Building and Operating a Display Incubator

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Observing a developing embryo can be a very fascinating and educational experience for all ages. Since most embryos develop internally and therefore are difficult to observe, the chick embryo provides an excellent tool for many types of learning situations.

Artificial incubation is usually used for projects where the embryo is to be observed and is also frequently used for hatching chicks for other reasons as well. Due to the fact that small display incubators that meet specific needs are sometimes difficult to obtain, the suggestions included here provide some alternatives.

The incubator suggested in Figure 1 can easily hold up to 100 eggs and serve as both the incubator and a place to display the chicks for one or two days after hatching. This unit can be modified to suit individual needs. Small increases or decreases in the size should not affect the operation of the incubator.

Incubator Housing

The incubator is made of plywood and plexiglass. These materials are suggested because plywood is relatively inexpensive and adds strength, while the more expensive plexiglass allows the see-through feature without the breakage problem. The amount of plexiglass can be changed depending on the primary purpose of the unit. If a display incubator is the main objective, then all the plexiglass will be needed. If the main objective is hatching, only a small window may be needed, or plexiglass can be eliminated altogether.

Thermostat

The suggested thermostat is a wafer-type with a small micro switch (Figure 2). This type of unit is a relatively inexpensive way to accurately control the temperature and is recommended over other more costly types. The thermostat should be located at the level of the eggs for proper temperature control.

Heaters

The ceramic cone style heater (Figure 3-B) provides an even heat, has a long life, and is less likely to break than a light bulb or some other types of heaters. The ceramic cones are available or can be ordered from many electrical supply companies. The suggested wattage rating on these cones is 220 watts. A higher rated cone can be used, but temperature control may be a problem. (If a larger cone is used, a dial rheostat switch dimmer can be used to adjust the heat output; otherwise, too much heat will be generated too quickly.) The

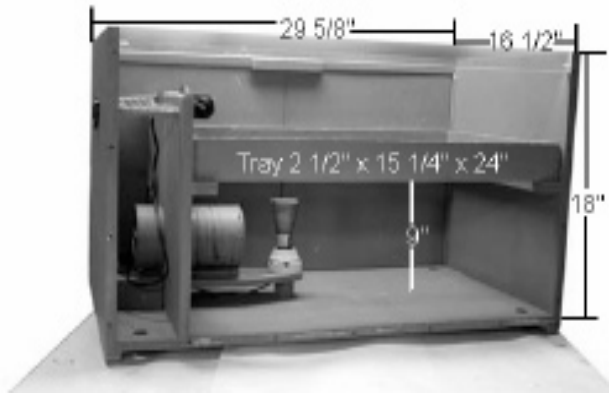

Figure 1.

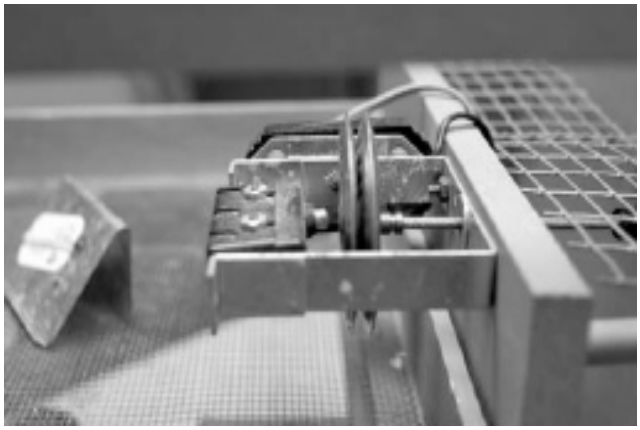

Figure 2.

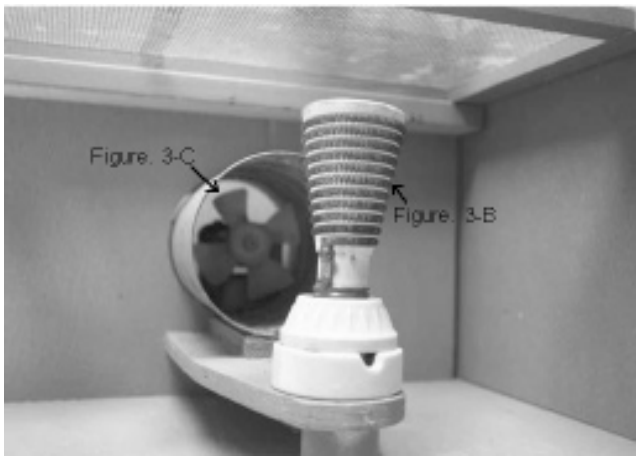

Figure 3-B and 3-C.

heater should be located directly in front of the fan. This arrangement helps ensure a uniform temperature.

