SCIENCE NEWS

Science Service, Washington, D. C.

THE SPECTROSCOPE AND STANDARD MEDICAL TESTS

FOR the first time in the history of medicine, standards depending on analysis with the spectroscope, the most powerful research tool of science, have been accepted for a medicinal product by the American Medical Association.

This was reported to the session of the Massachusetts Institute of Technology Spectroscopy Conference by Dr. Henry R. Kreider, of the chemical laboratory of the American Medical Association, who related the spectroscopic requirements which riboflavin, or vitamin B_2, must meet to gain approval of the council on pharmacy and chemistry of the association.

Heretofore, the standards for medicinal products have been determined largely by chemical and physical methods, but the spectroscope provides an "excellent means of standardization" and it will probably find wider and wider use with passing time. Dr. Kreider stressed the ability of the powerful eye of the spectroscope to detect extremely small but nevertheless therapeutically significant amounts of metals in medicinal compounds, whether they are present as impurities or as physiologically active ingredients. In one case he described, a salve claimed to contain mercury in organic combination baffled all attempts to detect the mercury chemically, but the spectroscope quickly revealed its presence, although in an amount much smaller than that claimed.

The spectroscope has also been very useful to the laboratory in examining physical therapy equipment such as therapeutic lamps and ultra-violet ray lights, for it enables precise investigations of their emissions and easy comparison with standards. Still another example of solving puzzling problems accurately, quickly and cheaply is the use of the spectroscope in testing portions of a patient's skin for metals. In this case a small piece of tissue is removed and examined under the spectroscope.

O. Ivan Lee and Thomas A. Wright, both of Lucius Pitkin, Inc., reported a comprehensive attempt to correlate the 2,700-odd recognized minerals into an organized table which would enable the most precise and careful analysis. The result is a simple but extensive chart of minerals, designed for daily use by the spectroscopist and mineralogist, a distinct contribution to the art of determinative mineralogy. It is the first set of tables of this nature since 1925.

SPECTROSCOPIC DETERMINATION OF THE NATURE OF VITAMIN B_1

A SIGNIFICANT chapter in the history of science was related when Dr. A. E. Ruehle, of the Bell Telephone Laboratories, a member of the group whose research paved the way, in 1936, for the laboratory manufacture of vitamin B_1, the anti-neuritic vitamin, told the story of the research before the Spectroscopy Conference. His story was also a chapter in the many which could be written concerning the contributions to scientific progress of the spectroscope.

Dr. Ruehle was a member of the group working under Dr. R. R. Williams who applied the spectroscope to learn the manner in which the atoms of the vitamin are hitched together and thus provide the clue most badly needed for duplicating it in the laboratory.

Ultra-violet absorption spectra were particularly well fitted for this work, Dr. Ruehle pointed out, for not only does the delicate technique yield precise analyses, but it has the added advantage of requiring only minute amounts of the substance under investigation for these tests. This was a great advantage over other analytical methods with vitamin B_1 because only small amounts were available for study. In the research unusual and extensive use was made of absorption spectra in an effort to secure hints as to what products were formed in various chemical reactions with the vitamin, how the atoms in the vitamin molecule divided, and to confirm later chemical findings.

The vitamin molecule, it was found, can be chemically split into two parts and by comparing the spectra of one of these and its derivatives with those of corresponding derivatives of a chemical known as thiazole, strong evidence was obtained that there was a so-called thiazole ring in the vitamin. This finding, incidentally, was later confirmed by the chemical synthesis of this part of the vitamin and was given by Dr. Ruehle as the first evidence of a thiazole derivative in nature.

Similarly the other portion of the vitamin molecule was shown by absorption spectra to contain a pyrimidine ring, and it was indicated that at a certain place on the ring an amino group was substituted for another group. Use of absorption spectra also gave the investigators the first evidence of the manner in which these two rings were linked together in the vitamin molecule.

From this information Dr. Williams and his associates were able to establish absolute chemical proof of the manner in which all the atoms comprising the complex vitamin molecule are hitched to each other and furnished chemists with the stepping stone to artificial manufacture of the vitamin a short time later.

THE SPECTROSCOPE AND CELL RESPIRATION

DR. T. R. HOGNESS, of the University of Chicago, speaking at the Spectroscopy Conference, stated that an understanding of the problem of cancer may well lie in a better understanding of how the cells of the body breathe, for the abnormal cell growth which characterizes cancer is linked with abnormal respiration.

Reporting spectroscopic studies that he has made of respiratory enzymes, Dr. Hogness emphasized the fundamental relationship between respiration and growth, adding the prediction that the keen eye of the spectroscope "will play a large rôle in our final understanding of cancer." Earlier in his paper Dr. Hogness had explained how this "master key of science" had enabled marked advances in man's understanding of the rôle of

the complex respiratory enzymes in bodily processes. With older methods of attacking this important problem only the total effect of all cellular processes could be studied, but the spectroscope has permitted the isolation and investigation of each individual step. The fundamental problem of cell growth will not be understood until the respiratory process of cells is known and that depends on knowing how enzymes function in the utilization of food and oxygen.

