

Predatory publishing and cybercrime targeting academics

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Abstract

The purpose of this report is to inform and warn academics about practices used by cybercriminals who seek to profit from unwary scholars and undermine the industry of science. This report describes the signs, symptoms, characteristics, and consequences of predatory publishing and related forms of consumer fraud. Methods to curb these cybercrimes include educating scholars and students about tactics used by predatory publishers; institutional changes in how faculty are evaluated using publications; soliciting cooperation from the industries that support academic publishing and indexing to curb incorporation of illegitimate journals; and taking an offensive position by reporting these consumer fraud crimes to the authorities. Over and above the problem of publishing good science in fraudulent journals, disseminating and citing poor-quality research threaten the credibility of science and of nursing.

KEYWORDS

cybercrime, open access, predatory publishers, research, scholarly publishing

1 | INTRODUCTION

A brief editorial on predatory open-access journals recently appeared in this journal (Umlauf, 2016). That short report garnered a great deal of interest by readers. In all fairness to readers, it did not include the range of methods that cybercriminals use to prey on scholars, academics, researchers, and the consumers of scientific research. Deceptive online practices have expanded to attack the ways scholars use to disseminate science that includes sham conference offerings, fake journals, identity theft, and dishonest business practices. Digital villains do not just aim at novices like graduate students or junior faculty members. Seasoned researchers and faculty members have also been fooled by these deceptive practices and are open to identity theft in the academic domain. The consequence to honest scholars is lost time, wasted use of data, misspent grant money, and completed manuscripts that are not indexed or archived. Scientific advancements are also undermined by a proliferation of questionable data from unethical scholars. Ironically, poor studies may be widely disseminated and good science lured into a black hole by cybercriminals who focus on academics. Ultimately, these circumstances lead to an erosion of public trust among both researchers and academics.

1.1 | The culture of academic publishing

As science has evolved into its present form, it depends on the work of successive generations of investigators for advancement. Progress in

modern science depends upon disseminating research that is valid and reliable. The industry of academic journals relies on a system where qualified scholars voluntarily review the manuscripts of others. This vetting process, also called peer review, screens out poor quality and unethical studies. Peer review can also benefit authors because reviewers typically make recommendations that will improve manuscripts. Glossary I provides a brief review of publishing terms.

Publishing a research study is viewed as an academic distinction that is only surpassed by having other scholars cite the study in their future manuscripts. In academia, papers with many citations are relatively uncommon and are considered major contributions to science; authors with many such publications are acclaimed in their fields. Likewise, journals that publish articles yielding many citations have the highest reputations in academia. Ultimately, publishing original studies that generate new science and future research is a critical component of scientific advancement.

2 | THE PARADIGM OF PREDATORY PUBLISHING

With the advent of the Internet, there have been widespread improvements in the dissemination of research in the form of online journals and their publishers. Conversely, the Internet has also opened pathways for dishonest actors to corrupt this system. The result is a new criminal paradigm that threatens honest scholars and the scientific

