

2022-11-16

# Sixty Years of Oceanography and Marine Biology: an Annual Review (OMBAR) A Brief Retrospective and Prospective

Hawkins, SJ

<http://hdl.handle.net/10026.1/20366>

---

10.1201/9781003288602-1

CRC Press

---

*All content in PEARL is protected by copyright law. Author manuscripts are made available in accordance with publisher policies. Please cite only the published version using the details provided on the item record or document. In the absence of an open licence (e.g. Creative Commons), permissions for further reuse of content should be sought from the publisher or author.*

# Sixty years of Oceanography and Marine Biology: an Annual Review (OMBAR) – a brief retrospective and prospective

Stephen J. Hawkins<sup>1,2,5</sup>, Alice Oven<sup>3</sup>, I. Philip Smith<sup>4</sup>, Anaëlle J. Lemasson<sup>2,5</sup>

<sup>1</sup>School of Ocean and Earth Science, National Oceanography Centre, University of Southampton, SO14 3ZH

<sup>2</sup>The Marine Biological Association of the UK, The Laboratory, Citadel Hill, Plymouth, PL1 2PB, UK

<sup>3</sup>Taylor and Francis, 2 & 4 Park Square, Milton Park, Abingdon-on-Thames, Oxfordshire, OX14 4RN, UK

<sup>4</sup>School of Biological Sciences, University of Aberdeen, Aberdeen, AB24 2TZ, UK

<sup>5</sup>School of Biological and Marine Sciences, The University of Plymouth, Drake Circus, Plymouth, PL1 8AA, UK

## OMBAR: from the beginning

The vision of Harold Barnes – the founding editor-in-chief of *Oceanography and Marine Biology: an Annual Review (OMBAR)* – 60 years ago was that the journal would produce timely reviews by experts in the field of marine biology and oceanography. New areas would be highlighted and previous reviews revisited from time to time to provide updates. This ethos was strongly maintained by Margaret Barnes, who succeeded Harold as editor-in-chief after he passed away in 1978, with Margaret being involved up until 2002 (see appreciation by Robin Gibson in the epilogue of this volume). Participation was generally by invitation and occasionally by recommendation.

Both Harold and Margaret were fine scientists, prolifically publishing on barnacles, but also very aware of the wider marine science landscape. The PhD thesis of the current editor-in-chief (SJH), written in the 1970s, was 40% on barnacles, and SJH has read and cited many of the Barnes' papers over the years. A particular favourite is Barnes & Powell (1950) on what would become called "intense density dependent processes" in a more jargonized age. In parallel with OMBAR, Harold Barnes founded the *Journal of Experimental Marine Biology and Ecology (JEMBE)* in 1967 and its active editing by both Harold and subsequently Margaret (until 1999) contributed to keeping them abreast of the field, aiding identification of emerging fields and experts, and hence invitations to contribute reviews to OMBAR. They were also avid attenders of conferences, particularly the European Marine Biology Symposia series which they helped establish – a good talk on an exciting topic could result in an invitation to submit a review to OMBAR.

In the last decade of her stewardship of OMBAR, Margaret as lead editor involved various colleagues from the Scottish Marine Biological Association/Scottish Association for Marine Science Laboratory at Dunstaffnage in co-editorial roles from volume 26 onwards (Alan Ansell, Robin Gibson); Ansell, Gibson and Barnes edited volumes 31–37; Gibson and Barnes edited volumes 38–40 when Margaret eventually stepped down in 2002 after 40 years association with the journal. Robin Gibson was involved as an editor in chief along with colleagues from both Dunstaffnage (John Gordon, David Hughes) and Millport (Jim Atkinson involved from vol. 39, Philip Smith) until volume 50 (Vol. 41: Gibson, Atkinson; Vol. 42, 43, 44, 45, 46, 47, 48: Gibson, Atkinson, Gordon; Vol. 49: Gibson, Atkinson, Gordon, Hughes, Smith). Roger Hughes joined the editorial team for volume 50 (Gibson, Atkinson, Gordon, D.J. Hughes, Smith, R.N. Hughes), taking over as editor-in-chief from volume 51 (Vol. 52 R.N. Hughes, D.J. Hughes, Smith; Vol. 53–54 R.N. Hughes, D.J. Hughes, Smith, Dale), in turn handing over to SJH in 2016 (Vol. 55) just before sadly passing away.

SJH has tried to establish a larger and more diverse international editorial board, including some mid and early career scientists, to facilitate peer review of all manuscripts, This has fluctuated with work commitments of the team (Vol. 55: Hawkins, Dale, Evans, Firth, Hughes, Smith; Vol. 56: Hawkins, Dale, Evans, Firth, Smith; Vol. 57: Hawkins, Allcock, Bates, Firth, Smith, Swearer, Todd; Vol. 58: Hawkins, Allcock, Bates, Evans, Firth, McQuaid, Russell, Smith, Swearer, Todd; Vol. 59: Hawkins, Lemasson, Allcock, Bates, Byrne, Evans, Firth, Marzinelli, Russell, Sharples, Smith, Swearer, Todd; and finally this volume 60: Hawkins, Lemasson, Allcock, Bates, Byrne, Evans, Firth, Lucas, Marzinelli, Mumby, Russell, Smith, Swearer, Todd). Philip Smith is its longest serving member. Despite expanding to increase diversity, the editorial board retains a strong British, Irish and Commonwealth base.

