identity of these curves appropriate factors to reduce them to a common optical density basis at 440 mμ. were obtained. When calculated by these factors, all of the curves are identical above 420 mμ. Further, the absorption bands at 447 and 468 mμ. are identical with those previously reported (3) for the reaction product of pure gossypol with *p*-anisidine.

Hydraulic- and screw-pressed meals, cooker meats, raw meats, and pure gossypol were treated with the oxalic acid solution for 16 hours as outlined in the proposed method. Spectrophotometric curves obtained for these solutions before reaction with *p*-anisidine all showed the principal absorption band at 373 mμ. for gossypol in the solvent used. All curves showed the same absorption as pure gossypol in the region of 370 to 450 mμ., indicating the absence of other materials absorbing characteristically in this region.

Application

The application of the method for following the state of gossypol during the processing of cottonseed is illustrated by the analysis of raw meats and press cake taken from the same stream of a hydraulic-press cottonseed oil mill. When calculated on a moisture- and oil-free basis the percentages of total gossypol pigments were 1.93 and 1.81 and of free gossypol pigments 1.87 and 0.146, respectively. Thus 95% of the gossypol pigments present in the raw meats was accounted for in hydraulic-pressed cake.

Table III shows the total gossypol pigment content of a number of typical cottonseed materials. Values for free gossypol pigments are included (3). It is apparent that in raw meats and hexane-extracted meal practically all of the gossypol pigments are present in the free form. Most of the gossypol in cooker meats, hydraulic-, and screw-pressed meals is present in the bound form. In general, the total gossypol values obtained for 6- and 16-hour hydrolysis periods are comparable.

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Some Physical and Chemical Properties of Certain Snake Oils

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Introduction

WELL-FED snakes in good physical condition have fat lobes deposited along both sides of the intestines in the area between the stomach and vent. This fat deposition involves about one-fourth of the total length of the snake. At the end of the hibernation period this fat supply is nearly or completely depleted. Although snake oil has been used and discussed for generations, very little information concerning its source or composition is available in the literature. Most of the publications which have dealt with physical and chemical properties of snake oil have neglected to state whether the oil was obtained from the whole snakes or from the lobes. For this reason the available data have little value for purposes of comparison with respect to species differences.

Experimental

Physical and chemical properties presented in this paper were determined from separate batches of cold-pressed oils from the fat lobes of boa constrictor *(Constrictor constrictor)*, prairie rattler *(Crotalus viridis viridis)*, and moccasin *(Agkistrodon piscivorus)*.

The cold-pressing method of extraction (Carver laboratory press) was employed for all samples since it eliminates changes in the lipoids which often are caused by heat and oxidation. From three to 20 snakes of each species were butchered soon after capture and the lobes of the respective species pooled. The fat lobes were dried on filter paper, and all connective tissues and blood vessels were carefully removed. The lobes were then wrapped in filter cloth and pressed. The expressed oils were centrifuged at 1400 r.p.m., and clear samples were siphoned off for analysis. The percentage yields of oil from lobes were: moccasin, 43.0; prairie rattler, 70.0; boa constrictor, 33.0. The percentages of unsaponifiable matter contained in these samples of oil were: moccasin, 0.46; prairie rattler, 0.25; boa constrictor, 0.55.

TABLE I

Characteristics of Cold-Pressed Oil From Fat Lobes[a] of Certain Snakes

	Moccasin *(Agkistrodon piscivorus)*	Prairie Rattler *(Crotalus viridis viridis)*	Boa Constrictor *(Constrictor constrictor)*
Specific gravity (25°/4)	0.9268	0.9323	0.9252
Refractive index (25°)	1.4690	1.4700	1.4670
Specific rotation[b]	−0.12°	−0.12°	−0.17°
Saponification number	192.6	193.5	194.7
Iodine number (Hanus)	104.4	114.0	89.6
Thiocyanogen value	77.2	84.0	70.1
Soluble acids (%)	0.13	0.20	0.04
Insoluble acids (%)	94.85	94.0	92.8
Reichert-Meissl value	0.07	0.13	0.13
Polenske value	0.04	0.12	0.00
Saturated acids (%)	22.7	16.80	25.35
Unsaturated acids (%)	72.7	77.44	67.71
Free fatty acids (%)	0.52	0.17	0.25
Acetyl value	4.1	6.0	7.0

[a] Pooled samples were used. [b] These values are in the range of experimental error.

All snakes used in this project were in excellent condition and were captured during the season when the deposit of fats are at a maximum.

