Table 3 *Heart beat per minute of the adultoid larva and extra larval instar produced after juvenoids and precocene-II treatments in the diapausing larvae of S. incertulas*

Chemical	Dose (μg/ individual)	No. of Individuals studied	Mean ± S. E. (range)
Adultoid larva			
Hydroprene	10	10	12.44 ± 1.28 (10.00 – 13.63)
Significance			$P < 0.001$
Methoprene	10	10	10.15 ± 1.37 (9.00 – 12.76)
Significance			$P < 0.001$
Extralarval instar			
Hydroprene	100	15	19.90 ± 4.66 (16.21 – 27.77)
Significance			$P < 0.001$
Methoprene	100	15	18.77 ± 3.62 (14.28 – 23.07)
Significance			$P < 0.001$
R = CH_3; R′ = C_2H_5	100	14	13.18 ± 1.98 (10.00 – 16.21)
Significance			$P < 0.001$
	50	15	16.15 ± 2.19 (13.33 – 20.00)
Significance			$P < 0.001$
Precocene-II	150	10	14.26 ± 1.41 (12.50 – 16.48)
Significance			$P < 0.001$
	100	10	24.72 ± 2.17 (22.00 – 27.27)
Significance			$P < 0.001$
	50	15	33.13 ± 1.67 (30.00 – 35.00)
Significance			$P < 0.001$

The juvenilizing property of precocene-II in differentiation and morphogenesis has earlier been found in *Corcyra cephalonica*[8]. Further, methoprene is more effective than hydroprene in reducing the rate of heart beat in adultoid larvae and extralarval instars of *S. incertulas*. This is possible because hydroprene degrades more rapidly than methoprene[9]. On the whole, the rate of heart beat shows drastic reduction in developmentally intermediate forms formed after early diapause breaking due to the application of juvenoids and antiallatotropin precocene-II in diapausing larvae of *S. incertulas*.

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RELATIVE IMPORTANCE OF TEMPERATURE AND PHOTOPERIOD IN THE PHYSIOLOGY OF INDIAN GARDEN LIZARD, *CALOTES VERSICOLOR*

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The literature on environmental control of molting and O_2 consumption in reptiles are scanty[1,2]. Particularly studies on effect of photoperiod on the physiology of reptiles are almost lacking. In the present study an attempt has been made to study the

relative importance of temperature and day length, if any, on scale shedding and on whole body O_2 consumption of the Indian garden lizard, *Calotes versicolor*.

During the month of June, adult male *Calotes* were captured from nature (Varanasi, Lat. 25° 18' N: Long 83° 1' E) and were acclimatized in constant laboratory conditions for a week. These were then divided into 6 groups of 10 each. Initial body weight of all the animals were recorded. Groups 2, 3 and 4 were treated with 6 hr light and 18 hr dark (6L : 18D); 12L : 12D; 16L : 18D, respectively. Temperature of all the light boxes was maintained at 27° ± 1°C. Groups 5 and 6 were exposed to 15°C and 37°C, respectively in isothermal cabinets maintained at 12L : 12D photoregim. The remaining group (Group-1) receiving natural day length (NDL) and room temperature (27° ± 1°C) served as control. Experiment was continued for 15 days. All the animals were provided with live maggots and water *ad libitum* throughout the course of study. On the last day final body weight of all the animals was noted. Scale shedding and whole body O_2 consumption were studied by following the earlier methods[3,4]. Students *t* test was used for data analysis[5].

A significant decrease in whole body O_2 consumption ($P < 0.001$, as compared to control) and a cessation in scale shedding were observed in low temperature (15°C) treated lizards. In the lizards exposed to high temperature (37°C), O_2 consumption was significantly enhanced ($P < 0.001$) and scale shedding was almost normal. No significant change in these two processes was observed in animals treated with different photoregims and constant temperature (27 ± 1°C), although short photoperiod (6L : 18D) decreased the processes to some extent.