The success of OMBAR stems very much from Harold's initiative, taken forward by Margaret's scholarship, wide knowledge, and supportive role as editor over many years. Cruz et al. (2022 – this volume) revisit Margaret Barnes' classic 1996 review in OMBAR of the stalked barnacle *Pollicipes* as a tribute to her research and scholarship

The inaugural volume of OMBAR published in 1963 reads like an international Who's Who of marine science at the time (Figure 1). There was a very strong input from the physical, chemical and biological oceanographers as well as marine biologists covering topics of very broad scope: Tides (by Rossiter), The Geology of some Continental Shelves (by Stride), Optical Oceanography (by Jerlov); Underwater Television (by Harold Barnes himself), Chemical Oceanography (by Hood), Primary production (by Yentsch), The Rhodophyta (by Dixon), Heterotrophic Micro-organisms (by Wood), Microdistribution of Plankton (by Cassie); Ecology and Functional Morphology of Molluscs (by Allen), Parasitic Copepods (by Boquet and Stock – the only review not by a single author), The Effects of Temperature and Salinity on Marine and Brackish Water Animals; Part 1 temperature (by Kinne), The Biogeography and Intertidal Ecology of Australian Coasts (by Knox), Pogonophora (by Eve Southward), and finally Lisitzin contributed reviews on both Mean Sea Level and The Hydrography of European Arctic and Sub-arctic Seas. To save space and cram in more articles, the titles of cited references were omitted in earlier volumes, but they were still invaluable for keeping abreast of the literature (see Figure 1 – photographed in Eve Southward's office in 2021, who was still publishing on Pogonophora at 91 years of age).

It is interesting to reflect on the diversity of topics reviewed in OMBAR publications, and on what has been highly cited. A look back at the 20 most-cited reviews published in OMBAR is given in Table 1. These cover a broad range of subjects from authors all over the world. Some older reviews may pre-date bibliometric information retrieval and not feature in this list. Interestingly and coincidentally, members of the current (and recently expanded) editorial board feature in this list (Byrne, 2011; Hawkins & Hartnoll, 1983). The current board also has several members who have contributed to OMBAR in the past and/or in this volume. Looking back over the top-cited papers over the last 10-year period (2009–2019, Table 2), the current board (Vol. 60) features again with Firth et al. (2016), Todd via Neo et al. (2017), Byrne again in addition to Byrne (2011) via Purcell et al. (2016). It is clear from Table 2 that a diversity of topics are covered in OMBAR reviews, including historical ecology (Lotze, 2010). It is gratifying that both applied and pure research topics feature in these highly cited papers.

In the early days OMBAR was published by Allen and Unwin followed by Aberdeen University Press, then later by University College London. Since 1999 (Vol. 37), it has been published by various parts of Taylor and Francis, who also republished older volumes under their imprints. Physical sales of OMBAR peaked at the turn of the century, each hardcover volume selling 500–700 copies throughout the 2000s. Today, OMBAR has an excellent Impact Factor of over 6 (based on publications up to volume 58, published in 2020), with an outstanding h-Index of 49 (Figure 2). Its

2020 CiteScore was 7.2 with Scopus, ranking OMBAR 9/224 journals in the field of Aquatic Science, and 7/128 in the field of Oceanography (in the 96<sup>th</sup> and 94<sup>th</sup> percentile, respectively). Figure 1 is based on data from Clarivate as this gives a complete record for the last 20 years, since Scopus has missed some years. The impact factor has fluctuated considerably in the last decade, reflecting the limited number of articles each year, but in most years it is over 4 with occasional higher peaks depending on its content that year (11 in 2014). Interestingly, Clarivate gives it an impact factor of 8 in 2020. Impact factors paint only a partial picture of the value of OMBAR, with reviews continuing to be read and cited for many years with long citation half-lives (OMBAR > 10 years).

### **OMBAR: an evolution through time**

Publishing and retrieval of information has changed greatly in the 60 years of *Oceanography and Marine Biology: an Annual Review* (OMBAR), and especially so in the 45 plus years that the current editor-in-chief (SJH) has been researching marine biology.

When SJH started as a research student in 1976, keeping up with the literature involved visiting the library at the Marine Biological Station in Port Erin, UK, on Friday afternoons (except when doing fieldwork), scanning any new journal issues arriving on the shelves that week, writing down the publication on a reference card, reading it and sometimes making a few notes on the back of the card. The references cited in the back of relevant papers were also looked at and more cards filled out, and if not in the Port Erin library nor available via the main library at the University of Liverpool, requests were made from inter-library loans via the British Library. These would arrive two to three weeks later as photocopies. It was too expensive and time consuming to photocopy any articles of interest on the shelves as each page had to be individually copied with 2 pages costing around the same as a half pint of beer at the time (10-12 pence then, > £1.75 now) and was strongly discouraged.

