

occasions was very crude, and proved altogether inadequate to sufficiently reduce the temperature of the water whilst passing through the tropics, when 84° Fahr. was recorded, and it was only possible to reduce this by 4° Fahr. Only two lobsters, both females, were landed alive the first voyage, and seven on each of the two succeeding voyages. Almost all the deaths occurred in the tropics, and the first three experiments proved conclusively that the most serious difficulty to be overcome was the high temperature experienced in this region.

A great improvement was effected in the cooling apparatus previous to making the fourth shipment, and, as this has proved entirely satisfactory, it may be as well to describe it in some detail. The chamber in which the wooden lobster-tanks are situated is about 20 ft. by 12 ft., and is insulated at the sides and ceiling. It is also fitted with a chute through which a current of cold air may be forced when desired. The supply of water is laid from the sanitary supply-tank on the upper deck into a 300-gallon tank situated in the 'tween-decks close to the tank-chamber. This tank is also insulated, and is pierced with a number of 1 in. pipes, through which a constant current of cold air is forced. The water is led direct from this tank to the wooden tanks containing the lobsters, each compartment being served with a separate cock. By this means it was found possible to reduce the temperature of a full and sufficient supply to the tanks by about 20° Fahr. Each lobster was confined in a separate compartment in the tanks, and the large claws were not tied during the voyage. Each compartment measures about 18 in. by 12 in. by 15 in. deep, and provision is made for emptying them for cleaning purposes. This process necessitated frequent handling of the lobsters, and was seldom resorted to on the last voyage, the cleaning being done by means of a siphon. They were fed daily on frozen herrings and haddocks, a piece about 2 in. square being placed in each division daily, and the portion not consumed was removed after a few hours. In addition to the improved cooling apparatus, the success of the last shipment was in a very large measure due to the Shaw-Savill Company kindly allowing the "Karamea" to call into Plymouth for the lobsters and crabs. The long railway journey and confinement in stagnant ballast-tank water were thus avoided, and the lobsters and crabs were placed on board in the very best condition. Twenty-five lobsters were shipped, but to these were added eight others that had been placed on board for ship's use, making a total of thirty-three. Only two deaths occurred during the voyage, and seventeen males and fourteen females were landed in the very pink condition, and were at once transferred by launch to the ponds.

Mr. Naismyth, chief engineer, was in charge of the first shipment, and it is greatly to his credit to have succeeded in keeping even two alive through the most adverse conditions. The second, third, and fourth shipments were under the charge of Mr. Finlayson, chief engineer, to whom belongs the credit of having overcome every difficulty in connection with the successful importation of both crabs and lobsters. The scrupulous cleanliness of the tanks, the businesslike appearance of the chamber, and the healthy state of the stock of lobsters and crabs bore evidence of the care that had been taken throughout the voyage. These experiments have proved conclusively that a very large percentage can be successfully imported. The present apparatus is capable of considerable extension, and I think we may reasonably conclude that, with the same care as has been exercised in the past, the limits of the numbers imported are determined only by the amount of accommodation which is provided. With larger apparatus it would be almost as cheap to import a hundred or so on each visit of any vessel on board of which permanent accommodation is provided.

Habits in Confinement.

Up to the present only two lobsters out of forty-four that have been landed have died. One, a male, appeared to have been unable to get rid of the cast shell at the second moult, and was found dead in the pond. The half-moulted portion was not eaten by the other lobsters. The second, a female, was killed by its mate in a glass tank, where the two, both egg-bearing females, were unfortunately placed on arrival without the precaution of securing their large nipping-claws. Before being placed in the ponds on arrival the large claws of each lobster are "muzzled" by means of small, tight-fitting rubber bands. If this is not done the lobsters are apt to more or less seriously injure each other, not, in my opinion, due altogether to a pugnacious disposition, but to their confinement in separate compartments and frequent handlings during the voyage, which, by reason of their purblind condition, causes them to acquire a habit of seizing at anything that comes near them. The action of the salt water rots the rubber bands, and the claws become free in about a month's time, by which time they have become accustomed to their surroundings and make allowance for each other's presence. No act of cannibalism has taken place, and even the defenceless newly moulted ones have rarely been even injured by the others.

A number of suitable shelters are placed in the ponds, and within a day or two after arrival each lobster has taken up its abode in one of these. When choosing a shelter the lobster is generally seen to insert the antennæ and large claws, and, when satisfied that the shelter is unoccupied, slews round and backs in, tail first, the large claws forming an efficient guard to the entrance. As a rule, each lobster sticks to its own shelter during the daytime, and they are rarely seen about the pond except at feeding-time and towards dusk. An occasional fight takes place for the possession of a shelter, which not infrequently results in the loss of a limb to one or other of the combatants. Many instances of regeneration of lost limbs have occurred, and the earlier arrivals have increased very greatly in size. They are fed irregularly on fish, chiefly red-cod, skinned and boned, and cut into pieces about 2 in. square.

Moulting, Spawning, and Hatching.

Most of the egg-bearing lobsters that have been shipped have lost their eggs before arrival. In several cases a few eggs still remained attached to the swimmerets, but on examination the greater portion of these were found to be coated with a profuse growth of algæ, diatoms, &c. None of these eggs have ever hatched out.