

The Origin of Soda Water

Chemistry

By EDWIN E. SLOSSON

It is the custom to call upon the school children of the country to contribute to memorials and monuments and movements of any sort which somebody else wants to have helped along.

Now if I should ever start a school subscription it would be for something really popular among the pupils. It would be for a monument to the inventor of soda water, and it would not be a dusty bronze statue over a dry marble basin, but a fountain in every schoolroom flowing freely the beverage that carbonates but does not inebriate.

The inventor was the Rev. Joseph Priestley, the discoverer of the chief element in the world, oxygen, and a chemist in whom we take a peculiar interest, for when England got too hot to hold him he sought refuge in Pennsylvania, where his home in Northumberland is a shrine to which American chemists pay pilgrimages. He was triply distrusted and ill-treated in his native land on the grounds that he was a republican, a non-conformist and a chemist, so a mob burned up his home and laboratory in Birmingham.

Flowers Without Soil

Water grown roses and other flowers, said to be more fragrant than those grown in the soil, may be put on the market soon if methods developed by W. F. Gericke, assistant plant physiologist of the University of California Experiment Station, are exploited commercially.

Mr. Gericke, who plants his flowers in jars of water to which have been added the chemical elements essential to growth, has during the last eight months succeeded in growing to full fruition, or bloom, several thousand floral plants comprising about fifty commercially important species.

The method is said to involve a minimum expense. Once set in suitable containers, filled with a nutrient solution, roses, dahlias, carnations and other plants grew and developed normally without the solution being renewed and, in many cases, without even water being added to replace what was absorbed.

Since compounding the various culture solutions requires little time and since little or no attention is required once the seedlings have been "planted" and (*Turn to next page*)

While he was preaching in a chapel at Leeds he lived near a brewery and so became interested in the possibility of utilizing the gas which came off the vats. When he moved away from this favorable location he had to devise some means of preparing and collecting the incombustible gas, then called "fixed air." This led him to the invention of the pneumatic trough, which is still the main mechanism of the analysis and storage of gases. He also determined the solubility of carbon dioxide and employed it for charging beverages. Perhaps you would like to hear the full title of this epoch making paper of 1772. "Directions for impregnating water with Fixed Air in order to communicate to it the peculiar spirit and virtues of Pymont Water, and other mineral waters of a similar nature."

Priestley's experiments interested a Philadelphia physician, Dr. Philip Syng Physick, and he induced a druggist, Townsend Speakman, to prepare carbonated water for his patients. Speakman added fruit juice as a flavor and then and there the soda-water business was born, 1807.

Previous to Priestley only natural

carbonated beverages were known but their use goes back to the remotest times, both in beverages charged with carbon dioxide by the fermentation of fruits and grains and in spring waters charged in the internal reservoirs of the earth. Mineral springs have been sought by the sick and suffering in all lands and ages. Wherever in Europe you find springs of carbonated water there you are likely to find the ruins of some Roman city, which probably remains to this day a fashionable resort whether it be called Bath, *Bad* or *bain*.

The effervescence of the waters seemed to cause effervescence of the human spirit for the spa has always been famous for its atmosphere of gayety and these pleasure cities are commonly called "watering places," but could better be called "carbonating places" for water could be had at home but people had to go long distances at great expense in time and money to "take the waters" at the bubbling spring. But now we can get such carbonated beverages at any drug store or grocery store and often in between.

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Long Light Waves Needed

Medicine

The red and yellow light rays of long wavelengths are just as important as the shorter violet or ultraviolet rays for normal growth and development, reports Dr. Charles Sheard of the Mayo Clinic.

Dr. Sheard and associates experimented with chickens, exposing different groups of them to sunlight from which the ultra-violet, red-yellow and green-blue rays respectively had been removed by special glass filters. At the same time, all the chickens were fed a diet rich in everything except vitamin D.

When either the red-yellow or the green-blue light was filtered out, the parathyroid glands, which play an important part in the process by which food is transposed into tissue and energy, increased greatly in size in order to maintain normal growth and development.

During the first two months the rate of growth of the chicks was greater under all filters when a small amount of cod-liver oil was added to the diet. At the end of six months' time it was found that the weights of chicks under (*Turn to next page*)

Chara Poisons Mosquitoes

Entomology

Mosquitoes have a hitherto unsuspected enemy in a humble aquatic plant that grows in many parts of the United States. Its name is *Chara fragilis*, and according to Prof. Robert Matheson and E. H. Hinman of Cornell University, who have investigated its properties, it not merely prevents mosquito "wrigglers" from growing to maturity in the waters it inhabits but actually kills them.

The two entomologists carried on observations on ponds where the *Chara* grew, and also planted it in experimental aquaria on which mosquitoes were then encouraged to lay their eggs. The eggs all hatched in due course, but hardly any of the larvæ lived to emerge as a full-fledged insect able to mar the peace of a porch or a picnic.