Getting to grips with the wider literature and concepts as a new graduate student in the 1960s and 1970s involved first reading more advanced textbooks, then specialist books and research monographs, edited volumes with chapters by invited experts, and then proceeding to reading review articles by experts in the field, as well as in parallel reading of individual journal articles. Reviews were extremely important as they attempted to cover the literature comprehensively as well as synthesising it. If they were good reviews, new directions and research gaps would be identified. Most importantly the references cited provided an integration of the field up to about one year or so before publication. The gold standards in marine biology at the time were *Advances in Marine Biology* and its rival *Oceanography and Marine Biology: An Annual Review*. In the wider field of ecology and evolution *Annual Review of Ecology, Evolution and Systematics* was excellent, with *Biological Reviews* providing a broader view of biological sciences. Trends journals were yet to emerge and proliferate. When SJH wrote his PhD thesis and subsequent papers from it, several reviews were highly influential on his thinking (Southward, 1958 in *Biological Reviews*; Southward, 1964 in special issue on grazing from a British Ecological Society Symposium; Connell, 1972 in *AREES*; Underwood 1979 in *Advances in Marine Biology*) including two in *OMBAR* (Lewis, 1976 and Branch, 1981), plus of course Lewis (1964) – the most comprehensive book on British and Irish rocky shores. Several early seminal papers on experimental ecology on rocky shores published in *Ecological Monographs* (Dayton, 1971; Menge, 1976; Lubchenco & Menge, 1978) also had comprehensive introductions which greatly helped. Fortunately, the volume of literature in SJH's field of rocky shore ecology was not huge historically making it possible to keep on top of new publications - and actually read nearly all of them from end to end. Thus greater scholarship was possible, but often with a lag phase of a year or two given the time from submission to print publication.

SJH's first paid job in December 1979 was as a Research Fellow at the Marine Biological Association of the UK (MBA) in Plymouth. The National Marine Biological Library (NMBL), located at Citadel Hill within the MBA building, was well-funded by the Natural Environment Research Council and represented at the time (and still to this day) a huge national and international resource, which is also much valued by the members of the Association. The NMBL was an abstracting hub for Aquatic Science and Fisheries Abstracts (ASFA). In the 1970s, a literature search involved using hardcopy abstracting volumes such as Zoological Record, Current Contents and ASFA. As a new scientist at the MBA, SJH was introduced to one of the "information scientists" who ascertained his research interests, and every week a neat stack of reference cards magically appeared on SJH's office desk (no one locked offices in those days). SJH's visits to the library became much more focused, but probably missed out on more whimsical tangential reading on other topics that sometimes happened when browsing the contents page of journals.

SJH's active links with OMBAR (apart from perusing the volumes as a PhD student) started in 1981, when George Russell was approached by Margaret Barnes to write a review on grazing on seaweeds for OMBAR. George had helped SJH's algal identifications and advised on seaweed ecology during his PhD and was aware of his work on grazing, and thus suggested that SJH would be better placed to write such a review. Hence SJH embarked this review on grazing with his PhD supervisor, Richard Hartnoll, which is still cited (Hawkins & Hartnoll, 1983, see Table 1). Margaret Barnes was an excellent editor and SJH learnt much from the exceedingly detailed neatly handwritten edits of the submitted typescript. Adjectival nouns have been largely avoided since her feedback. Much of the grazing review was done at the NMBL during research visits to Plymouth during vacations from the University of Manchester where he was then based. He also liaised with Alan Varley, a pioneering Head Librarian of the NMBL, in using a computer-based search of the literature using keywords – the output arriving on teleprinter paper 40 cm wide with holes down the side (also known as "tractor paper"). This was state of the art information retrieval at the time.

Throughout his career, OMBAR would remain a constant resource for SJH and his PhD students, especially when preparing lectures on subjects away from his immediate research interests or stumbling into new fields. Having retired from University administration at the beginning of 2016, SJH took on the Editor in Chief role at OMBAR from volume 55 at the request of Roger Hughes. SJH intends to step down in a phased manner over the next year or so, working with a new editor in chief from the existing board.

### **OMBAR: current and future contribution**

Information technology and bibliometric approaches exploded in the 1980s and 1990s. Abstract journals initially started issuing searchable CDs and then swiftly moved online as the internet took off. Journals moved to hybrid print and online publication, with online-only journals beginning to appear about 10-15 years ago. Nowadays, many traditional print journals have switched to online-only. Reprints have become obsolete as PDFs have emerged. The literature can now be searched using bespoke platforms such as Web of Science, Scopus, PubMed or Google Scholar. A quick Google search on a smart phone can deliver a literature search in a few moments that once required a trained information scientist and a mainframe computer occupying a dedicated large building. OMBAR publications are easily found on these platforms or using these search engines. To keep with the times, OMBAR has had to adapt. While the volumes remain printed, as per tradition, all volumes and their contents are listed online, and some of the publications are downloadable directly from the internet (those that are Open-Access – discussed further below).

