



The Sources and Geology of Petroleum.

MESSRS. EDITORS:—On page 54, present volume of the SCIENTIFIC AMERICAN, there is a highly interesting article from the pen of one of your correspondents (E. G. Kelley), on the subject of petroleum; but it contains some statements and opinions which, with due regard to true geological science, we cannot let go unquestioned and uncontradicted.

In the paragraph explaining the chemical formula of the change or degradation from woody structure to coal, E. G. K. asserts that petroleum comes from coal. If he means that, in some other portion of the globe than the United States and Canada, petroleum may be the result of a chemical change from coal, we shall not take a "a lance" against him; but in the North American continent it is not so. On the contrary, all the rock-oil which is of any economic value has its source in rock whose geological position is many thousand, probably not less than 5,000 feet below the coal-bearing strata. I do not mean to be understood that this great number of feet intervene between the oil-bearing strata and the coal-bearing at any one point, but that this is about the maximum thickness of the strata when measured in those localities where they are best developed.

Again, in the last paragraph but one from the bottom in the middle column, he says that "carbureted hydrogen, carbonic acid and olefiant gas are being constantly generated wherever mineral coal exists in large beds, and when condensed produce petroleum." We admit the formation of the gases, but deny that of petroleum as a geological fact. From the anthracite of Pennsylvania, through the soft coals of the same State, Virginia, Maryland, Ohio, Kentucky, Illinois and Iowa, there are no petroleum springs in the coal—no signs of any such condensation, either now existing or ever having existed in previous ages. The coal comes from the mine as dry oil as if no rock-oil were known in the world. Why should it not? The oil is the product of Dame Nature in her chemical laboratory from material (waste stock we once would have called it) produced millions of years, if not ages, before coal plants had been created. (This remark relates to the Silurian and not Devonian strata. In the latter many land plants have been found, 106 species in all, enough to show that there were large continental areas, and enough to form extensive beds of coal, but not in the region of the oil wells of North America.) It may be objected to this statement of fact of dry coal, that the oil has dripped through the intervening strata into the oil-bearing which lies below. To this we say that each coal bed has, immediately below it, a water-proof layer of clay, more or less thick, which must have held the oil if any had been formed. Again, in Ohio, Canada and Illinois, petroleum is found where no coal was ever made.

One can sit down in a laboratory, fill his flask with bog-head, light his lamp, witness the vapors slowly rise through the neck, go over through the connecting glass tube with the condenser and from thence issue as oil. It is a very beautiful experiment, very convincing that oil is the product of coal in the laboratory, but not as a necessary consequence in nature. Nature and man work differently to accomplish the same ends. Man's method of producing oil from coal, which was once woody fiber, is by destructive distillation. Nature's method is to build up by living forces the elements of hydrogen, carbon and nitrogen into organizations either of vegetable or animal, and then by degradation of the organism after death to bring forth these elements into new compounds and forms, not organic, for compounds are simpler than organisms. The Devonian seas swarmed with multitudes of organisms, both of vegetable and animal, much as the present seas do, if we may so judge from petrifications in the rocks. Here was abundant material for the chemical degradation of structure into oil. The soft porous sandstones of Pennsylvania, the softer slates of Canada and the open limestone of Chicago were the store-houses—the vats to hold the oil. The lard oil from Cincin-

nati as truly represents the organization of the hog as the lard, the ham, the bristles, or even the skeleton. Geologically, we should say, coal is the chemical product of the Carboniferous age, and oil is the chemical product of the Devonian age.

In the latter part of the same paragraph the writer says "the oil-springs are found in districts where the strata have been thrown up, causing caves and fissures, which are filled with the condensed vapors under pressure that are constantly being generated from the coal beds." If the writer has visited the regions where oil is "struck," he has not read the origin of the valleys and hills with true geological eyes; and if he has not, this information as to the strata is wide of the truth. From the Adirondac mountains in Essex county, N. Y., traveling in a south-westerly direction to the city of Pittsburgh in Pennsylvania, one passes over all the rocks containing organic remains, from the early oceans stocked with life to the carboniferous continent producing land plants and consequently coal. In all that distance the rocks lie smoothly, not disturbed, gently dipping towards the south-west, never thrown up nor convulsed. The same can be said of Canada and all the North-west States containing coal. It is in the anthracite where the rocks have been thrown up; but there, who has ever "struck oil?" The fact is, in New York State and Pennsylvania, to the north of the oil wells, the rock which yields the oil can be seen coming to the surface. In the city of Chicago it is quarried and builded into churches, when the prophecy is literally fulfilled, "the rocks shall flow with oil." The same can be done in Ohio, Virginia and Canada. We shall arrive at truth when we leave speculations and confine ourselves to facts.

