

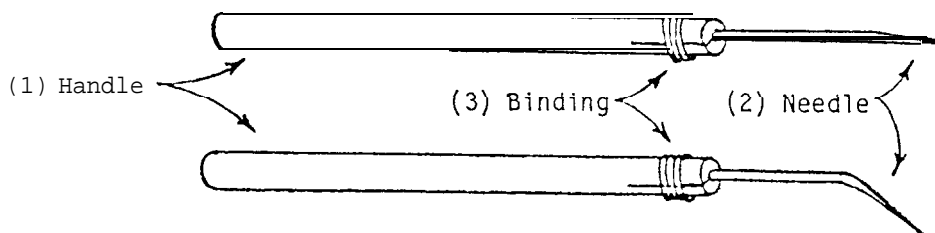
11. DISSECTING APPARATUS

A. DISSECTING APPARATUS

These items will permit the student to do many of the dissections normally done in elementary biology course work. If possible, each student should have each of the items in this section, but if cost and materials prohibit this, then enough items should be produced to permit students to work in groups of two or three.

A. DISSECTING APPARATUS

Al. Dissecting Needles

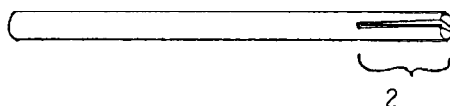


a. Materials Required

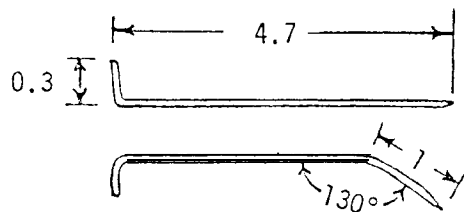
<u>Components</u>	<u>Qu</u>	<u>Items Required</u>	<u>Dimensions</u>
(1) Handle	1	Wood Dowel (A)	10 cm long, 0.6 cm - 0.8 cm diameter
(2) Needle	1	Steel Wire (B)	5 cm long, #20 gauge wire (approximately 0.05 cm diameter)
(3) Binding	1	Iron Wire (C)	About 10 cm of #24 gauge wire (about 0.025 cm diameter)

b. Construction

(1) Handle



(2) Needle

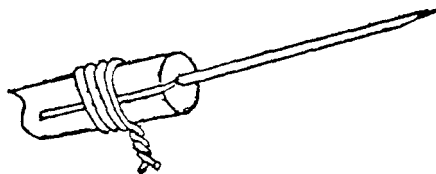


The wood dowel (A) serves as the handle. Make a slit about 2 cm deep in one end to receive the needle. Sand the two ends to make them smooth.

Break the wire (B) by bending it back and forth instead of cutting it with wire cutters as hard steel can easily damage wire cutters. File one end to a point.

At a point 0.3 cm from the unpointed end, grasp the wire with two pliers and slowly bend until a  $90^\circ$  angle has been reached. If a "bent tip" dissecting needle is desired, bend the needle to an angle of  $130^\circ$  approximately 1 cm from the pointed end.

(3) Binding

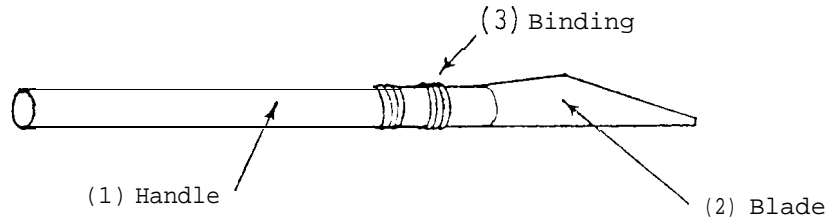


Insert the end of the needle into the handle about 1 cm deep. Wrap several turns of binding wire (C) tightly around the handle and twist the ends together.

c. Notes

(i) Iron, rather than steel, wire may be used for the needle by first making the bends where needed. Then heat the wire until it becomes dull red and immerse it in cold water to temper it. The iron wire will become hard enough so that it does not bend easily; however, it may be broken if pressed with too much force.