So, is there still a place, and a need, for annual volumes of reviews 60 years on from the first publication of OMBAR? And, if so, how can OMBAR keep up with the ever-evolving field of scientific reviews?

There certainly is a need – and both the contributing authors and the readers benefit. In some academic settings reviews have sadly become downplayed. The UK's Research Assessment Exercise and its successor the Research Excellence Framework certainly discourage reviews in both the physical and biological sciences, as they are not considered to be reports on individual pieces of new research. Reviews do still count if new ground or concepts are developed and meta-analytical and systematic review approaches are adopted – but it is a risk that scientists do not want to take when submitting their best outputs for assessment. Fortunately, synthetic and synoptic reviews are still valued in some research cultures where periodic assessments are made (e.g. Australia and New Zealand). Authors who write reviews generally benefit from the necessity to carefully read and digest the literature. Certainly SJH spent the 20 years or so following his 1983 grazing review working on topics identified as gaps – including the role of biofilms, the importance of mucus, behaviour of grazers and the need for broadscale geographic comparisons using replicated experiments.

The format and content of reviews have also changed with new literature searching and cataloguing technologies, and the ability to deposit appendix material in online supplementary files such as large tables, videos, or interactive maps and figures. The intellectual rigour of reviews has also greatly improved, with the increasing demand for robust, reliable, transparent and repeatable reviews from the academic community. There has been a clear spread in recent years of Cochrane-style systematic reviews pioneered in Medicine and infused into other academic disciplines, such as environmental science and biodiversity conservation. Statistical syntheses through meta-analyses are now routinely used to complement systematic reviews as well as other more traditional reviews – although their quality can vary and there is a general need for consistency in methodology when it comes to systematic syntheses (Christie et al., 2021; Haddaway & Macura, 2018; Haddaway et al., 2020). Re-analysis and re-use of freely available data are now commonplace. Good systematic work will also allow the identification of research clusters and research gaps, which can then inspire researchers to write further reviews and/or undertake new research. Bibliometric techniques can also be used to trace the development of a field. Workshops are convened to explore particular topics and often lead to reports that can be subsequently condensed into agenda setting reviews (Wolfe et al., 2020. Vol. 58 OMBAR).

Postgraduate student training has become more formalised, and in many countries a formal literature review has become a key part of the process. Some recent reviews in OMBAR fall into that category (Chen et al., 2021 in Vol. 59; Martinez et al., 2017 in Vol. 55; and Veenhof et al., 2022 and Leeuwis & Gamperl, 2022 – both in this volume), but when approached by younger authors the editorial team usually advise involvement of a senior colleague with a broad view of the field. Recently, retired scientists often with no or limited access to funding or laboratories, but usually with a good amount of free time on their hands, often write valuable reviews drawing on years of expertise. When approached by such prospective authors, the editorial team often advise involving a younger colleague to ensure an up-to-date approach. Such reviews can also give a strong feel for the historical foundations of a particular subject area. In this regard OMBAR has recently been pleased to publish reviews on seminal scientific activities such as the Great Barrier Reef expedition of the 1920s (Spencer et al., 2021 in Vol. 59). Most reviews these days have more than a sole author, but there have been some recent excellent exceptions published in OMBAR (Peck, 2018 (see Table 2), McQuaid, 2018, both in Vol. 56). There are also some where authorship is much greater and diverse, reflecting a multidisciplinary work stemming from a workshop (Morris et al., 2019).

The days when Harold or Margaret Barnes could single-handedly edit the volume and give scientific criticism akin to refereeing are gone. Now, the editor-in-chief reads a penultimate draft of the review before final submission, which is then refereed usually by two external referees plus expert input from one of our team of associate editors. We hope these steps have raised the quality of the published reviews, by constructive formative criticism and advice.

From the publishers' (Taylor and Francis) perspective, OMBAR forms an important part of CRC Press marine science portfolio by enabling in-depth annual reviews. As mentioned above, more recently, it has been possible to publish a mix of traditional subscription-only papers and Open Access articles in each volume, allowing authors yet another level of flexibility. Take-up of the Open Access option has increased in the last five years allowing access to OMBAR articles by a wider readership.

