In Fig. 1 the logarithm of (1-R)/c is plotted against the number of carbon atoms in the alcohol. The resulting curve approximates to a straight line. The slope of this line is approximately 1.75; it intersects the zero of the logarithmic scale at approximately 9 carbons. Using N for the number of carbon atoms, and A to replace (1-R)/c the equation of the line becomes:

$$N = 1.75 \log A + 9,$$

so that there is a logarithmic relation between the number of carbon atoms in any straight chain alcohol and its power as an accelerator of hemolysis. There is some suggestion here of a relation to Traube's Rule, the acceleration being connected with an accumulation of the alcohol in the surface. Such an accumulation occurs in the case of acceleration of the benzene derivatives, but the methods at our disposal, when applied to such dilute solutions, make it impossible to decide the matter one way or the other.

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Uterine Distention and Maintenance of Pregnancy Following Oöphorectomy in the Rat.*

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One of the writers has reported[1] that removal of ovaries in the rat need not result in interruption of pregnancy, provided but one fetus be retained and that the placentae of removed fetuses be left *in situ*. On the basis of this finding, it was suggested that the placentae exercise some degree of endocrine function in the maintenance of gestation—not so well developed, perhaps, as in certain monotocous forms in which the ovaries may be dispensed with during an appreciable part of pregnancy, but sufficiently so that a number of placentae can maintain the gestation of a single surviving fetus; for further discussion reference may be made to the original paper.

Now, in view of the striking effects on uterine growth and development that have been reported to follow experimental disten-

* The experimental work was carried out at the Biological Laboratory, Cold Spring Harbor, Long Island, N. Y.

[1] Haterius, H. O., *Am. J. Physiol.*, 1936, **114**, 399.

tion[2, 3, 4] the suggestion was advanced[4] that distention might prove a factor in maintenance of pregnancy under such experimental conditions; the investigation of this possibility has led to the present report.

The procedure followed was similar to that employed in the earlier work. That is, rats were mated and at a definite time in pregnancy (13th-18th day) were subjected, under ether anesthesia, first to unilateral oöphorectomy and removal of fetuses and placentae in excess of one, followed in 2 days by extirpation of the second ovary; in our experience one-stage operations almost invariably result in abortion, as exemplified by the last 4 cases in Table I. In fetal removal small incisions at the implantation sites allowed for "shelling out" of uterine contents, which then were replaced by equivalent masses either of melted paraffin (m.p. 40°C) or of malleable wax. The incisions were closed, and observations were made at suitable times.

TABLE I.
Summary of Cases of Uterine Distention and Fetal Retention.

Animal	Laparotomy	Oöphorectomy	Results
1	14*	16	22: fetus alive, 3.6 g
2	14	16	22: " " 5.36 "
3	14	16	22: " " 4.98 "
4	15	17	23: " dead, 5.35 "
5	15	17	22: " alive, 3.48 "
6	13	15	22: " " 3.43 "
7	15	17	22: " dead, 4.1 "
8	16	18	23: " " 4.8 "
9	15	17	22: " " badly crushed
10	14	16	22: " alive, 3.3 g
11	11-13†	One stage operation	23: fetal mass in uterus
12	11-13†	" " "	22: uterus empty
13	17-18†	" " "	22: fetal mass in advanced dissolution
14	17-18†	" " "	22: uterus empty

* Figures in this and succeeding columns refer to day of operation or autopsy.
† Stage of pregnancy estimated at time of laparotomy.

In no case did delivery occur, either at normal term or later, and autopsies were performed on the 22nd or 23rd days, as indicated in Table I. In a series of 10 animals, fully developed fetuses were recovered, 6 alive and apparently normal. Careful dissection failed to reveal accessory or residual ovarian tissue. In 4 instances (Cases 11-14), in which both ovaries were removed at the time of fetal

2 Van Dyke, H. B., and Gustavson, R. G., *J. Pharmacol. and Exp. Therap.*, 1929, **37**, 379.

3 Markee, J. E., Wells, W. M., and Hinsey, J. C., *Anat. Rec.*, 1935, **64**, 221.

4 Reynolds, S. R. M., *Cold Spring Harbor Symposium on Quant. Biol.*, 1937, **5**, 84.

expulsion, pregnancies were interrupted, despite a maintained uterine distention.

