THE PRACTICAL USE OF SCIENCE.

The adulteration of various articles of food has of late become so alarming, and the various processes are so skillfully conducted that the aid of science is being called in to assist in the detection of such practices, in order that the offenders may be more readily brought to justice. The French authorities are just now wrestling vigorously with those engaged in palming off upon the public a spurious article of olive oil, the adulterations of which have become so universal that it is difficult to get a pure article anywhere in the European market. According to the *Correspondence Scientifique*, the government recently referred the matter to a special committee of the Academy of Sciences, which has recommended the use of a new instrument which is called the diagometer. The instrument, which has been devised by Prof. Luigi Palmieri, has its action based on the differences in the electric conductivity of oils. Pure olive oil has very feeble conductive properties, which (as is also the case with other oils) increase with the amount of impurities added. The only oils that are known to compare to olive oil in respect to their low conductivity are the oils of pine-seed and hazel nuts; and these, fortunately, are too expensive to be used in the adulteration of the former. The conclusions of the committee on the practical value of the diagometer have not yet been announced; it is noted, however, that its use demands considerable manipulative skill. For the correctness of this abstract we refer to the London *Chemical News*.

Butter is another article to preserve the purity of which the aid of the scientist has been invoked. In reply to such a demand Herr Fisher asserts that the examination of butter by polarized light with a magnifying power of about 200 to 300 diameters, affords a much more certain criterion of its purity than a specific gravity test. Examined in this way, fictitious butter shows not only the globular drops and salt crystals characteristic of genuine butter, but likewise other more or less developed crystals. The author also finds this method may be applied to the determination of different kinds of fats, inasmuch as each of these show characteristic colors in polarized light. Mutton tallow, for instance, always give a blue tone; cocoa butter gives colors passing from the brightest green to the deepest red; the fat of oxen gives green and white luminous effects; while small bright green semi-lunar and vermicular bodies appear in common light. Hog's lard shows many colors, especially red and blue—yellow, which is characteristic of cocoa butter, being absent.

PETROLEUM AS FUEL.

A method of using petroleum as fuel for steam-boilers has been recently tried at Pittsburgh (U.S.) with, it is said, complete success; and, as oil can be had anywhere in the region of the wells for about 70c. a barrel, the company who hold the patent believe that the invention will be readily taken up, especially by the owners of steamboats. It resembles, according to the journal of the Franklin Institute, in its principal features, many of the forms previously described—air, steam, and oil-spray being injected into a suitable fire-box. The spray is said to be immediately converted into inflammable gas, becoming a pure, bright, powerful flame, devoid of smoke and producing intense heat. To accomplish this result extremely simple machinery is used. A small hole is drilled into the iron front of the fire-box, and into this passes a tube, which branches as it leaves this point into two pipes. One of these connects with the boiler itself, and the other with the receptacle containing crude oil. At the junction of these pipes there is an aperture for the admission of atmospheric air. Valves of peculiar construction regulate the quantity of steam or oil admitted into the furnace. This is all the machinery required, but its operation, according to the *Pittsburgh Telegraph*, is wonderfully complete and remarkably successful. The little steamer *Billy Collins* was selected for the test, and was fired up at 9 a.m. A preliminary blaze of wood under the boiler raised the small quantity of steam necessary to start the burner into operation. The oil valve was opened a trifle, the steam valve ditto. The petroleum trickled into the feed pipe, was caught up by the steam, and both plunged into the depth of the fire-box, a mass of many-tongued, roaring, brilliant, flame. As the pressure of steam increased, this flame grew in fury and intense heat, roaring through the entire length of the boiler with a sound like the coming of a thunderstorm. The needle of the steam-gauge climbed rapidly up the dial, and in twenty minutes the safety-valve blew off at 120 lb. pressure. Here was a boat puffing through the water with no sign of smoke from her chimney, no speck of soot in flue or fire-box, no firemen, no opening of furnace doors, no dirt, no coal going in, no clinkers or ashes to be seen anywhere. A turn of the hand regulated the terrible flame that seemed trying to overpower the limits of the furnace, and another turn of the hand brought the fire down to a quiet little flame a foot or two long. During the forenoon occupied by the test about 20 gallons of crude oil were consumed, and it was estimated that with oil at one dollar per barrel this fuel was equivalent to coal at six cents (quantity not stated) in heat-producing value, other things being equal. But other things are not equal by any means, the journal referred to declares, and everything is in favor of oil as against coal. The labor and the expense of "firing up" are dispensed with, and the engineer can regulate the flame as he does the steam in his engines. The danger from sparks and flying cinders is entirely done away with. The space occupied by oil, as compared with an equal quantity of coal, is very much less, and this much is gained for cargo. Further, the wear and tear upon boilers, grate, bars, &c., is infinitely less; and, it seems scarcely necessary to add, the comfort of passengers is greatly enhanced by the absolute freedom from dirt of all kinds. It is urged that to ocean-going steamers this device must prove of great value. A tank of oil situated at a remote end of the ship would hold fuel sufficient for a double trip and supplant the great coal-bunkers, with their attendent dirt. It is also maintained that the new furnace is full of promise for railway locomotives also.

