A SIMPLE METHOD FOR SAMPLING *COQUILLETTIDIA PERTURBANS* LARVAE[1]

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Larvae of *Coquillettidia perturbans* (Walker) are notoriously difficult to sample because they remain attached to the submerged roots of emergent vegetation throughout their developmental period. Lounibos and Escher (1983) reviewed sampling methods. Morris et al. (1985) described a battery-powered pumping system, operable from a boat or backpack, that has been applied to a variety of habitats in Florida. One commonly used sampling method involves pulling up plants and either shaking roots into a bucket (McNeel 1931, Lounibos and Escher 1983) or into a separatory cylinder placed over emergent vegetation (Bidlingmayer 1954). Plant-pulling is not generally satisfactory for surveillance or quantitative sampling because it requires pulling up plant species which are not always easy to dislodge from the substrate, returning to a site to check the separatory apparatus, or taking large volumes of material to a laboratory for sorting. This note describes a simple, hand-powered method of sampling *Cq. perturbans* larvae that does not require pulling plants or necessarily sorting samples in the laboratory.

Equipment needed includes a "thirsty mate" hand-operated boat bilge pump (no. 136PR, Beckson Marine Inc., Bridgeport, CT 06605), and a single 20 cm diam no. 20 brass soil sampling sieve (Fisher Scientific, Pittsburgh, PA 15219). If the results are to be quantified, the equipment should include a set of soil sampling sieves (mesh sizes of 5 × 5 mm, 2.5 × 2.5 mm, and 1 × 1 mm; Hubbard Scientific Co., Northbrook, IL 60062) and 2 round enamelware pans ca. 7.5 cm deep.

Before operation, the bilge pump must be modified by removing the intake valve located on the bottom of the pump shaft. Removal of the valve converts the pump to a syringe that is capable of drawing a column of about 700 ml of water. If the valve is not removed and the unit is used as a pump, debris will clog the apparatus and screen out larvae. The outlet hose located at the top of the pump shaft can also be removed since it serves no useful purpose once the unit has been converted from a pump to a syringe.

To sample for larvae at a potential site, the end of the bilge pump is placed into the water at the base of a cattail or other host plant. The pump should be lowered into the root mat of the plant but should not be placed directly into the mud layer. Pulling on the handle of the pump will draw a water column into the pump shaft and create enough suction to dislodge larvae and pupae that are attached to the root system that is being sampled. Holding the pump at a 45° angle from the vertical lessens the chances of drawing mud and allows the current to sweep through a larger portion of the root mat. After drawing up a sample of water, the pump must be quickly lifted out of the water and allowed to drain into the brass sieve. Since the valve has been removed from the pump, the water will drain back out of the shaft by gravity and the sieve must be located within easy reach to catch the sample. Fitting the sieve with a styrofoam or wooden collar allows the sieve to float and greatly facilitates sampling over a broad area of marsh.

For basic surveillance purposes, the sieve sample can be agitated to permit excess silt to drain and examined for larvae by eye. Within seconds, the light-colored larvae begin slowly moving about and stand out remarkably well against the dark background of the water and plant debris. The sample should always be covered with several cm of water to give the larvae access to free movement. If a large amount of plant debris is drawn up with the water sample, the larvae may not be apparent in the sample for 30–60 seconds.

If exact counts of larvae are required, the contents of the water column should be drained into a floating enamelware pan and more critically examined by passage through a set of soil sieves of decreasing mesh size. The sample is first poured in small amounts through the larger sieve and collected in a second enamelware pan. The organic matter and much that accumulates on the sieve should be washed and inspected for any larvae that become trapped. This filtrate is then poured again, in small amounts, through the next 2 smaller sieves. Remaining larvae will be trapped on the mesh of one of these sieves, depending on instar, and can be picked with a pipette and counted. Alternatively, samples can be stored in containers and later sorted in the laboratory.

This sampling method for *Cq. perturbans* lar-

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vae is simple and inexpensive. If presence or absence of larvae is all that is needed for surveillance purposes, an inspector can quickly survey a large area with the pump and floating sieve in a relatively short period of time. If quantification is required, the system is more time consuming but still within reasonable limits for research or control operations. Perhaps the major drawback to the bilge pump system is that it cannot be used in deep (1 m or more) water. The system described by Morris et al. (1985) can be used in shallow and deep water situations.

Credit must be given to Dr. James Westman, Professor Emeritus at Rutgers University, who conceived the idea of utilizing a bilge pump as a possible sampling device when he assisted in a field survey for *Cq. perturbans* in New Jersey. Dr. George B. Craig, Jr., also provided encouragement during the development of this sampling method.

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