cyclic AMP increased the percentage of mitotic cells in rat bone marrow *in vivo*[8], a non-specific amplification of the antigenic message is perhaps a better explanation. Cyclic AMP is known to mediate differentiated functions of cells[9]. In fact, isoproterenol, epinephrine and aminophylline were reported to stimulate the overall synthesis and secretion of immunoglobulins in human peripheral lymphocytes[10]. It is possible that cyclic AMP had amplified the secetory rate and/or the formation of anti-sheep red blood cell antibody. Since the function measured here represents protein (antibody) synthesis, the possibility exists that cyclic AMP could have affected the general steps such as uptake of precursor aminoacids, (messenger?) RNA synthesis, faster aminoacid assembly or secretion rate of proteins, etc. Moderate stimulation of RNA synthesis[11] and DNA synthesis[4,12] have been recorded before. Preliminary experiments showed that cyclic AMP can stimulate the incorporation of ^{3}H-lysine in human peripheral lymphocytes. Further experiments are required to understand the biochemical basis of modulating effect of cyclic AMP on the immune system.

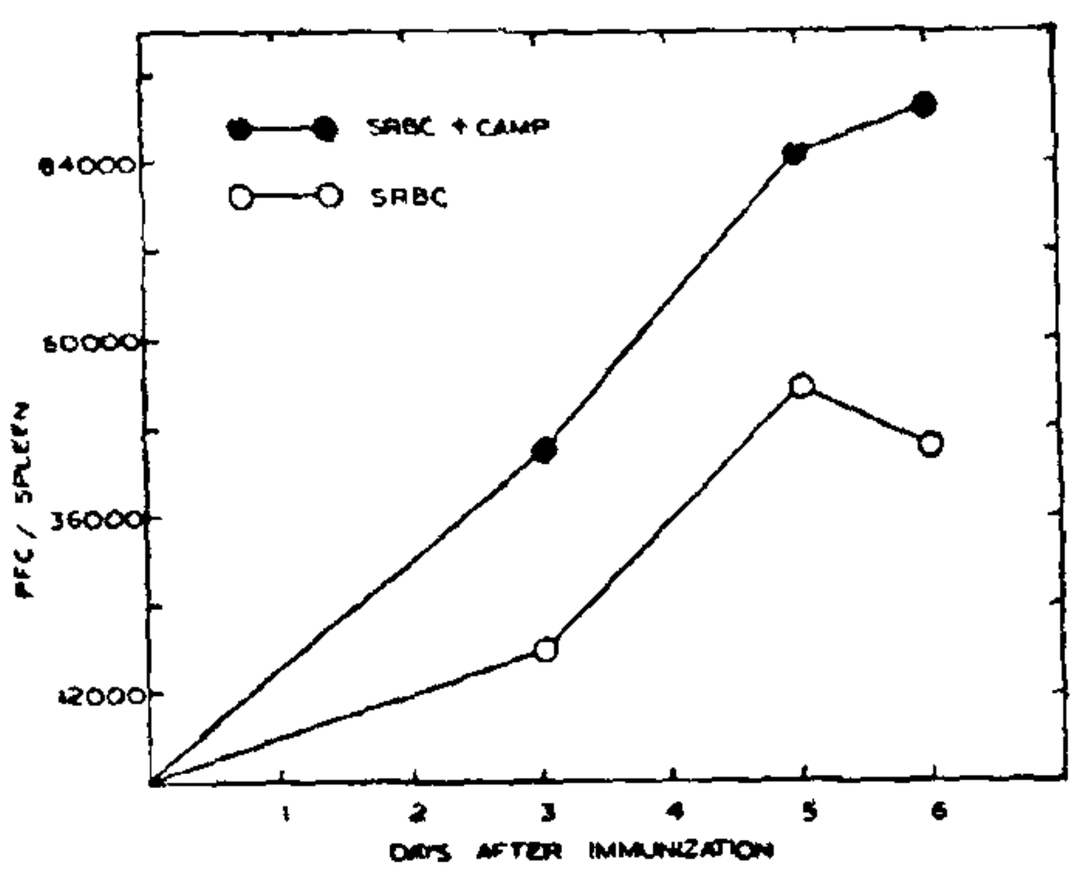

FIG. 2. Kinetics of immune response in control and cyclic AMP treated mice. Conditions were the same as described for Fig. 1 except that 2–4 mice in each group were sacrificed on indicated days.

Abbreviation used is cyclic AMP: cyclic 3′, 5′-adenosine monophosphate.

In conclusion it can be stated that injection of cyclic AMP into mice challenged with sheep RBCs augmented the number of plaque forming cells in spleen and haemagglutination titre of serum. Such an amplification of immune response by cyclic AMP is in accordance with the mediatory role of the nucleotide on the differentiated functions of cells in general.

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EFFECT OF COLOURED LIGHT ON EARTHWORMS

THOUGH no definite visual organs (eyes) have been observed on the earthworms, they are known to be sensitive and react immediately to light. It has been reported, for example, that a sudden illumination at night will cause them to quickly rush back to their burrows. This is explained on the basis of the presence, particularly on the prostomium, of lens-like structures which respond to light stimuli. Hegner and Stiles[1] have stated that a "positive reaction to faint light has been demonstrated for the manure worm *Eiscnia foetida;* this positive reaction to faint light may account for the emergence of the worms from their burrows at night. It is an interesting fact that although the worms react negatively to sunlight, they respond positively to red light and may be collected at night with the use of such a light". Howell[2] observed *Pheretima* sp. as completely photonegative and respond in proportion to the intensity of light.

