was very much in consistence with many others[10-12] where, in the absence of ovipositional site, parasitic hymenoptera have been reported to suffer egg-resorption. Thus, the reproductive rate and efficiency of the parasites in these seasons decline markedly. This may be the reason for their number declining among the emergents of next sub-seasons (season defined by Sihag[5]) which gives an opportunity to the bees to relapse their number among the emergents to reach to a peak. However, in the latter season, the parasite and bee activity coincides completely which again facilitates the parasite to rebuild their populations and a decline of bee populations. This course follows till the dormancy period approaches when bee population is at the lowest level. In the post dormancy seasons, these feats are again repeated thus establishing oscillation patterns[5].

This would indicate that a time lag between the commencement of emergence in bees and their parasites enables the former to relapse their withered populations and to observe oscillations. To anticipate whether the bees can overcome the parasitization due to this time lag, one will have to examine the phenomenon in ecological perspectives. In prey-predator system, if the prey is not overexploited, both the populations would perpetuate with set pattern of oscillations[1-4]. Earlier study on bee-parasite relationship[5] revealed that no tremendous increase in populations of these bees could be observed and the populations simply showed oscillations. Then it can well be assumed that the time lag between the commencement of emergence of bees and their cleptoparasites reported here would enable these bees to overcome parasitization only temporarily which may simply guarantee their species perpetuation, rather than effecting tremendous increase in their populations. In simple words, the growth of natural populations of these bees would be restricted to set oscillations unless some proper management practices are undertaken. Looking into the beneficial role of these bees in the pollination of alfalfa, one will have to ascertain the physical removal of the parasites in the presence of which an augmentation of bee populations does not seems possible.

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EFFECT OF THIOUREA ON HUMAN CHORIONIC GONADOTROPHIN (hCG) INDUCED SPERMATOGENESIS IN THE FROG *RANA TIGERINA* DURING THE POSTBREEDING REGRESSION PHASE

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It is well known that goitrogens interfere with the synthesis of thyroid hormones[1]. Hyperplastic changes are known to occur in the thyroid gland after thiourea treatment in a few amphibians[2,3]. However, there are no reports regarding its effect on spermatogenetic activity in amphibians. Therefore, in the present work the effect of thiourea on human chorionic gonadotrophin (hCG) induced spermatogenesis[4] was studied in *Rana tigerina*.

Adult male *R. tigerina* obtained from Karwar during the 2nd week of September was used. After acclimation they were separated into 3 groups and placed in cement tanks containing some water. They were force-fed with minced beef every alternate day. Treatments were given as follows:

Group 1. 0.2 ml distilled water (controls)
2. 20 IU hCG in 0.2 ml distilled water
3. 20 IU hCG in 0.1 ml distilled water + 25 µg thiourea in 0.1 ml distilled water

Injections (i.p.) were given on alternate days for 30

days. On the 31st day 5 frogs from each group were weighed and killed by decapitation. The testes were weighed and the gonadosomatic index (GSI) was calculated. They were processed for histological and histometric studies as described earlier[5-7]. The data were analysed using student's t test. The differences were judged as significant if $P < 0.05$.

In the distilled water injected controls the GSI and the diameters of testis and testis tubules were in a highly reduced state (table 1). The mean number of cell nests of stage 0 was greater while those of stage I and II were very few (table 2).

Administration of 20 IU hCG induced a significant increase in the GSI value and the diameters of testis and testis tubules over the control values (table 1). Cell nests of all stages (0–V) were present in the testis tubules (table 2). The mean number of stage 0 declined significantly ($P < 0.001$), while subsequent stages increased (table 2).

In hCG + thiourea-treated frogs GSI and diameter of testis tubules were significantly lower as compared to the hCG treated frogs (table 1). Spermatogenetic stages III to V were absent (table 2) whereas the cell nests of stage 0 were significantly greater and those of stage II were smaller (table 2).

