TABLE II.
Persistence of *Bacteroides* mixed with *Bacterium typhosum* in aerobic slant cultures.

Medium	No. of transfers	*Bacteroides* viable after	No. of days viable when transferred	No. of days viable when not transferred
Endo agar	15	13 transfers	25	11
Eosine-methylene blue	15	13 "	25	23
Veal infusion agar	10	8 "	16	12
Nutrient agar	10	8 "	16	11

broth inoculated with *Bacterium pyocyaneus* and *Bacteroides* showed rapid acid production without gas when incubated aerobically, although the strain of pyocyaneus used did not ferment these sugars. A mixed suspension of *Bacterium coli communis* and *Bacteroides* formed acid and gas in sucrose under the same conditions.

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Serum Colloid Osmotic Pressure in Normal Pregnancy.

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A slight amount of edema occurs in many women during normal pregnancy. A marked edema or even an anasarca may occur in pre-eclampsia and eclampsia. No adequate explanation has been given for the cause of the edema in normal or toxemic pregnancy.

In the edema of certain types of nephritis, malnutrition, and in some cases of cardiac disease, the cause is found in an abnormally low serum protein concentration. Various studies indicate that edema is likely to occur if the concentration of the serum protein is less than 5.5 gm. % or if the albumin concentration is less than 2.5 gm. %. Dieckmann and Wegner,[1] as well as other investigators, have demonstrated that the concentration of the serum protein in normal pregnancy is at the lower limits of normal. Their average figures obtained from the same women during pregnancy and the puerperium are given in Table I.

The studies of Schade,[2] Govaerts,[3] and Verney[4] would seem to

1 Dieckmann, Wm. J., and Wegner, C., *Arch. Int. Med.*, 1934, **53**, 353.
2 Schade, H., and Mentschel, H., *Z. f. klin. Med.*, 1924, **100**, 370.
3 Govaerts, M., *Bull. Acad. roy. de med. de Belgique*, 1927, **13**, 356.
4 Verney, E., *J. Physiol.*, 1926, **61**, 319.

TABLE I.
Means for Serum Protein Concentration in Normal Pregnancy.

	—Ante-Partum, Weeks—			—Post-Partum, Days—			
	10 to 15	26 to 35	36 to term	2 to 6	10 to 15	18 to 26	8 to 17 weeks
Serum Protein gm. %	6.77	6.42	6.51	6.13	6.80	6.88	7.26
Probable Error	0.06	0.05	0.04	0.09	0.07		
Standard Deviation	0.41	0.40	0.47	0.65	0.57		
Number of Cases	23	26	56	25	31	10	10

indicate that the oncotic or colloid osmotic pressure of 1 gm. of albumin is 7.54 cm. of water and 1 gm. of globulin is 1.95 cm. of water. Wells and co-workers,[5] after an extensive study of their methods and comparisons with one devised by himself, conclude that their figures are too high. He stated that "the specific osmotic pressure of serum appears to be a linear function of the albumin concentration. Variations in the globulin concentration over a wide range produce no effect on the specific pressure at constant values of albumin." The formula for the colloid osmotic pressure derived by him is: $P = C\,(21.4 + 5.9A)$, where P is the osmotic pressure in millimeters of water, C is the total protein concentration and A is the albumin concentration, in gm. per 100 cc. He found a standard of error of $\pm$ 5%.

Runge and Kessler[6] stated that the oncotic pressure was normal in the first trimester of pregnancy. At about the fourth month it began to decrease and steadily decreased until term. Fluctuations occurred during labor and the early puerperium, but it was normal on the eighth postpartum day. Similar changes in the concentration of the serum protein occur and are probably the cause of the alterations in the oncotic pressure.

Kaboth[7] reported a decrease in the oncotic pressure in pregnancy, but his fluctuations coincided with the changes in the concentration of the proteins.

A number of women at different periods of pregnancy were selected. All were apparently normal and none had more than a slight pitting edema of the ankles. In a number, serum was also obtained after delivery. The serum protein, albumin and globulin fractions were determined,[8] and the oncotic pressure measured with

5 Wells, H., Youmans, J., and Miller, D., *J. Clin. Invest.*, 1933, **12**, 1103.

6 Runge, H., and Kessler, R., *Arch. f. Gynak.*, 1925, **126**, 45.

7 Kaboth, G., *Arch. f. Gynak.*, 1926, **127**, 170.

8 Dieckmann, Wm. J., *J. Lab. and Clin. Med.*, 1931, **16**, 513.

Wells'[9] method. The collodion membranes used by us were standardized in his laboratory.

TABLE II.

No. of Patient	Period of Pregnancy Weeks	Serum Protein gm. %	Albumin gm. %	Oncotic Pressure cm. of Water		
				Determined	Calculated	Difference
1	2 mos. P.P.	7.18	4.17	31.5	33.0	—1.5
2	34	6.05	3.14	27.0	24.2	+2.8
	7 days P.P.	7.51	3.97	36.0	34.5	+1.5
3	33	6.57	3.22	29.1	26.7	+2.6
	8 days P.P.	7.33	3.79	32.6	32.8	—0.2
4	36	6.93	4.15	30.4	31.8	—1.4
	8 days P.P.	6.85	3.55	29.9	29.5	+0.4
5	20	6.34	3.44	26.7	26.5	+0.2
	20	6.90	3.67	29.6	30.0	—0.4
	7 days P.P.	6.82	3.55	31.1	29.0	+1.1
6	41	6.62	3.52	28.6	27.9	+0.7
	8 days P.P.	7.30	3.68	33.8	32.0	+1.8
7	40	6.29	3.27	25.2	25.8	—0.6
	7 days P.P.	7.33	4.02	34.1	33.5	+0.6
8	40	6.68	3.17	25.2	27.	—1.8
	8 days P.P.	7.50	4.40	34.7	36.	—1.3
9	40	7.02	3.91	27.8	31.5	—3.7
	11 days P.P.	7.21	3.87	32.5	32.0	+0.5
10	39	6.13	3.06	22.6	24.5	—1.9
	6 wks. P.P.	6.84	4.27	38.3	32.0	+6.3
11	33	6.84	4.16	30.0	31.5	—1.5
	40	7.36	4.58	31.0	35.5	—4.5
12	10	6.55	4.13	29.9	30.0	—0.1
13	37	7.04	4.25	33.3	33.0	+0.3
14	5 days P.P.	5.73	2.78	24.3	22.0	+2.3
15	40	6.87	3.49	29.8	29.0	+0.8
	7 days P.P.	6.78	3.19	27.7	27.5	+0.2
16	8	7.20	4.06	38.1	33.0	+5.1
17	34	6.70	3.93	27.9	30.0	—2.1
	7 days P.P.	6.84	3.22		28.	

P.P. = post-partum.

Our results are listed in Table II. The figures under the "Difference" column indicate, according to the sign, whether the determined measurement is greater or less than the calculated oncotic pressure. It is evident that with but few exceptions the determined and calculated pressures check within the limit of error.

We believe that this work indicates that in normal pregnancy there is no intrinsic change in the serum protein and that the edema is not due to a subnormal colloid osmotic pressure.

[9] Wells, H., *Tenn. Acad. Sci.*, 1933, **8**, 102.