TABLE I.

Days development (25°C)	t (days) of equation	$A_e = 46.5$ $A_o = 0.2$ K	Rate of tyramine hydrochloride oxidation catalyzed by activated protyrosinase	
			Theoretical	Experimental
8	1	—	—	*0.2 ± .18
9	2	.00136	0.7	*0.7 ± .14
10	3	.00137	1.3	*1.3 ± .45
11	4	.00139	2.5	2.5 ± .51
12	5	.00138	4.5	4.5 ± .68
13	6	.00138	7.8	7.8 ± .51
14	7	.00142	12.8	14.2 ± .71
15	8	.00141	19.5	19.6 ± .71
16	9	.00136	26.8	26.1 ± .60
17	10	.00134	33.6	32.1 ± .77
18	11	.00134	38.6	37.4 ± .28
19	12	.00139	42.0	42.4 ± .24
20	13	.00137	43.9	44.0 ± .21
42	35	—	—	46.5 ± .22

*Rate determined by extrapolation; all other rates by interpolation.

of the end product itself. The resulting forms of the final differential equations are identical.†

The very nature of autocatalytic reactions (Northrop[1]) intimates that at least one unit of the catalyst must be present among the reactants for the reaction to take place. Perhaps, in the way of speculation, the action of some gene mechanism may not be adverse to these observations (Gulick[11]).

It seems logical to conclude that within the grasshopper egg a precursor of tyrosinase is formed by autocatalysis.

10270 P

Variation in Distribution of Type and Group Substances in Smooth-Phase Cultures of Group A Beta Hemolytic Streptococci.

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For a decade it has been recognized that the amount of type-substance in different cultures of the same serological type of Group

† For these suggestions the authors are indebted to Dr. Gordon Marsh of this department.

11 Gulick, A., *Quart. Rev. Biol.*, 1938, **13**, 140.

A hemolytic streptococci manifests considerable variation. The limits of this antigenic variability in different strains of the same type, in different culture-phases of the same strain or in different colony cultures of the same strain and phase have, however, never been clearly related to the chief dissociative variants, with the exception of the early reports of Todd and Lancefield[1] and of Lancefield and Todd[2] on smooth and matt forms, and the later observations of Griffith.[3]

Observations on dissociative behavior had suggested to us that, among the variability-phenomena often associated with the R to S "reversion", there might arise smooth strains in which the type- or group-factor had been largely lost. A detailed study of cultures of hemolytic streptococci undergoing the R to S transformation has shown marked quantitative differences relating to type- and group-substances in different smooth-colony lines derived from the rough form. Study of these type- and group-cultures was of special interest because they represented antigenic variants within a single culture-phase.

From a smooth Type 5 strain a stable rough form was produced by encouraging the development of rough, marginal "outbursts" on typical smooth colonies. Upon reversion of this rough to smooth, following rapid broth-passages, 2 smooth colonies, macroscopically identical and containing organisms of similar morphological, cultural, and biochemical characters, were selected for further investigation. One colony-culture, 10-1S, gave maximal reactions, by the slide-agglutination technic of Griffith,[3] in Group A serums but no reaction in Type 5 serums from which the group-antibodies had been removed by absorption with a heterologous-type strain. The other colony-culture, 10-2S, gave maximal reactions in Type 5 serums but no reaction in Group A serums. It thus appeared that the former culture was heavily endowed with *group*-substance while the latter appeared to be equally endowed with *type*-substance. These 2 cultures resembled, respectively, the "group-" and "type-specific" phases mentioned by Griffith.[3] The antigenic characteristics of each culture have remained unchanged for about one year.

The absence of type-substance in the group-specific (GS) strain was further demonstrated by the precipitin-test. This test also showed that the type-specific (TS) culture possessed a fraction of group-substance. Moreover, in reciprocal slide-agglutination tests between TS and GS an unabsorbed serum immune to TS aggluti-

[1] Todd, E. W., and Lancefield, R., *J. Exp. Med.*, 1928, **48**, 751.

[2] Lancefield, R., and Todd, E. W., *J. Exp. Med.*, 1928, **48**, 769.

