The conclusion is drawn that the methionine can be metabolized to α-aminobutyric acid and that it is probably the main source of the latter, since it does not, of course, occur in the protein of the diet. The fate of the carbon chain of the former now seems clear. A reinvestigation of the possible role of α-aminobutyric acid in the body is indicated. If its presence is essential, methionine may have to be wasted in order to produce it, and, in that case, giving it to animals on a low methionine diet may exert a methionine-sparing action.

Methionine sulfoxide may be of significance in oxidation-reduction potential. It can oxidize cysteine to cystine *in vitro* (*2*). Methionine, on standing under various conditions, readily changes largely into the sulfoxide and may therefore act as an oxygen carrier. In view of this easy oxidizability, however, its presence in the urine after methionine feeding needs more careful checking. It may have been formed by aerial oxidation. The validity of procedures for the determination of methionine in urine by oxidation reactions (H_2O_2, etc.) also arises.

Further details of these findings, which arose out of an investigation into the aminoaciduria in Fanconi syndrome, have been submitted to the *Biochemical Journal*.

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Failure to Produce Neoplasms in Rats by Feeding Heated Wheat-Germ Oil

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The announcement by Rowntree (*2*) in 1937 of the occurrence of neoplasms in Wistar rats following the ingestion of crude wheat-germ oil created considerable interest. The suggested relationship to diet as well as the production in experimental animals of malignant lesions of the gastrointestinal tract were factors of scientific importance. Attempts to duplicate these results were made in many laboratories, unfortunately without success (*1*). Since one of us (G. D.) had prepared some of the original wheat-germ oil used by Rowntree in his successful experiments, an attempt was made to duplicate his work, using oil prepared by the same operator and under the same laboratory conditions. Rowntree's diet was followed in detail, and Wistar rats were fed for almost a year. No neoplasms were produced (unreported work).

Some recent evidence has suggested that heated fats may contain carcinogenic factors possibly due to the conversion of sterols to carcinogens by heat (*3*). Wheat-germ oil is rich in sterols, and Rowntree, in the preparation of his diet, actually might have changed some of the sterols in the wheat-germ oil to carcinogens, since the oil was usually heated again before use to insure that no trace of ether smell remained.

In order to test this possibility, crude wheat-germ oil was prepared exactly as it had been previously. It was then heated at 275° C. for two hours. Three liters of heated oil were mixed with 10 kg. of basic diet in accordance with Rowntree's directions. Thirteen female Wistar rats with an average weight of 64 grams and 14 male Wistar rats with an average weight of 65.5 grams were started on the diet in November 1945. The animals grew somewhat slowly, compared to colony rats, but the growth rate was steady and the animals appeared healthy. There were a number of deaths due to colds and pneumonia. The surviving animals were killed and autopsied in July 1946. Seven males averaging 253 grams and 5 females averaging 213 grams survived. The condition of all animals was excellent, with no suggestion of any malignant lesions.

This evidence would seem to indicate that the sterols in wheat-germ oil are not converted to carcinogens by heat. The heat conversion of sterols to carcinogens was apparently not a factor in Rowntree's production of gastrointestinal lesions in the rat.

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The Occurrence of Two Fertile Florets in the Spikelets of *Chloris*

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During the writer's experience in seed analysis Rhodes grass (*Chloris Gayana* Kunth) was frequently received for purity analysis and for germination test. Early examination of spikelets of this species disclosed that many contained a fertile pedicellate floret in addition to the fertile basal and sessile floret. The presence of caryopses was the criterion employed.

Thus far no confirmation of this observation has been found in the available grass and general floras examined. The seed analyst is perhaps the person best situated to make such an observation, since each of his many routine analyses requires the examination of thousands of individual seeds or seed units, but his usually elementary knowledge of taxonomy might lead him to overlook the significance of such a fact.

Descriptions of the genus *Chloris*, as far as the writer has been able to determine, appear to be unanimously in agreement on the occurrence of one fertile floret in the spikelet, and this the basal, sessile floret. For example, Hitchcock (*1*) states: "Spikelets with 1 perfect floret, sessile, . . . the rachilla disarticulating above the glumes, produced beyond the perfect floret and bearing 1 to several reduced florets consisting of empty lemmas. . . ." In no instance was there more than one floret in the spikelet described as fertile in the literature available. Silveus' description (*3*) is worded identically, and those in other floras are either essentially similar or identical.

As the average purity, or seed set of *C. Gayana* by weight, was found to be approximately 25 per cent (37 lots) (*2*), it may be assumed that the number of pedicellate florets matur-

ing caryopses would likewise be a fraction of the total number of perfect pedicellate florets. One count showed that one-third of the florets of spikelets containing caryopses were pedicellate. Another count yielded 25.2 per cent pedicellate florets with caryopses and represented a lot of more than 1,000 pounds of commercial seed. Detailed examinations are being continued.

