OPINION

Predatory journals and Indian ichthyology

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'Taxonomy is described sometimes as a science and sometimes as an art, but really it's a battleground.'

Bill Bryson, *A Short History of Nearly Everything* (Black Swan, 2003, p. 437)

Taxonomy is arguably the world's oldest profession[1], one which is used by biologists for effective communication[2], is essential for reproducibility in biological sciences[3], and plays a pivotal role in biodiversity conservation[4]. Being the fundamental component of biology, it is imperative that taxonomy is practised in a highly professional manner, as dubious taxonomy destabilizes the foundation of science, with potentially serious setback in basic and applied research[5]. Although the 21st century began with a hope that information and communication technology will act as a boon for reinventing taxonomy[6], the advent and rise of electronic publications, especially predatory open-access journals, has resulted in an additional challenge (the others being gap, impediment and urgency[7]) for taxonomy in the century of extinctions.

Predatory publishing has damaged the very foundations of scholarly and academic publishing, and has led to unethical behaviour from scientists and researchers[8]. The 'journal publishing industry' in India is a classical example of 'predatory publishing'[9], supported by researchers who are in a race to publish. The urge to publish 'quick and easy' can be attributed to two manifestations, i.e. 'impactitis'[10] and 'mihi itch'[11]. While impactitis can be associated with the urge for greater impact factor (IF) and scientific merit, mihi itch (loosely) explains the behaviour of researchers, especially biologists publishing in predatory journals yearning to see their name/s associated with a new 'species name'. Most predatory journals do not have an IF, and authors publishing in such journals are only seeking an 'impact' (read without factor), and popularity by seeing their names appear in print media. This practice has most often led to the publication of sub-standard papers (see examples below) in many fields, including ichthyology.

The introduction of academic performance indicator (API) by the University Grants Commission (UGC), lack of clarity in identifying and evaluating journals, the focus on 'quantity' over 'quality'[12], unhealthy competition between peers, and overall, a favourable non-scientific publishing environment have led Indian researchers to publish in mediocre journals wherein most manuscripts are published without any peer review. Perhaps it is also the fear of peer review that has nourished predatory journals, making India one of the world's largest base for predatory open-access publishing[13]. In such journals, the required publication fee, which ranges from a few hundred to a few thousand rupees, is the only criterion to be fulfilled before a paper is published[8], sometimes the very next day after submission. The number of predatory journals and publishers has seen a phenomenal increase from 18 in the year 2011 to 477 in 2014 (ref. 14). This enormous growth of predatory journals is impacting several disciplines in science and contributing to dubious research outcomes with long-lasting impacts. While this issue can be addressed at a general level, we believe that a more focused approach with appropriate examples that can highlight the issue in detail is likely to raise further concern and attention. Such a focused argument can also be used as a case study for understanding the effect of predatory journals on science in general, and can aid in designing and implementing rules and regulations at different levels of scientific and academic assessments. As a case study, we focus on recent ichthyological publications from India.

As a group of ichthyologists who regularly publish, review and edit papers related to taxonomy and conservation of Indian freshwater fishes, we are concerned by the increase in dubious 'taxonomic' practices creeping into the Indian ichthyological literature and disrupting its integrity. We present here some recent and pertinent examples of dubious 'taxonomic' papers in various 'predatory' journals that portray Indian ichthyology in bad light, that is otherwise in a phase of resurgence.

Rediscoveries of species have the potential to generate the much needed support for conservation[15] and are often celebrated by the media. Even though there are no guidelines for defining a species rediscovery[15] or its redescription, it is generally understood that a long-lost species is what needs to be rediscovered, and a species with an ambiguous identity needs a redescription. Some of the recent and pertinent examples of fish rediscoveries from the Western Ghats are that of *Glyptothorax poonaensis*[16] and *Hypselobarbus lithopidos*[17], both rediscovered after a period of >50 years. As there are no guidelines for defining a species rediscovery[15], several recent papers[18–21] are using 'rediscoveries' as a catch-phrase in their 'titles' to gain publicity and media attention. These publications have actually 'rediscovered' and 'redescribed' species which are already well known in the ichthyological literature, collected extensively in recent times, and represented by voucher specimens from recent collections in national repositories.

Some of the most illogical examples include a paper on the 'rediscovery' and 'redescription' of *Mystus armatus*[18], a relatively common species found in the Western Ghats. *Mystus armatus* has long been considered a valid species, without any ambiguities to its identity, and routinely collected and recorded in the literature with adequate voucher specimens deposited at national repositories[22–24]. A second example is a paper titled 'Rediscovery of *Mastacembelus malabaricus* after one and half century'[19]. *Mastacembelus malabaricus* has been in the cognizance of science for the last 15 years as it has been recorded in the literature[22,25], including a paper[26] with a detailed description supported by voucher specimens at a national repository. Yet another example is a paper on *Pristolepis marginata*[20], apparently 'rediscovering' a common freshwater fish occurring in the lowland rivers of the southern Western Ghats after a period of 150 years. There are several papers and checklists[23,24,27,28] published during the period 1990–2013 that have recorded *P. marginata* from its native range, many of them with voucher

specimens deposited in national repositories.

All the fake rediscovery papers discussed above[18–20] take no cognizance of the available literature, and/or ignore the existing scientific contributions on purpose, to attract media interest, as evident from the reports of these rediscoveries in the local newspapers[29,30]. It is also relevant to mention that these papers are plagued by inaccuracies, distorted information, and misrepresentation of facts which we refrain from pointing out as it would go beyond the scope of this paper.

