

by the stop breaking, or by the line carrying away. Where no accident occurred, when the dredge had been on the bottom for a sufficient time—from an hour and a half to two hours—the rope was brought to the deck-engine, and the dredge brought up. We found that the strain on the line was so great that the men could not hold on to it while it was being hove in, when turns were passed round one drum only of the engine; by the arrangement already described (p. 10), by the time the rope had reached the starboard drum, the pressure was so far relieved that the men could handle it easily, and a great support was given to the bearings of the engine.

On one or two occasions, when, owing to the great depth (over 3000 fathoms), we could not spare sufficient time to allow the dredge to sink in this manner, we fastened a sounding-rod to the bottom of the dredge-bag or trawl and put 4 cwt. of detaching weights on the rod. The dredge was then let go perpendicularly, the ship being kept stationary until sufficient line had been paid out to allow the rod to reach the bottom and disengage the weights, when the ship was allowed to drift a little way, and the leads were then attached to the thimble and allowed to slide down the rope to the toggle. This is a very good way of dredging or trawling quickly in deep water.

In running a section across one of the ocean-basins at the average depth of the ocean—from 2000 to 2500 fathoms—the dredging operations on board the *CHALLENGER* fell into a regular routine. Steam was got up at daybreak (we had probably been running on under sail all night), and the ship was hove-to during the morning watch and a sounding taken. The exact depth, the nature of the bottom, and the bottom temperature having been thus ascertained, and a sample of the bottom-water procured, the dredge or trawl was put over after breakfast, and the line slowly veered, in the manner described above, to about 4000 fathoms. In from two to three hours the movements of the accumulators indicated that the dredge had reached the bottom, and it was allowed, with all precautions, to drag for an hour or two. The operation of heaving-in then commenced, and continued for four hours or more, according to the resistance from the weight of the dredge or the state of the weather. When the number of 100-fathom marks on board indicated that the dredge was nearing the surface, the naturalists congregated on the bridge, and preparations were made for its reception.

Thus a single dredging operation occupied a whole day. When the dredge came up the light was usually beginning to fail, and we were sometimes obliged to use lanterns in clearing it. In hot climates it was unsafe to attempt to keep creatures over the night, they were almost sure to be half decomposed before morning; they were therefore registered and put into spirit at once, and we thus lost many opportunities of observing in detail the colours of the animals, and the structure and consistence of their fresh tissues. Animals from great depths were always brought up dead, so that we had not to regret lost opportunities of watching their movements or habits.