A2. Strapping Scalpel

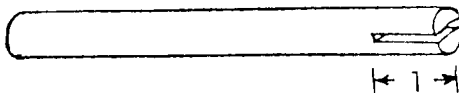


a. Materials Required

<u>Components</u>	<u>Qu</u>	<u>Items Required</u>	<u>Dimensions</u>
(1) Handle	1	Wood Dowel (A)	10 cm long, 1 cm diameter
(2) Blade	1	Steel Strapping (B)	6 cm long, 1 cm wide
(3) Binding	1	Iron Wire (C)	About 12 cm long, #24 gauge (approximately 0.025 cm diameter)

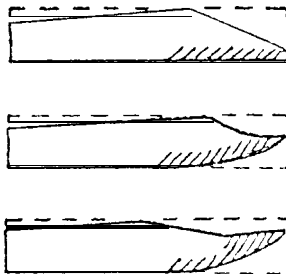
b. Construction

(1) Handle



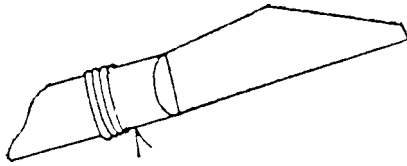
Make a slit in one end of the dowel (A) with a saw for the blade. Sand the ends to make them smooth.

(2) Blade



Cut the piece of strapping (B) into the shape of a scalpel blade (many shapes are useful for different purposes). Taper one end so it will fit the handle. File the edges (as shown by the shaded areas) to make the cutting edge.

(3) Binding



Insert the blade into the slit in the end of the handle. Wrap several turns of #24 gauge wire (C) tightly around the handle and twist the ends together. This should hold the blade firmly in place.

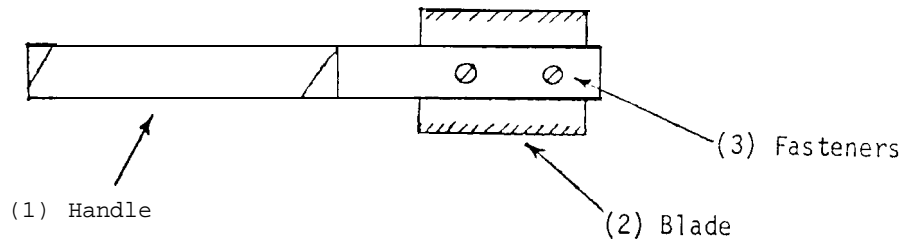
c. Notes

(i) The blade should be sharpened after the entire scalpel has been assembled in order to lessen the danger of being cut,

(ii) An equally good scalpel may be made from a piece of strapping about 15 cm long. Simply form a blade at one end as described above, and let the remainder act as the handle. This portion should be wrapped in tape to make it more comfortable to handle.



A3. Razor Scalpel

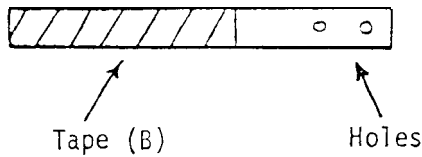


a. Materials Required

<u>Components</u>	<u>Qu</u>	<u>Items Required</u>	<u>Dimensions</u>
(1) Handle	2	Steel Strapping (A)	15 cm long, about 1.25 cm wide
	1	Tape (B)	About 50 cm long
(2) Blade	1	Double-Edged Razor Blade (C)	2.5 cm x 3.5 cm
(3) Fasteners	2	Bolts (D)	1.0 cm long, 0.4 cm diameter
	2	Nuts (E)	0.4 cm inside diameter

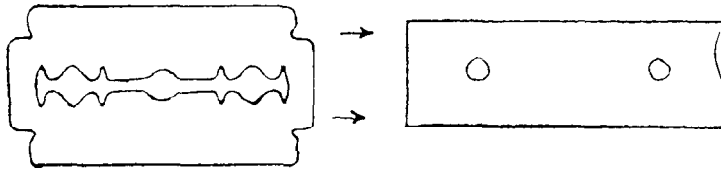
b. Construction

(1) Handle



Fasten the two pieces of strapping (A) together with tape (B). Drill two holes (0.5 cm diameter) in the other end for the bolts (D) to fit through. Locate these holes so that the razor blade (C) will be held in the desired position.

(2) Blade



Razor Blade (C)

Strapping (A)

Insert the blade between the two halves of the scalpel handle so that the two holes align over the holes in the razor blade.

