greater than 0.2 for all four experiments; clearly there are no differences in emergence as a result of the treatments—nor was any shown during the course of the experiments.

Little is known about the period between the hatching of a larva from its egg and its emergence from one of the two openings. These results show that either of the cyst openings is as effective as the other, since there was no difference between neck- and vulva-sealed cysts, and that a single opening is perfectly adequate for hatching to occur at the 'normal' rate. Since during these experiments almost a hundred larvæ sometimes emerged from a single opening during 24 hr., this latter finding is most surprising. Evidently competition to emerge among hatched larvæ cannot be so great as was thought; moreover, it is clear that larvæ do not emerge from the cyst as a result of random movement.

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Resistance of the Spiny Boll Worm to Endrin in Israel

IN 1956 very poor control of the spiny boll worm (*Earias insulana* Boisd.) on cotton was obtained in the Beith She'an area in Israel with endrin, although in previous years this compound gave excellent control and is still highly effective in other parts of the country. No published report has come to our knowledge of endrin resistance of the spiny boll worm. However, it has been claimed that the cotton boll weevil has developed resistance to this compound¹.

Larvæ of the spiny boll worm were collected from cotton bolls from four localities in the Beith She'an and adjacent areas. Larvæ from Sachnin in the coastal plain, a place where unirrigated cotton was grown for the first time this year and has been treated only once with endrin, as well as larvæ from untreated okra (*Hibiscus esculentus*) plants served for comparison.

The larvæ were exposed in groups of ten to endrin deposits (from acetone solutions; 1 gm./sq.m.; 1 day old) in closed Petri dishes. Only results for

last-stage larvæ are reported, since in the untreated control dishes there occurred some mortality in earlier stages. However, results with all stages tested showed the same trend. Under the test conditions, there was no lethal gaseous effect of endrin during 18 hr.

In Table 1, experiments repeated on different days are summarized. After an exposure time of, for example, 5 hr., larvæ from four localities in the Beith She'an area were much less affected by endrin than those collected from the other sources. The observations do not permit of measurement of the exact degree of resistance which has obviously developed.

We wish to record that E. Rivnay (private communication), too, has suggested that the spiny boll worm may have developed resistance to endrin and has found this to be the case for adult moths tested.

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¹ Roussel and Clower, Louisiana Agric. Exp. Sta. Circ. 41, cited in *Agric. Chem.*, **10**, 64 (1955).

Pulsating Aeration of Microbial Cultures

Two difficulties are frequently encountered when it is desired to grow pathogenic bacteria with active aeration, namely, foaming and wetting of the exhaust filter. Chemical or mechanical foam-breaking and heating systems can be used to avoid these problems but have many disadvantages. I have used them mainly on large-scale equipment^{1,2}. However, it was found that a basically different approach had to be used for ordinary laboratory equipment. Since the method which has been developed may have wide applications, it will be described below.

The basic principle (see Fig. 1) involves the use of only one sterile filter (a), and air is forced back and forth through this. To start the cycle, air is sucked through the filter into the glass growth vessel (g) by a temporary vacuum above the culture. As this causes the glass bead valve (d) to close, the air must pass out into the culture from below. The big bubbles so formed are caught in an inverted beaker (i) which has a small hole drilled in its bottom. From this a continuous stream of small bubbles goes to the surface, where foam collects. Following the pulse of ingoing air, a water-ejector sucks air and foam out of the growth vessel through the valve (d). The foam collects in the conical vessel (c), from which the exhaust air goes out through the filter. The next

Table 1. MORTALITY OF LAST-STAGE LARVÆ OF THE SPINY BOLL WORM, EXPOSED TO 1 GM./SQ.M. ENDRIN DEPOSITS, 1 DAY OLD, ON PETRI DISHES t , 30–31° C.

Source	Previous endrin treatment	No. of larvæ tested	% Dead and paralysed larvæ after exposure indicated (hr.)										
			$\frac{1}{2}$	1	1½	2	2½	3	3½	4	4½	5	18*
Beith She'an Valley and adjacent area:	Sprayed systematically for the past three years at about 14-day intervals	57	0	5	10	23	21	25	28	28	33	35	53
		115	1	3	6	15	17	17	22	25	29	32	47
		24	0	0	4	17	21	21	21	21	21	21	59
		29	0	0	0	7	10	17	17	17	21	17	38
Other sources:	One spray only	97	0	16	34	62	72	74	72	76	80	84	97
	Untreated	50	20	40	64	74	86	90	94	96	98	98	100

* No mortality in controls from all localities.