Liver (145.0 gm.)—75.0 mg. total
Muscle (138.0 gm.)—22.5 mg. total
Brain (71.0 gm.)—24.88 mg. total
Heart (65.2 gm.)—27.0 mg. total
Saliva (45.0 cc.)—20.0 mg. total

Kitten, 0.670 kg. 400 mg. sodium barbital per kg. intravenously. One hour after injection:

Heart (2.13 gm.)—1.0 mg. total
Kidneys (2.8 gm.)—3.37 mg. total
Liver (24.75 gm.)—14.4 mg. total
Brain (19.13 gm.)—3.75 mg. total
Spleen and pancreas (8.3 gm.)—2.25 mg. total
Muscle (33.2 gm.)—21.41 mg. total

Barbital was also recovered in the cerebro-spinal fluid and in the amniotic fluid and embryos of pregnant dogs.

In conclusion we might say that barbital is almost evenly distributed in the different organs without concentrating in any particular tissue.

(d) *Clinical Applications.* Poisoning with barbital is frequently encountered clinically, and during the brief span of 2 months, 5 cases were referred to us. In each case we were able to diagnose the poisoning by urine analysis. For example, 95 cc. of urine of Mr. H. G. (Gallinger Municipal Hospital) contained 383.0 mg. barbiturate. Subsequent investigations revealed that the patient had taken 6 tubes(?) of veronal tablets. Mr. P. (Gallinger Municipal Hospital) was transferred to the hospital in comatose condition. Two catheterized specimens of urine contained a total of 298.0 mg. barbiturate. At the same time, 0.15 mg. of barbiturate was found per cc. of blood.

6953

Inhibition of Diuresis by Hypnotics.

ROBERT P. WALTON. (Introduced by J. T. Halsey.)

From the Department of Pharmacology, Tulane University, School of Medicine.

The depression of diuretic function by anesthetics or hypnotics has often been attributed to certain effects peculiar to the type of anesthetic under consideration. Dooley and Wells[1] have suggested that ether anuria may be explained as a reflex arising from pulmonary irritation. Pick and collaborators[2, 3, 4, 5] have reported widely

[1] Dooley and Wells, *Am. J. Physiol.*, 1929, **90**, 330.

varying results with different hypnotics, some increasing diuresis in contrast to the more usual depression of function. Experiments in this laboratory, on the other hand, have indicated a more uniform depression of diuresis and have suggested that the effect is also associated with the condition of anesthesia in general. The chief exception to such a view is the reported diuretic effect of paraldehyde. The most prominent of these reports dealing with the effect on dogs is that by Bonsmann,[5] who used 9 different hypnotics and obtained results varying widely between the 2 extremes represented by paraldehyde and sodium luminal. The effect of these 2 drugs on dogs has been reinvestigated in this study, approximately according to a procedure previously described by the writer.[6] This requires a regularity in diet and a normal diuretic capacity for 2 or more days immediately preceding the day of experiment.

Orally administered doses of paraldehyde ranging from 0.75 cc. to 2.0 cc. kg. depressed the diuretic function to 24% of the normal for the 2-hour period following oral administration of water, 20 cc. kg. (av. of 15 exp.; lowest, 11%; highest, 45%). Diuresis with doses of 2.0 cc. kg. corresponded to 19% of the normal (av. of 6 exp.; lowest, 11%; highest, 29%). At this dose a dog is not ordinarily able to lift its head in 10 min. and does not recover this ability for 8½ hours. Surgical anesthesia is frequently produced for about 1 or 2 hours but is more often complicated by motor excitation.

With sodium luminal, orally administered in doses ranging from 50 to 150 mg./kg., diuresis for the same period was depressed to 11% of the normal (av. of 9 exp.; lowest, 2%; highest, 20%). Dosages above 100 mg./kg. were fatal. True surgical anesthesia was not obtained in the first few hours of any of these experiments.

For a corresponding 6-hour period, diuresis averaged about 62% of the normal with paraldehyde and 30% with sodium luminal. These differences are by no means as great as those reported by the Vienna school of pharmacologists but are nevertheless distinct differences.

In an effort to separate drug effects from anesthetic effects, these depressant drugs were antagonized with the stimulant drugs, Metra-

[2] Molitor, H., and Pick, E., *Arch. Exp. Path. Pharm.*, 1925, **107**, 180, 185; 1926, **112**, 114; *Biochem. Z.*, 1927, **186**, 130.

[3] Kugel, M. A., *Arch. Exp. Path. Pharm.*, 1929, **142**, 166.

[4] Buschke, F., *Arch. Exp. Path. Pharm.*, 1928, **136**, 43.

[5] Bonsmann, H. R., *Arch. Exp. Path. Pharm.*, 1930, **156**, 160.

[6] Walton, R. P., *J. Pharm. Exp. Ther.*, 1933, **47**, 141.

zol and picrotoxin. Overdosage of the stimulants either had no effect or caused greater depression of diuresis. Properly balanced dosages of the antagonists, however, frequently increased diuresis to a marked degree over that observed with the depressant alone and most frequently in those cases where the degree of depression was lessened.

Paraldehyde was used throughout at dosages of 2.0 cc./kg. Eight experiments with Metrazol indicated that 35 mg./kg. intraperitoneally was the most suitable dosage for this antagonist. By injection a few minutes before the paraldehyde, the period of depression was delayed 30 to 40 minutes but the time of recovery was not particularly affected. By injection a few minutes after the paraldehyde, there was no particular effect on the time of appearance of the depression but the period was considerably shortened. Two experiments with picrotoxin (2 to 3 mg./kg.) increased diuresis over that with paraldehyde alone but was not a suitable antagonist at this dosage because of the convulsions produced.

Three experiments were made with sodium luminal at dosages 110 to 150 mg./kg. Diuresis was increased during the period of stimulation but the effect on recovery was unfavorable, apparently because of the unusually prolonged action of this drug.

6954

Attachment of Marine Bacteria to Submerged Slides.

C. E. ZOBELL AND ESTHER C. ALLEN. (Introduced by M. L. Tainter.)

From the Scripps Institution of Oceanography, University of California, La Jolla.

Winogradsky,[1] Cholodny,[2] and Conn[3] have shown that a different bacteriological picture is presented when the microorganisms which attach themselves to glass slides incubated in the soil are observed directly, than when the same soil is studied microbiologically by the conventional cultural methods. Henrici[4] studied freshwater bacteria by such a direct microscopic method. We used a somewhat similar procedure to study marine bacteria on the coast of southern California.

[1] Winogradsky, S., *Soil Sci.*, 1928, **25**, 37.

[2] Cholodny, N., *Arch. f. Mikrobiol.*, 1930, **1**, 620.

[3] Conn, H. J., *Z. f. Bakt.*, 1932, **87**, 233.

[4] Henrici, A. T., *J. Bact.*, 1933, **25**, 277.