

The increase in number of operations, of course, is due to the discoveries, during the middle of the last century, of anesthesia and antiseptics and asepsis. The first discovery made it possible for surgeons to undertake many more as well as more complicated operations because the patient could be spared all pain. Before anesthesia, operations aside from bone-setting and tooth extractions were desperate, last-resort affairs undertaken only by the bravest surgeons and endured only by the bravest patients.

Antiseptic and aseptic procedures in the operating room added to the safety of surgery and the types of operations surgeons could undertake because it meant the end of often fatal germ-infections following operations.

At the rate of 65 operations per 1,000 persons, Americans undergo more than 8,000,000 operations each year. Most numerous, constituting nearly one-third of the total in Mr. Selwyn's figures, are removal of tonsils. Setting bones and operations in connection with injuries, types of operations that date back to antiquity, are still among those most frequently performed. Bone-setting ranks second and operations in connection with injuries third in order of frequency. Operations on the female reproductive organs take fourth place and appendicitis operations come fifth.

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ENGINEERING

Japan Begins Exploitation Of Aluminum In Manchuria

JAPAN is undertaking the exploitation of aluminum ores discovered in Manchuria, according to *Industrial and Engineering Chemistry*. (Nov. 10)

The Manchurian ores are high in phosphorus content and so must first be refined by a process credited to scientists at the University of Tokyo.

The ore is treated with sulfuric acid, yielding phosphoric acid and aluminum sulfate. The latter is treated with gaseous ammonia at 1,200 degrees Centigrade. Out of the reaction comes ammonium sulfate and aluminum oxide. The reduction of the aluminum oxide to metallic aluminum is accomplished by standard electrolytic methods.

Plans for the development call for the treatment of 15,000 tons of ore annually from which will be obtained 5,100 tons of metallic aluminum (about 11,000,000 pounds).

American aluminum production, in contrast, is nearly 300,000,000 pounds a year.

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PSYCHOLOGY—MEDICINE

Brain Wave Studies Helping Against Drug Addiction

Researchers Hope That Electric Signals May Distinguish Habit-Forming From Safer Narcotics

BRAIN wave records are now being used to aid in the fight against the poppy's curse, narcotic drug addiction, states an editorial appearing in the *Journal of the American Medical Association* (Nov. 12).

How the wavy lines traced by electrical impulses generated in the brain may help in this fight is described in a technical report of a nine-year search for a morphine substitute that will relieve pain without making addicts of those who use it.

The full report, published by the U. S. Public Health Service, will shortly be available, the editorial states, for especially interested physicians and other medical scientists. The studies have been conducted by a committee of the division of medical sciences of the National Research Council, headed by Dr. William Charles White.

The non-habit-forming morphine substitute has not yet been found. The many scientists working on the problem, however, are not discouraged, even after nine years of search that included examination of 300 new chemical compounds.

They have proved, for one thing, that by chemical methods they can change morphine so as to develop a substance that comes close to morphine in its ability to relieve pain. This can be done by synthetic methods, building up a new compound that is like morphine but that lacks the phenanthrene nucleus of morphine. Although the phenanthrene nucleus of morphine is not essential for relief of pain, the scientists are inclined to think that it is essential for addiction or habit formation.

It is for testing the addiction or habit-forming properties of possible morphine substitutes that the brain wave records, scientifically termed electro-encephalograms, may be useful. No method, short of the impractical one of giving a new chemical to large groups of non-addicts, has been developed for determining whether or not a drug is habit-forming. This has been one of the stumbling blocks in the research. Other properties

of new drugs can be safely determined from studying their effects on animals and on addicts and non-addicts, but not the important property of causing addiction.

Brain wave studies, therefore, have been started at the federal government's narcotic farm at Lexington, Ky. In one instance so far, the brain wave studies showed a difference between morphine and another narcotic drug—codeine. Since codeine is known to be less habit-forming than morphine, the scientists hope they are on the right track and that the brain wave studies will give them a safe tool for testing the habit-forming or addiction liability of pain-relieving drugs.

The ideal morphine substitute, the technical report states, will be a compound which gives relief from pain for five hours or more but which has a "dependence satisfying" action of 30 minutes or less, or better still, none at all. By "dependence satisfying" action is meant ability to prevent abstinence or withdrawal symptoms in a morphine addict who is deprived of the drug.

Physical dependence on morphine is one phase of morphine addiction which can be used as a test for addiction or habit-forming properties of morphine substitutes. If a new compound can satisfy this physical dependence already established in a morphine addict, it is assumed that the new compound itself will cause dependence if given over a period of time, and therefore that it has addiction or habit-forming properties.

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CHEMISTRY

No Nobel Prize Award In Chemistry for 1938

NO NOBEL Prize in Chemistry for the year 1938 will be awarded, it is announced by the Caroline Institute. The prize money of the award, amounting to something over \$35,000, will be placed in the general fund of the Nobel award.

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