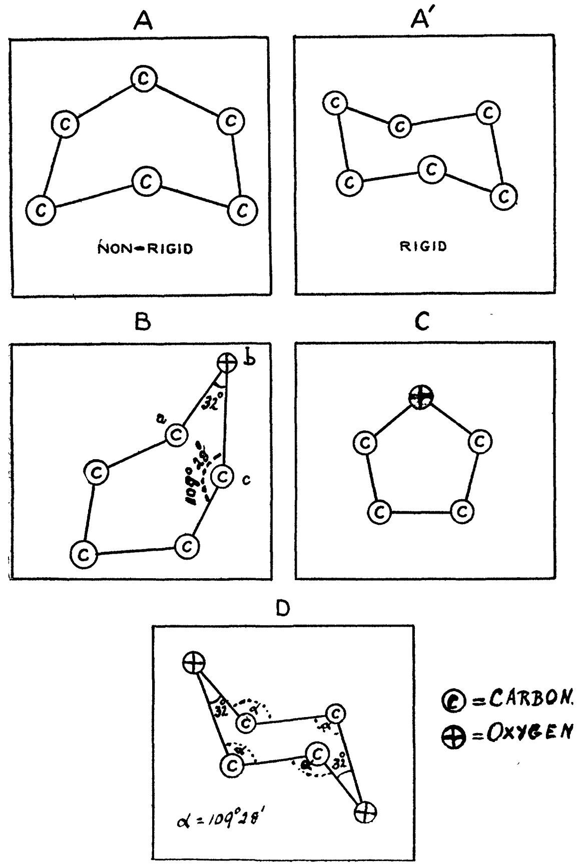

FIG. 1

The above ring forms may be readily demonstrated by use of the Goth carbon models. To represent an oxygen atom, two of the carbon valence bonds are removed from a carbon atom model and the two remaining valence units then bent over so as to subtend an angle of 32°.

It will be seen that in such a model (B) the passage from the "puckered," pyranose ring form into that of the Sachse-Mohr hexamethylene ring type is merely that of a transition of the valence direction of the oxygen atom from 32° to 109° 28′, this being shown on the model in very simple manner by the rotation of the oxygen-valence units *ab* and *bc* into the 109° 28′ position. In the case of the dioxane ring, containing two oxygen atoms, the new theory indicates a strainless ring structure for the compound, as represented by (D). It is seen that a perfectly symmetrical ring is obtained and one therefore having no dipolar moment.

The theory also offers an explanation of the well-known difference in properties found between ethylene oxide derivatives of carbohydrates and polysaccharides, and those of the trimethylene type.

The structures suggested above would seem to apply with equal force to other aldoses, to ketoses, polysaccharides, etc.

It is possible that the remarkable changes occurring in the character of the carbohydrate constituents during plant and animal cell metabolism are to be associated with the marked tendency of the furanose (gamma, active) strained ring type to pass over into the strainless, pyranose, "puckered" ring form as indicated above.

A more complete discussion of the theory is to be given in a forthcoming communication to the *Canadian Journal of Research*.

HAROLD HIBBERT

PULP AND PAPER RESEARCH INSTITUTE,
McGILL UNIVERSITY
(March 25, 1931).

NORTH AMERICAN FRESH-WATER SPONGES

IN order that the records of occurrence of fresh-water sponges in North America may be kept as nearly as possible up to date, I wish to make available the following notes upon the materials with which I have recently worked.

Some years ago while on furlough in South Carolina the writer collected several small bits of fresh-water sponges from a floating log in a fish pond near Summerton, South Carolina, and sent these on to the U. S. National Museum. They were, in the course of time, forwarded to Dr. Frank Smith, who identified them as *Trochospongilla horrida*. This find was of peculiar interest, both because it was, so far as I know, the first fresh-water sponge to be found in South Carolina and also because it was the second time this species, which is a comparatively common one in Europe, had been found in the United States. Dr. Smith had reported it from Illinois in 1921.

Dr. C. McLean Fraser, of the University of British Columbia, gave me a small bit of sponge which had been collected in October, 1925, in Beaver Lake, Stanley Park, Vancouver, British Columbia. This specimen is a typical form of *Spongilla lacustris*.

Professor Y. T. Chu, of St. John's University, Shanghai, China, while studying at Cornell University, Ithaca, New York, in 1925, sent me in September and October of that year two small specimens of fresh-water sponges, one taken from the fish hatchery at the university. This proved to be *Carterius tubisperma;* another from Beebe Lake at Ithaca has proved to be *Ephydatia mülleri* with heavy, smooth skeleton spicules. The opinion which places *Ephydatia japonica* as a synonym of *E. mülleri* is now generally, we believe, accepted. This sponge is very variable and *E. japonica* was separated from *E. mülleri* because it had smooth skeleton spicules: we now know that many specimens of this sponge contain both the spined and the smooth skeleton spicules, thus providing connecting links between the two formerly supposed distinct species.

