

to that of Aphides. It is dark, not light, in color; disagreeable, not pleasant, to the taste; distasteful to the bees, and not coveted by them; unwholesome for winter food for bees, and positively injurious to honey which is to be placed on the market.

Yet this bark-louse cloud has its silver lining. In early spring, before the flowers bloom, it stimulates the bees to their highest endeavor in breeding, so that well-stocked colonies greet the clover-bloom. The apiarist has only to extract this dark, ill-flavored honey at the dawn of the clover season, to convert a seeming ill into an unmixed blessing; especially as this coccid nectar is equally as good as honey for various manufacturing purposes, as the making of printers' rolls, the flavoring of cigars, and the manufacture of honey-cakes. Knowledge and caution on the part of the bee-keeper will keep this dark honey wholly separate from the other, and thus eliminate all harm, and make the former of no small advantage to him.

A. J. COOK.

ECONOMY OF FUEL.

How much can be accomplished in the way of economizing in fuel is shown by the results obtained lately on a trip of the *Burgos*, a freight-steamer built to carry cargo cheaply at a slow speed. Her engines are on the triple compound system, where the steam—in this case from a boiler-pressure of a hundred and sixty pounds per square inch—is expanded in three cylinders in succession. The average speed at sea, in all weathers, is very nearly ten miles per hour. In a voyage from Plymouth, Eng., to Alexandria, on the way to China, with a cargo weighing 5,600,000 pounds, and in a distance of 3,380 miles, the consumption of coal was 126 tons (or 282,240 pounds), being at the rate of 83.5 pounds per mile, or .03 of a pound per ton of cargo per mile: in other words, half an ounce of coal propelled one ton of cargo one mile. The *Railroad gazette* very neatly says, "Assuming that paper is as efficient a fuel as coal, we have only to burn a letter on board this steamer to generate and utilize enough energy to transport one ton of freight one mile. It is difficult to realize that so trifling an act as burning a letter involves such a waste of useful energy, or can have any reference to the energy sufficient to perform a feat which, under less favorable circumstances, requires a couple of horses and a teamster for about half an hour."

We may contrast with her performance that of the steamship *Oregon*, of the Guion line, where every thing is sacrificed to speed. The *Oregon* has engines of 13,000-horse power, 12 boilers, 72 furnaces, a cargo capacity some seven or eight times that of the *Burgos*, but intended for passenger business largely, attains an average speed of 17.9 knots (or 20.5 miles) per hour, and burns 337 tons of coal per hour, combustion taking place at the rate of over 16 tons of coal for each mile traversed. The cost of her coal for the voyage is put at considerably over \$18,000.

The best locomotive performance in this country of which there is authentic record gives a consumption

of about two ounces of coal per ton of freight hauled one mile, at the rate of thirteen miles per hour including stoppages, and rising to five or more ounces per ton per mile on grades of from fifty to seventy feet.

EXPLOSIVES AND ARMOR-PLATE.

DURING the last session of congress the theory was advanced that the effect of a moderate weight of dynamite, exploded in contact with the plates of a modern armor-clad ship, would be disastrous to the vessel. The Naval bureau of ordnance has tested this by exploding charges of gun-cotton and dynamite varying in weight from five to one hundred pounds, against a vertical target composed of nine layers of one-inch wrought-iron plates, strongly backed with twenty inches of wood, and braced so as to represent, as well as possible, the stiffness of the sides of a ship. Though much more work was done than it is likely would ever be performed against the armored side of a ship, the target was not materially injured.

In the course of these experiments it was apparently shown that the point at which a charge of a high explosive is ignited has an important effect upon the work done, since the effects of these charges were readily increased or diminished very materially, according as they were ignited on the side away from or adjacent to the plate; and this, too, notwithstanding the distance between the points of ignition in the two cases was only a foot. It is claimed that this result shows that the charge of a high explosive cannot furnish any tamping effect, but that to produce the greatest effect the ignition must be at some interior point of the explosive, well toward the rear. It also appears that the effects do not increase proportionally to the increase of the charge when the ignition surface remains constant.

The gradual ignition of the charge, even in the case of so violent an explosive as gun-cotton, was strikingly illustrated by the fact that when twenty-six pounds of wet compressed disks of that material were piled upon an iron plate, and exploded from the top (without tamping or cover), accurate impressions of the lower disks in the pile were stamped upon the iron underneath them. In this case there did not seem to be the least doubt concerning the complete explosion of the charge.

Experiments were also successfully made in firing shells charged with gun-cotton from ordinary rifled cannon, twelve rounds being fired from the twelve-pound howitzer, and thirteen rounds from the eighty-pound breech-loading rifle, and the ordinary service charges of gunpowder being used in the gun. Three unfuzed shells, charged with gun-cotton, were fired from the eighty-pounder against the target used in the dynamite experiments. The shells exploded with great violence, on impact; but the damage to the target was very slight, as the explosion took place before any practical penetration was effected. In view of recent successful experiments with a fuze

designed to explode wet gun-cotton, the bureau has under consideration a plan of a piece which is intended to project an aerial torpedo, charged with a hundred pounds of wet gun-cotton, to be exploded over or upon an enemy's deck.

