A NUTRITIONAL STUDY OF THE AMINO ACIDS IN THE PROTEINS OF SOME BEANS (PHASEOLUS Sp. AND VICIA Sp.)

BY

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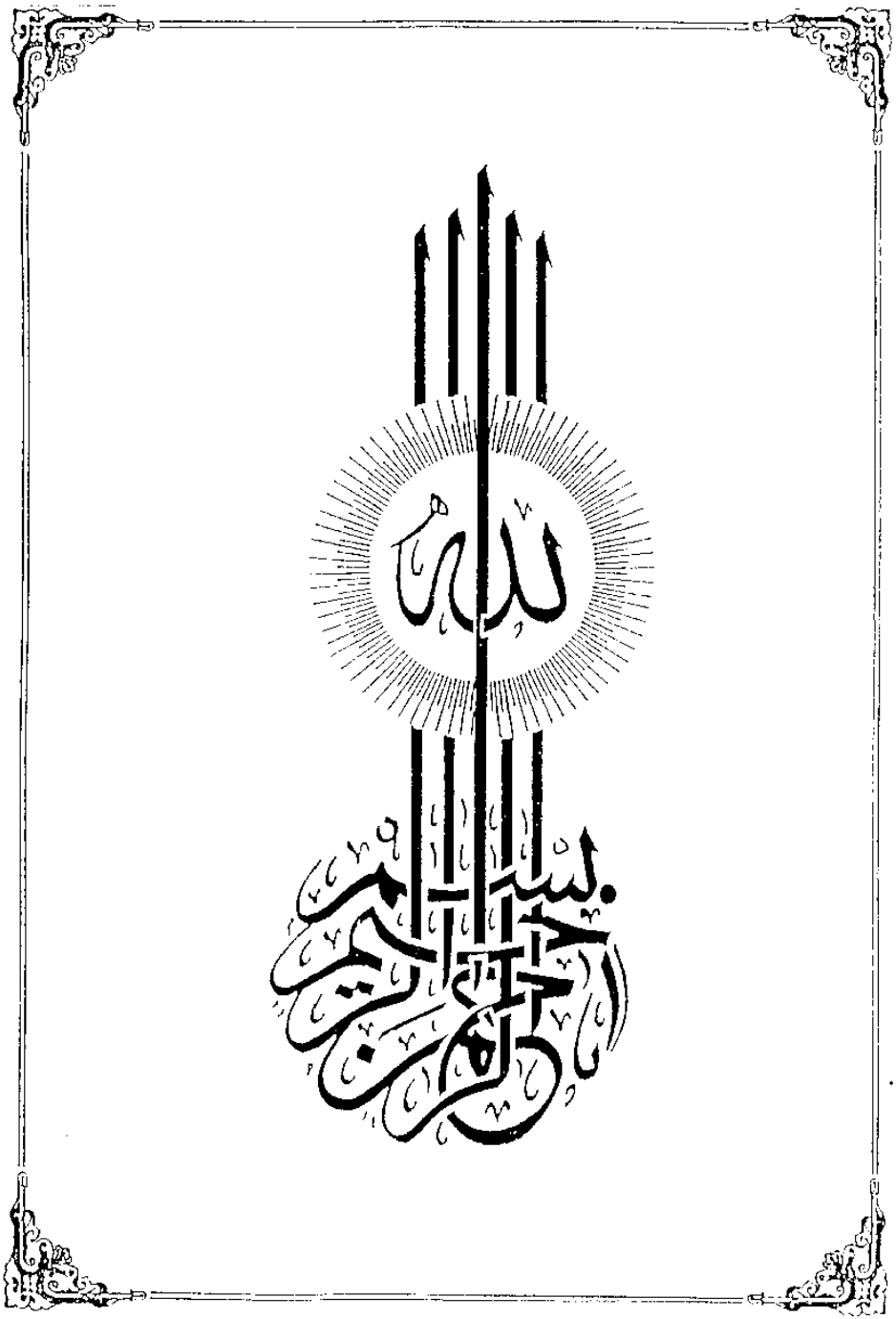

A C K N O W L E D G E M E N T S

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C O N T E N T S

INTRODUCTION

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The United Arab Republic (U.A.R) is one of the countries of the Near East, which also includes Iraq, Syria, Lebanon, Palestine and Saudi Arabia.

These countries have similar dietary, socioeconomic and cultural pattern. The U.A.R. has a total area of nearly one million square kilometres of which 3.3% is cultivated. According to the 1960 census, the population was 26,059,000 of which 98.8% inhabit the Nile Valley. The population grows at a rate of 2.8% per year and is expected to become 45 millions in 1982 (c f. Statistical Pocket Book of the U.A.R., 1952 - 1961).