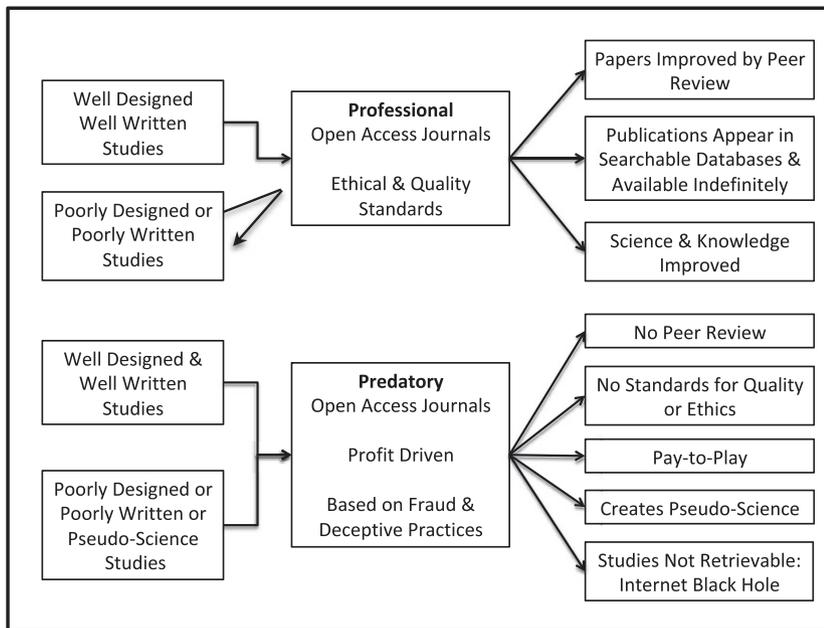


FIGURE 1 Open-access journals: professional versus predatory models

process. An academic librarian, Jeffrey Beall, has been on the forefront of describing this new paradigm and exposing the illicit methods of “Predatory Publishing” (Beall, 2012a, 2012b; Beall, 2017a, 2017b). That is, fake online publishers use spam email to find both naive and unsuspecting scholars as well as unethical authors who want to publish at any cost. This profit-driven scheme bypasses peer review and promises quick publication, but only after the author pays a fee. When a manuscript is poorly written or the science poorly designed, this arrangement is ideal. On the other hand, honest and mistaken authors who discover their error and seek to withdraw their papers later cannot. If the fake journal publishes anyway, authors are ethically barred from resubmitting their manuscript to a legitimate journal. Further, because these journals are not legitimate, their manuscripts may only appear online for a short time because they are just posted on a website, not truly indexed or archived (Figure 1). Glossary II includes a list of terms that delineate predatory publishing.

Although, Beall's initial focus was on scientific journals, the same strategies used by predatory publishers are now widely used to market spurious conferences, execute identity fraud targeting scholars, hijack professional journal websites, generate fake science, and enable unethical authors. Thus, creative cybercriminals are exploiting the need of scholars and investigators to disseminate their research. Ultimately, the criminals are making money, and unethical authors are willing to pay to publish substandard manuscripts for professional gain.

2.1 | Why has this form of crime advanced?

Like most cybercrime, profit is the motivator. Starting with the invention of the printing press, academic publishing evolved into a subscription model of specialty print journals where manuscripts undergo peer review to ensure scientific validity and quality. Today, manuscripts and journals can be published in online or hybrid formats. In 2015, legitimate online publishers generated \$335 million in total revenue. In the same year, illegitimate publishers generated \$75 million by publishing 500,000 questionable manuscripts in 8000 dubious journals

(Teixeira da Silva, 2015). Although the average charge to authors seem very low (US\$178), this likely reflects the preponderance of authors and questionable publishers from developing areas such as India, Asia, and Africa (Shen & Bjork, 2015).

2.2 | Who submits papers to questionable journals?

In a recent study of 1907 papers from 200 likely predatory journals, the largest number of papers (27%) came from India. Among developed countries, the US produced 15% and Japan just 4%. However, these rates must be reinterpreted based on scientific output per nation. For example, the US produces more than 5 times more published manuscripts as India. Accordingly, the adjusted rate by productivity is estimated at 10% for India and less than 1% for the United States and Japan. Overall, however, most (57%) of the corresponding authors represented higher income or upper middle-income countries (Moher et al., 2017). However, it is not known how many authors submitted manuscripts in error, because they assumed that the journal was legitimate. Conversely, authors who deliberately choose to submit manuscripts to dubious journals, especially those in developing countries, may be seeking better chances for employment, promotions, tenure, or research grants (Greco, 2016). Padding a resume with sham publications is one form of academic deception and may be very effective if publication records are not properly checked before employment or promotion.

2.3 | Publishers: Black List vs White List

Initially, Beall created a website to help authors identify deceptive publishers and journals. Therein, he posted 3 lists of predatory publishers and journals categorized as potential, possible, and probable (Beall, 2017). Beall's criteria for populating these lists were not research based; they were based on standards of library science (Beall, 2012). Although Beall was explicit about his methods to populate his listings, a very few publications were incorrectly categorized and corrected after appeals to Beall. Although Beall only referred to the 3 categories

simply as “lists,” in common parlance, they became known as the “Black List” because the contents were dishonest in nature. In 2017, because of legal pressure, Beall deleted the lists from his website. Many scholars have lamented removing them from public access, although the list still exists in archived form elsewhere on the Internet (Strielkowski, 2017; Watson, 2017). However, Beall's criteria remain available to the public; it offers a reliable and detailed method to identify devious invitations to publish or present.

As a logical alternative to black listing, scholars have been looking for a reliable *White List* to identify legitimate academic journals. Initially, many thought that using an indexed list like PubMed Central® would be a good choice, but indexing does not guarantee that a given journal is legitimate (Misra et al., 2017). Disreputable journals creep into PubMed Central® when papers by honest authors have been caught in the predator's trap and must be entered there because of regulations by funding agencies.

