the oxidation of which gives forth a rich supply of ozone. These vestiges of the primitive world tell us of their struggle against disease germs, and survival by virtue of this protection.

It seems a rather singular fact that when plants or animals do not produce destructive agents by which to vanquish bacteria, they are sure sooner or later to bring into existence a product destructive to themselves. When we pause to think that "the mill cannot grind with the water that is passed," nor the fire to burn with the carbon dioxide produced, we see it is a universal fact in nature. The germ that runs sugar down into alcohol, soon perishes in that alcohol. Following it comes the vinegar germ, giving us acetic acid in sufficient abundance to stop its own activity. Next follow one by one other germs to carry the changes farther and farther down the hill, till in every instance thay work their own destruction —or at least cessation of activity. Each of these products, final to some definite species of germ, is an antiseptic to that germ, and therefore a medicinal agent for the subjugation of that germ when it becomes pathogenetic. It took us a long time to learn that all our alcohol, wines and liquors were the products of germs. Even when "mother of vinegar" was handed from house to house and manufacturer to manufacturer, they did not for centuries suspect that they were handling germs. Many druggists do not yet know that ergot is the product of a disease germ. It is only lately that we have discovered that we owe our nitric acid, saltpetre, sweet spirits of nitre, and all our nitrates and nitrites, to the useful labors of humble bacteria. Much of our ammonia, some of our benzoic, hippuric and lentyric acid, we owe to their kind offices. As our knowledge of micro-organisms widens, our respect for their pharmaceutical and chemical skill increases. Within a year Dr. Carl Wehmer has reported the fact that he has isolated a species that converts sugar into citric acid so that eleven pounds of sugar will produce six pounds of the crystallized acid. The cost of such conversion is so trifling that it is scarcely worth considering. A discovery like this will work little short of a revolution. Sugar is cheap, and the acid is bound soon to be sold for little if any more than the price of the cheapest sugar. Of course we will have to wait till the patents run out for such a consummation.

When we pause to consider the fact that in the plant world the cells build up the countless numbers of organic compounds from simple carbonic acid, water and nitrogen compounds, and when we further consider that the bacteria are isolated cells capable of duplicating much or all of such work, we can gain some idea of the possibilities that lie before us. We have to supply them with the raw material for their food, and without money and without price they will do the rest. We only need to isolate the special kinds in relatively pure cultures, and set them to work. When mixed, one kind undoes the work of another, so that no useful results occur. Professor Conn, of Wesleyan University, has lately isolated the special bacterium that produces the essential ether to which is due the rich flavor of our highest quality of butter. Following his directions, the butter maker can now at will produce a ripened cream possessing the highest, richest aroma of prime butter. If we have successfully produced one such product, who can say what the end is? The highly prized aromas of wines and liquors, the rich flavors of roots and flowers, may all be within our power to produce in the same manner. If we can call these pigmy workers to our aid in making alcohol, acetic and citric acid, why not for other acids, other alcohols, and other organic compounds? We have found that through the magic of their power certain leguminous plants are able to draw from the atmospheric nitrogen their necessary supplies of that refractory gas. May we not utilize their services in a similar manner? Will not our pharmaceutical chemists of the future supply these same bacteria with what the leguminous plants provide them, and on a vast scale procure our nitrates, nitrites, ammonia and ammonium compounds, at the same time giving to the farmers all they need to enrich the soil of their farms? All the rich mines of Golconda never contain such wealth as is promised in this direction.

Man first learned of the winds as his foes, but soon he harnessed them and they became his friends. At a later date he gained power over fire, and in the conquest found he had a mighty agent to do his bidding. Still later, and the lightning that he had so long dreaded as the bolt of heaven, came within his grasp. and we are beginning to realize the majesty of such a victory. Now he has just begun his conquest of the most direct force he has ever had to fight—the microbes; and if our vision is not distorted he will find a power here second to none of the rest in the benefits it can bestow upon him.

New Reactions of Chloral-Hydrate.

If 12 centigrammes of resorcin are dissolved in a dilute aqueous solution of chloral hydrate and the liquid is superstratified with a pipette over dilute sulphuric acid, a few colored rings appear, amongst which a brown one is distinctly visible. On shaking, the mixture turns brown; it is clear at first, but becomes turbid on cooling. On superstratifying with concentrated ammonia, the uppermost alkaline stratum turns yellowish-red. —(2) Nessler's reagent produces, in an aqueous solution of chloral hydrate, a brick-red sediment, which gradually becomes brighter and finally assumes a dirty yellowish green color.—(3) If 30 centigrammes of potassium sulphocyanate are dissolved in 2 C. c. of chloral hydrate solution (the latter to correspond to 3–6 centigrammes of chloral hydrate), and the solution is heated to ebullition and then mixed with 3·5 drops of normal potassa solution, it assumes a light-brown color, deposits a dark-brown precipitate, and is gradually more or less decolorized. On the addition of ammonia, the solution turns light-brown, but does not become turbid.—(4) If $\frac{2}{3}$ centigrammes of sodium thiosulphate are dissolved in 2 C, c. of chloral-hydrate solution (as above), and this fluid is heated, the latter will assume a brick-red color and become turbid; and on adding a few drops of normal KHO, the solution turns a clear brownish-red.—(5) If 6–12 centigrammes of phloroglucin are dissolved in $\frac{3}{4}$ C. c. of hot distilled water, and if the solution is mixed with 9–12 centigrammes of chloral hydrate, heated to ebullition and at once mixed with 16 drops of normal KHO solution, it turns a deep brownish-red. If the cooled liquid is acidulated with hydrochloric acid and shaken with amylic alcohol, the latter turns a brown-red or deep-brown. Chloroform yields under the same circumstances (phloroglucin being dissolved in hot 90% alcohol) a dirty brown color in 2–4 hours.—A. JAWOROWSKI, in *Pharm. Ztsch. f. Russl.*

Chologogues.

For a long time our knowledge of the chologogue properties of drugs was more or less empirical or derived from clinical experience. The physiological experiments of Rutherford, Vignal, and Rohrig, however, gave us a scientific basis on which to work. The following is Rutherford's classification of the drugs which have the power to stimulate hepatic function.

POWERFUL HEPATIC STIMULANTS.

Croton oil.	Calabar bean.
Rhubarb.	Minispermin.
Magnesium sulphate.	Tannic acid.
Castor oil.	Acetate of lead (lessens).
Gamboge.	Jaborandi.
Ammon. chloride.	Sulphate of manganese.
Scammony.	Morphine.
Taraxacum.	Hyoscyamus.
Rochelle salt.	Diluted alcohol.
Sodium bicarb.	Calomel.
Potassium iodide.	

MODERATELY POWERFUL.

Leptandrin	Hydrastin.
Jalap.	Juglandin.
Sodium sulphate.	Benzoic acid.
Baptisin.	

HAVING LITTLE OR NO EFFECT.

Podophyllin.	Ipecacuanha.
Aloes, in large doses.	Sodium Phosphate.
Colchicum, large doses.	Potassium sulphate.
Euonymin, (Wahoo).	Phytolaccin.
Irisin (Blue Flag).	Sodium benzoate.
Sanguinarin.	Ammonium benzoate.
Colocynthin, large doses	Sodium salicylate.
Nitro hydrochloric acid, dil.	Ammonium phosphate.
	Mercuric chloride.

—*Therapy.*

Pupils in the schools of France quench their thirst with sterilized water, and the floors of scholastic buildings are cleansed with moist cloths instead of dry brush and broom.