

## Burning Atomic Hydrogen

By EDWIN E. SLOSSON

A chemical combination that produces greater heat than any hitherto known has been discovered by Dr. Irving Langmuir of the General Electric Company.

For over a hundred years the highest heat attainable by combustion was that produced by the burning of hydrogen in an atmosphere of oxygen. But Langmuir has found it possible to get a higher temperature by the unprecedented process of burning hydrogen in an atmosphere of hydrogen. In the oxyhydrogen blowpipe, commonly used for welding or the lime-light, two atoms of hydrogen united with one atom of oxygen to form a molecule of water. In the new Langmuir blowpipe two atoms of hydrogen simply unite with each other to form a molecule of hydrogen.

The novelty of the process consists in the possibility of producing a stream of hydrogen gas in the form of single and separate atoms instead of paired atoms, in which hydrogen has been hitherto handled. The coupled hydrogen atoms are divorced by passing a stream of the gas through an electric arc. The apparatus is simple, and looks like the ordinary blowpipe that you see used in welding or cutting steel on the street car track. It is held in the hand and the point of the flame directed on the metal while the head of the operator is enclosed in a helmet to protect the eyes and face from the intense light and heat.

A stream of hydrogen from a small copper tube is driven between the tips of the two tungsten electrodes and projects a double flame several inches long. The inner flame consists of atomized hydrogen burning in molecular hydrogen, while surrounding this is a flame of molecular hydrogen burning in air.

A tungsten wire stuck into the tip of the inner flame melts and drops off like an icicle in a gas jet. Now tungsten is a metal so refractory that it required many years of experimentation to find a way of getting it sufficiently softened so that it could be drawn into filaments for electric lamps. Its melting point is over six thousand degrees Fahrenheit, so the temperature of the flame of atomic hydrogen is doubtless more than seven thousand.

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## Ice Cream From Crude Oil

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that objection, for he foresees the utilization of the limitless stores of energy confined within the atom, as manifest in radium.

"When I saw not long ago in the laboratory of Dr. S. C. Lind a tiny drop of a colorless oil that had been formed from methane—the chief constituent of natural gas—as a result of the action of this form of energy upon it, I felt a new era in chemistry had dawned," Dr. Norris said. "That droplet meant a supply of combustible liquid to run our automobiles when petroleum is exhausted. We can make methane from carbon and hydrogen when the supply of natural gas fails us. The sun will always be able to convert carbon dioxide into a form from which we can get back carbon."

Dr. G. J. Esselen demurs to the suggestion of synthetic ice cream and expressed a preference for the old-fashioned method of feeding the cellulose to a cow. But in his own field Dr. Esselen was quite as radical in his prophecies as Dr. Norris. He goes so far as to surmise that the synthesis of cellulose may some day be accomplished in the factory as it is now in the field from the free raw materials of air and water.

Cellulose, which is the woody stuff of trees and other plants, now requires months or years to grow, but if the chemist once learns how to make it he may turn out a purer product in a few days or hours. Already the first steps toward this achievement have been taken. It has been found possible to make glucose artificially by the action of ultraviolet rays on water and carbon dioxide, that is, on "soda-water." It is easy to convert cellulose into glucose, and if we only knew how to reverse this reaction synthetic cellulose would be possible, though whether it would be profitable or not remains to be seen.

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## METALLURGY

### Light Railway Cars

The Germans are apparently going in for railway efficiency through saving of weights. Herr Peterson, an engineer of Frankfort, reported that in building two new trains for a Berlin local railway, the construction was entirely of aluminum alloyed with lithium. Aluminum is the lightest of present industrial metals, and lithium, though it adds strength to the alloy, weighs only one-fifth as much per given bulk.

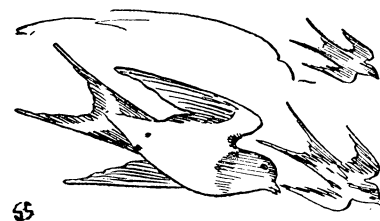
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## NATURE RAMBLINGS

By FRANK THONE

### Migrations and Hibernations

The flowers fade, the leaves fall from the trees, and birds speed southward. The time for the Great Cold is near at hand, and those who find it hard to combat must learn to fly.



