Communications

Specific Precipitating Activity of Plant Agglutinins (Lectins)[1]

BLOOD group specific agglutinins have been detected in the seeds and other parts of certain plants (*1–7*). They promise to have theoretical and practical importance, and we are engaged in a study of their immunochemical properties. One of us has proposed (*7*) the term "lectin" (from the Latin *lego,* to choose or pick out) for these and other antibody-like substances.

We have recently found that a number of these lectins are also specific precipitins. For instance, a protein purified from lima bean (Sieva) extracts by alcohol-water fractionation at 0° C precipitates with the salivas of secretors, but not of nonsecretors, of blood groups A and B, but not of O. This preparation also precipitates with a solution of A substance made by Morgan's method (*8*) from hog gastric mucin, but does not precipitate with the polysaccharides of *pneumococcus* I, Friedländer B, gum arabic, and other unrelated substances. An extract of *Dolichos biflorus* (*5*) precipitates with the saliva of secretors of subgroup A_1, but not with A_2 or other groups, and precipitates weakly with hog A. The proteins of beans which do not agglutinate human erythrocytes do not precipitate with any human salivas or with hog A; nor do the proteins of beans which nonspecifically agglutinate all human erythrocytes precipitate with salivas of blood group A or with hog A substance. The antibody-like behavior of the lectins thus extends to specific precipitating power for blood group substances.

It is thought that a study of this phenomenon may yield information about the quantitative course of the reaction, the heat of reaction and temperature coefficient, and the antigenic structure of the blood group antigens. A detailed account of some of our experiments is in preparation.

WILLIAM C. BOYD
ELIZABETH SHAPLEIGH
Boston University School of Medicine

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[1] This work was made possible by support extended to Boston University by the U.S. Atomic Energy Commission, under contract No. AT(30-1)-1395, the Navy Department (Office of Naval Research) under contract No. Nonr-492 (01), and by a research grant, H-1076 (2), from the National Heart Institute, Public Health Service.

Received January 18, 1954.

Geology and Coal Resources of the Centralia-Chehalis District, Lewis and Thurston Counties, Washington

RECENT geologic investigations by the U.S. Geological Survey in the Centralia-Chehalis district, Washington, are of economic interest to the coal and petroleum industries of the state. A comprehensive report on this area, now in preparation, describes large reserves of subbituminous coal and defines areas of marine sedimentary rocks and structures that may be favorable for the accumulation of oil and gas. The information contains data useful in the development and utilization of the coal, which furnishes one of the bases for the potential industrial growth of this region and aids in delimiting new areas favorable for exploration for oil and gas.

The rocks exposed in the Centralia-Chehalis district range in age from early Tertiary (Eocene) to Quaternary. The total thickness of these rocks is more than 12,000 ft. The sedimentary sequence includes marine, brackish-water, and nonmarine sedimentary rocks with interbedded volcanics. The beds are folded and faulted and, in most places, are now buried by poorly consolidated till and outwash from Pleistocene glaciers and by Recent alluvium. The Eocene and Oligocene rocks are intruded by dikes and sills of basalt and gabbro.

The structural history of the rock units in the Centralia-Chehalis district began in Eocene time with subsidence of a north-trending geosyncline and deposition of the McIntosh formation. Upwarping and volcanic activity occurred along the margins of the geosyncline during middle and late Eocene time. Local uplifting, adjacent to the area mapped, accompanied the extrusion of andesite flows of the Northcraft formation during the early part of late Eocene time. The geosyncline was divided into a number of separate basins of deposition during this period. There was no major break in sedimentation, however, in the deeper part of the basin, which occupied most of the mapped area.

The Skookumchuck formation and the Lincoln formation of Weaver were deposited on top of the Northcraft formation in later Eocene and Oligocene time. The deposition was accompanied by periodic warping of the floor of the basin, which resulted in an interfingering of nearshore and coal-bearing deposits with marine beds. Most of the present structural features in the area were formed during early Miocene time, a period of marked deformation and erosion. Slight downwarping occurred in late Miocene and Pliocene time, and faulting has continued to the present, as is evidenced by earthquake shocks of 1950 that probably centered along one or more of the faults in the area.

At least 14 different coal beds have been mined in the Centralia-Chehalis district. The coal beds range in thickness from a few inches to 40 ft and have an average thickness of 6 to 8 ft. Most of the minable coal is

of subbituminous C rank with an average of 8650 Btu on an "as received" basis. The ash content is usually high, ranging from 5 to 25 percent and averaging about 10 percent. When exposed to the air, the coal slacks readily because of its high moisture content, which ranges from 16 to 35 percent.