The next logical alternative might be to trust only journals that report having an “impact factor” score, a type of measure that illustrates scientific importance based on the number of citations of a journal's published papers. The score reflects the yearly average of number of times papers in the journal are cited by other authors. However, judging by some form of impact factor is not entirely safe because illegitimate journals can make up these scores as they choose (Shamseer et al., 2017). Illustrating how these criminal enterprises continue to evolve, others have reported that “fake impact factor factories” are generating new brand names or versions that are just as dubious or simply illegitimate (Gutierrez, Beall, & Forero, 2015; Teixeira da Silva, 2015).

2.4 | Predatory publishers: signs and symptoms

Predatory scams usually have similarities that help consumers discriminate genuine solicitations from fraudulent offers. Although Beall's (2012) cautionary criteria are quite detailed, there are several more concise listings of typical features or “red flags” suggesting questionable journals or publishers (Misra et al., 2017). Others have turned the research tables on spurious publishers to expose their methods. For example, Shamseer and colleagues used a 3-group comparative design of 302 journals to compare “presumed” predatory journals with open-access journals and subscription-based publications (Shamseer et al., 2017). The study yielded 13 evidence-based characteristics and malpractices, which were not unlike some found in Beall's original criteria and the list from Misra and colleagues (Table 1). Notably, these characteristics are fairly consistent whether drawn from observation or from research methods. Ultimately, however, we must keep in mind that these lists also educate criminals on how to refine their malpractices. As long as profits can be made, their dishonest strategies will continue to evolve.

2.5 | Citing bad science

According to Beall, the greater danger lies in the number of unethical authors who willingly publish low quality or fraudulent studies that threaten the credibility of science (Beall, 2016). Without valid peer review, dishonest journals “pollute the scholarly record with fringe or junk science and activist research.” That is, when other unsuspecting academics cite papers that contain bad science, they give legitimacy to the illicit journals (Shamseer et al., 2017). Anyone can be susceptible

TABLE 1 Signs and symptoms of predatory journals and publishers

Shamseer and colleagues*	Misra and colleagues**
<ul style="list-style-type: none"> • The scope of interest includes nonbiomedical subjects alongside biomedical topics. • The website contains spelling and grammar errors. • Images are distorted/fuzzy, intended to look like something they are not, or which are unauthorized. • The homepage language targets author. • The index Copernicus value* is promoted on the website. • Description of the manuscript handling process is lacking. • Manuscripts are submitted back to the journal via email. • Rapid publication is promised. • There is no retraction policy. • Information on whether and how journal content will be digitally preserved is absent. • The article processing/publication charge is very low (eg, <US\$150). • Journals claiming to be open access either retain copyright of published research or fail to mention copyright. • The contact email address is nonprofessional and nonjournal affiliated (eg, @gmail.com or @yahoo.com). 	<ul style="list-style-type: none"> • Journals that solicit or accept articles from many unrelated specialties. • Journals that are entirely online; claiming to be open access. • Journal indexing details are unclear or have nonstandard indexing. • Process of manuscript submission and handling is poorly outlined or inferiorly handled (ie, lacking peer review). • Repeated email solicitations for manuscripts from persons with whom you have no prior professional contact. • Very short deadlines for articles solicited from unknown journals. • Journals offering a reduced author's publication fee—if the paper is submitted within a very narrow timeframe (weeks). • Unprofessional language in an email soliciting an article that seems intended only to please or inflate the ego of the author. • Email solicitations referring to one or more previously published articles by the author, using flowery language praising the same and asking for a commentary or editorial on it. • Lack of transparency regarding publication fees. • Promise of a rapid publication (weeks). • New online-only journal with any one of the following: <ul style="list-style-type: none"> ◦ Lack of association with or publication by reputable professional societies. ◦ Very few articles published in the past 2 years. ◦ Publications that are poorly written with gross inaccuracies in the scientific content. • Poorly maintained webpage; language errors and grammatical mistakes. • Lack of proper instructions to authors, not adhering to existing ethical standards.

*Used with permission: Shamseer et al. (2017). Potential predatory and legitimate biomedical journals: can you tell the difference? A cross-sectional comparison. *BMC Med*, 15(1), 28. Index Copernicus – not a legitimate quality index for journals. **Adapted from: Misra, D. P., Ravindran, V., Wakhlu, A., Sharma, A., Agarwal, V., & Negi, V. S. (2017). Publishing in black and white: the relevance of listing of scientific journals. *Rheumatol Int*, 37(11), 1773–1778.

