at this time. By a stroke of good luck, the father of one of our students, a physician, was planning to be in the area just previous to the trip and was able to arrange to meet and stay with the group during most of the trip. He was also a qualified scuba diver.

We reviewed the costs of implementing the trip and decided to fly night coach, rent stationwagons for ground travel, camp at night, and eat one or two group meals daily. The total cost of the venture was approximately $300 per individual, and with more careful planning that figure could be reduced somewhat.

The trip developed into a combination of visits to educational and scientific institutions and outings to natural settings. When we arrived in Florida, our first stop was at the Florida Institute of Technology at Jensen Beach. The morning was spent in various seminars dealing with various aspects of marine biology and oceanography. After lunch the head of the institute, an oceanographer with extensive training and experience, took us out on one of their research vessels to demonstrate some oceanographic sampling techniques.

The next stop was at the Seaquarium in Miami. This provided an excellent opportunity for us to study in detail live displays of reefs and ocean communities. We were given a guided tour by one of the resident biologists and also saw some of their ongoing research projects.

While in the Keys we stayed at John Pennekamp Coral Reef State Park for several days. We took two full-day diving trips, visiting four different reef areas in the underwater park. The park also has a board walk through the mangrove swamp which allowed the students to see certain animals not found on the reefs.

Driving farther down the Keys, we stopped briefly at Long Key State Park. The tide was out at the time and this permitted the students to see some sandy beach organisms not seen at Pennekamp. They were especially intrigued by hermit crabs and their ability to change shells as they grow. Several of the students made a brief study of the aggressive characteristics of a de-shelled hermit crab.

Bahia Honda State Park is situated on a fairly small key with soft coral formations immediately off shore. During our stay there we were able to do a lot of offshore snorkeling and tide pooling at low tide. We saw a number of interesting sea birds in addition to a large assortment of marine invertebrates and fish. One day of ocean diving on a reef near the Park introduced the students to more ocean organisms including a type of stinging jellyfish. A park ranger conducted a tour through a mangrove swamp nature trail, showing the students edible and poisonous plants and the effect of wind and weather on plant growth.

Upon returning to the Miami area, we visited Florida Atlantic University where we attended seminars on their studies of marine and aquatic problems and took a tour of their research projects.

During the flight home, the students evaluated the course. The general feeling was that there was good preparation in advance, stimulating activities, positive field trip reinforcement, and the potential for much carry-over. The students suggested the trip should be limited to 16 people including 2 teachers; we had 17 students and 3 adults. The cost was well invested and reasonable according to them.

We feel this type of interdisciplinary study can be done by high schools with great success at any time of the year.

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INEXPENSIVE MODIFICATION OF A LIGHT TIMER

In many classroom or research projects, artificial light-dark cycles differing from 24 hours are required. We have achieved such cycles by adding an inexpensive attachment to a standard light timer without modifying the timing mechanism itself. This was achieved by using the timer as a drive to turn a cam operated microswitch. A wooden drive pulley, (B in fig. 1.) attached to the face of the timer, and pulley (C) to which the cam was bolted, were turned on a lathe. To achieve the desired time period the circumference of pulley B must be in the ratio of x/24 the circumference of pulley A, where x equals the total number of hours in the desired light-dark cycle.

We made a cam from 3/8 inch balsa wood because it can easily be carved and sanded to precise dimensions. Even though a soft wood, it has proven satisfactory over an extended period of use. Any number of desired light-dark ratios can be achieved by replaceable cams of different contours.

To avoid slippage, Velcro fabric closures were used to line the pulleys and as a drive belt. This material, commonly used as a zipper replacement, is available at most fabric stores. An event recorder attached to the microswitch has shown this mechanism to be very reliable.

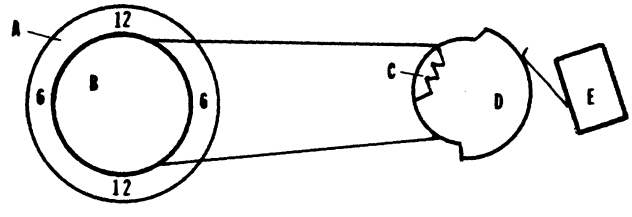

Fig. 1. Clock drive and cam-operated microswitch. A: timer face; B: drive pulley; C: pulley; D: cam; E: microswitch.

Other modifications of this setup are possible, and we have used one timer to simultaneously achieve two different light-dark cycles by employing a double drive pulley.