In its 60<sup>th</sup> year, the Editorial Board has been expanded to broaden its discipline base, have a global outlook, and embrace a greater diversity of ages, locations and genders. Looking forward to the next few years, OMBAR will retain and expand on its large and diverse editorial board drawn from across the world and from a variety of research fields, especially reaching out to the physical and chemical oceanographic sciences. It will continue to publish its traditional longer monographic reviews, but will also welcome short reviews. Contributions which can also include new data (which can be especially important to give a long-term view by building on past studies), papers on historical ecology and on the historical development of the field up to its present cutting edge, as well as Cochrane-style systematic reviews and meta-analyses are all encouraged. It will also welcome brief opinion pieces and mini-review articles on emerging topics, from time to time drawing on its editorial board for these. Manuscripts, both invited by the editorial board and unsolicited works submitted by the marine science community, will be considered for publication. All articles will continue to be peer-reviewed (OMBAR publications have been peer-reviewed from Vol. 55 onwards), and also edited by one of the board with appropriate expertise.

We hope that Harold and Margaret Barnes would have approved of these developments. After an editorial on the challenges set by the UN's decade of ocean Science for sustainable development, the first review in the present volume is a tribute to Margaret Barnes by Cruz et al. revisiting her comprehensive 1996 review of the biology of the stalked barnacle *Pollicipes* in OMBAR. Then follows a series of reviews: one by Claassens et al. (2022) which covers the diversity, distribution, ecology and conservation of Syngnathidae in Africa, one on hotspots of Cenozoic tropical marine biodiversity by Yasuhara et al. (2022), a review discussing blue carbon ecosystems in Sri Lanka by Gorman et al. (2022), a review of kelp gametophyte ecology by Veenhof et al. (2022), one systematically reviewing the use of stable isotopes for coral reef studies by Skinner et al. (2022), a review of echinoderm larval settlement by Doll et al. (2022), one presenting the relationship between boxer crabs and sea-anemones by Schnytzer et al. (2022), a topical review of marine litter and microplastics in the Indian Ocean by Honorato-Zimmer et al. (2022), one discussing the deep source-sink hypothesis by Mercier et al. (2022) and finally a review of adaptations and responses of marine animals to the high intertidal zone by Leeuwis & Gamperl (2022).

## References

Airoldi, L. & Beck, M.W., 2007. Loss, status and trends for coastal marine habitats of Europe. *Oceanography and Marine Biology: an Annual Review*, **45**, 345-405.

Andrew, N.L. & Mapstone, B.D. 1987. Sampling and the description of spatial pattern in marine ecology. *Oceanography and Marine Biology: an Annual Review*, **25**, 39-90.

- Ballesteros, E. 2006. Mediterranean coralligenous assemblages: a synthesis of present knowledge. *Oceanography and Marine Biology: an Annual Review*, **44**, 123-195.
- Barnes, H. & Powell, H. T. 1950. The development, general morphology and subsequent elimination of barnacle populations, *Balanus crenatus* and *B. balanoides*, after a heavy initial settlement. *Journal of Animal Ecology* **19**, 175-179.
- Barnes, M. 1996. Pedunculate cirripedes of the genus *Pollicipes*. *Oceanography and Marine Biology: an Annual Review* **4**, 303-394.
- Benjamins, S., Dale, A.C., Hastie, G., Waggitt, J.J., Lea, M.A., Scott, B. & Wilson, B. 2015. Confusion reigns? A review of marine megafauna interactions with tidal-stream environments. *Oceanography and Marine Biology: an Annual Review*, **53**, 1-54.
- Bonaldo, R.M., Hoey, A.S. & Bellwood, D.R. 2014. The ecosystem roles of parrotfishes on tropical reefs. *Oceanography and Marine Biology: an Annual Review*, **52**, 81-132.
- Branch, G.M. 1981. The biology of limpets: physical factors, energy flow, and ecological interactions. *Oceanography and Marine Biology: an Annual Review* **19**, 235-380.
- Bright, M. & Lallier, F.H. 2010. The biology of vestimentiferan tubeworms. *Oceanography and Marine Biology: an Annual Review*, **48**, 213-266
- Butman, C.A. 1987. Larval settlement of soft-sediment invertebrates: the spatial scales of pattern explained by active habitat selection and the emerging role of hydrodynamical processes. *Oceanography and Marine Biology: an Annual Review*, **25**, 113-165.
- Byrne, M. 2011. Impact of ocean warming and ocean acidification on marine invertebrate life history stages: vulnerabilities and potential for persistence in a changing ocean. *Oceanography and Marine Biology: an Annual Review* **49**, 1-42.
- Carlton, J.T. 1985. Transoceanic and interoceanic dispersal of coastal marine organisms: the biology of ballast. *Oceanography and Marine Biology: an Annual Review*, **23**, 313-371
- Chen, Y.-Y., Edgar, G.J. & Fox, R.J. 2021. The nature and ecological significance of epifaunal communities within marine ecosystems. *Oceanography and Marine Biology: an Annual Review* **59**, 585-720.
- Christie, A.P., Amano, T., Martin, P.A., Petrovan, S.O., Shackelford, G.E., Simmons, B.I., Smith, R.K., Williams, D.R., Wordley, C.F.R. & Sutherland, W.J. 2021. The challenge of biased evidence in conservation. *Conservation Biology* **35**, 249-262. doi: 10.1111/cobi.13577
- Claassens, L., Hodgson, A.N., Short, G. & Harasti, D. 2022. (this volume). Diversity, distribution, ecology, and conservation status of the family Syngnathidae in southern and western Africa. *Oceanography and Marine Biology: an Annual Review* **60**.
- Connell, J.H. 1972. Community interactions on marine rocky intertidal shores. *Annual Review of Ecology and Systematics* **3**, 169-192.
- Cruz, T., Jacinto, D., Fernandes, J.N., Seabra, M.I., Van Syoc, R.J., Power, A.M., Macho, G., Sousa, A., Castro, J.J. & Hawkins, S.J. 2022. (this volume). Pedunculate cirripedes of the genus *Pollicipes* – 25 years after Margaret Barnes' review. *Oceanography and Marine Biology: an Annual Review* **60**.



