

## THE CHARACTERISTICS OF TUBERCLE BACILLI IN HUMAN BONE AND JOINT TUBERCULOSIS.

BY ARTHUR EASTWOOD, M.D., AND FRED GRIFFITH, M.B.

### INTRODUCTION.

THE material on which this enquiry is based consisted of tuberculous tissue, pus, or fluid obtained from the sources specified in Table II, pp. 260–268.

To the surgeons and pathologists attached to the Institutions there named and to the practitioners who have provided us with specimens from private cases we wish to express our cordial thanks for the trouble they have taken in collecting the material, forwarding it to us, and informing us of the essential clinical facts pertaining to it.

During the period of collection, which was from August 1st, 1913, to May 31st, 1914, we have endeavoured to comprise as wide a range of cases as possible without restriction as to age, locality, or other circumstances.

In determining the characteristics of the various strains of tubercle bacilli isolated we have adhered to the methods described in our previous reports on "The Incidence and Bacteriological Characteristics of Tuberculous Infection in Children" and "Localised Tuberculosis in Swine" (*Reports to L. G. B. on Public Health and Medical Subjects*, New Series, Nos. 88 and 91).

### GENERAL RESULTS.

In Table II, pp. 260–268, the cases are set out in the order in which they were received, with the omission of 47 cases yielding negative<sup>1</sup> results; and the type of bacillus obtained from each is stated.

<sup>1</sup> In 23 of these negative cases, egg tubes were inoculated from the spleens, 40 in all, of guinea-pigs killed six weeks after intraperitoneal inoculation with original material. The tubes remained sterile in every instance. This precaution was taken since tubercle bacilli of reduced virulence sometimes fail to produce macroscopic lesions in guinea-pigs, though the bacilli inoculated survive and are recoverable from apparently normal tissues.

In each of the 261 cases which form the basis of the appended statistics, the specimen sent to us consisted of material directly removed from an affected bone or joint, or from an abscess in the neighbourhood of such lesion.

Five additional cases are included in Table II, viz. Nos. 1, 27, 37, 109 and 216. In these, though there was some disease of bone or joint, material directly connected therewith was not available, but specimens from more distal affected sites were sent for examination. We have considered that these five cases are worth putting on record, but have not included them in our statistics as to the types of bacilli found in cases of bone and joint tuberculosis.

The bacilli are described as being either of human or bovine type, or, in a few cases, as atypical, *i.e.* not completely conforming to either of these types. The evidence on which this classification is based, and the characteristics of the "atypical" strains will be found in the subsequent sections of this report.

The results of the investigation are summarised in the following table:

TABLE I.

*Types of Tubercle Bacilli at Different Age Periods.*

Age period	Number of cases	Human	Bovine	Atypical
0-5 years	47	31	14	2
5-10 "	108	75	31	2
10-16 "	62	52	7	3
16-25 "	15	12	3	—
Over 25 "	29	26	—	3
Total ... ..	261	196	55	10

The percentages of "bovine" cases are:

All ages (55 out of 261)	... ..	21.1 per cent.
Under 10 years (45 out of 155)	... ..	29.0 per cent.
Over 10 years (10 out of 106)	... ..	9.4 per cent.

Only three of the above patients were over 16, the ages of these being 17, 22, and 17 years.

In two cases typical "bovine" strains were obtained from different sites of the body, viz., from a psoas sinus and an empyaema in No. 104, and from a gluteal abscess and an abscess of the zygoma in No. 136.

It will be observed in Table II, in which the cases are presented in the order of receipt, that "bovine" cases crop up irregularly. Percentages computed from a short series might be misleading.

## CHARACTERISTICS OF THE TUBERCLE BACILLI OF HUMAN TYPE.

(1) *Cultures.*

The tubercle bacilli of this group are characterised by the production of luxuriant growth on media containing 5 per cent. of glycerin. On glycerin-agar they produced in from two to three weeks a thick, confluent, wrinkled layer; and the growth on glycerinated potato was abundant and pigmented. Sixteen of the viruses were also grown upon glycerin-broth. They all covered the surface with thick, wrinkled pellicles.

All the strains of tubercle bacilli here included ultimately attained to uniformity in type of growth, though in some cases considerable repetition of the tests was necessary to ensure that a strain had produced the best growth of which it was capable on the test media.

(2) *Virulence for Experimental Animals.*

The original material was always inoculated into guinea-pigs and produced general tuberculosis in almost every case. In the few exceptional cases where the tuberculosis was found to be localised at autopsy, guinea-pigs were tested with culture, the invariable result being the production of generalised tuberculosis.

Each virus was tested on rabbits by the subcutaneous inoculation between the shoulders of 10 mg. (or more) of serum culture. As will be seen from Table III, pp. 272-292, the usual result was that the rabbits, on being killed 100 days after inoculation, were in good health and only slightly affected, showing some deposits of tuberculosis in the lungs but little evidence of dissemination in other organs.

In a relatively small number of cases the rabbits showed disease of a definitely severer type. The lungs were enlarged and extensively replaced by caseous tissue, and in 10 instances the disease proved fatal in less than 100 days. The manifestations of severe infection were confined to the lungs. The lymphatic glands, apart from those directly connected with the site of inoculation, were not affected; neither was the spleen; and there was only slight tuberculosis of the kidneys. In these respects the anatomical features of the disease differed markedly from those produced by inoculation with equal quantities of bacilli of "bovine" type.

TABLE II.  
*Clinical Data and Bacteriological Results.*

No. of case	Initials of patient	Sex	Age in years	Place and Institution from which the material was obtained (In the case of the Alton specimens the patient's home address is added)	Situation of tuberculous lesions	Source of culture isolated		Type of Tubercle Bacillus
						Original material	Direct or through G.P.	
1	F. S.	F	12	Queen Mary's Hosp., Carshalton	Hip and glands	Cervical gland	Direct	Human
2	W. M.	M	16	St Bartholomew's Hosp., E.C.	Wrist (dorsal ganglion)	Fluid from ganglion	"	"
3	A. H.	F	9	Treloar's Hosp., Alton (London)	Spine	Pus from spine	Through G.P.	"
4	A. R.	M	11	Treloar's Hosp., Alton (Oakham, Rutland)	Hip	Gluteal abscess	Direct	"
5	A. B.	M	8	Treloar's Hosp., Alton (Chandler's Ford, Hants)	Psoas abscess	Pus from	"	"
6	H. R.	M	6	Treloar's Hosp., Alton (Portsmouth)	Hip	"	"	"
7	H. R.	M	4	Treloar's Hosp., Alton (Swanley, Kent)	Spine	Psoas abscess	Through G.P.	"
8	P. S.	M	9	Treloar's Hosp., Alton (London)	"	"	Direct	"
9	N. R.	F	3	Treloar's Hosp., Alton (Brentford, Middlesex)	"	"	Through G.P.	"
10	E. G.	F	7	Children's Hosp., Gt Ormond St, W.C.	"	Iliac abscess	Direct	"
11	F. E.	M	5	"	Mastoid	Bone from	Through G.P.	"
12	A. R.	F	4	(Private) Liverpool	Rib	Scrapings from	"	"
13	I. H.	F	14	Treloar's Hosp., Alton (Tidworth, Hants)	Spine	Psoas abscess	Direct	"
14	L. T.	F	7	Treloar's Hosp., Alton (London)	"	"	"	"
15	J. B.	M	9	"	Psoas abscess	Pus from	"	"
16	J. E.	M	20	St Bartholomew's Hosp., E.C.	Knee	Synovial membrane	Through G.P.	"
17	L. C.	F	11	Treloar's Hosp., Alton (London)	Hip	Pus from	"	"
18	L. D.	M	4	Children's Hosp., Gt Ormond St, W.C.	Psoas abscess	"	Direct	"
19	G. H.	F	6	Treloar's Hosp., Alton (Gosport, Hants)	Spine	Psoas abscess	"	Bovine
20	R. M.	M	7	Alexandra Hosp., Queen's Sq., W.C.	Hip	Pus from	"	Human
21	H. S.	M	4	"	"	"	"	"
22	G. H.	F	6	Queen Mary's Hosp., Carshalton	Spine	Psoas abscess	"	"
23	F. W.	M	8	Treloar's Hosp., Alton (London)	"	Lumbar abscess	Through G.P.	Bovine
24	G. M.	M	4	Children's Hosp., Gt Ormond St, W.C.	Hip	Pus from	Direct	Human
25	E. A.	F	5	Treloar's Hosp., Alton (Godstone, Surrey)	Spine	Psoas abscess	"	"

No.	Sex	Hosp.	Locality	Site	Contents	Source	Humanity
26	R. L.	Alexandra Hosp.	Queen's Sq., W.C.	Epiphysis of radius		Direct Through G.P.	Human
27	T. F.	East Suffolk Hosp.	Ipawich	Hip		Through G.P.	"
28	T. H.	Treloar's Hosp.	Alton (London)	Foot		"	Atypical Human
29	S. P.	Alexandra Hosp.	Queen's Sq., W.C.	Spine		Direct	Human
30	E. M.	Alexandra Hosp.	Queen's Sq., W.C.	Hip		"	"
31	C. G.	Treloar's Hosp.	Alton (London)	"		"	"
32	G. H.	(Private) Ipswich		Spine		"	Atypical Human
33	P. C.	Orthopaedic Hosp.	Birmingham	Psoas abscess		"	Human
34	G. R.	St Giles' Inf., W.		Lungs, caries of sacrum		Through G.P.	Atypical Bovine
35	H. W.	Alexandromew's Hosp.	E.C.	Mastoid		Direct	"
36	E. L.	Alexandra Hosp.	Queen's Sq., W.C.	Hip		Through G.P.	Human
37	C. S.	St Giles' Inf., W.		Lungs, caries of ribs		Direct	"
38	F. C.	St Bartholomew's Hosp.	E.C.	Psoas abscess		Through G.P.	Human
39	D. C.	Children's Hosp., Gt Ormond St.	W.C.	Abscess in thigh		Direct	"
40	L. B.	St Bartholomew's Hosp.	E.C.	Elbow		Through G.P.	"
41	M. B.	Alexandra Hosp.	Queen's Sq., W.C.	Hip		Direct	"
42	M. D.	(Private) Bradford		Sacro-iliac and multiple abscesses		"	Atypical Human
43	W. C.	St Bartholomew's Hosp.	E.C.	Spine		Through G.P.	Human
44	A. U.	Children's Hosp.	Shadwell, E.	Psoas abscess		Direct	"
45	D. R.	Alexandra Hosp.	Queen's Sq., W.C.	Hip		Through G.P.	"
46	R. J.	Treloar's Hosp.	Alton (London)	Psoas abscess		Direct	"
47	R. S.	"	"	Hip		Through G.P.	"
48	H. B.	(Private) Margate	"	Knee		"	"
49	C. Y.	St Bartholomew's Hosp.	E.C.	Spine		Direct	Bovine Human
50	G. L.	Treloar's Hosp.	Alton (Swansea)	Hip		"	"
51	E. S.	"	" (Salisbury)	"		"	"
52	G. D.	"	" (Cardiff)	Spine		Through G.P.	"
53	M. B.	"	" (Portsmouth)	Hip		"	"
54	E. P.	Sea Bathing Hosp.	Margate	Ankle		"	Human Bovine
55	R. B.	Treloar's Hosp.	Alton (London)	Spine		"	"
56	V. V.	"	"	Hip		"	"
57	R. R.	"	"	Spine		"	Human
58	W. H.	"	"	Hip		"	"
59	A. C.	Union Hosp.	Sheffield	Knee		"	"
60	R. H.	General Inf., Leeds		Ankle		Direct	"

TABLE II—(continued).  
Clinical Data and Bacteriological Results.

No. of case	Initials of patient	Sex	Age in years	Place and Institution from which the material was obtained. [In the case of the Alton specimens the patient's home address is added]	Situation of tuberculous lesions	Source of culture isolated			Type of Tubercle Bacillus
						Original material	Direct or through G.P.	Through G.P.	
61	M. H.	F	24	(Private) Bath	Sacro-iliac sinuses	Dressing from	Through G.P.	Human	
62	L. Y.	F	3	Children's Hosp., GtOrmond St., W.C.	Ankle	Pus from	Direct	"	
63	G. J.	M	7	Treloar's Hosp., Alton (Pontypool)	Hip	Gluteal abscess	"	"	
64	R. H.	M	4	Fleming Hosp., Newcastle	Spine	Lumbar abscess	"	Bovine	
65	E. G.	F	33	(Private) Ipswich	Psoas abscess	Pus from	"	Human	
67	M. B.	F	10	Alexandra Hosp., Queen's Sq., W.C.	Hip	Bone from	Through G.P.	"	
68	F. F.	M	36	St Bartholomew's Hosp., E.C.	Psoas abscess	Pus from	Direct	Atypical	
69	A. W.	M	9	Treloar's Hosp., Alton (Penge)	Hip	"	"	Bovine	
70	J. H.	F	72	General Inf., Leeds	Ankle	Tissue from	Through G.P.	Human	
71	M. L.	F	22	(Private) Alton	Spine	Dressing from sinus of	"	"	
71	W. W.	F	6	Treloar's Hosp., Alton (Romford, Essex)	Hip	Pus from	Direct	Bovine	
72	B. L.	F	9	Children's Hosp., GtOrmond St., W.C.	"	"	"	"	
73	E. W.	M	11	Alexandra Hosp., Queen's Sq., W.C.	"	"	"	"	
74	S. D.	F	14	Sea Bathing Hospital, Margate	"	"	Through G.P.	Human	
75	G. B.	M	8	Treloar's Hosp., Alton (London)	Spine	"	Direct	"	
76	F. W.	M	42	(Private) Weston-super-Mare	Tendon sheaths of wrist	Granulations from	Through G.P.	"	
77	E. S.	F	2	Queen Mary's Hosp., Carshalton	Multiple bones	Abscess of left int. malleolus	Direct	"	
78	P. S.	M	3	Treloar's Hosp., Alton (Birmingham)	Spine	Psoas abscess	"	Bovine	
79	T. K.	M	10	Fleming Hosp., Newcastle	Hip	Scraping from	Through G.P.	Human	
80	W. M.	M	4	Treloar's Hosp., Alton (Bargoed, Monmouth)	"	Pus from	Direct	"	
81	C. A.	M	6	Treloar's Hosp., Alton (Lowestoft)	Spine	Psoas abscess	"	Bovine	
82	L. B.	F	3	St Bartholomew's Hosp., E.C.	Ankle	Pus from	"	Human	
83	J. S.	M	5	Queen Mary's Hosp., Carshalton	Multiple bones and joints	Lumbar abscess	Through G.P.	Atypical	
84	A. C.	M	6	Treloar's Hosp., Alton (London)	Spine	Psoas abscess	Direct	Human	
85	W. C.	M	14	Queen Mary's Hosp., Carshalton	Hip	Pus from	"	"	
86	I. N.	F	4	Children's Hosp., GtOrmond St., W.C.	"	Gluteal abscess	"	"	
87	R. C.	M	7	Royal Inf., Manchester	Psoas abscess	Pus from	"	Bovine	
88	R. P.	M	13	Treloar's Hosp., Alton (Aberdovey)	Hip	"	"	Human	
89	E. D.	F	8	" (London)	Spine	Psoas abscess	"	Bovine	

90	T. S.	5	Treloar's Hosp., Alton (Brighton)	Hip	Pus from Popliteal abscess	Through G.P. Direct	Human
91	L. P.	9	" " (Cardiff)	Knee	Psoas abscess	Through G.P. Direct	" Bovine
92	L. S.	3	" " (Southall, Middlesex)	Spine			
93	H. B.	8	Treloar's Hosp., Alton (London)	Hip	Cervical abscess	Direct	Human
94	M. M.	10	" " " "	Multiple abscesses	Pus near hip	Through G.P. Direct	Bovine
95	H. B.	5	East Cliff House, Margate	" "	Pus from knee	Through G.P. Direct	" "
96	A. G.	11	" " " "	Shoulder joint	" "	Through G.P. Direct	" "
97	A. F.	17	Sea Bathing Hosp., Margate	Hip	Tissue from	Through G.P. Direct	" "
98	G. S.	5	Alexandra Hosp., Queen's Sq., W.C.	Knee	Dressing from abscess	Through G.P. Direct	" "
99	C. W.	16	Sea Bathing Hosp., Margate	Psoas sinus	Dressing from abscess	Through G.P. Direct	" "
100	D. B.	5	Treloar's Hosp., Alton (London)	Spine	Dressing from psoas abscess	" "	" "
101	E. C.	3	" " " "	" "	Dressing from psoas abscess	" "	" "
102	D. S.	8	" " " "	" "	Dressing from psoas abscess	" "	Bovine
103	J. R.	10	" " (Leicester)	Cervical caries	Dressing from sinus	" "	Human
104	L. G.	5	" " (London)	Spine	Dressings from psoas abscess and empyaema	" "	Bovine
105	F. I.	10	" " " "	Hip	Dressing from gluteal sinus	" "	Human
106	E. W.	10	" " " "	" "	Dressing from	" "	Bovine
107	V. W.	11	" " (Taunton)	" "	" "	" "	" "
108	F. O.	7	" " (Aberbeeg, Monmouth)	Psoas abscess	" "	" "	" "
109	A. W.	8	East Cliff House, Margate	Rib, Multiple abscesses	Abscess of neck	Direct	Human
110	S. D.	71	General Inf., Leeds	Rib	Abscess connected with Pus from	Through G.P. Direct	" Bovine
111	W. C.	5	Children's Hosp., Gt Ormond St, W.C	Knee	" "	Through G.P. Direct	Human
112	K. S.	7	Southern Hosp., Liverpool	Abscess of instep	" "	" "	" "
113	W. D.	8	Treloar's Hosp., Alton (Sutton, Surrey)	Hip	" "	" "	" "
114	T. F.	41	Royal Inf., Manchester	" "	Pus from abscess in thigh	" "	" "
115	D. L.	3	Treloar's Hosp., Alton (London)	Spine	Psoas abscess	Through G.P. Direct	" Bovine
116	A. J.	4	" " " "	Ankle	Dressing from	" "	Human
117	R. A.	9	" " " "	Spine	" "	Direct	" "
118	R. C.	11	" " (Bristol)	Hip	" "	" "	" "
119	W. G.	13	St Vincent's Home, Pinner, Middlesex	" "	Pus from	Direct	" "
120	L. A.	6	Children's Hosp., Gt Ormond St, W.C.	Spine	Pus near great trochanter	" "	" "

