

Synthetic Materials

Synthetic Tying Materials

Phil Genova ¹ and Ronald A. Howard Jr. ²

Recently there has been an explosion in the production and use of synthetics, man-made materials, for the fly tier. The boundaries of the modern fly angler are ever expanding. New species, challenging habitats and "fly wise" fish all present new problems for the angler and the fly dresser. Many of these challenges are now being met by the growing family of synthetics being manufactured in every conceivable (and some pretty inconceivable) color, texture, type and brilliance. The reader should remember that this information is a snapshot in time. New materials are being introduced all the time, and this discussion cannot be anywhere near complete. It is intended as an introduction to synthetics, not as an exhaustive listing of know products today.

Natural materials are limited in length, durability, color, texture and sparkle. These limitations frequently have been overcome by synthetic materials making it possible to create almost any effect desired. Synthetics are easily obtained, and they substitute for many hard-to-get or tightly controlled natural materials. Frequently, the fly tying uses of the materials are simply fortuitous by-products of another use. Those materials can be obtained through many local sources at much reduced prices from those costs incurred through fly tying houses.

Synthetics Used for Dubbing

Antron - Antron is a synthetic polymer fiber used in yarns. It has a sparkle that makes it great for many patterns. It is available as yarn or as loose fiber. Either type can be used to create the other. Antron is used either on its own or mixed with other natural or synthetic body materials to add sparkle to nymph bodies, particularly for bright hare=sear type bodies.

Polypropylene - Poly propylene or Apoly@ is a lighter-than-water polymer material available in spun fiber or yarn form. It is excellent for dry fly bodies and wings, and particularly useful as spent wings in dry fly spinners. It can also be used for nymphs or as streamer wings if tied on heavier hooks. It is available in a wide variety of colors, textures and fiber thickness.

Seal-Ex - Seal-Ex is a synthetic substitute for seal or polar bear underfur. Its exceptional luster and brilliance make it an excellent substitute for those hard-to-get or banned materials.

Andra Spectrum - Andra Spectrum is a fine spun fiber available in approximately 50 different colors designed for the fly tier. Its texture and fiber length make it an excellent dubbing material.

Fly-Rite or Poly Dubbing - See the comments on polypropylene above. This is the fine diameter material used for lighter-than-water dubbing.

Other Synthetic Yarns - Many other modern synthetic yarns are useful as body materials or as dubbing. Acrylic yarn has a spiky, brilliant appearance, yet it dubs easily. It is also the material of choice for tying yarn section crab bodies in flies like Del=s Merkin. Orlon has a wonderfully soft texture, luster and long fibers that permit dubbing a very tight body with ease. It is an excellent and more durable substitute for wool in any pattern calling for a wool yarn body. Dacron is used primarily in floss, an excellent substitute for silk floss. In fact most Asilk@ floss is non-twisted dacron. In addition to body materials, dacron is used for tails, butts or other tag ends in patterns.

Synthetic Hair

Many types of synthetic hair are available, some of them from sources that most tiers would not consider unless they

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have been at it long enough to realize the sources of commercial materials.

Fishair - One of the earliest artificial Abucktails, this material is available in many colors and thicknesses (measured in denier). Thinner deniers are popular winging materials for salmon and steelhead flies. Heavier deniers are used to make the long wings of large saltwater patterns. Fish Hair is a straight fiber.

Ultra Hair - Ultra hair is translucent and kinky, much like calf tail. It is used extensively for epoxy flies and Clouser minnows. This material is very tough and durable. **Super Hair** is a very similar product.

Big Fly Fiber - Big Fly Fiber or (Hairabou is an extra long, very fine fiber used for extremely large flies. The material fluffs easily to give the impression of bulk without excessive weight. As a result, big flies tied with this material are easy to cast.

Craft Fur - Craft fur is used for many sewing craft activities, including hair on dolls and bodies for fuzzy animals. It is easily obtained from some craft shops, although the color selection may be limited. It is very similar to Big Fly Fiber in character and usefulness.

Lite Brite - Lite Brite is a fine, flashy fiber that comes in a clump. Simply tie it in and tease it out for excellent streamer wings or body material.

Neer Hair - Available in extremely long lengths, this product is an excellent substitute for bucktail and similar materials when the extra length is needed in the tie.

Nylon or Dacron Rope - Nylon and dacron materials from either woven or floss-type ropes can be used in numerous ways. Simply comb the fibers out with a metal pet curry comb or a clipped toothbrush (like the dubbing brush described elsewhere) to separate the strands. This material is available in a variety of colors, but any color can be made simply by coloring it with a permanent marker. If using parachute cord as a source, do not forget the outer sheath, which is made up of woven strands of the same material used inside. Simply open the weave and comb out the fibers. The weave will produce a slight kinkiness in the fiber.

Tip: Since long streamer wings can get matted and tangled with use, keep a small brush or pet comb on hand. Run it through the wings, starting at the tips and working back toward the head in small sections. This will refresh the look and action of the fly.

CHENILLE

Many types of chenille are available to the tier in addition to the silk or synthetic fiber chenille familiar to all tiers.

Crystal Chenille - Crystal chenille includes crystal fibers that create a sparkly, translucent effect. The bright, colorful chenille is used primarily on steelhead, salmon and saltwater flies.

