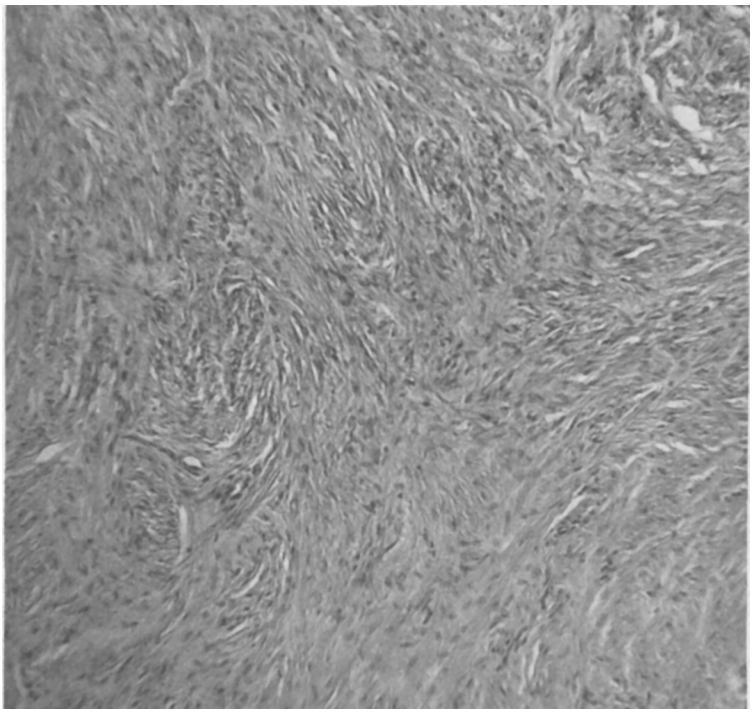

FIG. 4. Photomicrograph of tumor removed from horse 12, 600 days after inoculation with bovine papilloma material. The fibroblastic character of the growth with considerable collagenous cytoplasm is illustrated. Magnification ×120.

ported as equine sarcoid(4,5) and "Schwann tumor"(6) is striking. Glycerinated material from one field case of equine sarcoid was placed on 4 "susceptible" horses. Growth like that from bovine wart material developed in only one horse at the 2 sites of intradermal inoculation. This is additional evidence of similarity of the two conditions.

*Summary.* Material derived from spontaneous field cases of bovine papilloma of the skin was capable of causing a sarcoma-like lesion in the skin of the horse. The tumors so induced have some characteristics resembling equine sarcoid. The ability of an oncogenic agent to induce an epithelial tumor in one animal and to cause a new growth of connective tissue cells in another species is unique.

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## Serologic Cross-Reactivity of Some Enterobacteriaceae Isolated in the United States with Cholera Vibrios. (18751)

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The identity of a microorganism is usually determined by morphologic, physical, biochemical and serologic studies. Especially in the practical diagnosis of cholera vibrios fast serologic identification is much desirable, due to the character of the disease. Colonies

TABLE I. Cholera Agglutination Tests with Non-Cholera Organisms Selected at Random in the Chicago Area.

| Organism | No. tested | No. positive in spot tests with serum against | |
|---|---|---|---|
| | | Inaba | Ogawa |
| *E. coli* | 70 | 11 | 2 |
| *A. aerogenes* | 134 | 26 | 1 |
| *Paracolobactrum* | 5 | 1 | 0 |
| *Proteus* | 29 | 2 | 0 |
| *Pseudomonas* | 55 | 2 | 0 |
| *Alcaligenes* | 6 | 0 | 0 |
| *Streptococcus* | 16 | 7 | 2 |
| Total | 315 | 49 | 5 |

grown on initial isolating plates which resemble those of vibrios, may directly be tested by slide agglutination. Those grown on media containing carbohydrates and indicators, however, may cause difficulties, since they frequently show dissociation. Serologic cross-reactions with some strains of Salmonella and Alcaligenes may be expected, especially when sera with high titers are employed(1).

In order to ascertain whether non-cholera organisms frequently present in stools give such reactions also in countries outside of the cholera area, 315 microbes were picked out at random from patients with diarrhea in Chicago and used for slide agglutination tests with Inaba and Ogawa "O-H" sera prepared in this laboratory according to the routine method(2). Table I shows the results. As many as 49 (*i.e.*, 15.5%) were agglutinated by the Inaba serum. Five of these organisms reacted also with the Ogawa serum. Agglutination experiments employing the serial dilution test-tube method and high titer sera gave positive reactions with seven (*i.e.*, 2.2%) of the examined organisms.

Further experiments were carried out by using sera prepared by injecting rabbits with formolized and heat-killed *V. comma* cultures, respectively. These more specific sera had titers of 1:1,280 and 1:2,560 against their homologous antigens. Heat-killed antigens prepared from one *E. coli* (No. 95) and one *P. morgani* (No. 18) strain were agglutinated by dilutions 1:40 to 1:160 of the serum prepared by injecting heat-killed Inaba vibrios, while formolized antigens prepared from 5 strains of *A. aerogenes* (Nos. 3, 5, 19, 20 and 23), as well as from *P. morgani* (No. 18) were agglutinated by dilutions 1:40 to 1:160 or 1:320 of the serum prepared by treating rabbits with formolized Inaba cultures. While the proportion of strains of Enterobacteriaceae reacting to significant titers with cholera sera is low, the occurrence of such cross-reactions has to be kept in mind in diagnostic work.