TABLE II—(continued).  
*Clinical Data and Bacteriological Results.*

No. of case	Initials of patient	Sex	Age in years	Place and Institution from which material was obtained (In the case of the Alton specimens the patient's home address is added)	Situation of tuberculous lesions	Source of culture isolated		Type of Tubercle Bacillus
						Original material	Direct or through G.P.	
121	J. M.	M	4	Royal Hosp., Sheffield	Hip	Abscess of	Direct	Human
122	J. W.	M	4	Treloar's Hosp., Alton (Portsmouth)	"	Pus from	"	"
123	L. B.	F	5	Royal Hosp., Sheffield	Spine	Psoas abscess	"	"
124	H. H.	F	7	"	Multiple bones and joints	Pus from fibula	"	"
125	E. H.	F	6	St Bartholomew's Hosp., E.C.	Ulna	Pus from	"	"
126	J. N.	M	29	Royal Inf., Manchester	Psoas abscess	"	"	"
127	T. R.	M	68	Fulham Inf., W.	Elbow joint	"	"	"
128	W. B.	M	11	Children's Hosp., Gt Ormond St, W.C.	Hip	"	"	"
129	S. P.	M	4	"	Abscess of thigh	"	"	"
130	C. C.	M	8	"	Knee	"	Through G.P.	"
131	W. W.	M	4	Queen Mary's Hosp., Carshalton	Psoas abscess	"	"	"
132	A. N.	F	10	"	"	"	Direct	"
133	M. C.	M	6	(Private) Manchester	Hip	"	"	"
134	W. W.	M	15	Sea Bathing Hosp., Margate	Hip and pelvis	Lumbar abscess	Through G.P.	Bovine Human
135	E. D.	F	8	Alexandra Hosp., Queen's Sq., W.C.	Hip	Pus from	Direct	Bovine
136	H. B.	M	10	Treloar's Hosp., Alton (Kingstone, Somerset)	"	Gluteal abscess and abscess of zygoma	"	"
137	E. R.	F	9	Fleming Hosp., Newcastle	"	Scrapings from femur	Through G.P.	Human
138	L. R.	M	4	"	"	Abscess of	"	Atypical
139	R. T.	M	7	Treloar's Hosp., Alton (Wokingham, Berks)	Knee	Pus from	Direct	Human
140	J. H.	M	5	St Bartholomew's Hosp., E.C.	"	Synovial membrane of	Through G.P.	"
141	A. T.	F	27	"	"	Psoas abscess	Direct	"
142	W. N.	M	3	Surgical Home, Baschurch, Shropshire	Spine	"	"	"
143	E. W.	F	23	Surgical Home, Baschurch, Shropshire	Hip	Pus from	Through G.P.	"
144	A. W.	M	17	Sea Bathing Hosp., Margate	Shoulder joint	Scraping from	Direct	"
145	J. O.	M	6	Royal Inf., Manchester	Knee	Pus from	"	"
146	E. R.	F	52	St Bartholomew's Hosp., E.C.	Psoas abscess	"	"	"
147	G. P.	M	9	Treloar's Hosp., Alton (London)	Knee	Subcutaneous abscess	"	"
148	A. B.	M	13	Southern Hosp., Liverpool	Rib	Scrapings from	Through G.P.	"



149	S. E.	4	Treloar's Hosp., Alton (Worthing)	Spine	Psoas abscess	Direct	Bovine
150	G. S.	15	Queen Mary's Hosp., Carshalton	Psoas abscess	Gland from groin	Through G.P.	Human
151	H. M.	56	Cleveland St Inf., W.	Spine	Pus from	"	"
152	M. B.	6	Treloar's Hosp., Alton (London)	"	Lumbar abscess	Direct	"
153	W. D.	10	" " (Cottered, Herts)	Hip	Pus from	"	"
154	W. C.	38	(Private) Liverpool	Abscess of thigh	"	"	"
155	D. M.	14	(Private) Macclesfield	Tendon sheaths of hand	Scrapings from	"	Bovine
156	T. T.	11	Surgical Home, Baschurch, Shropshire	Hip	Pus from	"	Human
157	F. L.	13	Treloar's Hosp., Alton (London)	Spine and knee	Psoas abscess	"	"
158	P. W.	8	" " "	Spine	"	"	"
159	F. L.	9	Royal Inf., Manchester	Knee	Pus from	"	"
160	A. C.	3	Treloar's Hosp., Alton (London)	Spine	Psoas abscess	"	Bovine
161	P. C.	5	" " "	Hip	Pus from	"	Human
162	A. M.	7	Children's Hosp., Gt Ormond St., W.C.	Psoas abscess	"	"	"
163	S. P.	8	East Cliff House, Margate	Ankle	"	"	"
164	W. M.	25	Royal Inf., Manchester	"	Abscess in thigh	"	"
165	H. B.	12	Sea Bathing Hosp., Margate	Knee	"	"	"
166	F. P.	27	" " "	"	Psoas abscess	Through G.P.	"
167	J. W.	51	Fulham Inf., W.	Spine	Scrapings from	"	"
168	R. D.	9	" " "	Elbow	Psoas abscess	"	"
169	R. D.	14	St Bartholomew's Hosp., E.C.	Spine	Scrapings from	"	"
170	E. B.	10	Treloar's Hosp., Alton (Harrow)	Spine	Psoas abscess	"	"
171	A. D.	7	Children's Hosp., Gt Ormond St., W.C.	Knee	"	"	"
172	J. W.	7	Fleming Hosp., Newcastle	Hip	Tissue from joint	Through G.P.	"
173	R. H.	7	Treloar's Hosp., Alton (London)	Elbow	Bone from	Direct	"
174	B. T.	4	(Private) London	Spine	"	"	"
175	R. E.	4	" " "	Temporal bone	"	"	"
176	H. B.	14	Southwark Inf., S.E.	Knee	Lumbar abscess	Through G.P.	"
177	A. S.	7	Metropolitan Hosp., N.E.	Spine	Dressing from	"	"
178	F. P.	14	Alexandra Hosp., Queen's Sq., W.C.	Arm	Dorsal abscess	Through G.P.	Bovine
179	A. R.	12	" " "	Hip	Tissue from	Through G.P.	Human
180	W. B.	8	Queen Mary's Hosp., Carshalton	"	Pus from sinus near	"	"
181	I. P.	15	General Inf., Leeds	"	Pus from	Direct	"
182	H. M.	3	Treloar's Hosp., Alton (Bedford)	Meninges, spine, hip	Tissue from hip	Through G.P.	"
183	H. T.	3	" " (London)	Knee	Dressing from	"	"
184	G. P.	10	" " (Trelewer, Glamorgan)	Ankle	"	"	Atypical
185	N. P.	7	Treloar's Hosp., Alton (London)	Hip	"	"	Human
				Knee	"	"	"

TABLE II—(continued).  
*Clinical Data and Bacteriological Results.*

No. of case	Initials of patient	Sex	Age in years	Place and Institution from which the material was obtained. (In the case of the Alton specimens the patient's home address is added)	Situation of tuberculous lesions	Source of culture isolated		Type of Tubercle Bacillus
						Original material	Direct or through G.P.	
186	J. H.	M	4	Treloar's Hosp., Alton (Maidstone)	Spine	Dressing from lumbar sinus	Through G.P.	Human
187	M. H.	F	13	" (Middlesex)	Hip	Dressing from	"	"
188	J. B.	M	8	Treloar's Hosp., Alton (London)	Spine	Dressing from dorsal sinus	"	"
189	C. S.	M	10	" (Dublin)	Hip	Dressing from	"	"
190	W. M.	M	9	" (London)	"	"	"	"
191	L. G.	F	11	"	"	"	"	"
192	A. M.	M	12	"	"	"	"	"
193	H. B.	M	13	" (Ryde, I.O.W.)	"	"	"	Atypical Bovine
194	F. H.	M	5	" (London)	Ankle	"	"	"
195	D. Q.	F	10	" (Maidenhead)	Spine	Psoas abscess	"	Human
196	E. W.	F	8	" (Alton)	"	"	"	"
197	N. L.	F	8	" (South'mpt'n)	Hip	Pus from	Direct	Bovine
198	J. W.	F	9	" (Market Harborough)	Spine	Dressing from psoas sinus	Through G.P.	"
199	D. C.	F	9	Children's Hosp., Gt Ormond St, W.C.	Psoas abscess	Pus from	"	Human
200	K. R.	F	10	Fulham Inf., W.	Hip	Scraping from	"	"
201	G. R.	M	5	Children's Hosp., Gt Ormond St, W.C.	"	Pus from	Through G.P.	"
202	L. A.	F	1½	"	Ankle	Granulations from	"	"
203	L. B.	F	13	" (Fleming Hosp., Newcastle)	Spine	Pus from	Direct	"
204	J. R.	M	5	(Private) Manchester	Knee	"	"	"
205	R. R.	M	22	Southern Hosp., Liverpool	Wrist	Bone from	"	Bovine
206	F. A.	M	4	Treloar's Hosp., Alton (Birmingham)	Spine	Dorsal abscess	Through G.P.	"
207	E. M.	F	11	" (Hants)	Knee and hip	Pus from knee	Direct	Human
208	E. H.	F	25	(Private) Liverpool	Knee	Bone from	Through G.P.	"
209	F. B.	M	12	Surgical Home, Baschurch, Shrops.	Spine, elbow	Pus from elbow	Direct	"
210	F. D.	M	7	"	Spine	Psoas abscess	"	Bovine
211	J. T.	M	8	Children's Hosp., Gt Ormond St, W.C.	Spine, hip	Pus from hip	"	Human
212	E. R.	M	60	St Bartholomew's Hosp., E.C.	Knee	Tissue from	Through G.P.	"

213	P. M.	4	Metropolitan Hosp., N.E.	Ilium	Pus from	Direct	Human
214	V. H.	6	Treloar's Hosp., Alton (Reading)	Spine and hip	Psoas abscess	"	Bovine
215	I. J.	6	Alexandra Hosp., Queen's Sq., W.C.	Hip	Pus from	"	"
216	G. W.	30	General Hosp., Bristol	Sternum, clavicle, glands	Pertoneal gland	Through G.P.	Human
217	D. T.	4	Treloar's Hosp., Alton (Treharris, Glamorgan)	Tarsus	Dressing from	"	"
218	G. P.	6	Treloar's Hosp., Alton (London)	Knee	Pus from	Direct	"
219	C. W.	36	Surgical Home, Baschurch, Shrops.	Spine	Psoas abscess	"	"
220	E. C.	10	Alexandra Hosp., Queen's Sq., W.C.	Hip	Pus from	"	Bovine
221	K. B.	8	Treloar's Hosp., Alton (London)	Knee	"	"	Human
222	R. M.	7	"	Hip	"	"	Bovine
223	A. H.	4	Sea Bathing Hosp., Margate	Spine	Psoas abscess	"	"
224	E. Y.	11	St Bartholomew's Hosp., E.C. (Private) Liverpool	Hip	Abscess of	"	Human
225	J. C.	6	"	Abscess of hand	Scraping of bone from	Through G.P.	"
226	H. J.	30	"	Knee	Tissue from	"	"
227	F. K.	6	Alexandra Hosp., Queen's Sq., W.C.	Hip	Pus from	Direct	"
228	N. O.	6	"	"	"	"	"
229	H. S.	8	Sea Bathing Hosp., Margate	Spine	Psoas abscess	"	Bovine
230	R. R.	29	Treloar's Hosp., Alton (Edmonton, Middlesex)	"	"	"	Human
231	G. A.	7	"	"	"	"	"
232	C. W.	9	Treloar's Hosp., Alton (London)	Hip	Pus from	"	"
233	W. G.	13	Fleming Hosp., Newcastle	Spine	Psoas abscess	Through G.P.	"
234	B. B.	M	Treloar's Hosp., Alton (St Albans)	Ankle	Dressing from	"	Bovine
235	D. E.	7	Children's Hosp., GtOrmond St, W.C.	Hip	Pus from	"	"
236	H. M.	6	Treloar's Hosp., Alton (London)	Spine	Dorsal abscess	Direct	"
237	F. J.	10	St Bartholomew's Hosp., E.C.	Hip	Pus from	"	Human
238	F. B.	9	Treloar's Hosp., Alton (Edmonton, Middlesex)	Spine and ankle	Psoas abscess	"	"
239	C. M.	15	Royal Inf., Manchester	Shoulder	Bone from scapula	Through G.P.	"
240	I. E.	3	Treloar's Hosp., Alton (Tottenham)	Spine	Psoas abscess	Direct	"
241	F. L.	11	" (Aberavon, Glamorgan)	Knee	Pus from	"	"
242	C. Y.	3	Treloar's Hosp., Alton (Goodmayes, Essex)	Spine	Psoas abscess	Through G.P.	Bovine
243	W. R.	†‡	Queen Mary's Hosp., Carshalton	Knee	Fluid from	"	Human
244	G. R.	22	Royal Inf., Manchester	Hip	Scrapings from	"	"
245	N. F.	9	(Private) Manchester	Spine	Psoas abscess	Direct	Bovine
246	G. M.	9	Treloar's Hosp., Alton (London)	Hip	Pus from	"	Human

TABLE II—(concluded).  
*Clinical Data and Bacteriological Results.*

No. of case	Initials of patient	Sex	Age in years	Place and Institution from which the material was obtained. (In the case of the Alton specimens the patient's home address is added)	Situation of tuberculous lesions	Source of culture isolated		Type of Tubercle Bacillus
						Original material	Direct or through G.P.	
247	J. T.	M	6	Treloar's Hosp., Alton (Bristol)	Psoas abscess	Pus from	Through G.P.	Human
248	F. S.	F	7	" " (London)	Spine	Abscess of	Direct	"
249	A. U.	F	9	" " (Silvertown, Essex)	"	Dressing from lumbar sinus	Through G.P.	"
250	T. H.	M	17	General Inf., Leeds	Ankle	Tissue from	"	Bovine
251	J. T.	M	49	(Private) Liverpool	"	Bone from	"	Human
252	H. C.	M	11	Union Hosp., Sheffield	Spine	Psoas abscess	"	"
253	H. J.	M	68	St Bartholomew's Hosp., E.C.	Sternum	Pus from	Direct	"
254	F. H.	F	21	(Private) Liverpool	Spine	Bone from	Through G.P.	"
255	G. A.	M	5	Treloar's Hosp., Alton (Southampton)	Hip	Pus from	"	Bovine
256	E. D.	M	43	St Bartholomew's Hosp., E.C.	Knee	Fluid from	Direct	Human
257	A. S.	F	11	Fleming Hosp., Newcastle	Metatarsal bone	Piece of	Through G.P.	"
258	N. D.	F	5	"	Hand	Metacarpal bone	"	Bovine
259	C. W.	F	10	Alexandra Hosp., Queen's Sq., W.C.	Hip	Pus from	Direct	Human
260	E. M.	F	11	Fleming Hosp., Newcastle	Spine	"	"	"
261	E. C.	F	6	King Edward VII Hosp., Cardiff	Hip	"	Through G.P.	"
262	A. S.	F	12	Children's Hosp., Gt Ormond St, W.C.	Psoas abscess	"	"	Atypical
263	T. N.	M	11	Fleming Hosp., Newcastle	Tarsal bone	Piece of	Direct	Human
264	L. G.	F	2	St Bartholomew's Hosp., E.C.	Ear	Tissue from	Through G.P.	"
265	J. M.	M	11	Royal Inf., Manchester	Rib	Tissue from	Direct	"
266	H. B.	M	3	Royal Hosp., Sheffield	Hip	Pus from	"	"

As will be seen from Table III, the cultures which had produced exceptionally severe lung disease in rabbits were recovered, with the object of ascertaining whether this relatively high degree of virulence was maintained or possibly increased. The results show that this was not the case. Cultures made from severely affected lungs and tested on fresh rabbits usually produced a much slighter amount of disease; rarely was the disease as severe as before, and never of greater severity.

It has often been found that, when two or more rabbits were inoculated with the same quantities of the same strain, the disease in the lungs might be severe in one case but slight in the companion animals.

The question arises whether there are intrinsic differences in virulence between different viruses of human type. On the one hand, it may be argued that such differences do exist but, being relatively slight, are only brought into prominence when rabbits of somewhat exceptional susceptibility are used. On the other hand, the exceptionally severe results may be regarded as attributable to rupture of small vessels in the subcutaneous tissues during the operation of inoculation and immediate access to the bloodstream of some portion of the material injected. In support of the latter hypothesis it may be pointed out that the lesions produced correspond with the normal effects of intravenous inoculation of cultures of human type, and that the apparently higher virulence was not maintained after passage in the rabbit.

Whichever of these alternative explanations be adopted, the experimental facts afford no cause for doubting the value of the rabbit as a means of differentiating the human from the bovine type. They serve, however, to emphasise the importance of repeating the experiments when a eugonic culture, inoculated subcutaneously, produces lung disease of exceptional severity.

We here take the opportunity of remarking that our tabulated results of experiments on rabbits, which form the evidence upon which our conclusions are based, may also be found of use in considering the wider practical question, How far can this work of differentiating between "human" and "bovine" tubercle bacilli be incorporated as part of the routine of the general clinical laboratory? Bacteriological work on the tubercle bacillus is always long and tedious, and in routine work it is desirable to make as many short cuts as can be made without sacrifice of accuracy. One common difficulty with the tubercle bacillus is that a "human" strain may not be in full vigour when implanted on the glycerinated test media, and, in consequence, the

resultant growth may be poor. If such a strain happened to produce fairly severe lung disease in a rabbit, there might be a temptation, in hurried work, to make the diagnosis "bovine." It is therefore important to call attention to this danger and to show how it can be guarded against. In view of this object, the lengthy series of experimental data which we have provided will enable other investigators to form their own opinions as to the validity of the rabbit test and the care requisite for its accurate interpretation.

