

Kinne O. The effects of temperature and salinity on marine and brackish water animals. II. Salinity and temperature-salinity combinations. *Oceanogr. Mar. Biol. Annu. Rev.* 2:281-339, 1964.
[Biologische Anstalt Helgoland, Hamburg, Federal Republic of Germany]

This paper is a comprehensive, critical review of the effects of salinity and temperature-salinity combinations on marine and brackish water invertebrates and fish. It pays particular attention to tolerances, metabolism, and activity; responses to salinity changes; patterns of ion-, volume-, and osmoregulation; reproduction; body size; meristic characters; and nongenetic and genetic adaptations. [The *SCI*[®] indicates that this paper has been cited in over 185 publications since 1964, making it the most-cited paper ever published in this journal.]

Otto Kinne
Biologische Anstalt Helgoland
D-2000 Hamburg 52
Federal Republic of Germany

December 10, 1982

"There were three good reasons for producing this review. (1) I had published a number of papers concerned with salinity and temperature effects on a variety of marine and brackish water animals; hence, there seemed to be a need for a summarizing report on the state of the art; (2) Ted Bullock, who had invited me to work at the University of California, Los Angeles, insisted that it was time for me to write my first review; and (3) Harold Barnes of Scotland, then just about to start his now well-established *Oceanography and Marine Biology: An Annual Review*, was searching for what he called 'high-class contributions' to get his series off the ground. Originally, the paper in question was part of a larger review comprising effects of temperature, salinity, and temperature-salinity combinations. Understandably, Barnes wanted some diversity in his first volume and hence subdivided my paper into two sections, the first appearing in

1963.¹ Since my first review, I have authored a number of others, two of which also deal with temperature and salinity, updating and elaborating on the initial opus.^{2,3}

"Much of the difficulty I encountered related to the large number of pertinent papers, their publication in widely scattered journals, and, last but not least, the failure of many authors to conduct and to report their research with the necessary care, depth, and objectivity. In fact, a very large number of papers consulted for the review could have remained unwritten without changing the major conclusions. Some 20 percent of the total number of papers originally read turned out to be mere ballast, not even worth mentioning.

"A lesson I have learned from writing this and later reviews is that our science is in bad need of critical syntheses. At a time when a rain of hundreds of new papers per annum threatens to suffocate the individual marine biologist, we must recognize that progress in research is beginning to suffer acutely from hypertrophied production and from grossly underdeveloped digestion. Large sections of knowledge-production have become shortsighted or even blind. There is too little feedback-based directivity and too little pressure for correction and improvement. The slogan 'publish or perish' must be complemented by 'digest or degenerate.'

"Why did the paper become a *Citation Classic*? I don't know. I consider my subsequent reviews on the same topic more comprehensive and mature. There seems to be a 'copying effect' in paper quotation. Certainly, there are very important papers which receive less attention than they deserve on scientific grounds."

1. Kinne O. The effects of temperature and salinity on marine and brackish water animals. I. Temperature. *Oceanogr. Mar. Biol. Annu. Rev.* 1:301-40, 1963.
[The *SCI* indicates that this paper has been cited in over 150 publications since 1963.]

2. Temperature: invertebrates. (Kinne O, ed.) *Marine ecology, volume 1. Environmental factors, part 1.* London: Wiley, 1970. p. 407-514.

3. Salinity: invertebrates. (Kinne O, ed.) *Marine ecology, volume 1. Environmental factors, part 2.* London: Wiley, 1971. p. 821-995.