

camped, particularly at dawn and dusk. At the same time quantities of large yellow dipterous maggots were found in and among our pots and pans. This discovery gave a clue to the intermittent tattoo that had been heard on the tent roof during the night and early morning. Investigation proved the sound to be due to these maggots falling from the cocoons spun up in the over-hanging branches. Further observation led to the discovery that the blackbirds and bluebirds were feeding on the abundant and easily procured maggots before they could burrow out of sight into the ground for pupation. The blackbirds were occasionally seen to rip open a cocoon, possibly having first seen a maggot wriggling to get out, as no evidence was obtained to prove that they were deliberately consuming the pupae of the moth.

A census was taken of the cocoons in order to ascertain what percentage contained parasitized pupae or larvae. One hundred were gathered at random and carefully examined and recorded. While it is obvious that one count cannot be taken as conclusive evidence for the whole district, it gives an idea as to what might be expected. Forty-four cocoons contained parasitized larvae, each in-

habited by from one to five maggots of various sizes. Twenty-six pupae were parasitized in like manner. Thirty pupae were free of large dipterous maggots, although some of them were very feeble and lifeless.

Summed up, the result of examination demonstrated that in the case of those caterpillars that spun cocoons, 44 per cent were unable to pupate, 26 per cent contained parasites after reaching the pupal stage and the remaining 30 per cent appeared to be normally healthy although in a varying degree of vigour. Unfortunately no adults were reared from the pupae which were retained hence no figures are available as to the final effect of parasitism. Examination of cocoons in situ showed many of them with the round escape holes of the mature dipterous larvae, others bore evidence of being ripped open by the blackbirds, as previously observed.

Several adult dermestid beetles were taken or seen flying about the camp and while the preserved skins of drying mammals and birds no doubt had something to do with their presence, there is the possibility that they were attracted by the large numbers of dead and rotting *Malacosoma* larvae.

## ON THE OVIPOSITION HABITS OF THE AUSTRALIAN COCKROACH, *PERIPLANETA AUSTRALASIAE* (FAB.)

G. J. SPENCER

Department of Zoology, University of British Columbia, Vancouver, B.C.

During the last week in November some years ago a firm of local grocers sent me a gravid Australian cockroach. The roach was placed in a glass-covered beechwood rearing box about 14"x10"x3"; the box already contained a few domestic crickets with their food and shelter. It was observed for a few minutes daily during the next three months and its habits recorded; the following notes are extracted from these records:

**Dec. 1.** 10 a.m. carrying a partly extruded egg pod which was fully extruded by 12:30 p.m.

**Dec. 3.** Still carrying the egg pod.

**Dec. 5.** Pod deposited on the floor and later the same day partly devoured by the roach or by the crickets.

**Dec. 7.** 2 p.m. A 2nd pod was just appearing so the roach was removed to another similar cage which was butted up against a radiator for heat, and supplied

with a variety of powdered cereals, water from a partly plugged vial lying on the floor of the cage, and dried lean meat. Beyond a small tent-shaped piece of paper, there was no cover in the box.

**Dec. 8.** The egg capsule started the previous day had been deposited on the floor and had been eaten out by the roach which had probably eaten the previous one also.

**Dec. 17.** a.m. A 3rd capsule had been deposited overnight and had been completely covered in one corner of the box with shreds of wood fibre which the roach had torn off the smooth, dry, hard side of the box, and had cemented together with saliva. This gouging of fibres from the planed wood showed greater strength and sharpness of mandibles than one would expect to find in a cockroach. The cage was supplied with a petri dish of water with a flat wad of cotton batting in it to provide moisture. Cover for the insect was added in the form of a number of muddy grass roots with chopped-off stems and leaves.

**Dec. 20.** 10 a.m. A 4th ootheca just appearing. In the past 3 days the roach had twice covered up the 3rd pod with tufts of grass roots and had twice uncovered it again. The humidity in the cage was at saturation point. By 5:30 p.m. the 4th ootheca was almost completely extruded.

**Dec. 24** From 11 a.m. to 3 p.m. carrying a 5th egg pod which was a light red colour instead of the usual dark brown.

**Dec. 26.** Either the 4th or 5th pod had been eaten so the remaining one was removed to another cage to see if the eggs would hatch. They did not.

**Dec. 28.** A 6th pod had been laid overnight and covered with a sloping shelter alongside the paper shelter, of grass and roots.

**Jan. 2.** A 7th pod was banked up in a sort of lean-to up against the previous one.

**Jan. 5.** An 8th pod was deposited overnight, was partly covered with grass and

flour from the feed dish, and was placed in the corner alongside ootheca, No. 3.

**Jan. 12.** A 9th pod, placed with the Nos. 6 and 7, covered with an earthen coat.

**Jan. 16.** A 10th pod, besides the above, covered with foodstuffs, grass and earth. All these materials for covering had been carried two to three inches. Pod No. 8 was removed and examined and proved to be shrivelled up.

**Jan. 23.** The 11th pod, deposited overnight and covered with adobe alongside the above.

**Jan. 28.** Extruding a small pod.

**Jan. 30.** Pod No. 12, laid, not covered; eaten later the same day.

**Feb. 8.** Carrying a new pod, No. 13.

**Feb. 9.** Pod No. 13 deposited overnight, placed away from the others and covered with adobe.

**Feb. 20.** The 14th pod deposited alongside No. 13 on the floor, covered with adobe.

**Feb. 28.** Pod No. 15 deposited loose on the floor, not covered.

**March 5.** Carrying the 16th ootheca. Deposited it during the day and later covered it with adobe near Nos. 6 to 12.

**March 10.** The 17th egg pod, a very small one, was deposited and covered with adobe, at the hot end of the cage near the radiator, at the opposite side of the cage from all the others. Shortly after this the roach died. None of the eggs hatched.

We have here an unfertilized roach depositing 17 egg pods in exactly 100 days: she may have laid eggs before being confined in this cage. The egg laying averaged 1 pod every 6 days; most of them were covered with trash.

I find that the American roach also has this habit of covering her oothecae with trash and also of eating them now and then although supplied with an abundance of food and water.