Estar - Estar is like crystal chenille, but sparser. The result is a bright, sparkling chenille with a very translucent appearance.

Ice Chenille - Available in a variety of very bright colors, ice chenille is made up of mylar flash fibers twisted into a central set of thread strands. It is used to form brilliant bodies for shrimp patterns or similar flies. **Cactus Chenille** is similar but finer in texture.

Sparkle Chenille - Sparkle chenille is standard chenille with a strand of mylar tinsel twisted into the core. This produces a chenille with flash, similar to using a fine, oval tinsel rib.

Vernille (Ultra Chenille) - Vernille or ultra chenille is a flocked chenille that is much denser than standard chenille.

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It makes excellent bodies and is available in most of the common chenille colors.

Plastic Body Material

Swannundaze - Swannundaze is a flattened oval plastic used primarily for nymph bodies. The material is rather stiff but gives an excellent segmented effect to nymph bodies. It is available in a wide array of colors.

Larva Lace - Larva Lace is a thin, hollow tube of resilient plastic. It is used primarily for weaving nymph bodies or for ribbing nymph patterns.

Plaston - Plaston is similar to Swannundaze but much smaller in width. It is used primarily in quill bodies for dry and wet flies.

Nymph Rib or V-Rib - Nymph Rib or V-Rib is a vinyl ribbing material available in a fine, half-round strip that can be stretched to reduce its size. It produces an excellent ribbed effect on nymphs.

Flash Fibers

For many years, flash was provided in flies by using either brilliant materials like seal or polar bear, or by using metallic tinsel or wire in the pattern. Numerous additional materials are available to provide a wide array of flash fiber in tying situations.

Mylar Tinsel - Mylar tinsel is a plastic based product that can be manufactured in nearly any imaginable color, including prismatic or holographic patterns. Unlike metallic tinsel, this product will not tarnish when handled or exposed to air and moisture. It is available in 3 or 4 widths from tying houses and in very narrow widths as decoration tassels in craft stores.

Braided Mylar Tubing - Braided mylar tubing is available in many colors beyond the traditional silver and gold. It comes in pearl colors and holographic colors as well as the more traditional ones. All of them have a use for the fly dresser. A hollow, woven tube, the material has a yarn core (which, incidentally, may make an excellent poly wing material). Cutting the tube to length, removing the core, and slipping it over the hook's shank, either with or without an underbody, makes a beautiful bait fish body. Underbodies as varied as strips of folded aluminum can material, weighted shanks with foam padding, curon or poly foam, and dental picks may be used in the hidden underbody. The tubing comes in several diameters that can be wound or slipped on.

Edge Bright - Edge Bright is a neon plastic material available in sheets. It can be cut into strips to be wound on the shank to form bodies or to bind in as flash along the sides of a fly.

Flashabou - Flashabou is one form of tinsel marabou. It is fine, strong, flat mylar strips that comes in bundles. The light-weight mylar is extremely active in the water, providing the appearance of life in flies in which it is used. Often mixed into wings or used as wings itself, the material also may be used for ribbing bodies. It is available in a wide array of colors. The holiday decoration tassels mentioned above are an excellent source of some colors of tinsel marabou. **Spectra Splash Mylar Motion** is a similar material in twisted fiber form, called Flashabou with a twist by one dealer, the product swims well with faceted flash.

Krystal Flash - Krystal Flash is the original flash fiber, although several others are available today. A fine fiber with the appearance of a tiny string of brilliant lights, it is available in a wide array of colors. The materials come as thin, sometimes slightly crinkled strands. It adds flash to most patterns, giving a very life-like appearance. It may be used as wings or simply as an accent to provide iridescence and a life to a streamer or bucktail pattern. Patterns like the Scate's Shrimp use it as a flash back. Available in a wide variety of standard and fluorescent colors from black to pearlescent clear, a color to match your needs is available. **Flashabou Accent** is a similar material with a slightly larger fiber diameter. **Glass Mylar Motion** is a fine clear pearlescent flash fiber. **Angel Hair** is used for

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both flash and as a winging material on many patterns.

Sparkle Flash - Sparkle Flash is a stranded, sparkle fiber that combines mylar and nylon to form a twisted fiber that reflects light from many facets.

Other Materials

A wide variety of other materials find usefulness on the fly dresser=s bench.

Scud Back - Scud Back is a thin latex or plastic material used to form the backs on scuds and other crustaceans.

Fly Foam - Fly Foam is a closed cell polyethylene foam used for some types of floating terrestrial patterns, damsel fly imitations and similar patterns.

Furry Foam - Furry Foam is a flocked, felt-like material that is useful in crab and crayfish patterns. It comes in sheets that can be cut to shape. One manufacturer is even supplying these materials with a hook and loop backing that permit the production of Avelcro crabs.@

Silicone Calk or Cement - This product is used in coating wool or similar materials to make floating bugs or to attach eyes to heads of other flies. **Tip:** Use a good dish washing soap to keep the material from clinging to your fingers if you choose to use it. Eyes can be attached to sticky note strips for handling until the cement sets.

Softex - Designed for making soft bodied patterns, this product is used by many tiers as a substitute for silicone. It is easier to use, dries quickly and is reported to work very well on airhead poppers and sliders.

Epoxy - A general class of polymers, epoxies are a combination of a resin and a hardener or polymerizer. Most tiers use a fast setting epoxy or epoxy paints to cover heads, eyes or similar materials they wish to protect from teeth and other damage. It is also used in epoxy flies to form bodies.

