USGS, Washington, D. C., microfossils of the Mississippian. R. C. Moore, of the Virginia Agricultural Experiment Station, Blackburn, brought out the parallelism and differences in American and European faunas of the Mississippian. Most of these papers brought forth animated discussion.

On Saturday morning, December 27, the symposium on "Methods of Ground-Water Investigation" was introduced by E. J. Schaefer, USGS, Columbus, Ohio. F. C. Foley, USGS, Madison, Wisconsin, discussed development of ground water for military use in the Mediterranean theatres, 1942–45. Among other things, he described wells drilled in volcanic craters. Leland Horberg, of The University of Chicago, described the mapping of subsurface Pleistocene stratigraphy and the determination of buried valleys in Illinois, some of which serve as important sources of ground water. M. B. Buhle, Illinois Geological Survey, Urbana, in a joint paper with C. A. Bays, discussed the electrical-resistivity method of exploration for ground water. V. C. Fishel, of the USGS, Indianapolis, summarized the methods used in ground-water investigations in Kansas, and S. E. Harris, Jr., of Harvard University, in a joint paper with H. G. Hershey and W. E. Hole, described the methods of ground-water investigation in Iowa.

The Saturday afternoon session, Part II of the Ground-Water Symposium, dealt with problems in various states. F. H. Klaer, Jr., USGS, Indianapolis, described the usefulness of soil maps in mapping glacial geology and in ground-water investigations in Indiana; K. E. Anderson, Missouri Geological Survey, Rolla, methods of tracing sources of well contamination in Missouri, showing also the close relationship between geological conditions and probability of contamination; and J. G. Ferris, USGS, Lansing, Michigan, examples of hydraulic analyses which provided geophysical and geological information. M. I. Rorabaugh, USGS, Louisville, Kentucky, reported on studies of infiltration from the Ohio River near Louisville into the glacial aquifers and demonstrated the proportion and amount of river water entering the aquifers. D. W. VanTuyl, USGS, Columbus, Ohio, summarized the methods of investigation of a glacial aquifer near Canton, Ohio, in which stream flow duration curves, correlation of stream flow with pumping, and long-time well records combine to give a figure for safe yield from the aquifer. All papers were discussed and many of them by several participants.

The address of J. L. Rich, University of Cincinnati, retiring vice-president for 1947, on "Goals and Trends in Geological and Geographical Research" was delivered at 2:00 P.M. on December 27. Dr. Rich, in discussing the various motives for research, included the fear motive. He pointed out the danger to universities of secret research, and many disadvantages to universities resulting from their conducting government-sponsored research. He analyzed the problems of financing research, including the very pressing current problem of lessening returns from endowments.

The meetings of the Section were well attended, and the joint session with Section D overtaxed the capacity of the room provided for it. A local committee of which Leland Horberg was chairman, provided for assistance in many matters. (GEORGE W. WHITE, *Secretary.*)

Section on Medical Sciences, Subsection on Pharmacy (Np)

The Subsection held three sessions during the Chicago meeting. The sessions were well attended by representatives of the pharmaceutical industry, departments of pharmacology in medical schools, and representatives from the various areas of science in schools of pharmacy.

H. W. Youngken and Wm. E. Hassen, Jr., of the Massachusetts College of Pharmacy, Boston, reported that the camphor basil, *Ocimum kilimandscharicum,* a shrubby plant native to Kenya, British East Africa, has been grown successfully as an annual in the Boston area. A detailed description of the cultivated plants grown in the Medicinal Plant Garden was given. The dried leaves and flowering tops harvested in late October yielded an average of 2.5% of oil and 2.54% of camphor, the latter similar to the camphor from the camphor laurel of Japan and China.

E. R. Kirch, O. Bergeim, J. Kleinberg, and S. James, from the University of Illinois, Chicago, discussed experiments carried out under conditions of artificial gastric digestion to show the influence of various foods on the reduction of iron. It was found that fresh fruits and vegetables reduced iron as much as 77–98%, largely due to the ascorbic acid content. Egg white, meat, and bread reduced iron to the extent of 25–40%, while milk and egg yolk gave practically no reduction. It is believed in general that the iron utilized by the animal organism has to be in the reduced or ferrous state in order that it may be utilized and absorbed to a maximum.