Dr. Hogness is studying the chemical reactions whereby sugar gives up hydrogen, which combines with the body's oxygen to form water. Water and carbon dioxide are the two waste products in this system, one of the simpler transitions of the many involved in life. The first three steps are known; how the hydrogen goes from sugar to an enzyme, to another enzyme and then to cytochrome–C, another enzyme. Dr. Hogness has studied the properties of this last substance in his quest for the next one, a major missing link in the chain. Indications are that it is a very heavy protein.

THE CHEMICAL CONSTITUENTS OF PLANTS

A FIVE-YEAR exploratory program designed to discover the effects of nitrogen, phosphorus and other elements on the growth and chemical composition of various forage plants was described to the conference by Dr. B. C. Brunstetter, of the U. S. Bureau of Plant Industry.

Eighteen different kinds of grasses and legumes were grown in Maryland for the investigation, including types of plants most common in pastures in the north humid part of the country. These were fed various fertilizers and then spectrographically examined to determine their content of such important mineral substances as magnesium, manganese, aluminum, copper, iron, potassium and calcium.

Principally the study furnished important background material on the mineral content of plants grown in Maryland soil and under that region's climatic conditions. Dr. Brunstetter emphasized that any interpretation or application of the findings must await similar analyses on similar plants but under different environmental conditions. Only such comparisons, he said, can hope to lead to the discovery of laws governing the absorption of phosphorus, nitrogen and potassium by forage plants. Dr. Brunstetter suggested that additional similar studies would probably bring to light cases where the soil is deficient in one or more of the elements essential to plants.

Dr. Brunstetter also pointed out that those elements essential to plants are also usually essential to animal life. Thus while milk is an excellent source of minerals for man, the amount of these minerals contained in the milk is largely dependent on the amount found in the forage grasses eaten by cows. This in turn depends on the amount in the soil in which the grasses are grown.

Assisting Dr. Brunstetter in the research were Dr. A. T. Myers, Dr. H. L. Wilkins and Dr. M. A. Hein, all of the Bureau of Plant Industry.

THE NATIONAL HEALTH CONFERENCE

THE great problem of medical care for all has been projected by the three-day National Health Conference at Washington, D. C., into a major position among the issues before the nation.

When political parties and candidates begin to build their platforms, hardly any who hope for success will dare to leave out a plank for some sort of program for health protection and medical care. The voice of labor, agriculture and other consuming groups will be raised too insistently not to be heard and heeded.

Some phases of the $850,000,000 per year health program outlined by the government experts will undoubtedly come before the next Congress, and some provisions may rush to enactment with unanimous approval just as anti-cancer funds were voted by the last Congress.

Medical insurance, modeled along the lines of job insurance under social security is now emerging as a matter discussed by the people as well as by the experts. In some American form, a new kind of compulsory, government administered "life" insurance for the living, paying the medical bills when the great disaster of illness comes, seems almost sure to become a part of our social order. How soon, is a question. Three years? Five years? A decade?

The prevailing feeling among physicians, as crystallized by leaders of the American Medical Association, is opposed to any change in the usual system of individual engagement of doctors on a fee basis. "State medicine" is anathema to most of them, although a leaven of growing hundreds, the informal Committee of Physicians, favors and is expected to endorse formally the general health plan of the conference. Many physicians will join these liberals when they realize that it is the duty of the medical profession to respond to this national cry for the doctor, just as the family practitioner traditionally arises in the middle of the night to bring a new baby into the world.

Organized medicine at the conference just closed undoubtedly had impressed upon it the extraordinary fact that there is more demand for their commodity of disease prevention and treatment than they can supply. They were told that hundreds of practicing physicians are partially unemployed—with office hours too often leisure hours—while ill millions go untreated. It is a gigantic problem of distribution.

The public is calling for the doctor and trying to work out the best way to pay him. This is an old personal problem that is becoming a national issue. It is one that every one will hear more about in the months to come.—WATSON DAVIS.

TRANSATLANTIC SURVEY FLIGHTS

WITH the open season for transatlantic ocean hops already launched by the Hughes flight, Douglas (Where am I?) Corrigan and now the Mayo composite *Mercury* seaplane of England, the plans for further airline survey flights across the North Atlantic are without American participation this summer.

If America seems backward in this respect it only needs to be recalled that Pan-American Airways is about three years ahead of the field and its survey work is complete. So far as American participation in transatlantic aviation, it could be started immediately. As of July 1, Pan-American Airways had fourteen complete

"ocean crews" available. Each one of these crews consists of a flight captain, pilot officers, flight engineers, navigators and radio officers who all have had at least 100,000 miles of transoceanic transport behind them. While American pilots and American planes are thus waiting, here is the program of foreign nations which will permit them to catch up in their survey flights.