TABLE 2 Where to find credible nursing journals for authors and researchers

Directory of nursing journals	http://nursingeditors.com/journals-directory/
Directory of Open Access Journals	http://doaj.org/
SCImago Journal & Country Rank	http://www.scimagojr.com/
Journal Citation Reports, Web of Science	https://webofknowledge.com/

to this error if they rely on reading only abstracts and not the actual paper. However, this can be a particular problem for students if they habitually search for literature using common search engines like Google Scholar rather than a trustworthy index or listing from a professional organization (Table 2).

3 | OTHER FORMS OF CYBERCRIME AGAINST ACADEMIA

3.1 | Identity fraud: *journal editors wanted—dead or alive*

Another form of Internet fraud used against academics is when someone's name and reputation is listed as a reviewer or editor for an unknown journal or as an organizer/participant for a bogus conference—without their knowledge. As recently as 2016, a long deceased, but well-known scientist, was listed as the editor of a new journal (Spears, 2016). Not surprisingly, the photos of the Editorial Board included pictures of real scholars with fake names attached. Of course, this is done to fool the rest of us into believing that the journal or conference is legitimate. This tactic can only be challenged by contacting the named person yourself, which may actually do the victim a favour. Unfortunately, the target of identity theft may not have any recourse except to complain using the contact email listed on the website. However, like most forms of Internet fraud, criminals control their websites and can continue to misuse the reputation of honest scholars as long as they like—until enforceable laws with significant consequences are put in place and when sufficient numbers of scholars report these crimes.

3.2 | Hijacked conferences: *authentic or pay-for-play*

The notion of deceptive publishers has further expanded into the arena of scientific conferences. Unsolicited email invitations to conferences are commonplace too. Spam solicitations target both novice and expert academics and entice them by offering guaranteed speaking opportunities. Further, researchers frequently receive invitations to speak or present international conferences that are a very short time away, which is very unusual for professional conferences. It is noteworthy that many email invitations are signed using just a first name that may be unusual, such as “Rapture” (personal communication, 2018).

The inherent problem with these offers is that the events may not be legitimate or that famous speakers will not appear as advertised. For example, well-known conferences have been hijacked by slightly altering the name in advertisements (Bohannon, 2015; Cobey et al., 2017). As has happened to NIH researchers, their travel allotments were wasted on a poorly organized, inauthentic conference where they did not connect with other notable scholars as advertised (Bowman,

2014; Kolata, 2013). Like publishing research articles, presenting papers at scientific conferences are an important, but expensive, form of communication among scholars. Money spent on fake conferences yields no benefit to investigators or to science.

4 | INSTITUTIONAL STRATEGIES

Although Beall no longer maintains the lists of potential, possible, and probable predators, he is still on the forefront of addressing the problem of deceptive publishing. He has moved past focusing on authors alone to address how organizations contribute to this form of cybercrime (Beall, 2016). Addressing a wide range of related academic industries, he proposes these important policy changes:

- Eliminate using the *quantity* of publications as criteria for promotion review at universities and colleges.
- Exclude the metadata of illegitimate journals from library databases.
- Scholarly databases (eg, Scopus, Thompson Reuters Web of Science, PubMed) should make the acceptance criteria related to peer review more rigorous and refuse to work with illegitimate journals.
- Software companies that provide services to publishers (eg, licence journal management or standard identifiers) should decline to work with illegitimate journals.

These recommendations highlight the fact that there are many participants in the industry of academia, from students to faculty, to universities, to academic publishers and indexing services, who must take an offensive position against cybercrime and predatory publishing. Otherwise, if the public loses trust in science, nations may cease to fund or invest in research and academia.

5 | REPORTING CYBERCRIME

From a strictly educational perspective, educational and research agencies share an obligation to educate and warn their communities about how cybercrime threatens science and academia. The US National Institutes of Health (NIH), the primary source of scientific research support in the US, recently issued a warning about deceptive practices by journal publishers (US National Institutes of Health, 2017). In addition, the US Federal Trade Commission (FTC) has also issued a warning about predatory journal publishers. The warning also states that if you've been “approached or taken in by a predatory publisher, report it to the FTC” (<https://www.ftccomplaintassistant.gov/#crnt&panel1-1>) (Lake, 2017).

