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# DEMORPHOGENESIS OF MUSTARD APHID, *LIPAPHIS ERYSIMI* (KALT.) BY THE VAPOURS OF JUVENILE HORMONE ANALOGUES

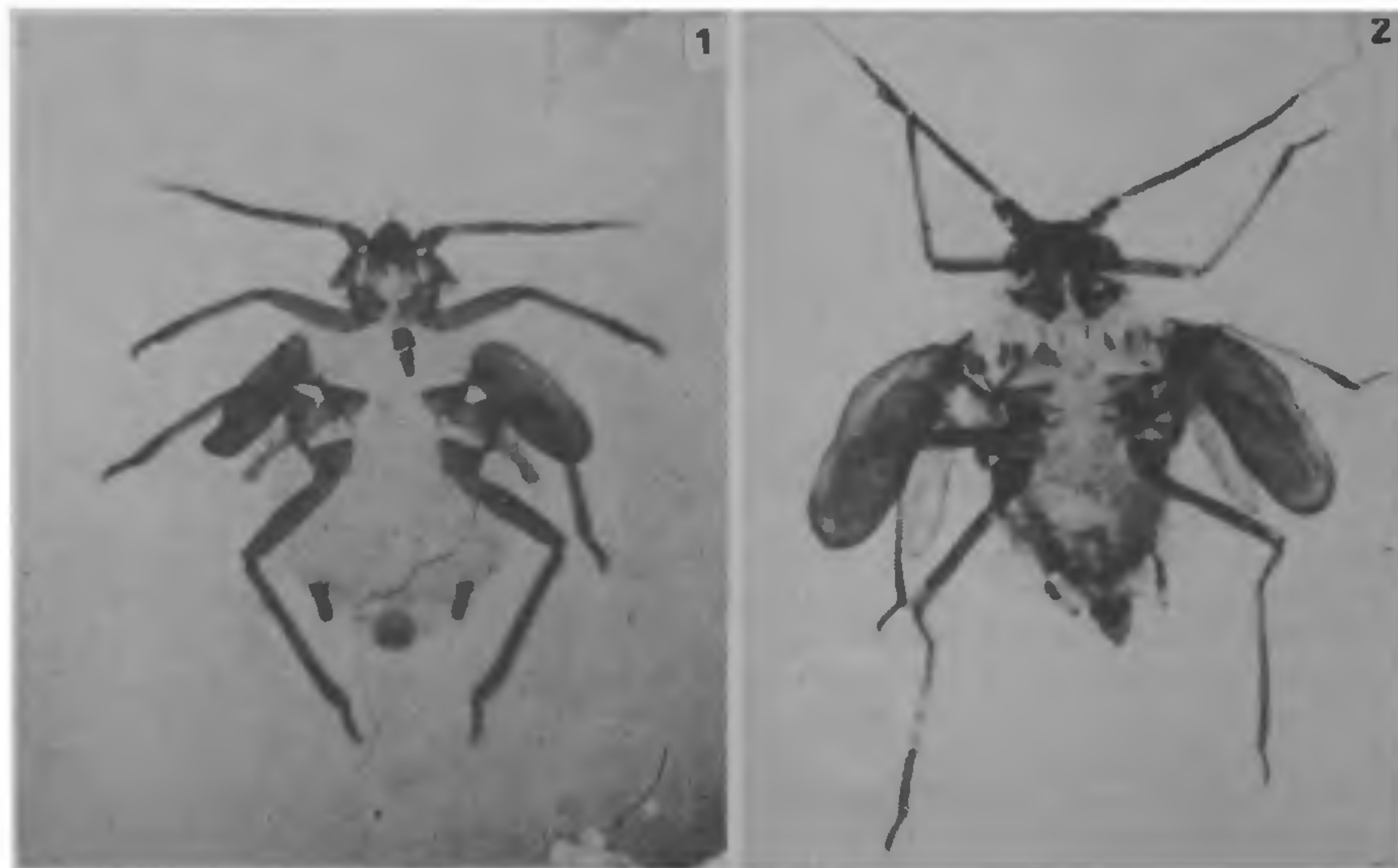
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THE application of juvenile hormone analogues (JHAs) to immature insects imparts demorphogenesis and the hemimetabolous insects at the penultimate-instar level are greatly affected by these chemicals<sup>1,2</sup>. However, information regarding the effectiveness of vapours of JHAs is available only for a few insects<sup>3,4</sup>. The effectiveness of the vapours of two

juvenile hormone analogues, R-20458 (6,7-epoxy-1-(p-ethylphenoxy)-3,7-dimethyl-2-octene) and ZR-512 (ethyl 3,7,11-trimethyl-2,4-dodecadienoate) to impart demorphogenesis to the mustard aphid, *Lipaphis erysimi* (Kalt.) exposed at the penultimate-instar level to the JHAs is reported.