One kind of rock gives us magnetic ore, another dye-stone ore, another gold, another lead, another coal, and another oil. It is our business to ascertain which rock is the parent of its peculiar mineral, and not to speculate whether one may not be the product of another. The importance of this statement cannot be over-rated. If a man believes from theory that hematite ore is the decomposition of magnetic, he will spend his money vainly in searching in the primitive. Thousands of dollars have been thus lost. And if a man is led by theory to believe that oil is the educt of coal, he may be disappointed in boring and spend his money in vain. During the oil mania how many were thus disappointed! How many returned to their homes disbelievers in the science of geology and pronounced it all a humbug! Had they not humbugged themselves?

We have in the last paragraph of the same column a specimen of the same kind of reasoning from assumed premises and inferences from false theories. The writer says:—"The process of condensing and hardening the softer coals is still going on in the earth (over 100,000 square miles); in the ages to come it will approximate the anthracite; hence, the supply of petroleum will not soon be exhausted." If the theory were correct, the inference would be true, of course, and oil-spring owners might take courage. But, suppose oil does not come from the condensation of coal. What then? Oil wells do fail; this is too apparent. They fail in Canada, in Ohio, in Virginia, in Pennsylvania—everywhere. Others may fail. It may not be true, even, that the softer coals are condensing. What then? Why, the whole theory falls to the ground, inferences and all. S.

Our Coast Defenses.

MESSRS. EDITORS:—The question is often asked—"Should foreign nations interfere in our deplorable civil war, are our fortifications on the sea-coast sufficient to protect us?" In the present condition of affairs our forts would hardly be strong enough to protect us sufficiently well; but with the improvements and additions proposed by Col. Jos. G. Totten we could withstand the most powerful force which any of the nations of Europe could bring against us; in proof of this assertion allow me to present to the readers of the SCIENTIFIC AMERICAN the following statements:—

We have for the defense of our sea-coast, from Passamaquoddy Bay to Cape Florida, forty-one old forts and batteries (most of which have been repaired), requiring 5,445 men to garrison them and an armament of 1,097 guns; we also have built four new fortifications—viz., Forts Hamilton, Lafayette, Wash-

ington and Macon—requiring a garrison of 1,870 men and an armament of 336 guns. There are about twenty forts now under construction, which will require 13,750 men and 2,750 guns. Besides all these forts on our Atlantic seaboard, Col. Totten has proposed to construct some seventy additional forts, which will require 32,600 men and 6,355 guns.

For the protection of the Gulf frontier, from Cape Florida to Sabine Bay, we have nine old forts and batteries, containing 69 guns and garrisoned by 350 men; we have also built seven new fortifications, requiring a garrison of 3,060 men and an armament of 532 guns. There are three works under construction, which will require 1,010 men and 193 guns. Besides all these forts Col. Totten has proposed to construct ten new forts, for which a garrison of 5,150 men and 928 guns will be necessary.

It will thus be seen that, if Col. Totten's plans are carried out, we shall have, in all, one hundred and sixty-four (164) forts and batteries, garrisoned by an army of 63,835 men and mounting 12,260 guns. Thus far our forts have cost about \$14,000,000; \$28,000,000 additional will be required to carry out the plans of Col. Totten. It must be remembered that these are all permanent forts, and these statements do not include the numerous field-works already erected during the present civil war. The term "guns" designates not only cannon, but also mortars, howitzers, &c. The garrisons mentioned are the war garrisons; and by reference to the ratio between guns and men it will be seen that five men are allowed to each gun. The intelligent reader will say that five men cannot serve a gun with ease; but in action it is very seldom that more than one-fourth of the guns are in use. Allowing one hundred rounds to each gun, there would be required about 8,500,000 barrels of powder, at a total cost of \$1,700,000. POLYTECHNIC.