Since formalin does not destroy the "O" antigen of cholera vibrios, these results must be evaluated rather carefully. It seems, however, that a factor which is absent in pure "O" cholera antigens and also in Ogawa sera produced by the injection of formolized vibrios into rabbits was present to a significant level in 5 *Aerobacter aerogenes* cultures and one *Proteus morgani* culture. This seems to be the common antigen "A" of Inaba and Ogawa strains the existence of which was recently confirmed by Kauffmann(3).

Further studies were carried out to ascertain the serologic relationship of these Enterobacteriaceae to Salmonellae and Brucellae, which are known to harbor antigenic fractions common with *V. comma*(1,4,5).

Cholera antigens were prepared according to the procedure of Ranta and Dolman(6). In order to obtain pure "H" sera, the "O-H" sera were absorbed with "O" antigens. Brucella and *S. enteritidis* sera were prepared according to standard methods(2).

Table II shows the results of agglutination tests which confirm former observations and indicate possible common antigenic factors appearing in cholera vibrios, Brucellae, Salmonellae, and some Enterobacteriaceae.

Reciprocal absorption experiments were carried out. The results of part of them are

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TABLE II. Cross-Agglutination Tests with Cholera and Non-Cholera Serums and Antigens.

| Antigen | Agglutination titer with serum | | | | | | |
|---|---|---|---|---|---|---|---|
| | *Br. suis* | *Br. melitensis* | *S. enteritidis* "O" | *S. enteritidis* "H" | Inaba "O-H" | Inaba "O" | Inaba "H" |
| *Br. suis* | 2560 | 5120 | 0 | 80 | 320 | 40 | 120 |
| *Br. melitensis* | 2560 | 5120 | 0 | 80 | 320 | 40 | 120 |
| *S. enteritidis* "O" | 0 | 0 | 2560 | 160 | 640 | 120 | 0 |
| *S. enteritidis* "H" | 40 | 80 | 0 | 10240 | 320 | 0 | 80 |
| Inaba "O-H" | 640 | 640 | 320 | 640 | 5120 | 5120 | 640 |
| Inaba "O" | 0 | 0 | 320 | 640 | 2560 | 2560 | 0 |
| *E. coli* #95 | 0 | 0 | 40 | 0 | 160 | 160 | 0 |
| *A. aerogenes* #3 | 40 | 80 | 0 | 40 | 320 | 0 | 80 |
| *P. morgani* #18 | 40 | 80 | 80 | 40 | 160 | 160 | 160 |

TABLE III. Absorption Experiments with Inaba "O-H" Serum.

| Antigen used for agglutination | Agglutinin titers after absorption with | | | | | | |
|---|---|---|---|---|---|---|---|
| | None | *Br. suis* | *Br. melitensis* | *S. enteritidis* | *E. coli* # 95 | *A. aerogenes* #3 | *P. morgani* #18 |
| Inaba "O-H" | 5120 | 2560 | 2560 | 1280 | 2560 | 2560 | 1280 |
| Inaba "O" | 2560 | 2560 | 2560 | 1280 | 1280 | 1280 | 1280 |
| *Br. suis* "H" | 320 | 0 | 0 | 0 | 320 | 160 | 160 |
| *Br. melitensis* "H" | 320 | 0 | 0 | 0 | 320 | 80 | 160 |
| *S. enteritidis* "O" | 640 | 640 | 640 | 40 | 80 | 640 | 80 |
| *E. coli* #95 | 160 | 40 | 0 | 40 | 0 | 160 | 0 |
| *S. enteritidis* "H" | 320 | 0 | 0 | 40 | 320 | 80 | 160 |
| *A. aerogenes* #3 | 320 | 40 | 40 | 40 | 0 | 0 | 80 |
| *Pr. morgani* #18 | 160 | 40 | 0 | 40 | 0 | 160 | 0 |

shown in Table III. They proved a fraction of the cholera "H" antigen to be identical with the factor common to the "g,m" antigen of Salmonellae and a part of the Brucella flagellar antigen, while a common "O" antigenic component was found to be part of the I.IX.XII antigen of Salmonellae.

After absorption with *S. enteritidis* (I.IX. XII:g,m. . .) the Inaba and Ogawa "O-H" sera did not agglutinate Brucellae which were agglutinated before absorption to a titer of 1:320. Absorption of these sera with *Br. suis* and *Br. melitensis* eliminated the agglutination of formolized but not of heat-killed *S. enteritidis* previously observed in serum dilutions to 1:80. Inaba "H" serum absorbed with the *A. aerogenes* cultures which were agglutinated by it (see Table I) did not agglutinate *Br. suis, Br. melitensis* or *S. enteritidis*. Neither did the Inaba "O" serum agglutinate heat-killed *S. enteritidis* after absorption with the *E. coli* No. 95 or *P. morgani* No. 18 strains. It was concluded, therefore, that some antigenic factors are common to *V. comma,* Brucellae, Salmonellae, and the examined Enterobacteriaceae.

Thus the list of organisms agglutinated by cholera serums has to be extended to include also other Enterobacteriaceae than Salmonellae.

*Summary.* Of 315 microorganisms selected at random from stool cultures of persons in Chicago, 49 or 15.5% showed cross-reactions with diagnostic cholera sera when examined with the slide test, and 7 or 2.2% with the serial test-tube dilution method. The common antigen seems to be the "A" fraction of *V. comma* and part of its "H" antigen, which also occurs in Brucellae and Salmonellae.

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