Other species of the genus containing such florets are the native *C. latisquamea* Nash and *C. verticillata* Nutt., of the subgenus *Euchloris*. While no indication of perfect pedicellate florets has been found to date in *C. cucullata* Bisch., *C. ciliata* Swartz, *C. canterai* Arech., *C. divaricata* R. Br., and *C. virgata* Swartz, all indigenous to or naturalized in Texas, it is probable that insufficient material was examined. *C. verticillata*, a prolific seeder and a very common species, contained 6 per cent of spikelets with mature or maturing caryopses in the pedicellate spikelets, all of which also contained caryopses in the basal florets.

In view of the above findings, it is proposed that the generic description of *Chloris* should include wording somewhat as follows: "Spikelets 3- to 4-flowered, the florets reduced progressively upward; perfect florets, 1 to 2; the first, basal and sessile; the second, pedicellate on the prolonged rachilla and perfect staminate, or neuter; the third staminate, or reduced to lemma and palea or only the lemma; and the fourth, when present, reduced to an empty lemma, or represented only by the rachilla apex, the two uppermost florets forming a club-shaped rudiment."

Specimens of the three species found to have perfect pedicellate florets have been submitted to Agnes Chase, agrostologist of the Smithsonian Institution. The writer would appreciate further confirmation of the facts presented and will be glad to examine other species of *Chloris* for additional information.

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Translocation of a Radioactive Plant-Growth Regulator in Bean and Barley Plants

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Previous experiments have shown that the application of a nonradioactive growth regulator (2,4-D) to a leaf or the roots of a young bean plant causes a stimulus to be translocated to the stem, where it brings about an easily detected growth response (curvature). A study of this type of response has revealed that the translocation of such a growth-regulating stimulus from a leaf to the stem is associated with the translocation of sugars along the same course and that it moves mainly in living cells (phloem); but when the stimulus is translocated from the roots, it can apparently move within the stem in nonliving cells (xylem) (*3*). However, neither the amount of stimulus translocated and its entire course of movement throughout a plant nor the absorption and translocation of such a stimulus in grasses can be detected readily on the basis of curvature measurements.

The present investigation, in which a radioactive growth-regulating substance was used, was undertaken (a) to determine whether or not the radioactive component was absorbed and translocated by representative dicotyledonous and monocotyledonous plants, and (b) to measure the amount of the radioactive component translocated and accumulated in various parts of the treated plant.

Experimental Method

The compound, 2-iodo-3-nitrobenzoic acid (INBA), used in this study causes form changes in leaves of bean seedlings when a few micrograms are applied to one primary leaf of each seedling. The response to INBA was found to be similar in character to that elicited by 2,3,5-triiodobenzoic acid (*4*). Radioactive iodine^{131} was used as the tracer atom because of the relatively high energy of its beta radiation (0.67 Mev), its availability in experimental quantities,[1] its convenient half-life (8.0 days), and the ease with which it could be incorporated into INBA. Synthesis was accomplished by replacing the mercury by iodine in anhydro-2-hydroxymercuri-3-nitrobenzoic acid (*1*). With this method the synthesis can be completed in less than three hours, and no isomers or troublesome by-products are formed. The method has the disadvantage, however, that mercuric iodide, a by-product of the reaction, contains an appreciable fraction of the radioactive iodine used in the synthesis. This disadvantage can be minimized by employing an iodine solution of high specific activity or might be circumvented by using a synthesis involving the diazotization of 3-nitroanthranilic acid (*2*).

Radioactive INBA was synthesized on a submacroscale as follows: The reaction was conducted in a round-bottomed pyrex vessel of 15-ml. capacity having two necks fashioned from interchangeable ground-glass joints. A pyrex Liebig condenser was inserted in one outlet and a ground-glass stopper in the other. Stirring of the reaction mixture was accomplished by means of a small, hollow, sealed, glass capsule containing several lengths of soft iron wire, which was externally rotated by means of a motor-driven permanent magnet. An iodine solution was prepared by dissolving 200 mg. of potassium iodide in 7.5 ml. of radioactive iodine solution[2] and adding a solution of 230 mg. (1.39 mM) of potassium iodide and 360 mg. (1.42 mM) of stable iodine in 0.35 ml. of water. To a boiling solution of alkali (70 mg. of NaOH in 2.1 ml. of water) in the reaction flask was added portionwise, with stirring, 460 mg. (1.26 mM) of anhydro-2-hydroxymercuri-3-nitrobenzoic acid. Boiling and stirring were continued during the dropwise addition of 0.12 ml. of concentrated HCl. Heating was stopped and 0.04 ml. of glacial acetic acid was added. To this rapidly stirred mixture the iodine solution was added rapidly from a glass, 10-ml. hypodermic syringe equipped with a capillary

[1] Obtained through the Isotopes Branch, Manhattan District, Oak Ridge, Tennessee (*5*).

[2] Radioactive iodine was received on August 26, 1946, in the form of a N/10 sulfuric acid solution having a specific activity of 1 mc./ml.