increase of blood pressure of the cat, more rapid contractions of the isolated frog heart, relaxation of the isolated non-pregnant uterus and contraction of the pregnant uterus of the cat. Control tests showed that extracts of the feline uterus alone, not mixed with adrenalin, decrease the blood pressure.

K. LISSAK,
International fellow, Rockefeller Foundation
DEPARTMENT OF PHYSIOLOGY,
HARVARD MEDICAL SCHOOL

THE MOLECULAR WEIGHTS OF ANTIBODIES

IT was shown by Heidelberger and Pedersen[1] that certain antibodies formed by the horse and the rabbit differed markedly in sedimentation constants and therefore probably also in size. It is of importance, therefore, to make accurate determinations of the molecular weights of these substances and also of the antibodies formed in other animal species.

Types I and III antipneumococcus sera from the horse, rabbit, pig, cow and monkey were used. The antibodies were purified by dissociation with 15 per cent. sodium chloride of the washed specific precipitate or agglutinate formed by adding type specific polysaccharide[2] or a heavy suspension of heat-killed pneumococci. Several of the antibody solutions used were prepared especially for this investigation by Dr. Michael Heidelberger, of the Presbyterian Hospital, New York. The 15 per cent. salt extracts were dialyzed against 0.9 per cent. NaCl and the sedimentation (s) and diffusion (D) constants determined.[3,4] From these values the molecular weights were calculated according to the formula given by Svedberg:

$$M = \frac{RTs}{D(1-V\rho)}$$

Determinations of the partial specific volume for horse antibody gave V = 0.715, which was also assumed to be valid for bovine and pig antibody. The value for normal globulin V = 0.745, was used in calculating the molecular weights of rabbit and monkey antibody. Table I shows the average sedimentation constants, diffusion constants and molecular weights of the various antibodies. In the last column are given the ratios between the experimentally determined molar frictional constant and the molar frictional constant for a spherical particle of the same mass and density.

TABLE 1

Species	$s_{20} \times 10^{13}$	$D_{20} \times 10^{7}$	M	f/f_0
Pig	18.0	1.64	930 000	2.0
Cow	18.1	1.69	910 000	2.0
Horse ...	17.9	1.63	930 000	2.0
Rabbit ...	7.0	4.23	157 000	1.4
Monkey ..	6.7	4.06	157 000	1.5

The high value for the frictional ratio f/f_0 would indicate that the heavy antibody molecule is neither compact nor spherical, as $f/f_0 = 1$ is obtained only when the molecule is spherical and unhydrated.

The proportion of antibody N to total N in the solutions ranged from 40 to 100 per cent. In each case, however, it was possible to obtain solutions showing only a single component with the sedimentation constant in the table. (A very small amount of a heavy component was found in the monkey antibody preparation).

The sedimentation constant was also measured in the 15 per cent. salt solution used for dissociation and found to be the same as after dialysis, indicating that the purification process had not altered the ultracentrifugal properties of the antibody.

In a horse antiserum and a pig antibody solution (each containing two components, $s = 6.7$ and 18.7×10^{-13}) it was possible to demonstrate that the heavy component was the bearer of the antibody activity by using the new analytical cell described in *Nature*.[5] After centrifuging the heavy component into the lower compartment no antibody could be detected in the upper compartment. When the heavy component was centrifuged so that the boundary was only part of the way down, antibody still remained in the upper compartment.

The results indicate that there are two definite groups of animals, one usually producing antibody of the same size as the heavy component frequently observed in normal mammalian sera, and the other forming antibody of the same size as the principal globulin component of normal sera.

ELVIN A. KABAT
Rockefeller Foundation Fellow, 1937–38
KAI O. PEDERSEN
INSTITUTE OF PHYSICAL CHEMISTRY,
UNIVERSITY OF UPSALA, SWEDEN

VITAMIN L

THE specific dietary factor for lactation and vitamin B complex had long been confused, and it was not until 1934 that the two were clearly distinguished and the existence of the lactation factor established.[1] Since

[1] M. Heidelberger and K. O. Pedersen, *Jour. Exp. Med.*, 65: 393, 1937.
[2] M. Heidelberger and F. E. Kendall, *Jour. Exp. Med.*, 64: 161, 1936; M. Heidelberger and E. A. Kabat, *Jour. Exp. Med.*, 67: 181, 1938.
[3] For a review see The Svedberg, *Chem. Rev.*, 20: 81, 1937; *Nature*, 139: 1051, 1937.
[4] O. Lamm and A. Polson, *Biochem. Jour.*, 30: 528, 1936.
[5] A. Tiselius, K. O. Pedersen and The Svedberg, *Nature*, 140: 848, 1937.
[1] W. Nakahara, F. Inukai and S. Kato, *Proc. Imp. Acad.*, Japan, 10: 268, 1934; *Sci. Pap. Phys. Chem. Research*, Tokyo, 24: 155, 1934.