In 2016 the FTC filed federal charges against 3 US companies: *OMICS Group*, *iMedPub LLC*, and *Conference Series LLC* as well as their owner Srinubabu Gedela. Using consumer fraud laws, the charges included the following: listing false statements on its website, failure to provide peer review, using the names and reputations of scholars as board members without their permission, deceptive business practices in excessive charges billed to authors and holding hostage valuable manuscripts when authors request to withdraw their papers and other

related predatory actions (US Federal Trade Commission, 2016, 2017). This case is still underway, but unfortunately, this legal action may only affect predatory businesses operating in the US, not other countries.

6 | IMPLICATIONS FOR NURSING

Like other areas of science, nursing is also under attack by predatory publishers. The number of questionable open-access nursing journals has grown exponentially from just 5 journals in 2011 to 54 in 2015 (Oermann et al., 2016). Oermann and colleagues examined 140 questionable journals from 75 publishers; they found the many of the red flags and characteristics described previously (Misra et al., 2017; Shamseer et al., 2017). For example, the average length of time the journals had been published was just 2.2 (SD = 1.98) years. Most of these journals published only 1 or 2 volumes (years) and a median of 2 issues per volume. At the time of Oermann's study, these 140 journals published 4238 articles with 27% in the first issue and 21% in the second issue. The mention of the peer review process was frequently absent from the journals' websites; the time between submission and publication was listed as only days to weeks in length. Thus, it is unlikely that peer reviews were completed. Some journals also indicated that they were indexed in PubMed, CINAHL, or EBSCO, but the investigators could not locate any of the journals in those indexes.

A second study by Oermann and colleagues examined the quality of manuscripts from predatory journals (Oermann et al., 2017). Almost all (97%) of the studies were evaluated as poor or average. Most authors (74%) had no academic credentials listed, and although these journals had nursing in their titles, only half of the papers were nursing related. Numerous papers had issues with grammar, spelling, incorrect word choice, capitalization, and phrasing, while many others were technically well presented but lacked scientific rigour to justify the results.

These two studies clearly illustrate that nursing is under siege by predatory publishers. However, what we do not know is how many honest authors have reported their problems with predatory publishers to law enforcement agencies. Perhaps nursing authors are simply unaware that there are legal options to counter this spreading problem? At the very least, academics must arm themselves with information about this type of crime and then report it. On the other hand, have academics been lobbying legislators to provide more legal protection for this important industry?

7 | CONCLUSION

Cybercrime targeting the academic and research industries is an undesirable outcome of the digital age. What is clearly lacking is sufficient awareness of the problem and how to resolve it. Unless scholars worldwide are willing to report these crimes and guard against citing bad science, our recent history of scientific productivity will regress into a new Dark Ages. To turn the tide, anyone who is defrauded or solicited for fraud should report it to the authorities. This is an international problem that requires an international solution.

AUTHORSHIP STATEMENT

This an original paper developed and written by Drs. Umlauf and Mochizuki. The opinions expressed in this paper are their own and do not reflect those of the journal, the publisher, or Chiba University. The authors have no financial interest or potential conflicts of interest regarding the content of this paper.

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Glossary | Brief List of Standard and Legitimate Publishing Practices

Open access publishing	Journals or publications with content that is available to all users for free, not just subscription holders (eg, individuals, university libraries, etc.). Example: <i>When research is awarded funding by the US government, resulting publications must be provided in OA format. This policy offers universal dissemination of scientific outcomes.</i>
Peer review, blind review	<ul style="list-style-type: none"> • A legitimate system whereby anonymous scholars review manuscripts submitted by others to determine if the methods and data are justified in a scientific context. • Reviewers consider the following: Research methods are rigorous; ethical standards have been met; statistical tests are appropriate; the results meaningful; etc. • Manuscripts are also reviewed for quality of writing and that papers meet the submission standards of the journal. • Reviewers make recommendations to publishers regarding necessary revisions and rejection or acceptance manuscripts.
Impact factor	<ul style="list-style-type: none"> • The term “impact factor” was originally developed by ThomsonReuters.com and reflects the citation performance of journals from their collection of indexed journals. • This quality metric indicates that a single journal has multiple papers that receive multiple citations per year; this average is calculated across multiple years. • Number of citations (from a single manuscript) is viewed as an indicator of the scientific importance of the paper and reflects positively on the reputation of the author(s) as well as their employer(s) and funding agencies. • This rubric works against new journals (and journals that are not indexed) because it takes several years for a sufficient number of citations by other authors to accumulate across time.
Article processing charge	The fee that authors pay to allow their paper to be accessible to everyone (ie, open access). Sometimes referred to as the <i>Gold APC</i> .
Indexing of journals	<ul style="list-style-type: none"> • A method of listing journals and/or articles in a searchable format for use by other scholars. • Acquiring indexed status is a complex process whereby journals demonstrate that they provide legitimate peer review and also have qualified editors and board members. • Indexed journals are viewed as a more reliable source of information than journals that are not indexed. • In general, other scholars and university promotion committees will not be able to find or examine articles from journals that are <i>not</i> indexed. • Papers published in journals that are not indexed are less likely to be cited by other scholars.
Indexing systems—brief list	<ul style="list-style-type: none"> • <i>PubMed</i>, National Library of Medicine, USA, International • <i>CINAHL</i> (Cumulative Index to Nursing and Allied Health Literature), USA • <i>Ovid</i>, (Ovid Technologies) a division of Wolters Kluwer International Group • <i>Japan Medical Abstracts Society, Ichushi Web</i>, Japanese • <i>Medical Online</i>, Japanese

