bilities of the various components in these sera are listed in Table 1; except for the absence in our photographs of the extra component with -2.1×10^{-5} cm^2 sec^{-1} volts^{-1} which had been identified as antibody, our measurements agree well with earlier ones.[2]

We have measured the areas under the globulin portion of the Longsworth photographs of sera before and after absorption with specific polysaccharides. This loss of area, limited to the γ-component, has paralleled the antibody content as determined by direct chemical[5] analysis (the last column of Table 1).

TABLE 1

Serum	Type	Mobility					Decrease in globulin area on absorption	Antibody per cent. of total globulin
		A	α	β	Antibody	γ		
		$-\mu \times 10^5$ cm^2 sec^{-1} volt^{-1}						
							%	%
6639	I and II	5.3	4.0	3.0	—	1.0	37	32
8617	IV and VIII	5.1	3.7	3.0	—	0.8	32	33
Tiselius and Kabat	.....	5.5	3.7	3.0	2.1	0.9		

We are not yet able to explain in satisfactory fashion the differences between our results and those of Tiselius and Kabat. Both sets of experiments were made at the same pH (7.7) and with similar buffers (0.15M NaCl, 0.02M total phosphates). All our accurate electrophoretic measurements have been made on sera diluted 1:4, but a few photographs of undiluted sera and of sera diluted 1:2 have given the same results. Though there is as yet only fragmentary evidence[6] to support the hypothesis, it is possible that the antibodies in a horse become smaller under prolonged immunization. The sera available for the present experiments were all from horses which had been producing antibodies for many years, and their antibodies may be different from those in the sera examined by Tiselius and Kabat.

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THE PHYSIOLOGICAL CHANGES PRODUCED IN YEAST BY ULTRA-VIOLET LIGHT AND BY HEAT

As part of an extensive investigation in these laboratories[1] of the effects of salts and lethal agents on biological systems an occasion has recently been found to make a comparative study of the effects of ultra-violet light and of heat. A single cell isolation of a strain of *Saccharomyces cerevisiae* was used as the test organism. Of the physiological functions studied, the ability of the cells to divide, thus forming colonies on agar, was found to be the most sensitive to both agents. The aerobic respiration of the cells was quite sensitive to heat, but proved to be relatively unaffected by ultra-violet light, that is, λ2650. Likewise, the resistance to staining with methylene blue is decreased by heat, but within comparable time limits is relatively unaffected by λ2650.

One of the more striking observations is that irradiation with λ2650 followed by heat treatment is two to five times as lethal as the treatment of the organisms in the reverse order. This is manifest in both the ability of the cells to form colonies and the resistance of the cells to staining.[2] Both functions are thus sensitized to heat by this wave-length. On the other hand, the rate of respiration is not sensitized, but is reduced by the same amount whether radiation is followed by heat treatment or *vice versa*.

The details of these experiments and the significance of the results in a general understanding of the nature of the lethal action of heat and ultra-violet light will be published shortly. In addition, the results give certain indications as to the mechanisms of the physiological processes studied and establish that certain of them are relatively independent of each other, *e.g.*, the ability of the cells to form colonies and their rate of respiration.

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[5] M. Heidelberger and F. E. Kendall, *Jour. Exp. Med.*, 61: 559, 1935.

[6] See for instance, E. A. Kabat, *Jour. Exp. Med.*, 69: 103, 1939.

[1] B. M. Duggar and A. Hollaender, *Jour. Bacteriol.*, 37: 219–239, 241–256, 1934; A. Hollaender and B. M. Duggar, *Proc. Nat. Acad. Sci.*, 22: 19–24, 1936; A. Hollaender and W. D. Claus, *Jour. Gen. Physiol.*, 19: 753–765, 1936; A. Hollaender and B. M. Duggar, *Jour. Bacteriol.*, 36: 17–37, 1938.

[2] W. T. Bovie and G. A. Daland (*Amer. Jour. Physiol.*, 66: 55–66, 1923) have reported a similar sensitization of *Paramecium caudatum* to the lethal action of heat by irradiation with the short ultra-violet rays transmitted by fluorite ($\lambda < 2000$Å). The relation between our work and that of various investigators on the (small) temperature coefficient of the lethal action of ultra-violet light is probably rather remote.

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