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2.6 TECHNIQUES FOR MARKING AND TAGGING MOLLUSKS

Occasionally you will want to study the movements of mollusks. You might want to study how dead shells are moved by the tides. On the other hand, you might need to study the movements of a group of live mollusks. What follows is a list of techniques for marking shelled mollusks. While there are techniques for tracking mollusks without shells (Anderson 1973, Richter 1976, Grimm 1996, Coyer et al. 1999), further discussion of these techniques is beyond the scope of this chapter. Coyer et al. (1999) review methods for tagging various forms of marine life.

One simple way of marking a shell is to write a number directly on it. This can be done with an indelible fine-tipped marking pen or with a fine-tipped drafting pen such as a Rapidograph pen (Koh-I-Noor, Corp., available at art stores and many office supply stores). If the shell is dark, you may have to put on a patch of a quick drying white enamel-like substance such as is found in Liquid Label (Light Impressions, Brea, CA).

You can also try quick drying enamel paint. It may be necessary to file the periostracum or shell to make it smooth enough to write on. When the shell is numbered, cover the number with a cyanoacrylate adhesive (Superglue, Crazy Glue) or acrylic polymer (found in Liquid Label) or dental acrylic. This will protect the number from abrasion (Lonhart 1999 and Lemari et al. 2000). Some researchers have recommended clear epoxies, however, Lemari et al. (2000) recommended against using epoxies. They found epoxies to be inferior to cyanoacrylate adhesives.

Another technique is to use pre-printed numbers. These numbered discs or labels are generally 3-8 mm in size. They are attached to the shell using a cyanoacrylate adhesive or acrylic resin. As with writing the number directly on the shells, you may have to file the shell to allow the tag or disc to make better contact. Pre-made tags that have been used for marking include Shellfish Tags (Hallprint Pty., Ltd., Holden Hill, South Australia, Australia), Fingerling Tags (Floy Tag and Manufacturing, Inc., Seattle, WA) and the Queen Marking Kit (bee tags) (E. H. Thorne, Ltd., Wragby, England).

You can also print numbers using a small font, such as a 6 or 8-point font, on waterproof paper with an indelible ink or print them with a drafting pen. Then cut them out or use a hole punch and then attach them to the shell as described above. Young and Williams (1983) used a variant of this technique. They printed numbers on Dymo tape (a plastic tape). They attached the tags to mussels using a cyanoacrylate adhesive. In studies lasting almost three years, they found that 95% or more of their tags were still attached to the marked mussels. You can physically alter the shell as a way of

marking it. Using a diamond-tipped scribe (available at most hardware stores) or a file, you can scratch a number or code on to the shell. If you use a code, remember to record the coding instructions so that others can decode the markings at a later time. Some researchers have used drills to encode shells (Thoma et al. 1959, Wolda 1963, Kleewein 1999). Ropes and Merrill (1970) use either a file or a Dremel Moto-Tool for notching surf clams.

A method of marking bivalves, not requiring disturbing the specimens to read the mark, has been described by Englund and Heino (1994). This method used a small float attached to a small disc with a cord. The disc was glued to the shell. The middle of the cord was tied to a tag carrying the number or coded message. Lastly, you can code shells by using colored enamel paints. For instance, a linear arrangement of four dots using five colors will allow you to mark 625 specimens differently. After the paint has dried, cover it with a cyanoacrylate adhesive or acrylic polymer for added protection and durability.

2.8 LITERATURE CITED

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Mollusc marking techniques

The following suggestions have been made for marking shells. These methods have been used for a variety of projects from investigating the behaviour of individuals to understanding populations dynamics. The techniques have been used in land, freshwater and marine environments.

Engraving/marking shells

Drilling a series of holes into the shells near aperture (these could be coded to give a unique recognition for individuals) (Wolda 1963, Kleewein 1999) Wolda 1963: *Archives Neerlandaises de Zoologie*, 15: 381-471.

Kleewein 1999: *Journal of Molluscan Studies*, 65: 303-315.

There are small diamond tipped markers usually for writing on glass, which were used for marking *Cepaea* populations. You can produce permanent dots or scratches. Alternatively a dental drill held in a pin-vise to drill holes adjacent to the lip. This has been used for *Cepaea* and *Partula* studies. A placement code gives you about 1000 individual marks.

Other options include:

- Write with the permanent marker Sharpie

- Paint them with reflector paint, (like the paint of the road marking)

- File marks on the shell with a nail-file.