England has three projects under way. The first—the flight of the seaplane *Mercury* after a launching from the giant flying boat *Maia*—is already completed. More flights with this same novel equipment will be made. In addition England plans to use the *Albatross*, a four-engined wood and plastic composition land plane designed especially for transoceanic service. And finally the flying boat *Cabot*, an enlarged version of the Empire seaplanes used last summer, will make test flights. The *Albatross* is due to take off early in September and the *Cabot* later in that month.

Germany, for the third year, will make flights (14 round trips in all) during the summer by way of Lisbon and the Azores. The *Nordmeer*, *Nordwind* and *Nordstern* will be launched by catapult from mother ships stationed at the Azores and at Port Washington, L. I., the seaplane terminal in America.

France, most backward so far in pushing its transatlantic service, plans at least six oceanic flights during the summer. One of the first flights will be that of the giant *Lt. de Vaisseau Paris*, 40-ton flying boat, with six engines, which has previously visited the United States by way of the South Atlantic and South America. The French route has not yet been decided, but the *S.S. Carimare* has been stationed in mid-Atlantic, for some months, to obtain the best weather data for transoceanic hops.

While Pan-American Airways is waiting for this foreign effort its "super-clippers" are under construction and the first—capable of carrying 72 passengers and powered by 6,000 horsepower—is now undergoing engineering tests at the Boeing factory in Seattle, Wash. This first seaplane will be ready for transatlantic service early in the fall and is believed to be an advance, of some several years, over anything which foreign nations have to offer for transoceanic commercial transport by air.

ITEMS

THE 317,000-pound horseshoe-shaped bearing for the 200-inch Mt. Palomar telescope has just been ground and polished until its surface is true to within five one-thousandths of an inch. Nearly as perfect as mechanical science can make it, the bearings soon will leave on the long water passage which will take it down the Ohio and Mississippi Rivers, across the Gulf of Mexico, through the Panama Canal and back up the Pacific to San Diego. From there it will be transported slowly up Mt. Palomar to the observatory of California Institute of Technology. Engineers at the Westinghouse Electric and Manufacturing Company were able to obtain the high accuracy of grinding surface only because they built a huge "sunbonnet" that shaded the bearing and reduced the swelling and shrinking of the enormous block of steel when the sun's rays shone on it, and then off again.

IT was reported at the meetings in Salt Lake City of the American Society of Civil Engineers that a new giant steam turbine-electric locomotive, of a design different from any locomotive now in operation, will soon be placed in service on the Union Pacific Railroad. Charles P. Kahler, system electrical engineer of the Union Pacific, stated that the unit, creating at least 5,000 horsepower, will virtually be a steam generating electric plant on wheels. The locomotive, now under construction, will generate 45,000 pounds of steam an hour at a pressure of 1,500 pounds to the square inch. This high pressure steam will drive a main turbine spinning at 12,500 revolutions per minute. The turbine, in turn, will drive an electrical generator at 1,250 revolutions per minute. This electric power will drive the locomotive. The steam circulates through a closed circuit. After leaving the turbine it goes to an air-cooled condenser, is there turned back into water and sent back to the boiler.

OFFICIALS of the U. S. Bureau of Entomology are not particularly alarmed by the Japanese beetle situation which has the metropolitan New York area aroused. New York's problem, viewed on the broad-scale picture, represents the alarms which always occur in the outlying areas of infestation when the beetles' arrival is novel and the population is lacking in knowledge of control. As the presence of the beetles occurs year after year an area grows accustomed to them. Japanese beetle quarantine methods, now enforced, are keeping the insect pest under reasonable control since it was first discovered at Riverton, N. J., in 1916. In usual years twenty-five miles represents the maximum distance which an area of infestation will spread.

SMALLPOX virus particles, hitherto unseen even under highest microscopic magnifications, have been made visible by means of an improved electron microscope developed by Dr. Franz Krause, at Neubabelsberg, near Berlin. The particles, which are not "germs" in the ordinary sense, being very much smaller than bacteria, were rendered visible at a magnification of 2,000 diameters. The virus was mixed with diluted gelatin. A fine-meshed metal screen was dipped in this and the film allowed to dry on it. This was then examined through the electron microscope, working in high vacuum.

L. CARRINGTON GOODRICH, Columbia University associate professor of Chinese, reports to the *Geographical Review*, that the first appearance of syphilis in the Chinese Empire, now established as during the year 1505, immediately followed by the introduction of maize, both of American origin, gives the time when China first learned of America's existence. This disproves the 200-year-old belief that Mexico was discovered by a Chinese Buddhist monk in the fifth century, but does not mean, Mr. Goodrich says, that "during all this long period of time, roughly from the fourth century before Christ to the fifteenth century of our era, the Chinese knew nothing of the New World." The first Chinese map to record the Americas was published in 1584. It was prepared by the Jesuit missionary, Matteo Ricci.