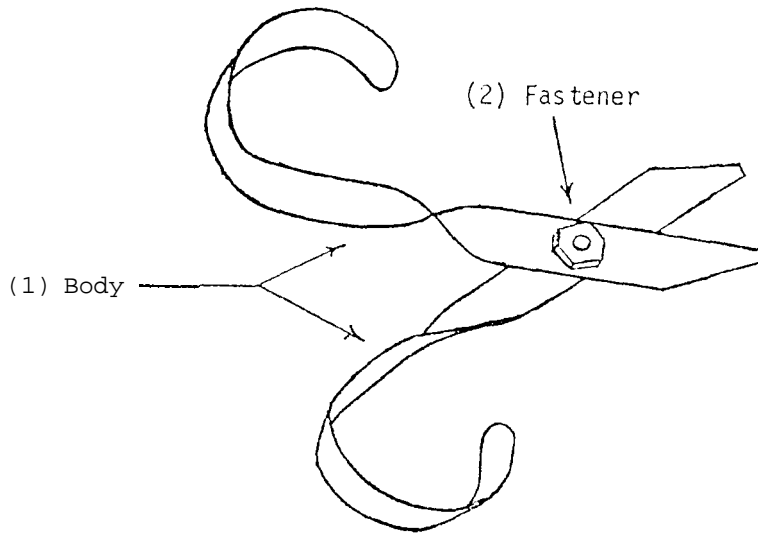
(3) Fasteners

Insert the short bolts (D) through the holes and screw on the nuts (E). This scalpel is now ready for use.

c. Notes

(i) The razor blade can easily be replaced as it becomes dull.

A4. Scissors

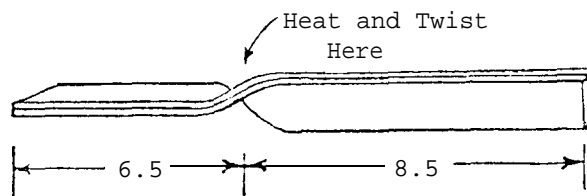


a. Materials Required

<u>Components</u>	<u>Qu</u>	<u>Items Required</u>	<u>Dimensions</u>
(1) Body	2	Steel Strapping (A)	15 cm x 1.25 cm, at least 0.05 cm thick
(2) Fastener	1	Bolt (B)	0.5 cm long, 0.5 cm diameter
	1	Nut (C)	0.5 cm inside diameter

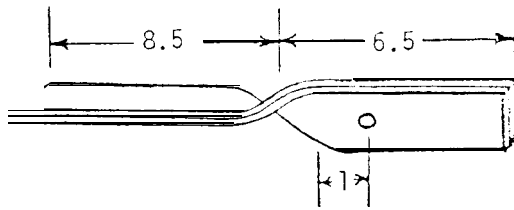
b. Construction

(1) Body



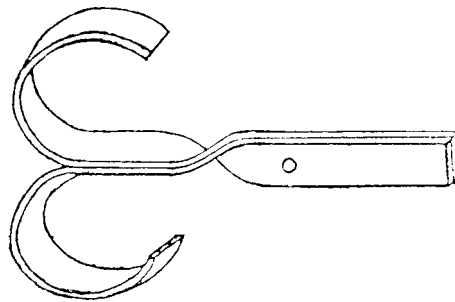
Hold the pieces of strapping (A) tightly together and heat them at a point approximately 6.5 cm from the end until they both glow dull red. Then, twist them a full quarter (90°) turn. Immediately plunge them into



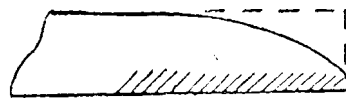


cold water to restore their temper.

Drill a hole 0.6 cm in diameter about 1 cm from the twist on the short (6.5 cm) end of both pieces.

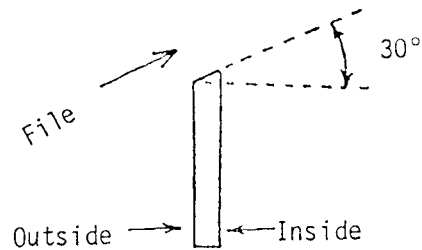


Bend the long (8.5 cm) ends up to form the handles.

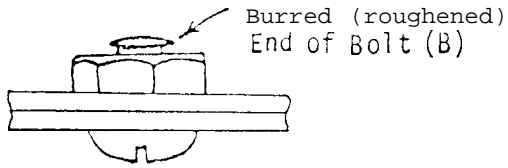


Trim the tips of the strapping to the shape of blades.

