positive to ninhydrin, Sakaguchi, Elson-Morgan and negative to Fehling, Tollen and maltol.

The homogeneity of the active material was established by paper chromatography, paper electrophoresis and countercurrent distribution studies. The substance is readily soluble in water, partially in methanol and ethanol, and completely insoluble in acetone, ether, petroleum ether, *n*-butanol, benzene and chloroform. The antibiotic is stable at room temperature. A neutral solution of the antibiotic autoclaved at 15 pounds/square inch for 15 min lost about 60% of its original activity. A comparative assay of the active material with other known antibiotics are presented in the Table.

The toxicity test was carried out on mice using a dose of 25 mg/kg body weight i.v. There was no untoward symptoms or death within 72 h.[7]

Zusammenfassung. Ein neues, gegen Bakterien und Pilze wirsames Antibiotikum wurde aus dem *Streptomyces* sp. Ac_6569 in der Form eines amorphen Hydrochlorids isoliert. Die Substanz ist wasserlöslich, aber fast unlöslich in organischen Lösungsmitteln, Schmp. 216–218° (Zersetzung); sie gehört zur Streptothricin-Gruppe der Antibiotika.

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Photosynthesis and Respiration I. Effect of Light Quality on the Photorespiration in Attached Shoots of Spruce

Evidence of the occurrence of a photorespiration as a distinct process from dark respiration in plants, have been reported by a number of authors[1–6]. In the work presented below the effect of light quality on photorespiration was investigated. The white, red or blue lights were selected, in which illumination with used lights produced the similar rate of steady apparent CO_2 uptake. Under these conditions of illumination one would expect the action spectrum on CO_2 evolution in light if photorespiration is a light-sensitive process.

Materials and methods. Attached shoots of 4-year-old spruce seedlings *Picea glauca* Moench/Voss were used as experimental material. Seedlings were grown in pots in forest soil under natural conditions at the Petatawa Forest Experiment Station, Chalk River, Ontario, and brought to Queen's University. Attached shoots were sealed into a plexiglass photosynthesis chamber connected in a closed circuit system to an IR CO_2 analyzer according to the method described by LISTER et al.[7]. The volume of the system was 2.12 l and the rate of air flow was 1.8 l/min. The rates of apparent photosynthesis, photorespiration and dark respiration and concentration of CO_2 at CO_2-compensation point were determined according to the methods described by TREGUNNA et al.[2]. The rate of apparent photosynthesis was determined at CO_2 concentrations from 360–250 ppm. The source of light was six 375 W Sylvania photoflood lamps (3200°K) filtered through 2 water screens. Between the light source and photosynthesis chamber, the red or blue cellulose acetate filters were introduced to modify the light quality. The transmission characteristics of these filters are given by TREGUNNA et al.[8]. Light intensity was measured by mean of radiometer YSI-65. The experiments were carried out at 25 °C. The determinations of each process mentioned above was made in 2 consecutive light-dark cycles. The same plant material was first illuminated with white light then with red, and blue, and vice versa. The data presented in this paper are typical for number of experiments.

Results and discussion. Data presented in the Table show that the rates of apparent photosynthesis under

The rates of apparent photosynthesis (APS), photorespiration (PR), dark respiration (DR) and CO_2 concentration at CO_2 compensation points (CO_2 comp.) in attached shoots of spruce illuminated with white, red or blue lights

Light quality	Light intensity in ergs/cm^{-2} per sec^{-1}	μg CO_2 min/g fresh weight of needles			(CO_2 comp.) in ppm
		APS	PR	DR	
White	9×10^4	49.3	5.9	14.1	70
Red	1.2×10^5	46.8	4.7	14.6	68
Blue	5×10^5	46.8	18.2	13.8	170

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white, red, and blue lights were similar or the same. The rates of dark respiration after periods of used lights were also very similar. Therefore if there was no effect of light quality on respiration, one could expect a similar rate of CO_2 production under illumination with light qualities used, since also the ability for photosynthetic reabsorption of respiratory CO_2[9] would be similar or the same. The rate of photorespiration, however, was not the same. Under blue light the rate of CO_2 evolution was by about 3–4 times higher compared with that under white or red lights respectively. The concentration of CO_2 at CO_2-compensation points was about 2.5 times higher under blue light than under red or white. It is noteworthy that the rate of photorespiration in blue light considerably exceeded the rate of dark respiration, whereas under red or white lights the rate of photorespiration was by about 2.5–3 times lower compared with that in darkness.

