

## REVIEWS

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JOHN C. MARR (Ed.) "*The Kuroshio – a symposium on the Japan Current.*"  
East-West Center Press, University of Hawaii, Honolulu, 1970. 611 pp.,  
\$17.50.

This volume is the latest in a series of published symposia reviewing the oceanography and fisheries of major ocean basins and, together with those on the Indian Ocean and the tropical Atlantic, is a useful comprehensive review; each had its origin in loosely coordinated international expeditions designed to provide quasi-synoptic data from large ocean areas on a seasonal basis. Each volume is probably of most use to the participants in the various cruises and symposia, in their subsequent work in the region, and each leaves the rest of us with the regret that it was not written by a single generalist, rather than by many specialists. But perhaps there are no more SVERDRUPS among us.

The 63 contributions, representing all but 17 of the papers presented at the Symposium, range from the delightful to the banal, and cover a far wider geographical area (the plankton of Singapore Straits) and subject matter (a review of the *Stolephorus* anchovies of Hawaii) than the title promises us.

A series of about a dozen excellent papers describe various aspects of the physical oceanography of the Kuroshio stream, and leave us with a striking impression of a complex, dynamic ocean feature which undergoes major fluctuations across a wide range of time and space scales. UDA's review, and his useful schematic map, are an excellent introduction to what MUROMTSEV, in his description of Soviet studies in this area, describes as "one of the most complicated parts of the world ocean". Papers by UDA, MUROMTSEV, and YOSHIDA describe the newly-discovered easterly flow at 20–24°N, near the boundary between trades and westerlies, which they term the Subtropical Frontal Counter-current, and YOSHIDA suggests that it may extend much farther to the east than the CSK (Cooperative Studies of the Kuroshio) data suggest.

BARKLEY extends his studies of the Kuroshio frontal meanders as a complex vortex street (or VON KÁRMÁN wake) and by placing a term for Coriolis force in his equations reaches an explanation of the stationary nature of the vortices; those of us who have tried to study at sea the effects of islands and banks in oceanic current systems on mid-ocean production should be very grateful for BARKLEY's resolution of the problem with such a simple and satisfactory model.

The periodic changes in the circulation pattern east of Japan are discussed in various time scales; ISHINO and OTSUKA describe the effects of the development of a meander, which brought the Kuroshio axis unusually close to the coast so that Tateyama Bay was flooded for a period of some days by a 4 knot current, destroying much fixed fishing gear. Papers by CHAN, CHU, TAFT, and NITANI and SHOJI discuss longer-term changes in circulation; TAFT describes the path of the Kuroshio over deep water, however, as being more stable over a yearly period than is the Gulf Stream. He describes the major deflections of the main axis of the stream during the period 1955–1964, and shows how a southward deflection, first noted in 1959, in association with a large cyclonic

cold eddy, was present for the next 4 years before the circulation returned to the 1958 conditions.

From the section on oceanic circulation I turned, with a familiar sinking feeling, to the papers on biological oceanography. Oceanic biology seems to be not only an inexact science, but is also, all too often, an uncritical one. MOTODA, IRIE and YAMAZI describe the results of 300-odd, 0–150 m vertical hauls with a NORPAC zooplankton net; they contour their biomass data, but not the numerical data derived from a sorting procedure into 30 major groups of biota because, as they rightly say: “since the sorted groups consist of mixed species it is of little value to trace the geographical distribution of a mass of sorted groups”. However, the next paper in the volume is a short descriptive text by YAMAZI, followed by 65 largely unreadable plots of exactly those data plotted in exactly that way. Anyone who can interpret figures 44 and 56 of this paper, for example, has clearer eyes than I have.

KUN, and others, describe the biological data from Soviet ships using JUDAY, and not NORPAC nets, unfortunately for conformity; this is a pedestrian effort which simply places some numbers (of unknown validity) on to-be-expected processes. MOTODA, KAWAMURA and NISHIZAWA attempt a respiration budget which I (as an old trophic budgeteer) find equally as unsatisfactory as my own attempts in this field of several years ago: where, for instance, are the micro-zooplankton in their budget? As here, sampling levels are too often confused with trophic levels in food chain studies.

