

in our snails do not agree with those described by Muto and Faust and Khaw, they do agree well with those given by Yamaguti, and therefore we may conclude that Yamaguti's description is certainly based on a study of the genuine cercaria of *C. sinensis*.

Concerning the first intermediate host of *C. sinensis*, *Parafossarulus striatulus japonicus* was believed to have been incriminated by Muto in Japan, *Melania hongkongensis* by Faust and Barlow,⁶ and *Parafossarulus striatulus*, *P. sinensis*, *Bithynia fuchsiana* and *B. longicornis* by Faust and Khaw, in China. As proved by the present experiments, *B. fuchsiana* should unquestionably be regarded as one of the first intermediate hosts of *C. sinensis*. Yamaguti's description of the cercaria of *C. sinensis* from *P. striatulus* var. *japonicus* leads us to the conclusion that this also should be regarded as one of its first intermediate hosts. Hsü and Chow⁷ have reported *Clonorchis* cercariae in *P. striatulus*, in Canton, identical with those described by Yamaguti, and therefore *P. striatulus* should also be regarded as a first intermediate host of this worm. The result of our experiments indicates that the cercaria described by Faust and his coworkers as being that of *C. sinensis* is, in reality, the cercaria of another fluke; therefore *M. hongkongensis*, *P. sinensis* and *B. longicornis* cannot be accepted as first intermediate host for *C. sinensis* in China unless definite proof be given that this is true.

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Type-Specific Polysaccharides of *C. diphtheriæ*.

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Polysaccharides derived from gravis, intermediate, and mitis types of *C. diphtheriæ* were found to be group-specific.¹ Recent findings,² however, indicate that any of these different cultural types may be present in a single serological type. Because of this an attempt was made to extend our previous study to include polysaccharides of different serological types of *C. diphtheriæ* with the object of determining the existence of type-specific polysaccharides.

⁶ Faust, E. C., and Barlow, H., *Am. J. Hyg.*, 1924, **4**, 69.

⁷ Hsü, H. F., and Chow, C. Y., *Chinese Med. J.*, 1937, **51**, 341.

¹ Wong, Sam C., and T'ung, T., *Proc. Soc. Exp. Biol. and Med.*, 1938, **30**, 422.

² Sia, R. H. P., and Huang, C. H., *Ibid.*, in press.

One organism from each of 5 distinct serological types kindly supplied to us by Sia and Huang² was employed for the present study. All organisms, with the exception of Park 8 (Type D41) were isolated locally. The various characterizations of these organisms were as follows:

Types	Cultural	Virulence
D14	Gravis	Positive
D25	Mitis	"
D30	Mitis	"
D41	Intermediate	"
X	Mitis	Negative

All of the cultures were capable of eliciting precipitin antibodies in rabbits from 4 to 5 weeks when administered intravenously as heat-killed vaccines. The cultivation of organisms, the preparation of polysaccharides, and the immunization of rabbits were the same as those described previously.¹ Absorption test was performed by mixing immune serum diluted 1:5 with well-washed living organisms grown on serum broth at 37°C for 48 hours and the mixture was incubated at 45°C waterbath for 2 hours. It was refrigerated overnight after which the serum was separated by rapid centrifugation.

It was found that 2 kinds of polysaccharide could be demonstrated by the precipitin reaction and by absorption tests. These polysaccharides will be designated as A and B. Polysaccharide A was present in the types D25, D30, D41, and X. Identical precipitin titers varying from 1:50,000 to 1:100,000 were obtained when polysaccharides A were mixed in the ring test with the homologous as well as the heterologous immune sera prepared with the above types. Cross absorption tests performed by mixing immune serum with organisms belonging to any of the types D25, D30, D41, and X showed a removal of all precipitins without affecting the type-specific agglutinins. Similar treatment of the same immune sera with the organism belonging to polysaccharide B (Type D14) removed neither precipitins nor agglutinins. These findings indicate that at least one of the common antigenic factor among the types D25, D30, D41, and X is the polysaccharide. It might also be mentioned that the polysaccharides obtained from various cultural types reported previously¹ all reacted with the above sera.

On the other hand, polysaccharide B derived from Type D14 diluted 1:100,000 reacted with its homologous antiserum only. No reaction was observed when the same polysaccharide was tested against antisera types D25, D30, D41, and X. Similar negative result was obtained when the antiserum type D14 was tested with

polysaccharides A or with the polysaccharides reported previously.¹ Likewise, cross absorption tests performed by mixing the same serum with organisms belonging to any of the heterologous types did not effect the precipitin titer nor the type-specific agglutinins.

The above findings indicate that 2 distinct kinds of polysaccharide are present in the so-called different serological types included in this study. One type of polysaccharide (A) appears to be shared by at least 4 of the 5 types while the second (B) has been encountered only once. The question of whether or not more than 2 types of polysaccharide are present in other serological types of *C. diphtheriae* is being investigated.

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Bacteriophage Typing of *B. typhosus* Isolated in Peiping.

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Four serologically distinct types of Vi-phages (Type I, II, III, and IV) specific for V-form strains of *B. typhosus* have been described.^{1,2} Type II Vi-phage was found to exhibit a highly selective lytic activity for the strain of *B. typhosus* from which it was propagated. Utilizing this selective behavior of the Type II Vi-phage a method has been evolved whereby V-form strains of *B. typhosus* could be divided into the typical V-forms and the Imperfect V-forms. The typical V-forms were further subdivided into several distinct types (A, B1, B2, C, D1, D2, E, F1, F2, G, H, J).² Studies on 706 strains of *B. typhosus* isolated in Canada, England, Norway, Sweden and Denmark have demonstrated the validity of such a scheme of typing.³ In order to test further the applicability of this scheme of bacteriophage typing and to determine the incidence of different types of *B. typhosus* occurring in this locality, a study was made on 79 strains isolated in Peiping. The results together with an account of isolation of 2 new type strains are given below.

Seventy-nine strains of *B. typhosus* isolated from active cases and carriers during 1937-1939 were inoculated in semisolid agar media

¹ Craigie, J., and Yen, C. H., *Trans. Roy. Soc. Canada*, 1937, **31**, Sect. V, 79.

² Craigie, J., and Yen, C. H., *Canad. Pub. Health J.*, 1938, **29**, 448.

³ Craigie, J., and Yen, C. H., *Canad. Pub. Health J.*, 1938, **29**, 484.