Notes on L— and B— Lupanin. By Sherman Davis.

The Physiological Action of Compounds Containing Bivalent Carbon. By J. U. Nef.

The Calculation of the Heating Effect of Coals from the Proximate Analysis. By W. A. Noyes.

So far as I am aware, no satisfactory formula has ever been given for the calculation of the heating effect of coals from the amounts of fixed carbon, volatile combustible matter and sulphur present. It has been generally assumed that the amount of oxygen in coals varies so greatly that no rational basis for such a calculation could exist. During the spring of 1895, Mr. J. R. McTaggart and Mr. H. W. Caver made careful analyses and determined the heating effect with Hempel's calorimetre, for six Indiana coals. Recently I have had the opportunity of examining similar analyses and calorimetric tests of fifteen Pittsburgh coals, made under the direction of Prof. N. W. Ford, of the University of Ohio.

In the analyses as given, the amount of oxygen in these coals appears to vary between quite wide limits. On subtracting from the total oxygen the oxygen present in the form of water, however, it was found that the average amount of *oxygen of combustible matter* was 7.72 per cent. for the Indiana coals and 8.05* for the Pittsburgh coals, or a general average of 7.96 per cent. and a maximum deviation from that average of 1.23 per cent. In only one coal is the difference from the mean more than one per cent.

Since the per cent. of hydrogen in these coals is subject to only a slight variation, it follows that the combustible matters present in all of these coals so far as they consist of carbon, hydrogen and oxygen, have a nearly constant composition. There should, therefore, be a nearly constant factor for this total combustible matter. In order to calculate this factor for the coals in question it has been assumed that one-half of the sulphur is found in the volatile combustible matter as calculated from the difference between total volatile matter and water, and that the fixed carbon is given with sufficient accuracy by subtracting the ash from the coke. In other words, the combustible matter was formed for the purposes of this calculation by subtracting from 100 the per cents. of water and ash

* In calculating this result Professor Ford's figures for oxygen were corrected by adding three-eighths of the weight of sulphurs, on the supposition that iron pyrites in the coal is burned to ferric oxide in the ash. See Jour. Am. Ch. Soc. XVII.

and one-half of the per cent. of sulphur. When the heating effect, as found in the calorimetre (calculated on the basis of the fuel burned and vapors of water at 100° C.) was divided by this per cent. of combustible matter it was found that one gram of combustible matter gives, on the average, for the Indiana coals 8073 calories and for the Pittsburgh coals 8078 calories.

We may, therefore, give the following empirical rule for the calculation of the heating effect of coals: *Find the combustible matter by subtracting from 100 the per cents. of water and ash and one-half of the per cent. of sulphur, and multiply this remainder by 80.7. The result will give the heating effect of the fuel burned to liquid water.*

For the twenty-one coals referred to, the heating effect calculated by this rule shows a maximum deviation from the calorimetre test of two and one-fourth per cent., while the agreement is in most cases, much closer than that.

It would not be safe to apply this rule to coals known to be of very different origin or character, until a similar comparison of calorimetre results with the analysis has been made for such coals.

Notes on the Flora of Lake Cicott and Lake Maxinkuckee. By Robert Hessler.

The following notes on the flora of the region surrounding Lakes Cicott and Maxinkuckee are offered as a contribution toward a complete flora of Indiana; they are based on personal observations made during the period beginning with August, 1894, and ending with December, 1896.

Longcliff, just west of Logansport, has been the basis of operation, so to speak, and this locality has been examined most fully. I thought it best, therefore, to make mention of the noteworthy plants found here, although the flora does not differ materially from that common to the central part of the State. It is the usual glacial drift flora, with beech as the most common forest tree.

The region about the lakes is in marked contrast. The upland soil is made up of a fine sand which contains only the merest trace of lime, and with oak as the prevailing tree. The lowlands in places are wet or swampy. Tamarack swamps and peat bogs occur here and there, but are nowhere of great extent. It is, perhaps, unnecessary to state that the wet northern portion of Indiana is being drained more and more every year, and the land, exceedingly fertile, brought under cultivation. The completion of the Kankakee drainage system will, in time, be followed by numerous minor systems, and in the course of a few years the