Philadelphia, Jan. 26, 1863.

An Electrical Phenomenon.

MESSRS. EDITORS:—Myself and brother were recently experimenting with two cells of Grove's battery; in the experimenting we suspended two small electro-magnets with vibrating armatures, &c., by two small brass chains with links like the figure 8. These chains formed part of the circuit for the current, the balance being sent through about 20 feet of wound copper wire; we had sent a current through probably a hundred times, successfully accomplishing our desire, when, on closing the circuit, the chains instantly parted and flew about the room bursting into at least twenty pieces of from one to a dozen or more links each; they being partially straightened. We collected the pieces but could not discover anything peculiar in their appearance; we put them together and repeated the experiment many times. Will some of your numerous readers explain the phenomenon? C. P. S. W.

Springfield, Mass., Jan. 29, 1863.

A Yankee Postage-stamp Canceled.

MESSRS. EDITORS:—Your correspondents seem to be making much unnecessary bother about the simple matter of effectually canceling postage-stamps. Let the mailing clerk place the letter upon some suitable support, and a single stroke with a rasp or coarse file will obliterate the stamp beyond restoration. Here is an apparatus without patent or restriction, as rapid and easy as stamping and as effectual as annihilation; but if "red tape" must needs have a machine for the purpose, it is an easy task to add as many wheels, levers, springs, &c., as will satisfy the most fastidious, though probably no such combination could equal in celerity or efficiency the simple rasp now used for other purposes. YANKEE.

New Haven, Conn., Jan. 26, 1863.

KITCHEN-GARDENS.—Before the era of kitchen-gardens, scurvy was one of the diseases by which the English population was kept down. Cabbages were not known in England until the period of Henry VIII. George I. was obliged to send to Holland to procure a lettuce for his queen. The Egyptians made a god of the cabbage, and the Greeks and Romans took it as a remedy for the languor following inebriation.

ANGER.—The beginning of anger is foolishness, and its end is repentance.

Railway Equipment.

The locomotive engine seems in most cases to have appropriated the above title, as if there was no other equipment. The great field for improvement was, to be sure, the machine department, a few years ago; but thanks to the skill and intelligence of that very worthy class of men, the master mechanics, the locomotive has made rapid strides towards perfection, within a dozen years past. Meanwhile, a department not a whit less important has remained, not quite perhaps at a stand-still, but far behind in the race of improvement. We refer to the cars, both passenger and freight. Whatever use there may be in weight as an element of success in the engine, there can certainly be no excuse for hauling fifty or a hundred tons in railway trains, in the shape of cars. Weight here is not only of no use, but is one of the greatest evils that the railway manager has to contend with. We may improve the engine as much as we can, and we may perfect the track to the utmost extent, and yet if we leave the cars, which consume so large a percentage of the power applied, clumsy and heavy, we still leave one of the most fruitful fields of railway economy uncultivated. The immense proportion of dead to paying loads hauled upon our railways shows how very far from perfection we are yet in the mechanical department. We might make cars of iron and steel which would not weigh over three-fourths of what our ordinary cars do now, and which would be at the same time strong and durable. The wheels, the trucks, and the body, are all susceptible of improvement; and if we could reduce the dead weight twenty-five per cent. would it not be worth while? We think it would. Much remains also to be done in the warming and ventilating of the passenger-cars. Among the various directions in which the improvement in equipment is to be made is a reduction of speed. Cars made to run thirty miles per hour need to be much stronger than those used to run only at fifteen miles per hour. This, to be sure, does not come into the mechanical, but into the managing department. There is left, however, a large field for improvement, which is the business specially of the shops; and that is the reduction of weight, but not of strength, of the cars, both passenger and freight.—*Railway Times.*

Mutton Trade of New York.

The following interesting extracts are from the *American Agriculturist*:—

"Few persons are aware of the extent to which sheep are sold in this city. Including those received at the four public market places and those sent directly to butchers, an average of over 10,000 live sheep per week were slaughtered in this city during the past year. Besides these, there are at least 1,000 dressed carcasses received weekly. If the whole number were driven in at one time, three abreast, allowing four feet of space for each sheep, the line would extend from New York to Albany, a distance of over one hundred and forty-five miles.

