

oergyi's researches announced only four months ago. This may allow treatment of the disease by mouth instead of by injection. He found that a long known drug, succinic acid, has the power to combat the acidosis condition which is the dangerous end result of diabetes. The new drug promises to aid diabetics

who do not respond completely to the now standard insulin treatment.

Fumaric acid mentioned in the official citation for the Nobel award is used in making the succinic acid.

The award to Prof. Szent-Gyorgyi is a cash prize of some \$40,000, which will be presented in December.

Science News Letter, November 20, 1937

MEDICINE

Anti-Pneumonia Vaccine Being Distributed to C.C.C. Camps

A VACCINE for preventing pneumonia, being prepared at the Army Medical School, Washington, D. C., is now being distributed to C.C.C. camps throughout the country. Young men at the camps will be given shots of the vaccine, which it is believed will protect them during the coming winter against the disease which ranks third as a cause of death among all diseases.

The vaccine, originally developed by Dr. Lloyd Felton of the Johns Hopkins University, will not be available to the public for probably two or three years. It will take at least that long to determine, by experience with it in the C.C.C. camps and elsewhere, whether or not it is an effective preventive.

Final decision will be based on comparison between the number of cases of pneumonia, if any, that develop among the vaccinated men with the number of cases developing among the unvaccinated. Since the number in the latter group may be small anyway, it will be necessary to wait until figures on thousands of cases in each group are available for comparison. Last year 25,000 men at C.C.C. camps were vaccinated, but that is considered too small a number for drawing conclusions.

Best method of protection against pneumonia now available to the general public is to avoid colds and influenza. Four-fifths of all cases of pneumonia start from a cold or influenza, experienced physicians estimate. Although it may not be possible to avoid colds and influenza, they can in many cases be kept from ending with pneumonia if proper care is taken.

Another important point in pneumonia prevention is the isolation of pneumonia patients as early as possible, so their germs cannot spread to well persons. For this reason and for the protection of the patient himself, a doctor

should be called at the first suspicion of pneumonia.

The usual autumn rise in influenza cases has already started, reports to the U. S. Public Health Service show. The increase, however, has not yet reached the stage of suggesting that there will be an epidemic. It does show that it is time to take precautions against colds, influenza and pneumonia.

Pneumonia is caused by a tiny germ called the pneumococcus. There are 32 types of these germs, each causing a separate type of disease. Fortunately there are curative serums available for at least five of these pneumonias—Types I, II, V, VII and VIII. If universally and reasonably adequate applications of serum treatment were made, nearly half the deaths from pneumonia could be prevented.

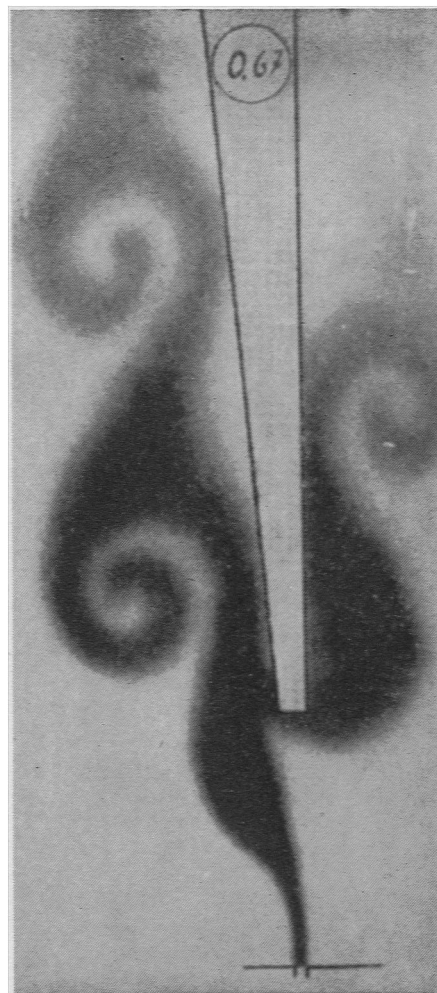
Dr. Felton's vaccine protects against Type I and Type II pneumonia and perhaps against other types as well. Preparation of it is a very tedious task. At the Army Medical School pneumonia germs for vaccine production are being grown in 50-gallon batches. From each such batch about one-sixth to one-third of an ounce of vaccine is produced. The amount required for a shot of vaccine—and only one shot need be given for protection—is not very large. From one gram of vaccine, which is less than a thirtieth of an ounce by weight, 1,000 men can be vaccinated.

If the vaccine becomes available generally, it will probably be possible to obtain it for about \$1 a shot.

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About 25 million elm trees shade the streets, yards and houses of America's villages and cities.

Houses built in Czechoslovakia are now required to have bomb-proof shelters provided in their cellars.



ARTISTIC SOUND

In artistic curls made visible by the addition of a small amount of smoke the eddies from an organ pipe swirl out. An illustration from the new book "Science and Music," by Sir James Jeans.

CHEMISTRY

Chemicals Added to Coal Fail To Aid Its Burning

CHEMICALS added to coal to make coal burn better have little effect on the combustion of fuel, the U. S. Bureau of Mines revealed at the conclusion of exhaustive tests.

Spurred by continual inquiries about alleged "fuel savers," the Bureau investigated, both alone and in mixtures, all the chemicals known to have been marketed for this purpose, and many others, including water and chlorine. None, it was stated, were found to produce the effects claimed for them.