Glossary II Predatory Practices that Target Academics and Researchers

<p>Predatory online publishers or journals</p>	<ul style="list-style-type: none"> • Unsolicited invitations to publish (or present) are excessively complementary but contain many errors in grammar and spelling. • Authors are required to pay a fee just to submit their paper. • Submitted papers do not receive legitimate peer review, and the manuscripts will not appear in a legitimate indexed journal. • These publishers promise immediate publication that does not reflect a reasonable interval for peer review and revision. • These publishing establishments are not legitimate; they are scammers and profiteers who target academics and researchers. • Titles of soliciting journals may have names that are very similar to well-known journals or do not reflect the author's specialty.
<p>Predatory professional conferences</p>	<p>In parallel to predatory publishing methods, academics and researchers receive email invitations to present or speak at conferences that are not legitimate. For example:</p> <ul style="list-style-type: none"> • Conferences may not be sponsored or organized by actual professional organizations; advertisements contain false statements. • Conference names may be very similar to well-known scientific events, but the event is not as advertised. • Speakers listed may include false or stolen identities. • Exotic or remote locations may be listed as the conference site to encourage attendees but also deter consumers from validating aspects of the event.
<p>Black List of publishers or journals</p>	<ul style="list-style-type: none"> • This term has been used to describe Beall's 3 lists of presumably illegitimate publishing agents involved in profiteering, fraud, and scamming authors (Beall, 2012). • The purpose of compiling these lists was to warn unsuspecting consumers (academic authors and researchers) to avoid fraudulent journals. • Historically, blacklisting was a method to censure or to deny jobs or services to individuals, groups, or countries that were deemed undesirable or untrustworthy.
<p>White List of publishers or journals</p>	<ul style="list-style-type: none"> • A White List is presumably a listing of legitimate journals and publishers of scientific and academic materials. • This term reflects a stereotype in cowboy and western films where the good guys wore white hats and the bad guys wore black hats. • No such perfect list exists regarding academic journals or publishers because anyone can make a journal appear legitimate by using false information. Consumers must verify for themselves whether a journal is legitimate by doing background research. • Academic librarians are invaluable to assist authors identifying trustworthy journals.
<p>Predatory practices—an incomplete list</p>	<ul style="list-style-type: none"> • Identity theft: fake editors and/or board members. • Recruiting and listing unqualified editors, board members, or conference organizers. • Advertising fake impact factors and or fake index status. • Pirateering a journal: buying a declining legitimate journal, then flipping it to a predatory format. • Domain name hijacking, sham, or look-alike websites • Email phishing/spoofing. • Temporary online listing of articles, etc.
<p>Hijacking</p>	<p>To mimic or copy a reputable conference or journal by copying their website. To trick consumers, spam emails are distributed that include these websites. Similar to the terms skyjack and carjack where vehicles are illegally seized from their owners.</p>
<p>Pirateering</p>	<p>A form of the word <i>pirate</i>: noun—one who robs or steals using violence; verb—appropriating the artistic work of others, to plagiarize or hijack a website.</p>
<p>Pay-to-play publishing</p>	<ul style="list-style-type: none"> • A profit-making practice used by predatory publishers who market themselves as legitimate scholarly publishers. • The scientific and literary quality of papers generated by this system is poor or questionable because actual peer review is lacking. • Submitted papers are seldom rejected as long as payment is made. • Although the papers may appear as a "journal article" on the internet for a time, publications may disappear forever without notice. • Unethical scholars deliberately use this system to create the appearance of a strong publication history that will help them to obtain a job, to be promoted or to apply for advanced positions.