

## Self-contained Ecosystem

In the course of research on self-contained ecosystems for long duration manned space flight, a scientist at Jet Propulsion Laboratory developed an ecologically balanced system capable of sustaining plant and animal life for years. That technology is now being employed in manufacture of an ecology display for the home, office or classroom: a five-inch sealed sphere containing six tiny shrimp, several tufts of algae and a clear "soup" of bacteria in filtered sea water—a closed ecosystem in which plant and animal life are mutually sustaining.

Called the EcoSphere<sup>®</sup>, the system is essentially a care-free aquarium that requires no feeding, no cleaning. Shown in the accompanying photo, it is, in effect, a model of Earth's own ecosystem when provided with an outside energy source: light, which is necessary for algae growth. The light may be indirect sunlight, but for dimly lighted rooms the manufacturer offers an accessory: a fluorescent-lighted life support stand (not shown in the photo) that serves as a base for the sphere.

The algae bask in the light and produce oxygen as they grow. The shrimp—a special species found in Pacific waters—breathe the oxygen while nibbling on the algae and the bacteria. The shrimp and bacteria give off the carbon dioxide needed by the algae for photosynthesis and growth. The bacteria decompose shrimp waste, breaking it down into basic chemical nutrients used by the algae. The algae and bacteria can reproduce; shrimp reproduction has not been verified. The algae can grow indefinitely; no one is sure how long the shrimp may live, but their life spans could conceivably reach 10 years. In test spheres at JPL, shrimp were still thriving after four years.

The EcoSphere is produced by Engineering and Research Associates, Inc. (SEBRA), Tucson, Arizona as a sideline product; SEBRA is normally engaged in research, development and manufacture of medical and scientific instruments and has a long association with the U.S. space program. SEBRA president Loren Acker learned of the JPL technology when he saw one of the sealed flasks on a business visit to a NASA official. Acker obtained a license for the technology, developed a prototype manufacturing process and produced an initial test marketing run of 80 spheres in 1983. The EcoSphere's surprising acceptance led to 1984 production of 200 units, sold through national catalog sales firms. Last October, SEBRA opened a new cleanroom facility in Tucson for sustained production of EcoSpheres; the facility is also conducting research toward development of a broader line of closed ecosystems for all educational levels.

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