RECENT RUSSIAN GEOGRAPHICAL EXPLORATIONS.

At the meeting of the physical section of the Imperial Russian geographical society, held Dec. 9, mention was made of Melnikow's archeological researches in the district of Troitzk and in the province of Mohilew. A few tumuli and prehistoric buildings had been examined, among which Melnikow claimed to have discovered cromlechs. Professor Sorokin travelled in central Thian Shan from Wernoje to the Issyk-Kul, thence by the Ula-Khom Pass to the Naryn valley, and by Mart Pass to Namangan in Ferghana. Old buildings were found on the shore of the Issyk-Kul, but no traces of any under the water. Limestones of very new formation were discovered in the lake. Professor Muschketow gave a *résumé* of Konshin's travels in the steppe east of the Caspian, including a part of the old beds of the Amu-Daria, which was followed by an interesting discussion in regard to these beds.

At a later meeting of the society, Dec. 17, Mr. Lessar read a communication on the country and tribes on the Afghan frontier. He first recalled his remarks made last year, that the only means of thoroughly subduing the Turcoman steppe was to annex Merv, and that it was comparatively easy at that time on account of the prestige of Russia. His expectations had been more than realized, as not only Merv had been peacefully annexed, but the country of the Saryks, southern Turcomania, had submitted. The peaceful annexation of Merv was said to be partly due to the conviction of the people that they would never have peace while there was not a power strong enough to enforce it, and that Russia was this power. After the subjection of Merv, the Russians came in contact with the Saryks, who had been hitherto very little known. Lessar found a great difference between the natives of Jalatan, near Merv, and of Pende, which is farther south. The former are very poor, not even possessing the commodities most prized by nomads, viz., good field-tents, fast horses, etc.; while this kind of wealth is more abundant in Pende. The people are not entirely nomadic, but know something of agriculture. They make use of artificial irrigation, though their method of storing and conducting water is very crude, and they know nothing of levelling. Lessar made the interesting discovery that the mountains in the south are very low, and composed of soft strata; while the same chain is much higher and steeper to the west and east. The Salors, a small tribe living near Merv, are very poor, the probable reason being the long cessation from robbing expeditions, while agriculture and stock-raising are rendered insecure by the incursions of their neighbors. A. WOEIKOF.

EMMERICH ON THE CHOLERA BACILLUS.

THE *Lancet* of Dec. 27, 1884, gives a very interesting *résumé* of a paper by Dr. Rudolf Emmerich, which is to be published in the forthcoming number of the *Archiv für Hygiene*. The remarks are taken from advance proofs, and the original article has not yet reached us. The observations were made during the epidemic in Naples, and at the instance of the Bavarian government.

Dr. Emmerich did not limit himself to observations upon the comma bacillus, but attempted to discover other organisms by means of various culture-media and methods. He procured blood upon a sterilized platinum needle from the median vein of a young woman in collapse from cholera, and about six hours before death. He inoculated ten tubes containing nutrient gelatine in three places each, and found organisms in three of them, the other seven remaining sterile.

The organisms were all of one kind, cylindrical, with rounded ends, and occurring singly or in pairs, the length being about one and one-half times more than their width. They grow at ordinary temperatures in slightly alkaline nutrient gelatine, which they liquefy in solid opalescent patches. Under a low power ($\frac{100}{\times}$), the colonies in the deeper portions of the gelatine present the form of a hone: those more superficial are like flat, circular mussel-shells.

The deeper colonies are yellowish brown by transmitted light, white by reflected light, and are finely granular. Those on the surface are pale yellow in the centre, whitish at the margin, and spread over the gelatine in a film.

These organisms were cultivated from the blood and from the internal organs of nine persons dead of cholera. They were most numerous in the kidneys and liver, then in the lungs, and least abundant in the spleen. They were found in sections of the intestines and kidneys (other organs not yet examined), and in very large numbers in the dejections and intestines after death. They grew in every culture experiment with alvine cholera material, whereas the comma bacilli only occurred in some cases.

Inoculation experiments were made at the Hygienic institute of Munich in conjunction with Dr. Sehlán. The animals used were mostly guinea-pigs, and symptoms were produced similar to those of cholera. The changes noticed varied from a simple desquamative catarrh, with rice-water-like intestinal contents, to hemorrhagic exudation, and destruction of the mucous coat.

The inoculations were made by the injection of two drops of a solution of a portion of a pure culture the size of a pin's head in two drams of water into the lungs, or subcutaneously. This produced an illness of from five to six days, with marked changes in the intestinal mucous membrane. The injection of a large quantity produced death in from sixteen to thirty hours, but with much less marked changes in the intestines.

The publication of the full paper is awaited with