CHEMISTRY

Morphine Synthesized

Complicated chemical structure of pain-relieving morphine is duplicated in the laboratory starting from phenanthene, promising synthesis of related, non-habit forming drugs.

➤ MORPHINE, PAIN reliever and poison, can be synthesized by a new method from coal tar products instead of being extracted from the opium poppy.

The new research was done at the Weizmann Institute of Science, Rehovot, Israel, by Dov Elad and David Ginsburg. It supplements a method of synthesis announced in 1952 by Drs. Marshall Gates and Gilg Tschudi of the University of Rochester, N. Y. (see SNL, March 8, 1952, p. 147.) The University of Rochester synthesis was the first solution to a long-standing chemical puzzle.

Morphine, one of the class of plant products known as alkaloids, has a complicated chemical structure composed of five interlocking carbon rings. This was first determined in Germany about 1889. Many chemists since then have tried to make the alkaloid without recourse to the poppy plant.

Such a synthesis would make chemically expert countries independent of the uncertainties of oriental opium trade. It would also allow them to be sure of the strength of material used and, more important, it would allow more experimenting with substitutions in molecular structure. This might make it possible to create new drugs with morphine's good qualities and without the poisonous and habit-forming qualities that make its use hazardous.

The new synthesis starts with phenanthrene, a three-ring carbon compound which occurs in coal tar, Drs. Elad and Ginsburg report in the *Journal of the American Chemical Society* (Jan. 5). The former one began by using Schaeffer's Acid, an aniline dye intermediate. Each builds up to a compound of Thebaine, or paramorphine. From there, the conversion to morphine and its derivative codeine is the same in each process.

Artificial compounds, such as Demerol, which have been synthesized during the past 15 years or so, provide substitutes for morphine that would take care of medical needs for the alkaloid product in case the supply of opium were cut off.

The long and complicated procedures for artificial production of genuine morphine would make its manufacture too costly at the present time but, once the key to production of a new chemical has been found, short cuts to cheapen its cost of production usually can be worked out within a relatively short time if the product is needed.

Science News Letter, February 13, 1954

PHYSICS

Einstein Theory Revised

➤ PROF. ALBERT EINSTEIN has revised his generalized theory of gravitation, which aims at a complete description of the physical universe by a single theory.

In the previous version of his theory, published last year (see SNL, April 11, 1953, p. 227), Einstein outlined a method for choosing a particular set of equations based on their "strength." He made, however, an error in counting the number of significant, or applicable, equations, which is corrected in his new revision.

Einstein believes that his theory holds the key to the universe, unifying in one concept the infinitesimal, whirling world of the atom and the vast reaches of star-filled space. Just as in 1905 his mathematical equations pointed out that light and mass were simply two different manifestations of energy, which was demonstrated nearly 40 years later in the blinding glare of the first atomic bomb explosion, so now he has tried mathematically to join gravitational and electromagnetic forces.

These, he believes, are also simply two different manifestations of the unified cosmic field.

Mathematical difficulties have so far prevented checking the revised theory against known experimental facts. Einstein believes, however, that his unified field theory will eventually yield an explanation of the "atomic character of energy."

Instead of the well-ordered universe that would follow from Einstein's field theory, most physicists today favor a particle theory, holding that the probability and uncertainty laws covering an electron's behavior must also apply to the universe.

Development of a single theory to explain both gravitational and electromagnetic forces has been a major goal of physicists since 1920.

It was in 1905 that Einstein published his famous special theory of relativity, which stated the equivalence of mass and energy and led to the well known equation, $E=mc^2$, or energy equals the mass times the velocity of light squared.

Einstein, who is now on the staff of the Institute for Advanced Study in Princeton, N. J., was awarded the Nobel Prize for physics in 1921.

Science News Letter, February 13, 1954

• RADIO

Saturday, Feb. 20, 1954, 3:15-3:30 p.m. EST

"Adventures in Science" with Watson Davis, director of Science Service, over the CBS Radio Network. Check your local CBS station.

Winners of the Thirteenth Annual Science Talent Search for the Westinghouse Science Scholarships will describe their projects, speaking from various parts of the country.

STATISTICS

Marriage Rate Drop Due to Old Depression

➤ WEDDING BELLS rang at a slightly slower rate during 1953. Two reasons for the drop, suggested by statisticians of the Metropolitan Life Insurance Company, are: 1. The number of single persons was depleted by the marriage boom immediately after World War II. 2. During that old depression in the 1930's fewer babies were born, and consequently fewer people are "coming of age" now.

Although the marriage rate dropped slightly, from 9.8 per 1,000 population in 1952 to 9.7 per 1,000 in 1953, there were about 20,000 more marriages in 1953 than in the preceding year.

Science News Letter, February 13, 1954

ASTRONOMY

Clue to Earth's Weather In Jupiter's Brightness

➤ A CLUE to the earth's weather can be found in changes in Jupiter's brightness, which are related to sunspot activity, Dr. Ralph Shapiro of the Air Force Cambridge Research Center, Mass., suggests.

Using photographic plates covering 25 years, he measured the brightness at various latitudes from pole to pole. The zone near the equator, he found, is relatively brighter than the other areas in the years when sunspots are in frequent. The brightness of the entire planet, however, is "high" when the sun is most active during its 11-year sunspot cycle.

Dr. Shapiro suggests that ultraviolet radiation from the sun acts as a trigger on Jupiter's atmosphere, and that the changes in brightness then follow the atmospheric changes. Further studies are needed, he says, to explore the way in which the changes in Jupiter's brightness are produced by small, high-atmosphere effects of ultraviolet radiations from the sun.

Finding such a relation also faces meteorologists who, in order to make more accurate weather forecasts, must know what effect variations in the sun's outpouring of energy have on our weather.

Observing the atmospheres of other planets, Dr. Shapiro points out in the *Journal of Meteorology* (Oct., 1953), is "simpler than similar observations of the earth's atmosphere," and may yield "useful information for the problem of solar-weather relationships."

Science News Letter, February 13, 1954