

Induction of circadian conidiation by rubidium chloride.

Rubidium chloride (RbCl) causes a marked reduction of the linear growth rate and induces mycelial banding in *Podospira anserina*, (Lysek and Schrufer, Ber. Deutsch. Bot. Ges., in press). In *Arthrobotrys oligospora*, Rb⁺ induces a light-dark-dependent rhythm of conidiation (Lysek and Nordbring-Hertz, 1981, *Planta*, in press). The effect of the Rb-ion is ascribed to the plasmalemma-ATPase, which transports K⁺ into the cytoplasm and extrudes protons. Rb⁺ is transported more slowly than K⁺ and thus reduces the extrusion of the countertransported protons (Conway and Duggan, 1958. *Biochem. J.* **69**: 265). Recent investigations by Lysek and Jennings (unpubl.) yielded evidence that an increase of the cytoplasmic proton concentration is involved in fungal rhythmic growth and differentiation. Owing to the known circadian rhythm of conidiation in the band mutant of Neurospora crassa, Rb⁺ was tested with this fungus.

Experiments were performed utilizing the csp-2 strain (FGSC #2525) in continuous dark (DD), light-dark-cycles of 10:14 h (LD), or continuous light (LL). The best results were obtained using a minimal medium supplemented with vitamins and 6 g D-fructose/l. (Esser, 1969, *Neurospora Newsl.* **15**: 27).

At 60 mM, Rb⁺ reduces the linear growth rate and induces banding of conidiation (Table 1). Crucial for determining whether rhythms are circadian is their behavior in light-dark regimes and their temperature compensation. Table 1 shows that the Rb⁺-induced banding reacts as expected for a circadian character in that it shows the endogenous period in DD, the entrainment in LD, and the suppression of the rhythm in LL.

TABLE 1

Effect of RbCl on growth rate and conidiation pattern in different light regimes

		LD	DD	LL
Control	growth rate (mm.d ⁻¹) at	42,1	41,9	41,2
	27°C			
	banding	no bands	no bands	no bands

60 mM RbCl	growth rate (mm.d ⁻¹) at	18,5	22,6	14,5
	27°C			
	banding	bands	bands	no bands

	Period (h)			
	at 27°C	24,1	21.7	
	at 22°C	24,3	24.4	-----

The question of temperature compensation is somewhat uncertain though, since Rb⁺ affected the viability of csp-2 at temperatures differing too much from 20° C. However, the data obtained at 22 and 27° C give evidence that the endogenous period of the induced rhythm does not differ too much from 24 h in this temperature compensated. In sum, these experiments show that the circadian conidiation can be triggered artificially and that it resembles other fungal rhythms in this aspect. (Supported by the Deutsche Forschungsgemeinschaft, Bonn-Bad Godesberg.) - - - Institute of Systematic Botany and Plant Geography, Free University, Altensteinstr. 6, D-1000 Berlin 33, F.R. Germany.