SUMMARY OF THE THESIS

STUDIES ON
PROTEINS AND AMINO-ACIDS IN FOOD-STUFFS
AND CALCIFEROL IN EDIBLE OILS OF GUJARAT.

The work presented in the thesis with the title "Studies on Proteins and Amino-acids in Food-stuffs and Calciferol in Edible Oils of Gujarat" has been described under the following sections:

SECTION I : (I A AND I B)

PROTEINS:

The proteins are indispensable constituents of the living protoplasm. Plants synthesize the proteins. The proteins are composed of a variety of different \( \alpha \)-amino acids having the presence of a terminal carboxyl \((-COOH)\) and of an amino \((-NH_2)\) group in \( \alpha \) position. The amino acids are formed by cleavage of peptide linkages on hydrolysis. The animals depend on ready made proteins and their intermediates or breakdown products for the synthesis and maintenance of their tissues.

Diet surveys carried out in India have shown that the bulk of the food in Indian Dietaries is formed by Cereals. These cereals supply about 80 per cent of the total energy. Protein-rich foods like meat, eggs, milk, etc., can not be afforded by common people. A good amount
of information is available on the protein content and the protein quality of food materials. However, to add to the information, an assessment data of some of the food crops grown in Gujarat and used by common people in Gujarat is undertaken.

I A. Proximate analysis of the cereals, tubers and pulses of Gujarat:

i) CEREALS: a) Bajri (Pennisetum typhoides), H-88, J-14, L-11; b) Jowar (Sorghum valgare), red and white; c) Rajkeera (Amaranthus peniculatus); d) Rice (Oryza Sativa), BK*70, J-280, Z-31; e) Wheat (Triticum sativum), A-205, NP-718, NP-824.

The maximum proteins (16.6 g. per cent) was found in Wheat, NP-824 and minimum (7.49 g. per cent) in Rice, Z-31.

ii) TUBERS: a) Potato (Solanum tuberosum, Banglori, Farukhabadi; b) Sweet Potato (Ipomeoa batatas, local; c) Yam (Kund)(Amorphophallus campanulatus), Sabarkantha & Surat; d) Yam, suran (Amorphophallus campanulatus), local.

The maximum proteins (13.32 g. per cent) was found in Kund, Surat variety and minimum (3.24 g.%) was in Sweet potato.

iii) PULSES: a) Bengal gram (Cicer arietinum), Chafe-Arnej and Dohad yellow; b) Black Gram (Phaseolus radiatus), Middle and Middle Zanlawa; c) Cow pea (Vigna catjang), local; d) Green gram (Phaseolus aureus), 2-15, 45-6; e) Lang (Lathyrus sativus), Tanchha; f) Muth (Phaseolus Aconitifolius), Baleshwar -12 and Disa 7-14; g) Peas (Pisum arvense), local Tanchha; h) Red gram (Cajanus cajan (141-31) val(dolichos lablab)
The maximum proteins (30.19 g. per cent) was found in Cow Peas (Chola) and minimum (17.56 g. per cent) in Peas, Tanchha.


The maximum protein content (29.2 g. per cent) was found in Ground-nut, Punjab-1 variety; (87.64 g. per cent) in Casein, Merck variety and (19.9 g. per cent) in green algae.

I. B. Digestibility of Cereals and Pulses of Gujarat:

The dietary proteins are macromolecular colloidal substances which are not absorbed to any considerable degree across the intestinal barrier and can not be utilized by the body even when introduced parenterally, only the smallest units - amino acids of dietary proteins can be utilized, as building stones for tissue protein synthesis. The digestion of food proteins to amino acids requires, besides the enzymatic cleavage of such linkages, the mechanical action of the digestive organs. In many cases, as a preliminary to protein cleavage, the carbohydrates or fat coating has to be broken down by these processes in order to expose the protein particles to the lytic action of the gastro-intestinal enzymes. To study the extent of enzymatic action on proteins
of the above dietary food stuffs, experiments with enzymes, such as pepsin, trypsin and erepsin were undertaken in vitro under the conditions of pH as in body stomach and intestine. It has been found that on enzymatic hydrolysis with 0.2% pepsin for 3 hours, the amino nitrogen was maximum with Bajri in cereals and with Chola in pulses; such hydrolysis was carried out with 0.5% and 1% pepsin also for 1, 2 and 3 hours of digestion time. The experiments were further carried out with trypsin and erepsin also.

SECTION II

CHROMATOGRAPHIC SEPARATION AND IDENTIFICATION OF AMINO ACIDS OF DIETARY PROTEINS OF SEVERAL CEREALS, PULSES & TUBERS:

It is found that the animal proteins are superior to vegetable proteins due to the presence of essential amino acids (especially methionine, tryptophan and lysine) in large amounts in animal proteins. To ascertain whether cereals, tubers and pulses studied possess these types of amino acids, the paper chromatographic separation of amino acids in the hydrolysates of 12 cereals, 13 pulses, 6 tubers and 6 varieties of ground-nut seeds has been undertaken by double dimensional technique using Butanol : Acetic acid : water and Phenol : water as solvent systems. The above amino acids were present in most of these food-stuffs in varying concentrations.
SECTION III

PEPTIZATION OF SEVERAL PULSES OF GUJARAT:

Despite the importance of several pulses as dietary food-stuffs, little is known concerning their chemistry and composition. The present investigation was undertaken to study the peptization of the proteins of pulses, preliminary to their isolation. The pulses like Chana, Chafe Arnej and Dohad Yellow; Peas, Tanchha; Lang, Tanchha; Udad, Middle and Middle Zanlava; and Chola were studied for peptization. The peptizing agents used were 0.06 N hydrochloric acid, 0.1 N sodium hydroxide and 1.0 N sodium chloride solutions. The influence of the pH of the suspension of pulses in the peptizing agent on the amount of nitrogenous compounds peptized has been studied and graphically represented as dispersion curves. The points of maximum and minimum peptization of nitrogenous compounds of these pulses were established.

SECTION IV: (IV A & IV B)

SERUM PROTEINS AND NITROGEN PARTITION IN URINE:

From the view-point of importance of vegetarian diet and to establish the norms of serum proteins and of different nitrogenous constituents in urine of persons on
vegetarian diet, the electrophoretic pattern of serum proteins (IV A) and the nitrogen partition in urine (IV B) have been studied.

SECTION V

ERGOSTEROL CONTENT OF EDIBLE OILS:

The important sterol found in yeasts, ergot and the mold Neurospora is C28 compound Ergosterol. Interest in ergosterol derives from the discovery that on irradiation with ultra-violet light it gives rise to Vitamin D₂ - Calciferol. The ergosterol content varies greatly in different fish oils, ranging from 40,000 I. U. per gram of liver in bluefin tuna fish to practically zero in the Sturgeon. Many foods now in the market have had their vitamin D content increased by irradiation. Liver oils of many fishes are rich sources. Vegetable oils and plant foods are poor sources.

 Attempts were made to study the edible oils such as saffola, ground-nut, til, sarsav, coconut oil, etc., whether they contained ergosterol as a product of unsaponifiable matter or not.

submitted by N. B. Vasavada.
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