Micro Web - Micro Web is a fine foam material that can be colored and cut to shape for realistic-looking fly wings. It looks like a very thin version of the foam sheeting often used to protect electronic equipment during shipment.

This is just a partial listing of the synthetic materials you can use in tying flies. Use your imagination and try materials you happen to see. If they work well, add them to your tying arsenal. If not, simply place them on the list of things that did not work for the application you had in mind. Remember their behavior, however. Some time later, you may have a need for exactly that type of material to create the effect you want in a new pattern.

Eyes On Flies

Phil Genova³

Saltwater fly rodders and many freshwater fly fishermen discovered early that streamer or bucktail flies with eyes tend to catch more fish. Early freshwater tiers used jungle cock nail feathers or similar materials to simulate eyes. Saltwater fly tiers have come up with many great ways to add eyes to flies to improve their success rate.

Most saltwater gamefish use visual clues to discover and capture their prey. Things usually move quickly in a marine environment and these predators often rely on Atargets@ to help them identify and capture prey. Obvious eyes are one of the most prominent cues predatory fish can use to locate and orient toward potential prey. Using an "eyes on the flies" strategy takes advantage of this fact. The following list includes several methods for assisting the predators in locating your "prey."

Eyes on the Head

Complete the thread-wrapped head on the fly, making it a little larger than usual. Apply a good coat of head cement and let it dry. On light-colored tying thread heads (white or yellow), the tier may simply apply a dot of black from a permanent marker (e.g. a Sharpie⁷). On darker heads, first apply a dot of yellow or white paint (paint pens are useful for this). Once the first color has dried, put a dot of black or red paint in the center as a pupil. Some tiers like to use a three layer approach with a black dot centered in a red dot centered in the lighter iris color. Once the paint has dried, coat the entire head with 5 minute epoxy or a hard, clear nail polish (e.g. Hard as Nails). This sealer coat enhances both the appearance and the durability of the eyes.

Bigger Eyes

Select a matched pair of rounded duck or pheasant body feathers, sized to match the pattern. For very small flies, use cheek or marginal wing feathers. Coat the center of feather with a flexible cement or head cement to seal the fibers together and allow it to dry completely. Apply a dot of light paint to the center of each feather as an iris and allow that to dry. Nail heads, small dowels or similar tools make excellent applicators for this purpose. Complete the eye with a pupil as above. Coat the sealed portion of the feathers with head cement or epoxy. Once the cheek and eye combinations are dry, position them and tie them in as cheeks on the fly.

Molded Eyes

These eyes are available in several styles and patterns. Stick-on, prismatic eyes are available from many suppliers and tackle shops. Available in sheets and in several colors, they add flash and attractiveness to the fly. With an adhesive back, they are simple to apply, either directly to the head or to a cheek feather. If applied on a cheek feather, be sure to prepare the base as it was above. Remember to coat with head cement or epoxy to increase durability.

Molded plastic or glass eyes are also available with or without stems from most craft stores. These eyes can be attached either with the stem intact or by trimming it or breaking it off using silicone cements. Leaving a bit of the stem attached when working with clipped hair or wool heads provides a bit more adhesion surface.

Bead Chain Eyes

Eyes can be made effectively from bead chains. These are available in a wide variety of sizes and colors - chrome, brass, copper, black. The beads are simply clipped off in pairs and bound to the top of the hook shank with a figure 8 wrap. The bead chain eyes can be left in their original finish and coated with epoxy or another sealer to prevent tarnishing in the salt water. Other tiers like to paint the beads in an red, yellow or white, adding pupils in the vicinity

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of the holes. Either way is effective. In addition to the added attractiveness of the flies, bead chain eyes add a little bit of weight to the fly aiding in getting it down to the fish. They may also cause the fly to ride with the hook point up, helping to avoid snags on bottom structure or weeds. Bead chain eyes can be obtained from supply houses, but they may be cheaper from hardware and plumbing supply stores.

Bead Eyes

Brass bead heads have become quite popular with freshwater tiers. They come in a wide variety of sizes and in several finishes -- chrome, brass, copper and black. These eyes are slipped over the point of the hook and attached at the head before the rest of the fly is tied. The fly fishers' answer to a light jig, these flies sink well and have an erratic action on retrieve. The size of salt water hook shanks limits the utility of brass beads to the larger sizes of beads and the smaller hook sizes and lighter wires, but they are useful in limited conditions. Like bead chains, these eyes can be left in their basic finish or painted at the tier's whim and desire. Remember to seal the eyes with epoxy, head cement or another material to prevent tarnishing.

Lead or Brass Dumbbell Eyes

Dumbbell shaped eyes are available in several sizes in either brass or lead. Some manufacturers supply eyes that are pre-painted at a higher cost, and most manufacturers have eyes in unfinished lead, brass, nicked brass, or black finishes. These eyes were popularized by the revolutionary Clouser Deep Minnow, a smallmouth bass fly that has found its way into the salt. The eyes are selected for weight and size and bound to the top of the shank with a figure 8 wrap. Most tiers like to add a drop of epoxy to aid in keeping the eyes in place. With the eyes on the top of the shank, the fly rides hook point up, avoiding many snags. The heavy head gives it a jigging action on a stripped retrieve, and the weight gets the fly deep quickly. These eyes give a realistic effect when painted with enamel or adorned with stick-on eyes. Once again, use epoxy over them to protect the finish and prevent tarnish.