These results clearly indicate that temperature plays a more prominent role than day length in regulating scale shedding and O_2 consumption of *C. versicolor*. Involvement of temperature in physiology of reptiles has been demonstrated in some other lizards too[6–9] where metabolic effects were observed only around 30°C and above. In geckos, shedding cycle is closely dependent on temperature[10]. Most of these studies, however, did not control the day length and thus failed to recognize which of the factors was primarily involved in regulation of the process. In the present study for the first time the importance of day length in reptilian metabolism was considered. Results of the artificial photoperiodic treatment revealed that day length plays very little or no role in whole body respiration and molting processes of *C. versicolor*. Although a decrease in these two processes was observed in 6L : 18D lizards, effects were not significant. Thus temperature was found more effective than photoperiod in regulating the physiology of this lizard. Interestingly when the seasonal scale shedding and respiration of this animal were studied in relation to fluctuating environmental temperature and photoperiod in nature[3], it was observed that the scale shedding ceases and O_2 consumption decreases in

Table 1 *Effect of photoperiod and temperature on body weight, scale shedding and whole body respiration of Calotes versicolor*

Parameters / Groups		Body weight in grams: Initial	Body weight in grams: Final	Total number of scales molted	O_2 Consumption in ml/g b.wt/hour
NDL + room temp. (control)		30.35 ± 0.32	28.55 ± 0.98	8.75 ± 1.79	0.43 ± 0.04
Room Temperature +	6L : 18D	28 2 ± 1.76	25.02 ± 1.70	4.75 ± 1.25	0.37 ± 0.05
	12L : 12D	23.55 ± 1.20	21.62 ± 1.22	9.5 ± 2.64	0 44 ± 0.02
	15L : 9D	23.64 ± 0.93	20.5 ± 0.93	8.66 ± 1.21	0.53 ± 0.09
12L : 12D +	15° ± 1°C	27.43 ± 0.72	26.33 ± 0.44	Nil	0.098* ± 0.019
	37° ± 1°C	37 6 ± 2.19	36.64 ± 2.29	7.5 ± 0.6	1.36* ± 0.22

* $P < 0.001$, compared to the control value.

winter when the animal experiences very low environmental temperature. The reverse is found true in summer. These observations are parallel with the results obtained in the present experiment after artificial exposure to different day lengths and varying temperatures.

The effect of temperature on physiology of this lizard is mediated either directly or indirectly through thyroid gland. In fact, thyroid hormones are well known for their involvement in physiology of reptiles[2,11,12]. However, the effects of thyroid hormones were observed only around 30°C. High levels of circulating thyroid hormones have also been reported in *C. versicolor* during winter. These observations lead the author to assume that the effect of temperature in this lizard is a direct one. However, further research is required to know in detail the mode of action of temperature in the physiology of reptiles.

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PROTECTION AGAINST *PLASMODIUM BERGHEI* IN RATS BY IMMUNIZATION WITH ADULT WORM HOMOGENATE OF *SETARIA CERVI*

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SUCCESSFUL vaccination against *Plasmodium berghei* has been achieved by using antigens prepared from sporozoite, asexual blood or gametocyte stages of the plasmodial life cycle[1]. Vaccination with non-protozoal agents has been reported to protect mice non-specifically against *P. yoelii* and *P. vinkei*[2,3]. This paper presents the results of experiments in which the albino rats were immunized with a homogenate of adult male and female worms of *Setaria cervi*, bovine filariid worm, before challenging them with 1×10^6 parasitized RBC of *P. berghei*.

Male inbred albino rats, 4–5 week old, were first immunized with *S. cervi* homogenate. The homogenate was prepared according to earlier studies[4]. The homogenate was emulsified with an equal volume of Freund's incomplete adjuvant. Sensitizing injections were given intraperitoneally on one or two occasions seven days apart. Control injections were made using a saline adjuvant emulsion.

Rats were challenged with a lethal dose of 1×10^6 parasitized RBC of *P. berghei* intraperitoneally 15 days after the last sensitizing injection. The results were expresed as the proportion of rats surviving 60 days after challenge. The mortality data were analyzed by application of χ^2 test with Yate's correction (1 tail) method.

Hundred per cent mortality was observed in non-immunized rats with a challenge dose of *P. berghei*. Immunization with homogenate of female worms appeared to be more protective than the male homogenate. The pooled data reveal that the survival of female homogenate-treated rats 31/60 (51.67%) was significantly greater ($P < 0.05$) than the male homogenate-treated rats 21/60 (35.0). The