



THESIS PRESENTED FOR THE DEGREE OF D.Sc., UNIVERSITY OF ADELAIDE

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On the Chemical Dynamics of the Central Nervous System.

-by-

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III. SUMMARY.

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1. It has been shown, by a new method, that one of the products of the activity of the central nervous system is a substance having the properties of an acid, and for reasons given in the body of the paper it is concluded that this substance arises from transformations occurring within the nerve-cells as a result of stimulation of sensory nerves.

2. It has been shown that the influence of temperature upon the medullary control of respiration is such as would be expected were the processes occurring in the nerve-cells of the medulla, <sup>in frogs</sup> ~~ef-the-eh~~ in the main, chemical reactions.

3. It has been shown that acids and oxidising agents, when applied directly to the medulla oblongata in frogs, accelerate the respiratory rhythm, while reducing agents slow or inhibit it.

4. It is inferred that the processes underlying the activity of nerve-cells are of the nature of autocatalysed chemical reactions in which one of the products of the reaction is the catalysor, and, moreover, that they are probably ~~auto~~ autooxidations.

~~5. Assuming that the formation~~

5. It is pointed out that the phenomenon, the subjective aspect of which has <sup>is</sup> been termed "memory", is of such a nature as to indicate that autocatalysed chemical reactions form the mechanism conditioning the response of the central nervous system to stimuli.

6. Assuming the extent of the memory-trace to be proportional to the mass of a product of an autocatalysed chemical reaction occurring in the central nervous system as the result of an applied stimulus it is shown that the ~~relation~~ deduced relation between the amount of material memorised and the number of repetitions is that which has been found by experiment.

7. On the basis of the above hypothesis it is shown that the Weber-Fechner law admits of a rational physico-chemical interpretation and that the information conveyed thereby, provided the above hypothesis be an accurate representation of the facts, is that the "intensity of sensation" is at any instant proportional

to the mass of the product of the above-mentioned autocatalysed chemical reaction and, therefore, to the extent of the memory-trace.