"Since the commencement of the war, the demand for wool has so greatly increased that farmers are adding largely to their flocks. They find that, with the high prices of wool and the good demand for lamb and mutton, sheep-raising is one of the most profitable branches of farming, and they are now holding back their stock. Prices vary somewhat with the supply, but well-fed sheep, which will weigh 100 lbs. alive, have been selling at \$5½ a \$6 per head, for a month past; they are now worth \$6½. The rise in wool has added largely to the value of pelts, mixed lots of these selling at \$2½ each, and selected pelts at \$2½ each.

"In former years the thin ewes have been bought up by farmers for store sheep, at \$2½ a \$3 per head. Of late this class has been mostly kept in the country. Those sent to market have been bought up by butchers at \$3½ a \$4 each. Contrasting with this class are a limited number of extra large fat sheep, usually sent in about the holidays and sold at high prices. A few have brought as high as \$15 a \$20 each. Three full-blooded Leicester sheep, from Canada, were recently sold to a butcher of this city for \$70. They dressed 471 lbs. The pelts would bring \$2½ each, which would leave the cost of the mutton a little over 12 cents per pound. In view of these figures it is safe to advise the raising of more sheep and fewer dogs."

Jerusalem Underground.

An account of Signor Pierotti's discoveries in the subterranean topography of Jerusalem has been published. Employed by the Pasha as an engineer, he has discovered that the modern city of Jerusalem stands on several layers of ruined masonry, the undermost of which, composed of deeply-beveled and enormous stones, he attributes to the age of Solomon, the next to that of Zorababel, the next to that of Herod, the next to that of Justinian, and so on till the time of the Saracens and Crusaders. He has traced a series of conduits and sewers leading from the "dome of the rock," a mosque standing on the very site of the altar of sacrifice in the Temple, to the Valley of Jehosaphat, by means of which the priests were enabled to flood the whole Temple area with water, and thus carry off the blood and offal of the sacrifices to the brook Kedron.

The manner of Pierotti's explorations was interesting:—He got an Arab to walk up through these immense sewers, ringing a bell and blowing a trumpet, while he himself, by following the sound, was able to trace the exact course they took. About two years ago he accidentally discovered a fountain at the pool of Bethesda, and on his opening it a copious stream of water immediately began to flow, and has flowed ever since. No one knows from whence it comes or whither it goes. This caused the greatest excitement amongst the Jews, who flocked in crowds to drink and bathe themselves in it. They fancied it was one of the signs of the Messiah's coming, and portended the speedy restoration of their commonwealth. This fountain, which has a peculiar taste, like that of milk and water, is identified by Signor Pierotti with the fountain which Hezekiah built, and which is described by Josephus. The measurements and position of most of these remains accord exactly with the Jewish historian's descriptions. Some of the Signor's conclusions are disputed, but no one has succeeded in so disinterring the relics of the Holy City.

Revenue of Great Britain.

The total revenue of Great Britain for the year 1862, amounts to £70,996,429 sterling. In 1861 it only amounted to £68,603,851; showing an increase of £2,392,578. This increase has not been caused by a higher rate of taxation, but is the *bona fide* result of the increase of wealth and trade. In only one department, that of the excise, is a diminution shown to the extent of £627,000. The decrease is to be accounted for by the repeal of the duties upon hops; the law enacting which came into effect, we believe, late in 1861. The increase in customs is £262,000; in stamp duties £425,775; in the property tax £1,142,000, and from miscellaneous sources £1,055,761. Taking the value of a pound at five dollars in gold, the entire British revenue in 1862, amounted to the prodigious sum of \$354,982,145. The British entrances and clearances of vessels for 1862 exceed those of 1861 by little short of 1,000,000 tons. The entrances and clearances of American vessels in English ports were three-quarters of a million less in 1862 than in 1861, and most of the trade thus lost has passed into British hands.

American National Revenue.