Studies on the frequency distribution of cell numbers in the spermatocysts revealed that, in the control frogs, the peak occurred in the secondary spermatogonial cell nests that contained < 7 cells. Thirty seven percent of the cell nests in hCG-treated frogs contained 25–30 cells. A small percentage of cell nests contained as many as 43–48 cells (table 3A). In the hCG + thiourea-treated frogs the peak occurred in the cell nests that contained only 7–12 cells (table 3A).

With regard to primary spermatocytes, in the control frogs the peak occurred in the cell nests that contained 7–12 cells (table 3B). In hCG-alone-treated frogs, 24 % of the cell nests contained 31–36 cells with

Table 1 *Effects of hCG and hCG + thiourea on the testis of R. tigerina during the post breeding regression period*

Group		Mean Testis wt. (mg)/ 100 g body wt. ± SE	Mean diameter (μm) ± SE	
			Testis	Testis tubule
Control	(5)	12 ± 3	1126 ± 69	86 ± 10
20 IU hGC	(5)	55 ± 6	1182 ± 89	148 ± 8
		$P < 0.001$	$P < 0.001$	$P < 0.01$
20 IU hCG +		27 ± 1	1874 ± 167	119 ± 8
25 μ thiourea	(5)	$P < 0.01$	ns	$P < 0.05$

SE = Standard error; ns = nonsignificant; figures in paranthesis indicate the number of animals; P values were calculated by student's t test; hCG treated group was compared with controls while hCG + thiourea treated group was compared with hCG treated group.

Table 2 *Effects of hCG and hCG + thiourea on the spermatogenetic stages of R. tigerina during the postbreeding regression period*

	Control	20 IU hCG	20 IU hCG + 25 μg thiourea
0 Primary spermatogonia	9.27 ± 0.61	1.21 ± 0.13	3.52 ± 0.85
		$P < 0.001$	$P < 0.05$
I Secondary spermatogonia	1.01 ± 0.17	6.19 ± 0.52	5.53 ± 0.75
		$P < 0.001$	ns
II Primary spermatocytes	0.07 ± 0.04	3.71 ± 0.39	1.18 ± 0.40
		$P < 0.001$	$P < 0.01$
III Secondary spermatocytes	—	0.57 ± 0.24	—
IV Spermatids	—	0.34 ± 0.12	—
V Sperm bundles attached to Sertoli cells	—	0.51 ± 0.14	—

Mean number of spermatogenetic stages/tubule cross section ± SE.

Table 3 *Effects of hCG and hCG + thiourea on the frequency distribution of cell numbers in the sectioned cysts of (A) secondary spermatogonia, (B) primary spermatocytes and (C) secondary spermatocytes of R. tigerina during the postbreeding regression period*

Group	Number of cells per sectioned cyst A: Secondary spermatogonia								
	<7	7–12	13–18	19–24	25–30	31–36	37–42	43–48	>48
Control	52	46	2	–	–	–	–	–	–
20 IU hCG	0	1	7	28	37	17	7	3	–
20 IU hCG + 25 μg thiourea	9	36	34	18	3	–	–	–	–
	B: Primary spermatocytes								
Control	25	60	15	–	–	–	–	–	–
20 IU hCG	0	0	8	20	23	24	15	8	2
20 IU hCG + 25 μg thiourea	1	24	33	18	16	8	–	–	–
	C: Secondary spermatocytes								
	<13	13–24	25–36	37–48	49–60	61–72	73–84	85–96	>96
Control	–	–	–	–	–	–	–	–	–
20 IU hCG	0	0	8	19	17	31	10	10	5
20 IU hCG + 25 μg thiourea	–	–	–	–	–	–	–	–	–

Figures represent the percentages of spermatocysts in the cross-section.

few nests having more than 48 cells (table 3B). But the peak in hCG + thiourea-treated group was in the cell nests having only 13–18 cells (table 3B).

In hCG-treated frogs the peak occurred in the cell nests of secondary spermatocytes that contained 61–72 cells (table 3C). The secondary spermatocytes were absent in the controls and hCG + thiourea treated frogs.

