

AN IMPROVED ARTIFICIAL NEST FOR  
LABORATORY REARING OF THE IMPORTED FIRE ANT,  
*SOLENOPSIS INVICTA* (HYMENOPTERA: FORMICIDAE)

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Present research with the imported fire ant, *Solenopsis invicta* Buren, has necessitated the maintenance of large numbers of laboratory colonies of these insects. Because of the moisture requirements for proper development and growth of laboratory colonies, we continue to make improvements in our laboratory rearing methods and materials (Williams et al. 1980 and Banks et al. 1981). Two types of laboratory nests used by our fire ant laboratories in Gainesville, Florida, and Gulfport, Mississippi, were described by Bishop et al. (1980). One of these nests, the Williams nest, has been in continuous use since 1980. I report here some modifications which have increased its usefulness.

The original nest consisted of a small plastic petri dish (100 X 10 mm) centered on the inner bottom of a larger plastic petri dish (150 X 25 mm). The smaller petri dish contained a piece of synthetic sponge that snugly fitted the inside and was saturated with water. Small holes (ca. 3 mm) were made in the top of the small dish, the top was replaced, and the dish placed inside the larger petri dish. Then dental labstone mixed with water was poured into the larger petri dish to completely cover the smaller dish. After the labstone mixture dried, it formed a smooth arena for the ants to maintain their colony.

Recharging the water reservoir was difficult with this design. Since the sponge was sealed, it could only be recharged by drilling a hole through the bottom of the nest into the small dish and then injecting water with a hypodermic syringe and needle. Care had to be taken to avoid being stung, damaging the queen or disrupting the colony. Recharging a large number of nests (500 or more) required an excessive amount of time and dictated the need for modifications.

The new nest design is similar to the old one except for the sponge reservoir (Fig. 1). The piece of synthetic sponge was cut in the shape of an "H" to fit into the bottom of the smaller petri dish and two holes (1.7 cm in diameter and 1.5 cm apart) made in the lid of the small petri dish with a hot soldering iron. Then the ends of a piece of 5.5 cm long Tygon tubing were inserted into the two holes. The tubing was of the type S-50-HL, 1.27 cm o.d. X 0.95 cm i.d. X 0.16 cm thick wall, Norton Performance Plastics, P.O. Box 3660, Akron, OH 44309. Four smaller holes (each ca. 3 mm) were made in the lid of the small petri dish (Fig. 1c) so that when it was covered with the labstone mixture, some of the mixture would flow into the holes and act as a wick to keep the labstone moist. The sponge was moistened, the lid was replaced, and the small dish was

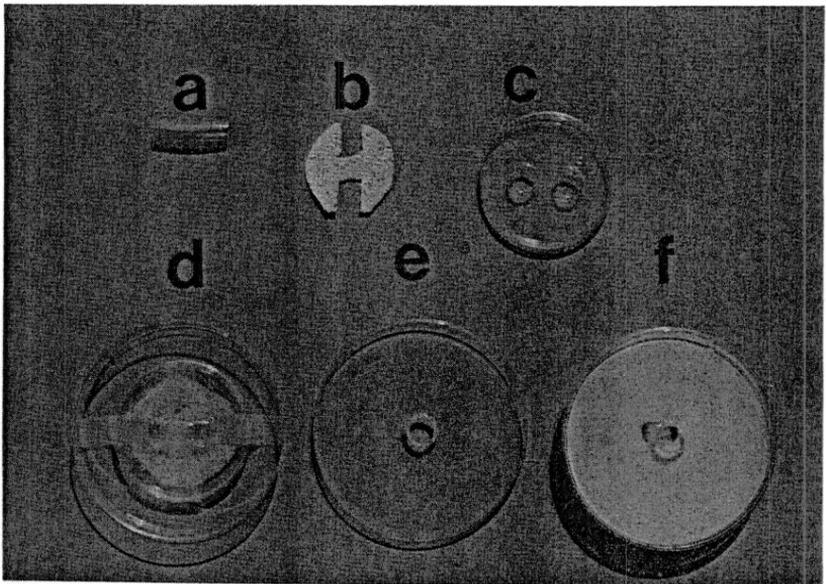


Fig. 1. Components of artificial nest for rearing ants: (a) piece of Tygon tubing; (b) synthetic sponge in the shape of an "H"; (c) small plastic petri dish (100X10mm); (d) large plastic petri dish (150X25mm) containing smaller petri dish, sponge, and Tygon tubing taped in position; (e) lid of large petri dish with hole in center; (f) completed nest with hardened dental labstone and top of Tygon tubing exposed.

