The sea in the neighbourhood of Port Said is constantly receiving Nile water. This comes out through a large shallow lake—Lake Menzaleh—and in the summer and autumn through the Damietta mouth of the Nile. Travelling through a thousand miles of heated desert—partly discharging through a shallow lake which is rapidly heated by the sun—the effluent water of the Egyptian Nile is much hotter than that of the Mediterranean Sea in the summer.

The order of the temperatures in these delta lakes is well shown by Paget (Fisheries Report of Egypt, 1921). It will be seen that the average monthly temperature in August and July is 30° C.

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Anti-Knock Ratings of Pure Hydrocarbons.

PROF. NASH and Mr. Howes emphasise the fact that whereas their figures for trimethylethylene and diamylene were quoted for twenty per cent volume concentration, our own were for twenty per cent weight concentration. From curves obtained for these hydrocarbons, reproduced in Fig. 1, it is clear

FIG. 1.

that over the range examined the relationship between weight-concentration and increase in H.U.C.R. is linear. Knowing the specific gravities, it is a matter of simple calculation to show that the discrepancy cannot be due to our use of what we regard as the only rational procedure. The specific gravity of the standard fuel was 0.725 at 60° F.

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So far as the possible effects of volatility are concerned, all tests at these laboratories are carried out with sufficient intake air, heating, and jacket and head temperature to ensure that no appreciable difference in anti-knock rating is found with any further heating, whether low boiling gasolines or heavy kerosines are being tested.

The recent recommendations made by Campbell, Lovell, and Boyd regarding the importance of making all comparisons at the mixture strength which gives maximum pinking have been in use here for upwards of two years. The Armstrong engine developed independently in these laboratories while their work was in progress includes both variable compression head and bouncing pin.

In order to find definitely whether differences in volatility are the cause of discrepancies between one fuel and another, experiments have been carried out with:

1. Standard heating conditions and compression adjusted to suit the sample.
2. Evaporative cooling, high compression and throttling to control the pinking as is the practice when using the Delco engine.

The mean results were identical, although the values of single readings using the second set of conditions were more erratic owing probably to the method of cooling which tends to induce stray hot spots.

We feel that possibly complete agreement might be reached on those points still in doubt if tests were carried out using a common supply of trimethylethylene and diamylene in both engines, employing a range of air-fuel ratios.

In the case of the Ricardo E.5 engine and the Armstrong engine used in this laboratory, the effect of air-fuel ratio has already been thoroughly studied. Similar experiments could be made without alteration to apparatus on the Delco plant, and we have no doubt concerning the ultimate results.

Confirmation of the accuracy of our figures is afforded by the fact that substantially identical values are obtained using such a wide range of research engines as:

- (a) The Thornycroft overhead valve engine of 1025 c.c. capacity.
- (b) The Ricardo sleeve valve engine of 350 c.c. capacity.
- (c) The Armstrong engine with a fixed ratio head.
- (d) The Armstrong engine with a variable compression head.

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WE would thank the Editor of NATURE for kindly allowing us to reply to the above letter of Messrs. Birch and Stansfield, but feel that we must not trespass on the space of this journal any further in that all contribution to our knowledge of the subject under discussion ceased with our letter which appeared in the issue of April 6.

In our previous communication no suggestion was made that the difference in the results obtained for diamylene and trimethylethylene was due entirely to the fact that Messrs. Birch and Stansfield employed concentrations by weight, whereas we used concentrations by volume. Nevertheless, the fact must necessarily contribute to the discrepancy.

It is also not impossible that the samples of diamylene as used by Messrs. Birch and Stansfield and ourselves were not chemically identical. The boiling ranges were not the same, and seeing that the diamylene as made from trimethylethylene is