Doll Eyes

Plastic doll eyes are ideal for many larger flies, hair bugs and big game patterns. They are relatively inexpensive and readily available in many sizes from craft stores. They are usually glued on with a waterproof super glue or epoxy. The surface of the fly or popper is sealed with head cement, a gap-filling glue or silicone sealant first. Once that surface preparation is dried, the eyes are glued in place. For tiers with large fingers, handling the smaller eyes can be a challenge. Applying a bit of tacky wax to a small piece of dowel or adhering a narrow strip of stick-on note paper to the eye can allow the eye to be handled without dipping the fingers in the glue. These eyes, too, can be coated with epoxy to increase their durability.

Monofilament Eyes

Some eyes, like those of shrimp and crabs, are best imitated with monofilament eyes. These can be purchased or prepared by melting heavy monofilament segments to produce stalked balls of amber, brown or black material. The stems of the eyes are simply bound in place, leaving the eyes in the appropriate position.

Experiment with these methods and with several color combinations to see which ones work best in your area. Most saltwater fly fishermen agree that eyes are one of the factors essential to increasing angling success on nearly every species.

Barbless Hooks: De-barbing, Sharpening and Using Them

Phil Genova⁴ and Ronald A. Howard Jr.⁵

A large number of anglers, particularly those who fish with flies, prefer to use barbless hooks. These hooks offer several advantages for the angler. They have a smaller cross section, making them penetrate better. This feature makes it easier to hook fish with the barbless or de-barbed hook. They are easier to remove from either the fish or the clothing or anatomy of the angler because they have no barb to catch on the way out. When catch-and-release is being practiced, this allows for faster, less traumatic handling of the fish. Since the hook tends to leave only a small hole or a slightly elongated hole in soft tissue, there is less tearing around it, less tissue damage to the fish, and a higher probability of survival if the fish is landed in a similar time to that taken using barbed hooks. Using barbless hooks may cost an angler a fish once in a while, but good technique can keep those losses to a minimum. If a tight line is maintained, the hooks hold well and result in relatively few lost fish.

Some manufacturers compromise between barbed and barbless hooks by offering hooks with mini-barbs, very low, short barbs. At least two styles of hooks are available currently without barbs. One is a simple, straight hook without a barb. Another features a small hump in the shank between the bend and the point. These are not available in all styles and sizes, however. Anglers who wish to use barbless hooks for fishing, or those who are required to do so by local regulations, must know how to de-barb their hooks without damaging the hook.

Regardless of how it is done, the process is easiest before the hook becomes part of a fly. Larger hooks can be de-barbed by filing the barb away carefully. Leaving a small, smooth hump where the base of barb was adds some security to the hook-up, but it is not necessary. While the hook is in hand and the file is available, this is a good time to sharpen the hook as well. Some anglers attempt to de-barb their hooks by cutting the barb away with a pair of wire cutters. This puts tremendous strain on the area from which the barb was cut. On small hooks that can further weaken what is already the weakest part of the hook, resulting in breaking points from the hook. Multiple missed strikes might be a clue that the hook is broken, but this process of counting coup on striking fish is taking the concept of catch-and-release a bit too far for most of us. A better alternative is to crush the barb down with a pair of pliers.

How the barb-flattening process is carried out is very important to the angler and the durability of the hook. The easiest way would seem to be holding the hook by the shank, inserting the barb cross-wise in the jaws of the pliers, and crushing it down into the cut from which it originated. Unfortunately, this obvious approach can be extremely damaging to hooks, particularly those that are tempered to be quite hard. The crushing process works the steel, often producing tiny cracks or breaks. If the point does not break off in the pliers, it will be likely to do so just when the trophy of a lifetime is on the other end of the line. The proper way to flatten the barb is to place the point of the hook in the jaws of the pliers tip first. This supports the metal as it is deformed and is less likely to cause breakage.

When the hook is being handled to de-barb it is also a good time to sharpen it. Several sharpening styles are in common use. Some anglers like to use a hone or hard carborundum stone and work around the point of the hook, bringing a sharper, needle-like point to it. Some like to file a diamond-shaped point with four sharply angled edges. Others prefer to use a somewhat triangular approach - flat on the bottom and pointed toward the top of the shank. The needle point is the most delicate of the three, easily damaged or rolled by contact with stones or hard mouth parts. The others are like cutting needles. They are designed to cut through tissue to embed themselves. These points are more durable and tougher than the needle point. They are also quicker and easier to touch up in the field.

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Most anglers find a fine-cut file useful in sharpening large hooks. The file allows more material to be removed more quickly than does a stone. Smaller hooks and the final sharpening on larger ones should be finished with a fine, hard whetstone. Tapered stones, called slips, or specially designed stones for fish hooks work best with smaller hooks. Regardless of the approach used, the point should try to catch on a finger nail when the hook is dragged across it.

