INSECT COLLECTION AND FEEDING

This invention relates to aquatic animal feeding and insect collection. This patent application is a continuation-in-part of the following U.S. patent applications: Ser. No. 460,619 filed Apr. 12, 1974, now U.S. Pat. No. 3,939,802, which is a continuation-in-part of Ser. No. 213,966, filed Dec. 30, 1971 (now abandoned); Ser. No. 477,839 filed June 10, 1974; and Ser. No. 497,540, filed Aug. 14, 1974, now U.S. Pat. No. 3,951,104. The disclosure of each of said applications is hereby incorporated herein by reference.

It is an object of this invention to significantly reduce the cost and labor required in feeding animals by collecting and feeding them insects. The insects cost nothing and can be collected without much labor. It also is an object to provide improved insect collection devices and methods for use in feeding aquatic animals.

The above objects are met by providing means for collecting and holding airborne and aquatic insects near the surface of water containing the aquatic animals until the insects are eaten. Also, light is shined into the water to attract aquatic insects from within the water. The insect collector uses light, preferably "near" ultraviolet (3,000 to 4,000 A) to attract the insects downwardly into a housing in which the lamp emitting the light is hidden so that it cannot be seen from a horizontal direction by the airborne insects. Preferably, a fan also creates air currents drawing the insects downwardly towards the water. Thus, the insects are forced towards the trap by at least two forces; inertia, and gravity, and preferably by a third, the force of the air flow created by the fan.

Other objects and advantages will be set forth in or apparent from the following description and drawings.

In the drawings:

FIG. 1 is a cross-sectional view, taken along line 1—1 of FIG. 2, of the preferred embodiment of the invention;

FIG. 2 is a perspective view of another embodiment of the invention, together with the embodiment of FIG. 1;

FIGS. 3 and 4 are cross-sectional views taken along lines 3—3 and 4—4 of FIGS. 2 and 3, respectively.

FIG. 1 shows a floating cage for use in growing fish 30 and 32. The cage 10 includes a tubular frame 12, an enclosure 14 made of netting material secured to the frame 12, a cover 16, and a floating ring 18 extending completely around the cage 10 and supporting the frame 12 above the surface 42 of the water in which the cage floats.

An insect collector device 20 is mounted in a hole in the cover 16. The collector 20 includes a frustro-conically shaped housing 22, a toroidally-shaped lamp 24, and a fan consisting of an electric motor 26, and a fan blade 27 driven by the motor. The motor 26 is mounted on a baffle plate 28 located in the center of the toroidal lamp 24.

The lamp 24 is a fluorescent "black light" which produces predominately near ultra-violet radiation; that is, radiation of from 3,000 to 4,000 angstroms, preferably with a peak near 3,600 angstroms. This type of radiation is known to attract insects very strongly, and has been found to penetrate water well. The fan blade 27 is rotated so as to create a down-draft of air through the housing 22 and downwardly into the cage 10 through the exit opening 23 of the housing. The radiation (including some visible light) from the lamp 24 shines into the water below, and simultaneously is reflected upwardly by the walls of the housing 22, which preferably are made of reflective metal such as aluminum for this purpose. The radiation penetrating into the water attracts aquatic insects 40 and other fauna such as plankton and small shrimp from within the water towards the lamp. The lamp also attracts flying insects such as insects 36 and 38 towards it.

The lamp 24 is hidden deep within the opaque housing so that it is not visible to insects 38 which are flying below the upper edge 21 of the housing. The insects must fly over the edge of the housing and down into the housing along paths such as path 37 in order to reach the lamp 24. Thus, the flying insects are drawn into the trap by three forces acting simultaneously; first, by the force of gravity, which pulls the insects downwardly towards the lamp 24; secondly, by the force of inertia, which prevents the downwardly-flying insects from escaping; and thirdly by the force of the air drafts created by the fan. With each of these three forces operating to trap the insects, the trap is extremely effective in gathering flying insects to be fed to the aquatic animals.

Although it might seem to be detrimental to hide the lamp 24 from horizontal view by the insects, the opposite has been found to be true; the collector 20 has a greater collection efficiency because of this feature. In fact, the collector 20 has utility as an insect trap to rid habitated areas of flying insect pests. In such a use, a collection bag or bath (represented by the water in FIG. 1) can be attached at the outlet 23 to collect the insect.

The air drafts created by the fan preferably are given a relatively high velocity by mounting the lamp bulb 24 with its outside a relatively short distance "A" from the side walls of the housing 22, and with its inner surface a relatively short distance "B" from the outer edge of the baffle plate 28. This arrangemment produces downwardly-directed air drafts of relatively high velocity around both the inside and the outside of the bulb 24. The baffle plate 28 covers and partially protects the motor 26 and fan blades 27 from rain and exposure to the sun.

Electrical wires and ballast for the motor 26 and the lamp 24, as well as mounting details of the device 20, have been omitted from the drawings for the sake of clarity. However, it is preferred that the plate 28, lamp 24, ballast and connecting structure be easily removable as a unit from the housing 22 for maintenance.

The air space 29 formed by the upper portion of the cage in cooperation with the upper surface of the water 42 is fully enclosed so that insects trapped in the air space cannot easily escape. The flying insects which enter the enclosure are forced eventually onto the water where they can be eaten by the fish 30 and 32. The enclosed air space 29 also traps aquatic insects emerging from the surface 42 of the water which have escaped being eaten by the fish in the cage. These insects also eventually fall to the water or are driven into the water by the fan so that they are eaten by the fish.

FIG. 1 also shows a structure for feeding fish not confined in a cage. The cage portion 14 is removed by cutting it away, for example, along the dashed lines 46; preferably the cage is omitted entirely. The remaining structure is floated on the surface of a pond containing the aquatic animals to be fed. The fish are drawn