

Dr. Turner suggests that, instead of saying that the emergent, as something distinctively new, is not deducible from the data afforded by our present knowledge of the old—the characterising properties of the living organism, for example, not deducible from our existing knowledge of not-living entities—it would be better to say that the character of the emergently new is unprecedented. One should welcome any suggestion that may conduce to clearness and precision. But some may ask in what respect the unprecedented differs from the not-deducible. Has it a wider or a narrower reach? Were I to use the word 'unprecedented' it would have for me a wider reach, since there are quite possibly, and I think very probably, thousands of instances in which some given mode of the algebraical summation of resultant features has never occurred before, and is, in that sense, unprecedented. But if this be so, we have here no criterion of that which is emergent as distinguished from resultant.

It seems, however, to be Dr. Turner's opinion that whereas the notion expressed by 'not deducible' prevents any reconciliation of opposed viewpoints, the implication of 'unprecedented' may tend to further such reconciliation. What, then, is this implication? It may be such as Prof. Alexander, Dr. Broad, and Prof. Whitehead would gladly accept. But we need a clearer statement of what unprecedented means and all that it means. In view of reconciliation, is there some implication, which Dr. Turner surmises may be taken for granted?

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Adsorption Isothermals.

In his book "Colloid and Capillary Chemistry" (page 111 of translation by H. Stafford Hatfield, London, 1926) Freundlich remarks in reference to the adsorption of gases: "a theoretically well-founded equation, giving the a , p curves over a considerable range, is not known. The empirical general parabolic equation $a = ap^{1/n}$ in which a and $1/n$ are constants, is still nearly always used." The quantities a and $1/n$ are functions of the temperature and are constant when this is constant.

Freundlich refers to the theoretical studies of Polanyi, Langmuir, A. M. Williams, and others, and quotes the equations for the adsorption isothermal which some of these workers have proposed.

One naturally hesitates to introduce another equation into the field, but feels encouraged to do so if the new formula appears more suggestive than the older ones. I have recently been much impressed by the manner in which

$$a = \frac{f(T)p^{T/273x}}{1 + \phi(T)p^{T/273x}}$$

agrees well with experimental observations in a variety of published cases. In this equation a has its usual significance, the amount adsorbed; T is the absolute temperature of the experiment; $f(T)$ and $\phi(T)$ are functions of T , being constant when the temperature is constant; p is the equilibrium pressure of the gas, or may be replaced by c , the equilibrium concentration, for cases of adsorption of solute from dilute solution. Clearly if $\phi(T)$ is positive the amount adsorbed attains a saturation value, but if $\phi(T)$ is negative it becomes infinite at a certain pressure.

The symbol x is of interest. It is often actually unity, and in all cases that I have so far examined, exceedingly good agreement with experiment has resulted when x has been given a low integral value, as shown by the following:

Adsorption of carbon monoxide, argon, nitrogen on charcoal	}	$x = 1$
Adsorption of water vapour on cotton, wood, leather		
Adsorption of acetone in water on blood charcoal	}	$x = 2$
Adsorption of bromine in water on blood charcoal		
Adsorption of isoamyl alcohol in water on blood charcoal	}	$x = 4$
Adsorption of benzoic acid in benzene on blood charcoal		

It should be noted that when the formula now proposed is substituted in Gibbs's adsorption formula:

$$a = -\frac{c}{RT} \frac{d\sigma}{dc}$$

we arrive at the following equation showing the effect of concentration on the surface tension of a solution:

$$\frac{\sigma_M - \sigma_L}{\sigma_M} = \frac{f(T)}{\phi(T)\sigma_M} R \cdot 273x \log(1 + \phi(T)c^{T/273x}),$$

which reduces to the empirical formula put forward by V. Szyszkowski (*Zeits. f. physik. Chem.*, **64**, 285; 1908) when $T = 273$ and $x = 1$.

Some years ago I had occasion to make measurements of the absorption of radiant energy from a stream of full radiation, temperature 373° absolute, by gases and vapours, and obtained data, more complete than any found published at the time, showing the variation of the proportion of the energy absorbed with the pressure of the absorbing gas in a column of constant dimensions. The equation suggested in the preceding for the adsorption isothermal can be applied with success in this case; T is the temperature of the radiation, p is the pressure of the absorbing gas, a is the energy absorbed, $x = 1$ for carbon dioxide, benzene vapour, $x = 2$ for water vapour. It is not difficult to conceive a relationship between the phenomena of adsorption and of radiation absorption.

The nature of my employment does not permit me to devote much more than my leisure hours to a study of this kind, and I shall be glad to communicate to any interested worker who may have facilities to pursue the matter both experimentally and theoretically, such results as I have, so far, been able to accumulate.

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The Mechanism of Enzyme Action.

FOR a long time two viewpoints regarding the mechanism of enzymatic activity have profoundly influenced our conceptions in this field. To Oscar Loew is due the credit for the original suggestion that the enzymes possessing atomic groups with kinetic lability are able, even at a comparatively low temperature, to perform chemical action. This suggestion was later abandoned more and more, and we now generally assume that, as in the case of heterogeneous reactions, the reactants are adsorbed by the enzyme in order that reaction may ensue. In accordance with this we believe with Bayliss that the reaction velocity is determined by the concentration of adsorption complex, that is, reactant—enzyme, present in the system. The possibility of carrying out such reactions depends doubtlessly on certain conditions of the surface, which are also profoundly influenced by the hydrogen ion concentration.

Preliminary experiments carried out with certain zymase solutions which behave as lyophile colloids confirm this assumption. The reactivity of these