Table 24.1. Anthropology journals and articles by year

Table 24.1 shows journals actually publishing articles each year. The percentages of free journals and articles has declined slightly—and, in fact, as may or may not be apparent from Figure 24.1, articles in free journals declined ever so slightly in 2014 (by 34 articles or 0.7%), after significant growth from 2011 to 2012.

On a journal-by-journal basis, 133 journals (51%) published more articles in 2014 than in 2013; 21 journals (8%) published the same number; 109 (41%) published fewer articles. For significant changes, 119 journals (45%) grew by 10% or more (including startups); 54 (21%) stayed about the same; and 89 (34%) published at least 10% fewer articles in 2014 than in 2013.

[See the book for omitted section.]

25. Arts & Architecture

Arts & Architecture includes most journals related to the fine arts and some on architecture—but note also two later subjects, language & literature and media & communications. This group includes 226 journals, which published 4,090 articles in 2013 and 4,139 in 2014.

	2014	2013	2012	2011
Journals	201	200	204	186
%Free	96%	96%	96%	97%
Articles	4,139	4,090	3,932	3,317
%Free	91%	87%	90%	93%

Table 25.1. Arts &architecture journals and articles by year

Table 25.1 shows journals that actually published articles in any given year. There has been no significant change in the extremely high percentage of no-fee journals—and the percentage of articles in those journals is actually rising (articles in APC-charging journals dropped by 32% from 2013 to 2014, although that's only a drop of 164 articles).

On a journal-by-journal basis, 115 journals (51%) published more articles in 2014 than in 2013; 24 (11%) published the same number; and 87 (38%) published fewer articles in 2014. In terms of significant changes, 104 journals (46%) grew by 10% or more in 2014; 47 (21%) stayed about the same; and 75 (33%) published at least 10% fewer articles in 2014.

[See the book for omitted section.]

26. Economics

As used here, economics includes most business and management-related topics. It's a large group of journals but not an especially large number of articles: 541 journals publishing a total of 15,945 articles in 2013 and 14,979 in 2014.

	2014	2013	2012	2011
Journals	493	518	482	438
%Free	76%	77%	78%	79%
Articles	14,979	15,495	17,194	14,853
%Free	58%	59%	59%	59%

Table 26.1. Economics journals and articles by year

Table 26.1 only includes journals that actually published articles in any given year, and although it fits the HSS model (more than three-quarters of journals and a significant majority of articles free), the percentage of articles in non-APC journals is on the low side for HSS—but hasn't changed much over the years. The significant decline from 2012 to 2013 and 2014 is mostly due to two large journals declining.

On a journal-by-journal basis, 227 journals (42%) published more articles in 2014 than in 2013; 74 (14%) published the same number; and 240 (44%) published fewer articles in 2014. Looking at significant changes, 192 journals (35%) grew by at least 10%; 157 (29%) stayed about the same; and 192 (35%) published at least 10% fewer articles in 2014 than in 2013.

Figure 26.1 shows free and pay articles by year graphically.

[See the book for omitted section.]

Country	Articles
Romania	2,002
Brazil	1,927
Canada	1,567
Ukraine	1,381
United States	1,103
Turkey	585
Spain	517
United Kingdom	465
Poland	378
Pakistan	343
Mexico	325
Singapore	318
India	316
Colombia	306
Russian Federation	290
Switzerland	281
Serbia	203
Germany	198
Czech Republic	196
Australia	177
Lithuania	173
Croatia	165
Iran, Islamic Republic of	164
United Arab Emirates	119
Nigeria	118
Slovenia	113
Italy	112

Table 26.4. Articles by country of publication

62 countries published economics articles in 2014; here's the top 27.

27. Education

With the addition of the rest of the world's OA journals, education is now the largest group of journals in HSS—and the number of articles, while still relatively small, nearly doubled. In all, 549 journals published 14,053 articles in 2013, declining to 13,314 in 2014.

	2014	2013	2012	2011
Journals	514	524	494	444
%Free	92%	92%	92%	94%
Articles	13,314	14,053	13,275	10,881
%Free	85%	86%	86%	91%

Table 27.1. Education journals and articles by year

Table 27.1 shows journals that actually published articles in any given year. What's implicit in the percentages is that APC-charging journals grew significantly in 2012 but have stayed about the same since then (although the 2014 decline is all on the free side).