### (3) *Effects of Passage in Rabbits.*

In 41 instances cultures were recovered from rabbits which had been used for the virulence tests, and the characters of these passage strains were compared with the characters of the original cultures. With three exceptions, they were found to be identical with the originals. Eighteen of these cultures were also tested on rabbits and, with the same three exceptions, were found to correspond with the human type as regards pathogenicity.

The exceptions were the cultures from the kidneys of Rabbit 527 (virus 37), Rabbit 17 (virus 208) and Rabbit 144 (virus 199). Rabbit 527 was killed 100 days after inoculation and showed a cystic local lesion, moderately severe tuberculosis of the lungs, a tubercle in the spleen, and a few tubercles and projecting nodules in the kidneys. A culture made from one of the kidney nodules was dysgonic in character and fully virulent for two rabbits, which died from typical bovine tuberculosis in 41 and 30 days. The companion to Rabbit 527, inoculated with the same dose, developed only slight disease. Further experiments were instituted. The culture used for inoculation of Rabbit 527 not being available, that from the fellow guinea-pig inoculated with original material was tested on three rabbits, with slight results. A culture from the kidney of one of these rabbits was again passed into two rabbits, again with slight results.

Rabbit 17 (virus 208) was killed 100 days after inoculation and showed only slight tuberculosis. A culture was made from one of two small tubercles in the kidneys. This culture, when tested, was found to be dysgonic and fully virulent for two rabbits which died in 34 and 41 days with typical bovine tuberculosis. Rabbit 18, companion to Rabbit 17, showed similar slight infection; a culture was made from a kidney tubercle and proved to be eugonic, like the original; it was not tested in rabbits. The original guinea-pig culture was re-inoculated

into two rabbits and produced only a small amount of disease; cultures from the lungs and a kidney of one were eugonic.

The culture from Rabbit 144 has been found to be fairly luxuriant but not equal to the human type; in a dose of .01 mg., inoculated intravenously, it has produced in a rabbit generalised tuberculosis resembling the "bovine" disease. The characters of this strain are not yet fully elucidated.

There are three possible explanations of the exceptional results obtained with the kidney cultures of Rabbits 527, 17, and 144, viz. (1) modification in the rabbit, (2) an admixture of bovine with human tubercle bacilli in the original material, (3) accidental infection of the rabbits with bovine tubercle bacilli. The experiments recorded above do not afford basis for a definite decision between these three alternatives.

#### A NOTE ON TABLE III.

In a few cases broth cultures were used for inoculation instead of serum cultures; and the site of inoculation was the subcutaneous tissue over the abdomen instead of between the scapulae. This is the method employed by some of the German investigators, who have rarely obtained severe lesions in rabbits inoculated with bacilli of human type. We tried it for the purpose of comparison with the method we have usually followed. As will be seen from the table, no tangible differences can be made out.

As we were dealing with eugonic cultures we have often exceeded the dose of 10 mg., which is the recognised dose for comparison of "bovine" with "human" virulence. This was done purposely, as it was theoretically possible for the eugonic culture to contain an admixture, perhaps scanty, of dysgonic and highly virulent bacilli; and the larger dose would give the latter element, if present, a better opportunity of manifesting itself. With human tubercle bacilli, subcutaneously inoculated, increase of dose makes little difference to the final result.

Twenty-five rabbits inoculated with one or other of the cultures of human type have been omitted from this table. Of these, 22 died prematurely, from intercurrent disease or other cause, in from 1 to 50 days after inoculation. The tuberculous lesions were only slight, except in one rabbit, inoculated with virus 44, where the lungs were somewhat severely affected.

The remaining three, Rabbits 617, 738 and 93 exhibited post-mortem evidence of accidental infection. The first, which died 24

TABLE III. Rabbits inoculated with Viruses of "human" type.

The cultures were all grown on pure serum, except those marked \*, which were grown on broth. The subcutaneous inoculations were all made between the shoulders, serum cultures being used, except those marked †, which were made over the abdomen, with broth cultures.

No. of case	Source of Cultures	Details of Cultures				Mode of Inoculation	No. of Rabbit	Weights of Rabbits in grammes		Duration of Experiments (days)	Local glands		Post-mortem Results				
		Age of sub-culture in days	Generation	Total duration of culture in days	Dose (mg.)			Initial	Final		Local lesion	Local glands	Lungs	Bronchial glands	Spleen	Kidneys	
1	Cervical gland	*25	8th	108	20	†sub.	402	3,420	2,820	K 101	Caseous	Caseous foci	Discrete tubercles; crepitanous tissue	Nil	Nil	Nil	Three small tubercles
	"	*25	8th	108	20	†sub.	403	1,880	1,400	K 101	Caseous ulcer	Caseous foci	Partially replaced by caseous tissue	Nil	Nil	Nil	Nil
	"	25	8th	108	10	sub.	404	2,840	3,250	K 101	Caseous	Nil	Discrete tubercles and caseation of margins	Nil	Nil	Nil	Eight small tubercles
2	Dorsal ganglion of wrist	*12	6th	90	15	†sub.	392	2,540	3,000	K 100	Caseous	Nil	A few minute tubercles	Nil	Nil	Nil	Nil
	"	14	3rd	97	10	sub.	401	2,100	2,820	K 100	Caseous	Nil	A few minute tubercles	Nil	Nil	Nil	Nil
3	Pus from spine	11	4th	37	10	sub.	391	2,770	3,100	K 100	Cystic	Nil	Partially replaced by caseous tissue	Nil	Nil	Nil	One tubercle and a few depressions on surface
	"	*20	4th	64	20	†sub.	408	3,570	2,950	K 102	Caseous	Nil	Partially replaced by caseous tissue	Nil	Nil	Nil	Nil
	"	*20	4th	64	20	†sub.	409	3,400	2,690	K 102	Caseous	Nil	Some caseous areas	Nil	Nil	Nil	Nil
4	Gluteal abscess	11	6th	69	10	sub.	387	2,860	3,250	K 100	Cystic	Nil	Small tubercles	Nil	Nil	Nil	Nil
	"	*11	6th	69	15	†sub.	388	1,880	2,800	K 100	Cystic	Nil	Small tubercles	Nil	Nil	Nil	Nil
5	Psoas abscess	7	5th	70	10	sub.	393	2,410	2,600	K 100	Cystic	Nil	Partially replaced by caseous tissue	Nil	Nil	Nil	Nil
	"	3	5th	167	10	sub.	541	2,180	2,300	K 100	Cystic	Nil	Caseous patches on surface	Nil	Nil	Nil	Nil
	"	3	5th	167	10	sub.	542	1,720	1,820	K 100	Caseous	Nil	A few minute tubercles	Nil	Nil	Nil	Nil
6	Pus from hip	10	6th	68	10	sub.	389	2,120	2,700	K 100	Caseous	Nil	A few tubercles	Nil	Nil	Nil	Nil
	"	14	5th	160	10	sub.	520	2,170	2,550	K 100	Caseous	Nil	A few minute tubercles	Nil	Nil	Nil	One grey focus
7	Psoas abscess	15	4th	52	10	sub.	420	3,380	3,250	K 100	Cystic	Nil	Enlarged; extensively caseous	Nil	Nil	Nil	A few tubercles
	"	*15	4th	52	35	†sub.	421	2,280	1,500	D 86	Caseous ulcer	Caseous	Enlarged; completely solid and caseous	Nil	Nil	Nil	A few small tubercles and depressions on surface



7	Rabbit 421 (lung)	10	2nd	27	11	sub.	619	1,750	1,400	K 100	Cystic	Caseous focus	Small tubercles and caseous margins	Caseous	Nil	One grey focus and minute depressions on surface
	"	10	2nd	27	11	sub.	620	1,580	1,550	K 100	Caseous ulcer	Caseous	Caseous patches on surface and at margins	Nil	A few small tubercles and depressions on surface	
8	Psoas abscess	*14	7th	70	20	†sub.	395	2,010	2,300	D 96	Fibrous	Nil	Nil	Nil	Nil	Nil
	"	*14	7th	70	20	†sub.	396	1,750	2,500	K 100	Caseous	Nil	Nil	Nil	Nil	Nil
	"	14	7th	70	10	sub.	397	1,600	2,540	K 100	Caseous	Nil	Nil	Nil	Nil	Nil
9	Psoas abscess	10	3rd	49	10	sub.	418	3,480	1,700	D 90	Caseous ulcer	Caseous foci	Extensively replaced by caseous tissue	Nil	A few small tubercles	
	"	*10	3rd	49	20	†sub.	419	3,060	2,650	K 100	Caseous	Nil	Partially replaced by caseous tissue	Nil	A few small tubercles	
	Rabbit 418 (lung)	10	3rd	35	10	sub.	637	2,620	1,900	K 100	Caseous	Caseous	Partially replaced by caseous tissue	Caseous focus	Several small foci	
10	"	10	3rd	35	10	sub.	638	1,150	1,700	K 100	Cystic	Nil	Several small tubercles	Nil	Nil	
	Iliac abscess	12	6th	77	10	sub.	405	2,490	3,200	K 101	Cystic	Nil	Small tubercles and margins	Nil	Nil	
	"	*12	6th	77	20	†sub.	406	2,440	2,270	K 101	Caseous	Nil	Extensively replaced by caseous tissue	Nil	Nil	
	"	*12	6th	77	20	†sub.	407	2,070	2,150	K 101	Caseous	Nil	Extensively replaced by caseous tissue	Nil	Nil	
11	Bone from mastoid	15	4th	46	10	sub.	414	2,600	2,650	K 100	Caseous	Nil	A few minute tubercles	Nil	Nil	
	"	*15	4th	46	36	†sub.	415	1,500	1,900	K 100	Caseous foci	Caseous	A few small tubercles	Nil	Nil	
12	Scraping from rib	15	3rd	38	10	sub.	412	2,850	2,670	K 100	Cystic	Nil	Discrete tubercles	Nil	Nil	
	"	*15	3rd	38	60	†sub.	413	1,620	1,970	K 100	Caseous	Caseous foci	Caseous patches	Nil	Nil	
13	Psoas abscess	10	4th	51	10	sub.	390	2,350	3,020	K 100	Cystic	Caseous foci	Minute tubercles	Nil	Nil	
	"	14	4th	143	13	sub.	522	2,570	—	K 100	Cystic	Nil	Discrete tubercles	Nil	Nil	
	Psoas abscess	13	4th	54	10	sub.	400	1,970	2,420	K 100	Caseous	Nil	One small tubercle	Nil	Nil	
	"	12	3rd	95	12	sub.	508	3,450	3,270	K 100	Cystic	Nil	A few small tubercles	Nil	Nil	
15	Psoas abscess	*13	4th	52	20	†sub.	398	1,980	2,760	K 100	Caseous ulcer	Nil	Small tubercles	Nil	Nil	
	"	13	4th	52	10	sub.	399	1,680	2,750	K 100	Cystic	Nil	Two minute tubercles	Nil	Nil	
16	Synovial membrane of knee	8	4th	37	50	sub.	427	2,420	2,420	K 100	Caseous	Nil	Extensively replaced by caseous tissue	Nil	A few depressions on surface	

TABLE III. Rabbits inoculated with Viruses of "human" type—(continued).

No. of case	Source of Cultures	Details of Cultures				Age of sub culture in days	Generation	Total duration of infection in days	Dose (mg.)	Mode of inoculation	No. of Rabbit	Weights of Rabbits in grammes		Duration of Experiments (days)	Post-mortem Results			
		Initial	Final	Local lesion	Local glands							Lungs	Bronchial glands		Spleen	Kidneys		
16	Synovial membrane of knee	9	8th	93	13	sub.	521	2,640	2,500	K 100	Caseous ulcer	Nil	Extensively replaced by caseous tissue	Opaque foci	Nil	A few nodules, one large and projecting		
	Rabbit 427 (lung)	9	5th	38	15	sub.	655	2,080	2,700	K 100	Cystic	Cystic	Minute tubercles	Nil	Nil	One small tubercle		
	" "	9	5th	38	10	sub.	656	2,030	1,640	D 91	Caseous	Nil	Small tubercles	Nil	Nil	One small tubercle		
17	Pus from hip	8	3rd	36	12	sub.	429	2,150	2,400	K 100	Caseous	Nil	A few tubercles	Nil	Nil	Nil		
	" "	15	5th	56	11	sub.	453	2,250	2,850	K 100	Caseous	Nil	A few tubercles	Nil	Nil	Nil		
18	Psoas abscess	9	6th	86	11	sub.	436	2,870	2,450	K 101	Caseous	Nil	A few marginal tubercles	Nil	Nil	Nil		
	" "	9	6th	86	11	sub.	437	2,380	2,400	K 101	Cystic	Nil	One grey nodule	Nil	Nil	A few tubercles in medulla		
20	Pus from hip	*11	3rd	47	20	†sub.	410	3,340	3,000	K 102	Cystic	One caseous focus	Extensively replaced by caseous tissue	Nil	Nil	A few tubercles		
	" "	11	3rd	47	10	sub.	411	1,900	1,850	K 102	Caseous ulcer	Caseous nodule	Extensively replaced by caseous tissue	Nil	Nil	Nil		
21	Pus from hip	15	4th	51	10	sub.	416	2,430	2,550	K 100	Cystic	Nil	Scattered tubercles	Nil	Nil	Nil		
	" "	*15	4th	51	45	†sub.	417	2,080	1,070	D 92	Caseous ulcer	One caseous focus	Extensively replaced by caseous tissue	Nil	Nil	Nil		
22	Rabbit 417 (lung)	10	2nd	21	12	sub.	618	1,600	1,550	K 100	Caseous	Caseous nodule	Minute tubercles	Nil	Nil	One tubercle		
	Psoas abscess	10	4th	48	10	sub.	422	3,070	1,600	D 94	Cystic	Caseous nodule	Partially replaced by caseous tissue	Nil	Nil	One minute tubercle		
	" "	*24	4th	48	24	†sub.	423	3,150	2,750	K 100	Caseous	Nil	A few small tubercles	Nil	Nil	Nil		
	" "	12	8th	148	12	sub.	580	1,820	2,000	K 100	Cystic	Cystic	Three translucent foci	Nil	Nil	Nil		
24	Pus from hip	8	3rd	65	14	sub.	434	3,230	2,140	D 54	Caseous	Nil	Discrete tubercles	Nil	Nil	Nil		
	" "	8	3rd	65	14	sub.	435	3,760	3,350	K 101	Caseous	Caseous	Discrete caseous tubercles	Nil	Nil	Nil		
25	Psoas abscess	5	8th	101	12	sub.	486	2,210	2,050	K 100	Cystic	Cystic	Caseous patches on surface	Nil	Nil	Two translucent foci		
	" "	5	8th	101	15	sub.	487	1,820	1,870	K 100	Cystic	Cystic	A few translucent foci	Nil	Nil	Nil		

26	Pus from wrist	5	4th	66	10	sub.	438	2,100	2,070	K 100	Caseous	Nil	Discrete tubercles	Nil	NJ	Nil
	"	5	4th	66	10	sub.	439	1,510	1,690	K 100	Caseous	Nil	A few translucent tubercles	Nil	NI	Four small tubercles
27	Urine	8	4th	33	12	sub.	454	2,050	2,120	K 100	Cystic	Nil	A few discrete tubercles	Nil	NI	Nil
	"	8	4th	33	12	sub.	455	1,770	1,800	K 100	Caseous	Nil	Several tubercles	Nil	NI	Nil
28	Metacarpal bone	3	4th	57	10	sub.	511	2,050	1,850	K 101	Caseous	Nil	A few translucent tubercles	Nil	NI	Nil
	"	3	4th	57	10	sub.	512	1,890	1,650	K 101	Caseous	Nil	Several discrete tubercles	Nil	NI	Nil
30	Pus from hip	9	5th	72	10	sub.	456	2,620	1,500	D 82	Caseous	Nil	Completely replaced by caseous tissue	Nil	NI	A few minute tubercles and depressions on surface
	"	9	5th	72	30	sub.	457	1,810	1,850	K 100	Cystic	Caseous focus	Caseous patches on surface	Nil	NI	One minute tubercle
	Rabbit 456 (lung)	10	4th	56	11	sub.	693	1,540	1,670	K 100	Cystic	Nil	A few small caseous foci and slight marginal caseation	Nil	NI	Nil
	"	10	4th	56	11	sub.	694	1,820	1,600	K 100	Caseous	Caseous	Some superficial caseous areas	Nil	NI	Eight small tubercles
31	Pus from hip	9	5th	72	10	sub.	462	1,770	2,000	K 100	Cystic	Caseous focus	A few translucent tubercles	Nil	NI	Nil
	"	9	5th	72	14	sub.	463	2,250	2,000	K 100	Caseous	Caseous focus	A few small tubercles	Nil	NI	One grey focus
33	Proas abscess	8	4th	43	14	sub.	424	2,040	2,150	K 100	Caseous	Nil	A few small tubercles	Nil	NI	One tubercle
	"	8	4th	43	14	sub.	425	1,620	1,250	K 100	Caseous	Nil	A few small tubercles	Nil	NI	Nil
37	Abscess in buttock	8	4th	50	14	sub.	527 <sup>1</sup>	3,090	2,520	K 100	Cystic	Caseous	Partially replaced by caseous tissue	Nil	NI	One minute tubercle
	"	8	4th	50	14	sub.	528	2,590	2,320	K 100	Cystic	Nil	Some superficial caseous areas	Nil	NI	A few depressions on surface
	"	11	4th	337	10	sub.	111	1,970	2,050	K 100	Cystic	Nil	Small tubercles on surface	Nil	NI	Nil
	"	11	4th	337	10	sub.	112	2,340	2,450	K 100	Cystic	Nil	A few translucent foci	Nil	NI	Nil
	"	11	4th	337	-1	i.v.	115	2,270	2,420	K 100	—	—	A few translucent foci	Nil	NI	A few small tubercles
	Rabbit 115 (kidney)	7	5th	90	10	sub.	155	1,870	2,000	K 100	Cystic	Nil	A few small tubercles	Nil	NI	Nil
	"	7	5th	90	10	sub.	156	2,020	2,050	K 100	Caseous	Cystic	A few small tubercles	Nil	NI	A few scars on surface
38	Proas abscess	10	5th	52	13	sub.	451	1,890	2,200	K 100	Caseous	Caseous foci	A few small tubercles	Nil	NI	Nil
	"	10	5th	52	13	sub.	452	1,770	1,600	K 100	Caseous	Caseous	Superficial caseous patches	Nil	NI	One small tubercle

<sup>1</sup> See p. 270.