The tests in *R. tigerina* remain regressed during the prolonged postbreeding regression phase extending between August and March when the hypophysial gonadotrophs (B_2 cells) are nonsecretory[8]. However, it has been shown in *R. tigerina* that administration of hCG during the postbreeding period induces complete spermatogenesis[4]. Therefore, this experimental model was used in the present study to assess the involvement of thyroid gland, if any, in the spermatogenetic process of the frog. The present study shows that thiourea affects spermatogenesis so that stages III to V fail to develop in spite of stimulation by the hCG (table 2). Further, the rate of mitotic activity in the spermatogonial cell nests is also reduced by thiourea which is evidenced by the fact that the cell nests in hCG + thiourea treated frogs contained fewer cells (table 3A & 3B). Thus the present studies show that goitrogens severely affect spermatogenesis in the frog. The present work apppears to be the first report to show that goitrogens impair spermatogenesis in amphibians. It is suggested that the normal functioning of thyroid gland is essential for spermatogenetic activity in the frog.

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NEWS

IMMUNIZATIONS SAVE 8,00,000 LIVES YEARLY OF INFANTS IN DEVELOPING WORLD

Immunizations against six childhood diseases are now saving the lives of an estimated 8,00,000 infants yearly in countries of the developing world, according to data available to the World Health Organisation at the end of July.

A status report published in WHO's *Weekly Epidemiological Record* (No. 34) says this represents a "major public health gain in the past ten years."

WHO launched an Expanded Programme on Immunization in 1974 against polio, diphtheria, pertussis (whooping cough) and tetanus, as well as measles and tuberculosis, the major killers of infants.

According to WHO officials, the success of the programme is measured largely by immunisations given against polio as well as against diphtheria, pertussis and tetanus (DPT).

To protect against these diseases, a full course of vaccines—either two or three doses—is needed, and thus more than one trip to the health centre. The report shows 40 million infants receiving these doses, a figure that represents coverage of about 40% of the 100 million infants who, in 1984, survived to one year of age in the Third World.

Despite these success, however, an estimated 2,65,000 cases of polio, two million deaths from measles and 6,00,000 deaths from pertussis alone still occur yearly in the developed world. These figures exclude China.

And only 14 million pregnant women receive the two doses of anti-tetanus vaccine they need. As a result, some 8,00,000 deaths from neonatal tetanus occur each year, according to WHO estimates. In order to protect their newborn babies against neonatal tetanus, the doses are given to mothers four weeks apart. (Press Release WHO/22, 22 August 1985, World Health Organisation, 1211 Geneva 27, Switzerland).

A RED LIGHT ON CANCER

. . . A patient with cancer of the eyelid was unable to have surgery. So "James McCaughan [Grant Medical Ctr., Columbus, Ohio] gave the patient an intravenous injection of hematoporphyrin derivative, a dye made from hemoglobin, the red pigment of the blood that, for reasons that scientists don't understand, lingers longer in cancer cells than in normal ones. After waiting 72 hours to allow the dye to clear out of healthy tissue, the surgeon shone a visible red light on the tumor for eight minutes; two months later, because a little of the cancer was still there, he repeated the treatment. That was in 1983. There has been no evidence of the tumor since. . . . 'The dye sets the tumor cells up for the kill by making them sensitive to light,' explains Thomas J. Dougherty [Roswell Park Memorial Inst., Buffalo, N.Y.]. 'When the light hits them, the dye absorbs it, and the energy from the reaction results in the release of singlet oxygen, a form of oxygen that—although it lasts for only about a millionth of a second—has a lethal effect.' No one is sure why singlet oxygen is lethal. 'But we think it's because it destroys cell membranes.' "

[(Judith Randal in *Science 85* 6(5):76–7, Jun 85). Reproduced with permission from Press Digest, *Current Contents*®, No. 30, July 29, 1985. p. 14. (Published by the Institute for Scientific Information®, Philadelphia, PA, USA.)]