Nearly 15,000 ft of drilling between 1949 and 1951 yielded information on the extent, thickness, physical characteristics, and reserves of the district's coal. This information, combined with information obtained by mapping and prospecting, shows that the district contains more than 3.5 billion short tons of coal, of which about 40 percent is considered recoverable with present mining methods. During 1951, four mines were operating in the district and produced a total of 52,500 short tons of coal.

As early as 1901, the presence of a thick sequence of marine sedimentary rocks in the Centralia-Chehalis area encouraged the search for oil and gas. Since that date, there has been intermittent exploration, and prior to July, 1952, 14 test holes were drilled within the area. The results of this drilling have not been encouraging, but small shows of gas have been reported. The McIntosh formation of late middle Eocene age, which includes a thick sequence of marine siltstone with interbedded sandstone, is considered the most favorable formation to test for oil and gas. Seven of the test wells drilled in the area are reported to have penetrated rocks of the McIntosh formation. Shows of gas were reported in all these test holes; and a show of oil was reported from a well drilled on the Lincoln Creek uplift, in the western part of the mapped area.

PARKE D. SNAVELY, JR.
R. D. BROWN, JR.
ALBERT E. ROBERTS
W. W. RAU
LINN HOOVER
M. H. PEASE, JR.

U.S. Geological Survey
Portland, Oregon

Received March 1, 1954.

A Dehydrator for Direct-Current Amplifiers

THE direct-current amplifier is extremely sensitive to minute variations in grid voltage. This sensitivity is required for operation but also is a property that introduces considerable error into experimental data obtained with its use under certain conditions. The phototube amplifier in the Beckman DU Spectrophotometer was often found to be unstable in humid weather, as indicated by continuous fluctuations in the galvanometer needle. Since the battery voltage source was constant, the instability was assumed to be caused by variations in the grid voltage. The latter could result from a variable d.c. ground path in parallel with the 2000 megohm grid resistor (the phototube load resistor). The grid voltage variation proved to be due to moisture condensed on the grid resistor, as shown by stabilization after drying. Although the cartridge containing silica gel may successfully perform this function, the following system was found to be more rapid and effective.

Two of the mounting screws on the front panel of the amplifier case were replaced by longer screws that had been drilled lengthwise to permit the passage of air. To these screws were connected the intake and outlet hoses of a recirculating drying system that consisted of an electric double-action piston pump to circulate the air, a cotton filter to remove any oil from the pump, and a tube containing the desiccant (indicating silica gel). The color change from blue to pink indicates when the tube of desiccant must be changed. Several tubes of desiccant may be kept on hand and, when necessary, dried in an oven or by perfusion with hot air. The pump should be turned on about an hour before the amplifier is to be used, unless the atmospheric conditions have been especially humid, in which case more time may be necessary.

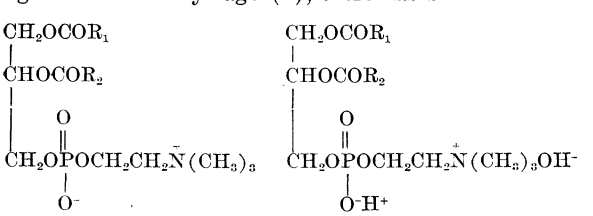
STERLING PIERCE
GARTH MILLER

Department of Biological Sciences
Stanford University, California

Received February 12, 1954.

Depiction of the Lecithin Molecule

DESPITE the fact that experimental evidence serving to establish the zwitterion structure (I) of lecithin on a firm basis was provided by a number of investigators about 20 yr ago (*1*), there has been considerable reluctance to discard the archaic and misleading depiction II. Thus, the structure of lecithin continues to be represented as II (or even more naive representations in which the nitrogen atom is joined to five substituents) in current literature and in otherwise modern and up-to-date biochemistry textbooks.



I II

In a recent series of papers, Baer (*2*) has spoken more and more positively in favor of the old representation II on the basis of the fact that ultimate analyses of crystalline lecithins and structurally related substances indicate the presence of the elements of a molecule of water in addition to those predicted from a consideration of formula I. Baer's painstaking compilation of analytic data on a number of lecithins isolated from natural sources, in addition to those based on his own elegantly prepared synthetic products, would seem to leave little doubt that such substances characteristically incorporate a molecular equivalent of water within their crystal lattices. However, the presence of what is usually termed "water of