- Patch of quick-drying enamel paint, then numbered with indelible ink. To prevent it getting rubbed off, coat the patch with Superglue

- Epoxy paints (commonly used for painting boats)

Sticking marks on outside of shell

Various alternatives have been suggested:

- Small plastic "Hallprint" tags from Australia glued on with Crazy or Superglue (cyanoacrylate)

- Dymo Tape numbers carefully cut and stuck on with Superglue

- Waterproof sheets with numbers

 - Bisenberger *et al.* (1999) *Annalen Naturhist. Mus Wien*: 453-546.

- Plastic numbered bee tags imbedded in glass ionomer cement (dental cement). Paul Johnson comments bee tags are available from a company in Denmark (sweiney.com ... he thinks), and you can order the dental cement from any dental supply place.

- Plastic numbered Bee tags attached using nail varnish or epoxy resin (Queen marking kit, E.H. Thorne Ltd, Wragby, England) glued to the clean, dry shell using epoxy after cleaning the shell with alcohol and even file the shell with an abrasive - like sandpaper).

- Small pieces of marked (thin) cardboard in clear dental acrylic.

Passive transponders

e.g. For slugs: Grimm (1996) *Journal of Molluscan Studies*, 477-482 describes implanting magnetic transponders which are 2mm x 11 mm in size into slugs (under the skin of the foot) and then releasing them using a battery driven hand held activating and reading device to check on individuals. There was small mortality recorded during implantation. However, the transponders are expensive.

For shells placed on the shell surface Baminger (in press).

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Baminger (in press).

Bisenberger *et al.* (1999) *Annalen Naturhist. Mus Wien*: 453-546.

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Kleewein 1999: *Journal of Molluscan Studies*, 65: 303-315.

Wolda 1963: *Archives Neerlandaises de Zoologie*, 15: 381-471.

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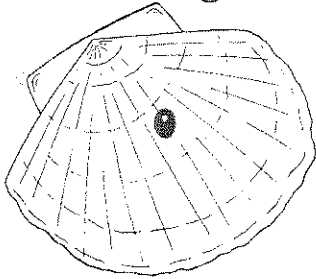
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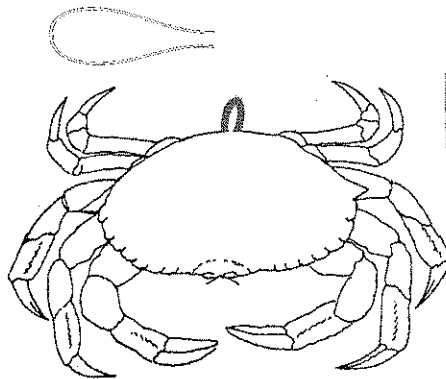
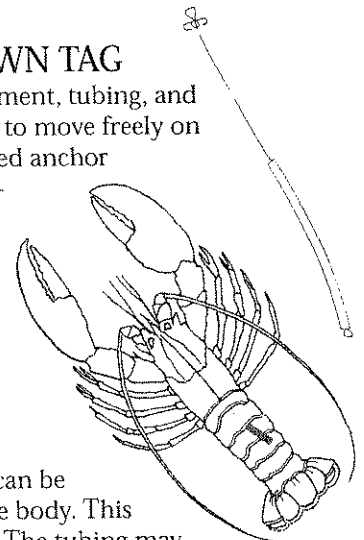
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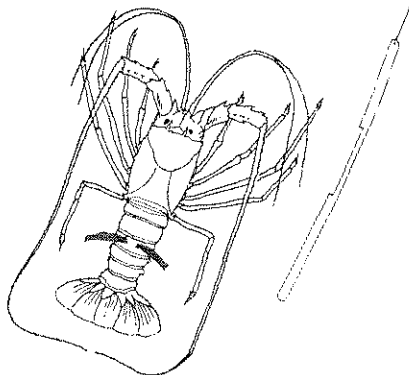
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STREAMER TAG FTSL-73

