

enza virus content of allantoic fluids, and for the demonstration of antibodies by the agglutination-inhibition test. The data are

significant because of the bearing they have upon the mechanism of virus hemagglutination.

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Widespread Distribution of Poliomyelitis in Households Attacked by the Disease.*

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Among patients admitted to the University of Kansas Hospitals because of poliomyelitis in 1946 it was clear that intercurrent illness had occurred in additional family members. Several households were selected for study on the basis that other illnesses had occurred at a time when poliomyelitis attacked a member of the group. Each member was sampled to determine whether poliomyelitis virus could be found in the oropharyngeal exudate and intestinal effluvia. Results obtained in a study of 4 households are reported here.

Material and methods. Throat Swabs: Cotton pledgets on applicator sticks were used to sample exudate from the oropharynx of each person. Pledgets moistened with exudate were stored at -70°C in sterile individual screw-capped bottles containing 1 cc of distilled water. In the preparation of each specimen and its inoculation into monkeys we have used methods described in earlier papers.^{1,2,3}

Stool Specimens: The manner of collection of stool samples has been described.⁴ No more than 12 hours elapsed between collection of each specimen and storage in a dry ice chest.

The method of preparation and inoculation of monkeys with each specimen has also been described.^{5,6} Each stool sample was inoculated into a monkey using the intraperitoneal and intranasal portals.

Monkeys: Rhesus (*Macaca mulatta*) and cynomolgus (*Macaca irus*) monkeys were used. A positive test in this study indicates that the monkey developed paralysis. In addition lesions consistent with those observed in poliomyelitis were observed in tissues from the spinal cord and elsewhere in the cerebral axis.

Results. The results of tests for poliomyelitis virus in oropharyngeal exudate and feces derived from each member in each of 4 households appear in Table I.

Twenty people living in these 4 households were studied. Sixteen had poliomyelitis virus in their intestinal discharges, and among these 16, 7 had virus in the oropharynx. Of 12 children in these families, each had poliomyelitis virus in the stool specimen; 5 had virus in the oropharynx. Considering the 8 adults in these households, 4 had poliomyelitis virus in respective stool samples. Among these 4, virus was detected in the throat of 2 fathers. Poliomyelitis virus was not found in the remaining 4 parents.

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⁴ Wenner, H. A., and Casey, A. E., *J. Clin. Invest.*, 1943, **22**, 117.

⁵ Trask, J. D., Vignee, A. J., and Paul, J. R., *Proc. Soc. Exp. Biol. and Med.*, 1938, **38**, 147.

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TABLE I.
Tests for Poliomyelitis Virus in Feces and Oropharyngeal Exudate in Members of 4 Households Attacked by Poliomyelitis.

Family	Age, yrs	Type of illness	Onset of illness, 1946	Feces			Oropharyngeal exudate		
				Collected	Monkey No.	Result	Collected	Monkey No.	Result
H.M.	♂	Abortive	June 20	June 26	R-116	+	June 26	C-129	0
	♀	Indefinite	22	25	R-122	0	25	R-84	0*
	♂	Abortive	17	25	R-113	+	25	R-98	0
	♂	Paralytic	18	24	R-90	+	27	R-85	0
	♂	Abortive	17	25	R-117	+	27	R-96	0*
T.P.	♀	"	15	25	R-115	+	27	R-101	0*
	♂	Indefinite	July 10	Aug. 3	R-119	0	Aug. 3	C-128	0
	♀	None	—	4	R-125	0	3	R-103	0*
	♀	Paralytic, mild	25	8	R-120	+	3	R-88	0
	♀	"	23	2	R-89	+	July 26	R-86	+
C.D.	♂	None	—	2	R-112	+	Aug. 3	R-102	0*
	♂	Abortive	28	4	R-91	+	3	R-87	0
	♂	None	—	Aug. 4	R-121	+	July 31	C-130	+
	♀	"	—	July 31	R-124	+	31	R-104	0
	♀	Paralytic	25	4	R-109	+	26	R-99	+
R.C.†	♀	Abortive	29	4	R-111	+	31	R-94	+
	♂	Abortive	†Aug. 5	18	R-118	+	Aug. 19	C-132	+
	♀	None	—	18	R-123	0	19	C-131	xd3
	♂	Paralytic	Aug. 11	18	R-110	+	17	R-97	+
	♀	"	13	18	R-114	+	17	R-95	+

0* = susceptible on challenge to local heterologous strain isolated

during same outbreak.

x = incompleting test.

d = death.

3 = 3rd day.

R = *M. mullatta*.

C = *M. irus*.

† There is doubt about the accuracy of onset of illness in this patient.

TABLE II.
Comparative Data on Intestinal and Pharyngeal Specimens Obtained from Members of 4 Households Attacked by Poliomyelitis.

Type of illness	No. of cases	Mean interval in days between onset and sampling		Positive tests	
		Feces	Oropharynx	Feces	Oropharynx
Paralytic	6	8.6	5.3	6/6*	4/6
Abortive	7	8.3	8.3	7/7	2/7
Indefinite	2	14.0	14.0	0/2	0/2
None	5	—	—	3/5	1/4
	20			80%	37%

* Numerator—positive tests, denominator—individual tests completed.

Some facts concerning the members of these 4 households appear in Table II. The positive stool tests, aside from bringing persons who had poliomyelitis into view, confirm earlier studies.^{7,8} Obviously it has been easy to detect poliomyelitis virus in stools. It is somewhat harder to find it in the oropharynx. If the detection of poliomyelitis virus in the throat has been irregular the results have a pattern. In other words it is not difficult to detect poliomyelitis in the oropharynx of a sick patient if sampling is done during the first few days of illness. It is harder to obtain specimens at an optimal period (1 to 5 days) in abortive and subclinical attacks of poliomyelitis unless symptoms occur at the same time or follow onset of illness in a recognized case in a household.

In reference to onset of illness (Table I) in members of these households it is evident that poliomyelitis virus had seated itself in individuals within a brief period (average 3.1, range 1 to 7 days). Illness if it occurred in additional family members preceded or closely followed the onset of symptoms in the recognized case.

Comment. It is quite clear that virtually all members in these households had poliomyelitis. As others^{8,9} have, we found that adults as well as children had subclinical poliomyelitis. The detection of virus in 3 of 4 fathers is noteworthy, particularly in view of finding it in only one mother.

Our data are not extensive enough to determine how infection entered into the group. If the virus was introduced into the household by a carrier such an individual has been lost among other members who were found to harbor virus in the throat or stool. Indeed, there is suggestive evidence, based on the history of onset of illness, that infection occurred in these households as a result of exposure at a common source. Such an exposure must have been of short duration and taken place in a brief period of time.

Summary. A study of 4 households attacked by poliomyelitis provided evidence of widespread distribution of virus in the members of these units. There were 20 members in these households; 16 had poliomyelitis virus in their intestinal discharges; 7 had virus in the oropharynx.

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⁹ Pearson, H. E., Brown, G. C., Rendtorff, R. C., Ridenour, G. M., and Francis, T., Jr., *Am. J. Hyg.*, 1945, **41**, 188.