caval, external jugular, and cisternal pressures, which coincided with the forceful respiratory efforts. The obstruction produced arterial hypoxia and hypercapnia. During hypothermic obstruction, pressure increases were significantly less and respiratory fluctuations dampened. The increase in endotracheal pressure and minute volume of ventilation were approximately one-half those observed during obstruction in normothermia. Nevertheless, there was no statistical difference in arterial hypoxia nor in the increase in carbon dioxide content produced by respiratory obstruction in hypothermia as compared with normothermia.

Effect of Methylphenidate Ritalin on Thiopental Ventilatory Depression. J. Gerard Converse, M.D., and Sanford Cobb, M.D. *Department of Anesthesiology, University of Miami School of Medicine at Jackson Memorial Hospital, Miami, Florida.* The effect of methylphenidate hydrochloride (Ritalin) on the ventilatory depression produced by thiopental was studied in man by CO_2 stimulus-response techniques. Patient response to a changing CO_2 stimulus was measured spirometrically during pre-drug and post-drug periods, while a constant electroencephalographic level of thiopental narcosis was maintained for both periods by adjusting the drip inflow rate of thiopental as indicated by the EEG. The changing CO_2 stimulus was provided both before and after methylphenidate injection by allowing endogenous CO_2 to accumulate in a 9-liter closed rebreathing system for eight minutes. Strength of stimulus was measured in two parameters, P_{CO_2} of end-expiratory gas and of jugular bulb blood. Magnitude of response was measured as minute alveolar ventilation. Between the two periods of CO_2 accumulation, methylphenidate 0.55 mg./kg. was given intravenously. Stimulus and response magnitudes were observed in the second, fifth and eighth minutes of each rebreathing period. By dividing the observed values of P_{CO_2} and $\dot{V}_A$ by the respective control values, changes were expressed as "P_{CO_2} Ratio" ($P_{CO_2}R$) and "alveolar ventilation Ratio" (V_AR). The ratios were plotted against each other on rectangular coordinates. Post-methylphenidate curves to the left of the pre-methylphenidate curve probably indicate change of respiratory center threshold and/or sensitivity in the direction of stimulation, while additive depression may be suspected if the "test" curve lies to the right of the control curve. Studies in 10 patients in whom end-expiratory gas P_{CO_2} was the only parameter by which stimulus was quantified indicated that methylphenidate does not favorably alter the ventilatory depression produced by thiopental under the conditions of this study. It is recognized that respiratory center activity is correlated more closely with the P_{CO_2} of jugular bulb blood than with the P_{CO_2} of end-expiratory gas, and studies are in progress to obtain this more accurate stimulus evaluation. [*Supported in part by a grant from Ciba Pharmaceutical Products, Inc.*]

Spectrophotometric Method for Analysis of Blood Ether Tensions. James A. Cutter, M.D., and Benton D. King, M.D. *Department of Anesthesiology, University of Buffalo and the Edward J. Meyer Memorial Hospital, Buffalo, New York.* A micro-analytical procedure, based on the colorimetric micro-diffusion method for alcohol (*Sunshine, I., and Nenand, R.: Anal. Chem. 25: 653, 1953*), has been developed for sampling ether tensions during anesthesia, which is both simple and accurate. The method utilizes a Conway micro-diffusion cell, the interior of which is divided into two concentric compartments. The blood sample is placed in the outer compartment, and a mixture of sulfuric acid and potassium dichromate is placed in the inner compartment. The 65 per cent sulfuric acid acts as a desiccant to accelerate diffusion of the ether into the center well and the dichromate oxidizes the ether to acetic acid, during which reaction it is reduced to chromic ion with a color change from the yellow acid-dichromate complex to the green chromic ion which may be measured with precision on a spectrophotometer at wave length of 428 millimicrons. During the diffusion reaction, the Conway cell is sealed with a ground glass cover to prevent loss of ether. The diffusion is accelerated by the addition of sodium carbonate to the blood in the outer compartment and by incubation for three hours at 90 C. Accurate calibration of the method was achieved by an apparatus capable of produc-