Journal-by-journal, 245 journals (45%) grew in 2014; 51 (9%) published the same number of articles; and 253 (46%) published fewer articles in 2014 than in 2013. Looking at significant changes, 201 journals (37%) published at least 10% more articles in 2014; 134 (24%) stayed about the same; and 214 (39%)

published at least 10% fewer articles in 2014. Two-thirds of the 2014 drop is from one journal.

[See the book for omitted section.]

Finally, OA education journals in 59 countries published articles in 2014. Table 27.4 shows the 26 countries with at least 100 articles.

Country	Articles
Brazil	2,411
United States	1,698
Turkey	1,239
Spain	991
Canada	871
United Kingdom	418
Russian Federation	403
Mexico	364
Australia	313
Iran, Islamic Republic of	292
Ukraine	268
Romania	265
India	240
Indonesia	236
Italy	197
Germany	194
Norway	186
Poland	174
Colombia	154
Pakistan	130
Jordan	120
Chile	116
Costa Rica	114
France	110
South Africa	106
Lithuania	101

Table 27.4. Articles by country of publication

Once again, it's an interesting list, with Brazil leading the way and Turkey not far behind the U.S.

28. History

History includes most aspects of cultural research focused on the past and a number of local and regional journals. There are now more than twice as many journals as in the earlier study, but not quite twice as many articles. A total of 275 journals published 5,643 articles in 2013 and 5,883 in 2014.

	2014	2013	2012	2011
Journals	245	253	250	230
%Free	98%	98%	98%	98%
Articles	5,883	5,643	5,639	5,055
%Free	96%	97%	97%	98%

Table 28.1. History journals and articles by year

Table 28.1 includes only journals actually publishing articles each year. The tiny percentage of APC-charging journals and articles in those journals hasn't changed much over recent years. The increase in articles in free journals from 2013 to 2014 is 86% of the *total* APC-charged articles for 2014 and more than the total for 2013.

[See the book for omitted section.]

29. Language & Literature

Language and literature includes linguistics and a number of other fields as well as author-specific journals. It's another subject where the worldwide journal total is twice (exactly, in this case) that in the earlier study. The 524 journals published 11,239 articles in 2013 and 10,711 in 2014 (and once again the decline is mostly one journal).

	2014	2013	2012	2011
Journals	448	472	479	436
%Free	96%	96%	97%	97%
Articles	10,711	11,239	11,029	9,770
%Free	81%	83%	84%	86%

Table 29.1. Language & literature journals and articles by year

[See the book for omitted section.]

30. Law

Law includes forensics and criminology. Another subject that's more than doubled in journals and articles by including the world, this set of 218 journals published 4,367 articles in 2013 and 4,394 in 2014.

	2014	2013	2012	2011
Journals	189	202	193	184
%Free	98%	98%	97%	97%
Articles	4,394	4,367	3,759	3,731
%Free	94%	96%	96%	97%

Table 30.1. Law journals and articles by year

Table 30.1 includes journals that actually publish articles in any given year. There are only five APC-charging law journals, and although the paid article count has more than doubled since 2011, it's still a very small portion of the whole—although articles in those five journals did increase enough in 2014 to more than make up for a tiny decrease in no-fee articles.

[See the book for omitted section.]

In 2014, OA law journals in 37 countries published articles. Table 30.4 shows the 26 with at least 20 articles.

Country	Articles
Brazil	795
Colombia	473
United States	440
Spain	348
Romania	343
Chile	260
Russian Federation	247
Hong Kong	178
Mexico	122
Italy	117
France	99
Croatia	90
Indonesia	88
India	85
South Africa	81
United Kingdom	76
Lithuania	73
Germany	68
Netherlands	67
Switzerland	54
Argentina	45
Peru	36
Estonia	33
Austria	30
Serbia	27
Poland	23

Table 30.4. Articles by country of publication

31. Library Science

Library science includes bibliography, museums, archives and some aspects of information science. It's the smallest group of articles. In all, 131 journals published 2,485 articles in 2013 and 2,542 in 2014.

	2014	2013	2012	2011
Journals	119	127	125	114
%Free	97%	97%	96%	96%
Articles	2,542	2,485	2,528	2,297
%Free	97%	98%	96%	96%

Table 31.1. Library science journals and articles by year

Table 31.1 only includes journals that published articles in a given year, which accounts for the unusual *increase* in free% (one of the five APC-charging journals apparently ceased after 2012). It's a fairly steady-state area, at least since 2012.

