acid hydrogen carriers of Szent-Györgyi and co-workers[5] and the acetic-succinic-pyruvic-acetic cycle, while the cyclic processes of alcoholic and lactic fermentation are closely comparable. The combination of CO_2 with an organic acid, the photo-reduction of the carboxyl group and the consequent intramolecular changes leading finally to the setting free of the organic acid again, would be just such a cycle. Doubtless some of the organic acid would be reduced to sugar in each cycle.

These considerations suggest an important connection between photosynthesis and organic acid metabolism, a connection which, to the writer's knowledge, has never been investigated. If photosynthesis were to require a small supply of organic acid as intermediate, this would explain such observations as the failure of isolated chloroplasts to photosynthesize. In any event, it is believed that investigations along the above lines would be profitable.

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AIRPLANE COLLECTIONS OF SUGAR-BEET POLLEN

THE localized area in the Rio Grande Valley in southern New Mexico in which sugar beets were being grown for seed production in 1938 afforded opportunity for making collections to determine presence of sugar-beet pollen at various altitudes. The area planted to sugar beets for seed comprised about 900 acres and was concentrated into a few districts lying between El Paso, Texas, and Las Cruces, New Mexico. Source of the sugar-beet pollen caught was assignable with some sureness, since no other sugar beets were grown within a 125-mile radius. The period of flowering of the sugar beet extended from late April until the middle of June, the height of blooming being between May 15 and June 1.

Through the cooperation of the U. S. Army Air Corps an airplane flight in the general region of concentration of beet fields was made on June 3, 1938, by Major Guy Kirksey, commanding officer at Biggs Field, El Paso, Texas, with F. C. Meier as observer.[1] The flight was made from 10:30 A.M. to 1:00 P.M. of a hot, fairly quiet day. Series of short exposures of agar plates were made at the various altitudes.

Flights in other years in this region had indicated presence of sugar-beet pollen fairly high in the air.[2] Special precautions were taken in making the 1938 collections to eliminate possibility of contamination either prior to exposure or during examination of the agar plates. Using 40 per cent. sucrose agar, Petri dishes were prepared in Washington a few days previous to the flight. After solidification of the agar, the covers of the dishes were bound in place by a strip of Cellophane adhesive running across the lid and fastening to the bottom dish. The Petri dishes were also sealed with ordinary surgical adhesive tape to prevent contamination and drying. The small wooden Petri dish holder devised by F. C. Meier was used in exposing the agar plates outside the plane. This holder consists of a circular wooden base about the size of the Petri dish and is fitted with short projecting brass strips which, slipping between the overlapping side walls of the lid and base, clamp the bottom half snugly. In making an exposure the adhesive seal was removed in the cockpit, and the covered Petri dish pushed in place in the holder. The observer held the plate outside the plane with one hand, twisted the top with the other to cut the Cellophane binder and then removed the cover. When the exposure was completed, the lid was replaced outside the plane. The covered dish was then resealed with the surgical adhesive tape in the cockpit.

In order to avoid outside contamination, the exposed plates were taken directly from the landing field to an air-conditioned room for the examinations for presence of sugar-beet pollen. In the systematic study of the plates under the microscope, magnification with the 16-millimeter objective was ordinarily adequate for the identification. Magnification with the 4-millimeter objective to bring out more sharply the characteristic markings of sugar-beet pollen,[3] which differentiate it from allied pollens of somewhat similar size, was frequently used to verify identifications, and also whenever the pollen was more deeply embedded in the agar film. The data obtained from the examination of the plates for the various exposures are given in Table 1.

TABLE 1

SUGAR-BEET POLLEN GRAINS TRAPPED ON AGAR PLATES EXPOSED IN AIRPLANE FLIGHT, RIO GRANDE VALLEY, SOUTHERN NEW MEXICO, ON JUNE 3, 1938

Elevation above valley floor	Number of pollen grains and exposure period in minutes				
	1	2	3	4	5
1,000	–	17	19*	5	15†
2,000	–	–	14	4	7*
3,000	0	3*	7*	4	–
4,000	1;0	0	–	2	6
5,000	5	2	6	6	9*

* One germinating pollen grain found.
† At least two pollen grains germinating.

Pollen grains were found at all altitudes with the number becoming fewer at four thousand feet. At the 5,000-foot level, which corresponds to the so-called "dust horizon," the number seemed appreciably larger

[5] *Zeit. Physiol. Chem.*, 236: 1, 20, 31, 58, 66, 1935.

[1] The senior author while continuing his research in aerobiology was lost with the Hawaii Clipper on July 29, 1938.

[2] G. H. Coons, U. S. Dept. Agr. Yearbook, 1936, p. 646.

[3] Ernst Artschwager and R. C. Starrett, *Jour. Agr. Res.*, 47: 823–843, 1933.

than for the other altitudes except the lowest at which samples were taken. The plates showed also numerous fungus spores, plant hairs and pollen from other species of plants, notably *Pinus* spp. One pine pollen grain collected at 4,000 feet above the valley floor had germinated on the agar.

It seems at this time desirable merely to record the presence of viable sugar-beet pollen in the air at high elevations without any inferences as to relation to cross-pollination problems of the sugar beet.

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BASAL DIETS FOR VITAMIN B_1 DETERMINATION

INVESTIGATIONS which are still in progress have demonstrated that it is quite practical to prepare a diet satisfactory for the determination of vitamin B_1 by applying the observation of Williams and coworkers[1] that this vitamin is destroyed by cleavage with sulfite. A basal diet consisting of sucrose, 71 per cent., vitamin B_1 free casein, 18 per cent., salt mixture, 4 per cent., fat, 5 per cent., and cod liver oil, 2 per cent., was used, and various proportions of sucrose were replaced by addenda containing the vitamin B complex.

Sulfite treatment of yeast was carried out as follows: 400 cc of 0.1 per cent. sodium sulfite were added to 50 grams of dried yeast in a 500-cc wide mouth bottle. SO_2 was introduced until a pH of 4 was reached, and the bottle was then stoppered and allowed to stand 5 days at room temperature (25° C.). The contents of the bottle were then dried on purified casein at a temperature not exceeding 65° C.

Rats fed the basal ration containing 5 or 15 per cent. of sulfite-treated yeast, and receiving in addition crystalline vitamin B_1, grew as rapidly as animals receiving the same quantity of untreated yeast in the basal diet. Six animals 27 days old, weighing approximately 40 grams, were fed the basal ration with 15 per cent. of sulfite-treated yeast. Four of these animals developed acute polyneuritis in 32, 33, 34 and 34 days, respectively. Two animals died in 24 and 31 days, respectively, the latter showing slight symptoms of polyneuritis before death. There is reason to believe that with slight modification of the basal diet the percentage of polyneuritis can be increased and animals may be produced which are more suitable for quantitative assay where duration of cure of polyneuritis is used as the criterion.[2]

[1] R. R. Williams, R. E. Waterman, J. C. Keresztesy and E. R. Buchman, *Jour. Am. Chem. Soc.*, 57: 536, 1935.

[2] O. L. Kline, C. D. Tolle and E. M. Nelson, *Jour. Assoc. Off. Agric. Chem.*, 21: 305, 1938.

In the preparation of rations which contain adequate amounts of the members of the vitamin B complex and devoid of vitamin B_1, the destruction of vitamin B_1 with sulfite appears to offer definite advantages over any procedure that has been proposed. Details of an exact procedure are being studied, but because of a widespread interest at present in methods for determining the vitamin B_1 content of foods and pharmaceutical preparations as well as human requirements for vitamin B_1, this preliminary report may be helpful to others.

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