

## Bill Is \$178,191,272

**A**LCOHOLIC mental disorders cost \$178,191,272 to the people of the United States each year, according to an estimate given the American Association for the Advancement of Science by Dr. Horatio M. Pollock, director of mental hygiene statistics, New York State Department of Mental Hygiene.

Patients suffering from alcoholic mental disease or alcoholism in mental hospitals throughout the United States number about 31,220, Dr. Pollock estimates. Since the cost of maintaining these patients averages about \$500 a year, the total cost would be \$15,610,000.

To this sum must be added the economic loss which results when a man or a woman suffers mental breakdown. Figured only for those patients first entering a mental hospital during a single year, this would amount to \$86,154,712.

But this sum does not include the loss of earnings and the money spent on alcohol during all the years of alcoholic excesses that went before the victims finally landed in the mental hospital. This amount Dr. Pollock figures to be \$76,426,560.

These three amounts make up the striking total of \$178,191,272, which does not count losses due to physical illness, crime connected with intoxication, pay of policemen, cost of courts and jails.

## 'Tight' Really Is Loose

**M**OVING PICTURES to show people who had been to a drinking party just how they look when they think they are having a wonderful time were advocated as of great educational value.

The psychiatrist who would thus dampen the spirits of "good fellows" is Dr. Abraham Myerson of Harvard Medical School.

Getting "tight," he declared, really

means getting loose, for the main factor which makes for a reasonable well-organized personality, inhibition, disappears when intoxication begins.

Several social factors contribute to the building up of the alcoholic habit, Dr. Myerson has observed. First is the tendency to measure he-man-ness by the quantity of alcohol a man can imbibe. Actually, capacity to take alcohol is a liability rather than an asset, since it leads to alcoholism.

The man who becomes acutely sick

after a drink of liquor almost never becomes an alcoholic.

Another social influence is the general tolerance toward the man who gets drunk. Alcoholic intoxication is practically the one form which is indulged in public. It should, Dr. Myerson believes, receive exactly the same condemnation that morphine addiction does.

"The alcoholic," he said, "should cease being a subject of humor and take his place where he belongs in the realm of drug addicts."

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PHYSICS—ASTRONOMY

# Smallest Pieces of Atoms Cause Biggest Explosions

## Supernovae Are Caused When Tiny Neutrinos Emitted From Nuclei of Atoms Escape With Star's Energy

**T**HE smallest pieces of atoms known to science may be responsible for the biggest star explosions—the "supernovae"—stars which suddenly flash out from relative obscurity to equal 100,000,000 suns. One of these may have been the Star of Bethlehem.

This theory is proposed by Dr. George Gamow, professor of mathematical physics at George Washington University, who worked out its details with the aid of a Brazilian scientist, Dr. Mario Schenberg.

Neutrinos, they believe, are the cause. These are emitted from the nuclei of atoms, together with electrons, in one form of disintegration which happens with radium and similar elements. They carry away about two thirds of the energy released from the nucleus when this happens. Because they are so small and have no electrical charge, they have been most elusive.

Inside a star which has started to contract, the temperature would reach several hundred million degrees. Under these conditions processes that can never happen under earthly conditions would easily take place. An electron might hit the nucleus of an iron atom, converting it into a form of another element, manganese. This element, known as Mn-56, has been made artificially in the laboratory. In the process a neutrino would be given off. But the core of the Mn-56 atom would, in a few hours, turn back to iron, with the liberation of an electron, and another neutrino. Then another stray electron would change the iron

back to manganese, again with a neutrino released.

Dr. Gamow says that there are dozens of analogous processes which would work the same way. As these worked to and fro, he says, neutrinos would be produced all the time.

"The neutrinos would penetrate without any difficulty through the body of the star and escape unobserved, carrying away the energy," he declared. "The process provides for the unlimited cooling in the center of the star, and prevents the central temperature and pressure from rising above a certain value.