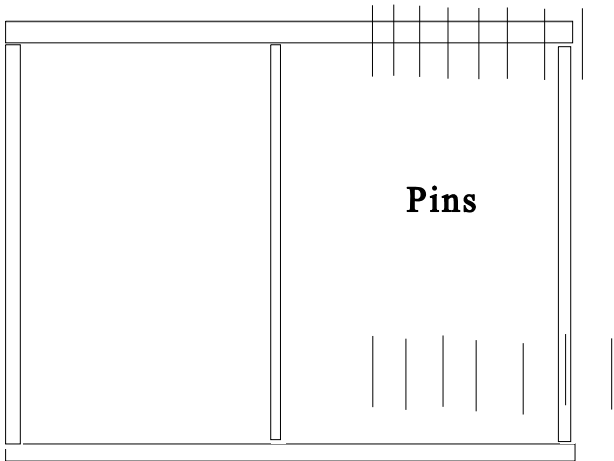
Sharpening hooks, like sharpening knives or broadhead blades, takes practice. But sharpness is one of the critical factors in solid hook ups on fish. The popularity of laser sharpened or chemically sharpened hooks in spite of their prices is testimony to the value experienced anglers place on sharpness in the hooks they use. Spend a little time learning how to sharpen your hooks, and the time will be rewarded in increased success.

The decision on whether or not to use barbless hooks is your own, a personal ethical decision that grows from experience and immediate objectives. It is not a one-size-fits-all decision or one that makes the angler ethically superior or inferior to those that elect the other course of action. The decision is unlikely to be the same for all species, all techniques, all waters and all personal objectives. We do feel that it should be included in the list of options for every angler, particularly in catch-and-release situations.

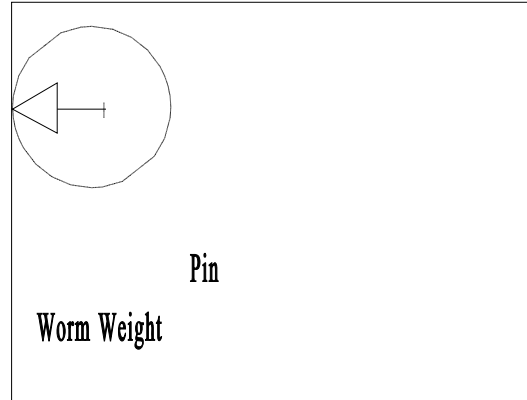
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Obtain some "garden" variety pins. Thread the worm weight on to the pin with the narrow end of the weight pointing away from the pin top. Insert the pin horizontally into the balsa wood about 2" below the inside top of the rack. Repeat for as many weights as you want to paint.

Top View

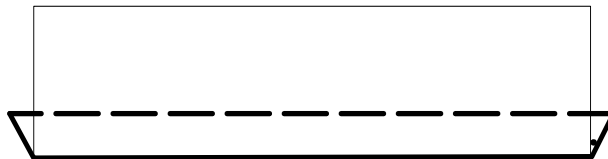


Side View



Safety Considerations: Do not use the drying rack in the oven above temperatures of 300 degrees Fahrenheit or it will catch fire.

Drying Rack



Baking Pan

Fact Sheet: Crickets

Making a Magnetic Fly Drying Strip

Bob Mowdy⁷

Every fly tier who works with streamers, bucktails or wet flies needs to have some way to keep them suspended while head cement dries. This quick project makes a handy strip for drying flies and holding them in place so they do not get lost or covered with bits of material on the tying bench. They are simple to make and very handy on the tying bench.

Materials

The project can be made from nearly any scraps of standard 1/2" stock. Narrow strips measuring approximately 1 1/2" by 10 inches work best. Hardwood stock is heavier and more stable. Magnetic strips can be purchased from craft shops or discount stores. Usually it comes in a 2" wide strip with adhesive on one side for craft projects. Purchasing two or three feet is a good idea, since any left over material can be used to pick up hooks or for other purposes that may come to mind. Use shellac or a polyurethane varnish to finish the wood. Hardwoods are preferred because they are usually denser. The heavier wood will be more resistant to being knocked over by a hand or a dropped tool. A local cabinet shop or woodworker may be willing to donate suitable scraps, if you are willing to ask. Small strips often accumulate around the shop, and some of them may have beautiful grain.

The tools needed for this project are simple -- a ruler, square, hand saw (a back saw or miter saw would be excellent if you have one), plane and some sandpaper. Use a small block of wood for a sanding block to keep from rounding over the corners. You also will need a paint brush, a suitable solvent (alcohol for shellac and water for water-based polyurethane), and a container for cleaning the brushes.

Procedure

Select your piece of wood and cut it to size. If it needs to be ripped to width, have a leader do the ripping unless you have been checked out on power tools. Wider scraps (3" or more wide) could handle a pair of magnetic strips if you choose. Mark the locations for the magnetic strip by drawing a finger along the edge of the board and dragging the pencil parallel to the edge. Next, saw a kerf (the groove made by the saw) to hold the lower part of the magnetic strip. Start with the saw at an angle to one end of the wood strip to

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get the cut started. Once the cut is started, lower the saw until it is parallel to the wood's surface, and cut a uniformly deep kerf to a 3/8". Test the kerf with the magnetic strip to see if it will fit. If it is too tight, insert a piece of sandpaper and sand to open it enough to hold the magnet. Peel the tape off the magnetic strip and press it into the kerf. Trim the strip flush with the ends of the wood using a sharp knife.