TABLE III. Rabbits inoculated with Viruses of "human" type—(continued).

No. of case	Source of Cultures	Details of Cultures				Dose (mg)	Mode of Inoculation	No. of Rabbit	Weights of Rabbits in grammes		Duration of Experiment (days)	Post-mortem Results					
		Age of sub-culture in days	Generation	Total duration of culture in days	Initial				Final	Local lesion		Local glands	Lungs	Bronchial glands	Spleen	Kidneys	
39	Pus from thigh	9	5th	47	11	sub.	458	1,650	2,450	K 100	Caseous	Cystic	A few translucent tubercles	Nil	Nil	Nil	Nil
"	"	5	5th	82	12	sub.	545	2,150	2,450	K 100	Cystic	Nil	Several small tubercles	Nil	Nil	Nil	A few scars on surface
40	Synovial membrane of elbow	7	6th	86	11	sub.	573	1,900	2,020	K 100	Cystic	Nil	A few translucent areas	Nil	Nil	Nil	Nil
"	"	7	6th	86	11	sub.	574	1,850	1,920	K 100	Cystic	Nil	Caseous tubercles on surface	Nil	Nil	Nil	One small tubercle
41	Pus from hip	7	4th	39	16	sub.	440	2,060	1,850	D 75	Caseous	Caseous nodule	Scattered caseous nodules	Nil	Nil	Nil	A few minute tubercles and scars
43	"	7	4th	39	16	sub.	441	1,850	1,890	K 100	Cystic	Nil	Small translucent tubercles	Nil	Nil	Nil	Nil
"	"	6	4th	44	12	sub.	504	3,630	3,000	K 100	Cystic	Nil	Partially replaced by caseous tissue	Nil	Nil	Nil	Two grey foci and a few depressions on surface
"	"	6	4th	44	12	sub.	505	1,880	2,200	K 100	Caseous	Caseous	A few translucent tubercles	Nil	Nil	Nil	A few pits on surface
44	Psoas abscess	5	6th	89	10	sub.	543	2,050	2,150	K 100	Cystic	Nil	A few translucent tubercles	Nil	Nil	Nil	Two small tubercles and superficial scars
"	"	5	6th	89	10	sub.	544	1,300	1,250	K 100	Cystic	Caseous	Superficial caseation	Nil	Nil	Nil	Several small tubercles
45	Pus from hip	10	3rd	42	11	sub.	488	1,700	1,670	K 100	Caseous	Caseous	Caseous patches on surface and at margins	Nil	Nil	Nil	Three minute tubercles
"	"	10	3rd	42	11	sub.	489	1,510	1,770	K 100	Caseous	Nil	A few translucent tubercles	Nil	Nil	Nil	Three grey foci
46	Psoas abscess	6	4th	68	11	sub.	480	1,870	1,700	K 100	Cystic ulcer	Cystic	Scattered translucent tubercles	Nil	Nil	Nil	Three minute tubercles
"	"	6	4th	68	11	sub.	481	1,930	1,800	K 100	Caseous ulcer	Caseous	Small tubercles on surface	Nil	Nil	Nil	One minute tubercle
47	Pus from hip	4	3rd	38	11	sub.	484	1,920	1,670	K 101	Cystic	Nil	Numerous shotty tubercles	Nil	Nil	Nil	One tubercle
"	"	4	3rd	38	15	sub.	485	1,870	1,820	K 101	Cystic	Caseous focus	A few small tubercles	Nil	Nil	Nil	Nil

48	Pus from knee	6	5th	74	14	sub.	555	1,740	1,900	K 100	Cystic	Nil	Two translucent foci	Nil	Nil	Nil
	"	6	5th	74	14	sub.	556	1,640	1,700	K 100	Cystic	Nil	Caseous areas on surface	Nil	Nil	Nil
50	Pus " from hip	7	3rd	33	10	sub.	446	2,220	2,120	K 100	Cystic	Nil	Almost completely replaced by caseous tissue	Nil	Nil	One small tubercle
	"	7	3rd	33	10	sub.	447	1,450	1,570	K 100	Caseous ulcer	Caseous	Partially replaced by caseous tissue	Nil	Nil	Two small tubercles
51	Pus from hip	*13	3rd	53	30	†sub.	468	2,280	2,020	K 100	Cystic	Caseous	Not enlarged but extensively replaced by caseous tissue	Nil	Nil	A few grey foci
	"	13	3rd	53	15	sub.	469	1,680	1,570	K 100	Cystic	Nil	Caseous nodules	Nil	Nil	A few grey foci
52	Dressing from lumbar abscess	7	3rd	36	12	sub.	531	2,370	2,300	K 100	Caseous ulcer	Caseous	Several translucent tubercles	Nil	Nil	A few grey foci
	"	7	3rd	36	12	sub.	532	1,740	1,700	K 100	Cystic	Nil	Some translucent tubercles	Nil	Nil	Two grey foci
53	Dressing from sinus of hip	6	6th	66	11	sub.	565	2,220	2,170	K 101	Cystic	Caseous	A few caseous patches	Caseous	Nil	Three grey foci
	"	6	6th	66	11	sub.	566	2,000	1,550	D 83	Caseous	Caseous	Almost completely replaced by caseous material	Caseous	Nil	A few caseous foci and one large tubercle
	Rabbit 566 (bronchial gland)	7	—	40	10	sub.	822	1,820	1,950	K 100	Cystic	Nil	A few translucent foci	Nil	Nil	Two tubercles
	"	7	—	40	10	sub.	823	1,520	1,470	K 100	Cystic	Cystic	A few tubercles	Nil	Nil	Nil
57	Dressing from lumbar sinus	6	5th	57	12	sub.	551	2,000	1,900	K 100	Cystic	Cystic	Caseous patches on surface	Nil	Nil	Six small tubercles
	"	6	5th	57	12	sub.	552	1,450	1,620	K 100	Cystic	Nil	A few minute tubercles	Nil	Nil	Nil
58	Dressing from hip	11	3rd	68	14	sub.	535	2,170	1,600	D 90	Caseous ulcer	Caseous	Some small tubercles	Nil	Nil	One grey focus
	"	11	3rd	68	14	sub.	536	2,190	2,520	K 100	Caseous	Nil	Superficial caseous patches	Nil	Nil	Nil
59	Tissue from knee joint	6	5th	59	12	sub.	550	1,400	2,070	K 100	Caseous	Nil	A few translucent foci	Nil	Nil	Nil
	"	5	5th	73	10	sub.	591	1,770	1,940	K 100	Cystic	Nil	A few translucent foci	Nil	Nil	Nil
	"	5	5th	73	10	sub.	592	1,980	1,570	K 100	Caseous	Nil	A few tubercles	Nil	Nil	Four grey foci
60	Synovial membrane from ankle	9	5th	46	10	sub.	460	2,570	1,770	K 100	Cystic	Nil	Almost completely replaced by caseous tissue	Grey focus	Nil	A few small tubercles
	"	6	8th	116	10	sub.	597	2,000	2,040	K 100	Caseous	Nil	A few translucent foci	Nil	Nil	Nil
	"	6	8th	116	10	sub.	598	1,800	1,840	K 100	Cystic	Caseous focus	Partial superficial caseation	Nil	Nil	Four small tubercles
	Rabbit 460 (lung)	7	3rd	48	10	sub.	718	1,550	1,790	K 100	Cystic	Cal. focus	A few minute tubercles	Nil	Nil	Nil
	"	7	3rd	48	10	sub.	719	1,920	1,920	K 100	Cystic	Nil	Caseous nodules	Nil	Nil	Two tubercles and a few depressions on surface

TABLE III. Rabbits inoculated with Viruses of "human" type—(continued).

No. of case	Source of Cultures	Details of Cultures				Age of subculture in days	Generation	Total duration of infection in days	Dose (mg.)	Mode of inoculation	No. of Rabbit	Weights of Rabbits in grammes		Duration of Experiments (days)	Post-mortem Results			
		Initial	Final	Local lesion	Local glands							Lungs	Bronchial glands		Spleen	Kidneys		
61	Dressing from sacral sinus	5	7th	75	sub.	595	1,900	1,890	K 100	Cystic	Caseous focus	Small tubercles	Nil	Nil	Nil	Grey foci in cortex; pus in pelvis of one Nil		
	"	5	7th	75	sub.	596	1,700	1,770	K 100	Cystic	Nil	A few small tubercles	Nil	Nil	Nil	Grey foci in cortex; pus in pelvis of one Nil		
62	Pus from ankle	10	3rd	34	sub.	449	2,120	1,920	K 100	Caseous	Caseous	Extensively replaced by caseous tissue	Nil	Nil	Nil	Nil		
	"	10	3rd	34	sub.	450	2,020	2,000	K 100	Caseous	Caseous foci	Superficial caseous patches	Nil	Nil	Nil	Nil		
63	Gluteal abscess	5	4th	55	sub.	478	2,720	2,950	K 100	Caseous	Nil	Extensively replaced by caseous tissue	Oedematous	Nil	Nil	Three grey foci		
	"	5	5th	230	sub.	848	2,170	2,350	K 100	Cystic	Nil	Several small tubercles	Nil	Nil	Nil	Two grey foci		
	"	5	5th	230	sub.	849	2,850	2,020	K 100	Caseous ulcer	Caseous foci	A few superficial and marginal tubercles	Nil	Nil	Nil	Two grey foci		
65	Psoas abscess	10	4th	59	sub.	491	1,820	2,150	K 100	Cystic	Cystic	Small translucent tubercles	Nil	Nil	Nil	Nil		
	"	4	5th	75	sub.	547	2,670	2,590	K 100	Cystic	Nil	Superficial caseous patches	Nil	Nil	Nil	Two grey foci		
	"	4	5th	75	sub.	548	1,900	1,740	K 100	Caseous ulcer	Caseous	A few small tubercles	Nil	Nil	Nil	Three grey foci		
66	Bone from hip	5	4th	50	sub.	563	2,120	2,050	K 100	Cystic	Cystic	A few small tubercles	Nil	Two small tubercles	Four tubercles	Nil		
69	" " "	5	4th	50	sub.	564	1,900	2,050	K 100	Cystic	Nil	Several small tubercles	Nil	Nil	Nil	One grey focus		
	" " "	5	4th	54	sub.	559	1,600	1,870	K 100	Caseous	Caseous focus	Nil	Nil	Nil	Nil	Nil		
70	" " " Dressing from sinus of spine	5	4th	54	sub.	560	2,200	2,100	K 100	Cystic	Nil	One grey tubercle	Nil	Nil	Nil	Nil		
	" " "	8	7th	81	sub.	629	1,930	1,850	K 100	Cystic	Nil	A few small tubercles	Nil	Nil	Nil	Nil		
	" " "	8	7th	81	sub.	630	2,260	2,220	K 100	Cystic	Nil	A few small tubercles	Nil	Nil	Nil	One small tubercle		
74	Pus from hip	7	3rd	31	sub.	529	1,570	1,700	K 100	Cystic	Caseous focus	One translucent tubercle	Nil	Nil	Nil	Nil		
	" " "	7	3rd	31	sub.	530	1,840	1,900	K 100	Cystic	Nil	Three translucent tubercles	Nil	Nil	Nil	Nil		

75	Pus from spine	10	3rd	58	11	sub.	509	2,370	2,140	K 101	Cystic	Nil	Superficial scattered tubercles	Nil	Nil	Nil
	"	10	3rd	58	12	sub.	510	1,770	1,620	K 101	Caseous ulcer	Caseous	Discrete tubercles on surface	Nil	Nil	A few grey foci
76	Tendon sheath of wrist	8	5th	66	11	sub.	587	1,380	1,590	K 100	Caseous ulcer	Nil	A few translucent tubercles	Nil	Nil	Nil
	"	8	5th	66	11	sub.	588	2,150	—	K 100	Caseous	Caseous focus	Several tubercles on surface	Nil	Nil	A few pits on surface
77	Abscess of malleolus	6	4th	64	13	sub.	539	2,550	2,650	K 100	Caseous	Nil	A few translucent tubercles	Nil	Nil	Nil
	"	6	4th	64	13	sub.	540	2,400	2,100	D 81	Cystic	Cystic	Small translucent foci	Nil	Nil	One grey focus
79	Scraping from hip	8	6th	82	12	sub.	623	1,620	1,450	K 65	Caseous ulcer	Caseous	Extensively replaced by caseous tissue	Caseous	Nil	A few minute tubercles
	"	8	6th	82	12	sub.	624	1,670	1,820	K 100	Caseous	Nil	A few small tubercles	Nil	Nil	Nil
	Rabbit 623 (lung)	7	3rd	40	13	sub.	814	1,820	1,620	K 100	Caseous ulcer	Caseous foci	A few translucent tubercles	Nil	Nil	Nil
	"	7	3rd	40	13	sub.	815	3,020	2,540	K 100	Cystic	Caseous foci	Caseous tubercles on surface and at margins	Nil	Nil	One grey focus
80	Pus from hip	7	3rd	30	10	sub.	466	2,390	2,320	K 100	Cystic	Nil	A few minute tubercles	Nil	Nil	One grey focus
	"	7	3rd	30	16	sub.	467	1,600	1,470	K 100	Cystic	Nil	Caseous patches on surface	Nil	Nil	Nil
82	Pus from ankle	9	3rd	50	10	sub.	506	3,370	1,850	D 76	Caseous	Nil	Extensively replaced by caseous tissue	Nil	Nil	Several tubercles
	"	9	3rd	50	10	sub.	507	3,170	2,440	K 100	Caseous	Nil	Completely replaced by caseous tissue	Nil	Nil	A few grey foci
	Rabbit 506 (kidney)	6	3rd	50	10	sub.	711	1,770	1,700	K 100	Cystic	Nil	Several caseous nodules	Caseous	Nil	A few tubercles
	"	6	3rd	50	10	sub.	712	1,790	1,850	K 100	Cystic	Nil	Several discrete tubercles	Nil	Nil	Three tubercles
84	Psoas abscess	6	6th	56	12	sub.	553	1,350	1,970	K 100	Caseous	Cystic	A few tubercles	Nil	Nil	Nil
	"	6	6th	56	12	sub.	554	1,390	1,500	K 100	Cystic	Nil	Translucent foci and slightly caseous margins	Nil	Nil	One depressed scar
85	Pus from hip	8	6th	87	11	sub.	581	2,000	2,120	K 100	Cystic	Nil	A few minute tubercles	Nil	Nil	Nil
	"	8	6th	87	11	sub.	582	2,100	1,800	D 92	Cystic	Nil	Almost entirely replaced by nodular caseous substance	Nil	Nil	A few small tubercles
	Rabbit 582 (lung)	9	6th	76	14	sub.	875	2,106	2,270	K 100	Cystic	Nil	A few small tubercles	Caseous	Nil	Two tubercles
	"	9	6th	76	14	sub.	876	1,420	1,690	K 100	Cystic	Nil	A few small tubercles	Nil	Nil	Nil
86	Gluteal abscess	8	4th	48	12	sub.	523	2,570	2,300	K 100	Cystic	Caseous	Small tubercles	Nil	Nil	A few grey foci
	"	8	4th	48	12	sub.	524	1,970	2,020	K 100	Cystic	Cystic	Patches of superficial caseation	Nil	Nil	Nil
88	Pus from hip	5	6th	76	10	sub.	593	1,960	2,090	K 100	Cystic	Nil	Patches of superficial caseation	Nil	Nil	Nil
	"	5	6th	76	10	sub.	594	1,660	1,950	K 100	Caseous	Cystic	Patches of superficial caseation	Nil	Nil	Four small tubercles

TABLE III. Rabbits inoculated with Viruses of "human" type—(continued).

