LETTER

COMPARATIVE ACTIVITIES OF SUCCINIC AND GLUTAMIC
DEHYDROGENASES OF TAIL, DORSUM AND HIND
LEG MUSCLES DURING NORMAL
METAMORPHOSIS OF *RANA*
CATESBIANA

To the Editors:

During the period of metamorphosis of *Rana catesbiana* and *Rana pipiens*, features of the cell outgrowth from muscle explants are markedly different with muscles from three body regions, *i.e.*, tail, dorsum and hind leg (Niizima, 1956). With tail muscle, cell proliferation is very slight and takes place at a much slower rate. Differentiation of fibroblasts and myoblasts does not occur in the culture of tail muscle. On the other hand, it was demonstrated that activity of succinic and glutamic dehydrogenases of tail muscle of *Rana japonica* decreased considerably prior to the beginning of its resorption, without showing any observable change in proteolytic enzyme activity (Yamamoto and Suzuki, 1957). The same was the case with *Rana catesbiana*; decreases in activity of succinic and glutamic dehydrogenases were 20% and 40% respectively between the stages of metamorphosis 10 and 15. (Developmental stages of tadpoles were identified after Nonaka, 1951). Following up these observations, a comparative study on the activity of these dehydrogenases of muscles from the three regions was undertaken.

Muscles of tail, dorsum and growing hind legs were excised from a *Rana catesbiana* tadpole at the 15th stage of development, and each of them was homogenized with water in 2% using a whole-glass homogenizer. Employing appropriate amounts of the homogenate after centrifuging at 2,000 r.p.m. for 2 mins., succinic and glutamic dehydrogenases were assayed as described before (Yamamoto and Sugisawa, 1957). The table shows comparative activities of the

Tadpole No.	Morphological index of metamorphosis		Substrate	Per cent activity of dehydrogenase 1)		
	A2)	B3)		Tail	Muscles from Leg	Dorsum
1	2.3	0.60	Succinate	100	104	—
			Glutamate	100	114	—
2	2.4	0.58	Succinate	100	134	—
			Glutamate	100	142	—
3	2.6	0.55	Succinate	100	—	78
			Glutamate	100	—	78
4	1.5	0.63	Succinate	100	—	75
			Glutamate	100	—	48

1) In 10 experiments, activities of succinic and glutamic dehydrogenases averaged 25.5 and 52.5 units/10 mg wet tissue/hr. respectively

2) Body length/Hind leg length (Yamamoto and Suzuki, 1957)

3) Hind leg length/Tail length (Dolphin and Frieden, 1955)

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two enzymes. Enzyme activities were considerably lower in the tail than in growing legs, and higher than in dorsal muscles.

Results obtained here and cited above appear to suggest the mechanism of tail resorption as follows. During or just before the onset of metamorphosis, tail tissue lowers its ability to differentiate new muscle fibers and the proteolysis continues unchanged, resulting in the resorption of the tail. Amino acids produced are absorbed without suffering from rapid breakdown, due to the decreased activity of oxidative enzymes such as glutamic and succinic dehydrogenases, and utilized effectively within the tadpole body. The fact, that these enzymes in the tail are kept more active than in the dorsal muscle, might show that the resorption of the tail is a physiological process, but not a degenerative one.

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THIOUREA-INDUCED PRECOCIOUS GERM CELL DIFFERENTIATION IN FROG LARVAE

To the Editors:

Effects of thiourea on the gonads of anuran larvae are of some interest in the studies on the endocrine correlation in the hypophysis-thyroid-gonad system. As reported in the previous paper (Iwasawa, 1955), the gonadal differentiation of *Rhacophorus schlegelii* tadpoles treated with a 0.025% solution of thiourea was slightly retarded in both external appearance and histological picture as compared with that of the controls at the time of their metamorphosis. Three weeks later, the testes of nearly half of the tadpoles whose thiourea treatment was initiated at a relatively later stage of development transformed into ovoid form, and on histological examination, it was revealed that the seminiferous tubules were developing and the germ cells in the different stages of development, *i.e.*, spermatogonia, primary spermatocytes and secondary spermatocytes were differentiating. The development of the gonad is naturally influenced by genetic and environmental factors, and therefore the progress of gonadal development is more or less

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