

the climate was very cold because of the high altitude, Indian farmers used a similar device on frosty nights. Record of this Indian invention is found in the writings of Garcilaso de la Vega, who lived in Peru in the days of Spanish Conquest and claimed to be a descendant of the Incan Indians.

Garcilaso writes that on clear nights the valleys near Cuzco froze at any time of year. So, on a clear evening the Indians, fearing frost, would set fire to their rubbish heaps. Each individual tried to make a smoke in his corral, for it was said that frost was prevented by the smoke because it served as a blanket, like the clouds.

It has recently been learned that not the smoke, but the warmed air itself, is the frost preventive; but until this discovery was made, modern orchardists shared with ancient Indians a belief in the frost-stopping efficacy of smoke.

*Science News Letter, April 15, 1933*

CHEMISTRY

### Eternal Youth for Bread Promised in Experiments

**E**TERNAL YOUTH for bread, biscuits, cakes and pies is promised by a Russian scientist, Dr. A. P. Mironov.

He discovered that under certain conditions the addition of a minute amount of agar-agar, a vegetable jelly, to the dough, prevents bread from becoming stale. In a test, bread loaves after six months storage were found to be almost indistinguishable from bread fresh from the oven.

Why does bread become stale? Any baker with scientific leanings can recite at a moment's notice a barrelful of startling theories on this commercially important subject. The truth of the matter, however, is that very little is really known about it, except that fresh bread rather quickly undergoes a change which makes it crumbly and hard, and causes the loss of its characteristic pleasant smell and taste. Contrary to the widely accepted idea, bread that grows stale is not drying out—it merely grows old and thus becomes not suitable for eating. This bakery profit erasing change is generally believed to be of a colloidal nature.

It is an established fact that a tiny amount of some colloid added to another colloid frequently causes a change in its properties. This was the starting point of Dr. Mironov's research, and after numerous failures he succeeded in

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working out a set of bread-making conditions which gave the bread necessary qualities. Agar-agar is tasteless and odorless and being used in a very small quantity does not affect the taste, flavor and consistency of bakery products. In fact, this material made from a species of sea-weed has had already a long and honorable application in the confectionary industry, where it is extensively used in pastil, marmelade and jam making.

Agar-agar was one of the substances added experimentally to bread dough during research conducted in the food research laboratory of the Bureau of Chemistry and Soils of the U. S. Department of Agriculture by L. H. Bailey. Under the conditions of his experiments, however, Mr. Bailey did not obtain such results as are claimed in the Leningrad experiments of Dr. Mironov.

*Science News Letter, April 15, 1933*

## CHEMISTRY

## Lokombitsika Suggested As Cheaper Rival to Shellac

**L**OKOMBITSIKA, the shellac-like natural wax deposited on Madagascar forest trees by a species of insect, is suggested as a new raw material for American industry by L. Wilson Greene, writing in *Plastic Products*.

Although commercial quantities have been imported into France and Germany for several years, it is not yet used in this country. Mr. Greene tested a sample and found that although lokombitsika is inferior to shellac, also an insect secretion, for some purposes, it may prove useful as a cheap varnish material.

*Science News Letter, April 15, 1933*

## PHYSIOLOGY

# Carbon Dioxide Called Normal Stimulant of Breathing Center

**C**ARBON DIOXIDE in low concentrations stimulates the nerve center in the brain which controls breathing. That is why a mixture of small amounts (5 per cent.) of carbon dioxide and oxygen has proved helpful and often life-saving in drowning, carbon monoxide poisoning and other cases of asphyxia. Evidence for the stimulating function of carbon dioxide gas was reported by Prof. Yandell Henderson and associates, E. M. Radloff and L. A. Greenberg, of Yale University for the American Physiological Society.

"Asphyxia always arises primarily from a deficient supply of oxygen to the tissues of the body," Prof. Henderson explained.

Formerly it was believed that there was at the same time an excess of carbon dioxide, the gas which is formed in the tissues and exhaled in normal breathing. Investigations have now shown that on the contrary there is a lack of carbon dioxide as well as of oxygen, since in the absence of oxygen no carbon dioxide is formed in the tissues.

Both gases are needed to resuscitate victims of any sort of asphyxia, but the two gases work in quite different ways, Prof. Henderson found. Lack of oxygen depresses and finally paralyzes the breathing-control center in the brain. But since oxygen is a food and not a stimulant, supplying oxygen, even in excessive amounts, never stimulates this

center to start the breathing process of the body.

When the amount of carbon dioxide in the body is reduced, even a normal breathing center becomes inactive and breathing stops. Supplying carbon dioxide stimulates the center to start the body's breathing process again. Then the vital oxygen, which is also being supplied from the rescue squad's gas tank, can be inhaled and used.

Asphyxia occurs in drowning, in new born babies that fail to breathe spontaneously, and in the victims of carbon monoxide poisoning by city gas or by automobile exhaust gas. Asphyxia is also largely responsible for the depression of vitality after major surgical operations and prolonged anesthesia.

### Effect of Illuminating Gas

What would be the effects on the body of small amounts of illuminating gas, such as might leak from faulty burners in concentrations too small to produce death?

An answer to this question was reported from the physiology laboratory of Iowa State College to the American Physiological Society. Erma Smith, associate professor, and coworkers, E. McMillin and I. Williams, exposed white rats for one hour daily to a gas-air mixture containing three-tenths of a per cent. of carbon monoxide, the deadly constituent of illuminating gas. After 150 consecutive days' exposure, they found the animals became unkempt in appearance, underweight and failed to rear their young.

All of the rats' organs contained an excessive amount of blood. The blood itself had an increased amount of hemoglobin and increased number of red cells.

Females were able to survive deadly concentrations of the gas for a longer time than males. Desexed animals did not show this difference. New born animals survived for three hours in mixtures which proved fatal in thirty minutes to 40-day-old rats. Adapted animals developed greatly increased tolerance.

*Science News Letter, April 15, 1933*

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