No. of case	Source of Cultures	Details of Cultures			Dose (mg.)	Mode of Inoculation	No. of Rabbit	Weights of Rabbits in grammes		Duration of Experiment (days)	Local lesion	Local glands	Post-mortem Results				
		Age of sub-culture in days	Generation	Total weight of rabbit				Initial	Final				Lungs	Bronchial glands	Spleen	Kidneys	
90	Pus from hip	12	5th	79	11	sub.	657	1,960	1,850	K 100	Cystic	Nil	Numerous discrete tubercles	Nil	Nil	Three tubercles	
	"	12	5th	79	11	sub.	658	1,660	1,670	K 100	Cystic	Nil	Slight superficial caseation	Nil	Nil	Three grey foci	
91	Popliteal abscess	8	5th	76	10	sub.	613	1,770	1,970	K 100	Cystic	Nil	A few translucent foci and slight marginal caseation	Nil	Nil	One grey focus	
	"	8	5th	76	10	sub.	614	2,050	2,020	K 100	Cystic	Cystic	Partial superficial caseation	Nil	Nil	A few pits on surface	
93	Cervical abscess	8	5th	69	11	sub.	585	2,110	2,040	K 100	Caseous ulcer	Caseous focus	Slight superficial caseation	Nil	Nil	Nil	
	"	8	5th	69	11	sub.	586	2,150	2,170	K 100	Cystic	Cystic	A few translucent tubercles	Nil	Nil	Nil	
95	Pus near hip	12	5th	71	10	sub.	601	2,170	2,070	K 100	Cystic	Nil	Nil	Nil	Nil	Nil	
	"	12	5th	71	10	sub.	602	1,620	1,720	K 100	Cystic	Nil	Nil	Nil	Nil	Nil	
96	Pus from knee	8	5th	69	13	sub.	583	2,500	2,870	K 100	Cystic	Caseous focus	A few translucent foci and slight marginal caseation	Caseous focus	Nil	Nil	One grey focus
	"	8	5th	69	13	sub.	584	1,720	1,790	K 100	Caseous ulcer	Cystic	A few small caseous nodules	Nil	Nil	Three wedge-shaped foci	
97	Pus from shoulder joint	3	6th	66	10	sub.	649	1,240	1,500	K 101	Cystic	Caseous	A few translucent foci and slight marginal caseation	Nil	Nil	Three small tubercles	
	"	3	6th	66	10	sub.	680	2,340	2,200	K 101	Caseous	Nil	A few tubercles	Nil	Nil	Nil	
98	Pus from hip	5	5th	58	11	sub.	587	2,050	1,420	D 68	Caseous	Caseous foci	A few translucent tubercles	Nil	Nil	One grey focus	
	"	5	5th	58	11	sub.	588	1,800	2,190	K 100	Cystic	Cystic	Translucent foci	Nil	Nil	Three minute tubercles	
	"	6	8th	150	11	sub.	717	2,000	2,270	K 100	Cystic	Caseous	A few translucent tubercles	Nil	Nil	Nil	
99	Tissue from knee	6	5th	51	10	sub.	635	1,650	1,050	D 88	Cystic	Nil	Superficial caseous patches	Nil	Nil	Nil	
	"	6	5th	51	10	sub.	636	1,670	2,000	K 100	Caseous	Caseous focus	Slight superficial caseation	Nil	Nil	Three grey foci	
	Rabbit 635 (lung)	10	4th	155	15	sub.	905	2,000	950	D 54	Open sore	Nil	Small grey tubercles	Nil	Nil	Nil	
	"	10	4th	155	15	sub.	906	1,950	1,950	K 100	Caseous ulcer	Caseous foci	A few tubercles and slight marginal caseation	Nil	Nil	One depressed tubercle on surface	
	"	6	5th	203	14	sub.	110	2,500	2,400	K 101	Caseous	Nil	Caseous patches on surface	Nil	Nil	Nil	



100	Dressing from psoas sinus	5	5th	70	10	sub.	647	1,620	1,790	K 101	Cystic	Nil	Small tubercles on surface	Nil	Nil	Two small tubercles
101	" " Dressing from psoas abscess	5 13	5th 7th	70 74	10 10	sub. sub.	648 661	1,600 2,260	1,900 2,220	K 101 K 100	Cystic Caseous	Nil Nil	A few small tubercles A few grey foci	Nil Nil	Nil Nil	Nil Nil
103	" " Dressing from cervical sinus	13 11	7th 6th	74 65	10 10	sub. sub.	662 643	2,200 2,220	2,270 2,150	K 100 K 100	Cystic Cystic	Nil Nil	A few grey foci A few small tubercles	Nil Nil	Nil Nil	Nil Nil
105	" " Dressing from gluteal sinus	11 13	6th 3rd	65 40	10 10	sub. sub.	644 631	2,180 2,080	2,200 1,970	D 100 K 100	Cystic Cystic	Nil Cystic	A few grey tubercles Slight superficial caseation	Nil Nil	Nil Nil	Nil Two small tubercles
109	" " Abscess of neck	13 5	3rd 6th	40 66	10 10	sub. sub.	632 599	1,550 1,720	1,570 2,070	K 100 K 100	Cystic Cystic	Nil Nil	Discrete tubercles on surface Small caseous nodules	Nil Nil	Nil Nil	Six grey foci Nil
110	" " Abscess of rib	4	6th	86	10	sub.	633	2,300	2,200	K 100	Cystic	Nil	Superficial caseous patches	Nil	Nil	A few grey foci
112	" " Abscess of instep	12 4	6th 6th	94 94	10 10	sub. sub.	634 641	1,770 1,650	2,050 1,640	K 100 K 100	Cystic Cystic	Nil Caseous foci	A few translucent foci Surface partially caseous	Nil Nil	Nil Nil	Nil A few pits on surface
113	" " Pus from hip	6	6th	94	10	sub.	642	1,730	1,550	K 100	Caseous	Nil	A few grey foci	Nil	Nil	Nil
	" " "	6	11th	129	11	sub.	689	1,750	1,920	K 100	Cystic	Nil	A few tubercles	Nil	Nil	One small tubercle
	" " "	6	11th	129	11	sub.	690	1,950	1,800	K 100	Caseous	Nil	Discrete nodules on surface	Nil	Nil	Two minute tubercles and a caseous streak
114	Pus from abscess in thigh	12	6th	92	10	sub.	639	1,770	1,720	K 100	Cystic	Cystic	A few superficial tubercles	Nil	Nil	Nil
115	" " Psoas abscess	12 5	6th 6th	92 98	10 11	sub. sub.	640 651	1,520 2,450	1,540 1,920	K 100 K 101	Cystic Caseous	Cystic Nil	A few minute grey foci Partially replaced by caseous tissue	Nil Nil	Nil Nil	Six small tubercles
116	" " Dressing from ankle	5 10	6th 6th	98 101	11 11	sub. sub.	652 691	1,500 2,570	1,520 2,350	K 101 K 100	Caseous Cystic	Nil Nil	A few translucent foci A few minute tubercles	Nil Nil	Nil Nil	Nil Nil
118	" " Dressing from hip	10 6	6th 5th	101 83	11 10	sub. sub.	692 687	1,940 2,330	1,920 2,000	K 100 K 100	Cystic Cystic	Nil Caseous	A few minute tubercles Scattered nodules and two caseous patches	Nil Caseous nodule	Nil Nil	Nil A few pits and one small tubercle
119	" " Pus from hip	6 6	5th 7th	83 140	10 11	sub. sub.	688 709	1,460 1,820	1,420 2,100	K 100 K 100	Cystic Cystic	Nil Nil	Small tubercles on surface	Nil Nil	Nil Nil	One tubercle Nil
120	" " Pus near great trochanter	6 7	6th 6th	140 63	11 11	sub. sub.	710 611	1,820 1,800	2,100 1,900	K 100 K 101	Cystic Caseous	Cystic Nil	Slight superficial caseation	Nil Nil	Nil Nil	One grey focus
	" " "	7	6th	63	11	sub.	612	1,550	1,270	K 101	Cystic	Nil	A few small tubercles	Nil	Nil	Two grey foci

TABLE III. Rabbits inoculated with Viruses of "human" type—(continued).

No. of case	Source of Cultures	Details of Cultures			Dose (mg.)	Mode of inoculation	No. of Rabbit	Weights of Rabbits in grammes		Duration of Experiments (days)	Post-mortem Results					
		Age of sub-culture in days	Generation	Total duration of culture in days				Initial	Final		Local lesion	Local glands	Lungs	Bronchial glands	Spleen	Kidneys
121	Abscess of hip	6	8th	139	11	sub.	708	1,500	1,720	K 100	Cystic	Nil	Gray nodules on surface	Nil	Nil	One caseous focus
	"	6	7th	172	13	sub.	808	1,520	2,050	K 100	Cystic	Cystic	Two small tubercles	Nil	Nil	Nil
	"	6	7th	172	13	sub.	809	1,550	1,600	K 100	Caseous	Nil	Small tubercles on surface	Nil	Nil	Nil
122	Pus from hip	7	6th	138	13	sub.	699	2,450	2,270	K 100	Cystic ulcer	Caseous	Numerous caseous nodules	Nil	Nil	A few small tubercles and pits on surface
	"	7	6th	138	13	sub.	700	1,670	1,650	K 100	Cystic	Caseous	A few tubercles	Nil	Nil	One tubercle
	"	9	3rd	55	13	sub.	98	1,950	1,850	K 103	Cystic	Nil	Partial caseation of surface	Nil	Nil	A few small tubercles
	"	9	3rd	55	13	sub.	99	2,350	2,050	K 103	Caseous	Caseous	A few small tubercles on surface	Nil	Nil	Several small tubercles
123	Psoas abscess	7	7th	138	10	sub.	720	1,700	1,820	K 100	Cystic	Nil	A few grey foci	Nil	Nil	Nil
	"	7	7th	138	10	sub.	721	1,450	1,820	K 100	Caseous	Nil	Small scattered tubercles	Nil	Nil	Nil
124	Pus from fibula	7	9th	136	12	sub.	705	1,450	1,670	K 100	Cystic	Nil	A few tubercles	Nil	Nil	Nil
	"	7	9th	136	12	sub.	706	1,440	1,650	K 100	Caseous	Cystic	A few tubercles	Nil	Nil	One tubercle
125	Pus from ulna	7	9th	141	10	sub.	732	2,650	2,320	K 100	Cystic ulcer	Nil	A few grey nodules	Nil	Nil	Nil
	"	7	9th	141	20	sub.	733	2,300	2,020	K 100	Cystic	Nil	Surface replaced by caseous tissue	Nil	Nil	Two scars on surface
126	Psoas abscess	7	7th	132	12	sub.	703	1,770	2,190	K 100	Cystic	Nil	A few caseating nodules	Nil	Nil	One tubercle
	"	7	7th	132	12	sub.	704	1,600	1,900	K 100	Cystic ulcer	Cystic	Scattered tubercles	Nil	Nil	A few tubercles and pits
127	Pus from elbow joint	7	5th	132	11	sub.	701	2,050	2,370	K 100	Cystic	Caseous	A few tubercles	Caseous focus	Nil	Nil
	"	7	5th	132	11	sub.	702	1,620	1,670	K 100	Caseous	Cystic	A few marginal nodules	One tubercle	Nil	Nil
128	Pus from hip	7	7th	134	10	sub.	726	1,950	2,120	K 100	Caseous ulcer	Nil	A few minute tubercles	Nil	Nil	Nil
	"	7	7th	134	10	sub.	727	1,700	1,900	K 100	Caseous	Nil	A few translucent foci	Nil	Nil	One depressed scar

129	Abscess of thigh	7	7th	147	11	sub.	744	1,480	1,470	K 100	Caseous	Caseous focus	A few tubercles on surface	Nil	Nil	Nil
130	" " from knee	7	7th	147	11	sub.	745	1,680	1,670	K 100	Caseous	Nil	Small caseous areas	Nil	Nil	Nil
	" " from knee	7	8th	116	13	sub.	734	1,780	1,700	K 100	Cystic	Nil	Grey nodules on surface	Nil	Nil	A few small tubercles and pits; pelvis of one caseous A few tubercles
131	" " abscess	7	8th	116	13	sub.	735	1,920	1,450	K 100	Cystic	Nil	A few tubercles on surface	Nil	Nil	A few tubercles
	" " abscess	11	8th	130	10	sub.	816	1,600	1,900	D 96	Caseous	Nil	Nil	Nil	Nil	Nil
	" " abscess	11	8th	130	10	sub.	817	1,690	1,970	K 100	Caseous	Cystic	Nil	Nil	Nil	Nil
132	" " abscess	7	6th	145	15	sub.	739	1,480	1,850	K 100	Caseous ulcer	Nil	A few grey foci	Nil	Nil	Nil
	" " "	10	8th	228	11	sub.	901	2,370	2,050	K 100	Cystic	Caseous focus	Small tubercles on surface	Nil	Nil	Nil
	" " "	10	8th	228	11	sub.	902	2,250	2,220	K 100	Cystic	Nil	A few small tubercles	Caseous focus	Nil	One grey focus
134	Lumbar abscess	5	6th	129	11	sub.	790	1,820	1,820	K 100	Cystic	Nil	A few small tubercles	Nil	Nil	A few scars on surface
137	" " Scrapings from femur	5	6th	129	11	sub.	791	1,500	1,350	K 100	Cystic	Nil	One grey focus	Nil	Nil	Nil
	" " "	7	5th	110	12	sub.	778	2,200	2,100	K 100	Caseous	Caseous focus	A few translucent foci and slight marginal caseation	Nil	Nil	Nil
	" " "	7	5th	110	12	sub.	779	1,850	950	D 98	Caseous	Caseous foci	Partially replaced by caseous tissue	Nil	Nil	A few grey foci and pits on surface
	Rabbit 779 (lung)	8	2nd	21	14	sub.	76	1,840	2,070	K 100	Cystic	Caseous	A few translucent foci	Nil	Nil	One grey focus
	" " "	8	2nd	21	14	sub.	77	2,270	2,140	K 100	Cystic	Caseous focus	Several small tubercles	Nil	Nil	One small tubercle
139	Pus from knee	5	6th	150	12	sub.	784	1,990	1,800	K 100	Cystic	Caseous focus	Caseous patches on surface	Nil	Nil	Nil
	" " "	5	6th	150	12	sub.	785	1,440	1,420	D 99	Caseous ulcer	Nil	A few small tubercles	Nil	Nil	One minute tubercle
140	Synovial membrane of knee	7	6th	107	12	sub.	782	1,850	1,700	K 100	Caseous	Nil	A few caseous areas on surface	Nil	Nil	Nil
	" " "	7	6th	107	12	sub.	783	1,770	1,500	K 100	Cystic	Nil	A few small tubercles	Nil	Nil	Two caseous nodules
141	Synovial membrane of knee	11	7th	119	12	sub.	812	2,110	1,800	K 100	Cystic	Nil	A few small tubercles	Nil	Nil	Nil
142	" " Psosas abscess	11	7th	119	12	sub.	813	1,920	2,300	K 100	Cystic	Nil	A few small tubercles	Nil	Nil	Nil
	" " "	11	7th	157	13	sub.	820	1,700	1,700	K 100	Caseous	Cystic	Slight marginal caseation	Nil	Nil	Nil
	" " "	11	7th	157	13	sub.	821	1,770	1,700	K 100	Caseous	Cystic	One small tubercle	Nil	Nil	Nil
143	" " Pus from hip	11	8th	157	10	sub.	818	1,670	1,800	K 100	Caseous	Cystic	Slightly replaced by caseous tissue	Caseous foci	Nil	Nil

TABLE III. Rabbits inoculated with Viruses of "human" type—(continued).

No. of case	Source of Cultures	Details of Cultures				Dose (mg.)	Mode of Inoculation	No. of Rabbit	Weights of Rabbits in grammes		Duration of Experiment (days)	Local lesion	Local glands	Post-mortem Results			
		Age of subculture in days	Generation	Total duration of culture in days	Days of infection				Lungs	Bronchial glands				Spleen	Kidneys		
143	Pus from hip	11	8th	157	10	sub.	819	Initial 1,790	Final 2,100	K 100	Cystic	Cystic	Translucent foci on surface and slight marginal caseation	Caseous focus	Nil	Nil	One grey focus
144	Scraping from shoulder joint	11	9th	192	12	sub.	859	1,960	2,000	K 100	Caseous	Nil	A few minute tubercles	Nil	Nil	Nil	Nil
145	Pus from knee	11	9th	192	12	sub.	860	1,980	2,190	K 100	Caseous	Nil	One small marginal tubercle	Nil	Nil	Nil	Nil
	"	12	7th	162	15	sub.	841	1,950	2,100	K 100	Cystic	Nil	A few translucent foci	Nil	Nil	Nil	Nil
	"	13	10th	191	10	sub.	863	2,070	2,100	K 100	Caseous	Nil	A few small tubercles	Nil	Nil	Nil	One grey tubercle
	"	13	10th	191	10	sub.	864	2,850	2,220	K 100	Cystic	Nil	Several flat tubercles on surface	Nil	Nil	Nil	Two small nodules
146	Psoas abscess	9	9th	195	10	sub.	867	1,750	1,800	K 100	Caseous	Nil	A few translucent foci	Nil	Nil	Nil	Nil
	"	9	9th	195	10	sub.	868	1,800	1,900	K 100	Cystic	Nil	Slight marginal caseation	Nil	Nil	Nil	One tubercle
147	Subcutaneous abscess	12	7th	159	11	sub.	832	1,720	2,020	K 100	Cystic	Nil	Small caseous patches on surface	Nil	Nil	Nil	One small tubercle
	"	12	7th	159	11	sub.	833	1,700	2,020	K 100	Cystic	Nil	Thin caseous layer on surface	Nil	Nil	Nil	One minute focus
148	Scrapings from rib	12	5th	126	10	sub.	836	1,920	2,000	K 100	Cystic	Nil	Discrete tubercles on surface	Nil	Nil	Nil	Three small tubercles
	"	12	5th	126	10	sub.	837	2,290	2,420	K 100	Cystic	Nil	Translucent foci and slight marginal caseation	Nil	Nil	Nil	Nil
150	Gland from groin	12	7th	154	12	sub.	838	1,890	1,850	K 100	Cystic	Nil	Semi-confluent tubercles on surface	Nil	Nil	Nil	One scar on surface
	"	12	7th	154	12	sub.	839	2,970	2,450	K 100	Cystic	Nil	Caseous patches on surface	Nil	Nil	Nil	One grey tubercle
151	Pus from spine	8	—	115	12	sub.	844	2,170	2,400	K 100	Cystic	Nil	A few grey tubercles	Nil	Nil	Nil	Nil
	"	8	—	115	12	sub.	845	2,200	2,000	K 100	Cystic	Nil	Grey foci on surface and slight marginal caseation	Nil	Nil	Nil	A few grey foci
152	Lumbar abscess	5	7th	152	11	sub.	842	1,870	2,100	K 100	Cystic	Nil	A few small tubercles	Nil	Nil	Nil	Nil
	"	5	7th	152	11	sub.	843	1,620	1,070	D 65	Caseous ulcer	Nil	A few small nodules	Nil	Nil	Nil	Nil
153	Pus from hip	11	10th	179	13	sub.	855	2,970	2,850	K 100	Caseous	Caseous	A few grey foci	Nil	Nil	Nil	Nil
	"	11	10th	179	13	sub.	856	2,220	2,150	K 100	Caseous	Caseous	A few grey foci	Nil	Nil	Nil	Nil
154	Abscess of thigh	7	7th	150	10	sub.	830	2,020	1,220	K 100	Caseous	Cystic	Minute tubercles	Nil	Nil	Nil	A few small tubercles
	"	7	7th	150	10	sub.	831	1,770	1,900	K 100	Caseous	Cystic	A few minute tubercles	Nil	Nil	Nil	Nil