Journal-by-journal, 54 journals (41%) grew in 2014; 10 (8%) published the same number of articles as in 2013; 67 (51%) published fewer articles in 2014. In terms of significant change, 46 journals (35%) grew by at least 10% in 2014; 27 (21%) stayed about the same; 58 (44%) published at least 10% fewer articles in 2014.

[See the book for omitted section.]

Other Details

	Journals	%Free	Articles	%Free
Largest: 121+	2	100%	289	100%
Large: 51-120	5	100%	344	100%
Med.: 31-50	19	100%	754	100%
Small: 19-30	18	89%	401	88%
Smallest: 0-18	87	97%	754	98%

Table 31.2. Library science journals and articles by article volume

Table 31.2 emphasizes just how odd library science OA is: what few APC-charging journals there are, are all small—none even publishing 31 articles in 2014. Otherwise, it's fair to say that medium-sized and smallest journals dominate the field.

	Jour.	%APC	%All	Art.	%APC	%All
High	2	40%	2%	27	42%	1%
Low	2	40%	2%	37	58%	1%
Nominal	1	20%	1%	0	0%	0%
None	126		96%	2,478		97%

Table 31.3. Library science journals and articles by fee range

Table 31.3 doesn't mean much, given how few library science charge fees. There are none with medium fees and the one with nominal fees is apparently defunct.

APCs could have totaled $18,350 in 2014 if there were no waivers or discounts. That makes the average charge $286.72 for those few articles involving charges—or $7.22 per article overall. (No, there's no missing digit: that's just over seven bucks.)

[See the book for omitted section.]

32. Media & Communications

Media & communications includes film, journalism, communication theory and some related fields. Adding the rest of the world more than doubled the journal count and nearly doubled article count. In all, 166 journals published 3,616 articles in 2013 and 3,902 in 2014.

	2014	2013	2012	2011
Journals	151	160	149	141
%Free	93%	94%	96%	96%
Articles	3,902	3,616	2,890	2,619
%Free	78%	87%	91%	94%

Table 32.1. Media & communications journals and articles by year

[See the book for omitted section.]

33. Miscellany

This odd group of journals includes interdisciplinary and multidisciplinary journals that didn't seem to belong in STEM, as well as a few that just didn't fit anywhere else. Because some journals have moved to Other Sciences, it's actually a smaller group than in the previous study. The 73 journals in the group published 4,923 articles in 2013 and 4,988 in 2014—but more than half of those were in a megajournal and two other very large journals.

	2014	2013	2012	2011
Journals	58	67	65	54
%Free	84%	85%	85%	87%
Articles	4,988	4,923	4,360	2,146
%Free	39%	44%	42%	66%

Table 33.1. Miscellany journals and articles by year

Table 33.1 shows those journals that actually published articles in each year. This group is unusual for HSS because most articles for years after 2011 are in the small number of APC-charging journals.

[See the book for omitted section.]

34. Philosophy

Philosophy includes specific philosophers and philosophies (as opposed to religions). While broadening the dataset didn't quite double the journal count, it more than doubled the articles—but this is still a somewhat stagnant group. The 175 journals published 3,091 articles in 2013 and 3,035 in 2014.

	2014	2013	2012	2011
Journals	154	162	158	154
%Free	96%	96%	96%	96%
Articles	3,035	3,091	3,153	2,759
%Free	95%	95%	97%	97%

Table 34.1. Philosophy journals and articles by year

[See the book for omitted section.]

35. Political Science

Political science includes military and defense topics and most governmental affairs areas. The 212 journals in this area published 4,038 articles in 2013 and 4,261 articles in 2014.

	2014	2013	2012	2011
Journals	189	200	188	170
%Free	94%	95%	95%	95%
Articles	4,261	4,038	3,791	3,372
%Free	83%	89%	90%	94%

Table 35.1. Political science journals and articles by year

[See the book for omitted section.]

36. Psychology

Psychology includes a few borderline cases—and, as this chapter may suggest, it's an uneasy fit in HSS, in some ways closer to STEM. The 167 journals published 5,406 articles in 2013 and 5,798 in 2014.

	2014	2013	2012	2011
Journals	158	162	153	146
%Free	85%	88%	88%	90%
Articles	5,798	5,406	4,643	4,065
%Free	66%	70%	77%	81%

Table 36.1. Psychology journals and articles by year

[See the book for omitted section.]