A paper by HATTORI describing a “band-structure” in the distribution of fish eggs and larvae is perhaps the least critical paper of all; his hypothesis, that coastwise “bands”, each derived from a source bay, describe the distribution of these biota, is based upon the data from a single transect of stations, normal to the coast, occupied only once. His data could equally well describe a random series of plankton patches, a possibility he ignores. Anyway, the following paper, by HIRANO and FUJIMOTO on dye diffusion experiments in the same region, suggests to me that HATTORI’s “bands” are impossible on physical grounds.

There is a series of descriptive papers, each a useful building block in larger schemes, on the zoogeography of chaetognaths, copepods, euphausiids and ostracods in restricted parts of the Kuroshio region; chaetognaths are reported from around Korea (PARK) and Formosa (LIAW), euphausiids from around Korea (HONG) and ostracods and copepods from around Formosa (TAN and TSENG, respectively). Again, the interest of these papers varies rather widely; PARK, on chaetognaths, lays the groundwork for the use of these organisms as biological indicators while TAN, on copepods, publishes largely undigested data lists. It would be nice to think that from these studies might come, in this region where real-time oceanography is perhaps more developed than elsewhere, operational and continuing use of biological indication of advection, upwelling and meandering processes.

Fishery biology is served by species reviews in a small number of genera selected by consensus of CSK participants as actually or potentially valuable in the commercial fisheries; these genera include *Nemipterus*, *Stolephorus*, *Rastrelliger*, *Saurida*, and *Mugil*. The level of sophistication in the handling of data varies considerably, though it is commendable that some (e.g. TUNG on *Mugil*) have taken their studies as far as the computation of yield-per-recruit equations. MENASVETA discusses the excitingly large potential of demersal fish in the Sunda Shelf regions; after the spectacular rise in the 1960s in the Gulf of

Thailand trawl fisheries, to an annual production of nearly half-a-million tons, it is evident from this review (and other work) that in the usual tropical situations – off river mouths, in gulfs and on other muddy shelf areas – high catches can be expected throughout the region. Recent FAO estimates suggest a potential in excess of 2.5 million tons in this area, compared with present production of less than one million. Management of tropical multi-species trawl fisheries is extremely difficult, and yet MENASVETA's data indicate how vital this has already become in the Gulf of Thailand. Practical and political problems unknown to high latitude fisheries administrators must be, but often are not, solved if such fisheries are to be placed on a sustained-yield basis.

We are promised a second and perhaps a third CSK Symposium: let us hope for rather more critical editing (difficult, admittedly, in this medium) if these are to be published, and for more skill from the publishers: the present volume is large, not very elegant, and weakly bound.

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R. LETACONNOUX and A. E. J. WENT (Eds.) “*Symposium sur les Ressources Vivantes du Plateau Continental Atlantique Africain du Detroit de Gibraltar au Cap Vert*”.

Rapp. P.-v. Reun. Cons. perm. int. Explor. Mer, **159**, 1970, 289 pp  
D.kr. 70.00.

Upwelling regions have been singled out for especial attention in oceanographical studies, but although it is the closest geographically to Europe, the North-West African region has attracted much less attention than the other major upwelling regions. Very few hard facts have been readily available and one has generally been forced to draw analogies instead of using observed data, in discussions of the area.

It is a pleasure, therefore, to open this volume of papers and find presented together for the first time an unexpected amount of information on many aspects of the oceanography of this fertile stretch of ocean.

Interest in the seas off north-west Africa dates well back into history. The early Portuguese navigators, limited to coastal navigation, met repeated frustration in their efforts to sail southward by the great reefs and strong currents off Cape Bojador. However the great oceanographical expeditions of the 19th Century set their sights farther afield and barely touched upon this part of the African coast, while the growing activities of fishery scientists had perforce to be concentrated on waters nearer home and in the areas where the major fish stocks lay.

Now, however, this volume displays the rapid growth of interest in the north-west African area, the sudden realisation that here on the doorstep of Europe is an area of great fertility, by-passed for so long, but clearly worthy of close study.

The papers are grouped in seven chapters, according to the sections of the Symposium at which they were presented. It is only to be regretted, as is so often the case, that it has taken three years for these papers to appear in the press although a resumé and the reports of chairmen of the sections were published by FAO in 1969.