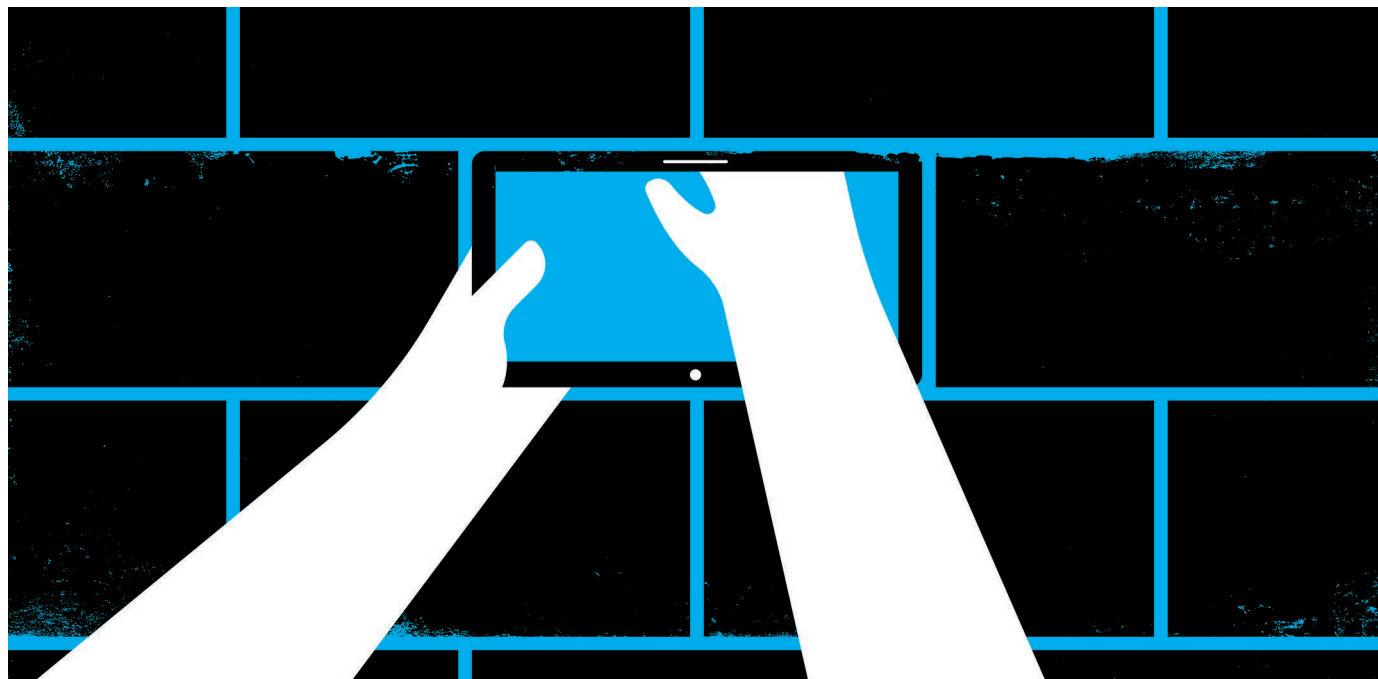# NEED A PAPER? GET A PLUG-IN

A collection of web-browser plug-ins is making the scholarly literature more discoverable.

BY DALMEET SINGH CHAWLA

For researchers with limited library resources, literature searches can seem frustratingly hit or miss: sometimes, they find exactly what they need first time, but sometimes, the key reference is hidden behind a paywall.

According to one analysis, about one-quarter of web-accessible English-language scholarly documents are freely available online — roughly 27 million of a total of 114 million documents (M. Khabsa and C. L. Giles *PLoS ONE* **9,** e93949; 2014).

But some researchers find it challenging to access the publications they need. For example, many authors make their papers available on public repositories, but those are hard to pull up in searches. Other times, researchers can access a paywalled paper through their institutions, but find themselves blocked when trying to access it using a different network at home. At that point, scientists can mine the Twitter hive-mind using the #icanhazpdf hashtag. And some opt for the self-styled "pirate website" service Sci-Hub.

Increasingly, however, scientists are turning to tools such as Unpaywall, Open Access Button, Lazy Scholar and Kopernio. These tools all do more or less the same thing: tap into an overlapping set of data sources to identify and retrieve open-access copies of research papers that are inaccessible or hard to find through other routes.

I CAN HAZ SCIENCE?

Marine biologist Holly Bik has access to the University of California system's entire digital catalogue — some 53,000 journals — when she's on site at the Riverside campus. Off campus, it is a different story. Although the university provides access to library resources through its virtual private network (VPN), she finds that the connections can be unreliable. Some websites and networks also block VPN connections, which can make it difficult to access literature while on the road, Bik says. "You're kind of at the mercy of your Internet connection when you're off-campus."