Finish the project by applying several coats of shellac or polyurethane. Allow each coat to dry completely, sand lightly with fine sandpaper (220 to 400 grit), and wipe with a tack cloth before adding the next coat. Two or three coats should produce a shiny, well protected surface.

Fact Sheet: Crickets

Making a Hookout

Ronald A. Howard Jr.⁸

Some type of tool for removing hooks from fish is often handy. For smaller fishes, many anglers use a hemostat, needle holder or needle-nosed pliers. Specialized hook removing pliers are also available when grasping the hook firmly is required. In many situations, particularly when the fish are large and toothy or when they can inflict damage with heavy spines, a hookout is a useful tool. Many designs have evolved in various parts of the world depending upon the needs of the user and the materials that are available. One of the most simple designs is made from a length of rod. For a heavy duty tool useful for large bluefish, pike or similar toothy species, a hookout made from 1/8 or 3/16 inch mild steel rod is adequate. About 19 inches of rod is needed to create the tool. Start by rounding the ends of the rod to eliminate sharp edges. Next form a triangular handle about 4 inches wide with legs about 3 inches long on one end of the rod. Then form a shallow hook (about 1/2 inch deep) on the other end.

A lighter and more salt resistant hookout can be made from brass rod, brass nuts and washers, and a piece of wood. Using a piece of wood of your choice that is slightly rectangular in cross section will permit constructing a slightly oval handle that will be stronger and allow better handling. A handle blank about 3 x 1 x 3/4 should be adequate. Drill a hole slightly smaller than the nut and just deep enough to hide it in the center of one 3/4 side. Then drill a smaller hole, just large enough to allow the rod to pass through it, through the center of that hole. Measure the length of the rod that will be required to pass completely through the wooden handle and thread a bit more than is required. Attach one brass nut to the rod, turning it down tightly against the unthreaded part of the rod. Press the other nut into the recess in the handle and screw the rod into it until the nut is firmly seated in the handle. Unscrew the rod from the handle and shape the handle to a comfortable oval with rounded ends using a sharp knife, rasp, and sandpaper. (A stationary belt or disc sander can speed this process considerably.) Mix up a small amount of epoxy and apply it to the threads on the rod and to the drill hole. Screw the rod back into the handle, drawing it up tightly against the handle on both sides, then set it aside to let the epoxy set up.

Once the epoxy has cured, set the rod in a vice or block that allows it to rest on the lower nut and gently peen the top of the rod to form a head that looks like a rivet. If desired, round the edges of the lower nut with a file to leave a smooth surface. Form a tight, shallow hook on the other end of the rod. This completes the metal work.

Finish the wooden handle by applying several coats of a good spar varnish, sanding the first three coats down to bare wood after they have dried. This should produce a durable finish that will stand up to years of use without rot or excessive discoloration of the wood.

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Using the Hookout

To use the hookout, hook it over the line or the hook and follow it to the bend of the hook. Then give a slight twist and pull to the hookout while applying tension to the line. Hookouts are most useful to the bait fisherman or the user of single hook lures that might be taken deeply. They allow the angler to put considerable pressure on the hook to remove it without causing excessive damage to the fish. Fish that are going to be released need not be handled at all if the hookout can reach the hook and the line can be controlled. The weight of even a modest sized fish is usually adequate to provide the force needed to release it. For those anglers who pursue toothy species, the hookout can save a lot of scrapes and cuts on the fingers and allow a quicker and easier release.

Fact Sheet: Crickets

Raising Crickets ⁹

Ronald A. Howard Jr. ¹⁰

Crickets are a preferred bait for many types of fishes. They can be captured in open areas or under lights at night or purchased from bait shops or laboratory suppliers, but many anglers prefer to rear their own. During the warmer parts of the year, crickets can be reared by an angler for use as bait.

The equipment needed is simple, inexpensive and easily maintained, and rearing procedures are relatively simple. Approximately 400 crickets can be reared every three months for every 450 square inches of rearing space (about the size of a five gallon bucket).

Materials and Equipment

The following materials are needed to make a cricket rearing facility.

- one of more well-cleaned grease, paint or food containers
- window screening
- tape or other attachment mechanisms
- chick watering fount (or equivalent)
- sand
- excelsior or coarse, dry hay
- poultry laying mash
- saucer or tray
- rain shelter
- insect control

Setting up a Cricket Rearing Facility

Large grease, paint or food containers approximately 18 inches in diameter make excellent rearing containers. Start by thoroughly cleaning the containers. If metal containers are used, sand the top few inches of the inside of the can to a smooth finish and wax it with a hard furniture wax. This helps to keep the cricket in the can. Prepare a piece of window screening to fit tightly over the top of the can. A firmly attached screen will prevent entry by unwanted pests and keep the crickets inside. Add about 4 to 6 inches of clean, dry sand to the bottom of the can and moisten the sand until it feels damp to the touch. Place a small glass poultry watering fount (basically a glass jar turned upside down in a pan) in the center of the rearing container, and fill the pan with cotton batting to a level just above the water level. Set one or more saucers or small trays of laying mash on the sand and cover the sand with about 4 or 5 inches of excelsior or coarse hay, pulling it up around the saucers and watering fount. Be careful not to create a siphon that will cause the fount to drain into the sand and cause the sand to become excessively moist. Stock each container with 20 to 30 adult crickets, about half of them males and half females. Female crickets can be recognized by the presence of a long ovipositor protruding from the end of the abdomen. Adult crickets have wings. Young crickets can be stocked, but the time required for the first crop of bait crickets will be longer. Place

⁹These materials are adapted from *Raising Crickets*, a publication of the Southern Regional 4-H Wildlife Literature Committee

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Fact Sheet - Earthworms

the container in an area where it will maintain a temperature of 80 to 90 degrees Fahrenheit, and arrange to protect it from rain if the chamber is set up outdoors. If ants are a problem in the area, use an insecticide or some type of barrier to prevent their attacking the crickets.