Results of the experiments are contained in a bulletin by P. Nicholls, W. E. Rice, B. A. Landry and W. T. Reid.

Science News Letter, November 20, 1937

PHYSICS

Music May Have Scale Of 53 Notes, Predicts Jeans

Human Ear, Wearied With Old Harmonies, Demands New Notes at First Rejected, Then Tolerated, Liked

MUSICIANS of 1,000 years hence may be writing and playing their music on a scale which contains 53 notes to an octave, predicts Sir James Jeans, the noted British astronomer whose ability to turn scientific terms into the language of the layman has made the mysteries of the universe and the hearts of atoms enter the realm of non-fiction best sellers.

Sir James' newest book, "Science and Music" (Macmillan), predicts the 53-note scale for the distant future when all the possible combinations of the present 12 note scale have become boring to human ears.

But before that day comes, a day which will produce music better than the present, it may be expected that the music of the future will be like that of the present, but intensified. This has been the past history of music in which certain pleasing musical forms have been built up and persisted.

One tendency of music, says Sir James, has been the history of consecutive fifths. Harmonies which have seemed venturesome and even ugly to one generation seem natural and even beautiful to the next. And then through continuous use they become obvious and tedious to later generations. Just as popular swing music continually demands new "hit" tunes, so does "the sated ear forever demand new harmonies which it will fast learn to tolerate, and then dismiss as threadbare and uninteresting."

New Chords

Palestrina, J. S. Bach, Beethoven, Liszt, Wagner and Debussy are all examples of noted composers who broke new ground and introduced new chords that were considered discordant at first but which have now passed into the common language of music.

Sir James' scale of 53 notes enters in that distant day when it may be conceived that the human ear will find tolerable all the possible discordances which can be fashioned out of the present scale of 12 notes. In that day man will have only one other way to expand his musical horizon; by adding notes to the

scale and thus splitting the octave into more and more parts.

Already, says the British scientist, there has been some experimentation with quarter tones. Enlargement of the scale has been progressive throughout musical history, he adds. First there was the pentatonic scale with five notes, then the heptatonic scale with seven notes and finally the chromatic scale of the present with its 12 notes.

"Has it reached," asks Sir James, "its final resting place in the 12-interval division of the octave, or will the subdivision still continue?"

"We have already seen that the question is one for the arithmetician. Without forgetting the proverbial dangers of prophecy, we may be fairly sure that the laws of arithmetic will not alter, and that the natural harmonics will not change their position—a million years hence, as now, their frequencies will be 2, 3, 4, . . . times that of the fundamental. And, unless the physiological quality of our ears changes appreciably, we may assume that we shall always obtain our basic pleasure from chords whose frequency ratios can be expressed by the smallest of numbers. Because of this, it seems likely that the present fifth, with the simplest frequency ratio of all, 3 : 2, and the major third, with the next simplest frequency ratio 5 : 4, will figure largely in the music of the future. Before we attempt a conjecture about the musical scale of the future, it is worth seeing how far the subdivision of the octave would have to be extended, to provide a scale richer and purer in this respect than our present scale."

The logical divisions of the octave to obtain the maximum amount of harmonious fifths and major thirds occur at 12, 41, 53 and 306 notes to the octave. The 12 note octave is now being used and the 41 note octave has some difficulties, so that the next choice falls at 53 notes to a musical octave.

"So far as is known, a 53-note scale was first proposed by Gerardus Mercator (1512-94), the famous Flemish mathematician, geographer and map-maker. In the middle of the last century, two har-

moniums with 53 notes to the octave were built, one for Mr. R. H. M. Bosanquet of London, and one by Mr. J. P. White of Springfield, Mass., but neither seems to have been regarded as more than a curiosity," points out Sir James.

"We have already seen that the present 12-note scale has its roots embedded very deeply in the unalterable properties of numbers; we now find that music will have to go very far before finding a better scale. But a 53-note scale would give far purer harmonies than the present scale, and we can imagine future ages finding it worthy of adoption, in spite of all its added complexities—especially if mechanical devices replace human fingers in the performance of music. For, in the last resort, our limited scales have their origin in the limitations of our hands.

"Yet, if ever music becomes independent of the human hand, may not the race then elect to use a continuous scale in which every interval can be made perfect—as with the unaccompanied violin of today?"

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CHEMISTRY

Petroleum Chemists Told Of Need for Basic Research

RESearch in the chemistry of petroleum and its products has had to be rather higgledy-piggledy for a quarter of a century because the automobile industry has been a chronic Oliver Twist, holding out its dish and hungrily crying for "more." Research energies have had to be concentrated on meeting this terrific demand.

But now it is time to get down to real fundamentals of petroleum chemistry research, Dr. Harrison E. Howe, editor of Industrial and Engineering Chemistry, told the American Petroleum Institute. Thus far, petroleum chemists have been so busy as "oil cooks" that they have had time to find out the fundamental nature of only about ten per cent of the complex mixture that is crude oil. They need to work out the other ninety per cent of this basic knowledge, and then find out more about what the whole thing is good for.

"The petroleum industry owes its growth to research and the application of its results," Dr. Howe declared. "It must continue a research program, with adequate staffs of carefully-trained and chosen men giving their attention to expertly-chosen problems, if it would maintain its position."

Science News Letter, November 20, 1937