Sharpen the shaded area of the blade. File this area on the outside edge only, not the inside edge where the blades meet. In sharpening, file upward at an angle of  $30^\circ$ .



(2) Fastener

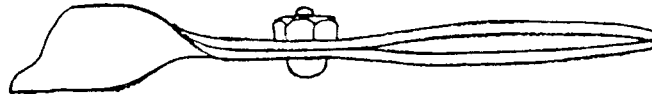


Fasten the two halves of the scissors together with the short bolt (B) (a long bolt may be cut to length) and nut (C). When the proper tightness is obtained, burr the end of the bolt to prevent the nut from loosening and falling off.

c. Notes

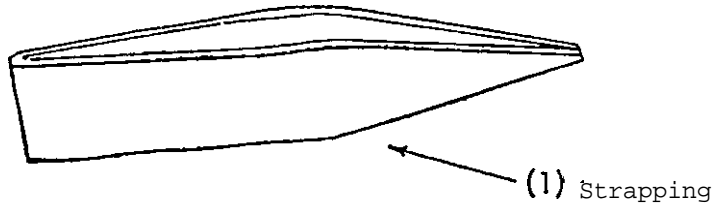
(i) Scissors constructed of strapping of 0.05 cm in thickness work fairly well in cutting tissues as long as short cuts are made, and the material being cut is kept well back between the blades.

(ii) Scissors work better if the blades are slightly curved as shown below.



Side View

A5. Forceps



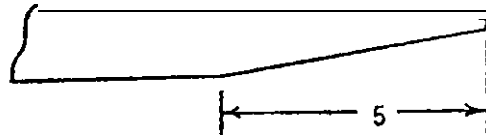
a. Materials Required

<u>Components</u>	<u>Qu</u>	<u>Items Required</u>	<u>Dimensions</u>
(1) Strapping	1	Steel Strapping (A)	20 cm long, about 1.25 cm wide

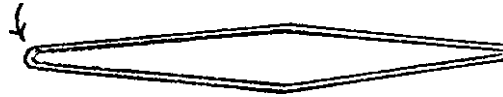
b. Construction

(1) Strapping

Cut each end of the steel strapping (A) to a taper.



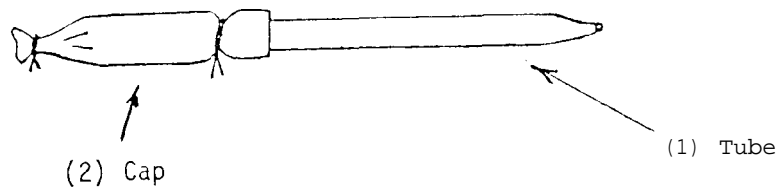
Temper This Bend



Side View

Bend the strapping a full **180°** at the midpoint. Make certain the tops touch and are in good alignment. Heat the bent area to dull red and plunge immediately into cold water to temper the steel. Bow the blades of the forceps slightly

A6. Dropper

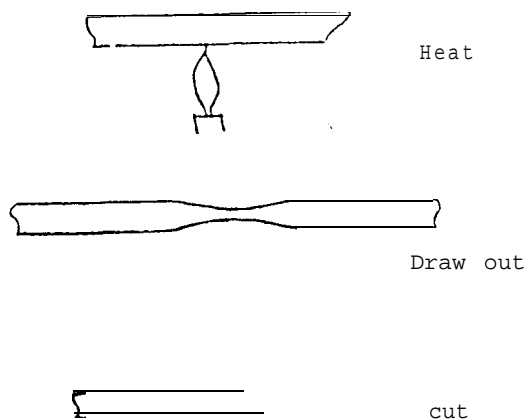


a. Materials Required

<u>Components</u>	<u>Qu</u>	<u>Items Required</u>	<u>Dimensions</u>
(1) Tube	1	Glass Tubing (A)	7 cm long, about 0.6 cm diameter
(2) Cap	1	Rubber Tubing (B)	4 cm long, 1 cm outside diameter
	2	Soft Wire (C)	4-5 cm long

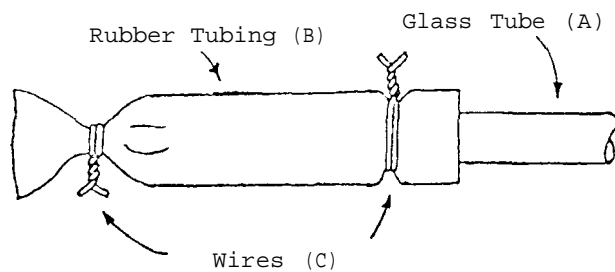
b. Construction

(1) Tube



Hold the glass tubing (A) over a hot flame, turning it to heat it evenly. When it begins to soften, draw it out until the constriction is the desired diameter, and allow it to cool. When cool, cut the tubing at the constriction with a small triangular file.

