

Table III. Results of Sex-linked lethal and induced crossing over experiments.

Pesticide	Sex linked lethal test					Induced crossing over test			
	% concentration	% emergence	No X chromosomes tested	No of lethals	% lethals	Cross over types	No of cross overs	Total scored	
Fenbar	1	0.00008	69.6	474	1	0.21	1 bw 1 cn bw	2	2047
	2	0.00008	58.3	-	-	-	2 dp b cn		
	3	0.00008	63.	-	-	-	1 bw 1 cn bw 1 dp b 1 b cn bw	4	2306
Endrin	1	0.002	59.3	230	1	0.43	-		
	2	0.003	64.0	-	-	-	-	-	-
	3	0.004	61.0	-	-	-	1 dp b	1	1285
Gamalin	1	0.001	60.0	405	2	0.50	4 bw 1 dp b cn	5	2246
	2	0.001	70.0	-	-	-	2 bw		
Deenol	1	0.0025	49.0	314	-	-	1 bw	2	2061
							1 dp b bw		
Nicotox	1	0.008	72.6	249	3	1.20	-	-	2081
Stam 34	1	0.035	52.0	240	2	0.83	-	-	1650
Control			98.0	381	2	0.52	-	-	4963

Postlethwait, J.H. University of Oregon, Eugene. Molting of *Drosophila* first instar larval cuticle induced by a metamorphosing host.

At metamorphosis third instar larval tissues degenerate. To find whether larval tissues of the first instar larva molt or degenerate during metamorphosis, the anterior thirds of first instar larvae were transplanted into ready to pupate hosts. As figure 1A shows, the implanted

first instar larval cells did not degenerate; rather they molted to produce second or third instar mouth hooks (see Table 1). In contrast, anterior thirds of first instar larvae when implanted into adult females only occasionally molted to form second instar mouth hooks and never molted twice to form third instar mouth hooks (Figure 1B and Table 1). Thus mouth hook molting in a metamorphosing host is due at least in part to the host's endocrine organs since more molts occur in a metamorphosing host than in a non-metamorphosing host.

To ascertain whether the implant's ring gland was responsible for sparing the epidermal cells from degeneration or whether this property was inherent in the cells themselves, first instar mouth hooks without brains or ring glands were implanted into metamorphosing or non-metamorphosing (adult) hosts. The results (Table 1) show that mouth hooks without first instar endocrine organs can molt repeatedly in a metamorphosing host. In one case (Figure 1C) we even observed a total of four pairs of mouth hooks which represents one more molt than occurs in situ. This may have been accomplished in a manner similar to the supernumerary molts found by Ždarek and Slama (1), who injected ecdysone into last stage fly larvae shortly after their molt. In the case reported here, the rapid succession of high ecdysone titers during metamorphosis may have elicited three molts from the first instar epidermis. Only fifteen percent of control mouth hooks implanted into adults molted once. These studies show that the ability to molt rather than degenerate is a property of the first instar epidermis rather than the immediate effect of the first instar brain-ring gland complex upon these cells.

The competence of the imaginal discs of the first instar larva to respond to the metamorphosing host by differentiation can also be studied in these experiments. In only seven percent of the transplants of anterior thirds of first instar larvae into mature third instar larval hosts was there any indication of differentiation of adult parts. In one case there

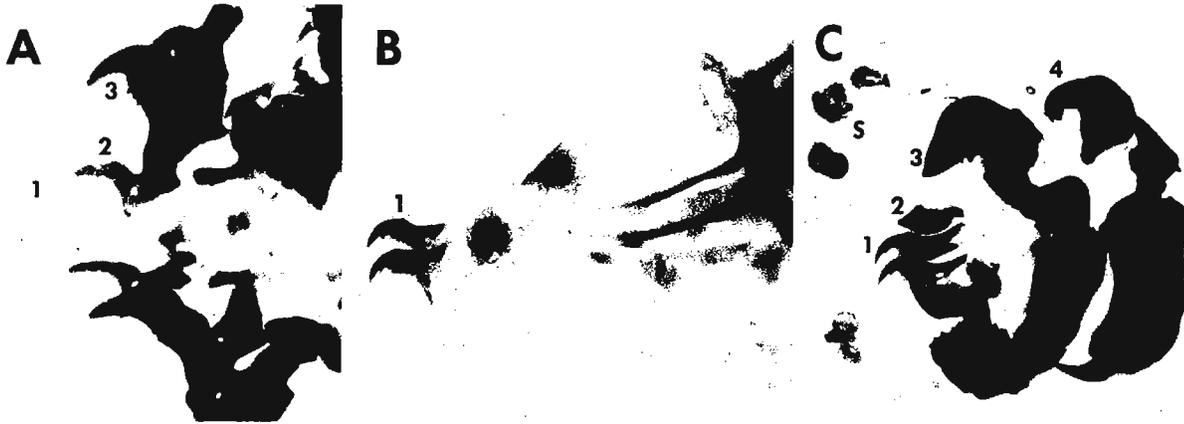


Figure 1. Response of first instar mouth hooks of *D. virilis* to metamorphosis.

A. Anterior third of a first instar larva transplanted into a ready to pupate host, and recovered from the adult after metamorphosis. Beside the original first instar mouth hooks are the second and third instar mouth hooks, showing that the tissue molted twice.

B. Anterior third of a first instar larva transplanted into an adult host, and recovered seven days later. Only the first instar mouth hooks are present, showing that no molting has occurred.

C. First instar mouth hooks transplanted into a ready to pupate host, and recovered from the adult after metamorphosis. Four pairs of mouth hooks have been formed, indicating three molts. 1,2,3, first, second and third instar mouth hooks; 4, supernummary mouth hooks; S, molted spiracles.

Table 1. Effect of a metamorphosing host on first instar mouth hooks of *D. virilis*.

Implant	Age of implant	Age of host	Number of recovered hosts	Number of implants in which the mouth hooks molted			Number of implants in which the imaginal discs metamorphosed
				once	twice	thrice	
Anterior third	First instar	Mature third instar	84	60 (72%)	8 (10%)	0	6 (7%)
Anterior third	First instar	Adult	26	5 (19%)	0	0	0 (0%)
Mouth hooks minus ring gland	First instar	Mature third instar	38	35 (92%)	13 (34%)	1 (3%)	-
Mouth hooks minus ring gland	First instar	Adult	20	3 (15%)	0	0	-

was a little eye pigment, in others there were only brown cuticular vesicles with no bristles or hairs. The overwhelming conclusion was that first instar discs lacked the competence to respond appropriately to the hormonal conditions of the metamorphosing host, as shown also recently by others (2-4). This work shows that neither first instar larval cells nor imaginal tissues have developed competence to respond to the hormonal conditions of metamorphosis.

References: (1) Zdarek, J. and K. Slama 1972, *Biol. Bull.* 142:350-359; (2) Gateff, E. 1972, Thesis, University of California, Irvine; (3) Mindek, G. 1972, *Wilhelm Roux Arch.* 169: 353-356; (4) Schubiger, G. 1973, in press.

Supported by a Rockefeller Foundation Grant to Professor C.M. Williams and NIH Grant GM 19307 to J.H.P.