NOTES

A general-purpose animal holder for dissections

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During dissections of small vertebrates, it is frequently necessary to adjust the position of the preparation in order to change the view of a particular structure under study. However, this often results in a change in the relative position between the structure and the dissection microscope; thus it becomes necessary to reposition either the preparation or the microscope before continuing dissection. One way to overcome this problem is to use a microscope stand that permits free and easy movement of the microscope in many planes. While these stands are highly flexible and useful in many situations, they are generally very large and expensive, and it is generally necessary to make a number of adjustments for each change in subject position. Since stands of this type are not readily available in most laboratories and their usefulness is somewhat limited, we have developed a relatively inexpensive and highly flexible system that maintains the position of the object under study, relative to the microscope, thus eliminating the need to move the microscope during any phase of a dissection.

The animal holding system, shown in Figure 1, is based on the principle that an object in the center of a sphere does not move, relative to a stable external point, when the sphere is rotated in any direction. In the system described here, the animal (a fish, in my work) is positioned so that the structure of interest (the ear) is at the center of the sphere. The base of the holder (B in Figure 1) can then be rotated almost 45 deg in any direction; yet the ear stays in the field of the microscope and, with minor adjustments at higher magnifications, in focus.

The base of the holding system is made from a section of an old bowling ball which is cut into two pieces. (The balls frequently can be obtained free from bowling alleys when they are no longer usable for bowling due to surface abrasions). The smaller section is used for the holder since the center of the sphere is above the sides of the base, allowing access to all sides of the object under study without interference by the sides of the ball. After sectioning, the ball is milled out until

there is approximately a 1½-in. shell left on all sides and an additional 1½-in. shell left on the future front and back of the base (see Figure 1) for mounting the actual animal holding device. Five holes are drilled in the bottom of the ball to allow for water outflow from the system when the fish is being respiration. An additional cut is made at one end of the ball to permit the tail of a long animal to overhang the holder.

One of the main features of the system is that the holder can be rotated to a wide range of positions, thus permitting different views of the object under study (± 45 deg). This is done by having the ball sit in a Plexiglas ring (P) that is hollowed out and beveled to fit the curvature of the ball. The Plexiglas base has a drain hole so that excess water can be led away to a sink. The principle of operation then, is that the Plexiglas base acts as a bearing to support the ball and allow its rotation. However, the hollowed bowling ball is rather light and it will not stay in position when rotated from the horizontal plane. Consequently, molten lead is poured into the ball, thus adding substantial weight and stabilizing the system in all positions.

The part of the system holding the fish is designed for flexibility. It is configured to permit considerable variation in the size and shape of the fish that can be restrained. Further, the fish holder itself can be easily removed and a different holder, designed more specifically for a different group of animals, substituted in the same base.

The fish is held by a series of cross-pieces (C) that are perpendicular to a pair of main beams (M). These are held on four vertical uprights that come up from brass bases which are screwed into the shelf made in the bowl-

Figure 1. Animal holding system: B-base, C-cross beam, H-headrest, J-joints, L-lead, M-main support beam, P-Plexiglas ring (or support), S-setscrew, R-respirator tube, V-contact area for holding fish.

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ing ball. Each section of the holder is made from hollow brass rods, and perpendicular sections are held together by junctions (J) of hollow brass just slightly larger than the main supports. Since all pieces of the holder are held together by these junctions, there is considerable flexibility in the positioning of the segments that actually hold the fish. The rods are held in place by setscrews (S) placed in each of the junction pieces.

The fish is held by V-shaped pieces of brass (V), lined either with foam rubber (as shown in the figure) or sandpaper. The fish is placed into a general position and then the cross-pieces are tightened against the fish, providing a firm grasp on the animal. While we have three pairs of cross-pieces available, generally two pairs are sufficient for most fishes. One pair is placed immediately behind the operculum and the second towards the tail region. Since my work involves dissection of the cranium, considerable pressure is placed in the downward direction. Consequently, a V-shaped headrest (H) is placed under the lower jaw to support the head. In addition, a

respirator (R) tube can be moved along the main beams to give flexibility in setting up most sized animals.

The described holder has made it considerably easier to perform a whole range of dissections heretofore difficult or impossible without some other more cumbersome system. The major advantage of the system has been the ability to quickly change the position of the animal in small degrees without affecting the focus of the object or the stability of the preparation. Furthermore, the animal holding system is flexible both in terms of construction and in the types of animals that can be held for dissection. The system is expressly made for fish but a wide range of changes can be made, all based upon the single principle of a rotatable sphere.

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