cur, although bile and pancreatic juice were *not* present. Furthermore the oleic acid disappeared from the loop, and an abundant chylomicronemia gave evidence of its particulate absorption (*1, 2*).

The Thiry loop often contained traces of excreted fat. However, with the large amounts of fatty acid that we used, we consider that, essentially, there was only a water phase, and that carrier fats and glycerides were not available for the degree of absorption that we have observed. The degree of chylomicronemia in the experiments with oleic acid introduced into the Thiry loop sometimes was equal to that observed following the oral feeding of 0.5 g/kg of body weight of olive oil. Therefore, in our experiments, the pathway of absorption of long-chain fatty acid was not determined by either oil phase or glyceride carriers; that is, the fatty acid did *not* behave precisely as predicted on the basis of the partition hypothesis.

In analyzing physiological phenomena, we believe that, in the first place, a simple experiment must be performed, narrowing down the latitude of the experimental conditions to as few factors as possible. Therefore, we have not considered whether fatty acids are normally eaten by the rat as "constituent fatty acid of most dietary glycerides."

"A more precise definition of the intraluminar conditions" in our Thiry fistulas would not help in our opinion, to explain or to shake the doubtless absorption of long-chain fatty acid as chylomicrons from a loop devoid of bile, pancreatic juice, glyceride carriers, or oil phase.

Our experiments on absorption of fatty acid *per se* are a minor point in the investigation of fat absorption in general but our scope was the investigation of basic physiological phenomena.

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Effect of Elemental Sulfur in the Diet on Load-Extension Hysteresis in Single Wool Fibers

As has already been demonstrated by means of radioactive sulfur as a tracer, sulfur in the diet of sheep is metabolized and appears in wool after a period of 2 wk or less. It has been of great interest, therefore, to discover whether variations in the amounts of sulfur could be correlated with measurable differences in the structure or physical properties of wool. The x-ray diffraction patterns of wool are characteristic of α-keratin but are so diffuse that very slight structural changes are difficult to detect even with the most precise techniques and measurements. There is some slight indication of sharpening of the fiber interferences with increasing amounts of silver in the diet.

Wool samples were secured from sheep of the same age and breed, at the same time. Their basal ration, fed *ad libitum,* contained 0.05 percent sulfur. The only variable was the addition to this standard diet of 0 to 0.7 percent of powdered sulfur, the actual amounts added being 0, 0.20, 0.25, 0.40, 0.55, 0.60, and 0.70 percent. By all odds, the most sensitive method of evaluation of any effects has been the careful determination of elongation of single fibers as a function of applied load. A special, very sensitive piece of apparatus was constructed from an analytic balance such that analytic weights could be added in steps. As the load was applied to the single fibers, an elongation was quantitatively measured by a long pointer and a magnified scale. Enough individual measurements were made of single fibers of each type to assure statistical soundess at constant temperatures and humidity. Remarkable reproducibility has been found in the stress-strain curve, both with loading and with removal of the weights.

For wool with no additional sulfur in the diet, there is very nearly perfect recovery, so that the loop of tension and relaxation is extremely narrow. However, the area measured by a planimeter for wool corresponding to 0.7 percent sulfur in the diet is more than 3 times that of the loop for 0.2 percent sulfur. The intermediate percentages of sulfur also give intermediate values for the hysteresis loop areas.

It is clear, therefore, that sulfur has been metabolized and added to the disulfide linkages between the keratin molecules in the wool fibers. As the number of these bridges statistically placed between molecules increases, there is a greater tendency to retention of the extended configuration of the fiber and resistance to relaxation upon removal of the load. These highly quantitative experiments by a well-known and traditional technique have demonstrated, therefore, the correlation between sulfur in the diet and sulfur in the wool fibers, and the results point clearly to the fact that there should actually be quantitative differences in mechanical behavior of the wool fibers in textiles as a function of the number of disulfide linkages and in terms of metabolism of sulfur in the diet of sheep.

Detailed descriptions of the apparatus and the hysteresis loops will be published elsewhere.

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