

a homogeneous composition. Their approach is heralded by an immense swarm of *Lepas fascicularis*, which at the beginning of May and June float passively on the surface of the northern portion of the North Sea. *Arachnactis albida* follows soon afterwards, as does also *Physophora borealis*. The salpæ and doliolids, which with *Cupulita sarsi*, constitute the bulk, generally make themselves visible in July, August, and September."

We know that these warm surface forms approach the coast of western Norway, and as far north, for instance, as the Trondhjem fjord.¹ Even within the Norwegian Sea such seasonal migrations occur, the warm water layers from the eastern part spreading out over the deeper areas during summer.

Active
migrations.

The foregoing remarks refer only to the passive migrations or drift of pelagic forms with the currents of the sea. Fishermen have, however, long recognised the vast active migrations of the powerful swimmers, especially fishes, generally supposed to be undertaken in order to reach definite localities. The first to submit these migrations to scientific investigation was probably G. O. Sars. As to the herring fisheries on the coasts of Norway he was struck with the fact that while herrings of all sizes are captured along the entire coast from the Skagerrack to the Barents Sea, spawning herrings are only caught in large quantities on a definite restricted portion of the coast, viz., from Stavanger to Romsdal (the Norwegian North-Sea coast), and he concluded that the herrings must necessarily migrate to these places to spawn, enormous spawning-migrations entering as a necessary link in the life-history of the herring.

Numerous instances of such migrations are known from the fishing industries, on the coast of Norway principally in the case of herring and cod, and in Iceland of cod and plaice. I refer the reader to my description of the migrations of the capelan (*Mallotus villosus*) in the Finmark Sea² (Barents Sea). This small boreo-arctic fish spawns in spring on the coast banks of Finmark, and during summer it migrates far north into the Barents Sea towards the ice-limit. In March 1901, when many miles off the Finmark coast and over deep water, I could observe and fish the capelan, the shoals being followed by millions of auks, fulmars, kittiwakes, and gulls, the stomachs of which contained capelan.

¹ See Nordgaard, *loc. cit.*

² Hjort, *Fiskeri og Hvalfangst i det nordlige Norge*, Bergen, 1902.