

AN EASILY-CONSTRUCTED TEMPORARY CAGE FOR STUDYING ANIMALS IN THE FIELD

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Controlled experiments are easy to perform on animals in the laboratory, but unnatural conditions can cause behavioral artifacts. Studying animals in their natural environment reduces artifacts, but makes precise control difficult. Large outdoor enclosures provide some of the advantages of each method of study; living conditions can be controlled to a great extent, yet laboratory artifacts are less likely to affect the results.

Recent advances in the study of dragonfly behavior, in particular, have been made possible by the use of large flight cages (Michiels & Dhondt 1988, 1989). Return rates for dragonflies captured and released into the wild can be as low as 36% (Hilton 1983, 1984). Experimentally-treated individuals released into a cage, on the other hand, can generally be recaptured (Michiels & Dhondt 1988). Studies of longevity, maturation processes (Michiels & Dhondt 1989, Dunham 1993b) and the effects of population density (Dunham 1993a) are also possible in an enclosure.

In this note, I describe a method of constructing a large cage. The design is simple, the cage is easy to build in a short time, and it is sturdy enough to withstand 40-50 mph winds (pers. obs.). I have successfully used this cage to observe behavior of *Pachydiplax* dragonflies at a pond (Dunham 1993b, 1994). In addition, *Calopteryx* damselflies survived several weeks at a section of a small stream enclosed by this cage (J. Waage, Brown Univ., pers. comm.). These large insects were unable to escape from the cage. Although, in general, small birds were unable to enter the cage, on occasion they did get under the net if it was not sealed at ground level. If desired, minor modifications could be made to keep birds in or out. Michiels & Dhondt (1988, 1989) built a taller enclosure covering the same area.

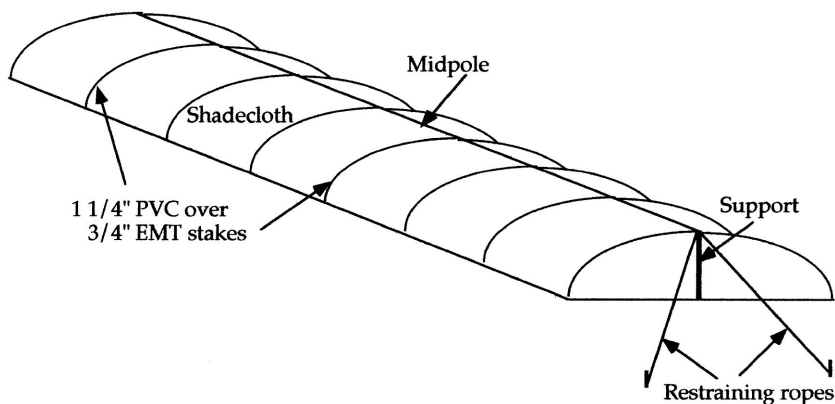


Figure 1. The completed flight enclosure, 10 m x 20 m x 3 m.

The materials needed to construct the cage are listed below. All measurements are given in both English and Metric units because construction materials in the U.S. are still measured in English units.

- PVC pipes, 3 cm (1 1/4 in) schedule 40 (thick-walled)
- PVC joints (if pipe comes without bell ends), 3 cm (1 1/4 in)
- EMT (galvanized metal electrical conduit), 2 cm (3/4 in)
- Nylon rope, 1.5 cm (1/2 in)
- Wooden stakes, 3 x 3 x 60 cm (1 in x 1 in x 2 ft)
- Cable ties (also called tie wraps), 18 cm (7 in)
- PVC glue
- Sledge hammer
- Pipe cap, 2.5 cm (1 in) and short length of 2.5 cm (1 in) pipe
- Netting, 360 m² (12 x 20 m plus endpieces); (4000 ft² or 40 x 65 ft plus endpieces). Netting should be UV resistant, not nylon; 10% shade-cloth works well. Sew together using nylon twine and large-eyed (tap-stry) needle.
- S-hooks, 2.5 cm (1 in)
- If a PVC midpole is used:**
- Drill bit, 1 cm (3/8 in)
- Carriage bolts, 7.5 x 1 cm (3 in x 3/8 in)
- Wing nuts, 1 cm (3/8 in)

Instructions for building a 10 x 20 x 3 m enclosure are as follows. Larger enclosures can easily be constructed by adding more supports. For an enclosure 20 m long, 9 cross-supports provided the sturdiest support, but 8 will still hold up the cage under most conditions. The midpole (connecting the centers of the cross-supports) can be rope or PVC pipe. PVC is sturdy but heavy. Rope is lighter and less expensive.

