LETTERS TO THE EDITOR

Banana and Gastric Secretion

SIR,—It has been reported previously that bananas have a high 5-hydroxytryptamine (5-HT) content (Waalkes, Sjoerdsma, Creveling, Weisebach Udenfriend, 1958; West, 1958). In view of the fact that 5-HT may be concerned in peristaltic reflexes (Bulbring and Lin, 1958) and also in inhibiting acid gastric secretion (Black, Fisher and Smith, 1956), it was considered of importance to make a systematic study of this amine in vegetables and fruits commonly employed as food, and further note, if such food has any effect on acid gastric secretion.

5-HT was extracted with acetone and assayed on rat oestrous uterus and rat colon (Parratt and West, 1957), and further identified chromatographically.

It was confirmed that high amounts of 5-HT are contained in bananas. Moderate amounts were detected in tomatoes, which also contain tryptamine. Trace amounts were detected in vegetables belonging to the natural order cucurbitacae.

The effect of feeding bananas on gastric secretion was studied by cannulating the pylorous and the cardiac ends of the stomach in guinea-pigs of either sex, anaesthetised with urethane (1·6 g./kg.); secretion was induced by intramuscular injections of histamine (1 mg./kg.) in animals pretreated with mepyramine (10 mg./kg.). The entire amount of secretion for 30 min. was washed out by distilled water introduced through the cardiac cannula and collected from the duodenal one. The total amount of acidity was determined in terms of N/100 NaOH with phenolphthalein as indicator.

In control animals, when the stomach contained either distilled water or starch solution at the time of histamine injection, the average acidity in six observations was found to be 15·3 ml. whereas average acidity in seven test observations was only 2·4 ml. when the stomach contained 3–4 ml. of neutralised banana extracts. The results on statistical analysis yielded a confidence limit greater than 99/100. This experiment has been repeated in different strains of guinea-pigs, at different times of the year and has always yielded similar results.

It is possible to induce a chronic state of hyperchlorhydria in guinea-pigs by repeated injections of histamine in increasing doses under antihistamine cover. When animals were maintained on the usual diet, such treatment produced ulceration and fatal perforation of the stomach usually by the 5th day. However, in animals fed only with bananas such histamine treatment did not produce any acute symptom and there was no evidence of ulceration in the stomach when the animals were killed.

Thus it was seen that banana emulsions introduced directly into the stomach reduce acid gastric secretion, and also prevent chronic ulceration and perforation induced by repeated injections of histamine. Whether this activity is due to its 5-HT content, or may prove of clinical use, is now under investigation.

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Modification of Quantitative Colorimetric Estimation of Glutethimide in Toxicology

SIR,—In the course of an investigation of the vomitus of a patient containing glutethimide, certain snags were encountered in its quantitative estimation.

The measurement of the ultra-violet absorption spectrum and characteristic "half-life" in ethanolic potassium hydroxide (Goldbaum and Williams, 1960) works satisfactorily with urine and blood. Applied to the vomitus, there was enough fatty matter present in the chloroform extract to cause a turbid solution in the final ethanolic potassium hydroxide mixture, thus making the spectrophotometric reading impossible. Dissolving the extract in 10 per cent ethanol removed most of the fat and gave a qualitative identification of the glutethimide. However, the recovery of glutethimide was not quantitative.

The colorimetric method of (Sheppard, D'Asaro and Plummer, 1956) also gave a turbid solution and treatment with aluminium hydroxide column chromatography recommended by these authors did not remove the fatty impurities. We have now found that by extracting the purple colour into isobutanol the fatty impurities does not interfere. We also found the choice of 0·5 ml. of the ferric chloride reagent to be more satisfactory in imparting a less strong yellow colour to the isobutanol layer. Accurate and reproducible results were obtained as long as the readings were taken within half an hour.

Reagents. (*a*) Hydroxylamine hydrochloride 2M (store in refrigerator) (*b*) Sodium hydroxide 3·5N (*c*) Hydrochloric acid 3·5N (*d*) Ferric chloride 0·37M in 0·1N hydrochloric acid. (*e*) Isobutanol A.R. (*f*) Methanol A.R. (*g*) Chloroform A.R.

Method. Extract the specimen with chloroform. Filter and evaporate the solvent at a low temperature to 2–3 ml. and then at room temperature (30°) to dryness. Dissolve the residue in a small amount of methanol, so that it contains not more than 1 mg. of glutethimide per ml., for colour development.

Standard Graph. Introduce 1 ml. of methanol solution of glutethimide, containing respectively 0·25, 0·50, 0·75 and 1·00 mg. into 4 × 10 ml. glass stoppered cylinders. Add 1 ml. of hydroxylamine hydrochloride reagent and 1 ml. 3·5N of sodium hydroxide. Allow to stand for 30 min. Add 1·5 ml. 3·5N hydrochloric acid, 5 ml. isobutanol and then 0·5 ml. of ferric chloride reagent. Shake vigorously for 30 sec. and allow to separate. As soon as separation is complete, pipette off the isobutanol and filter through a 5 cm. No. 1 Whatman filter paper. Measure its optical extinction, without delay, at 510 mμ using the reagents as blanks.

Recovery experiments. We have investigated the recovery of glutethimide in vomitus by adding 1 mg. of pure glutethimide to four specimens of vomitus,