by a short febrile period with viremia and by the appearance of neutralizing antibodies in the serum a few weeks after the infection.

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Conversion of Red Muscle to Pale Muscle.*

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It has long been taught that the function of myohemoglobin in red muscle is its function as an oxygen reservoir for the sustained contractions so typical of this kind of muscle.[1] Variations in myohemoglobin content were noted by Whipple[2] who correlated the content of this pigment with the age, state of health, and amount of activity engaged in by dogs. McClintock, Hines, and Jordan[3] observed that increased activity of muscle would lead to an increase in myohemoglobin content. In order to test the validity of the concept that myoglobin content and type of activity are correlated, the experiments described below were carried out.

Methods. Large, mature rabbits were selected for these experiments. Six such animals were used and each was anesthetized with nembutal. Under aseptic conditions, the tendon of the right soleus muscle was severed and the central end of this tendon sutured to the peripheral end of the severed tendon of the synergistic pale tibialis posterior muscle. By causing the red soleus to utilize the insertion of the pale tibialis muscle, it was hoped to convert the soleus to a pale muscle. The ankle was fixed with an orthoplast bandage in such a way that the foot was kept partially flexed for a period of 2 weeks at the end of which time the bandage was removed. The animals were then sacrificed after a period of 6 months. At sacrifice, the animal was placed under nembutal anesthesia and the normal tibialis and soleus of the left leg and the transplanted soleus of the right leg were arranged for recording. All tendon sutures were found to have been successful. The contractions of each of these extensor muscles were elicited as a part of a crossed extensor reflex elicited by stimulation of the contralateral sciatic nerve.

After the recordings were made, the animal was perfused with saline, and the muscle was excised and weighed. Hemoglobin of muscle was determined by the acid hematin method according to Whipple[4] and iron determinations were simultaneously made by the method of Wong.[5]

Results A comparison of reflexly induced tetanic contractions is shown in Fig. 1. This typical result illustrates the fact that excitation with stimuli of equal strength (10 volts), equal frequency (60 c.p.s.), and equal duration (1 sec.) result in a prolonged and maximal degree of contraction, marked by considerable after-discharge in the normal soleus and a very short, lesser degree of tetanus with a conspicuous lack of after-discharge in the case of the normal tibialis posterior. The transplanted soleus, on the other hand, exhibits a reflexly induced contraction which is remarkably similar to the contraction of the pale tibialis muscle. There remain, however, some remnants of red muscle contraction characteristics as evidenced by the greater extent of contraction than with the pale muscle and by the existence of a

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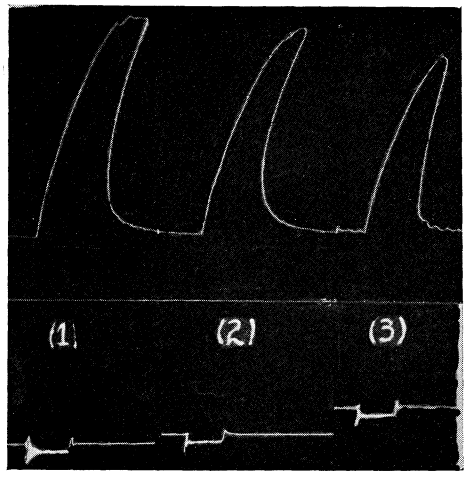

FIG. 1.
Kymograms showing the effect of stimulation of the contra-lateral sciatic nerve in causing reflex contraction of (1) the normal (left) soleus, (2) the transplanted (right) soleus, (3) the normal (left) tibialis posterior.

minimal degree of after-discharge. It is apparent, nevertheless, that the characteristic of the contraction is more nearly that of pale muscle than of red.

In Table I are compared the analyses for iron and myohemoglobin in normal soleus, transplanted soleus, and normal tibialis posterior muscles. It is evident from these results that the alteration in function of the red muscle has resulted in an iron and myohemoglobin content very similar to that of normal pale muscle and far below that of normal red muscle.

TABLE I.
Comparison of Myohemoglobin and Iron Contents in Normal Red, Transplanted Red, and Normal White Muscles.
All muscle weights corrected to 5 g. All values represent averages in mg per 5 g muscle of the number of determinations indicated in parentheses.

Muscle	Iron content	Myohemoglobin content
Tibialis posterior (2)	32.50	10.00
Transplanted soleus (3)	34.00	10.29
Normal soleus (3)	53.49	15.74

Summary. Conversion of red muscle to pale muscle can be accomplished by changing the position of the tendon of insertion to that of a white muscle. In thus assuming the function of a pale synergistic muscle, the red muscle in turn assumes the properties of pale muscle as evidenced by similar types of reflexly induced contractions and by similar myohemoglobin and iron contents. Acknowledgment is due Mrs. G. W. Wyatt for aid in the chemical determinations.

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Sulfhydryl and Disulfide Content of Normal and Arsenic-Resistant Trypanosomes.*

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The sulfhydryl group has been regarded as a more or less specific receptor for tervalent arsenicals since it was postulated by Voegtlin[1] that arsenicals are bound through the formation of dithioarsenite complexes. It was further suggested by him[2] that differences in the equilibrium position of the glutathione system or in the absolute quantity of glutathione in sub-strains of a given strain of trypanosomes were responsible for the phenomenon of arsenic-resistance, the resistant strain presumably having a greater sulfhydryl reserve with which to detoxify the arsenical. Since then, the concept of the arsenic receptor has been broadened to include the fixed sulfhydryl groups of proteins,[3,4] the importance of which has been emphasized by the work of Barron

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† John Jacob Abel Fellow in Pharmacology.

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