Journals in 38 countries published articles in 2014; Table 36.4 shows the 25 with at least 20 articles each.

Country	Articles
Switzerland	1,505
Brazil	1,200
Spain	498
Colombia	420
Russian Federation	274
United States	259
Germany	202
United Kingdom	189
Poland	137
Chile	124
Georgia	120
Canada	101
Iran, Islamic Republic of	98
Mexico	93
Italy	91
India	89
Japan	41
Costa Rica	36
Czech Republic	35
Romania	33
Serbia	28
Portugal	25
Peru	24
Croatia	22
Uruguay	22

Table 36.4. Articles by country of publication

37. Religion

Religion includes journals on specific religions and religious figures, but also aspects of religious and non-religious thought. In all, 114 journals published 2,532 articles in 2013 and 2,784 articles in 2014.

	2014	2013	2012	2011
Journals	104	106	107	100
%Free	91%	92%	92%	94%
Articles	2,784	2,532	2,563	2,398
%Free	66%	66%	71%	69%

Table 37.1. Religion journals and articles by year

[See the book for omitted section.]

38. Sociology

Sociology includes a range of social sciences that didn't fit elsewhere, including gender studies, social science and more. It's a sizable and growing group, with 404 journals publishing 11,957 articles in 2013 and 13,338 articles in 2014.

	2014	2013	2012	2011
Journals	369	384	377	348
%Free	90%	90%	91%	92%
Articles	13,338	11,957	10,946	9,223
%Free	65%	74%	77%	83%

Table 38.1. Sociology journals and articles by year

[See the book for omitted section.]

39. Subject Summaries

This chapter consists of tables showing one or more characteristics of the gold OA activity within the 28 subjects, with subjects sorted by the salient characteristic. Some of the tables simply summarize what's already present in the subject chapters; some provide new information.

[See the book for omitted section.]

Subject	Art/J Q1	Art/J Med	Art/J Q3
Medicine	18	35	70
Agriculture	17	32	55
Physics	15	32	70
Engineering	16	31	60
Chemistry	15	30	81
Other Sciences	17	28	56
Biology	13	27	61
Ecology	12	26	45
Technology	16	26	66
Zoology	14	26	60
Miscellany	12	25	63
Computer Science	11	22	59
Psychology	12	22	35
Earth Sciences	12	21	38
Economics	12	21	32
Mathematics	12	21	39
Sociology	11	20	33
Media & Communications	11	19	28
Anthropology	10	18	32
Education	11	18	32
Law	9	17	30
Political Science	10	17	25
Religion	9	17	27
History	10	16	24
Arts & Architecture	9	15	24
Language & Literature	9	15	25
Philosophy	10	15	27
Library Science	9	14	26

Table 39.8. Articles per journal in 2014: Median, also showing 1st and 3rd quartiles

Finally, Table 39.8 looks at articles per journal in 2014, excluding journals that didn't publish any articles that year. The sorted column is the median (half of the journals have as many or more articles, half have as many or fewer), but the table also shows the first quartile and third quartile. Is it surprising that journals in medicine have the highest median and that HSS journals typically run much smaller? Probably not. It's a little surprising that in a dozen subjects fully half the journals that published articles in 2014 published fewer than 20 articles.

40. Conclusions and Next Steps

I began this project in an attempt to bring hard numbers to discussions of what's actually happening with open access journals. After several intermediate steps, this report is the result. Covering very nearly all of the journals in the *Directory of Open Access Journals*—which, to my mind, is a good way to define "serious OA journals"—it was done without preconceived notions as to what I'd find.

I'm fundamentally an OA independent. I'd like to see more scholarship available to more people. I *know* academic libraries can't keep playing the Big Deal game for much longer, and that this game locks out new publishers and gives the biggies an unfair advantage. I don't believe it's reasonable to assure the same very high profits for the biggies in an OA world by supporting high article processing charges, without fairly clear accounting as to where that money is going. But I also know it costs money to publish, although so little to publish the typical 10- to 20-article-per-year humanities journal that a departmental budget can probably absorb it easily.

This report shows what's happening as of 2014, as completely as I believe anybody has done. I've tried to keep my own opinions out of it, and—with few exceptions—I've deliberately avoided naming individual journals or publishers.