Rearing Crickets

Normally the sand need not be moistened again for about three months. Crickets need relatively dry sand to have the young remain free from disease.

Clean the watering fount, replacing the water and cotton every four to eight weeks. Keep food readily available at all times. Plan on replacing food every two to three weeks when crickets are small and every four to five days when they are larger. Replace food as needed.

Adult crickets lay eggs at intervals of approximately 30 to 50 days, laying them in slightly moist sand. The eggs hatch in 15 to 25 days, and the young crickets grow very rapidly at the prescribed temperatures. They reach bait size in about a month of growth at that temperature, and they will reach sexual maturity in one or two months. They can survive, but will grow and mature much more slowly, at temperatures significantly above or below that range. Shade will help to keep temperatures down during hot weather, and artificial heat, like a low wattage bulb suspended inside the container, can be used to raise the temperature under cooler conditions. **Caution: The heat from a light bulb placed too close to the excelsior or hay may cause a fire!**

Two to four crops of crickets can be reared in each container without cleaning the container. Generally, larger crops will be obtained if the containers are cleaned and restocked with adults after every second crop of bait crickets.

Additional Information Sources

Many sources of information can be used to further your production of crickets. You might start with E. Lawrence Palmer (1954) *Crickets as Bait*, from the National Wildlife Federation, Earl F. Kennamer, Leaflet YA-11, Auburn University Extension Service, Auburn, AL, or D. T. Gardner, *Fish Bait Production*, Circular E-33, Cooperative Extension Service, Auburn University, Auburn, AL. Consult your local Cooperative Extension Agent for additional information if needed.

Extensions and Connections to Other Programs

Clearly, rearing crickets can have a direct link to entomology and conservation or natural history programs. It could also provide an entry into entrepreneurship programs if the participant decides to raise crickets for sale to bait shops or direct sales to anglers. Woodworking or other engineering projects could become related if building projects are included.

Fact Sheet-Earthworms

Raising Earthworms¹¹

Ronald A. Howard Jr.

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Earthworms of some type have nearly universal appeal as fishing bait. The worms may be dug from the ground or decaying vegetation, picked up from moist areas at night, captured using a worm fiddle or some other device, or purchased from bait dealers.

Many types of worms can be grown as fish bait. Climate and the tolerance of the worms for heat or cold imposes limits on the production of earthworms or the selection of worms that can be raised in some parts of the country. Large types commonly called "night crawlers" or "dew worms" and smaller types like "red wigglers" or "ringed worms" are commonly raised for bait or other uses.

In the wild, worms eat detritus, decaying organic matter and tiny soil organisms. They respire through the surface of their skins, so that surface must remain moist at all times. They grow best under cool to moderately warm conditions, depending upon the species being grown. Most species are relatively intolerant of high levels of sand in the soil. As a result, the soil or rearing medium must be composed of a mixture that avoids sand, and its moisture and temperature levels must be controlled within the tolerance limits of the worms. Best production will occur when they are held at the optimum or preferred range for the species. Food must be supplied to promote rapid growth and reproduction.

Materials and Equipment

Earthworms can be reared in buckets, tubs, above ground boxes, and rearing pits. In each case, the rearing containers should provide for adequate drainage while preventing smaller worms from escaping the container. Some growers place screened rearing boxes on rearing tables covered with a layer of sand. The boxes are made of rot resistant wood that contains no preservatives or poisons that can kill the worms. They are large enough to hold and grow a significant number of worms, but small enough that they can be handled easily when worms are to be harvested or

¹¹These materials are adapted from *Raising Earthworms*, a publication of the Southern Regional 4-H Wildlife Literature Committee

Fact Sheet - Earthworms

sorted, or when growing media are being changed. Protection from predators is important in most areas.

A good worm growing medium can be made by mixing equal parts of zyzzyx. Where summers produce temperatures in excess of the tolerance or productivity limits for the worms being raised, shade or other means of keeping the worms cool is absolutely essential to production. The following materials are needed to make a worm rearing facility.

Setting up a Worm Rearing Facility

Rearing Worms

Additional Information Sources

Extensions and Connections to Other Programs

Clearly, rearing worms can have a direct link to conservation or natural history programs. It could also provide an entry into entrepreneurship programs if the participant decides to raise worms for sale to bait shops or direct sales to anglers or if the dried worm castings are sold to gardeners or others wanting an excellent soil amendment. Gardening or horticulture projects can be enhanced by participation in a worm rearing project.

Woodworking or other engineering projects could become related if building projects are included.

Fly Tying References

Some Fly Tying References

Ronald A. Howard Jr. ¹²

McClane=s Standard Fishing Encyclopedia. 1965. A. J. McClane, ed., Holt, Rinehart and Winston. New York.
Broad coverage of fish and fishing. Instruction on fly casting and fly tying with numerous patterns and color plates to provide graphic support for them.