Fake rediscovery papers such as those discussed above are not the only issues that plague Indian ichthyology. Glaring scientific and technical errors have become common in many recent taxonomic papers. Examples include papers describing new species (*Aborichthys cataracta* and *A. verticauda*) by placing them under a wrong family (Balitoridae instead of Nemacheilidae)[31], as well as mentioning wrong species authorities for comparative specimens used in the study (*Glyptothorax davissinghi*, Manimekalan & Arunachalam 1998, instead of Manimekalan & Das 1998)[32]. A few others defied all rules prescribed in the International Code of Zoological Nomenclature (ICZN), such as the designation of a 'neotype' for *Olyra longicaudata* using three specimens[33], which was later corrected[34].

While a large part of the accountability of the evidence presented in such papers rests with the authors, monitoring through the editorial and peer-review process also plays an integral part[5]. In many papers about which we discuss in this paper, both the peer-review process and subsequent copy-editing (if there was any) have been seriously compromised as there are several obvious mistakes in the presented facts as well as in language style and presentation. For example, in the paper 'rediscovering' *Pristolepis malabarica*[21], it is mentioned that the body of the fish is 'rectangular to roughly oval in outline', which obviously makes no sense. While another paper[32] provides images of the paratypes preserved in formaldehyde, and mentions that the fish is in 'living condition'. Yet another paper[35] presents dubious taxonomic characters to distinguish a catfish species *Horabagrus melanosoma* from its congeners. The publication[35] not only uses many overlapping and morphologically plastic characters, like denticulation on dorsal and pectoral fin spine; it also mentions that the pelvic fin never reaches the anal fin origin, when in fact figure 3 of the paper[35] (and an examination of the type specimen by one of the authors of this paper (A.A.)) clearly shows that the pelvic fin of the holotype of *H. melanosoma* reaches the anal fin origin. Perhaps one of the most notorious examples of inappropriate copy-editing is the distorted figure in the description of '*Barilius pectoralis*'[36], a name which is currently unavailable as it does not fulfil Article 8.5 of the amendment of ICZN.

Peer-review process is considered to be the central pillar of academic publishing[37], a critical part of quality control and self-corrective nature of science[38]. Although peer review has its own limitations[38], it is still one of the best ways to avoid glaring errors and inaccuracies in a manuscript. While peer review and editorial decisions can sometimes be harsh, and demotivating[39], they nevertheless provide a good base for learning and avoiding mistakes. By publishing in predatory journals to avoid peer review, authors are in fact stunting their own professional growth, apart from disrupting the integrity of science.

To cite an example, in the description of *Garra palaruvica*[40], the authors provide a table for morphometric characters with ambiguous values, as it is not mentioned which ones are shown in percentage of standard length, which values fare in percentage of head length, and which ones denote standard length and total length. While the authors do not provide the units of measurement for both the total length and standard length (which do not appear to be in percentages), there are two major errors in the data. First, although the authors mention that the measurements were taken to the nearest 0.1 mm, the values of both total length and standard length are mentioned at two decimal places. Secondly, the value for total length of the fish is mentioned as the 44th character in a table, when standard length is mentioned right at the top. These are fundamental errors with regard to any fish taxonomy paper which, in normal cases, are caught during the peer review and allowed to be rectified before the paper is published. Because of the lack of peer review in predatory journals, authors do not learn and repeat the mistakes in future papers[41–43], which again are published in predatory journals.

While the ICZN has laid down a set of rules for naming animals and resolving nomenclatural issues[44], it does not provide any guidelines on publishing outlets, nor can it prevent the establishment of nomenclature produced by unscientific practices[5]. So much so that scientific names can even be published in journals without peer review[5]. At least five journals discussed in this note, where recent papers[18–20,32–34,40–43] on taxonomy and nomenclature have been published are listed as 'vanity' and 'predatory' open-access[14].

Differentiating between science and non-science in taxonomy is a challenge[5], especially in the age of e-publications. Publishing is no longer a controlled environment and there are outlets where dubious taxonomy is presented as fact[5]. Since 2013, there has been a sudden spate in the number of freshwater fish description papers from India published in obscure journals that provide little or often no information on the editorial team. In the case of some journals which do provide a list of editors, it is clear that none has the expertise in fish taxonomy or systematics. From January 2013 till July 2014, of the 16 new freshwater fish species descriptions from southern India, eight (50%) were published in such obscure journals[33,40,42,43,45–48]. It is also disturbing to note that some of these papers[32,33,40–42] are outputs of one of the world's most ambitious ichthyology projects[49].

We believe that, like ichthyology, related scientific disciplines (especially in biology) are also likely to be affected in the similar manner. The arguments we have raised here clearly highlight that it is impossible to change this trend, unless there is a consensus among the scientists and researchers to become more accountable and refrain from publishing in such predatory journals. Other management-level initiatives such as maintaining the list of predatory journals and disregarding publications in such journals for academic and scientific assessments could no doubt be helpful. In addition, especially in the case of taxonomy, the support of codes such as International Code of Nomenclature (ICN) and ICZN, better coordination among regional taxonomists, and proactive involvement of journal editors, reviewers and science users are urgently required to safeguard taxonomy against the explosion of unscientific practices, including taxonomic vandalism in India and elsewhere.

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