of the attempts to demonstrate abnormal sensitization in Hydroa have employed the quartz-mercury arc as a source, and the results have been very conflicting, some claiming to have shown an enhanced and some a diminished sensitivity. It is probable that exposure to such a source would produce a very severe sunburn of the normal type before the abnormal hematoporphyrin response would appear, so that the latter would be masked. A few cases in which sunlight or carbon arc have been used as a source have shown results in apparent agreement with ours.

A more complete description of the experiments together with an account of artificial photosensitization with porphyrins will be given elsewhere in the near future.

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Hemolytic Phage-Bacterium Conjugates.

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The production of hemolytic bacteriophage-bacterium conjugates was reported by Friedberger and Vallen.[1] Apparently identical aggressive conjugates were afterwards isolated from clinical material.[2] The non-hemolytic microörganisms which can be transformed into erythrolytic variants by phage-"hybridization" include *B. typhosus, B. dysenteriæ, B. paratyphosus, B. suipestifer, S. choleræ,* and *B. coli.* In order to obtain material for an immunochemic and genetic study of such "hybrids," we have tested the erythrolytic powers of 75 conjugates, formed by combining 11 local typhoid strains with 7 demonstrably active antityphoid bacteriophages. Each bacteriophage was first grown for 3 to 6 test-tube generations on each of the 11 typhoid strains. In 67 of the 77 combinations powerful lysis was noted. The 67 resulting apparently completely lysed typhoid cultures were incubated for an additional period of 48 to 72 hours. In 65 of the tubes an overgrowth with phage-resistant

[1] Friedberger, E., and Vallen, J., *Klin. Wochenschr.*, 1923, **22**, 1649.

[2] van Loghem, J., *Centralbl. Bakt.*, 1926, **100**, 19; Sonnenschein, C., *Ibid.*, 1929, **111**, 177; 1930, **117**, 58; Kleineberger, E., *Ibid.*, 1930, **117**, 344; Bechtel, E., *Ibid.*, 1930-31, **119**; Bianchi, L., and Callerio, C., *Z. Immunitätsf.*, 1931, **72**, 155; Zimmerman, E., *Ibid.*, 1934, **82**, 495.

B. typhosus took place. Hemolytic titers of these 65 aggressive overgrowths are recorded in Table I.

TABLE I.

Hemolytic Titers of Phage-bacterium Conjugates.

65 *B. typhosus* overgrowths each inoculated into a fresh tube of 1-10 veal-broth-dilution of the corresponding bacteriophage (*i. e.*, Chamberland filtrate), incubated 24 hours, then streaked or plated on 2.5% washed-sheep-erythrocyte agar (equivalent to 5% whole blood).

Not all of the colonies on any one of the 65 resulting plates were hemolytic. All lytic colonies on any one plate, however, were of equal titer. Subcultures from lytic colonies gave pure hemolytic strains of the same titer.

Titers were estimated by comparing the hemolytic areas surrounding the colonies. Thus: ++, hemolytic zone approximately 2 mm. in diameter; +, approximately 1 mm.; ±, no lytic zone, but corpuscles laked under colony; 0, no demonstrable laking.

Bacteriophage No.	*B. typhosus* strain number 20	3	21	5	6	38	8	37	22	1	4	Control (No bacteria)
56	+	++*	0	0	++	±	++	+	?	0*	0	0
175	+	+	+	++	++	++	0	0	0	0	0	0
45	±	+	+	±	0*	0	0	0	0	0	0	0
8	+	0	+	+	0	0	0	0	0	0	0	0
163	++	0	0	0	0	0	0	0	+	0	0	0
53	++	0	0	0	0	0	0*	±	?	0	0	0
23	0	0	0	0	0	0	0	0	0*	0*	0*	0
Control (no phage)	0	0	0	0	0	0	0	0	0	0	0	—

* = Original typhoid culture phage-resistant. (Phage-multiplication shown by phage-titration of filtrate.)

? = Phage-resistant strain not obtained.

The table shows that only 23 (30%) of the phage-resistant *B. typhosus* variants produce demonstrable lysis, and that only 8 (10%) of them give lytic reactions equal to that of fairly active hemolytic streptococci (++). Active proliferation of bacteriophage in the 52 hemolytically negative phage-bacterium complexes was demonstrated by phage-titration of filtrates.