The Secretary of the Revenue has communicated to Congress the Report of the Commissioner of Internal Revenue, respecting the operations of the Excise Law passed by Congress at its last session. The States not in rebellion have been divided into collection districts, of which there are one hundred and eighty-three, including two in Virginia—corresponding in number to the Representatives to which they will be entitled in the Thirty-eighth Congress. An Assessor and Collector have been appointed in each District—with the exception of the two Districts in Virginia. The entire number of Deputy Collectors is eight hundred and ninety-eight, and the whole number of Assistant Assessors, is twenty-five hundred and fifty-eight, making an aggregate of Collectors and Deputies, Assessors and Assistants, of thirty-eight hundred and fourteen—besides sixty male and eight female clerks, which have been appointed in the Treasury Department and assigned for duty in the office of Internal Revenue. As the result of a careful investigation recently instituted into the several sources of revenue, Mr. Boutwell is en-

abled to make an approximate estimate as to the probable amount that will be raised under the Excise Law. According to this estimate, there will be received from all sources, except stamp duties, during the current fiscal year, ending the 30th of June next, the sum of \$61,777,799. He estimates that the receipts from stamp duties, during the same period, will amount to the sum of \$15,000,000, making an aggregate revenue of \$76,777,799. This result, the Commissioner states, has been reached by the most careful inquiry that could be instituted into the amount of the various kinds of manufactures, the revenue to be derived from each, and by a like careful inquiry into all the other sources of income. It may be assumed that, without material changes in the business of the country, the revenue from the same sources, for the fiscal year 1863-4, will not be less than \$150,000,000.

The cost of assessing and collecting is estimated at \$3,616,000, not including printing expenses.

Sugar as Food.

In the last number of the *British and Foreign Medical Review* there is an interesting paper on "Sugar as Food and as a Product of the Organism." In alluding to the uses of sugar in assisting assimilation, the reviewer quotes Mr. Bridges Adams, who says:—"I know by experience the difference in nutritious effect produced by the flesh of tired cattle on a march, and those slain in a condition arising from abundant food and healthy exercise. In the former case any amount might be eaten without the satisfaction of hunger, whilst in the latter a smaller amount removed hunger. But I discovered that certain other food of a different quality, such as grape-sugar and fruit, would help the tired meat to assimilate, and thus remove hunger." Puddings and fruit tarts are not, therefore, simple flatteries of the palate, but digestive agents; provided always they are not themselves of rebelliously indigestible materials, which, in English cookery, is too frequently the case. The reviewer alludes to the fondness of artisans for confectionery, and of patients just discharged from the hospital asking for "sweets," in preference to good substantial food, as examples of a correct instinct. There is no doubt that in children, in whom the requirements of growth call for a rapid and efficient transformation of food into tissue, the demand for sweets is very imperious; and parents should understand that the jam pot will diminish the butcher's bill and increase the amount of nutrition extracted from beef and mutton.

To Prevent the Rotting of Wood.

In order to prevent wooden posts and piles from rotting while in the ground, the following receipt has been sent to the Société d'Encouragement, Paris. A certain paint is used which has the hardness of stone, which resists damp, and is very cheap. It has been in use for the last five years:—50 parts of resin, 40 parts of finely-powdered chalk, about 300 parts of fine hard sand, 4 parts of linseed oil, 1 part of red oxide of lead, and 1 part of sulphuric acid, are mixed together. The resin, chalk, sand, and linseed oil are heated together in an iron boiler; the red lead and the sulphuric acid are then added. They are carefully mixed, and the composition is applied while hot. If it be not found sufficiently fluid, it may be made thinner by adding some more linseed oil. This paint, when cold and dry, forms a varnish of the hardness of stone.

MODEL-MAKING.—We frequently have inquiries from inventors residing in Philadelphia and its vicinity, to know where they can have models made suitable for the Patent Office. For the general information of inventors residing in Philadelphia, we would state that we have seen some very fine specimens of workmanship in models from the shop of J. R. Sees, whose advertisement can be found in another column.

STEAM FIRE-ENGINES.—Since the substitution of steam fire engines in Baltimore, the losses by fire have been reduced almost to *nil*. Last year the insurances ran up to \$120,000,000, while the absolute losses by fire do not exceed \$15,000, and this in a city of at least 220,000 inhabitants!

THE Bahama *Herald* of Jan. 17th states that the British man-of-war, *Vesuvius*, recently took \$1,500,000 in specie from Mobile, for Europe.