(2) Cap

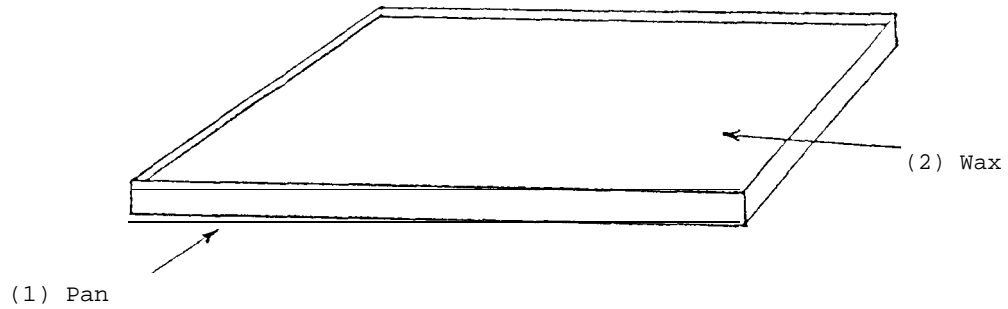


Slip the rubber tubing (B) over the end of the glass tube. Wrap a piece of wire (C) tightly around the tubing to hold it tight to the glass, and twist the end of the wire together. In a similar manner, close off the open end of the rubber tubing so that it is airtight.

c. Notes

(i) Droppers may be made in many shapes and sizes to fit the various uses for which they are needed.

A7. Dissecting Pan

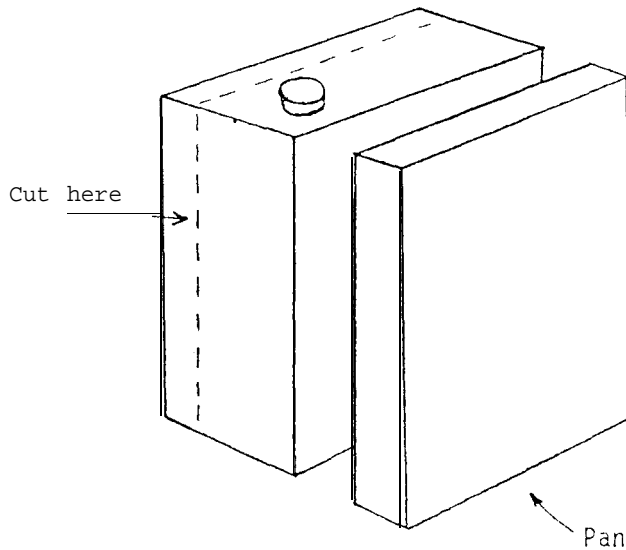


a. Materials Required

<u>Components</u>	<u>Qu</u>	<u>Items Required</u>	<u>Dimensions</u>
(1) Pan	1	Oil Can (A)	Approximately 17 cm x 25 cm x 3 cm
(2) Wax	--	Paraffin Wax (B)	Enough to partially fill the pan (about 1 liter)

b. Construction

(1) Pan



Remove the handle from a 4 liter rectangular oil can (A). Cut off the sides about 3 cm from the edge. It is best to put tape on the sharp edges of the pan to prevent students from cutting themselves.

(2) Wax

Fill the pan about two thirds full of melted paraffin wax (B), and allow the wax to harden. Be careful in heating the wax not to get it too hot or it may ignite. It is best to place the paraffin block in a glass jar, and put the glass jar in hot water until the wax melts,

c, Notes

(i) Any container like an oil can (e.g., waxed cardboard milk containers) can be used as long as a suitable pan can be made from it. Alternatively, pans can be made from sheet metal if there is sufficient technical help available.

(ii) Cases for dissecting tools can be made from heavy cloth material if it is desirable to keep each student's kit separate from the others.