"It is thus clear that, when this process starts, the star must rapidly collapse under its own weight. The outer layers of the star, heated by the compression, will lead to a large increase of the observed luminosity, which will be registered by astronomers as a nova, or supernova, explosion.

"However, the radiant energy (light, etc.) emitted during such explosion will be but a small fraction of the total energy liberated in the collapse, since most of the energy escapes unobserved, carried away by the neutrinos."

Dr. Gamow pointed out that this agrees closely with astronomical data. These indicate that the energy detected by telescopic observations is much smaller than might be expected from such a collapse.

He also explains the difference between ordinary novae, or "new stars," which

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get to be about 10,000 times as bright as the sun, and the brightest of the supernovae, which are ten thousand times brighter than the novae. It is due, he believes, to the fact that the stars have different masses. He finds that a mass 40 per cent larger than the sun is a critical value. Above this figure the collapse is much more violent—result is a supernova.

Dr. Gamow said that these great stellar explosions occur in our Milky Way system about once in three centuries.

"The last explosion of that type in our galaxy was that observed by Tycho Brahe in A.D. 1572," he stated. "The previous one was observed by the Chinese in 1054. The Star of Bethelhem was evidently also a supernova of about 4 B.C."

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## BIOLOGY

## Extremely High Pressures "Paralyze" Protoplasm

### About 5,000 Pounds Per Square Inch Stops Streaming Movement Characteristic of Living Stuff of Cells

**V**ERY high pressure, such as is found in the deepest parts of the sea, has a paralyzing effect on protoplasm, the living substance found in all cells, Prof. Douglas A. Marsland of New York University reported to the meeting of the American Association for the Advancement of Science in Philadelphia at a special symposium on protoplasmic activity. The pressure apparatus with which he worked was rebuilt out of a hydraulic jack such as is used in commercial garages for lifting heavy trucks.

The effect of extreme pressure is most evident in stopping the streaming movement that is characteristic of all protoplasm. This streaming can be observed readily in the leaf cells of certain plants, in moving amoeboid cells, in dividing animal cells, and in the expansion and contraction of the color bodies in the skins of fishes. All these varied forms of protoplasmic streaming were retarded as the pressure went up, and stopped altogether at the same high pressure—5,000 pounds per square inch. The stopping occurred when non-streaming parts of the protoplasm became unable to change from fluid to a firmer, jelly-like substance, which appears to be a necessary prelude to the streaming activity.

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### Speed Blossoming of Trees

**A**N EXTRACT of last year's dead leaves will delay the opening of next year's buds, on cut fruit-tree twigs set in it, Prof. C. G. Vinson of the University of Missouri reported to the Association. A contrary effect on peach twigs,

forcing the flowering at an earlier date, was obtained with several organic acids commonly found in plant tissues—succinic, maleic, fumaric and malic. Tannic acid had an effect similar to that of the dead-leaf extract, hindering flower opening.

The experiments reported by Prof. Vinson are preliminary steps in a search for a compound that can be sprayed on dormant fruit trees in early spring, to prevent them from blossoming too early and then getting caught by frost, at present a source of great losses in northern orchard regions.

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### Water a Barrier

**E**VEN moderately wide stretches of water form barriers to birds that cannot swim, when they are migrating in spring and autumn, Prof. S. C. Ball of Yale University stated at the meeting of the Ecological Society of America. He stated that he has often seen flocks of birds decline to cross Gaspé Bay, a relatively small body of water at the outmost end of Quebec Province, although the wooded shore was fully visible from the opposite side. Instead, they turn and make the long detour via the shoreline.

Prof. Ball is inclined to believe, however, that the real impulse is not so much fear of the water as inclination to stay near the forests that mean food and shelter to them. He has observed the same hesitancy about flying over open grassy deltas even where the river channels are quite narrow.

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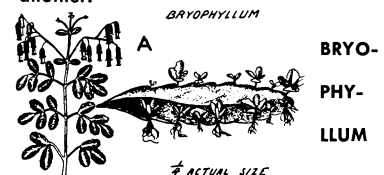
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