156	Pus from hip	9	6th	181	12	sub.	871	1,670	1,870	K 100	Caseous	Nil	Small caseous areas on surface	Nil	Nil	Nil
	"	9	6th	181	12	sub.	872	1,990	1,530	K 100	Caseous	Nil	Thin caseous patches on surface	Nil	Nil	One small tubercle
157	Psoas abscess	9	9th	181	12	sub.	873	1,940	2,020	K 100	Cystic	Cystic	Slight marginal caseation and a few grey tubercles on surface	Nil	Nil	One small tubercle
	"	9	9th	181	12	sub.	874	2,200	2,220	K 100	Cystic	Nil	Marginal caseation and grey patches on surface	Nil	Nil	One grey focus
158	Psoas abscess	8	7th	148	12	sub.	846	2,650	1,750	K 100	Caseous	Nil	A few translucent foci	Nil	Nil	Nil
	"	8	7th	148	12	sub.	847	1,470	1,570	K 100	Caseous	Nil	Nil	Nil	Nil	Nil
159	Pus from knee	7	6th	147	13	sub.	834	1,890	1,950	K 100	Cystic	Nil	One translucent tubercle	Nil	Nil	One grey focus
	"	7	6th	147	13	sub.	835	2,170	2,550	K 100	Cystic	Nil	A few translucent foci	Nil	Nil	Nil
161	Pus from hip	13	7th	175	12	sub.	865	1,500	1,920	K 100	Cystic	Nil	A few flat tubercles on surface	Nil	Nil	Nil
	"	13	7th	175	12	sub.	866	1,500	1,670	K 100	Caseous	Nil	A few small tubercles	Nil	Nil	Nil
162	Psoas abscess	9	8th	178	12	sub.	869	1,770	1,970	K 100	Caseous	Nil	A few discrete tubercles	Nil	Nil	Nil
	"	9	8th	178	12	sub.	870	2,070	1,900	K 100	Cystic	Nil	A few small caseous patches	Caseous	Nil	Four small tubercles
163	Pus from ankle	11	7th	168	10	sub.	857	2,150	2,050	K 100	Caseous	Cystic	A few small yellow tubercles	Nil	Nil	Nil
	"	11	7th	168	10	sub.	858	1,980	2,200	K 100	Cystic	Caseous	A few greyish tubercles	Nil	Nil	One grey focus
164	Pus from knee	13	8th	167	12	sub.	861	1,850	2,120	K 100	Cystic	Nil	Several small tubercles	Nil	Nil	Nil
	"	13	8th	167	12	sub.	862	1,650	920	D 62	Cystic	Caseous	A few yellow tubercles	Nil	Nil	Nil
165	Abscess in thigh	5	8th	205	16	sub.	919	1,950	2,020	K 103	Cystic	Caseous	Caseous patches on surface and at margins	Nil	Nil	Two depressed tubercles
	"	5	8th	205	16	sub.	920	1,750	2,020	K 103	Caseous	Caseous	A few small tubercles	Nil	Nil	Two small tubercles
166	Psoas abscess	6	8th	176	15	sub.	923	2,170	2,450	K 103	Caseous	Nil	A few tubercles and slight marginal caseation	Nil	Nil	Nil
	"	6	8th	176	15	sub.	924	1,950	2,000	K 103	Caseous	Nil	A few tubercles and slight marginal caseation	Nil	Nil	Nil
167	Scrapings from elbow	6	6th	170	13	sub.	925	1,870	2,000	K 103	Cystic	Caseous	Small tubercles on surface	Nil	Nil	Two tubercles
	"	6	6th	170	13	sub.	926	2,320	2,020	K 103	Caseous	Caseous	Small caseous areas on surface	Caseous	Nil	Minute pits on surface
168	Psoas abscess	6	10th	176	15	sub.	951	2,280	1,650	K 100	Caseous	Caseous	One translucent focus	Caseous	Nil	Nil
	"	6	10th	176	15	sub.	952	1,910	2,150	K 100	Cystic	Nil	One small tubercle	Nil	Nil	Nil
169	Pus from knee	6	9th	204	12	sub.	941	1,770	2,000	K 103	Caseous	Caseous	A few translucent tubercles on surface	Caseous	Nil	Nil

TABLE III. Rabbits inoculated with Viruses of "human" type—(continued).

No. of case	Source of Cultures	Details of Cultures				Dose (mg.)	Mode of Inoculation	No. of Rabbit	Weights of Rabbits in grammes		Duration of Experiment (days)	Local Lesion		Post-mortem Results		
		Age of subculture in days	Generation	Total of all cultures	Final				Local glands	Lungs		Bronchial glands	Spleen	Kidneys		
169	Pus from knee	6	9th	204	12	sub.	942	1,950	1,420	D 102	Cystic	Caseous	Almost completely replaced by caseous tissue	Nil	Nil	A few minute tubercles
	Rabbit 942 (lung)	8	4th	73	12	sub.	137	2,280	1,850	K 101	Cystic	Caseous	Numerous discrete caseous tubercles	Nil	Nil	A few small tubercles
	"	8	4th	73	12	sub.	138	1,970	1,300	D 57	Caseous	Nil	Small caseous tubercles on surface	Nil	Nil	Nil
170	Pus from knee	4	9th	204	12	sub.	939	1,750	1,900	K 103	Cystic	Cystic	Some small tubercles on surface	Nil	Nil	Nil
	"	4	9th	204	12	sub.	940	1,470	1,470	K 103	Caseous	Caseous focus	A few translucent foci on surface	Nil	Nil	Nil
171	Tissue from hip	11	6th	185	12	sub.	11	1,550	2,000	K 101	Caseous	Nil	A few translucent foci	Nil	Nil	Two tubercles
	"	11	6th	185	12	sub.	12	2,020	2,150	K 101	Cystic	Nil	Scattered grey tubercles on surface	Nil	Nil	Pus in pelvis of one
172	Bone from elbow	6	8th	202	15	sub.	921	2,470	2,400	K 103	Caseous	Nil	A few caseous tubercles	Nil	One minute tubercle	Nil
	"	6	8th	202	15	sub.	922	1,850	2,050	K 103	Cystic	Nil	Minute tubercles on surface and slight marginal caseation	Nil	Nil	Nil
173	Lumbar abscess	4	11th	203	12	sub.	937	1,740	1,820	K 103	Cystic	Nil	A few minute tubercles	Nil	Nil	Nil
	"	4	11th	203	12	sub.	938	1,770	1,670	K 103	Caseous	Nil	A few small tubercles	Nil	Nil	Nil
176	Tissue from knee	6	4th	176	13	sub.	945	2,220	1,420	K 100	Caseous	Caseous focus	Several tubercles on surface	Nil	Nil	Nil
	"	6	4th	176	13	sub.	946	2,450	2,570	K 100	ulcer	Nil	Small tubercles on surface	Nil	Nil	Nil
177	Abscess in arm	6	7th	176	16	sub.	949	1,850	1,800	K 100	Caseous	Nil	Almost completely replaced by caseous tissue	Nil	Nil	Nil
	"	6	7th	176	16	sub.	950	1,900	2,020	K 100	Cystic	Nil	A few small tubercles on surface	Nil	Nil	Nil
178	Pus from hip sinus	8	7th	184	13	sub.	995	1,940	2,100	K 102	Caseous	Nil	A few small tubercles	Nil	Nil	Nil
	"	8	7th	184	13	sub.	996	2,650	2,420	K 102	Cystic	Nil	Two small tubercles	Nil	Nil	One grey focus
179	Pus from hip	10	9th	211	15	sub.	985	1,870	2,170	K 100	Caseous	Nil	Slight marginal caseation	Nil	Nil	Nil
	"	10	9th	211	15	sub.	986	1,670	1,770	K 100	Cystic	Nil	A few translucent foci and slight marginal caseation	Nil	Nil	Nil

180	Pus from hip	5	7th	97	10	sub.	728	1,890	1,900	K 100	Cystic	Caseous	A few small tubercles	Nil	Nil	Nil
	"	5	7th	97	10	sub.	729	1,570	1,650	K 100	Cystic	Nil	One nodule and two tubercles	Nil	Nil	Nil
181	Tissue from hip	7	8th	161	12	sub.	965	1,400	1,020	K 100	Caseous	Caseous	Partial caseation of surface	Caseous	Nil	Pus in pelvis of one
	"	7	8th	161	12	sub.	966	1,620	1,370	D 66	Caseous ulcer	Caseous focus	A few small tubercles	Nil	Nil	A few small tubercles
	"	7	9th	235	14	sub.	121	2,500	2,400	K 100	Cystic	Nil	Extensive superficial caseation	Nil	Nil	A few small tubercles
	"	7	9th	235	14	sub.	122	2,020	2,150	K 100	Cystic	Cystic	Small discrete tubercles on surface	Nil	Nil	A few small tubercles
182	Dressing from knee	6	8th	159	14	sub.	947	2,200	2,120	K 100	Cystic	Nil	Several tubercles on surface	Nil	Nil	One small tubercle
	"	6	8th	159	14	sub.	948	1,900	2,170	K 100	Cystic	Nil	Small tubercles on surface	Nil	Nil	One tubercle
184	Dressing from hip	6	5th	161	15	sub.	953	2,250	2,050	K 100	Caseous ulcer	Nil	Extensive superficial caseation	Caseous focus	Nil	Three small tubercles
	"	6	5th	161	15	sub.	954	1,120	1,800	K 100	Cystic	Nil	Caseous patches and discrete tubercles on surface	Nil	Nil	Nil
185	Dressing from knee	8	10th	176	12	sub.	997	1,570	1,870	K 102	Caseous	Nil	Surface partially replaced by network of caseous tissue	Nil	Nil	One small tubercle
	"	8	10th	176	12	sub.	998	1,690	1,800	K 102	Caseous ulcer	Caseous foci	A few small tubercles	Nil	Nil	Two small tubercles
186	Dressing from lumbar sinus	5	3rd	161	12	sub.	958	2,100	2,290	K 100	Cystic	Nil	Grey foci on surface and slight marginal caseation	Nil	Nil	Nil
	"	10	5th	189	14	sub.	78	2,020	1,920	K 100	Cystic	Nil	Discrete tubercles and patches on surface	Nil	Nil	Nil
187	Dressing from hip	5	8th	172	16	sub.	9	1,550	1,720	K 101	Caseous	Nil	A few small tubercles	Nil	Nil	Nil
	"	5	8th	172	16	sub.	10	1,870	2,070	K 101	Caseous	Nil	A few small tubercles	Nil	Nil	Nil
188	Dressing from dorsol sinus	5	7th	160	14	sub.	961	1,820	2,050	K 100	Caseous ulcer	Cystic	Two minute foci	Nil	Nil	Nil
	"	5	7th	160	14	sub.	962	1,800	1,920	K 100	Cystic	Nil	Extensive superficial caseation	Nil	Nil	A few small tubercles
189	Dressing from hip	10	5th	80	10	sub.	810	1,780	2,300	K 100	Cystic	Nil	A few translucent foci and slight caseation of margins	Nil	Nil	Nil
	"	10	5th	80	10	sub.	811	1,760	1,700	K 100	Cystic	Nil	A few small tubercles	Nil	Nil	Nil
190	Dressing from hip	5	7th	172	11	sub.	959	1,880	1,300	D 87	Opaque foci	Caseous foci	A few tubercles	Nil	Nil	Nil
	"	5	7th	172	11	sub.	960	1,750	1,620	K 100	Caseous	Nil	Grey foci on surface and slight marginal caseation	Nil	Nil	One small tubercle
191	Dressing from hip	5	6th	167	11	sub.	13	2,040	2,350	K 101	Cystic	Nil	A few small tubercles	Nil	Nil	Nil
	"	5	6th	167	11	sub.	14	1,550	1,650	K 101	Caseous ulcer	Caseous foci	A few small tubercles	Nil	Nil	Nil



TABLE III. Rabbits inoculated with Viruses of "human" type—(continued).

No. of case	Source of Cultures	Details of Cultures				Dose (mg.)	Mode of inoculation	No. of Rabbit	Weights of Rabbits in grammes		Duration of Experiment (days)	Post-mortem Results				
		Age of sub-culture in days	Generation	Total duration of culture in days	Initial				Final	Local lesion		Local glands	Lungs	Bronchial glands	Spleen	Kidneys
195	Psoas abscess	11	5th	170	15	sub.	19	2,190	2,170	K 100	Caseous	Caseous foci	A few caseous tubercles	Nil	Nil	Two minute foci
196	"	11	5th	170	15	sub.	20	1,890	2,120	K 100	Caseous	Nil	One small tubercle	Nil	Nil	Nil
	"	11	8th	212	15	sub.	23	1,900	2,020	K 100	Caseous	Nil	A few small tubercles	Nil	Nil	Nil
	"	11	8th	212	15	sub.	24	1,800	1,920	K 100	Caseous	Caseous foci	Numerous small tubercles on surface	Nil	Nil	Nil
199	Psoas abscess	10	9th	179	13	sub.	62	2,200	2,190	K 101	Caseous	Cystic	Extensively replaced by caseous tissue	Nil	Nil	A few small tubercles
"	"	10	9th	179	13	sub.	63	1,850	2,000	K 101	Caseous	Caseous focus	Small tubercles	Nil	Nil	One small tubercle
Rabbit 62 (kidney)		8	3rd	57	20	sub.	143	2,300	2,050	D 62	Cystic	Nil	A few small tubercles on surface	Nil	Nil	Nil
Rabbit 63 (kidney)		8	3rd	57	15	sub.	144	2,400	2,370	K 100	Caseous	Nil	Soft caseous nodules	Nil	Nil	A few tubercles
200	Scraping from hip	11	7th	179	14	sub.	982	1,700	1,850	K 101	Cystic	Nil	Discrete tubercles on surface	Nil	Nil	Nil
	"	16	9th	214	14	sub.	102	2,550	2,800	K 103	Cystic	Nil	A few small grey tubercles on surface	Nil	Nil	A few scars on surface
201	Pus from hip	5	9th	177	13	sub.	955	2,020	1,200	D 76	Caseous	Caseous	Partially replaced by caseous tissue	Nil	Nil	Two minute tubercles
"	"	5	9th	177	13	sub.	956	2,100	2,250	K 100	Cystic	Caseous	Nil	Nil	Nil	Nil
"	"	4	12th	272	16	sub.	125	2,250	2,420	K 101	Cystic	Nil	Slight marginal caseation	Nil	Nil	A few small tubercles
"	"	4	12th	272	16	sub.	126	1,720	1,450	K 101	Cystic	Nil	Several grey tubercles on surface	Caseous foci	Nil	Small scars on surface
202	Tissue from ankle	11	6th	161	15	sub.	973	1,690	1,900	K 100	Caseous	Cystic	Nil	Nil	Nil	Nil
	"	11	6th	161	15	sub.	974	1,390	1,690	K 100	Cystic	Caseous	Very slight marginal caseation	Nil	Nil	Nil
203	Pus from spine	11	7th	175	11	sub.	977	2,140	2,300	K 101	Cystic	Caseous foci	Extensively replaced by caseous tissue on surface	Nil	Nil	Several small tubercles, some projecting on surface
"	"	11	7th	175	11	sub.	978	1,800	1,920	K 101	Caseous	Nil	Small tubercles on surface	Nil	Nil	Nil



204	Pus from knee	5	11th	202	13	sub.	15	1,890	2,070	K 101	Cystic	Caseous foci	Numerous small tubercles on surface	Nil	Nil	One tubercle
207	"	5	11th	202	13	sub.	16	1,260	1,720	K 101	Cystic	Caseous	A few small tubercles	Nil	Nil	Nil
	"	11	8th	196	14	sub.	971	2,370	1,840	K 100	Cystic	Nil	Grey tubercles on surface	Nil	Nil	Nil
	"	11	8th	196	14	sub.	972	1,740	1,940	K 100	Cystic	Nil	Superficial tubercles	Nil	Nil	Two small tubercles
208	Bone from knee	11	8th	175	11	sub.	17	2,300	2,350	K 100	Cystic	Nil	Discrete nodules on surface	Nil	Nil	Two small tubercles
	"	11	8th	175	11	sub.	18	2,170	2,140	K 100	Cystic	Caseous focus	Small grey tubercles on surface	Nil	Nil	Two small tubercles
209	"	5	8th	266	17	sub.	185	1,940	1,950	K 100	Caseous	Nil	Caseous patches on surface and a few nodules in substance	Nil	Nil	Scars on surface and small tubercles
	"	5	8th	266	17	sub.	186	1,960	1,950	K 100	Caseous ulcer	Caseous	A few small tubercles on surface	One caseous	Nil	Nil
210	Pus from elbow	11	8th	193	14	sub.	983	1,990	1,950	K 101	Caseous	Nil	Caseous tubercles on surface	Nil	Two tubercles	One tubercle.
	"	11	8th	193	14	sub.	984	1,790	1,870	K 101	Caseous	Caseous	A few grey foci and one caseous nodule	Caseous	Nil	Nil
211	Pus from hip	11	8th	189	14	sub.	975	1,820	2,000	K 100	Cystic	Nil	A few tubercles on surface	Caseous	Nil	One tubercle
	"	11	8th	189	14	sub.	976	1,490	1,320	K 100	Caseous	Caseous	A few translucent foci	Nil	Nil	Nil
212	Tissue from knee	11	6th	155	15	sub.	967	1,700	1,970	K 100	Caseous	Caseous	One translucent tubercle	Nil	Nil	Nil
	"	11	6th	155	15	sub.	968	2,370	2,450	K 100	Cystic	Cystic	Small tubercles on surface	Caseous	Nil	A few tubercles
213	Pus from ilium	11	8th	188	14	sub.	979	2,650	2,270	K 101	Cystic	Cystic	Thin caseous layer on about half of surface	Nil	Nil	Two tubercles
	"	11	8th	188	14	sub.	980	2,090	2,220	K 101	Caseous	Nil	A few small caseous foci	Nil	Nil	Nil
216	Peritoneal gland	7	7th	166	15	sub.	7	1,990	2,020	K 101	Caseous	Nil	A few translucent foci	Nil	Nil	One grey focus
	"	7	7th	166	15	sub.	8	1,740	1,670	K 101	Caseous	Nil	A few small tubercles	Nil	Nil	Nil
217	Dressing from tarsus	7	6th	146	14	sub.	993	2,350	2,340	K 102	Caseous	Nil	A few small tubercles on surface	Nil	Nil	Two depressed tubercles
	"	6	7th	223	14	sub.	109	2,020	2,350	K 101	Cystic	Cystic	Some small tubercles	Nil	One minute tubercle	A few grey foci
218	Pus from knee	7	7th	183	11	sub.	999	1,690	1,650	K 102	Caseous	Nil	Three grey foci	Nil	Nil	Nil
	"	7	7th	183	11	sub.	1	1,970	2,250	K 102	Caseous	Nil	A few tubercles	Nil	Nil	One tubercle
219	Psoas abscess	11	6th	181	14	sub.	970	1,700	1,820	K 100	Caseous ulcer	Nil	Surface of lungs partially replaced by caseous tissue	Nil	Nil	One small tubercle
	"	6	7th	280	15	sub.	116	2,170	2,420	K 100	Caseous	Caseous	Discrete tubercles on surface	Nil	Nil	Nil
221	Pus from knee	8	6th	177	14	sub.	987	1,940	2,000	K 100	Cystic	Nil	Extensively replaced by caseous tissue	Nil	Nil	Nil
	"	8	6th	177	14	sub.	987	1,940	2,000	K 100	Cystic	Nil	Extensively replaced by caseous tissue	Nil	Nil	Nil

TABLE III. Rabbits inoculated with Viruses of "human" type—(continued).

