of only 1 NOR, this specimen cannot be regarded as heterozygous for this region, since the relationship between functionality of the nucleolus organizers and their visualization induced by the ammoniacal silver staining technique must be further verified.

T. cristatus carnifex seems to share the above-mentioned features. When its chromosomes are treated by the AS-SAT technique, the 2 NORs (subterminally on the short arm of chromosome VI, and, in intercalary position, on the short arm of chromosome IX[10-12]) clearly show a black coloration; some AS-SAT additional sites are also evident, for instance on chromosome XII (figure 2,d).

The procedure proposed by Howell et al.[2] for humans, thus appears to be of cytotaxonomic interest in Salamandrids, since the technique is particularly effective in revealing the number and localization of NORs, and of possible additional sites, in those species where they are still unknown.

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An empirical relationship between the prey density and predatory efficiency of *Gambusia affinis*

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Summary. Larval density of Culex fatigans essentially influences the predatory rate of the mosquito-fish Gambusia affinis. The feeding rate of the fish gradually increases up to a maximum value at intermediate prey densities beyond which there is an asymptotic saturation in the feeding rate. The relationship is represented by an empirical equation which helps in the prediction of the ideal stocking rate of the fish in natural systems.

It is well known that predation by the fish Gambusia affinis alters the number and composition of populations of mosquito larvae[1]. In a predator-prey system, the functional responses of either species are considerably influenced by the properties of the other component[2]. Early theories of trophic ecology are based on the assumption that predatory rates are proportional to prey abundance[3]. Such assumptions have little significance in forecasting the success of predation as well as the stocking rate of the predator in natural systems. So far, workers in the field of larvivorous control of mosquitoes have taken the area of the habitat as an index for stocking predatory fishes[4]. More important than this, would be the study of interrelationship between the predator-prey properties, to arrive at the ideal stocking rate of the biological control agent. The present paper elucidates the influence of density of Culex fatigans larvae on the predatory rate of G. affinis.

Material and methods. Gambusia affinis collected from the Bellandur tank (near Bangalore) were grouped into males, non-gestating females and gestating females depending on their sex and physiological state. 5 individuals of similar body weights (male: 151.3 ± 12.94; non-gestating female: 160.3 ± 7.07 and gestating female: 249.2 ± 11.94 mg) were selected from each group and kept in separate aquaria (surface area: 625 cm^2) containing 1 l of aerated freshwater. The fish were starved for 3 days prior to the start of the experiment to elicit hunger in them[5]. The prey consisting of live 4th instar Culex fatigans larvae, were offered to these experimental individuals in different densities (5, 10, 25, 50, 75, 100, 125, 150 larvae/625 cm^2). The fish in each group/at each density level were allowed

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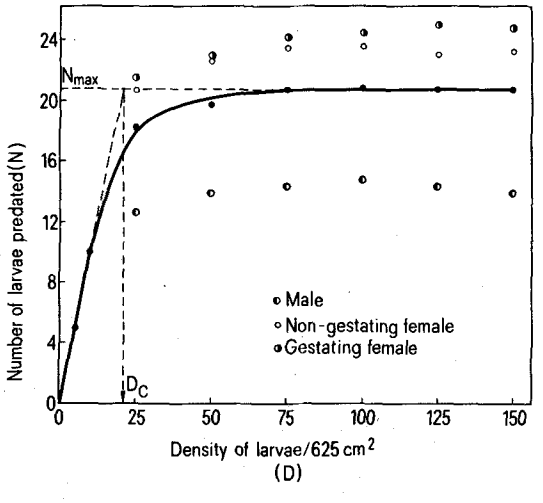

Fig. 1. Relationship between the density of 4th instar Culex fatigans larvae and the predatory efficiency of Gambusia affinis.

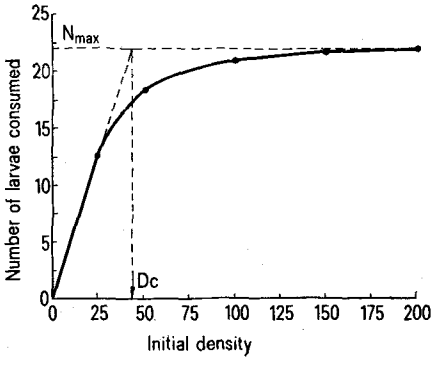

Fig. 2. Predatory efficiency of Mesogomphus lineatus at different larval densities[7].

