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ELECTROPHYSIOLOGICAL STUDIES ON THE ANTIEPILEPTIC EFFECT OF VIGABATRIN IN SEIZURE-INDUCED RATS

A thesis

Submitted in fulfillment

for the degree of Ph. D.

In Zoology (Physiology)

By

Rashida Abdulghani Mohammed Noor

B. Sc. (Zoology)

M. Sc. (Physiology)

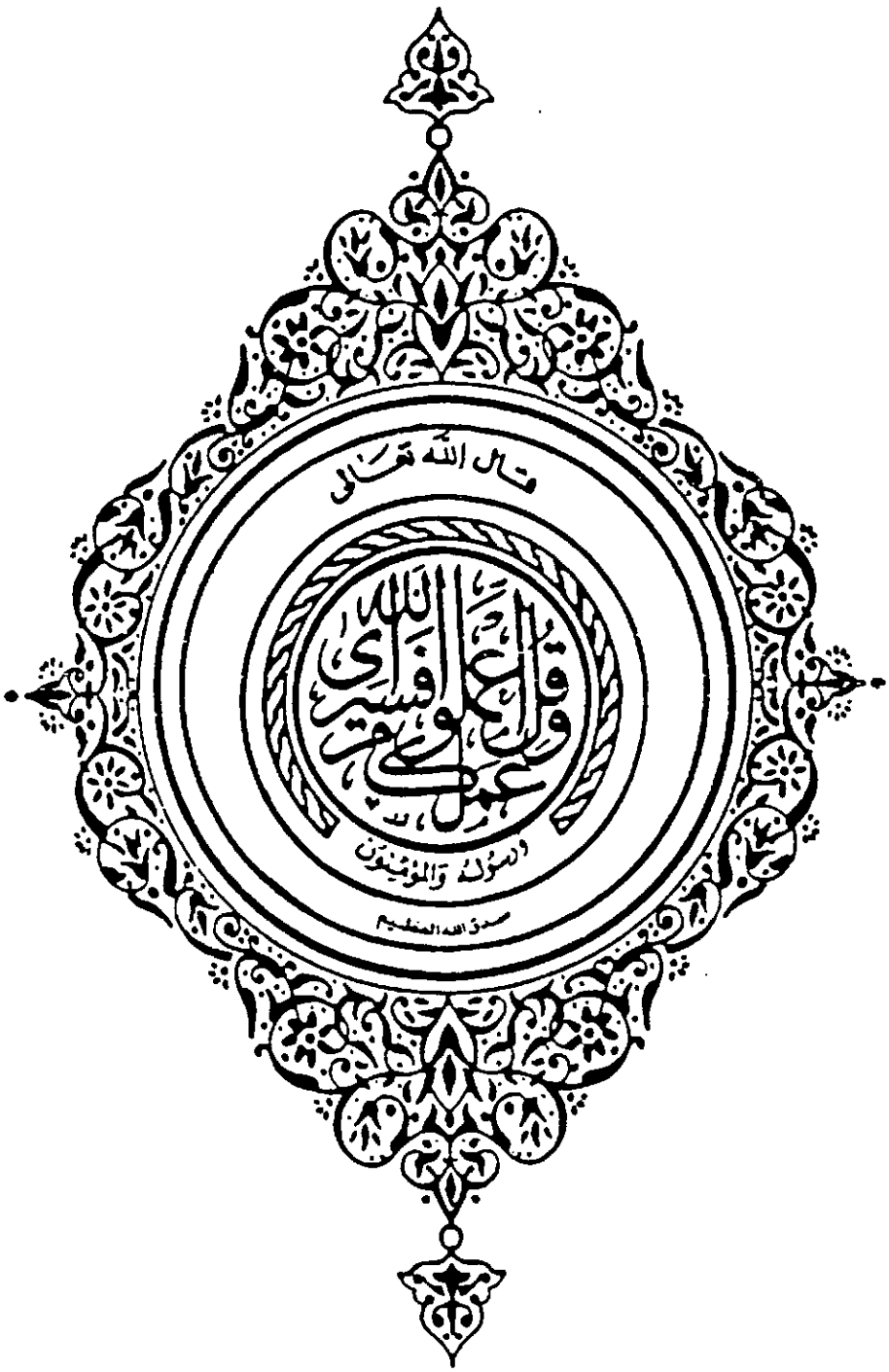
Department of Zoology

Faculty of Science

Cairo University

2002

بسم الله الرحمن الرحيم



APPROVAL SHEET

Title of the Ph.D. Thesis

ELECTROPHYSIOLOGICAL STUDIES ON THE ANTIEPILEPTIC EFFECT OF VIGABATRIN IN SEIZURE-INDUCED RATS

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To Every Researcher
Working for
Human Welfare

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INTRODUCTION

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The first human electroencephalogram (EEG) recording was described by **Hans Berger in 1929** although animal recordings had been made long before by **Caton (1875)** and by **Beck (1890 a, b)**. **Berger (1929)** showed that it was possible to record rhythmic electrical fluctuations from the human brain with electrodes placed on the scalp. The author first demonstrated that the EEG is composed of four basic rhythms: alpha, beta, theta and delta. The EEG is a simple, sensitive and precise indicator of central nervous system (CNS) function **(Mattia and Moreton, 1986)**. It is a gross and coarse measure of the behavior of the neurons of the brain reflecting as it does the summated properties of large populations of cells **(Laidlaw and Richens, 1976)**.

In both clinical and experimental research, increasing use is being made of computer-processed EEG tracings as a means of characterizing and identifying substances acting on the CNS **(Fink, 1977; Gehrmann and Killam, 1978; Itil, 1981)**. In experimental research, this technique of analyzing animals' EEGs affords many advantages **(Stille, 1981)**. The electrodes remain fixed in the same locations. Depth electrodes may also be used, allowing tracings to be recorded from structures possibly more relevant to the aim of investigations **(Fairchild *et al.*, 1980)**. Different animal species

can be used to compare effects seen in classical psychopharmacological models. The influence of environmental factors in animals is less complex than it is in man and can be controlled to a greater extent (**Glatt *et al.*, 1983**).

Both qualitative and quantitative descriptions of the effects of psychoactive drugs on the EEG of various laboratory animals have been reported (**Gehrmann and Killam, 1976; Fink, 1978; Fairchild *et al.*, 1980; Depoortere and Granger, 1982; Depoortere *et al.*, 1983; Glatt *et al.*, 1983; Krijzer *et al.*, 1983; Dimpfel and Decker, 1984, 1985; Radwan *et al.*, 1998**).

Quantified pharmaco-EEG investigations have concentrated on time-related drug-induced changes in the frequency and amplitude of EEG signals and in developing statistical approaches to the analysis (**Wauquier, 1999**). In addition, quantification of pharmaco-EEG changes uses time series analysis by such methods as power spectra, zero crossing, or normalized sleep descriptors, and in most cases the absolute power in different frequency bands is measured (**Wauquier, 1999**).

Electrical activity from the brain consists primarily of rhythms that are named according to their frequency in cycles per second (c/sec), also called Hertz (Hz) (**Hughes, 1994**). Delta refers to all rhythms less than 4 c/sec, theta is between 4 and <8 c/sec, alpha is between 8 and 13 c/sec and beta is >13