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CRUSTACEANS AS FOOD FOR FISHES IN FISH CULTURE

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For many years crustaceans have been regarded as valuable food for fishes. This view is based on the fact that they often form a large proportion of the natural food of many species of fishes. This is especially true of the young which in many species subsist almost entirely upon crustacea.

The fresh-water crustacea, all of which are more or less useful as food for fishes, are divided into two groups or classes technically designated as Entomostraca and Malacostraca. While both groups contain many species which form a considerable portion of the natural food of many kinds of fish, only a few forms have received special attention in fish-cultural practices.

ENTOMOSTRACA

The Entomostraca are very small, and some are so minute as to be invisible to the naked eye. They enter largely into the natural food of the youngest stages of various fishes and even the adults of some fishes.

There is scarcely a natural body of water of any size or character that will not be found to contain some form or other of Entomostraca. Of these, perhaps the best known form is a genus of the so-called water fleas, known as Daphnia. Daphnia pulex may serve as a representative of the widely distributed Entomostraca, being found in almost all regions of the world. This species attains a length of about one-tenth of an inch, and wherever found under favorable conditions, it is usually in swarming miltitudes.

MALACOSTRACA

This group of crustaceans comprises the generally larger and more conspicuous forms. In classification they fall into four distinct groups or orders: Isopoda ("Sowbugs"); Amphipoda (Scuds, "Shrimp"); Mysidacea ("Shrimp"); and Decapoda (prawns or shrimp, and crayfish or "crawfish" or "crab"). These orders differ much in superficial appearance, shape of body, size, color, and structure.

Isapoda. - Included among the Isopoda are the common terrestrial sowbugs or pillbugs and several aquatic species found in brooks and ponds. The most common species (Asellus communis) attains a length of about half an inch. It is not generally abundant enough to make it more than of accessory value as fish food.

Amphipoda. - Amphipoda or scuds include those small forms related to the sand hopper of the seashore and are commonly though inappropriately designated as "shrimp". The amphipods generally vary greatly in the nature of their habitats, but are very similar in their habits. They are quick and active in their movements, their thoracic legs being adapted for climbing, and their abdominal appendages for swimming and jumping. They dart about among green water weeds, usually keeping well in shelter and swim rapidly when disturbed. They are hardy and their habits enable them to maintain their numbers although they are not as prolific as many other crustaceans. They carry their young in a pectoral brood pouch until well developed, and their agility and ability to conceal themselves serves to a considerable degree as protection against predacious enemies.

There are several species of scuds or "shrimp" in North American waters which, owing to their general abundance, are of considerable importance as fish food. One kind, however, may be better adapted to a certain locality than others and when artificial distribution is contemplated, it is necessary to take into consideration the physical and chemical conditions essential for success. Notwithstanding the wide distribution of some forms and their general abundance they require certain kinds of surroundings which are different for each species.

Decapoda. - The principal fresh-water crustaceans in this group of interest as fish food are the shrimps or prawns and the crayfishes. Of the former Palaemonetes is the most important. It has been recorded from Florida to Illinois and Lake Erie, and is the smallest of fresh-water decapods. It is frequently abundant, living among water mosses and grasses and abounds in creeks, ponds, and lakes. The crayfishes or crawfishes are the commonest inland representatives of Decapoda. They live in rivers, ponds, lakes, and sloughs; some are more or less terrestrial, others subterranean, living in cave waters. They are mainly carnivorous, their food being smaller animals, dead or alive, and decomposing flesh, but southward an omnivorous species is a great depredator in newly-planted fields of corn and cotton. The different species vary much in size, many of them being large enough to be of considerable commercial importance. The smaller, purely aquatic species form an important food for several species of fishes, including black bass, rock bass, and perch. The eggs of shrimp and crayfishes are carried during incubation, attached to the swimmerets of the abdomen, and the young are of the form of the adult, when hatched. They cling for a time after hatching to the hairs of the swimmerets by means of their little upper feet, and are carried about by the mother crawfish.

ARTIFICIAL CULTURE OF CRUSTACEANS

Entomostraca, particularly species of Daphnia, have been raised successfully for food of small aquarium fishes and also for food of young black bass and other fishes in ponds. The methods employed have been described in Memorandum I-61 available from this Service.

Amphipods have been raised and a continuous supply maintained in artificial enclosures containing suitable aquatic plants. Naturally, the most common and widely distributed species are best for this purpose, since they will thrive under a greater variety of conditions. It is doubtful, however, if it is practicable to produce them in sufficient quantities to support a large number of fish.

Neither the fresh-water shrimps nor crayfishes have been raised artificially in this country, but in Europe crayfish culture has been practiced with more or less success. It appears, however, that as extensive plants are required to produce crayfish as to raise fish so that their production for fish food is not practicable.

POSSIBILITY OF STOCKING STREAMS AND LAKES

While it is possible to stock streams and lakes with crustacea of various species, this is usually not necessary since most natural waters which provide suitable conditions are already inhabited by these animals. If, however, such stocking is thought to be desirable the species to be stocked should be determined by the character of the water; the section of the country; and the availability of a supply. A nearby supply from water of similar character is desirable, not only on account of convenience but because the species occurring there are most likely to be suited to the waters to be stocked. However, some crustaceans can be shipped long distances with reasonable care.

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