Figs. 1–3. Figs. 1–2. *Pinjoriapollis magnus* sp. nov., Slide Nos. 6196/5 (Holotype), 6189/5. Fig. 3. *Pinjoriapollis lanceolatus* sp. nov., Slide No. 6193/9 (Holotype).

Type Horizon and Locality.—Pinjor Formation (Upper Siwalik) near Chandigarh, India.

Remarks.—*P. lanceolatus* sp. nov. differs from *P. magnus* sp. nov. in being lanceolate in shape and in having thinner exine.

Pinjoriapollis is an important constituent and is represented by 10% of the assemblage (*P. magnus* 4%; *P. lanceolatus* 6%). The pollen grains of this genus appear to have an affinity with those of the family Magnoliaceae. The present day distribution of this family is in temperate region. It has been noticed that the entire assemblage is composed of mixed elements both belonging to colder and tropical-subtropical climate. The source of the temperate elements towards the north and that of the tropical ones towards the south of the basin of deposition has already been suggested[1-2]. It may therefore be surmised that the source of *Pinjoriapollis* may lie towards the north.

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GENETIC STUDY OF CLEISTOGAMY IN RICE (*ORYZA SATIVA* L.)

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In a collection of tribal rice varieties studied at this Institute in 1971, a variety Dhundhuni was found to be cleistogamous. In this case, the glumes did not open at all, though fertilization and grain setting took place normally inside the florets. During anthesis, the glumes were firmly clasped and could be separatee only with great effort. Both male and female organs developed satisfactorily. Pollen was healthy and viable and could be used in hybridisation. Such cleistogamy was reported by Kadam and Patil[2]. Chandraratna[1] and Parmar *et al.*[3] have stated that 'Sathi' varieties of Uttar Pradesh (India) also are cleistogamous. In their case, however, the panicle itself does not emerge from the boot-leaf sheath.

For genetic study of cleistogamy, reciprocal crosses of Dhundhuni with other varieties were tried. For obvious reasons, Dhundhuni flowers could be emasculated only by the clippng method. Seeds resulting from genuine crosses made in this way were shrivelled. On germinating 21 such seeds, the seedlings died within a week. On the other hand, Dhundhuni pollen used on 3 other varieties gave normal crossed seeds. F_1 plants resulting from these crosses were only chasmogamous indicating that cleistogamy was of a recessive character.

With a view to determining the kind and the number of genes involved in its inheritance, 465 F_2 plants of the cross, Blue Belle × Dhundhuni, were raised in 1972. As not a single segregate bore cleistogamous flowers and as the character could be a multiple recessive, a fresh round of crosses was undertaken with I.R. 8 and Chandina as the female parents. These provided additional 1104 and 714 F_2 plants respectively in 1980, but without producing a single cleistogamous one.

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The fact that not a single cleistogamous plant appeared even among 2283 F_2 segregates derived from 3 different crosses cannot be explained even by assuming as many as 5 pairs of duplicate recessive genes. Therefore, the only plausible inference about the genetic nature of cleistogamy in Dhundhuni rice rice variety is that it may be being governed by one or more cytoplasmic factors.

January 20, 1981.

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EFFECT OF LOW LIGHT AT ANTHESIS ON SPIKELET STERILITY IN RICE

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Spikelet sterility is one of the major factors for low grain yield in rice during the monsoon season. Low light normally prevalent during the flowering period is considered to be responsible for high sterility in early to medium duration rice varieties[1]. As the critical period for pollination and fertilization is the day of anthesis, trials were carried out at Central Rice Research Institute, Cuttack, during *kharif* 1978 to see the effect of low light exposure of the plants during the period of anthesis on spikelet sterility.

Two early high yielding cultures, *Ratna* and *JS* 52–102 (*Pallavi*) were grown in pots. The spikelets from the main shoot were tagged at the time of anthesis and were exposed to varying low light intensities (10, 25 and 50% normal light) for specific periods near the anthesis period, *i.e.*, 1 hr before anthesis (T_1) during anthesis (T_2), 1 hr after anthesis (T_3), and combination of treatments $T_1 + T_2$ (T_4), $T_2 + T_3$ (T_5) and $T_1 + T_2 + T_3$ (T_6). Control series were maintained under normal light (80 klux). The reduced light was manipulated by wooden screens and the light intensities determined by lux meter were obtained at the top of the plant by altering the distance between two wooden strips (2 cm wide and 1 cm thick).

Table I

Effect of varying light intensities during anthesis on spikelet sterility % in rice (kharif 1978)

Treatment	Sterility % under varying light intensities					
	10% NL		25% NL		50% NL	
	Ratna	*JS*	*Ratna*	*JS*	*Ratna*	*JS*
T_1	61·4	37·1	47·7	35·3	40·9	32·4
T_2	73·6	49·6	60·3	40·2	52·9	40·4
T_3	43·1	37·9	49·0	41·4	46·7	34·1
T_4	68·1	45·0	56·2	43·8	50·4	44·1
T_5	69·4	48·1	58·6	44·8	52·7	41·6
T_6	69·7	54·6	62·1	45·9	53·9	44·0
Control (NL)	40·6	27·5				

CD 5%: V (variety) = 1·30, L (light) = 1·12, T (treatments) = 0·98, $V \times L = 1·82$, $V \times T = 1·06$, $L \times T = 0·98$, $V \times L \times T = 2·38$. NL = Normal light (80 klux), *JS* = *JS* 52–102.

Treatments T_1 to T_6 as indicated in text.

The sterility, in general, increased with reduction in light intensity, *i.e.*, 34, 45, 49 and 55% sterility at 100, 50, 25 and 10% of normal light. Cv *Ratna* consistently showed higher sterility (43–74%) than *JS* 52–102 (32–54%) at all the light regimes. Reduced light for 1 hr prior or 1 hr after anthesis showed lower sterility (42%) than that at anthesis (53%). The combination of shade treatment along with that at anthesis (T_4, T_5 and T_6) consistently recorded high sterility (53–55%) indicating the crucial role of light during the short period of anthesis on spikelet sterility (Table I).

The adverse influence of low light at the critical stage of anthesis has not been reported earlier. However, reports on heat induced sterility have shown that high temperatures (above 35° C) at anthesis even for less than 1 hr are detrimental for fertilization of rice spikelets[2].

The present results suggest that though low solar radiation during *kharif*, in general, is responsible for high sterility, the prevalence of such radiation during the critical period of anthesis assumes para-