Dayton, P.K. 1971. Competition, disturbance, and community organization: the provision and subsequent utilization of space in a rocky intertidal community. *Ecological Monographs* **41**, 351–389.

Decho, A. 1990. Microbial exopolymer secretions in ocean environments: Their role (s) in food webs and marine processes. *Oceanography and Marine Biology: an Annual Review*, **28**, 73-153.

Diaz, R.J. & Rosenberg, R. 1995. Marine benthic hypoxia: a review of its ecological effects and the behavioural responses of benthic macrofauna. *Oceanography and Marine Biology: an Annual Review*, **33**, 245-03.

Doherty, P.J. & Williams, D.M. 1988. The replenishment of coral reef fish populations. *Oceanography and Marine Biology: an Annual Review*, **26**, 487-551.

Doll, P.C., Caballes, C.F., Hoey, A.S., Uthicke, S., Ling, S.D. & Pratchett, M.S. 2022. (this volume). Larval settlement in echinoderms: a review of processes and patterns. *Oceanography and Marine Biology: an Annual Review* **60**.

Elsdon, T.S., Wells, B.K., Campana, S.E., Gillanders, B.M., Jones, C.M., Limburg, K.E., Secor, D.H., Thorrold, S.R. & Walther, B.D., 2008. Otolith chemistry to describe movements and life-history parameters of fishes: hypotheses, assumptions, limitations and inferences. *Oceanography and Marine Biology: an Annual Review*, **46**, 297-330.

Firth, L.B., Knights, A.M., Bridger, D., Evans, A.J., Mieszkowska, N., Moore, P.J., O'Connor, N.E., Sheehan, E.V., Thompson, R.C. & Hawkins, S.J. 2016. Ocean sprawl: challenges and opportunities for biodiversity in a changing world. *Oceanography and Marine Biology: an Annual Review* **54**, 193–269.

Gorman, D., Jayakody, S., Kodikara, S., Udagedara, S., Dahanayaka, D.D.G.L., Ranawana, K.B., Kumara, M.P., Pahalawattaarachchi, V., Thavanayagam, M., Steven, A., Gunawardana, J.A.A.L. & Vanderklift, M.A. 2022. (this volume). The status and future of blue carbon ecosystems in Sri Lanka: conservation, restoration and policy. *Oceanography and Marine Biology: an Annual Review* **60**.

Graham, N.A., Ainsworth, T.D., Baird, A.H., Ban, N.C., Bay, L.K., Cinner, J.E., De Freitas, D.M., Diaz-Pulido, G., Dornelas, M., Dunn, S.R. & Fidelman, P.I. 2011. From microbes to people: tractable benefits of no-take areas for coral reefs. *Oceanography and Marine Biology: an Annual Review*, **49**, 105-136.

Haddaway, N.R., Bethel, A., Dicks, L.V., Koricheva, J., Macura, B., Petrokofsky, G., Pullin, A.S., Savilaakso, S. & Stewart, G.B. 2020. Eight problems with literature reviews and how to fix them. *Nature Ecology & Evolution* **4**, 1582–1589.

Haddaway, N.R. & Macura, B. 2018. The role of reporting standards in producing robust literature reviews. *Nature Climate Change* **8**, 444–447.

Hawkins, S.J. & Hartnoll, R.G. 1983. Grazing of intertidal algae by marine invertebrates. *Oceanography and Marine Biology: an Annual Review*, **21**,195-282.

Heip, C.H.R., Vincx, M. & Vranken, G., 1985. The ecology of marine nematodes. *Oceanography and Marine Biology: an Annual Review*, **23**, 399-489

Hicks, G.R. 1983. The ecology of marine meiobenthic harpacticoid copepods. *Oceanography and Marine Biology: an Annual Review*, **21**,67-175.

Honorato-Zimmer, D., Weideman, E.A., Ryan, P.G. & Thiel, M. 2022. (this volume). Amounts, sources, fates and ecological impacts of marine litter and microplastics in the western Indian Ocean region: a review and recommendations for actions. *Oceanography and Marine Biology: an Annual Review* **60**.

Leeuwis, R.H.J. & Gamperl, A.K. 2022. (this volume). Adaptations and plastic phenotypic responses of marine animals to the environmental challenges of the high intertidal zone. *Oceanography and Marine Biology: an Annual Review* **60**.