Streamer Fly Tying and Fishing. 1966. Joseph D. Bates, Jr. The Stackpole Company. Harrisburg, PA
Comprehensive reference to the history and development of streamers and bucktails in North America. Extensive patterns and numerous color plates. The reference for streamer and bucktail tying.

Art Flick=s New Streamside Guide to Naturals and Their Imitations. 1969. Arthur B. Flick. Crown Publishers, Inc., NY.
Introduction to the Catskill school of fly tying. Patterns for the major hatches and stories to go with them. Most patterns useful in much of North American trout habitat.

Selective Trout. 1971. Doug Swisher and Carl Richards. Crown Publishers, Inc., New York.
The introduction of the Swisher and Richards school of fly tying for selective trout, including extensive hatching tables, hatch matching suggestions based on their patterns, no-hackle patterns, emerger patterns and much more.

Salt Water Flies: Popular Patterns and How to Tie Them. 1972. Kenneth E. Bay and Hermann Kessler, J. B. Lippincott Company. Philadelphia.
An early work on salt water flies and fly fishing with step-by-step illustrations of tying steps in 8 featured flies and 50 additional patterns. Color and black-and-white photographs.

Master Fly Tying Guide. 1972. Art Flick, ed., Crown Publishers, Inc., New York.
Illustrated instruction on fly tying skills by master tyers Art Flick, Lefty Kreh, Ted Niemeyer, Carl Richards, Ernest Schwiebert, Helen Shaw, Doug Swisher, and Dave Whitlock, each featuring patterns in their area of special expertise. Excellent support and instruction.

Fly Tying Problems and Their Answers. 1972. John Veniard and Donald Downs. Crown Publishers, Inc., New York
Primarily a text on fly tying materials, problems encountered, and solutions to those problems.

Nymphs. 1973. Ernest Schwiebert. Winchester Press, New York.
Extensive guide to larval aquatic insects and patterns to match them by the author of *Matching the Hatch*.

The Handbook of Fly Tying. 1989. Peter Gathercole. Stoeger Publishing. South

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Fact Sheet-Ice Fishing Sled

Hackensack, NJ.

Well illustrated steps in fly tying, leading to development of many fundamental and advanced skills. Excellent for the visual learner. Many fly patterns provided.

Bug Making. 1993. C. Boyd Pfeiffer. Lyons and Burford Publishers. New York. Complete guide to making hair and hard-bodied, soft-bodied, and hair or fur bugs. Excellent illustrations. Some patterns need to be expanded for the fly tyer.

Flytyers Masterclass. 1995. Oliver Edwards. Stoeger Publishing, South Hackensack, NJ. Excellent illustrations and explanations of tying procedures, primarily British patterns, although many of them are adaptable to or useful in American waters as well.

Illustrated Dictionary of Trout Flies. 1995. John Roberts. Collins Willow, Harper Collins Publishers, London.

Extensive coverage of British and European patterns for trout and grayling arranged in alphabetical order by their pattern name.

The Art of Fly Tying. 1996. Claude Chartrand. Firefly Books. Buffalo, NY Outstanding illustrated guide for the fly fisher, basic entomology, collecting advice, discussion of fly tying materials and skills and illustrated introductions to 116 patterns, mostly American, but some European and British patterns as well. Well-designed and thought through.

Angler=s Fly Identifier. 1996. Dr. Stephen J. Simpson and Dr. George C. McGavin. Running Press. Philadelphia.

Excellent fly angler=s entomology text coupled with fly tying instruction and specific patterns.

Fly Tying References

Building an Ice Fishing Sled

David H. Greene and Ronald A. Howard Jr.

Many ice fishermen like to use a sled to carry their equipment to and from their favorite fishing spots. Any old sled or toboggan can be used by just putting a box on it to hold the equipment they need to carry along, but a customized sled built for the purpose can be much more useful and satisfying.

Start your project by determining the size limits of your usual fishing vehicle. There is no sense in building a sled that you cannot get into your car, so measure carefully to determine the outside dimensions for the sled. Next, look at your gear; and determine the best layout for your purposes. The drawing included with this activity sheet will offer some suggestions on a possible layout. It offers a seat with secure storage for small items, and an open box for tip-ups, jigging rods or chugging sticks, a bait bucket and a small ice chest.

The instructions here are designed around some simple power tools and a basic knowledge of woodworking. If the participants in your program are not well prepared to use these tools, the parts can be pre-cut, allowing them to assemble the sleds. This construction assumes use of 5/8 inch exterior grade plywood, but heavier material could be used if desired. The runners are made of hardwood or pine with either plastic or metal carpet edging to preserve the edges. The sled is assembled with screws and waterproof glue.

For a sled that meets the specifications shown in the drawing, the following is a bill of materials.

Runners	- 2 -	waterproof glue
Bottom	- 1 -	carpet edging
Sides	- 2 -	
End pieces	- 2 -	
Center supports	- 2 -	
Center piece	- 1 -	
Seat	- 1 -	
Box supports	- 3 -	
Diagonal brace	- 1 -	

This needs to be a relatively simple ice fishing sled that can serve as a carrying device, storage device, wind break and seat - I think that Outdoor Life or Field and Stream had one in it several years ago.

Fact Sheet-Ice Fishing Sled

(Insert drawing of sled)