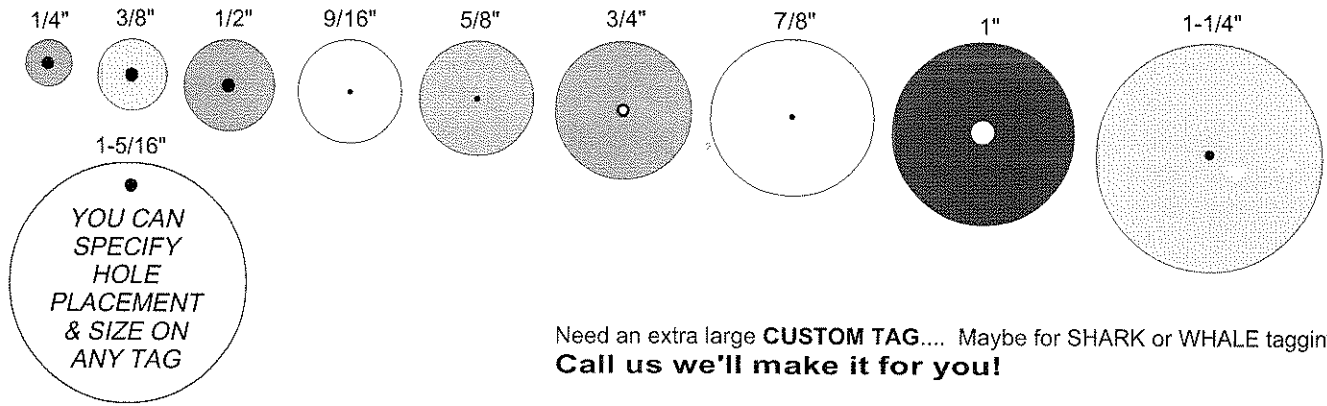
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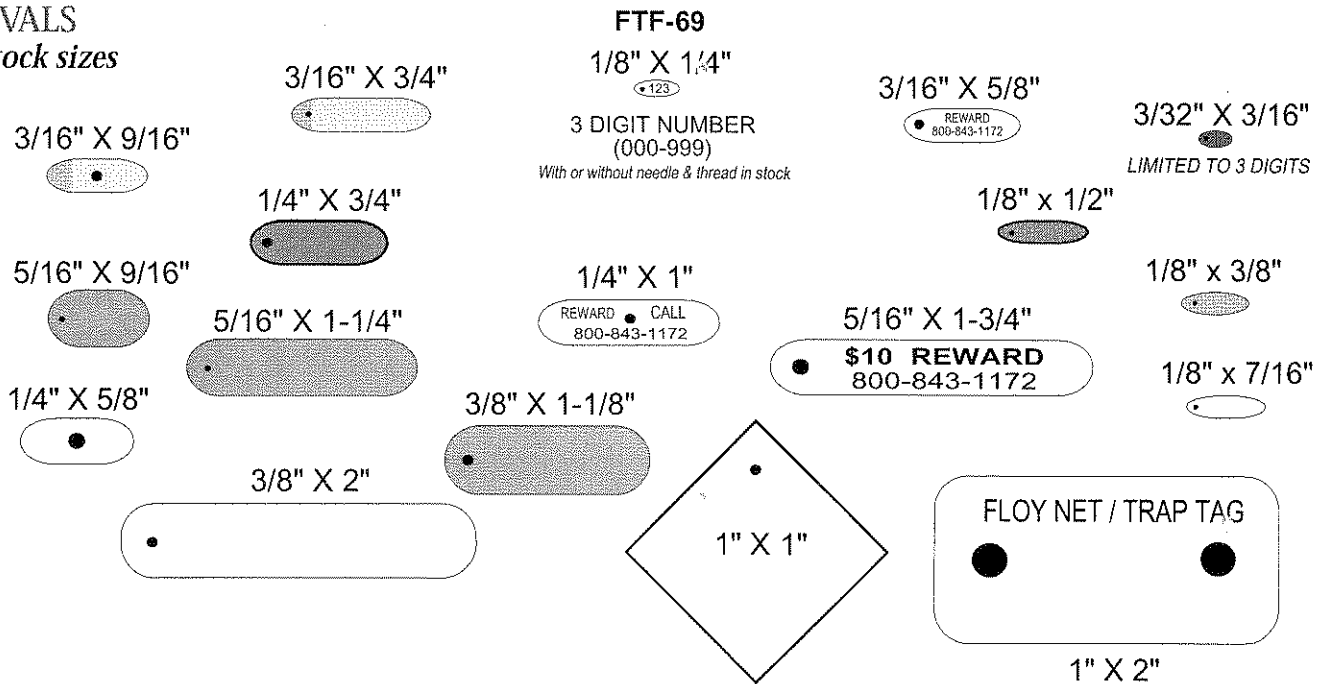
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