[3] Griffith, F., *J. Hyg.*, 1935, **34**, 542.

nated both itself and GS, while the unabsorbed serum immune to GS agglutinated only its homologous antigen. It thus appeared that there was sufficient group-substance in the TS culture to produce some group-antibodies, but not a sufficient amount to yield positive slide-agglutination with GS serum. Moreover, in the GS culture there was not sufficient type-substance to produce serums capable of giving type agglutination with TS 10-2S antigen. Our results suggested that slide-agglutination was more useful than precipitation for the identification of TS and GS strains.

Additional evidence of the antigenic diversity of the TS and GS lines was furnished by absorption-tests. One sample of a crude Type 4 serum was absorbed with TS 10-2S antigen and a similar sample was absorbed with GS 10-1S. Absorption with TS removed no group-antibodies, while absorption with GS removed all group-antibodies capable of acting on stock cultures of Types 1 to 10 as well as on GS 10-1S itself.

The interesting question arose: Was the segregation of type- and group-substances in TS and GS cultures (arising from 2 sister-colonies and representing *the same culture-phase*) sufficiently great to make possible the complete removal of group-antibodies from the TS serum as a result of absorption with the GS antigen, and without at the same time reducing the type-specific-antibody content? Such "homologous absorption" has been postulated by Griffith[4] as the "ideal method" for the preparation (by absorption) of type-serums, although successful results have not, we believe, been reported.

A sample of TS 10-2S serum was absorbed with GS 10-1S culture. When this absorbed serum was tested by slide-agglutination

TABLE I.

Conservation of type and loss of group antibodies in a smooth Type 5 serum (TS 10-2S) absorbed with a group-specific, smooth variant of the same strain (GS 10-1S). Homologous type, strain and phase absorption. Slide agglutination technic.

Antigens	Unabsorbed antiserums		Type 5 antiserum absorbed† as indicated below				Control Rabbit Serum
			Type	Once*	Twice	Once	
	10-1	10-2	10	10-1	10-1	10-2	
GS 10-1S	4+	4+	—	—	—	—	—
TS 10-2S	—	4+	4+	4+	4+	—	—

* This sample of absorbed serum was divided into 2 fractions. One was absorbed again with 10-1S (Column 5). The other was absorbed with 10-2S (Column 6).

† Serum diluted 1:3 (3 cc) absorbed with sediment from 1500 cc of broth culture.

4 Griffith, F., *Proc. Second Internat. Cong. for Microbiol.*, London, 1936, p. 133.

it was found that the absorption had removed all group-antibodies capable of reacting with the GS 10-1S culture as well as with stock cultures of Types 1 to 10. This absorption had not, however, removed the specific Type 5 antibodies capable of reacting with the TS 10-2S culture. A second absorption with the GS culture left the type-antibody content still unchanged. These results, as shown in Table I, again demonstrated the absence of type-substance in the smooth variant, 10-1S.

These results appear to suggest that a detailed examination of smooth-colony variants of other serological types of Group A *beta* hemolytic streptococci, isolated upon reversion from the rough, might result in the discovery of highly type-specific and group-specific lines whose employment would facilitate preparation of type- and group-serums appropriate for identification of streptococcal cultures.

10271 P

Permanent Diabetes Insipidus Possible in the Absence of the Pars Anterior.*

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von Hann,[1] on the basis of pathological material, suspected that a functional pars anterior of the hypophysis was essential for a deficiency in the antidiuretic principle to be evident in the form of d.i. This contention has been championed particularly by Richter[2] and Ingram and Fisher[3] on the basis of experimental material. The experiments reported below reinforce data already on record,[4] which demonstrate that a moderate d.i. can obtain in the total absence of the pars anterior.

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1 von Hann, F., *Frankfurt. Z. f. Path.*, 1918, **21**, 337.

2 Richter, C. P., *Am. J. Physiol.*, 1936, **117**, 46, and *A. R. N. M. D.*, 1938, **17**, 392.

3 Ingram, W. R., and Fisher, C., *Anat. Rec.*, 1936, **66**, 271.

4 (a) Richert, F. L., and Dandy, W. E., *Bull. Johns Hopkins Hosp.*, 1936, **58**, 418; 1925, **37**, 1; (b) Keller, A. D., PROC. SOC. EXP. BIOL. AND MED., 1938, **38**, 31; *Am. J. Physiol.*, 1938, **123**, 111; (c) White, H. L., and Heinbecker, P., *Am. J. Physiol.*, 1938, **123**, 213.