

of hemoglobin in the plant kingdom. Neither plants nor rhizobia produce hemoglobin independently, and it is only present during the effective stage of symbiosis.

The other pigments found in the nodule are legcholeoglobin, a green pigment; and legmethemoglobin and coproporphyrin, both browns. These last three are considered to be breakdown products of the first. Hemoglobin is thought to be indispensable to the fixation process. When the bacteroid zone changes from red to green, the effective nodule is approaching senility.

Many factors, such as inadequate photosynthesis, clipping of plant tops, drought or excessive moisture, fruiting, and attack by certain insects or fungi, may lead to loss of nodules. Some nodules may last as long as six years, others are fragile structures designed for short, seasonal periods. Microscopic evidence of senility is loss in turbidity, brownish color, wrinkled surface, or spongy texture.

A mottled condition in the bacteroid area, due to clumping of rhizobia in the innermost bacteroid cells is histological evidence of nodule senility. "Many minute vacuoles are formed, and the rhizobia and cell nuclei lose their ability to stain," reported Dr. Allen. The bacteria may invade the intercellular spaces by attacking the host cell walls. Nuclei disintegrate, walls collapse, and cell contents disappear. "Potent rhizophages" may be active at this time. Finally the nodule is sloughed from the root.

More Research on Wood Wastes Asked at Stockholm

A call for more efficient utilization of our wood resources was the theme of the plenary lecture delivered before the symposium on the chemistry of wood and wood wastes at the 13th International Congress of Pure and Applied Chemistry in Stockholm recently. The plea was made by Harry F. Lewis of the Institute of Pulp and Paper Chemistry, Appleton, Wis. The International Congress was held in conjunction with the 17th Conference of the International Union of Pure and Applied Chemistry.

The pulp and lumber industry would prefer to make low grade pulp from wood waste and evaporate and burn the liquors than get into the business of making alcohol, yeast, lignin ethers, or vanillin, Lewis declared. However, he feels, the industry must break with tradition sooner or later and enter new fields.

He emphasized that any chemical industry derived from wood must face competition from an alert synthetic chemical industry accustomed to spending a sizable portion of its sales income on both

fundamental and applied research. He remarked that a few companies in the pulp and paper industries spend only 1 to 1.5% on research while the chemical industry has been estimated to spend about 3.5% of its net sales dollar for research.

He made the point that just because conventional wood distillation plants are no longer operating, wood distillation as a process for converting wood substances to chemicals is not necessarily finished. Application of the fluidizing process, used by the petroleum industry, to destructive distillation of sawdust might make possible the recovery of some intermediate products of pyrolysis in high yield; these in turn may be susceptible to catalytic oxidation with subsequent production of valuable chemicals.

Our comparative ignorance of the physical and chemical constituents of wood is another handicap for the industry, said Lewis. "We know only in part what lignin is; if we knew its chemical structure we might not even then be able to convert the enormous amounts of lignin available in all of our wastes to a chemical asset, but at least we would work more intelligently toward the ultimate goal, which is to make a material useful to something else besides the particular plant in which it is formed."

Industry

Mrs. Tucker's Foods Opens Plant in Illinois

Mrs. Tucker's Foods new plant at Jacksonville, Ill., was dedicated Aug. 13 at ceremonies attended by the Governor of Illinois, William Stratton. The occasion was marked by a civic holiday for the citizens of Jacksonville.

New plant of Mrs. Tucker's Foods at Jacksonville, Ill. Dedication on Aug. 13 was attended by the governor of Illinois. Facilities at plant include storage tank facilities capable of handling 600 railroad tank cars at a time, vegetable oil refining unit, and a hydrogen production plant



According to the company, the new plant has one of the largest capacities for refining and processing vegetable oils in the world. Construction has taken three years. Among the plant's facilities are storage tank facilities capable of handling more than 600 railroad tank cars at a time, a vegetable oil refinery, a hydrogen production plant, packaging lines for shortenings, margarines, salad and cooking oils, refrigeration plant, warehouse and maintenance facilities, office space, and a cafeteria. Between 400 and 500 employees will ultimately be required for operating the plant.

Products to be made in the plant include shortening, margarine, and salad oil for retail markets and Velvet, Gleam, Southern Queen, and Kerba shortenings and cooking oils for institutional users.

Mrs. Tucker's was founded in 1913 and became a part of Anderson, Clayton & Co. last year.