No. of case	Source of Cultures	Details of Cultures				Age of sub culture in days	Generation	Total duration of incubation in days	Dose (mg.)	Mode of inoculation	No. of Rabbit	Weights of Rabbits in grammes		Duration of Experiment (days)	Post-mortem Results			
		Initial	Final	Local lesion	Local glands							Lungs	Bronchial glands		Spleen	Kidneys		
221	Pus from knee	8	6th	177	14	sub.	988	1,690	1,870	K 100	Cystic	Nil	Small tubercles on surface	Nil	Nil	Three small tubercles		
224	Abscess of hip	7	8th	181	11	sub.	25	2,200	2,170	K 100	Caseous	Nil	A few translucent foci	Nil	Nil	Nil		
	"	7	8th	181	11	sub.	26	2,250	2,420	K 100	Cystic	Cystic	Semi-confluent tubercles on surface and at margins	Nil	Nil	Several tubercles, some projecting, and scars on surface		
225	Bone from hand	7	6th	144	13	sub.	29	2,370	2,340	K 100	Cystic	Nil	Several tubercles on surface	Nil	Nil	Pits on surface		
	"	7	6th	144	13	sub.	30	1,800	1,790	K 100	Cystic	Nil	Surface and margins partially caseous	Nil	Nil	A few minute tubercles		
226	Tissue from knee	7	7th	164	11	sub.	21	1,820	1,850	K 100	Caseous	Nil	Extensive superficial caseation	Nil	Nil	One minute focus		
	"	7	7th	164	11	sub.	22	2,020	2,100	K 100	Caseous	Nil	A few tubercles	Nil	Nil	One small tubercle		
227	Pus from hip	8	10th	186	15	sub.	51	2,100	2,300	K 100	Caseous	Nil	A few small tubercles	Nil	Nil	Nil		
	"	8	10th	186	15	sub.	52	2,070	2,250	K 100	Cystic	Nil	Several small tubercles	Nil	Nil	Nil		
228	Pus from hip	10	6th	173	11	sub.	991	2,100	2,120	K 102	Cystic	Cystic	Small grey tubercles on surface	Nil	Nil	Two small tubercles		
	"	8	9th	163	15	sub.	45	1,920	2,320	K 100	Caseous	Nil	A few tubercles on surface	Nil	Nil	Nil		
	"	8	9th	163	15	sub.	46	1,900	2,070	K 100	Caseous	Nil	A few small tubercles on surface	Nil	Nil	Nil		
230	Psoas abscess	8	7th	178	14	sub.	39	2,300	2,550	K 100	Cystic	Caseous focus	A few small tubercles on surface	Nil	Nil	Two small tubercles		
	"	8	7th	178	14	sub.	40	1,800	1,950	K 100	Caseous	Nil	Numerous small tubercles on surface	Nil	Nil	Nil		
231	Psoas abscess	8	9th	177	15	sub.	35	1,990	2,400	K 100	Cystic	Nil	Two translucent foci	Nil	Nil	Nil		
	"	8	9th	177	15	sub.	36	1,770	2,020	K 100	Cystic	Cystic	A few translucent foci	Nil	Nil	Nil		
232	Pus from hip	14	9th	186	13	sub.	47	1,940	2,000	K 100	Caseous	Nil	Slight marginal caseation	Nil	Nil	Two small tubercles		
	"	14	9th	186	13	sub.	48	2,300	2,350	K 100	Cystic	Nil	Nil	Nil	Nil	Nil		
233	Psoas abscess	7	6th	146	13	sub.	2	1,650	1,820	K 102	Cystic	Nil	One caseous nodule and a few translucent foci	Nil	Nil	Nil		

233	Psoas abscess	7	6th	146	12	sub.	3	1,470	1,950	K 102	Caseous	Caseous focus	Nil	Nil	Nil	Nil
237	Pus from hip	14	6th	173	15	sub.	41	1,770	1,950	K 100	Caseous	Nil	Small caseous patches on surface	Nil	Nil	One minute focus
	"	14	6th	173	15	sub.	42	1,770	1,620	K 100	Caseous ulcer	Nil	A few small tubercles	Nil	Nil	Nil
238	Psoas abscess	14	8th	170	12	sub.	43	2,520	2,370	K 100	Cystic	Nil	Small grey tubercles on surface	Nil	Nil	Nil
	"	14	8th	170	12	sub.	44	2,680	2,900	K 100	Cystic	Nil	Small grey tubercles on surface	Nil	Nil	Nil
239	Bone from scapula	14	6th	139	12	sub.	50	1,920	2,050	K 101	Cystic	Nil	A few small translucent tubercles	Nil	Nil	Nil
	"	15	6th	140	12	sub.	53	1,870	1,900	K 100	Caseous	Caseous focus	Two translucent tubercles	Nil	Nil	Nil
240	Psoas abscess	8	8th	163	11	sub.	37	2,490	1,920	K 100	Caseous	Caseous	Thin caseous layer on two-thirds of surface	Nil	Nil	A few tubercles
	"	8	8th	163	11	sub.	38	2,170	2,340	K 100	Cystic	Caseous focus	Small grey tubercles numerous on surface	Nil	Nil	Several tubercles
241	Pus from knee	7	7th	178	12	sub.	81	1,140	2,170	K 101	Caseous	Nil	A few tubercles	Nil	Nil	One tubercle
	"	7	7th	178	12	sub.	82	1,570	2,020	K 101	Caseous	Cystic	A few small tubercles	Nil	Nil	Nil
243	Fluid from knee	6	7th	149	11	sub.	66	2,400	2,370	K 100	Caseous	Nil	Extensive superficial caseation	Nil	Nil	Nil
	"	6	7th	149	11	sub.	67	1,720	1,880	K 100	Caseous	Nil	Extensive superficial caseation	Nil	Nil	One tubercle
244	Scrapings from hip	7	6th	97	15	sub.	935	1,620	1,850	K 103	Cystic	Caseous foci	A few small tubercles	Nil	Nil	Nil
	"	7	6th	97	15	sub.	936	2,190	2,200	K 103	Caseous	Nil	Some grey tubercles on surface	Nil	Nil	Nil
246	Pus from hip	6	5th	70	11	sub.	915	1,850	1,590	D 93	Caseous	Caseous focus	Enlarged and replaced by caseous tissue	Caseous focus	Nil	Nil
	"	6	5th	70	11	sub.	916	2,120	1,790	D 84	Cystic	Caseous focus	Extensively replaced by caseous tissue	Nil	Nil	One small tubercle
	"	4	10th	157	15	sub.	131	1,870	1,800	K 101	Caseous	Caseous	A few small tubercles	Nil	Nil	One scar on surface
	"	4	10th	157	15	sub.	132	2,670	2,400	K 101	Caseous	Caseous	Small caseous tubercles	Nil	Nil	A few small tubercles
Rabbit 916 (lung)		4	3rd	32	10	sub.	129	1,640	2,050	K 101	Cystic	Nil	A few small tubercles	Nil	Nil	One scar on surface
"		4	3rd	32	1	i.v.	130	1,670	1,540	K 101	—	—	Almost completely replaced by caseous tissue	Nil	Nil	Protecting tubercles on surface

TABLE III. Rabbits inoculated with Viruses of "human" type—(concluded).

No. of case	Source of Cultures	Details of Cultures				Mode of Inoculation	No. of Rabbit	Weights of Rabbits in grammes		Duration of Experiment (days)	Post-mortem Results					
		Age of subculture in days	Generation	Total duration of culture in days	Dose (mg.)			Initial	Final		Local lesion	Local glands	Lungs	Bronchial glands	Spleen	Kidneys
246	Rabbit 130 (kidney)	7	4th	53	20	sub.	175	1,770	2,070	K 124	Caseous focus	Nil	Discrete tubercles on surface and a few in substance	Nil	Nil	Nil
	"	7	4th	53	20	sub.	176	1,670	1,500	K 124	Cystic focus	Caseous focus	A few small tubercles on surface	Nil	Nil	Nil
247	Psoas abscess	7	5th	124	12	sub.	54	2,250	2,400	K 101	Cystic	Nil	A few translucent tubercles	Nil	Nil	One tubercle
	"	7	5th	124	12	sub.	55	1,800	1,670	D 73	Cystic	Nil	A few superficial tubercles	Nil	Nil	Nil
248	Abscess of spine	6	6th	173	12	sub.	70	1,770	2,050	K 100	Caseous	Cystic	A few translucent foci	Nil	Nil	One grey focus
	"	6	6th	173	12	sub.	71	1,670	1,790	K 100	Cystic	Nil	A few grey tubercles	Nil	Nil	One minute focus
249	Dressing from lumbar sinus	6	6th	140	12	sub.	91	2,150	2,120	K 104	Caseous	Caseous	A few grey tubercles	Nil	Nil	One grey focus
	"	6	6th	140	12	sub.	92	2,350	2,050	K 104	Caseous	Caseous	A few grey areas on surface and at margins	Nil	Nil	A few small tubercles
251	Bone from ankle	17	5th	128	15	sub.	33	2,470	2,500	K 100	Cystic	Cystic	Nil	Nil	Nil	Nil
	"	17	5th	128	15	sub.	34	2,170	2,150	K 100	Caseous	Nil	Nil	Nil	Nil	Pus in pelves of both kidneys
252	Psoas abscess	10	5th	132	13	sub.	68	1,800	1,950	K 100	Cystic	Nil	A few grey tubercles	Nil	Nil	Nil
	"	10	5th	132	13	sub.	69	2,080	1,950	K 100	Caseous	Cystic	Small grey tubercles on surface	Caseous foci	One small tubercle	One scar and one grey focus on surface
253	Pus from sternum	7	8th	162	12	sub.	58	2,200	2,200	K 101	Cystic	Cystic	Small grey tubercles on surface	Nil	Nil	One grey tubercle
	"	7	8th	162	12	sub.	59	1,750	1,900	K 101	Caseous	Caseous	Partially replaced by caseous tissue	Nil	Nil	Nil
254	Bone from spine	6	7th	119	13	sub.	72	2,020	2,090	K 100	Cystic	Cystic	A few translucent foci	Nil	Nil	Nil
	"	6	7th	119	13	sub.	73	2,240	2,440	K 100	Cystic	Cystic	A few grey tubercles	Caseous focus	Nil	Nil
256	Fluid from knee	5	10th	177	14	sub.	96	2,100	2,200	K 103	Cystic	Nil	A few small tubercles on surface	Nil	Nil	A few small tubercles
	"	5	10th	177	14	sub.	97	2,000	2,270	K 103	Cystic	Nil	A few small tubercles on surface	Nil	Nil	A few scars on surface

257	Metatarsal bone	6	5th	120	12	sub.	87	2,350	2,420	K 104	Caseous	Caseous	A few yellow nodules and grey tubercles	Nil	Nil	Nil
	"	6	5th	120	12	sub.	88	2,700	1,800	K 104	Caseous ulcer	Nil	Thin caseous layer on parts of surface	Nil	Nil	Two scars on surface
259	Pus from hip	7	8th	160	15	sub.	79	1,520	1,900	K 101	Caseous ulcer	Caseous	Nil	Nil	Nil	Nil
	"	7	8th	160	15	sub.	80	1,500	1,800	K 101	Cystic	Cystic	A few translucent foci	Nil	Nil	Nil
260	Pus from spine	17	5th	140	15	sub.	31	2,270	2,350	K 100	Cystic	Nil	A few translucent foci and very slight marginal caseation	Nil	Nil	A few minute foci
	"	17	5th	140	15	sub.	32	2,190	2,100	K 100	Caseous	Cystic	Small grey tubercles numerous on surface	Nil	Nil	A few small tubercles
261	Pus from hip	9	8th	97	14	sub.	27	2,020	2,150	K 100	Caseous	Nil	A few small translucent areas on surface	Nil	Nil	Nil
	"	9	8th	97	14	sub.	28	2,400	2,100	K 100	Caseous ulcer	Nil	A few translucent foci	Nil	Nil	Nil
263	Tarsal bone	10	6th	128	15	sub.	989	2,340	2,620	K 100	Caseous	Caseous focus	A few small tubercles	Caseous	Nil	Nil
	"	10	6th	128	15	sub.	990	1,990	1,820	K 100	Cystic	Nil	Scattered tubercles on surface	Nil	Nil	One tubercle
264	Tissue from ear	6	9th	104	13	sub.	64	2,770	2,740	K 100	Caseous	Cystic	Nil	Nil	Nil	Nil
	"	6	9th	104	13	sub.	65	2,070	2,250	K 100	Caseous	Caseous focus	Two small tubercles	Nil	Nil	Nil
265	Tissue from rib	7	8th	147	15	sub.	83	1,800	1,940	K 101	Caseous	Nil	Small tubercles on surface and slight marginal caseation	Nil	Nil	Nil
	"	7	8th	147	15	sub.	84	1,850	1,770	K 101	Cystic	Cystic	Several grey tubercles on surface	Nil	Nil	Nil
266	Pus from hip	7	7th	139	10	sub.	60	2,220	2,400	K 101	Caseous	Caseous focus	Partial superficial caseation	Nil	Nil	Numerous scars on surface
	"	7	7th	139	10	sub.	61	1,800	2,070	K 101	Caseous	Caseous focus	Partially replaced by caseous tissue	Nil	Nil	Nil

days after subcutaneous inoculation with virus 21, showed generalised peritoneal tuberculosis, complete tuberculous solidification of the lungs, and advanced renal tuberculosis of bovine type. A culture from the kidney was dysgonic. As will be seen from the table, the companion rabbit, 618, developed only slight disease. The second and third rabbits showed advanced, generalised tuberculosis of intestinal origin. The former died 62 days after subcutaneous inoculation with virus 132, and yielded a dysgonic culture; the latter was killed 104 days after subcutaneous inoculation with virus 164. In both cases the companion animals, recorded in the table, showed only slight disease.

#### CHARACTERISTICS OF THE TUBERCLE BACILLI OF BOVINE TYPE.

##### *Cultures.*

The tubercle bacilli in this group were identical with bacilli of bovine origin in their growth on glycerinated media. The majority of the viruses were markedly dysgonic, in the usually accepted sense of that term. Whilst a few others yielded better growths, none grew so profusely as the "human" strains.

##### *Virulence for Experimental Animals.*

All the viruses were highly virulent for guinea-pigs and produced typical generalised tuberculosis in these animals.

Each virus was inoculated subcutaneously into at least two rabbits, in a dose of 10 mg. of culture (see Table IV, pp. 296-300). When both animals died in less than 100 days from typical generalised tuberculosis, we considered that the bovine type of the virus was definitely established. This was the case with 43 out of the 55 viruses. The remaining 12 called for some further investigation.

With regard to these 12, it will be observed from the table that, in every instance, (1) one rabbit (or more) died in less than 100 days with typical generalised tuberculosis of organs and lymphatic glands, but (2) one or more companion rabbits inoculated with culture of the same virus showed somewhat less severe infection. Cultures recovered after a single passage through a rabbit usually proved to have regained full virulence when tested in another series of rabbits. Whilst recognising that these differences in the results of inoculation may be attributed to variations in susceptibility of the rabbits, it must be

pointed out that similar differences rarely occur in rabbits inoculated with the same quantity of bacilli derived from the ox.

These experiments therefore show that the twelve viruses in question were appreciably, though only slightly, below the standard of "bovine" virulence for the rabbit. The age of the patients from which these viruses were derived ranged from 5 to 22 years and averaged 9.9 years. The age of the patients from which the 43 fully virulent viruses were obtained varied from two months to 17 years and averaged 6.2 years.

Four rabbits are omitted from Table IV. They all died prematurely from intercurrent disease in from 21 to 39 days after inoculation. In each case the amount of disseminated tuberculosis found at the time of death was compatible with the "bovine" character of the virus.

#### CHARACTERISTICS OF THE ATYPICAL TUBERCLE BACILLI.

Whilst we have found no difficulty in classifying all the preceding viruses as belonging either to the human or the bovine type, there remain the following, which differ from each of these types as regards the inter-relationship between cultural characters and virulence. In the present investigation we have found 10 such strains; to our records of these we have added notes on three others, which we met with in enquiries previously reported.

Of these 13 strains, six are indistinguishable culturally from bovine bacilli, viz. viruses 29, 32, and 262 obtained from bone and joint tuberculosis and viruses H 99, P LXXI, and P LXXVII discovered in two previous enquiries. But for rabbits the virulence of these six is that of the eugonic human bacillus.

The remaining seven strains are also of low virulence for the rabbit, but culturally they differ from both the human and the bovine type in one or other respect. They grow well on bovine serum, generally producing bright yellow pigment on suitable batches of serum; on glycerin-agar the growth is extremely slow and is in the form of very numerous, almost microscopic colonies, upon which a few large, convoluted, pigmented colonies ultimately supervene; on glycerin-potato the growth is slow but prolonged, resulting in the formation of large, peculiarly shaped, pigmented colonies. Growth on glycerin-broth has occurred only in the form of a few isolated islands.

