Thus, a cell culture of gingseng (strain BIO-2) produces, in addition to substances isolated previously [1], 6-O-acyl derivatives of β-sitosterol β-D-glucoside.

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AMINO ACID COMPOSITION OF COCOA SHELLS

S. Kh. Chomaeva, É. T. Oganesyan, and L. A. Aidinyan

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Cocoa shells form an industrial waste from the processing of cocoa beans, and make up 10-13% of the weight of the initial raw material. At the present time, investigations are being performed on the use of cocoa shells as a source of tanning substances, purine alkaloids, furfural, natural pigments, and aromatizers [1-3]. The fat of cocoa shells contains a considerable amount of vitamin D [4], and an extract has been proposed for use as an antioxidant for oils and fats [5].

The protein and polysaccharide composition of this material has been studied by enzymatic hydrolysis [6].

We have now studied the amino acid composition of cocoa shells. The samples analyzed were obtained from confectionery factories in Kiev and Erevan. For a preliminary qualitative characterization we used paper chromatography on type S Leningrad paper and a AAA-339 amino acid analyzer (Czechoslovakia). An aqueous ethanolic extract of cocoa shells was evaporated to small volume, and methanol was added to precipitate high-molecular-weight compounds. The mixture was centrifuged at 4000 rpm for 20 min, the deposit was separated off, and the resulting mother liquor was analyzed on paper in the BAW (4:1:2) solvent system. For a clearer separation of the compound, chromatography was carried out by the descending method. After the chromatograms had been treated with a 0.3% solution of ninhydrin, more than 11 spots were detected. Not all the amino acids could be identified completely by paper chromatography. Only six amino acids were identified.

For a deeper study of the qualitative and quantitative composition of the free amino acids of the cocoa shell extract, we used the amino acid analyzer. The raw material (50.0 g, accurately weighed) was exhaustively extracted with a mixture of chloroform and benzene (1:1) in a Soxhlet apparatus. After the solvents had been evaporated off, the crude product was transferred quantitatively into a round-bottomed flask, 500 ml of 40% aqueous ethanol was added, and the mixture was boiled under reflux for 1 h. The extracted meal was separated off by centrifugation. The combined extracts were evaporated to a syrupy state, and a fivefold amount of methanol was added to precipitate high-molecular-weight compounds. The precipitate was separated off, and the filtrate obtained was evaporated to dryness. The dry extract consisted of a light brown powder readily soluble in water. A solution of 12 mg of the powder in 2.2 ml of sodium citrate buffer solution was injected into the column of the amino acid analyzer. The qualitative composition of the amino acids in the sample was determined on the basis of retention times. A standard mixture consisting of 18 amino acids was used as internal standard. The amounts of amino acids found were recalculated to mg%. The peak areas were used as the parameters for calculation. The amino acid analyzer was calibrated on standard samples of amino acids in nanometers.

The results of the analysis are given below:

Pyatigorsk Pharmaceutical Institute, and Erevan Zootechnical-Veterinary Institute.

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	Amino acid	mg%
1.	Aspartic acid	115.25
2.	Threonine	100.36
3.	Serine	24.37
4.	Glutamic acid	8.45
5.	Proline	128.47
6.	Glycine	68.07
7.	Alanine	47.67
8.	Valine	11.24
9.	Methionine	43.76
10.	Isoleucine	98.41
11.	Leucine	26.33
12.	Tyrosine	96.71
13.	Phenylalanine	192.30
14.	Histidine	39.35
15.	Lysine	10.84
16.	Arginine	11.60
	Total	1023.18

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