Columbia-Southern to Produce Ammonia at Natrium

Columbia-Southern Chemical Corp. has announced that it will enter the ammonia production field with a new plant to be built at Natrium, W. Va. The hydrogen by-product from Columbia-Southern's chlorine-caustic plant at Natrium will be utilized in the ammonia process. The hydrogen is now being burned for fuel.

Agricultural outlets are expected to account for about 50% of the plant's output. The company has not disclosed the plant's planned capacity or the cost of building it. Contracts are to be let in the near future and production is expected to begin late next year.

Columbia-Southern is a wholly owned subsidiary of Pittsburgh Plate Glass Co.

Calspray Buys Assets Of Mid-State Chemicals Supply

California-Spray Chemical Corp. has announced the acquisition of assets of Mid-State Chemical Supply Co. in San Joaquin Valley of California. The line of fertilizer formerly sold by Mid-State will be a new venture for Calspray. About two thirds of Mid-State's business has been in fertilizer and the rest in pesticides.

Cliff Gay will be the branch manager at the former Lindsay office of Mid-State and Louis Grabe will be manager at Bakersfield.

Frito Buys Two Texas Vegetable Oil Firms

Frito Co. of Dallas, Tex., has announced the purchase of Texas Vegetable Oil Co. and its subsidiary, Vegetable Oil Refining Co. Both of the vegetable oil companies are located in San Antonio, Tex. C. E. Doolin, president of Frito, was elected president of the two new firms after the acquisition. Amount of the purchase was not disclosed.

Continental Can Buys Squeeze Bottle Manufacturer

Continental Can Co., in a step to round out its diversification in the packaging field, has announced the purchase

Herbicides Field Day at Beltsville

One of the test plots inspected by Herbicide Producers on Herbicide Field Day at the USDA's Beltsville Experiment Station recently. This sugar beet plot was sprayed with six pounds of TCA and two pounds of Endothal to test pre-emergence herbicides. Annual grasses and broadleafed weeds were controlled for 45 days in the sprayed portion. On the right is the heavy infestation of weeds in the untreated area



On The Cover

Progress in Food Preservation

THE PRESERVATION OF food, so that mankind is freed from dependence on the annual harvest of the field, fruit of the orchard, and catch of the sea, was one of the most important discoveries in man's effort to attain a degree of freedom from, often-merciless nature. Since Appert first discovered the principle of canning, science has been able to apply it more efficiently, but the principle has gone almost unchanged.

In the 3500 canneries in the U. S., which turn out about 20 billion cans and jars of food annually at a \$4 billion retail value, modern scientists

and technologists apply their knowledge to maintaining product quality and improving container serviceability. In the frozen food industry, preparations are being made for a research program into the nutritional qualities of frozen foods.

Science has contributed new techniques to food preservation—frozen foods, dehydrated foods—and scientists are now talking much about supersonics, antibiotics, and ionizing radiations. Canning, however, remains as the most utilized method of preserving food

of all the outstanding stock of the Elmer E. Mills Corp., Chicago.

The Mills company, producer of plastic products including flexible bottles, tubes, and pipe and tubing, has one plant in Chicago which will continue to operate under the supervision of Mr. Mills.

Chemical Enterprises Buys into Georgia Ammonia Distributor

Chemical Enterprises, Inc., has announced its plans to purchase a major interest in the Southeastern Liquid Fertilizer Co. of Albany, Ga., thus increasing its investment in the field of anhydrous ammonia distribution.

Chemical Enterprises has similar interests in Indiana, Illinois, Iowa, Kansas, and Oklahoma. Its latest acquisition is the company's first venture in the southeast.

Chemical Enterprises is a joint venture of Lee Higginson Corp., investment bankers, and a group of chemical engineering consultants, including Singmaster & Breyer, C. O. Brown, and C. R. Downs.

Foreign

British Ministry of Agriculture To Develop Research Institute

The British Ministry of Agriculture has announced plans to develop an independent agricultural research institute. The present British research facility at Cheshnut Experimental and Research Station which has been supported by the government is no longer adequate for a national research station and the site is not favorable for expansion.

The agricultural research Council has now acquired a 1000 acre tract in Sussex. The new institute will begin with the transfer of apparatus and personnel from the old station. However eventual plans call for the construction of a new and expanded research establishment.

British Find Amyl Alcohol Inhibits Potato Sprouting

The report of the British Food Investigation Board for 1952 contains a note on the use of amyl alcohol mists for the storage of potatoes. The British are investigating various cold storage techniques for the preservation of potatoes in commercial quantities. They report that sprouting was completely inhibited by storage at 10° C. in an atmosphere of 1 part per million of amyl alco-