The specific property that makes *Chara* deadly to mosquitoes has not yet been discovered.

Borax has had another use added to the long list of things it is good for by Prof. Matheson and Mr. Hinman. They have discovered that a concentration of one and one-half parts in a thousand of (*Turn to next page*)

Getting Down to Skim Milk

Geology—Economics

GEORGE OTIS SMITH, Director of the U. S. Geological Survey, before the Mineral Law Section of the American Bar Association:

In recent years the mineral industry seems to have grown too fast. The American habit of "stepping on the gas" has brought the mineral industry close to the danger line.

We must not make the mistake of interpreting the speeding up of the mines, quarries and wells as a special phenomenon caused by the war demand, for, in the mineral industry as a whole, the postwar growth has been equal to the growth for a similar period of war and pre-war years. So long as the supply permits, the consumption of mineral raw materials increases in response to civilization's demands. Agriculture grows only about as fast as population, because the per capita demand for foodstuffs changes in variety only—not in quantity. Mining grows at a far different rate and a rate independent of population, for the demands by civilization for mineral products change in both variety and quantity with every discovery and invention.

In a large way, however, wise

Poisons Mosquitoes—*Con'd*

water is very quickly fatal to "wigglers." The borax seems to hold its larva-killing properties for a long time; one experiment ran from July 25 to September 7 of last year without any signs of weakening at the end.

The two entomologists add, however, that borax should be used only where its possible effects on other animals and on plant life will be of no consequence.

In the course of their experiments they raised large numbers of mosquito larvæ, which had to be fed artificially. They state that they found common compressed yeast, such as goes into the collegiate "double malted," very good wiggler food.

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All the important varieties of wheat now cultivated can be traced back to the wild wheat that still grows on Mount Hermon.

Next to the United States, the country with the most automobiles per inhabitant is Hawaii, with eight people to each car.

public policy has a real concern in the supply of mineral raw materials. This is true not only because the products of the mines are the stuff that civilization feeds on, but also because mining is a process of continuous depletion, whereas agriculture harvests annual crops, and even forestry harvests periodic crops. A Harvard economist has stated the contrast, "Mining typically lives upon its capital; agriculture upon its income." This increasing draft upon irreplaceable mineral deposits, this depletion of fixed reserves, makes a job for the mining engineer, but more than that, it presents a problem to the intelligence of the nation. Minerals are essential assets because they constitute a country's guaranty of future prosperity.

American industry has all the energy of youth, yet with a background of three centuries of colonial and national life we Americans are now mature enough to begin to think in terms of time as well as of space. A nation's greatness can be gaged by duration as well as by area, and a nation's wealth can be measured by its power to last. Prosperity to continue through the cen-

Long Light Waves—*Cont'd*

both the amber and blue filters was much less than under the whole of sunlight except in the cases where cod-liver oil was fed. This small amount of cod-liver oil is apparently able to induce normal growth and development irrespective of the presence or absence of any portion of either ultra-violet or visible solar energy.

Without cod-liver oil and on a standard ration, experiments showed that normal growth did not take place unless both the ultra-violet and visible rays of sunlight were admitted.

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When African Bushmen hunted ostriches they would hide behind an ostrich skin and hold the head up on a stick, so as to come near the birds without alarming them.

The United States has found the production of iodine too expensive, though it is estimated that almost five times our consumption of 3,000,000 pounds could be obtained from the kelp along the Pacific Coast.

turies is what we must plan for.

The Old World idea of an entailed estate might well be brought over into our thinking of the public interest in natural resources. The vital question for America today is not how many acres of oil fields or square miles of coal beds or million tons of copper ore are there for us to exploit, but rather how long can the present order of things be continued so as to benefit other generations of Americans. Prosperity should fail to satisfy the patriotic citizen unless it is backed up with some guaranty of permanence. To regard ourselves as trustees, possessing the uncounted wealth of America only to be passed on to our successors in interest without unnecessary depletion, is adopting the Golden Rule in perpetuity. Stewardship of that type means the greatest good to the greatest number for the longest time, and that is practical conservation.

As seen by the engineers, the issue of the control of production is truly a national one, not simply the problem of their employers, the mining companies.

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Flowers—*Continued*

exposed to the proper environment. Mr. Gericke predicts that in the future at least part of the production of flowers for markets and for the home will be in water media.

For the use of home flower growers, tablets or food pills, similar to those now used as a soil fertilizer, could be compounded. These would contain the same elements used for various flowers in the vats and would need only to be dissolved in the proper amount of water.

Generally speaking, this is what flowers are made of: potassium, calcium, magnesium, iron, nitrogen, phosphorus, sulphur, boron, manganese and zinc, absorbed in solution through the roots; and carbon, hydrogen and oxygen, supplied by the air and water.

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Scientists excavating at the ruins of an ancient town in Iraq have unearthed peas, date stones, nuts similar to pistachios, and wheat, all carbonized by fire, but showing the sort of things eaten in the east 3,000 years ago.