Human folk who have their favorite winter resorts in the frostless lands and their favorite lines over which they travel every autumn were long anticipated by the birds. It is a fact well known to ornithologists that birds of the same flock winter in the same general regions year after year, and that many species have lines of migration marked out as sharp and definite as railway tracks.

To a very large extent these lines are determined by the great river courses. One of the greatest channels of bird travel in the world is the flood plain of the Mississippi river, with its feeder, the Missouri. In the East, Lake Champlain and the Hudson river form links in a similar southward caravan route of the air.

Where a river occupies a deep valley between mountain systems, it is easy to understand why birds hold to it in preference to the colder and more arid heights. But there is a reason, equally good if less immediately apparent, why birds follow a great prairie stream. Such a stream bears along its banks a great belt of sheltering and food-offering timber—perhaps the only continuous line of trees to be found in the whole long flight. These are highly important to the perching birds, while the swimmers and waders naturally prefer to keep at least a thread of blue water in sight to which they may descend for feeding and sleep at night.

As autumn advances songs become rarer and rarer. The birds have departed, and insects die mutely in countless swarms or dig into the ground or seek cracks under stones or crevices in trees. The coldblooded virtuosi of our marshes and ponds, the frogs and toads, burrow into the

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### Nature Ramblings This Week

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mud, as do their voiceless "contemporary descendants," the reptiles. Old age comes not once a lifetime but once a year to the poor beasts not blessed with warm blood.

It would be almost true even to say that death comes to them once a year. The chill which they cannot resist, the stiffening of their limbs, the dulling of such poor mental faculties as they have march closer day by day until, in anticipation of the death-like sleep of hibernation (which would be the final sleep of death if they failed to take it in time) they dig their own graves like the extravagant ascetics of old and literally bury themselves to wait until spring brings resurrection.

A hibernating frog or toad can survive cold that would certainly kill a mammal or bird. There are experimental cases on record where these animals have been frozen solidly into cakes of ice and when thawed out came to life and hopped around. True, they died afterward; but a warm-blooded creature treated that way would never have "come to" at all. So being a batrachian has at least a few compensating advantages.

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Grasses that grow in the shade are less nutritive for cattle than those that grow in the sunlight.

The quality of wool is materially affected by the kinds of feed given to the sheep.

Over 11,000 foreign chestnut trees have been planted in the Meade National Forest.

Pittsburgh is drawing plans for a subway to relieve the growing traffic congestion.

A traveler in an unexplored region of Africa recently discovered two large extinct volcanoes.

Vulcanizing was first achieved when a pot of rubber upset and came into contact with sulphur.

Some 30 distinct nationalities are represented among the 300,000 people of the Territory of Hawaii.

Doves are important weed destroyers; one dove was found to eat 9,200 weed seeds at a single meal.

The Roman Emperor Nero had snow brought down from the mountains to cool his wine.

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If the blowpipe is turned upon the tip of a cone of alumina, the refractory ingredient of clay and porcelain, this melts down like a tallow candle in a Bunsen burner. If a sheet of steel or other metal is rolled into a tube the seam can be welded without solder by simply running the blowpipe along the joint. When the flame plays on a plate of chrome steel it leaves a string of puddles in its track.

The heat is higher than that of the familiar oxy-acetylene blowpipe though not so high as in the electric arc itself. Dr. Langmuir suggested that we may in time get rid of the rattle of riveting which annoys the neighborhood when a skyscraper is being constructed, and the welded joints of the steel frame would be stronger since no holes need be bored in it.

A further advantage of the new flame is that the metals heated by it are not oxidized, since they are completely enclosed in hydrogen gas. This makes it possible to weld such light metals as aluminum and magnesium, which when heated in air fall into white powder.

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