

### Riboflavin Marker in Drug Products

Sir:

In patients receiving long-term therapy, a simple procedure is desirable for determining whether or not the patients are actually taking their prescribed medication. This might be done by including, in the dosage form, a marker which is easily detectable in the urine. Riboflavin has been suggested for this purpose by several investigators. This communication reports a brief examination of the use of riboflavin in this manner.

Control urine samples were collected from three human subjects on uncontrolled diets. Three milligrams of riboflavin was then administered to each subject. Urine samples were again collected after 3 hours.

Two subjects collected control urine samples prior to receiving orally, on different days, 3 mg. riboflavin plus one of the following drugs: 10 mg. chlorpromazine, 5 mg. prochlorperazine, 1 mg. trifluoperazine, 10 mg. thioridazine, and 5 mg. tranylcypromine. Urine samples were collected 3 hours after the subject had received the drug plus riboflavin.

The urine samples were observed in transparent flint glass bottles under the following conditions: In a darkroom, the urine samples were illuminated with a Black-Ray Model B-100 long-wave ultraviolet lamp.<sup>1</sup> The control urine samples exhibited a light blue fluorescence. The other urine samples exhibited a milky white fluorescence with distinct yellow at the sides of the bottle. Riboflavin in water shows a very intense yellow fluorescence under these conditions.

The control and test urine samples did not look appreciably different under normal illumination; however, under long-wave ultraviolet light they were easily distinguishable. Urine samples from subjects receiving riboflavin alone or riboflavin plus drug were indistinguishable.

For subjects receiving these, and possibly other drugs, three or four times daily, this amount of a riboflavin marker per dose seems more than sufficient to aid in establishing that the prescribed medication is actually being taken by simple periodic urine checks.

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<sup>1</sup>Marketed by Ultraviolet Products Inc., San Gabriel, Calif.

## Book Notices

*Metabolic Effects of Anesthesia.* By S. H. NGAI and E. M. PAPPER. Charles C Thomas, 301-327 East Lawrence Ave., Springfield, Ill., 1962. viii + 89 pp. 15 × 23 cm. Price \$5.75.

A concise, critical review of the effects of general anesthesia on metabolism, with a bibliography of 367 references. An index is appended.

*The Toxicology of Radioactive Substances.* Vol. 1, Strontium, Caesium, Ruthenium, and Radon. Edited by A. A. LETAVET and E. B. KURLYANDSKAYA. Pergamon Press Ltd., Headington Hill Hall, Oxford, England, 1962. x + 236 pp. 15 × 24 cm. Price \$12.50.

An English translation (edited by Elizabeth Lloyd) of Russian reports on animal experiments with isotopes of strontium, ruthenium, cesium, and radon. The book in Russian was published in 1957.

*Annual Review of Pharmacology.* Vol. 2. Edited by WINDSOR C. CUTTING. Annual Reviews, Inc. 231 Grant Ave., Palo Alto, Calif., 1962. vi + 477 pp. 15 × 22 cm. Price \$7.

The breadth of coverage in this annual volume is indicated by the first four reviews on pharmacologists of Edinburgh and pharmacology in parts of China, India, and Europe. The timeliness is shown in reviews on biochemical mechanisms of drug action, structure-activity relationships, drug absorption, fate and excretion, toxicology, and recent advances in chemical and biochemical assay techniques applicable in pharmacology. Other subjects are included, in addition to the extremely interesting and helpful Review of (published) Reviews. General author and subject indexes are appended as well as cumulative author and chapter titles for the first and second volumes.