From the Smith, Kline & French Laboratories, Philadelphia, came a report by R. H. Blythe, J. J. Gulesich, and H. L. Tuthill which described new and modified *in vitro* tests based on physicochemical principles devised for the evaluation of hydrophilic laxatives. These tests measure swelling, water uptake, and water retention in artificial gastric and intestinal media. *In vivo* conditions are further simulated by a novel use of Carbowax as an osmotic agent. In this test, the gel formed by allowing the substance to swell

in artificial intestinal fluid is subjected to the pull of a 30% solution of Carbowax "4000" through a "600"-grade cellophane membrane. This osmotic effect was selected as giving an indication of hydrophilic properties of the agent under the physiological conditions which exist in the colon. The tests were applied to commercial preparations of karaya and psyllium and to the synthetics, methylcellulose and sodium carboxymethylcellulose. In addition to having the advantages of greater uniformity and stability, the cellulose derivatives were found to be generally superior to the gums in hydrophilic properties.

C. C. Pfeiffer, of the University of Illinois at Chicago, gave the result of work in which he attempted to answer why a particular type of chemical structure or, more important, why unrelated types, have the same specific pharmacological action on particular types of reactive cells. Previous hypotheses based on the known ring systems of organic chemistry have been inadequate. Greater correlation is obtained by modeling the formulas in three dimensions, determining the active prosthetic groups and the critical or optimal interprosthetic distance lineally. Atomic model measurements of acetylcholine and its aliphatic homologues are in accord with the postulate that three receptors on the cell surface are activated by a double oxygen prosthetic group and a methyl on nitrogen prosthetic group at an interprosthetic distance of approximately 5 A. The nature of the oxygen prosthetic groups may be ester, ketone, ether, or hydroxyl. The closed ring structure of pilocarpine, arecoline, neostigmin, and physostigmin have these three prosthetic groups at approximately the same interprosthetic distance as in acetylcholine. Potency of the quaternary analogues of neostigmin may be correlated with the optimal interprosthetic distance. Potent blocking molecules which are close analogues of atropine have an identical spacing of the three prosthetic groups contained in a large umbrella molecule which, in some unknown manner, blocks the receptors on the cell and perhaps adjacent receptor groupings.

Researches on the new rodenticide known as Castrix were described by K. P. DuBois, of The University of Chicago. This investigation has shown that Castrix is about 5 times more toxic to rats than the wartime discoveries known as 1080 and ANTU. It is readily acceptable to rats and highly toxic when offered at a concentration of 1% in the diet. Castrix produces convulsions and death in about 30 minutes after lethal doses are eaten. Sodium pentobarbital (Nembutal) was found to be a very effective antidote for Castrix poisoning.

Particular interest was evidenced in a series of papers on the use of radioactive tracer compounds. John E. Christian, of Purdue University, pointed out that radioactive elements have possibilities for direct application in therapeutics, but that their greatest interest in pharmaceutical research is as tracer elements. Because a radioactive isotope of an element behaves identically with other isotopes of that element in all chemical and physiological properties, it labels without question the particular atoms one wishes to trace. In other words, the labeled atoms are specific for tracing any element. The extreme dilutions in which it is possible to trace such tagged atoms makes it possible to undertake studies hitherto impossible. For example, one may study and determine accurately the rate of absorption of certain substances and the degree of irritation on the skin or mucous membranes, the time and rate of disintegration of enteric coated tablets, the distribution of drugs into certain organs and tissues, the rates of excretion, and the route of excretion. This new tool should make it possible greatly to extend our knowledge of the mechanism of drug action, and from that knowledge we should be able to devise better drugs.

The removal of calcium and phosphorus from teeth by mouth washes, fruit juices, and similar substances has received considerable attention in the scientific press during the last few years.

A. E. Jarvis, of Pitman-Moore and Company, Indianapolis, and L. D. Edwards, J. E. Christian, and G. L. Jenkins, of Purdue, showed that when a rat was injected with radioactive phosphorus, the rat's teeth became radioactive. The effect of various substances on the removal of the radioactive phosphorus from the rat's tooth was then studied. It was revealed that the pH of the solution of a mouth wash or fruit juice has little effect upon phosphorus depletion of the teeth. Distilled water removed much more phosphorus than did ordinary tap water or the usual mouth washes. Lemon juice was found to be the most active of all the substances tested in removing phosphorus from teeth.

R. K. Thoms, J. E. Christian, and L. D. Edwards reported that they had determined the residues of applied phospholipids and sodium *n*-alkyl sulfates on the rat skin using radioactive tracer substances. They found that this technique evaluated very well the amount of such residues remaining after application in the form of a soap and rinsing with water. In a series of sodium *n*-alkyl sulfates the residues remaining on the skin after rinsing and drying were greatest with those compounds whose chain length was optimum for surface activity, namely, 12 carbon atoms. These investigators found that the amount of phospholipid in a so-called superfatted soap remaining on the skin after application in soap and then washing was almost insignificant. (GLENN L. JENKINS, *Chairman.*)