The mustard aphid, *Lipaphis erysimi* (Kalt.) was reared on radish plants, *Raphanus sativus* L., grown in pots under cage conditions. Third-instar aphids (presumptive alatae) bearing miniature green wing buds were selected for the experiment. Filter paper discs were fixed to the bottom of crystallizing dishes (50 mm × 100 mm) and 0.5 ml of each concentration, (0.001, 0.01, 0.1 and 1%) of the JHAs (R-20458 and ZR-512) in acetone was applied to each disc using a one ml pipette. The filter paper discs under control were treated with 0.5 ml acetone per disc. A radish leaf with 25 to 30 third-instar aphids (presumptive alatae) was kept on the moist filter paper lying at the bottom of petri dish (15 × 155 mm). After 30 min of the treatment of filter paper discs, the crystallizing dishes were inverted over the leaves supporting test-insects so that their bottoms turned upwards to make the operation air tight. For each concentration of an analogue, there were three replications. The



Figures 1 and 2. 1. Normal fourth instar (presumptive alatae) of mustard aphid, *Lipaphis erysimi* (Kalt.), and 2. Nymphal-adult intermediate of mustard aphid, *Lipaphis erysimi* (Kalt.).

**Table 1** Relative degree of demorphogenesis in third-instar (presumptive alatae) mustard aphid, *Lipaphis erysimi* (Kalt.) after treatment with vapours of different concentrations of juvenile hormone analogues

Concentration	JHA	Number of deformed individuals				% deformed individuals
		A	I	SN	T	
0.001	R-20458	8	4	—	12	20.0
	ZR-512	12	6	—	18	30.0
0.01	R-20458	21	9	—	30	50.0
	ZR-512	7	17	4	28	46.7
0.1	R-20458	23	13	2	38	63.3
	ZR-512	7	21	9	37	61.7
1.0	R-20458	16	21	4	41	68.3
	ZR-512	3	26	16	45	75.0
Control	—	—	—	—	—	—

Total number of insects treated in all the cases was 60. A, Adultoids; I, Nymphal-adult intermediates; SN, Supernumerary nymphs; T, Total number of deformed individuals; —, No morphogenetic effect as detailed in the heading of column.

test-insects were exposed to the vapours of the JHAs for 12 h and were then removed to the crystallizing dishes containing fresh radish leaves as food. Twenty insects from each replicate were selected to study the effect of the JHAs' vapours on morphogenesis of the aphid.

Vapours of both the JHAs affected the morphogenesis of the aphid. Among abnormal individuals were adultoids, nymphal-adult intermediates and supernumerary nymphs. The adultoids differed from normal alate adults in having curled, often crumpled and twisted wings and were devoid of power of flight. The nymphal-adult intermediates were relatively more juvenile in appearance than adultoids but differed from normal fourth-instar aphids (presumptive alatae) in having elongated sclerotized wing pads and pterothorax with a few sclerotized stripes (figures 1 and 2). The genital openings of 40% intermediates were found totally occluded and they died within 10 days of the last-moulting under congestion of developing young ones. In a few of such individuals the abdominal walls got ruptured under the pressure of developing embryos and young ones. The supernumerary nymphs, formed after one additional moult, bore highly sclerotized wing pads and a few sclerotized stripes on the pterothorax. The genital openings and subgenital plates were not developed and this inhibited parturition.

Table 1 shows that ZR-512 has an edge over the second JHA, R-2045B as regards the production of highly juvenilized individuals, i.e. supernumerary

nymphs. Only 4 supernumerary nymphs resulted after treatment of 60 aphids with the maximum dose at 1% R-20458 whereas four times more, (i.e. 16 supernumerary nymphs) were formed after treatment of the aphid with ZR-512 at the same concentration. Increase in concentrations of both the JHAs resulted in increased production of nymphal-adult intermediates and supernumerary nymphs. However, in overall effect, the two JHAs do not seem to differ.

Similar types of demorphogenesis after treatment with the vapours of JHAs were also reported in other aphids, i.e. *Acyrtosiphon pisum* (Harris), *Amphorophora agathonica* (Hottes) and *Myzus persicae* (Sulger<sup>3,4</sup>). The inference that the aphids exposed to the vapours of the JHAs could not lay offspring also hold good for the nymphal-adult intermediates (with occluded genopores) and the supernumerary nymphs produced in the present investigation on treatment of the mustard aphid with vapours of the two JHAs.

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### A NEW RECORD OF SPIDERS AS PREDATORS OF SORGHUM SPIDER MITE *OLIGONYCHUS INDICUS* (HIRST) (ACARI: TETRANYCHIDAE)

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THE mite *Oligonychus indicus* (Hirst) is one of the important spider mite pests of sorghum (*Sorghum bicolor* (L.) Moench) and many insect natural enemies have been recorded on it although spiders are rarely viewed as natural enemies of this important pest<sup>1</sup>. However, such observations on other phytophagous mites are available like spiders feeding on *Panonychus ulmi* Koch on apple<sup>2</sup> the species of spiders belonging to Microphantidae feeding on *O. punicae* (Hirst) on avocado<sup>3</sup> and spiders *Philodromus* sp. and *Theridion murarium* (Emerton) on spider mites of peaches<sup>4</sup>.

During our investigation (1982–85) at the Main Research Station, University of Agricultural Sciences, Dharwad, Karnataka, on the population dynamics of *O. indicus* in relation to its natural enemies and weather parameters apart from insects, five species of spiders were observed in the clasping leaf sheaths of mite susceptible sorghum variety TAM-2566. They were found to move out of their hiding during cooler hours and feed on all the stages of mite. In the laboratory when each species of the spider was confined to cages containing sorghum leaf infested with mites, they were found to feed readily on all stages of the mite. The spiders were identified as *Uloborus* sp. (Uloboridae), *Argyrodes* sp. (Theridiidae), *Theridula* sp. (Theridiidae), *Theridion* sp. and *Cheiracanthium* sp. (Chebionidae) which forms a new record.

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## ANNOUNCEMENT

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