As far as food production is concerned, the U.A.R. is more fortunate than many other countries of the region. A study of the food balance sheet (1962), shows that the energy value of the total food supplies is about 2806 Cal / head / day and the protein intake is about 80g of which only 10.8 come from animal origin.

The main agricultural products are cereals, legumes, different varieties of vegetables and fruits. Cereals, mainly wheat are the staple food. Bread is made from wheat

in the cities, from maize in the villages in the north, from millet in the south of the Nile Valley and from barley in the Oases and some isolated areas of the country. Rice is mainly consumed in urban areas especially in the north. Legumes, especially beans and lentils are most widely consumed. Fresh vegetables are available all the year round at reasonable prices. Different varieties of fruits are cultivated. Their prices are within the reach of all (Morcos, 1966).

Animal foods include meat, poultry, eggs, fish, and dairy products. Meat goes to those who can afford it. In rural areas, the farmers sell their own produce of milk, butter, cheese, eggs and poultry in order to buy larger quantities of cheep foods like bread and beans to feed a large number of children.

The amount of food as officially declared, will meet the requirements of the population, but the high death rate, the prevalence of anaemia, rickets, protein - calorie deficiency diseases among infants and children all point out that the food of the people being deficient (Morcos, 1969).

From the nutritional point of view, two important

problems face the nutritionist in our part of the world, that is the inadequacy of protein and the problem of parasites. For economic reason, the protein intake of the population can not be increased by the increase of animal proteins. The obvious alternative is to augment the diet with legumes, which as a class, are relatively rich in protein.

Legumes occupy a prominent position in our national dietary. Broad beans (Vicia faba), lentils (Lens esculenta) and kidney beans (Phaseolus vulgaris) come first in order of legume consumption. Stewed beans and beans cakes are two most popular foods which are eaten as the first meal of the day. The immature pods of Vicia faba are either eaten as a snack or cooked as a vegetable. The dry seeds of Phaseolus vulgaris or its immature pods are cooked with tomato sauce which is a familiar food.

The aim of this thesis is therefore:

To demonstrate the importance of legumes in the Egyptian diet and to see to what extent our needs for amino acids are catered for by popular foods, specially the legumes. A systematic study of the amino acid content of some new vareities of Phaseolus vulgaris and Vicia faba,

being produced by the Plant Breeding Section of the Vegetable Research Department, Ministry of Agriculture, Guiza are to be undertaken.

PART I

REVIEW OF LITERATURE

HISTORICAL REVIEW

During the present century much has been learnt about the relation between food and health. It has become clear that the health of communities, and particularly the health of children depends as much on satisfactory nutrition as on the control of infections and parasitic diseases.

The foods we eat yeild energy and build up and repair the body. As sources of energy, proteins, fats and carbohydrates are to some extent, interchangeable, but their economic cost is very different. Carbohydrate foods are the cheapest source of energy and may provide up to 85 percent of the energy needs of low-income groups in most of the developing countries. Modern nutrition teaches that the body needs proteins (amino acids) as well as fats (fatty acids), carbohydrates (monosaccharides), minerals and vitamins for growth, repair and maintenance. Among important advances has been an increase in our knowledge of the quantitative and qualitative food nutrients required by man. Proteins are indespensable components of an adequate diet. Nature has therefore provided all food-stuffs, with the exception of a few refined foods, with protein.

According to Autret (1961), "Protein malnutrition is without doubt the main nutritional problem in the under-developed countries today". Recent information on the dietary value of proteins confirms that the number one problem for F A O and for national agricultural departments is the production of protein foods of good quality.

Proteins:

Proteins are essential constituents of both plant and animal cells. There is no life without them. Plants build their own protein from inorganic materials obtained from the soil and air. Animals form the proteins characteristic of their own tissues, but in general they cannot build them up from simple inorganic substances such as suffice for the plants, and must depend upon the digestion products obtained from the proteins of their food, since animals must have proteins for the construction and upkeep of their tissues and as they cannot make their proteins except from the cleavage products of other proteins, it follows that proteins are necessary ingredients of the food of all animals.

Proteins are also sources of many catalysts such as

enzymes and hormones which are outstandingly essential in making the chemical reactions of the body run smooth and fast enough to meet the needs of life processes and in so regulating the conditions within the body that the process of living may proceed efficiently. Still other proteins act as antibodies of the blood, which defend the organism against viruses, which are themselves proteins and the harmful substances produced by pathogenic organism. Finally the nucleoproteins found in the genes are believed to represent the basic unit of heredity.

Where there is such diversity of functions, there must be a corresponding diversity of chemical structure. This diversity is due to the simpler compounds, the amino acids which join together to make up the protein molecule.

When proteins are subjected to hydrolysis either by acids, alkalies or enzymes, the resulting hydrolystate is found to contain a variable number of compounds which have many characters in common.

It seems that Braconnat (1820) (Cf. Gortner & Gortner, 1950) was the first to expose proteins to acid hydrolysis.