Conclusions of Sorts

Maybe I shouldn't attempt to draw conclusions; maybe that should be left for the reader. But I do believe I can offer some partial answers to the questions posted in the first chapter.

> Is gold OA a significant portion of scholarly publishing—and, if so, how big is it and how fast is it growing?

Yes, it is—almost certainly at least 20% and possibly more. It's growing, but not (generally) very rapidly.

> How do subject areas differ in terms of gold OA publishing?

Vastly. See most of the book.

> How much money might be involved in gold OA APCs? (That's really two questions: How much do journals charge per article and how much revenue might journals be gaining from those charges?)

Might be is an important qualifier: I wouldn't be surprised if actual revenues weren't at least 15% lower than those shown and maybe more. These numbers are provided throughout the book.

> How many articles are published in a typical OA journal (or, realistically, in various sorts of OA journals)?

There's no such thing as "typical"; the median is 14 to 35, but the reality is zero to more than thirty thousand.

> How do OA journals and their policies differ by starting date?

Other than pay-vs.-free, where it's clear that most pay journals in most topics emerged quite recently, I couldn't really answer this one.

> Are there useful things to say about claimed country of publication?

Useful's a tricky term, but I believe the articles-by-country tables are at least interesting and quite possibly meaningful.

> Beyond major subject areas, do OA journals differ significantly by narrower subject categories?

Enormously—so much so that it may be more useful to think of OA within a subject area. I suspect a medical expert could split the huge medicine category into a dozen or so smaller subjects that would show quite a range of numbers as well.

I suspect there are many other conclusions to be drawn as well. Personally, what I see here leads me to be skeptical of the need for a humanities megajournal or any form of major APC-charging humanities development: It seems as though most humanities and social sciences are doing fairly well without charges—but I could be wrong.

There is *no* field in which there aren't a significant number of free OA journals publishing a significant number of articles (even biology had more than 6,000 no-fee articles in 2014). There are fields in which there is no significant amount of APC-charging OA activity (library science, for example), but not many. No-fee publishing is declining in some subjects but by no means all (see Table 39.4), and gold OA in general is doing pretty well.

What's Next?

Open access in all its flavors is healthy and probably growing, not without controversies and not without pains.

I believe it's useful to have real numbers on what's happening in OA. I've tried to provide those numbers for 2011-2014 in this report, being as transparent as possible about techniques and limitations.

I believe it would be useful to *continue* that process. The full implementation and verification of *DOAJ*'s new listing criteria is likely to change the landscape to some extent, but it's also fair to assume that there will be hundreds of new journals introduced each year (quite apart from "journals" and other chimeras).

The largely-manual process I use has its limitations, but it may be the only way to get real numbers. The primary limitation is that it's time consuming. On average, it probably takes me an hour to deal with 10 to 15 new journals (sometimes less, sometimes more), and about an hour to add new numbers to existing records for 20 to 40 journals. Add it up, and you're talking about a lot of labor, quite apart from analysis and report preparation.

Which raises the question of money. This report was done without financial support (although the narrower report covering through the first half of 2014, appearing in summary form as *Open-Access Journals: Idealism and Opportunism*, did involve payment). I offer no apologies for the fact that ALA Publishing charges for that publication—and I offer no apologies for charging for this report.

If there's enough activity to make it worthwhile, I'll make the anonymized spreadsheets behind this report available on figshare. (A single appropriate payment from an agency would also suffice—and a single appropriate payment could change the price of the PDF version of this report to $0. Contact waltcrawford@gmail.com if you're interested, or if you know of ways to fund further research.)

If there's enough activity to make it worthwhile or if there are other sources of funding, I'll do another round in early 2016—taking the latest *DOAJ*, looking at journals that are new or didn't make A-B grades this time around, adding 2015 article counts, and doing a 2011-2015 report. I think it would be worthwhile, and I'm not looking for enough activity to constitute minimum wage for the time spent.

So the next steps are up to you and others who care about OA and want to see facts behind the discussions, not just opinions. I'm willing, but not without support. And, of course, "enough activity" includes citing and publicizing this report as appropriate.

Meanwhile, OA matters—not only gold OA (and its so-called cousin "hybrid" OA) but also green OA. I'll continue writing about it from time to time in *Cites & Insights* as long as that ejournal (which is, as always, free but not OA because it's neither peer-reviewed nor scholarly) continues. If this is the last report of its kind, there will be other objective sources of at least partial information; pay attention to them!

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