Levin, L.A. 2003. Oxygen minimum zone benthos: adaptation and community response to hypoxia. *Oceanography and Marine Biology: an Annual Review*, **41**, 9-9.

Levin, L.A. 2005. Ecology of cold seep sediments: interactions of fauna with flow, chemistry and microbes. *Oceanography and Marine Biology: an Annual Review*, **43**, 11-56.

Lewis, J.R. 1964. *The Ecology of Rocky Shores*. London: English Universities Press.

Lewis, J.R. 1976. Long-term ecological surveillance: practical realities in the rocky littoral. *Oceanography and Marine Biology: an Annual Review* **14**, 371-390.

Lotze, H.K. 2010. Historical reconstruction of human-induced changes in US estuaries. *Oceanography and Marine Biology: an Annual Review* **48**, 267-338.

Lubchenco, J. & Menge, B.A. 1978. Community development and persistence in a low rocky intertidal zone. *Ecological Monographs* **48**, 67-94.

Lucrezi, S. & Schlacher, T.A. 2014. The ecology of ghost crabs. *Oceanography and Marine Biology: an Annual Review*, **52**, 201-256

Martinez, A.S., Byrne, M. & Coleman, R.A., 2017. Filling in the grazing puzzle: a synthesis of herbivory in starfish. *Oceanography and Marine Biology: an Annual Review*, **55**, 1-34.

McMahon, K.W., Hamady, L.L. & Thorrold, S.R. 2013. Ocean ecogeochemistry: a review. *Oceanography and Marine Biology: an Annual Review*, **51**, 327-374.

McQuaid, C.D. 2018. Implications of long-term climate change for biogeography and ecological processes in the Southern Ocean. *Oceanography and Marine Biology: an Annual Review* **56**, 1-71.

Menge, B.A. 1976. Organization of the New England rocky intertidal community: role of predation, competition, and environmental heterogeneity. *Ecological Monographs* **46**, 355-393.

Mercier, A., Hamel, J.-F., Brown, A. & Ammendolia, J. 2022. (this volume) Vertical faunal exchange in the ocean and the deep source-sink hypotheses: a review from the perspective of pressure tolerance studies. *Oceanography and Marine Biology: an Annual Review* **60**.

Mineur, F., Cook, E.J., Minchin, D., Bohn, K., Macleod, A. & Maggs, C.A., 2012. Changing coasts: marine aliens and artificial structures. *Oceanography and Marine Biology: an Annual Review*, **50**, 189-233.

Morris, R.L., Heery, E.C., Loke, L.H.L., Lau, E., Strain, E.M.A., Airoidi, L. & Alexander, K.A. 2019. Design options, implementation issues and success evaluation of ecologically engineered shorelines. *Oceanography and Marine Biology: an Annual Review* **57**, 137-196.

- Morrisey, D.J., Swales, A., Dittmann, S., Morrison, M.A., Lovelock, C.E. & Beard, C.M. 2010. The ecology and management of temperate mangroves. *Oceanography and Marine Biology: an Annual Review*, **48**, 43-160.
- Neo, M.L., Wabnitz, C.C., Braley, R.D., Heslinga, G.A., Fauvelot, C., Van Wynsberge, S., Andréfouët, S.G., Waters, C., Tan, A.S.H., Gomez, E.D. & Costello, M.J. 2017. Giant clams (Bivalvia: Cardiidae: Tridacninae): a comprehensive update of species and their distribution, current threats and conservation status. *Oceanography and Marine Biology: an Annual Review* **55**, 87–388.
- Pawlik, J.R. 1992. Chemical ecology of the settlement of benthic marine invertebrates. *Oceanography and Marine Biology: an Annual Review*, **30**, 273-335
- Peck, L.S. 2018. Antarctic marine biodiversity: adaptations, environments and responses to change *Oceanography and Marine Biology: an Annual Review* **56**, 105–236.
- Peck, L. 2018. Antarctic marine biodiversity: adaptations, environments and responses to change. *Oceanography and Marine Biology: an Annual Review*, **56**, 105-236.
- Pillay, D. & Branch, G.M. 2011. Bioengineering effects of burrowing thalassinidean shrimps on marine soft-bottom ecosystems. *Oceanography and Marine Biology: an Annual Review*, **49**, 137-192.
- Pratchett, M.S., Anderson, K.D., Hoogenboom, M.O., Widman, E., Baird, A.H., Pandolfi, J.M., Edmunds, P.J. & Lough, J.M. 2015. Spatial, temporal and taxonomic variation in coral growth—implications for the structure and function of coral reef ecosystems. *Oceanography and Marine Biology: an Annual Review*, **53**, 215-295.
- Pratchett, M.S., Caballes, C.F., Rivera-Posada, J.A. & Sweatman, H. 2014. Limits to understanding and managing outbreaks of crown-of-thorns starfish (*Acanthaster* spp). *Oceanography and Marine Biology: an Annual Review*, **52**, 133-200.
- Purcell, S.W., Conand, C., Uthicke, S. & Byrne, M. 2016. Ecological roles of exploited sea cucumbers. *Oceanography and Marine Biology: an Annual Review* **54**, 367–386.
- Schnytzer, Y., Achituv, Y., Fiedler, G.C. & Karplus, I. 2022. (this volume). The intimate relationship between boxer crabs and sea-anemones: what is known and what is not. *Oceanography and Marine Biology: an Annual Review* **60**.
- Shannon, L.V. 1985. The Benguela ecosystem, Evolution of the Benguela physical features and processes. *Oceanography and Marine Biology: an Annual Review*, **23**, 105-182
- Skinner, C., Cobain, M.R.D., Zhu, Y., Wyatt, A.S.J. & Polunin, A.V.C. 2022. (this volume). Progress and direction in the use of stable isotopes to understand complex coral reef ecosystems: a review. *Oceanography and Marine Biology: an Annual Review* **60**.
- Smith, C.R. & Baco, A.R. 2003. Ecology of whale falls at the deep-sea floor. *Oceanography and Marine Biology: an Annual Review*, **41**, 311-354.
- Snelgrove, P.V.R. & Butman, C.A., 1994. Animal sediment relationships revisited: Cause versus effect. *Oceanography and Marine Biology: an Annual Review*, **32**, 111-177.
- Southward, A.J. 1958. The zonation of plants and animals on rocky sea shores. *Biological Reviews* **33**, 137–177.