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A NEW IDEA FOR A DISSECTING TRAY

Have you ever needed to use transmitted light as well as reflected light in examining a specimen under a microscope? Did you need to immobilize the specimen? Was it necessary to keep the specimen covered to prevent dehydration? I recently had such needs, and after asking myself "Why not keep a space in the bottom of a dissecting tray free of wax so the light could come through?" I solved the problem with the modified dissecting tray described below.

The following materials are needed:

transparent container to serve as the tray
wax (paraffin)
hot plate (sand bath)
pan for melting the wax
object for creating the inner wax-free area

In choosing the size of tray to be used, the size of the organism to be studied should be kept in mind. A second point of consideration is the height of the tray or dish to be used: it should not be so deep that the sides interfere with the functioning of the dissecting microscope. Where the wax-free inner area is to be located in the bottom of the dissecting tray is determined by which part of the specimen you wish to examine. Fig. 1 shows a dissecting tray with the wax-free area located off-center to facilitate examination of the vertebrae of a fish. Most often a tray considerably larger than the animal is used, so that the specimen can be moved to view any area of the animal over the wax-free area.

After deciding upon the location and appropriate size of the wax-free area, simply set a small jar or a plastic or styrofoam cup in that position and pour the

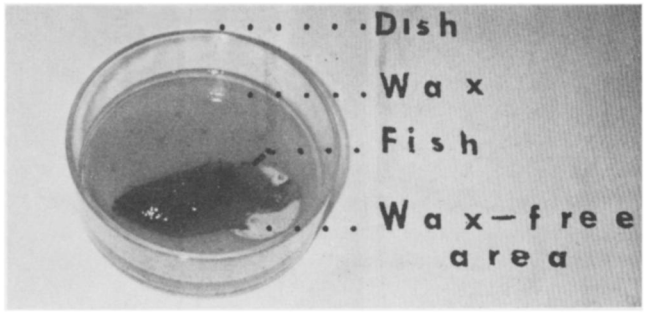

Fig. 1. A wax-free area is placed off center to permit examination of fish vertebrae under a dissecting microscope.

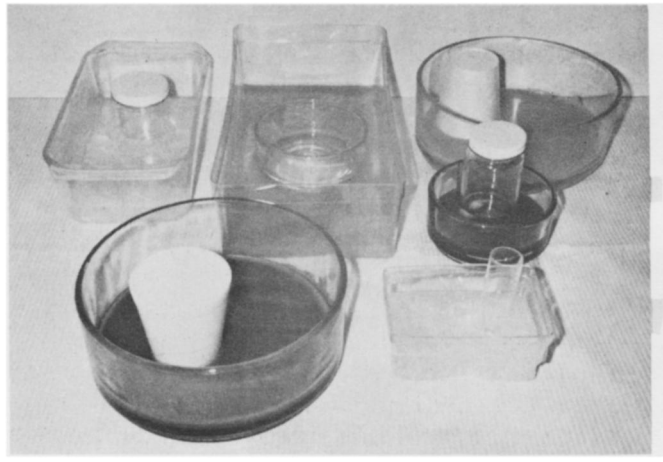

Fig. 2. A variety of objects may be used to form different sizes of wax-free areas.

melted wax into the tray. If a cup is used, filling it with sand or aquarium gravel will prevent it from floating when the wax is added. Fig. 2 shows dishes of various sizes with objects of various diameters in position to form the clear wax-free area.

Use a hot plate or a sand bath in melting the wax. Most waxes are quite volatile and there may be some danger if an open flame is used.

Generally, wax should be poured into the tray to a depth of 1 cm. However, the depth will depend upon the size of the specimen to be pinned. In cases of small delicate animals less depth is required. The proportions given in table 1 will serve as a guide in determining the amount of wax to use.

Table 1. Amount of wax required for various sizes of trays.

Size of tray	*Amount of wax required*
2-quart pyrex dish (8½-by-4½ inches)	275 g
8-inch preparation dish	240 g
4-inch preparation dish	65 g
plastic shoe box (14-by-6 inches)	400 g
small plastic box (4½-by-3 inches)	70 g

I found that flexible plastic or styrofoam cups work better than glass or plastic jars to form the clear wax-free area. Because the styrofoam can be slit down the side and peeled away from the wax it presents fewer problems in leaving a wax-free area. However, if styrofoam or plastic cups are not available, a glass jar can be removed after the wax has solidified by heating a scalpel and inserting it between the jar and the wax at intervals around the jar. Be sure the wax has set prior to the removal of the jar or it will flow over the area you wish to keep clear when the jar is removed. If the entire wax plate is heated to help remove the jar the wax may flow into the area you wish to keep clear.