1. Glue together sections of PVC pipe to form 8 or 9 cross-supports 12 m (40 ft) long. When bent into position, these will form the framework for a cage about 3 m high at the center.

2. While the glue is drying, cut sections of EMT into stakes 1.5 m (5 ft) in length. These stakes are needed to hold the cross-supports in place. Drive the stakes into the ground in 2 rows 10 m apart. If needed the end cap can be placed over the end of the pipe to prevent flaring of the pipe as it is driven into the ground. For 9 cross-supports, the interval between stakes is 2.5 m (8.125 ft); for 8 cross-supports, the interval between stakes is 2.85 m (9.25 ft). The exact height of the EMT stakes above ground is unimportant, but leave no more than one-half of the EMT protruding.

3. Attach the rope or PVC midpole to the cross-supports before erecting the enclosure. Tie or bolt the cross-supports (Fig. 2) at the appropriate distance apart to form the midpole. If the rope is used, make sure it is pulled taut so that the distance between cross-supports is the same as that between the stakes.

4. Slip ends of cross-supports over the ends of the EMT. The PVC ends will rest on the ground.

5. Pull rectangular piece of netting across top of cage.

6. Use cable ties to attach netting to PVC near the ground.

7. Sew hemispherical pieces of netting to netting covering the top to enclose the ends of the cage. The netting can be left sewn together when the cage is disassembled so that the next time it is erected this step will be unnecessary. Leave a section open for the entrance. The entrance can be held closed using S-hooks.

8. Stake edges of netting to ground, or cover edges with dirt. The latter may be necessary to keep birds out (or in).

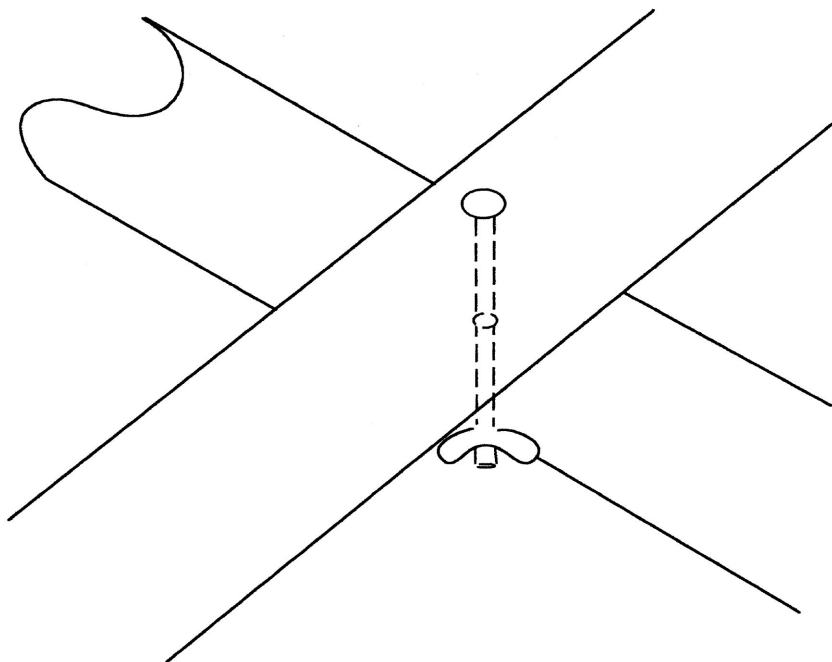


Figure 2. Detail of PVC midpole bolted to PVC cross-support.

9. Secure the midpole at ends of the cage with ropes. If the cage sags (especially likely if a PVC midpole is used) put a support under the upper end of each restraining rope.

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SUMMARY

An inexpensive and simple method is given for building a large outdoor cage. This type of enclosure can be erected quickly on most terrain, including over water.

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