AFRICAN PROJECTS.—The French government is reported to have appointed a commission to conduct investigations preliminary to the construction of a railway across the Desert of Sahara to the river Niger, and French engineers are said to be now at work exploring the line of the proposed road as far as the Laghouat on the south. M. Saleillet, an engineer, has been charged with the examination of the unexplored regions lying to the east of the colony of St. Louis, in Senegal, as far as Timbuctoo. This gentleman advocated, at a late meeting of the Paris Geographical Society, the construction of a railroad from Dakkar, on the Atlantic, to St. Louis; the opening of the river Senegal to navigation as far as Bafoulabé, and the union of the Senegal with the Niger by means of a canal from this point to Bamakou on the last named river. The Niger is now navigable from Bamakou to Timbuctoo, and lower down for a distance of 1,500 miles. The total expense of this work M. Saleillet places at $5,000,000. The population that it would unite in commercial relations is about 37,000,000. The country it is proposed to open by these several projects is represented as being rich in various commercial products, and peopled by intelligent races, who, it is believed, would favor, rather than hinder, their execution. The Government Commission is said to have approved M. Saleillet's plans, and the survey for the canal is to begin at once.

OXIDATION OF IRON AND STEEL WHEN IN CONTACT.—Mr. G. Radcliffe, in a paper read before the Iron and Steel Institute of Great Britain, incidentally mentioned a case in which steel boiler-plates, which had been exposed to the same conditions as adjacent iron-plates, had distinguished themselves by pitting more than the latter. The steel plate next to the iron one was oxidired considerably more than any other. This fact would appear to point to a species of galvanic action set up by the contact of the two varieties of metal in an exciting liquid, the steel playing the part of the positive element. Mr. Radcliffe does not attempt, however, to offer an explantion, but simply concludes that, under the above-named circumstances, it will not do to place iron and steel side by side.

CARBON IN COMETS.—It is generally believed that some compound of carbon exists in comets, and it has been assumed that the bright lines in the spectra of these bodies was due to that compound being in an incandescent state. G. J. Stoney has advanced another hypothesis. He suggests that the bright lines are caused by the light of the sun falling on the compound of carbon, and rendering it visible in the same way that light renders the moon, the planets and other opaque objects visible, the vapor of carbon being opaque to the particular rays which appear as bright lines in its spectrum.

RECENT experiments, it is said, seem to show that chlorine, which has hitherto been classed as one of the elements, is a compound, one of the elements of which is oxygen. It is known by chemists that ozone has a higher density than oxygen in its usual state, the explanation given being that the ozone molecule has three atoms oxygen, whereas the ordinary oxygen molecule consists of but two. On heating ozone the density is decreased, and the gas becomes plain oxygen. In this case, one of the "elements" must probably be struck from the list.