



Tagging Shrimp with Visible Implant Elastomer

Application Note APE04

Introduction

Visible Implant Elastomer is a two-part silicone-based material that is mixed immediately before use. VIE tags are injected as a liquid that soon cures to a pliable, biocompatible solid. The tags are implanted beneath transparent or translucent tissue and remain externally visible. In many amphibians, VIE tags are even visible through darkly pigmented skin. VIE tags are widely used for marking an ever-broadening range of finfish, crustaceans, reptiles, and amphibians. VIE has become very popular worldwide for marking shrimp because it is easy to inject, has no effect on the host, and is retained through molts.

In this Application Note, we describe specific techniques for tagging shrimp. Our website (www.nmt.us) has much more information that would be useful to prospective taggers, and we encourage you to read that information as well. New users will find the VIE Project Manual particularly comprehensive.



Please become familiar with the directions for the operation of the VIE Air Driven Elastomer Injection System and the Manual Elastomer Injectors as well as mixing instructions for the VIE tags before attempting to tag. If this is your first time tagging, we recommend that you practice on animals that are not part of a study or important stock. It does take some practice to develop the proper technique. Researchers at Hawaii's Oceanic Institute and at the Washington State Department of Fish and Wildlife were instrumental in developing these tagging methods. Juvenile shrimp as small as 0.01 grams and adults have been tagged successfully (please see References, below).

Tagging Shrimp

Three body locations are currently recommended for tagging shrimp with the VIE. All three are located in the 6th or last abdominal segment. The tags placed in the dorsal, left ventral, and right ventral locations (Figures 1 and 2) can be easily differentiated if the tags are placed properly. Migration of the tags can be a problem if the tagging is not done correctly. It is thought that in shrimp larger than 5 grams that other locations are possible including other segments. The additional locations need to be tested before use.



Figure 1: Ventral tag locations.



Figure 2: Dorsal tag locations.

The shrimp do not need to be anesthetized. The injection syringe is inserted into the 6th abdominal segment from posterior to anterior (right). Do not insert the needle all the way to the previous (5th) segment as that can lead to tag migration.



The tag should be placed shallowly in the muscle so as to be visible, but deep enough so as not to be shed when the shrimp molts. The tag should be about 1 mm away from the exoskeleton, depending on the size of the shrimp (right). If the tag is too deep in the muscle it may not be visible after much growth. When tagging in the ventral locations, care should be taken to avoid the ventral nerve cord. The tag should be oriented outside and parallel to the ventral nerve cord.



As the needle is withdrawn, inject the elastomer leaving a straight line of material as the tag. End the tag before reaching the exoskeleton. Any extruding material could cause a percutaneous condition and problems similar to those resulting from external fish tags, including loss.

Before the elastomer cures or the wound heals, the tag can be forced out of the wound if the shrimp is handled vigorously too soon after tagging.

Follow the instructions provided with the injector for proper sterilization techniques.

Code Capacity

While VIE is primarily used for batch identification, a surprising number of batches or individuals can be generated by combining multiple tags, multiple tag locations, and multiple colors. For example, researchers tracking seahorses have used this method to track more than 500 individual seahorses at one time.

Six fluorescent colors (red, yellow, blue, orange, green, and pink) and four non-fluorescent colors (black, brown, white, and purple) constitute the only intrinsic VIE codes. If the shrimp are fairly transparent, both the fluorescent and non-fluorescent colors can be used. If the tags are obscured by pigment, the visibility of the fluorescent colors can be greatly enhanced by using NMT's VI Light. Please refer to our Application Note APE05 "Fluorescing Visible Implant Elastomer Tags and Visible Implant Alpha Tags" for more details on using the VI Light and the VIE Color Standard.

If only one tag per shrimp were used, the number of potential unique tags is simply the product of the numbers of colors used and the locations. However, if two or more tags are used in each specimen, in combination with several different locations, many unique codes can be devised. In any tagging program, it is important that all of the study animals have the same number of tags. That way, there can be no confusion between animals which lost tags and those which began with fewer tags.

In general, the number of unique codes is found by the formula:

$$\frac{L!}{(L-N)!N!} C^N$$

Where:

C = number of colors used

L = number of body locations

N = number of tags

For example, three body locations used with four colors (C = 4, L = 3, N = 3) would provide 64 unique codes:

$$\frac{3!}{(3-3)!3!} 4^3 = 64$$

If you have questions about how VIE may be used in your research, please contact our biologists at biology@nmt.us.

References

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