In March, 1927, Dr. V. M. Tanner sent me some small specimens of *Spongilla fragilis* collected in the Wasatch Mountains in Utah in a small fresh-water pond at an elevation of 7,800 feet. The gemmules of this sponge are found in two very distinct arrangements in different parts of the sponge: in one case, they are scattered through the sponge structure, being grouped together in the typical *S. fragilis* groups of from three to several gemmules with their pore tubes projecting through the covering layer of materials; in the other case, the gemmules form a continuous layer one gemmule thick, closely bound together by a layer of spongin through which the long pore tubes with their curved ends project.

Dr. Jacques Rousseau, of Quebec, kindly sent me several specimens of a deep green sponge forming short cylindrical growths independently and also around the stems of a water weed. This was collected August 8, 1926, and contained no gemmules, but is readily distinguishable by its form and its flesh spicules as *Spongilla lacustris.* This material was collected from Lake Montauban in Quebec Province. Later on, August 17, 1928, Dr. Rousseau also collected this same species at an elevation of 3,650 feet from Lake Cote, Shikshok Mountains in the Province of Quebec, Canada.

Dr. Charles P. Sigerfoos, of the University of Minnesota, has given me a specimen of sponge collected near Minneapolis, Minnesota. This was very full of gemmules and proved to be an *Ephydatia mülleri* with thin smooth skeleton spicules.

Professor W. H. Cole, of Clark University, Worcester, Massachusetts, has kindly sent me recently a collection of sponges which he made from Sudbury River, Concord, Massachusetts, in September, 1924. This sponge he had already correctly identified and reported as *Spongilla lacustris.*

Dr. S. F. Light, of the University of California, has kindly sent me on separate occasions two small specimens of fresh-water sponges from California. The first one is an interesting form of *Ephydatia fluviatilis* with skeleton spicules varying from smooth to finely spined ones. No special location nor date is recorded on this specimen. The second specimen is from Noyo River, Central Mendocino County, and was a "vivid green in life." This sponge was collected in August, 1929, and has no gemmules in it. While there is some doubt as to its determination on account of the absence of gemmules, it is doubtless a species of *Carterius* and I am inclined to believe that it is *C. tubisperma.* Later collections bearing gemmules will be necessary before a final determination can be reached.

Dr. J. G. Needham, of Cornell University, has recently sent me a small collection of sponges made during the month of July, 1930, in the state of West Virginia. Fortunately most of these specimens can be satisfactorily identified, for they bear gemmules. One of these specimens is a very beautiful lichen or liverwort-like growth closely attached to the surface of a stone as a thin, branching form. This is *Trochospongilla leidyi* and it was collected from a stream near Justice, West Virginia. Another small specimen of the same species forming a thin crust on its support was taken at Guyandotte River, also near Justice.

A specimen of the typical form of *Trochospongilla* (*Tubella*) *pennsylvanica* was found in Elk Garden, Mineral County, West Virginia. A good collection of green *Spongilla lacustris* growing in masses rather than in cylindrical projections was taken from Greenbrier River, Marlington, West Virginia. Another specimen of sponge was collected from the Cacapan River near Wardensville, West Virginia, but since this bears no gemmules and presents no distinctive characteristics to enable one to identify it, I shall not hazard a guess even as to its genus. The skeleton spicules are smooth, of medium size and bear sharp points at their ends.

N. GIST GEE

ROCKEFELLER FOUNDATION,
PEKING, CHINA

THE NATIONAL ACADEMY OF SCIENCES

AT the annual meeting of the National Academy of Sciences, held in Washington on April 27, 28 and 29, the following papers were presented:

Molecules in the sun's atmosphere: HENRY NORRIS RUSSELL. It was once supposed that the sun's atmosphere was too hot to permit the formation of chemical compounds, but six have now been detected over the photosphere and eight more above the spots. The heat of formation of a number of these compounds is known (from their band spectra) and their dissociation in the sun and stars can be discussed in the same manner as the ionization of atoms. The results are in good agreement with observation. In general, the compounds increase in number and amount at low temperatures. Most of the known compounds contain hydrogen—the most abundant constituent of stellar atmospheres. Oxygen—also very abundant—comes next on the list. The carbon compounds CN and CH show a maximum at temperature a little lower than the sun's. This may be explained if oxygen is in excess, for CO is more firmly bound than the other compounds, and at low temperatures most of