The methods employed in the analyses are the Official and Tentative Methods of Analysis of the Association of Official Agricultural Chemists. Analytical data for the characteristics of the cold-pressed oil are shown in Table I. No nitrogen was found in any of these snake oils, and the amount of moisture and volatile matter was found to be less than 0.1%. Because the amount of highly unsaturated fatty acids present in snake oil is quite large, it was not considered advisable to attempt the use of iodine and thiocyanogen values in calculating the percentages of monoethenoid and polyethenoid acids.

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Solvent Extraction of Cottonseed and Peanut Oils. VII. Effect of Drying Flaked Prime Cottonseed on Color of Oil and Meal Properties

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OIL color is an important problem to the solvent extraction of cottonseed. Previous work by Vix *et al.* (5) has shown that the heating of cottonseed oil miscellas to various temperatures ranging from a control temperature up to 240°F. for periods of 15 minutes to 3 hours increased the color of the final refined and bleached oils from prime colors for the control to 35Y-32R for those heated at 240° for 3 hours. Colors were determined in a 5¼-inch cell using the Lovibond color system. In view of these results it was believed that the heat used in flake drying might also have an appreciable effect upon the color of the extracted oil. Also, other investigations (1, 2) have shown that heat, together with other conditions such as moisture and pressure, may affect the protein solubility and free gossypol content of the meal. Consequently this investigation was undertaken to obtain data regarding the relationship between flake drying temperatures and color of the oil obtained from the flakes and properties of the resulting meals. Moreover flake preparation, especially moisture control of flakes, is proving more and more important in the current industrial development of the cottonseed solvent extraction process.

The cottonseed used for this study was a prime lot from the 1948 crop of New Roads, La. The seed had been in storage about 8 months under favorable conditions. Flakes prepared from this seed had initially the relatively low moisture content of 6.9%. It must be emphasized that flakes from seed that were not prime or that had a high moisture content or were stored under unfavorable conditions would in all probabilities have given different results.

Seven 14-lb. samples of these prime flakes were dried, each under different conditions, as follows: 120°, 150°, 180°, 210°, and 240°F. all for 3 hours, and 180° for 6 hours. A run with undried flakes was conducted as a control. The dried flakes were extracted with hexane at room temperature, and the resulting miscellas concentrated, steam stripped, and vacuum-dried at temperatures below 120°F. [previous work (5) having shown that color fixation of miscellas occurred at temperatures above 150°F.]. The colors of the refined and bleached oils obtained were determined by the Lovibond colorimeter.

Results showed that, although the colors increased slightly with increased drying temperatures of the flakes, all of the oil colors were prime.

Flake Preparation

Three hundred pounds of prime cottonseed from the 1948 crop of New Roads, La., were cleaned, delinted, and dehulled in standard pilot-plant cottonseed flake preparation equipment. The whole meats containing a hull content of 1.4% were cracked and flaked to an average thickness of 0.009 in. To minimize any increase in their free fatty acid value of 1.2%, the flakes were kept in sealed cans placed in cold storage until just before drying each batch.

Flakes were dried in a forced draft electric oven having 36- x 48-inch trays which were loaded with approximately 3 lb. of flakes per tray. Each batch was dried at the specified temperature and time just prior to extraction. Table I shows the drying data for the seven experiments. Moisture content of the dried flakes varied from 4.5 to 0.3%.

Extraction

Each batch of dried flakes was immediately extracted with commercial hexane at room temperature in a group of six Soxhlet extractors having a total capacity of about 6,000 grams of flakes. A "countercurrent-batch" procedure was used in which the oil miscella from one extractor was used in the

TABLE I

Flake Drying Data and Meal Properties

Exp. No.	Weight of flakes	Drying		Moisture of dried flakes	Extracted meal	
		Temp.	Time		Protein solubility[a]	Free gossypol
	lb.	*°F.*	*hrs.*	*%*	*%*	*%*
1	13.0	Control	Control	6.9	81.9	1.05
2	13.0	120	3	4.5	84.4	1.13
3	13.0	150	3	2.6	82.4	1.23
4	14.5	180	3	1.2	83.3	1.23
5	14.5	180	6	0.8	83.3	1.10
6	14.5	210	3	0.6	81.6	1.13
7	14.5	240	3	0.3	78.7	1.06

[a] Protein solubility in 0.5 N NaCl solution.

[1] One of the laboratories of the Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, U. S. Department of Agriculture.