physiologically active bases. In many cases this adjustment might be avoided if salts of weak acids were available to replace the salts of highly ionized acids now in use. A recommendation that any particular salt is suitable cannot be made on the basis of the pH of the solution alone. . . . A useful salt of any physiologically active base must also satisfy the requirement of stability, either in the solid state or in aqueous solution or, preferably, both. Aqueous solutions of ester-type compounds, unless stabilized, may be expected to undergo decomposition in neutral or alkaline solutions. . . . A systematic study of the best procedure to be followed in preparing solutions of salts of physiologically active bases must involve considerations of the osmotic effect and pH of the solutions as well as the stability of the preparation and the equilibrium concentration of the free base. . . .

"It is reported that solutions to be used parenterally (except intravenous) or to be applied on mucous surfaces should have a pH equal to or slightly greater than the tissues on which they are employed. This general rule may require slight modification, however, if the equilibrium concentration of the free base becomes the deciding factor, as may be the case where too rapid absorption produces irritation. A slight modification of the pH, not sufficient to be significant in itself, may be very important in adjusting the equilibrium concentration of the free base as indicated by equation. A consideration of these factors indicates that salts may be found whose simple water solutions, rendered isotonic when necessary, may prove to be very useful. With this thought in mind the authors have prepared the aspartates, glutamates, levulinates and secondary phosphates of atropine, ephedrine, epinephrine and procaine. Ephedrine nicotinate was also included in the series. Preliminary attempts to produce pure salts by recrystallization from water solution failed to yield satisfactory products. . . .

"All of the salts were extremely soluble, most of them dissolving in an equal weight, or less, of water. The phosphate of ephedrine deviated from this rule, 1.0 cc. of water being required to dissolve 0.164 Gm. Procaine phosphate was soluble to the extent of 0.086 Gm. in 0.12 cc. and the epinephrine salts showed slight turbidity, the glutamate in twice its weight of water, the levulinate in five times its weight and the phosphate in 100 times its weight of water. Procaine levulinate and epinephrine aspartate were viscous liquids even after standing in the desiccator for several weeks. . . . The salts of ephedrine may be prepared and stored for use and for this reason a further study of the properties of these salts and their solutions is being undertaken together with a study of the rate of hydrolysis of the ester-type bases." 17 references.

J. C. M. C.

GRUBER, C. M., AND GRUBER, C. M., JR.: *The Effect of Barbituric and Thiobarbituric Acid Derivatives on the Pyloric Sphincter and Stomach in Unanesthetized Dogs.* J. Pharmacol. & Exper. Therap. **72**: 176–183 (June) 1941.

"The effects of barbituric and thiobarbituric acid derivatives on isolated segments of small intestine have been studied by numerous investigators. . . . No one has attempted to determine whether or not the barbiturates have an action upon the pylorus which is opposite to their effect on the remainder of the gastro-intestinal system, nor have the thiobarbiturates been investigated as to their effect on the activity of the stomach. . . . 1. The increased emptying time of the stomach by amytal and other barbituric and thiobarbituric acid derivatives is not due to a contracted

pyloric sphincter. 2. The sodium salts of amytal, ortal, pentobarbital, evipal, pentothal (thiopentobarbital), and thioethamyl when injected intravenously in anesthetic doses in unanesthetized dogs may cause complete cessation of action of the pylorus and stomach. 3. The height of the contractions of the pylorus and stomach muscles invariably decreases after the injection of the barbiturates but it may increase in some experiments with the thiobarbiturates. 4. The general tonus of the organs is always decreased with the barbiturates but it may in some animals be increased with the thiobarbiturates. 5. In those experiments in which the animal recovered from the anesthesia of the barbiturates without producing increased intra-abdominal pressure, no increase in either the activity or the general tonus of the organs was noted." 7 references.

J. C. M. C.

TATUM, H. J.; NELSON, D. E., AND KOZELKA, F. L.: *A Study of the Effects of Morphine and of Carbon Tetrachloride on the Rate of Disappearance of Ethyl Isoamyl Barbituric Acid.* J. Pharmacol. & Exper. Therap. **72**: 123–129 (June) 1941.

"This investigation was undertaken for the purpose of studying the mechanism of the increased duration of anesthesia produced by the less stable barbituric acid derivatives when administered to animals premedicated with morphine or to animals with liver injury produced by carbon tetrachloride. . . . Experimental liver injury in animals has been observed to produce an increased duration of action of the less stable barbiturates. . . . Because of the clinical importance of this problem it seemed pertinent to reinvestigate the question in order to determine whether or not the relationship existing between the less stable barbiturates and morphine or liver injury may be explained at least in part by a decreased rate of detoxification of the barbiturate. . . .

"The rate of disappearance of amytal from the tissues was studied in (*a*) normal rabbits, (*b*) rabbits premedicated with morphine, and (*c*) rabbits premedicated with CCl_4. Observations were made on the rate of disappearance of bromsulphalein from the blood stream on a similar series of rabbits. The increase in duration of anesthesia produced by the combination of morphine or CCl_4 with amytal is closely correlated with the effects which these drugs have on the retention of bromsulphalein in the blood stream. The duration of anesthesia in the three series of animals parallels the rate of disappearance of the amytal from the blood stream. The animals of each series regain their righting reflexes when the concentration of the amytal in the blood reaches approximately the same level, viz., 2.9 mg. per cent. Morphine decreases the rate of disappearance of the barbiturate at least in part by altering the blood supply to the liver, while the primary effect of CCl_4 appears to be the production of liver injury." 12 references.

J. C. M. C.

CLARK, O. R.: *Spinal Anesthesia in General Surgery: an Analysis of 400 Cases.* J. Kansas M. Soc. **42**: 195–202 (May) 1941.

"The principal part of this paper is an analysis of 400 consecutive cases of attempted spinal anesthesia. . . . The cases comprise a selected portion of a general surgical practice, and make up approximately one-sixth (16.88 per cent) of the cases operated. . . . Of the 400 cases, 284 were given procaine, novocaine, or neocaine, and are hereafter grouped together as 'procaine.' . . . Seventy-three were given pontocaine; 37 metycaine; 3 spinocaine; and 2 nupercaine. . . . The technique varies depending on the type of anesthetic solution used. . . . The percent-