were reported in pearl millet[1-3], barley[4], *Triticum monococcum*[5] and also in pea[6].

The small size of chromosomes in the mutant was probably due to highly unequal exchange of segments. Moreover, bivalent with larger chromosomes (interchanged), the counterpart of the smaller ones, was not observed at MI as they were most likely involved with multiple interchange.

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PHOSPHOHEXOSE ISOMERASE AND ALDOLASE ACTIVITIES OF SERUM AND MUSCLE TISSUE IN *TRICHINELLA*-INFECTED ALBINO RATS AT DIFFERENT PERIODS OF POSTINFECTION

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TRICHINOSIS has been recognised as one of the important meat-borne helminthic zoonoses. A tentatively calculated 27 million cases of trichinosis in the world presents a serious challenge to meat hygienists and epidemiologists and parasitologists[1]. The present authors, while studying the effects of different chemotherapeutic agents in trichinella-infected rats[2], noted a mild to moderate alteration in the levels of some glycolytic enzymes of host tissues. This finding prompted us to study two key glycolytic enzymes, namely phosphohexose isomerase (PHI) and fructose 1,6-diphosphate aldolase (aldolase) in the serum and muscle tissue of host animals at different periods of this parasitic infection.

Forty eight male albino rats (inbred in our laboratory) weighing between 50 and 60 g were divided into two groups of 24 each, as control or non-infected (C) and infected (T). Animals of T group were infected with *Trichinella spiralis* larvae following the procedure

Table 1 *PHI and aldolase activities of serum and muscle tissue of trichinella-infected albino rats at different periods of postinfection.*

Days of postinfection	PHI activities				Aldolase activities			
	Control (C)		Infected (T)		Control (C)		Infected (T)	
	Serum (unit/ml)	Muscle (unit/mg protein)	Serum (unit/ml)	Muscle (unit/mg protein)	Serum (unit/ml)	Muscle (unit/mg protein)	Serum (unit/ml)	Muscle (unit/mg protein)
2	5.6 ± 0.4	3.5 ± 0.2	6.1 ± 0.7	4.0 ± 0.4	3.8 ± 0.2	6.2 ± 0.3	5.1 ± 0.4	6.5 ± 0.8
5	4.9 ± 0.4	3.9 ± 0.4	5.9 ± 0.8	5.1 ± 0.5	3.9 ± 0.2	6.2 ± 0.4	4.2 ± 0.3	7.6 ± 0.7
13	6.2 ± 0.8	3.5 ± 0.5	10.2 ± 0.9^{a}	6.5 ± 0.4^{b}	4.6 ± 0.3	5.4 ± 0.3	6.2 ± 0.2^{a}	9.5 ± 0.4^{d}
21	7.2 ± 0.4	4.1 ± 0.4	15.5 ± 1.2^{b}	7.2 ± 0.4^{b}	4.3 ± 0.3	6.1 ± 0.3	9.3 ± 0.7^{b}	12.2 ± 0.6^{d}
28	5.9 ± 0.7	3.5 ± 0.4	16.8 ± 1.0^{d}	10.1 ± 0.5^{d}	3.1 ± 0.4	6.5 ± 0.3	11.2 ± 1.0^{d}	18.3 ± 1.2^{d}
35	8.1 ± 0.3	3.7 ± 0.4	17.9 ± 1.2^{d}	12.0 ± 0.9^{d}	4.4 ± 0.2	5.9 ± 0.3	12.1 ± 0.8^{d}	19.5 ± 1.4^{d}
50	6.6 ± 0.4	3.9 ± 0.4	18.4 ± 1.3^{d}	13.5 ± 1.2^{d}	4.2 ± 0.3	5.2 ± 0.4	12.8 ± 1.2^{d}	20.7 ± 1.2^{d}
60	5.8 ± 0.4	4.0 ± 0.4	18.6 ± 1.5^{d}	15.1 ± 1.1^{d}	3.9 ± 0.3	6.3 ± 0.3	13.4 ± 1.0^{d}	20.8 ± 1.3^{d}

Values are mean ± S E. of three values. Values are significantly different from those for the corresponding controls (student's 't' test): $^{a}P < 0.05$; $^{b}P < 0.01$; $^{d}P < 0.001$.

described earlier[2]. The animals were individually caged and maintained on standard laboratory diet[3] and water *ad lib* until experimentation. Three infected animals were sacrificed at a time on 2, 5, 13, 21, 28, 35, 50 and 60 days of postinfection along with controls side by side. Blood and muscle tissues were collected for PHI[4] and aldolase[5] estimation.

PHI and aldolase activities of serum and muscle tissue of infected host at different periods of postinfection and those for the corresponding controls are shown in table 1. It is evident from the present results that at the early stage of postinfection both the PHI and aldolase activities of serum and muscle tissue remained unchanged which may be explained on the ground that at this stage invasion of parasitic larvae into the muscle did not occur. At the later days of postinfection a large number of growing parasites settled into the sketal muscle and probably myofibrils are dearranged[6]. It seems likely that due to this, permeability of muscle cell membranes are increased as a result of which the intracellular enzymes are being released. So the concentration of these enzymes increases not only in the muscle tissue but also on the serum level. Increased enzyme levels in the muscle tissue may be due to enhanced aerobic glycolysis for the metabolism of carbohydrates through Embden-Myerhoff pathway by the nematodes. There is almost a linear correlation between the days of postinfection and enzyme concentrations. This may be due to increased number of parasites in the muscle tissue with the days of postinfection.

We finally conclude from the present work that the measurement of PHI and aldolase activities at different periods of trichinella infection are also of considerable significance for the diagnosis of severity in trichinosis, which is yet to be studied.

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INHIBITION OF GROWTH AND TOXIN PRODUCTION BY LAURIC ACID DERIVATIVES IN *ASPERGILLUS* SPECIES

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SEVERAL approaches[1-3] have been suggested to protect foods and feeds from mold growth and toxin production. One of them is to preserve the food materials with food-grade chemicals which appear to be safe because of their non-toxic nature to the consumer. Reports are available showing the inhibition of growth and toxin production by some fatty acid derivatives[4], antioxidants[5] and certain natural substances; like lauricidin (a monoglyceride of lauric acid) and butylated hydroxy anisole.

The monolaurin derivatives of lauric acid *viz* lauricidin-012, lauricidin-812 and lauricidin-1012 are considered as generally recognised as safe (GRAS) chemicals. The efficacy of these compounds as antifungal agents and toxin inhibitors is not known. Their efficacy as antifungal agents was therefore studied with special reference to three toxigenic *Aspergillus* species of *A. flavus*, *A. ochraceus* and *A. versicolor* (isolated from maize) which produced alfatoxin, ochratoxin and sterigamatocystin, respectively[6]. These were grown on sterilized chemically defined media[7-9], maize grain and maize flour, the latter two usually found naturally contaminated with these fungi and toxins.

Each test compound was incorporated at various concentrations in the above growth substrates and were inoculated with 1 ml of spore suspension of the test organism containing 10^5 spores. These were incubated for 8, 10 and 14 days, at which optimal growth and toxin were recorded for *A. flavus*, *A. ochraceus* and *A. versicolor* respectively. After the incubation period, dry weights of the mycelial mats were taken by separating the mycelial growth from the liquid phase and drying them at 100°C for 24 hr. Fungal growth on the two solid substrates (maize and its flour) was estimated biochemically by assaying the