Glimpses of Nature. By Andrew Wilson. (London: Chatto and Windus, 1891.)

MR. WILSON does not profess to present in this book anything strictly new, or to give a full account of the various subjects with which he deals. Nevertheless, the volume may be of considerable value, for on all the groups of facts in which he is interested he is able to discourse brightly and pleasantly, and many of his short papers are well calculated to excite in the minds of intelligent readers a desire for more ample knowledge. The papers are reprinted from the *Illustrated London News*.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

The Fusing and Boiling Points of Compounds.

I HEREWITH send you the translation of a note just presented for me by M. Berthelot to the Paris Academy, as you may see in the *Comptes rendus*. I have added two illustrations and a few words in italics. GUSTAVUS HINRICHS.

St. Louis, May 8.

Statement of the General Law determining the Fusing and Boiling Points of any Compound under any Pressure, as Simple Function of the Chemical Constitution of the same. By Dr. Gustavus Hinrichs.

The atomic form of normal lineary compounds, such as the paraffins, alcohols, acids, is very nearly prismatic. All other serial compounds may be referred to these, either as isomerics or as substitution products. The boiling and fusing points of these latter are obtained from those of the former according to laws and processes published by me about twenty years ago, partly in my "Principles of Molecular Mechanics," 1874, and in Notes of the *Comptes rendus* for 1873 and 1875; *partly in papers of the Proceedings of the American Association for the Advancement of Science for* 1868. It remains, therefore, only to show how these fundamental points are determined for prismatic compounds.

The boiling-point t of a prismatic compound consists of two distinct functions, namely—

$$t = y_1 + y_2 \quad . \quad . \quad . \quad (1)$$

where

$$y_1 = k_1(\log a - \log \alpha_1) \quad . \quad . \quad . \quad (2)$$

and

$$y_2 = k_2(\log \alpha_2 - \log a)^2 \quad . \quad . \quad . \quad (3)$$

The symbols α_1 and α_2 represent certain definite values of the atomic weight a of the compound, while k_1 and k_2 are constants.

For every value of the atomic weight a greater than α_2 the formula (1) is limited to $t = y_1$, which, according to (2), represents the straight line which I call the logarithmic limit, the ordinate being the boiling-point t, the abscissa x, the logarithm of the atomic weight $x = \log a$. For values of a less than the above limit α_2, the parabolic ordinate y_2, determined by (3), must be added to y_1, according to (1), in order to obtain the boiling-point.

Accordingly, the boiling-point curve of any homologous series of prismatic atom-form consists of a parabolic arc (3), tangent to the logarithmic limit (2), at the point determined by $a = \alpha_2$. The constant k_1 determines the inclination of the logarithmic limit, and k_2 may be called the parameter of the parabolic branch.

All compounds derivable by terminal substitution from normal paraffins have a common logarithmic limit, determined by $k_1 = 583°·75$ and $\alpha_1 = 72·78$, the pressure being 760 mm. Every individual homologous series of this great family of compounds is completely determined by the special values of the two constants α_2 and k_2. For example, the thirty-five normal paraffins C_nH_{2n+2} are determined by $\alpha_2 = 201$, and the parameter $k_2 = 200°$. For the monamines, the corresponding values are $\alpha_2 = 278$, and $k_2 = 225°$. I have determined these constants for all the important series. Furthermore, these values are themselves functions of the atom or radical which characterizes the head of the corresponding homologous series—*that is, H for the paraffins, H_2N for monomines, &c.*

If now the co-ordinate $z = \log p$, where p is the pressure of the saturated vapours, be laid off on the third rectangular axis the above given values belong to the plane XY determined by $p = 760$ mm. For the pressure $p = 15$ mm. the logarithmic limit is determined by $k_1 = 517°·0$, and $\alpha_1 = 113·81$. It will be noticed that its inclination towards the X axis is less, and that it intersects the same at a greater distance from the origin. The logarithmic limit surface, generated by the logarithmic limits for all pressures, is a hyperbolic paraboloid, fully determined by the above two lines for 15 and 760 mm. pressure.

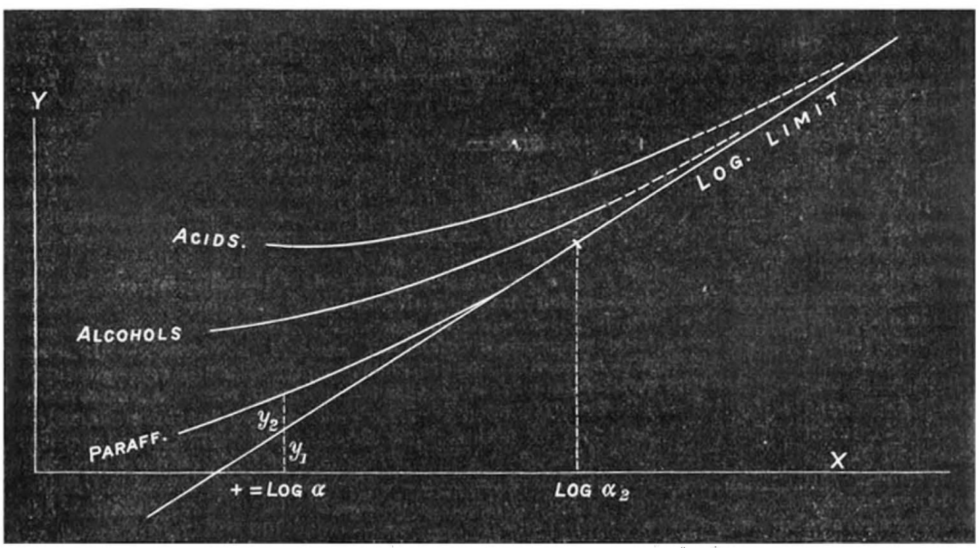

FIG. 1.