ing solutions of ether in water or blood which were accurate to 0.1 mg. per cent. Weighed ampuls containing ether sealed in an atmosphere of nitrogen were placed in a mechanical device for applying a crushing force. This was enclosed in a flask containing a measured quantity of blood or water, and all air was ejected from the system by introducing mercury prior to breaking the ampul. Constant pressure and volume were maintained, and thorough mixing and removal of samples were permitted under anaerobic conditions. Analyses in the range of 25 to 150 mg. per cent have been carried out on 0.5 ml. samples with a reproducibility of ± 5 per cent and a standard deviation of 1.46 per cent. Work is being continued to reduce certain systematic errors, and an analytical method of even greater reproducibility is anticipated.

Differences in Effects of Cyclopropane, Ether and Halothane on Some Components of Anesthesia. THOMAS B. DAVIS, M.D., CLIFFORD L. MITCHELL, M.D., HUGH H. KEASLING, M.D., AND WILLIAM K. HAMILTON, M.D. *Division of Anesthesiology, Department of Surgery, and Department of Pharmacology, College of Medicine, State University of Iowa, Iowa City.* The progression of alterations in function in an organism exposed to increasing concentrations of pharmacological agents classed "anesthetics" has given rise to such phrases as "lightly anesthetized," "deeply anesthetized," and "depth of anesthesia." These terms imply that the effects of anesthetics as administered are constants and thus fail to convey accurately and completely information regarding the status of an organism. This study was based on the old concept that the anesthetic state is a composite depression of many functions and that the relative degree of depression of these functions depends on many factors. This report demonstrates the variations in alterations of functions which occur following administration of cyclopropane, ether or halothane. These experiments were carried out in 30 adult mongrel dogs. Following the intravenous administration of 20–25 mg./kg. of thiopental, a tube was tied into the trachea. The electrocardiogram, electroencephalogram, venous pressure, arterial pressure, and end-expired carbon dioxide were monitored continuously. Frequent records were obtained of respiratory volume. The effects of central stimulation of the ipsilateral sciatic nerve on the tone of the quadriceps muscle was determined at intervals. The animal was prepared for recording, allowed to recover until purposeful movements were observed and then ether or halothane was administered utilizing a non-rebreathing system or cyclopropane was administered via closed circle with carbon dioxide adsorber. Initial attempts to obtain cross-over data on more than one agent per dog were unsuccessful since even with two-hour intervals residual effects of the previous agent were noted. The data reported are based on single administrations in the last 13 dogs. In each experiment the inspired concentration of agent was sufficient to produce apnea in approximately twenty minutes. Under the conditions of these experiments heart rate, venous pressure, end expired carbon dioxide, respiratory rate and tidal volume progressed in a similar manner for all agents. The electrocardiogram was similar for all agents with the exception of ventricular arrhythmias late in the administration of cyclopropane to 2 dogs. Halothane consistently produced a marked hypotension in contrast to relatively little change following ether or cyclopropane. The arterial pressure pulses in halothane treated animals consistently exhibited a lowering of the incisura, widening of the pulse contour and a more gradual run-off. The pressure pulses were relatively unchanged following the other agents. Cyclopropane and ether induced progressive changes in the electroencephalogram, while halothane induced little change. Even at apnea, considerable low voltage, fast activity was present with the latter drug. All agents decreased the muscle response during the first six to eight minutes of administration. The response was not measurable after this time during ether or halothane administration; however, with cyclopropane the diminished response then remained unchanged throughout the remainder of the administration. These data support our working hypothesis that the anaesthetic state depends upon the agent utilized in its induction. Preliminary data indicate that rate of administration also alters the "pattern of depression." The present failure to note reported differences in ventilatory functions (probably