

With respect to Mr. Clifford's observations he might say that whilst it was true that some of the valuable constituents of the sludge were destroyed by this process, the analysis of the final product showed that a little over one-third of the fatty matter and about one-fourth of the nitrogen were lost. The phosphoric acid would be very little altered. It was therefore far from the fact to say that the digested sludge resulting from the process was useless. In view of the possibilities of this sludge and the large amount of promising investigation going on just now he (the author) considered it a very desirable thing to accumulate the sludge on a tip. This process made such storage possible by eliminating the nauseous character of the sludge.

The merits of small versus large outfall works were chiefly engineering and financial ones, which usually told in favour of the large installation.

The means for utilising the sludge had yet to be worked out, and if the claims of the inventors of some recent processes were realised when tried on a large scale, then this means would be very shortly at hand. In the meantime the processes like the one described in this paper relieved the community of a serious nuisance.

The difficulty in connection with the manurial value of sludge was exemplified by the small proportion of the nitrogenous matter destroyed by the above process. This provided independent evidence of the extreme slowness with which the nitrogen became available for the nourishment of plant life.

As to the cost of the process, the costs given above were working costs, and included maintenance and repairs of working parts of machinery. From a mechanical point of view the process was simple and the wear and tear very small. The interest on capital and sinking fund charges were in this case very intricate, and so involved that it was almost impossible to assess them accurately. Their net contribution to the figure for cost was however probably small.

NOTE ON GRU-GRU OIL.

BY A. W. KNAPP, B.Sc., F.I.C.

Gru-gru is the Trinidad name for *Acrocomia sclerocarpa*. I saw trees of the same species (*Acrocomia lasiocarpa*) in Grenada, and they are said to grow in many parts of S. America. They will grow in the poorest of soils. The trunk has at intervals circles of sharp spines, so that it is almost impossible to climb. The tree belongs to the same tribe as the coconut palm—the leaflets are thinner and the trunk is generally swollen in the middle. The leaves are said to yield a very delicate fibre. The fruits are oblate spheroid in shape, about the size of a large plum, and dark green in colour. The skin is very tough, but if the fruits are allowed to fall to the ground this rots off leaving the nuts behind, the kernels remaining sweet. The shell of the nut is about $\frac{1}{4}$ -inch thick and hard, the kernel ($\frac{1}{2}$ -inch across) has the appearance and flavour of coconut, but is tougher and more transparent.

Fruit: length $1\frac{1}{2}$ inch, breadth $1\frac{1}{4}$ inch, weight 30 grammes.

	Per cent.
Pericarp	59.73
Shell	31.30
Kernel	8.97
	100.00

Dry ether extracts 2.44 per cent. from the pulp of the pericarp. The kernel contains:—

	Per cent.
Fat (petroleum ether extract)	49.13
Water	8.14
Albuminoids	13.70
Fibre and unestimated	29.03
	100.00

One tree I examined had on it 9 large bunches, each bunch containing about 400 fruits, that is, in all 3,600. The kernels were collected in March. The oil, which was

obtained from the kernels by pressing them when hot, gave the following figures:—

	Oil.	Insoluble fatty acids.
Colour	Very pale yellow	White
Odour	Like coconut oil	Like coconut fatty acids
Taste	Ditto	Ditto
Sp. gr. (90° C. water at 15.5° C.)	0.861	0.838
Melting point	26.0° C.	24.0° C.
Titer	—	23.05° C.
Iodine value (Wijs)	10.4	20.3
Refraction at 40° C.	36.95	10.7
Saponification value	243.5	—
Reichert-Meissl value	7.2	—
Polenske value	13.0	—
Shrewsbury and Knapp	163.0	—
Neutralisation value	—	261.0
Mean molecular weight	—	214
Free fatty acids (as oleic)....	0.62%	—

From the above properties I conclude that this is the same oil as Mocaya oil of Paraguay and the oil from the maccasuba palm of Surinam (see De Nigri and Fabris, Chem. Rev., 1897, 82; and Sack "Inspectie van den Landbouw in West Indie," Bulletin 5, 1906).

It is evident both from the organoleptic and analytical tests that the oil is very similar to coconut and palm-kernel oils, so that it consists chiefly of laurin and myristin. It contains about 12 per cent. more olein than coconut oil, and hence should have about the same value as palm-kernel oil.

The soap produced from this oil is almost white and has excellent lathering properties, and the "stearine" from the oil would make a good edible fat.

It is not at present cultivated in the West Indies, and hence, although widely distributed is only thinly scattered, so that the gathering of sufficiently large quantities presents considerable difficulty. Further, the nuts are very hard. The shells when cracked are heavy enough to be separated from the kernels by immersion in brine. Last June, as an experiment, copra was prepared from gru-gru nuts in St. Vincent.

In conclusion I wish to thank Mr. S. B. Phillips for his assistance.

DISCUSSION.

Mr. SILVESTER asked if the author had any knowledge of gru-gru oil being used, for cocoanut oil, in the manufacture of margarine.

Mr. KNAPP replied that he was not aware that such a practice was followed, though there was no reason why it should not be pursued.

Newcastle Section.

Meeting held at Armstrong College on Wednesday, December 10th, 1913.

MR. T. W. LOVIBOND IN THE CHAIR.

THE SOLUBILITY OF MINERAL PHOSPHATES IN CITRIC ACID.

BY G. S. ROBERTSON, B.Sc.

Quite recently artificial manure manufacturers have placed on the market large quantities of mineral rock phosphates as a suitable phosphatic manure. These mineral phosphates, in spite of the fact that they are very finely ground, are only slightly soluble in 2 per cent. citric