

One to five annuli in the central concave region were clearly seen; and the same number of partial annuli in the outer flattened region in each sagitta, according to the age of fish. These observations on the otolith were not only indicative of the age of the fish but also helped in confirmation of age of the fish when other methods were doubtful. No false rings were present, either in the central concave region or the outer flattened region of the sagitta.

Two rings in a year in the sagitta of the fish showed low winter feeding and high summer feeding as determined by feeding intensity recorded by Pathani⁵. Ricker⁶ also recorded two rings in a year in the otolith for some fishes of U.S.A.

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EFFECTS OF SUBOPTIMAL TEMPERATURES ON THE HATCHING AND INCUBATION PERIOD OF EGGS OF *PYRILLA PERPUSILLA* WALKER

THE sugarcane leaf hopper *Pyrilla perpusilla* is abundantly found in sugarcane growing belts of India and its heavy infestation often adversely affects the quality as well as the quantity of sugarcane. According to the observations of Stewart and Walton¹ the time required for hatching of eggs of Southwestern corn-borer, *Ziadatrea grandiosella* when refrigerated at 7.2° to 12.7° C for different periods of time and then allowed to hatch at room temperature was directly proportional to the age of eggs, temperature and duration of refrigeration. In spite of severe infestation of the pest, there is practically no information on the effects of suboptimal temperatures on hatching of fertile eggs within tolerable limits. Hence an attempt is made here to study the phenomenon in this species.

The eggs of *P. perpusilla* were obtained from adults collected in the field and kept for further rearing in the laboratory. Eggs of different age groups were refrigerated for 24, 48, 72, 96 and 120 hr at 6–8° C. The ages of eggs at the beginning of refrigeration were 24, 48, 72, 96 and 120 hr respectively. After refrigeration the eggs were kept at 30° C.

The results (Table I) show that 8.0% and 2.0% of freshly laid eggs hatched after 24 and 48 hr of refrigeration respectively while none of them hatched when the refrigeration period was extended to 72, 96 and

TABLE I
Extension of incubation period of *Pyrilla perpusilla* eggs by refrigeration

Age of the eggs (Before refrigeration) in hours	Refrigeration period									
	24 hours		48 hours		72 hours		96 hours		120 hours	
	% Hatcha- bility	Incuba- tion period in days	% Hatch- ability	Incuba- tion period in days	% Hatcha- bility	Incuba- tion period in days	% Hatcha- bility	Incuba- tion period in days	% Hatcha- bility	Incuba- tion period in days
Freshly laid	8.0	11	2.0	11	Nil	Nil	Nil	Nil	Nil	Nil
24	40.0	12	22.0	12	4.0	13	Nil	Nil	Nil	Nil
48	50.0	12	32.0	12	20.0	13	4.0	13	Nil	Nil
72	82.0	9	66.0	10	64.0	10	40.0	11	0.0	14
96	100.0	8	90.0	10	64.0	10	48.0	10	46.0	12
120	100.0	8	100.0	9	94.0	9	80.0	10	62.0	11

The incubation period and percentage hatch of eggs at 30° C was 8 days and 100% respectively.

120 hr. The 24 hr old eggs showed 40.0%, 22.0% and 4.0% hatching when refrigerated for 24, 48 and 72 hr respectively but no hatching was observed when they were refrigerated for 96 and 120 hr. Of the 48 hr old eggs 50.0%, 32.0%, 20.0% and 4.0% hatched after 24, 48, 72 and 96 hr of refrigeration but failed to hatch when refrigerated for 120 hr. The hatching of 72 hr old eggs was not inhibited even by the longest refrigeration period of 120 hr and similar was the case with 96 and 120 hr old eggs. In the controls maintained at 30° C the eggs showed a 100% hatchability.

These observations indicate that eggs in advanced stages of development are not so adversely affected by lower temperatures as the ones in early stages. The duration of the incubation period was found to be directly proportional to the refrigeration time. In 72 hr old eggs, it was 9 days when the eggs were refrigerated for 24 hr and 14 days when the refrigeration period was extended to 120 hr. Similarly in 96 and 120 hr old eggs the incubation period was extended with the extension of refrigeration period.

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IMPACT OF GAMMA RADIATION ON THE MALE GERMINAL CELLS OF THE ERI SILKMOTH, *PHILOSAMIA RICINI* H. (SATURNIDAE : LEPIDOPTERA)

THE nature and frequency of chromosomal breaks induced by Co⁶⁰ γ -radiation in the primary spermatocytes of *P. ricini* H. were studied. Irradiation by an acute dose of 1000 R of γ -rays in the prophase I and metaphase I cells resulted in chromatid and isochromatid types of breaks, the frequency of such chromosomal breaks being 8.4%. None of the subchromatid type aberrations were observed.

Introduction

Impact of ionising radiations like X-rays and γ -rays in inducing chromosomal aberrations has been elaborated in many species of plants and animals¹⁻⁴. Basically three types of chromosomal aberrations have been stated to be produced. Induction of chromatid type break (involving one of the sister chromatids) and isochromatid type breaks (involving both the sister chromatids at the same locus) occur if cells are

irradiated at the prophase or prometaphase (post-meiotic synthetic period of DNA)⁷⁻⁸. Subchromatid exchanges also are produced between chromosome units smaller than single chromatid during this period⁹⁻¹⁰. Chromosome type breaks are produced when the cells are subjected to irradiation at the resting stage (G₁ phase), prior to DNA synthesis⁷⁻⁸. However, both chromosome and chromatid type breaks are induced when irradiated during early S phase when there is incomplete replication of the chromosomes¹¹. The purpose of the present investigation is to study the nature and frequency of occurrence of such stage specific induced chromosome breaks in the primary spermatocytes of the eri silkmoth, *Philosamia ricini* H.

Materials and Methods

Male pupae of the species were irradiated during early half of their pupal life from a γ -ray source of Co⁶⁰ (1.3 MeV, Eldorado-6) at a dose rate of 65R/min amounting to a total dose of 1000R, at the Cancer Institute, Cuttack. They were reared at a temperature of 28° C. The testes were excised after 8 hours and fixed in 3:1 ethanol acetic acid mixture. Chromosome preparations were stained by Heidenhein's iron haematoxylin.

Cytology of spermatogenesis of the species: The cytology of spermatogenesis in *P. ricini* follows a definite pattern. Gonial mitoses are quite abundant in the II instar larvae, just 7-8 days after hatching. The primary spermatocytes differentiate during the early III instar and are at the leptotene and zygotene stages. In the early IV instar, however, majority of the cells are in the pachytene stage. During the V₃₋₄ instar the germ cells are in the diakinesis and within one day they reach the metaphase I. The duration from the very differentiation of an early primary spermatocyte to first meiotic metaphase is about 13 days. Early pupae show all stages including primary and secondary spermatocytes.

Results and Discussion

There is no marker chromosome, nor morphologically distinct sex chromosome in *P. ricini*. Two or more chromosomes are morphologically alike, either oval or spherical at metaphase I. Therefore, a study of the frequency of chromosomal breaks specific to marker chromosome or sex chromosome¹² is impeded. Further, it is not possible to distinguish chromosome or chromatid type breaks in the oval or spherical metaphase chromosome. Therefore, attempts, have been made to study them in the chromosomes during the diplotene and diakinesis at the time when the bivalents are elongate and pose the initiation and separation of their chiasmata. In these stages, displacement in the axes of the broken ends of a chromosome or chromatid is not expected. Chromosomal breaks have also been scored in meiotic metaphase cells although either