Even on campus, library collections often include only a subset of volumes. This can pose a real limitation for people who need to find articles that date back decades, for instance. "A lot of researchers will tell you that this older literature can be a treasure trove of ideas," Bik says. "In this day and age, it's important to have access to those kind of things."

So, too, must some people who work on the research periphery, such as science policy-makers. Many of these individuals are limited to the papers that are freely available online through open-access journals, institutional repositories and preprint servers.

The lack of access to so much research represents "a fundamental barrier to progress", Kopernio co-founder Peter Vincent said in an interview published on Imperial College London's website in May.

Kopernio, a free web-browser plug-in ▶

▶ that aims to reduce the search for accessible copies of paywalled papers to a single click, offers one possible solution. When users land on a journal article web page for which a copy is legally available from open-access publishers, preprint archives or a user's own library subscription, the plug-in overlays a bar across the top of the page. Clicking a button within that bar brings up the desired PDF. The tool finds PDFs for about 80% of papers, according to Kopernio co-founder Ben Kaube, a physics doctoral candidate at Imperial.

Launched in April as Canary Haz, a play on #icanhazpdf, Kopernio allows users to register their university log-in credentials, providing those working off-campus with access to library resources, even without a VPN.

"There is nothing more frustrating than trying to do work off campus and coming up against paywall after paywall on sites you are used to having unfettered access to," says Barney Walker, who is working towards a PhD in synthetic biology at Imperial and is a regular user of Kopernio. Even when institutions subscribe to content, he notes, navigating some publisher sites can be difficult. Papers can be blocked or difficult to load, requiring repeated log-ins, particularly when working off-campus. "Kopernio takes care of that for you, giving you access with a single click to many different publishers."

Vincent says that the plug-in has 3,000 users across 350 institutions. Although it is still in the early stages of development, it already supports more than 20,000 journals and 1,000 libraries, with more being added every week. A 'locker' feature allows Kopernio to store previously accessed papers for future requests by the same user. The tool has also been integrated with Google Scholar and PubMed, and displays a button for each search result for which it can find a PDF. A premium version of Kopernio, which will charge users for features such as Dropbox integration and private cloud-based lockers, will launch later this year, Kaube says.

AN EXPANDING TOOLBOX

Kopernio is not the first such tool. A popular alternative is Unpaywall, which has more than 100,000 active users worldwide and 75,000 queries per day. One of those users is Bik, who says that the software "definitely lowers the activation energy required to quickly download a paper". Another is Stephanie Zihms, who studies energy and geoscience at Heriot-Watt University in Edinburgh, UK. "My rate in accessing paywalled papers has probably increased by 50% or so," she says.

Similarly to Kopernio, Unpaywall is a browser extension that simplifies the search for open-access PDFs. The tool gets much of its data from a database called oaDOI, which indexes 90 million papers that have been assigned digital object identifiers (DOIs). Both Unpaywall and oaDOI were created by Jason Priem and Heather Piwowar, who co-founded the non-profit firm Impactstory in Vancouver, Canada. According to a study published in August and co-authored by the pair, Unpaywall can find legal and free copies of the papers that its users land on almost half the time (H. Piwowar *et al. PeerJ Preprints* **5,** e3119v1; 2017).

If a paper is available, Unpaywall's grey 'lock' icon turns green and 'unlocks'. Activating the 'OA Nerd Mode' option colour-codes the unlock sign gold, green or bronze depending on which open-access subcategory the paper falls under. (Gold refers to papers published in open-access journals; green content is published in subscription journals but archived in an open repository; bronze indicates studies that are free to read on the current page, but published in a toll-access journal.)

"My rate in accessing paywalled papers has probably increased by 50%."

Other options include Open Access Button, in which users can e-mail authors through the click of a button when the program can't find a copy of the paper (or the data set underlying it), and Lazy Scholar, which provides users with metrics such as the journal impact factor and suggests related papers for additional reading. Both tools launched in 2013.

These tools largely overlap in the data sources they use, and therefore, the papers they can access. These include PubMed Central, Europe PMC, Google Scholar and the Bielefeld Academic Search Engine, a database of more than 100 million documents from 5,000 or so sources.

What distinguishes these tools from sites such as Sci-Hub is that their developers say that they retrieve only legally available articles. But some publishers still have concerns. Glenn Ruskin, a spokesperson for the American Chemical Society (ACS) in Washington DC, which publishes several pay-to-read journals singles out Unpaywall, and says that it "must take proper care to direct its users to content-sharing sites that respect the intellectual property of rightsholders". In response, Priem says that he has already tweaked the tool to exclude sources flagged by publishers, and welcomes pointers to any other such sites.

Other publishers, too, including Springer Nature, which publishes *Nature*, say that they are working to help scientists to access and share their journal articles through the development of their own software. (*Nature*'s news team is editorially independent of its publisher.)

Certainly, scientists say that they need such tools. As Éric Archambault, chief executive of Science-Metrix in Montreal, Canada, puts it, scientists "shouldn't be spending hours finding papers", but "spending hours reading them". ■

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