Per Ottestad. "On Antarctic Copepods from the 'Norvegia' Expedition." Sci. Res. Norwegian Antarctic Exped. No. 15. Oslo, 1936.

This is an account of the biology and distribution of four species of copepods, *Calanus acutus*, *Calanus propinquus*, *Rhincalanus gigas*, and *Metridia gerlachei*, taken during the circumpolar voyage of the "Norvegia" in 1930—31. These species were selected for detailed study as being the most plentiful in the area traversed. They have already been dealt with in publications by R u u d and M c I n t o s h, and the present paper amplifies the earlier accounts, by filling in, though only by a single line of stations, areas previously unexplored. Serial vertical hauls, most of them extending to a depth of 400 metres or more, have ensured a comprehensive sampling.

Three of the species mentioned, *Calanus acutus*, *Calanus propinquus*, and *Metridia gerlachei*, agree, according to the author's deductions from his observations, in having, in the Antarctic, a single spawning period which takes place shortly after the melting of the ice, the presence of a new brood having been noted in company with the spawning survivors of the previous year. The place of reproduction for all three species is to the south of the antarctic convergence, i.e., the junction between the antarctic and the sub-antarctic water. The production of the new brood depends, in the author's opinion, on the warming of the surface water to a positive temperature. It results from this that since this warming-up occurs at different times in different areas, specimens in all stages of development may be found at any time during the antarctic summer.

The fourth species, *Rhincalanus gigas*, showed no indication of a new brood on the antarctic stations but on one station north of the convergence and on another situated upon it there are clear signs of the presence of a summer brood distinct from the winter stock. It is inferred from this that spawning takes place in the sub-antarctic region and that the stock in the Antarctic is renewed by the drifting in from the north each year of some of the summer brood, probably by a sub-surface current, for the antarctic surface drift is mainly from the west with a northward component. This drift must bring in very considerable quantities to account for the high number of specimens found on some of the stations south of the convergence. It is probably significant that the young stages of *R. gigas* are not found most abundantly in the surface layers but occur with equal or greater frequency down to 300 metres. Whether a sufficient breeding stock remains north of the convergence or whether it is renewed by the drifting back of the adults by a return current is not yet apparent.

G. P. F.

G. L. Clarke. "The Diurnal Migration of Copepods in St. George's Harbor, Bermuda." Biol. Bull. Woods Hole, Mass., Vol. LXVII, No. 3, pp. 456—460. U. S. A., 1934.

The vertical distribution of two species of planktonic copepods *Calanopia americana* and *Acartia spinata* was studied in water 12·5 to 14 metres in depth in St. George's Harbor, Bermuda. Both species occurred at the surface and in the deep layers at night, but at sunrise they migrated to the bottom. While *Acartia spinata* was caught in fair numbers in the water layers close to the bottom in the daytime, the behaviour of *Calanopia americana* was rather unusual. The very large population of that species which was found at night disappeared almost entirely in the daytime from the water layers above the bottom. It was thought that these copepods may have actually burrowed into the soft mud on the bottom in the daytime. This