- Southward, A.J. 1964. Limpet grazing and the control of vegetation on rocky shores. In: *Grazing in Terrestrial and Marine Environments, British Ecological Society Symposium No. 4*. D.J. Crisp (ed.). Oxford: Blackwell Scientific Publications, pp. 265–273.
- Spencer, T., Brown, B.E., Hamylton, S.M. & McLean, R.F. 2021. 'A close and friendly alliance': biology, geology and the Great Barrier Reef Expedition of 1928–1929. *Oceanography and Marine Biology: an Annual Review* **59**, 89–138.
- Stella, J.S., Pratchett, M.S., Hutchings, P.A. & Jones, G.P. 2011. Coral-associated invertebrates: diversity, ecology importance and vulnerability to disturbance. *Oceanography and Marine Biology: an Annual Review*, **49**, 43-104.
- Thiel, M., Castilla, J.C., Fernández Bergia, M.E. & Navarrete, S. 2007. The Humboldt current system of northern and central Chile. *Oceanography and Marine Biology: an Annual Review*, **45**, 195-344
- Thiel, M., Penna-Díaz, M.A., Luna-Jorquera, G., Salas, S., Sellanes, J. & Stotz, W. 2014. Citizen Scientists and Marine Research: Volunteer participants, their contributions, and projection for the future. *Oceanography and Marine Biology: an Annual Review*, **52**, 257-314.
- Tsounis, G., Rossi, S., Grigg, R., Santangelo, G., Bramanti, L. & Gili, J.M. 2010. The exploitation and conservation of precious corals. *Oceanography and Marine Biology: an Annual Review*, **48**, 161.
- Underwood, A.J. 1979. The ecology of intertidal gastropods. *Advances in Marine Biology* **16**, 111–210.
- Veenhof, R.J., Champion, C., Dworjanyn, S.A., Wernberg, T., Minne, A.J.P., Layton, C., Bolton, J.J., Reed, D.C. & Coleman, M.A. 2022. (this volume). The ecology of kelp gametophytes and implications in a changing ocean. *Oceanography and Marine Biology: an Annual Review* **60**.
- Wolfe, K., Anthony, K., Babcock, R.C., Bay, L., Bourne, D.G., Burrows, D., Byrne, M., Deaker, D.J., Diaz-Pulido, G., Frade, P.R. & Gonzalez-Rivero, M. 2020. Priority species to support the functional integrity of coral reefs. *Oceanography and Marine Biology: an Annual Review*, **58**. 179-326.
- Yasuhara, M., Huang, H.-H.M., Reuter, M., Tian, S.Y., Cybulski, J.D., O’Dea, A., Mamo, B.L., Cotton, L.J., Di Martino, E., Feng, R., Tabor, C.R., Reygondeau, G., Zhao, Q., Warne, M.T., Aye, K., Zhang, J., Chao, A., Wei, C.-H., Condamine, F.L., Kocsis, A.T., Kiessling, W., Costello, M.J., Tittensor, D.P., Chaudhary, C., Rillo, M.C., Doi, H., Dong, Y.-W., Cronin, T.M., Saupe, E.E., Lotze, H.K., Johnson, K.G., Renema, W., Pandolfi, J.M., Harzhauser, M., Jackson, J.B.C. & Hong Y. 2022. (this volume). Hotspots of Cenozoic tropical marine biodiversity. *Oceanography and Marine Biology: an Annual Review* **60**.