under the abnormally overcast and humid conditions, but had not commenced to feed.

Taking all points into consideration; the oviposition of S. *callippe* on sagebrush; the occurrence of *Speyeria* larvae on sagebrush, and the presence of sagebrush at all the author's collecting sites for S. *callippe* it is suggested that sagebrush may serve as the larval foodplant. Specimens of the larvae and adults have been deposited in the Yale Peabody Museum.

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## A METHOD FOR OVERWINTERING HIBERNATING LARVAE OF BUTTERFLIES

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In a recent issue of the *Journal* (18: 201–210, 1964) Noel McFarland presented many useful tips for preserving the immature stages of lepidoptera. His statement that overwintering larvae are easily handled by storage in jars in shaded areas but subject to normal out-of-doors temperatures is true in part. There are some areas in the country where this can be done without too great loss of specimens. I have found here in Colorado, and W. H. Edwards discovered almost a century ago in West Virginia, that overwintering losses under such conditions are very high.

Edwards's solution was to send his larvae for overwintering to an icehouse and to have the boxes in which he stored the larvae packed in the cold, moist sawdust used to retard the melting of the ice. Alas, there are no longer such places.

The environment of our modern electric or gas refrigerators, household or laboratory, is much too dehydrating to be of use. I have had success with a simple and inexpensive device that I have passed on in letters to some friends. I repeat it here for a larger audience. I use a portable, or automobile, ice chest, the sort that has come into vogue for picnics or camping trips. These can be purchased in many places for less than $20. I recommend one that is sturdily built. It will last for years. Mine has a good latch on it that seals the lid effectively against too much loss of moisture or ingress of heat. It is metal and plastic construction with a drain hole and a place for racks.

When larvae begin to go into hibernation, often in late July and August for some species of butterflies, I put each into a sterile shell vial and

loosely plug it with sterile absorbent cotton. A data slip is placed in the vial with the larva. The vials are laid in the plastic racks of the icebox. The icebox then is charged with a dozen or so large ice cubes and a 10-pound plastic bag of such cubes that is sealed against leakage. I insert through the drain hole a thermometer in a cork. By the middle of September I find that there is little reason to open the chest for insertion of new material. From then on I watch the thermometer. When the temperature in the chest reaches 36–38° F. I open it and replace the melted bag of ice and if there is no free water in the chest I add a few loose cubes.

I have found that when Satyridae are being carried in the chest I can remove them after they have been in hibernation for 11 or 12 weeks and break hibernation by allowing the larvae to warm up in their shell vials to room temperature. Several weeks before this it is wise to bring in a piece of sod, potted in a low, large flowerpot. Warmth, moisture, and sunlight will produce an abundant supply of food for most Satyridae and the grass-feeding Skippers.

My technique differs from McFarland's in that I keep my larvae isolated. Incidently, this does not work well with the larvae of some Nymphalidae that are gregarious in the early instars. They appear to need "company" to thrive. Each larva in its individual vial is examined each day. Fresh spears of grass are put into sterile vials and the larva transferred when the food is limp or used up. This greatly reduces loss from mold and disease. It also allows precise records to be kept, something that is difficult with "bulk" feeding. I preserve the shed head capsule and skin of each instar when I am making a careful study of a species.

I do not disturb larvae that are about to molt. Before molting and before hibernation the larva clears its gut of frass. If after this the larva is inactive for four or five days I put it into the hibernator. If on the other hand the larva is active after molt I transfer it to fresh food and collect the exuvia. Head capsules I mount on a bit of card and put that and a label on a pin.

The shed skin can be moistened and extended and then mounted as a slide for study of the hairs, etc.

The advantage of the ice chest is that the environment is constant in humidity and the temperature easily controlled to prevent too early breaking of hibernation. This happened for me with three successive outdoor winterings. Another, perhaps greater, advantage is that the hibernating larvae are where they are handiest, in the laboratory or at home.