The data showed a clear enhancement effect of blue light on the evolution of CO_2 in the plants used. Recent reports[10,11] showed that the enhancement effect of blue light was also observed when respiration was measured by oxygen uptake and when algae was the plant material. It is assumed that the flavin[10] or carotenoids[11] are the photoactive pigments involved in this phenomenon. In our previous work[5], we have suggested a close relationship between photosynthesis and photorespiration. It is possible to propose that the enhancement effect of blue light on CO_2 evolution may be mediated through the photosynthetic apparatus by synthetizing some substrate or substrates utilized by photorespiration, for example the glycolic acid[12].

It has been observed that synthesis of glycolic acid was stimulated under short-wave light[13]. Another question which can arise from the results presented in the Table is that of a photosynthetic reabsorption of respiratory CO_2. If the rate of evolution of CO_2 in light represents a remnant of respiratory CO_2 which is not reabsorbed by chloroplasts, one can expect that at a similar rate of apparent CO_2 uptake under white, red or blue lights, the rate of CO_2 evolution must also be similar. The data presented here indicate, however, that the reabsorption of respiratory CO_2 in light could not be a simple reason for the change in rate of CO_2 evolution in light as compared with that in darkness. The alternative argument might be assumed that the blue light has an effect on the resistances for the diffusion process of CO_2 from and into the sites of CO_2 absorption and evolution in leaves. However, this would be rather difficult to understand, since the rates of apparent CO_2 uptake under light qualities applied were similar when the same plant material was investigated[14,15].

Zusammenfassung. In isolierten Sprossen der Fichte *Picea glauca* Moench/Voss ergab Belichtung mit blauem Licht ähnliche CO_2-Assimilationsgeschwindigkeit wie mit weissem oder rotem Licht. Die Geschwindigkeit der Photorespiration hingegen war bei blauem Licht ca. 3–4mal so gross wie bei weissem oder rotem Licht.

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Electron Spin Resonance Investigations on Ferricytochrome *c* Compounds

The electron spin resonance method gives information concerning the electronic structure of paramagnetic metal complexes, such as hemoproteins[1–6]. We have measured the electron spin resonance absorption of ferricytochrome *c* from the horse heart. Recently Dickerson and coworkers[7] published X-ray diffraction results on horse heart cytochrome *c* showing that only 1 coordination position of the iron is occupied by a histidyl residue and the other probably by the methionyl residue in position 80 of the amino acid chain. All ferrihemoproteins are octahedral d^5 iron complexes. This octahedron is almost distorted so that we expected electron spin resonance spectra with an axial symmetry or lower. Our measurements were made on frozen solutions. The concentration of ferricytochrome *c* was 2 m*M* and the temperature was 77 °K.

First ferricytochrome *c* itself was investigated at different pH values. In the neutral pH range, a broad absorption line appears which involves 3 *g* values: $g_1 = 3.0$; $g_2 = 2.26$; $g_3 = 2.0$. This electron spin resonance spectrum corresponds to a low spin state of the porphyrin bound iron. Gordy and Rexroad[8] investigated commercial ferricytochrome *c* in the solid state at a temperature of 4.2 °K. They found beside the absorptions about the *g* value 2 an absorption peak at $g = 5.9$; but they explained this weak resonance as an impurity of hemoglobin in their sample of ferricytochrome *c*.

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