Edward and Lofty[3] state that earthworms react to different wavelengths of light; blue light is stimulating and red is not. Ultraviolet seems harmful and may account for death, after rain, of earthworms[4]. Hess[5] reported that worms exposed to strong light for long periods do not react at all to a sudden increase in intensity due to saturation of light receptors. Bhat[6], on the other hand, observed earthworms, kept in fairly well lit laboratory, come up to the surface to deposit their casts even during the day, though they do so in relatively larger numbers during nights. It was in this context that the authors considered it worthwhile to record the reaction of two species of the worms *Drawida paradoxa* and *Hoplochactella kempi* obtaining in this part of the country to different light conditions as this would help others to choose the suitable colour of light to study them in the laboratory or under the field conditions during nights.

A wooden box measuring in the inside 48 × 24 × 40 cm was constructed with 1 cm thick wooden planks. The box was provided with a partition in the middle in such a way that two cubicles, each 24 × 24 × 40 cm were available as experimental cages for the animals. The partition, at the floor level, was cut 13 cm high to serve the purpose of migration of the worms from one cubicle to another from the subsurface of the soil itself. The cubicles were filled for experimental purposes 20 cm deep with soil and cowdung at 10% (Bhat[7]). The box was covered with a lid which was provided inside with holders to fit in electric bulbs. The wires were connected to a single plug-point so that in case of power failure the light was unavailable for both the cubicles. The bulbs used were zero Watt to prevent heating up the atmosphere and drying up of the soil.

At the commencement of experiment, into each of the boxes, known number of worms, recorded in Table I and II at the top of the columns, was introduced. The boxes contained soil *plus* adequate cowdung (feed) to maintain the animals for about a week. Daily water was provided adequately. Tables I and II present results which typify several experiments carried out. The experiments were repeated with worms collected from various locations. Each experiment was completed within a week to prevent the worms getting acclimatised to, and which tend to, bias results.

TABLE I

Response of earthworms to coloured lights

Period	A series				B series			
	No. of worms		% Preference		No. of worms		% Preference	
	Green	Red	Green	Red	Green	Yellow	Green	Yellow
Initial	20	20	..	..	14	14	..	..
After 1 day	26	14	65	35	14	14	..	..
After 2 days	21	19	52·5	47·5	15	13	53·6	46·4
After 3 days	25	15	62·5	37·5	17	11	60·7	39·3
After 4 days	24	16	60	40	17	11	60·7	39·3

In the first experiment equal number of worms (20) were exposed to green and red light. From Table I it is evident that the worms migrated comparatively more towards the green light. Continuation of the experiment for another two days proved to be harmful to the worms as there were deaths under the red light.

In another experiment when all the worms were kept under the red light, they tended to migrate to green; when kept in green to darkness, when possible. Occasionally there was evidence of migration towards even red light. From all these, the conclusions which could be drawn were that as compared to red, green was preferable and as compared to green, yellow was preferable, the preference for blue and green remaining the same. Violet light was not preferred. Preference-wise, the migrations were yellow>green>blue> red.

In another series, one chamber was kept in darkness and another kept lit with light specified in Table II for all the 24 hrs. The results indicated that the worms were reluctant to move out of darkness to light only 7 out of 40 (17%) did so from darkness to red, in as

TABLE II

Preference for darkness

Period	A series				B series			
	No. of worms		% Preference		No. of worms		% Preference	
	Darkness	Red	Darkness	Red	Darkness	Yellow	Darkness	Yellow
Initial	40→	..	..	..	..	←30	..	..
After 1 day	38	2	95	5	3	27	10	90
After 2 days	38	2	95	5	6	24	20	80
After 3 days	36 (1 died)	2 (1 died)	94·7	5·3	8 (3 died)	16 (3 died)	33·4	66·6
After 4 days	34	4	89·5	10·5	9	15	37·5	62·5
After 5 days	28 (1 died)	7	80	20	11	13	45·8	54·2
			II Set					
Initial	..	←35	..	..	24→	..	..	..
After 1 day	3	32	8·5	91·5	20	4	83·3	16·7
After 2 days	4	30 (1 died)	11·2	88·8	20	4	83·3	16·7
After 3 days	8	25 (1 died)	24·2	75·7	20	4	83·3	16·7
After 4 days	9	23	28·2	71·8	..	..	..	..
After 5 days	11	20	35·5	64·5	..	..	..	..

many as 5 days, those migrated during the first three days being only of the order of two (5%).

Migration from red towards darkness was progressively on the increase, nearly one-third of the population having traversed from red to darkness within five days. Moreover, from the data given in Table II as well as other experimental results (not presented here) it became evident that after some days of exposure to red light the worms began to die out under its influence. This was somewhat unexpected though. To sum up, it may be mentioned that to study the worms during the nights yellow/green/blue light should be preferred to red as suggested earlier.

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GEETHA NAIMPALLY.
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EARLY LOWER TRIASSIC CONODONTS FROM SPITI RIVER SECTION*

SINCE the pioneering stratigraphical and palaeontological works of Gerard[1], Blanford[2], Stoliczka[3], Griesbach[4], von Krafft[5], Hayden[6] and Diener[7], very little has been added to our knowledge about the stratigraphical details of the Spiti region. Though subsequent to Hayden's survey. Jhingran *et al.*[8] visited the area along with the third Royal Danish Expedition, their work has not been published.