

tered off by suction and the bacteriophage is recovered in the filtrate.

The original bacteriophage suspension was active in a dilution of 10^{-9} . No activity could be detected in the original filtrate or in the final wash-water but after elution the purified phage was active in a dilution of 10^{-7} . The ordinary color tests for proteins were negative. No precipitate was formed by $\frac{1}{2}$ or complete saturation with ammonium sulfate.

Further purification studies by means of selective adsorption are now in progress and also attempts to remove salts by dialysis and to concentrate the suspension *in vacuo*.

5141

Capillary Circulation in Skeletal Muscle in Rest and in Exercise.

E. G. MARTIN, EOLA WOOLLEY AND MIRIAM MILLER.

From the Laboratory of Physiology, Stanford University.

Method—Gracilis muscles in anesthetized dogs were injected with India ink introduced under pressure centrally into the femoral artery below the origin of the branch artery to the muscle without interrupting the circulation. The injection was continued until the venous blood showed complete blackening. The muscle was quickly clamped off, excised, and dropped at once into Bouin's fluid for fixation. Paraffin sections about 10 to 15μ thick were made for counting. To study the effect of exercise, a muscle was stimulated directly through the obturator nerve by means of brief tetani repeated about once a second for about 3 to 5 minutes. India ink was injected while the muscle was being stimulated.

Results on muscles of amytalized dogs. In resting gracilis about 925 capillaries were injected per sq. mm. of tissue. These are figures for injected bundles. There were also many bundles in which larger vessels contained ink but capillaries none. In exercised gracilis about 1900 capillaries were injected per sq. mm. tissue. An occasional uninjected bundle was seen in these muscles, but far fewer than in resting muscles.

$$\text{Ratio } \frac{1900}{925} = 2.05$$

The maximum number of capillaries per sq. mm. (about 2200) was seen in muscles injected $\frac{1}{2}$ hour after death. No uninjected bundles were seen.

Results on muscles of dogs anesthetized with morphine and ether. The technique was the same as above except for the method of counting. In these experiments the number of open capillaries was compared with the number of muscle fibers in a field of given area. In resting muscle the results were: fibers 4.40; capillaries 2.65, or 0.60 capillary per fiber. In active muscle the results were: fibers 4.44; capillaries 5.65, or 1.27 capillary per fiber.

$$\text{Ratio } \frac{1.27}{0.60} = 2.11$$

These results appear to correspond more nearly with the findings of Hartman, Evans and Walker¹ than with the earlier observations reported by Krogh.² The choice of anesthetic appears to have made no difference in these experiments in the number of capillaries open in rest and in exercise.

5142

Certain Physiological Changes Accompanying Prolonged Mental Reaction

MARY L. SMULL, A. S. RAUBENHEIMER, F. M. BALDWIN, RALPH WEBB, EDITH HARKER, ZELMA HUXTABLE AND MARJORIE ABERNETHY. (Introduced by G. Martin.)

From the Department of Zoology, University of Southern California.

In an attempt to note the extent and to find the limits of certain suspected physiological changes produced during periods of prolonged mental effort, several series of carefully planned experiments were undertaken involving 3 subjects familiar with the solution of mental arithmetic problems. The task was uniform throughout and consisted in the solution of multiplication of 4 numbers by 4 numbers from memory alone. The level of metabolic rate was measured by oxygen consumption using the Graphic Metabolism machine. Changes in the blood elements, erythrocytes and leucocytes and changes in hemoglobin content were checked in the usual manner by use of the hemocytometer and the hemoglobinometer. Conspicuous changes in excretory products were determined by routine urine analyses, involving variations in specific gravity, reaction, occur-

¹ Hartman, F. A., Evans, J. I., and Walker, H. G., *Am. J. Physiol.*, 1929, **90**, 668.

² Krogh, A., "The Anatomy and Physiology of Capillaries," New Haven, 1922.