It would appear, therefore, that maintenance of adequate uterine distention may contribute to the preservation of pregnancy in the experimentally monotocous and oöphorectomized rat. While this does not invalidate the possibility of an endocrine activity of retained placentae, especially in view of the results reported by Kirsch,[5] it demonstrates that a mechanical factor may be of importance, although the physiological mechanism is as yet speculative. It seems probable that mechanical and hormonal factors work together; Kirsch, for example, has shown that pellets inserted in the completely evacuated uterus of the oöphorectomized rat are expelled within 40-48 hours, whereas if some placentae are allowed to remain, either in the same or in the contralateral horn, both placentae and pellets are retained until the time of normal term—indicative of a contribution by the placentae to progestational factors.

Growth influences exerted by distention are well known. For example, (a) the occupied horn in a unilateral pregnancy is reported to be larger than the empty horn,[6] although both are presumably under identical hormonal influences; (b) local uterine growth has been obtained by insertion of rolled rubber dams during pseudopregnancy;[2] (c) both fetal number and fetal weights are important factors;[7] (d) marked uterine growth occurs as a result of fluid distention,[3] and (e) growth, moreover, still occurs in a uterine horn after interruption of its thoraco-lumbar visceral innervation.[8] Finally, Reynolds, in a series of papers (summarized in [4]) has reported the effects of uterine distention by means of pellets in the oöphorectomized rabbit, both untreated and subjected to hormone administration. In the course of this work it was demonstrated that the distention factor will operate in the absence of ovarian hormones and that both hypertrophy and hyperplasia will occur under this circumstance.

An explanation of the results reported here is by no means clear, although it is tempting to suggest that fetal integrity was preserved by the combined influences of the retained placenta and the mechanical effects of the distending pellets serving to prevent retrogression of the progestational changes incident to pregnancy or, perhaps, to prevent an increase in uterine motility.[4] Maintenance of more adequate

[5] Kirsch, R. E., *Am. J. Physiol.*, 1938, **122**, 86.

[6] Knaus, H. H., *Münch. med. Wochenschr.*, 1929, **10**, 404.

[7] Markee, J. E., and Hinsey, J. C., *Anat. Rec.*, 1935, **61**, 311.

[8] Hinsey, J. C., and Markee, J. E., *Anat. Rec.*, 1935, **61**, 253.

vascular relations may also have been involved. Obviously, these possibilities are as yet conjectural.

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Sulfapyridine Potentiation of Narcotic and Toxic Effects of Papaverine* in Rats and Rabbits.

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In the course of investigating the effect of papaverine on the blood pressure of rabbits treated with sulfapyridine,‡ [1] it was observed that, in these animals, papaverine had a profound narcotic effect. This finding is significant since the literature refers only to the sedative action of papaverine, Schroeder[2] reported that the oral administration of 0.5 g of papaverine produced drowsiness only, and that 1.0 g produced sleep and catatonia in ¼ to ½ hour. Deep narcosis was not observed even with 2.0 g, and increased excitability, rather than sedation, ensued. This was evidenced by shivering, convulsions, dyspnoea, dilation of the pupils and finally arrest of respiration and death. Similar findings were obtained by Zeelen[3] after the subcutaneous injections of papaverine in normal rabbits. He also was unable to produce deep narcosis.

The present investigation deals with the effect of papaverine on rabbits and rats to which sulfapyridine had been previously administered. The animals were first tested for their reaction to papaverine alone. After a rest period of 6-8 days the papaverine was injected subcutaneously 3 hours after the oral administration of sulfapyridine. Eight to 10 days later the animals which survived the second set of experiments were again retested for the papaverine response alone.

Rat Experiments. In this series 10 male rats weighing between 120-200 g were used. All of the animals received a subcutaneous injection of 0.3 mg papaverine per gram of rat. Sedation, diminished

* The term papaverine is used to designate Papaverine Hydrochloride.

‡ We wish to thank Dr. J. J. Carlisle of Merck & Co. for supplying the sulfapyridine used in this investigation and to express our appreciation to Miss Bessie Zirin for her technical assistance.

1 Work in progress in collaboration with W. Antopol.

2 v. Schroeder, A., *Arch. f. exp. Path.*, 1883, **30**, 125.

3 Zeelen, B., *Z. f. exp. Path. u. Ther.*, 1911, **8**, 590.