Fan Motor

One unique characteristic of this incubator is that it has air circulation (normally called forced air) provided by a fan (Figure 3-C). It is important to wire the fan so that it runs continuously to maintain a uniform temperature. A motor rated at 1/250th horsepower and a 3-inch diameter fan are ideal for this purpose. A shroud made from a large juice can will work well to help protect the fan and direct the air toward the heater.

Thermometer

A reliable thermometer is essential for satisfactory operation of the incubator. The thermometer should be located at the level of the thermostat (egg level).

Supplies and approximate cost

Fan and Motor — $5 to $20
Thermostats and Switches — $5 to $20
Thermometers — $1 to $5
Ceramic heaters — $10 to $25

Many appliance repair services can provide a small motor and fan similar to those needed to ventilate appliances. The fan and motor can also be purchased from:

W.W. Grainger, Inc. (Wholesale Only)
4314 Will Rogers Parkway
Oklahoma City, OK 73018
Phone: 405-943-9631

The companies listed below are possible suppliers for incubator components.

Lyon Electric
2765 S. Main
Chula Vista, CA 91911
(619) 216-3400

G.Q.F. Manufacturing Co.
Box 1552
Savannah, GA 31498
(912) 236-0651

Assembling the Incubator

Assembly and wiring of the incubator should be according to the pictures and directions in this fact sheet and the blueprint mentioned below. Persons wiring the incubator should use care and make all connections correctly. Before operating the incubator, having the wiring checked by a qualified electrician is recommended.

Successful Operation of the Incubator

The success of incubation depends on the proper operation of the incubator. The important factors are location of the incubator, temperature, humidity, turning of the eggs, and ventilation.

Location of the Incubator

The incubator should be located in the draft-free area out of the direct sunlight and should be operated for at least 24 hours prior to the beginning of incubation to insure proper adjustment.

Temperature

The temperature should be held at 100°F (32.5°C) throughout the incubation period. Usually the thermostat will control the temperature in the range from 99 to 101°F. When the incubator is opened, the temperature will drop and no adjustment needs to be made.

Humidity

Humidity is another important aspect of incubation. Moisture can be added to the air in the incubator by placing an aluminum pie plate or similar container filled with warm water in the bottom of the incubator in front of the fan. Extra evaporation can be accomplished by adding a piece of sponge, to serve as a wick, to the water container. The sponge should be large enough to extend above the water level. Adequate humidity is particularly important at hatching time. If moisture condenses on the inside of the plexiglass, the humidity may be too high and may need to be reduced.

Turning the Eggs

To keep the developing embryo moving around inside the egg and to prevent it from adhering to the shell, the eggs should be turned two or three times daily during all but the last two to three days of the incubation period. Each egg should be marked so turning all eggs is insured. A simple method to use is to place an “X” on one side of each egg and an “O” on the opposite side, then when the eggs are turned all the “X”s or “O”s are visible at the same time.

Ventilation

Getting fresh air into the incubator is necessary because the developing embryos require oxygen. The ventilation openings in the bottom of the unit allow the amount of fresh air

entering the unit to be regulated. It is particularly important that these openings be at least partially open during the final stages of incubation when the embryos are large and when more oxygen is needed.

Using the Incubator to Brood Chicks

If chicks are to be left in the incubator for brooding, the temperature should be maintained at 95 to 100°F. Chicks can remain in the incubator for approximately 24 hours without feed and water, but small containers of feed and water should be provided, if convenient. Placing newspapers on the bottom of the incubator during the brooding period will facilitate cleaning.

CAUTION: When operating the incubator, extreme caution should be used to prevent burns from the heater. There is no indication whether or not the ceramic cone heater is hot, so it should always be treated as if it were hot. A warning sign, which says "HOT" should be included at the base of the heater. A shield consisting of a circular wire mesh screen, which sits around the heater, may be added as an extra precaution. A 1/2- by 1/2-inch wire mesh is a good choice for the shield.

A 17- by 22-inch blueprint of the incubator may be ordered from the Oklahoma State University Plan Service, Room 214 Ag Hall, Stillwater, OK 74078. The cost is $1.00 per copy.

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