taped to the center of the large petri dish. Dental labstone (244 g) thoroughly mixed with tapwater (76 cc) was then slowly poured into the larger petri dish completely covering the small dish but leaving the top of the Tygon tubing exposed. After the labstone hardened (20-30 min), four exit/entrance grooves for the ants were melted through the side of the large petri dish using a soldering iron. The grooves were 90 degrees apart and extended to the level of the labstone. Another hole (ca. 1.7 cm in dia) was melted through the center of the lid of the large dish directly over the Tygon tubing. Replacement of the lid on the large petri dish made the nest ready for use. The water supply can be recharged by inserting the needle (18 ga) of a hypodermic syringe filled with water into the Tygon tubing through the hole in the lid of the large petri dish and injecting 30 cc of the water. The nest usually needs recharging every 3-4 weeks at  $30 \pm 2^\circ\text{C}$  and  $65 + \% \text{ RH}$ . Higher temperatures and low humidity, or both, may require more frequent recharging.

Nests can be reused numerous times even though some microbial growth may occur on the surface of the labstone. The nest can be cleaned for reuse by washing with soap and water using a household sponge, rinsing thoroughly with clean water, and allowing to dry before recharging and putting into use. Worker ants will occasionally cut a hole in the Tygon tubing, especially if the tubing is thin-walled, and then the entire colony, especially the queen and most of the brood, will be moved into the sponge area of the nest. Pieces of the sponge will be removed, eventually making the nest unfit for reuse. When this happens, the ants can be forced to move out of the nest by not recharging with water and removal of the top of the nest. This technique also can be used to drive ants (colony) from old nests into a new one.

In 1988, the cost of each nest was \$1.37 US, exclusive of labor. The nest can last for a year or more until ants do cut through the tubing and enter the sponge area. The tropical fire ant, *Solenopsis geminata* (Fabricius), tends to cut through the Tygon tubing quickly. Therefore, either extra thick-walled tubing or the old type of Williams nest (Bishop et al. 1980) should be used to rear this ant species.

Colonies of the following ant species have been maintained in excellent condition in these nests in our laboratory: *S. invicta*, *S. richteri* Forel, *Camponotus socius* Roger, *C. pennsylvanicus* (DeGeer), *C. abdominalis floridanus* (Buckley), *Pheidole dentata* Mayr, *P. morrissi* Forel, *Iridomyrmex pruinosus* (Roger), *Pogonomyrmex badius* (Latreille), *Conomyrma bureni* Trager, *Monomorium minimum* (Buckley), *Paratrechina longicornis* (Latreille), *Trachymyrmex septentrionalis* (McCook), *Aphaenogaster floridana* M. R. Smith, *A. flemingi* M. R. Smith, and *Formica pallidefulva* Latreille.

We have maintained over 800 colonies of *S. invicta* in addition to numerous colonies of the other ant species in these nests. The nests require minimal maintenance, are less expensive, and enable us to rear ants more efficiently.

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#### REFERENCES CITED

- BANKS, W. A., C. S. LOFGREN, D. P. JOUVENAZ, C. E. STRINGER, P. M. BISHOP, D. F. WILLIAMS, D. P. WOJCIK, AND B. M. GLANCEY. 1981. Techniques for collecting, rearing, and handling imported fire ants. USDA, SEA, AATS-S-21, 9 p.
- BISHOP, P. M., W. A. BANKS, D. F. WILLIAMS, C. E. STRINGER, J. A. MITCHELL, AND C. S. LOFGREN. 1980. Simple nests for culturing imported fire ants. *J. Georgia Entomol. Soc.* 15: 300-304.
- WILLIAMS, D. F., C. S. LOFGREN, AND A. LEMIRE. 1980. A simple diet for rearing laboratory colonies of the red imported fire ant. *J. Econ. Entomol.* 73: 176-177.