Influence of larval density on the predatory rate of Gambusia affinis

	Density of larvae offered/625 cm²							
	5	10	25	50	75	100	125	150
Male	5.0 ± 0.00	10.0 ± 0.00	12.6 ± 4.08	13.8 ± 2.45	14.5 ± 2.29	14.8 ± 3.02	14.3 ± 1.04	14.0 ± 0.76
Female non-gestating	5.0 ± 0.00	10.0 ± 0.00	20.7 ± 3.25	22.7 ± 3.62	23.5 ± 3.90	23.6 ± 3.60	23.0 ± 1.24	23.3 ± 0.95
Female gestating	5.0 ± 0.00	10.0 ± 0.00	21.5 ± 3.94	22.8 ± 2.54	24.2 ± 1.55	24.5 ± 2.30	25.1 ± 0.78	24.9 ± 1.32

to predate for 10 h/day. All the experiments were conducted at a temperature of 25 ± 2 °C. The experiments in each series were repeated on 3 successive days and hence the performance of 5 individuals yielded a total of 15 observations in each series.

Results and discussion. The table represents the influence of density of 4th instar Culex fatigans mosquito larvae on the predatory rates of male, non-gestating and gestating female Gambusia affinis. From this it is evident that the fish consumed all the larvae when the prey density was 5 or 10. With further increase in density of larvae to 25/625 cm², neither male nor female fish predated all the larvae. This trend remained unaltered at further density levels. However, there was a significant difference between the predatory rates of males to females. Male G. affinis consumed a lower number of larvae as compared to the female, and this pattern of feeding remained unaltered at densities from 25 to 150 larvae/625 cm². The lower intake of males may be attributed to the smaller body weight of the male G. affinis (Katre[6]). It is also clear from the table that increase in density level beyond 25 larvae/625 cm² did not markedly alter the predatory rates of either male or female fish. Ware[3] has also reported a similar predatory behaviour in the rainbow trout (Salmo gairdneri) in relation to the density of Cragonyx and Hyalella.

Figure 1 illustrates the average predatory rate of male, non-gestating and gestating Gambusia affinis at the different prey density levels. Larval densities of 5, 10, etc., markedly increase the predatory rate of G. affinis till a critical density (which in the present study is 23 larvae) is reached. Beyond this density level, the curve tends to flatten out and reaches an asymptote indicating that there is no marked change in the predatory rates of fish with further increases in prey density. This type of predatory behaviour of G. affinis can be represented by an empirical equation:

$$N = \frac{N_{max}}{\sqrt{1 + K\left(\frac{Dc}{D}\right)^2}}$$

where:
N = Number of larvae predated at any density D,
N_{max} = Maximum number of larvae predated,
K = Experimental constant (0.75),
and Dc = 'Critical density' beyond which the predatory pattern of the fish becomes independent of larval density.

Under laboratory conditions, when fed on 4th instar Culex fatigans larvae, the dragonfly nymph Mesogomphus lineatus was also reported to display a similar relationship with the prey densities[7]. The data obtained for M. lineatus by Mathavan[7] is plotted in figure 2. It may be seen that the present empirical equation obtained for G. affinis fits the data of Mathavan[7] on M. lineatus very well, indicating that the predatory behaviour of M. lineatus in relation to the prey density remains similar to that of G. affinis.

With the help of the proposed model, at known values of N_{max} and Dc, it is possible to predict the stocking rates of the biological agents for successful control of mosquito larvae in natural systems.

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Difference between frog and toad tadpoles in response of the keratinizing epidermis of the oral region to excess of vitamin A

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Summary. Rearing of the tadpoles of the frog, *Rana breviceps*, in solutions containing 2.5, 5, 7.5, 10 and 15 IU/ml vitamin A palmitate resulted in reduction or complete disappearance of the keratinized epidermal material over the jaws and of the horny labial teeth. The tadpoles of the toad, *Bufo andersonii*, however, were not affected in this way at all by exposure to even 20 and 30 IU/ml vitamin A in the rearing medium.

The role of vitamin A in differentiation and maintenance of epithelia as mucoid or keratinizing type is well known. Deficiency of this vitamin results in mucoid epithelia becoming keratinized, whereas its excess inhibits keratinization and induces mucous metaplasia and hyperplasia in epidermis and other epithelia[1–4]. However, investigations of this nature have been concerned mainly with avian and mammalian tissues, and the possible role of this vitamin in epithelial differentiation in lower vertebrates has remained neglected. In the amphibian larvae at least, vitamin A excess is reported to promote hyperplasia of the mucosal cells of the intestine. Feeding of large amounts of this vitamin to Xenopus laevis tadpoles was found to increase the number of goblet cells in the intes-