The atypical characters of the above 13 viruses have been found to be permanent features and have not been altered by passage through rabbits.

TABLE IV. Rabbits inoculated with "Bovine" Viruses.

No. of case	Source of Cultures	Details of Cultures				Dose (mg.)	Mode of Inoculation	No. of Rabbit	Weights of Rabbits in grammes		Duration of Experiment (days)	Post-mortem Results
		Age of sub-culture in days	Generation	Total duration in days	Final				Initial			
19	Psoas abscess	13	6th	107	10	sub.	472	1,200	D 31		General tuberculosis of organs and lymphatic glands.	
"	"	13	6th	107	10	sub.	473	1,500	D 55		"	
23	Lumbar abscess	10	4th	65	10	sub.	513	2,290	K 101		Chronic general tuberculosis of organs and glands, but lungs mainly crepitant, with patches of early caseation.	
"	"	10	4th	65	10	sub.	514	1,720	D 81		General tuberculosis of organs and lymphatic glands.	
"	"	8	14th	204	10	i.v.	750	1,650	D 61		"	
"	"	8	14th	204	10	sub.	752	1,600	K 100		Caseous ulcer at site of inoculation; caseous foci in both subscapular, right popliteal, and left inguinal glands; a few translucent foci and small grey patches on surface of lungs; all other tissues normal.	
"	"	8	14th	204	10	sub.	753	1,950	D 96		Chronic general tuberculosis, but inguinal and popliteal glands not affected; lungs not enlarged, but extensively caseous, with cavity formation; renal tubercles apparently retrogressive.	
Rabbit 514	(kidney)	8	6th	83	10	sub.	850	1,620	D 45		General tuberculosis of organs and lymphatic glands.	
"	"	8	6th	83	10	sub.	851	2,050	D 56		"	
35	Tissue from mastoid	11	5th	62	10	sub.	502	2,500	D 43		"	
"	"	11	5th	62	10	sub.	503	2,160	D 32		"	
36	Pus from hip	8	3rd	53	10	sub.	448	1,460	D 76		"	
"	"	11	6th	88	10	sub.	496	3,300	D 30		"	
"	"	11	6th	88	10	sub.	497	1,900	D 83		"	
49	Psoas abscess	8	5th	46	10	sub.	525	2,540	D 40		"	
"	"	8	5th	46	10	sub.	526	2,040	D 42		"	
54	Scraping from sinus of ankle	10	6th	83	10	sub.	627	2,560	D 82		"	
"	"	10	6th	83	10	sub.	628	1,400	D 37		"	
55	Psoas abscess	8	5th	75	10	sub.	669	1,700	D 53		"	
"	"	8	5th	75	10	sub.	670	2,170	D 59		"	
56	Dressing from hip	7	6th	92	10	sub.	685	1,970	D 84		"	
"	"	7	6th	92	10	sub.	686	1,770	D 27		"	
64	Lumbar abscess	11	4th	60	10	sub.	492	3,600	D 47		"	
"	"	11	4th	60	10	sub.	493	2,320	D 53		"	
68	Pus from hip	4	5th	62	10	sub.	515	2,470	D 56		"	
"	"	4	5th	62	10	sub.	516	1,600	D 85		"	



71	Pus from hip	6	5th	70	10	sub.	537	1,950	1,500	D 35	General tuberculosis of organs and lymphatic glands.
	"	6	5th	70	10	sub.	538	1,950	1,400	D 53	"
72	Pus from hip	11	5th	57	10	sub.	498	2,600	1,650	D 33	"
	"	11	5th	57	10	sub.	499	1,950	1,240	K 101	Chronic general tuberculosis of organs and lymphatic glands.
	"	7	10th	225	10	sub.	829	1,800	1,050	D 80	General tuberculosis of organs and lymphatic glands.
73	Pus from hip	11	5th	56	10	sub.	494	3,600	2,600	D 84	Caseous ulcer at site of inoculation; left axillary gland caseous; all other lymphatic glands normal; spleen normal; lungs enlarged and completely replaced by caseous tissue; numerous tubercles in kidneys.
	"	11	5th	56	10	sub.	495	2,150	1,570	D 30	General tuberculosis of organs, but lungs only partially replaced by caseous tissue.
	"	5	12th	181	10	sub.	796	1,770	1,400	K 100	Caseous ulcer at site of inoculation; general tuberculosis of lymphatic glands; lungs not much enlarged, but mainly replaced by caseous tissue; spleen normal; a few minute tubercles in kidneys and depressions on surface.
	"	5	12th	181	10	sub.	797	1,540	950	D 39	General tuberculosis of organs and lymphatic glands.
78	Rabbit 494 (lung)	8	4th	58	10	sub.	754	1,750	1,020	D 93	General tuberculosis of organs and glands, but some crepitant tissue remaining in lungs.
	"	8	4th	58	10	sub.	755	1,750	970	D 95	"
	"	5	6th	89	10	sub.	561	2,000	1,420	D 47	"
	"	5	6th	89	10	sub.	562	1,300	1,100	D 53	General tuberculosis of organs and lymphatic glands.
81	Psoas abscess	8	12th	147	10	sub.	667	1,370	1,120	D 42	"
	"	8	12th	147	10	sub.	668	1,600	990	K 100	"
	"	10	16th	273	10	sub.	913	2,050	1,570	K 100	Caseous local lesion; caseation of one subscapular and one bronchial gland, all other lymphatic glands normal; lungs not much enlarged but mainly replaced by caseous tissue, with cavity formation; spleen normal; tuberculous nodules in kidneys and testes.
	"	10	16th	273	10	sub.	914	2,570	1,900	D 55	Caseous local ulcer; subscapular and bronchial glands caseous, inguinal and popliteal tubercles in kidneys.
87	Rabbit 668 (kidney)	5	5th	53	10	sub.	94	1,850	1,650	D 56	General tuberculosis of organs and lymphatic glands.
	"	5	5th	53	10	sub.	95	1,800	1,450	D 75	"
	"	7	7th	129	10	sub.	663	2,300	1,550	D 77	"
	"	7	7th	129	10	sub.	664	1,390	970	D 48	"
89	Psoas abscess	7	10th	124	10	sub.	665	2,490	1,820	D 46	"
	"	7	10th	124	10	sub.	666	1,750	1,170	D 36	"
92	Psoas abscess	6	9th	113	10	sub.	715	2,120	1,530	D 45	"
	"	6	9th	113	10	sub.	716	1,750	1,190	D 38	"
94	Pus from hip	7	8th	102	10	sub.	671	1,740	1,220	D 43	"
	"	7	8th	102	10	sub.	672	1,980	1,220	D 62	"
102	Dressing from psoas abscess	11	9th	108	10	sub.	730	2,530	1,350	D 78	General tuberculosis of organs and glands, but lungs not completely replaced by caseous tissue.
	"	11	9th	108	10	sub.	731	2,010	1,200	D 81	General tuberculosis of organs and lymphatic glands.
	"	18	4th	58	10	sub.	74	2,120	1,650	D 35	"
	"	18	4th	58	10	sub.	75	1,600	1,150	D 62	Caseous local lesion; general tuberculosis of lymphatic glands; lungs almost completely replaced by caseous tissue; spleen normal; a few tubercles in kidneys.

TABLE IV. Rabbits inoculated with "Bovine" Viruses—(continued).

No. of case	Source of Cultures	Details of Cultures				Dose (mg.)	Mode of Inoculation	No. of Rabbit	Weights of Rabbits in grammes		Duration of Experiment (days)	Post-mortem Results
		Age of sub-culture in days	Generation	Total duration of culture in days	Initial				Final			
104	Dressing from psoas sinus	9	7th	82	10	sub.	675	1,820	1,350	D 59	General tuberculosis of organs and lymphatic glands.	
	"	9	7th	82	10	sub.	676	1,740	1,320	D 95	"	
	"	9	7th	79	10	sub.	673	2,270	1,380	D 52	"	
	"	9	7th	79	10	sub.	674	2,000	1,170	D 70	"	
106	Dressing from hip	9	7th	90	10	sub.	677	2,090	1,450	D 45	"	
	"	9	7th	90	10	sub.	678	1,640	1,170	D 59	"	
107	Dressing from hip	9	6th	86	10	sub.	679	2,270	1,720	K 100	Caseous ulcer at site of inoculation; caseation of peripheral glands; lungs largely replaced by caseous tissue, with cavity formation; spleen normal; in kidneys numerous nodules, pus in pelvis of one and pits on surface.	
	"	9	6th	86	10	sub.	680	1,850	1,100	D 66	General tuberculosis of organs and lymphatic glands.	
	"	10	7th	213	10	sub.	933	1,950	1,520	D 54	"	
	"	10	7th	213	10	sub.	934	1,700	1,100	K 103	Caseous ulcer at site of inoculation; general tuberculosis of lymphatic glands; lungs enlarged and completely replaced by caseous tissue; numerous large tubercles in kidneys; a few small tubercles in spleen.	
108	Dressing from psoas abscess	16	6th	92	10	sub.	681	2,100	1,500	D 33	General tuberculosis of organs and lymphatic glands.	
	"	5	11th	141	10	sub.	800	2,420	1,720	D 86	Caseous ulcer at site of inoculation; peripheral glands caseous; bronchial glands and spleen normal; lungs partially replaced by caseous tissue; a dozen small tubercles in kidneys.	
	"	5	11th	141	10	sub.	801	1,520	—	K 100	General tuberculosis of organs and glands, but a little orepitant tissue in lungs.	
	"	10	16th	262	10	sub.	117	2,200	1,440	D 93	Caseous ulcer at site of inoculation; caseation of subscapular glands and a few caseous foci in bronchial glands, but inguinal and popliteal glands normal; network of caseous tissue on surface of lungs and interior congested; a few tubercles on surface of spleen but none in substance; small tubercles in cortices of kidneys and scars on surface; many tubercles in walls of intestines.	
111	Pus from knee	7	8th	100	10	sub.	683	1,570	1,300	D 48	General tuberculosis of organs and lymphatic glands.	
	"	7	8th	100	10	sub.	684	1,430	1,040	D 78	"	
117	Dressing from spine	6	10th	120	10	sub.	776	1,520	1,170	D 59	"	
	"	6	10th	120	10	sub.	777	1,600	1,000	D 81	"	
133	Pus from hip	8	9th	151	10	sub.	770	1,750	1,170	D 79	"	
	"	8	9th	151	10	sub.	771	1,980	1,520	D 44	"	
135	" from hip	7	7th	144	10	sub.	748	1,430	1,050	D 64	"	
	"	7	7th	144	10	sub.	749	1,450	1,150	D 46	"	

136	Gluteal abscess	8	9th	150	10	sub.	762	1,530	1,320	D 65	General tuberculosis of organs and lymphatic glands.
	"	8	9th	150	10	sub.	763	1,400	1,200	D 48	"
	Abscess of zygoma	8	6th	136	10	sub.	760	1,530	1,090	D 57	"
	"	8	6th	136	10	sub.	761	1,220	1,040	D 49	"
149	Psoas abscess	6	9th	134	10	sub.	772	1,700	1,150	D 98	"
	"	6	9th	134	10	sub.	773	1,870	1,150	D 70	"
155	Tendon sheath of hand	5	8th	137	10	sub.	798	1,750	1,370	D 62	"
	"	5	8th	137	10	sub.	799	1,400	990	D 42	"
160	Psoas abscess	8	7th	121	10	sub.	756	1,650	970	D 83	"
	"	8	7th	121	10	sub.	757	1,390	970	D 49	"
174	Dressing from temporal bone	7	5th	76	10	sub.	746	2,500	1,190	D 95	"
	"	7	5th	76	10	sub.	747	1,670	1,050	D 30	"
175	Dorsal abscess	8	6th	115	10	sub.	774	2,320	1,670	D 36	"
	"	8	6th	115	10	sub.	775	1,670	1,000	D 88	"
193	Dressing from hip	10	7th	133	10	sub.	899	2,090	1,150	D 75	"
	"	10	7th	133	10	sub.	900	2,470	1,500	D 57	"
194	Dressing from ankle	8	5th	79	10	sub.	764	1,740	1,520	K 100	Caseous local ulcer; caseation of subscapular and bronchial glands; popliteal and inguinal glands normal; numerous tubercles in lungs, but greater part of tissue crepitant; a few tubercles in spleen and many in kidneys.
	"	8	5th	79	10	sub.	765	2,170	1,150	D 57	General tuberculosis of organs and lymphatic glands.
	"	9	3rd	39	10	sub.	107	2,440	1,420	D 36	"
	"	9	3rd	39	10	sub.	108	1,870	1,450	D 30	"
197	Pus from hip	10	7th	119	10	sub.	802	1,600	1,500	K 100	Caseous local ulcer; general tuberculosis of lymphatic glands; lungs partially crepitant and not enlarged, but contain large caseous nodules; spleen normal; many tubercles in kidneys.
	"	10	7th	119	10	sub.	803	2,070	1,100	D 93	General tuberculosis of organs and glands, but lungs not completely caseous.
	"	8	9th	232	15	sub.	85	2,010	1,070	D 74	General tuberculosis of organs and lymphatic glands.
	"	5	9th	232	15	sub.	86	2,100	1,340	D 57	"
	"	8	3rd	62	10	sub.	103	2,050	1,670	D 33	"
	"	5	3rd	62	10	sub.	104	1,920	1,120	D 67	"
198	Dressing from psoas sinus	9	6th	69	10	sub.	883	1,690	1,370	D 31	"
	"	9	6th	69	10	sub.	884	2,070	1,450	D 46	"
205	Bone from wrist	8	6th	104	10	sub.	768	1,920	1,150	D 55	"
	"	8	6th	104	10	sub.	769	2,120	1,500	D 92	Soft caseous local lesion; general tuberculosis of lymphatic glands; lungs not enlarged but extensively replaced by caseous tissue; spleen normal; a few tubercles in kidneys and several small pits on surface.
	"	5	9th	249	10	sub.	113	2,470	1,600	D 76	General tuberculosis of organs and lymphatic glands.
	"	5	9th	249	10	sub.	114	2,550	1,700	D 45	"
206	Dorsal abscess	7	7th	126	10	sub.	895	1,140	1,000	D 45	"
	"	7	7th	126	10	sub.	896	1,690	1,240	D 31	"
	"	10	6th	96	10	sub.	780	2,350	1,260	D 54	"
210	Psoas abscess	10	6th	96	10	sub.	781	1,500	1,000	K 100	Soft caseous local lesion; general tuberculosis of lymphatic glands; lungs not enlarged, caseous patches on surface and at margins, greater part of tissue crepitant; several tubercles in spleen; small tubercles in kidneys and pelvis of one caseous.

TABLE IV. Rabbits inoculated with "Bovine" Viruses—(concluded).

No. of case	Source of Cultures	Details of Cultures				Dose (mg.)	Mode of inoculation	No. of Rabbit	Weights of Rabbits in grammes		Duration of Experiment (days)	Post-mortem Results
		Age of sub-culture in days	Generation	Period during which culture in days	Initial				Final			
210	Psoas abscess	12	11th	228	10	sub.	100	1,500	1,350	D 47	General tuberculosis of organs and lymphatic glands.	
214	" "	12	11th	228	10	sub.	101	2,350	1,800	D 65	" "	
214	Psoas abscess	8	6th	83	10	sub.	758	2,070	1,400	D 73	" "	
215	" "	8	6th	83	10	sub.	759	1,480	1,100	D 86	" "	
215	Pus from hip	8	4th	85	9	sub.	766	2,520	2,040	D 37	" "	
215	" "	8	4th	85	10	sub.	767	1,600	1,300	D 45	" "	
220	" "	9	6th	139	10	sub.	893	1,420	1,020	D 47	" "	
222	Pus from hip	7	7th	141	10	sub.	894	2,270	1,650	D 48	" "	
222	" "	7	7th	141	10	sub.	897	1,370	1,000	D 62	" "	
223	Psoas abscess	11	6th	96	10	sub.	898	1,780	1,350	D 69	" "	
223	" "	11	6th	96	10	sub.	826	1,850	1,500	D 42	" "	
229	Pus from hip	7	5th	86	10	sub.	827	1,870	1,200	D 43	" "	
229	" "	7	5th	86	10	sub.	806	1,670	1,220	D 38	" "	
234	Dressing from ankle	9	6th	104	10	sub.	885	2,690	1,400	D 43	" "	
235	" "	9	6th	104	10	sub.	886	2,770	1,870	D 55	" "	
235	Pus from hip	9	6th	99	10	sub.	881	1,870	1,500	D 49	" "	
236	" "	9	6th	99	10	sub.	882	2,170	1,640	D 40	" "	
236	Dorsal abscess	9	6th	118	10	sub.	889	1,650	1,070	D 82	" "	
242	" "	9	6th	118	10	sub.	890	1,470	850	D 59	" "	
242	Psoas abscess	9	5th	80	10	sub.	887	2,090	1,700	D 35	" "	
245	" "	9	5th	80	10	sub.	888	1,700	1,220	D 46	" "	
245	Psoas abscess	10	8th	129	10	sub.	909	2,250	1,420	D 77	" "	
250	" "	10	8th	129	10	sub.	910	1,950	1,300	D 72	" "	
250	Tissuc from ankle.	9	4th	69	10	sub.	891	1,720	1,240	K 100	Caseous local ulcer; general tuberculosis of lymphatic glands; lungs enlarged and extensively replaced by caseous tissue; a few tubercles in spleen; caseous but not projecting tubercles and streaks in kidneys, with some small depressions on surface.	
250	" "	9	4th	69	10	sub.	892	1,300	1,150	D 35	General tuberculosis of organs and lymphatic glands.	
250	" "	7	7th	178	10	sub.	123	2,100	1,570	D 49	" "	
250	" "	7	7th	178	10	sub.	124	1,920	1,350	D 32	" "	
255	Rabbit 891 (lung)	4	3rd	37	10	sub.	127	2,420	1,650	D 43	" "	
255	" "	4	3rd	37	10	sub.	128	2,020	1,570	D 51	" "	
255	Pus from hip	10	6th	79	10	sub.	911	2,220	1,240	D 46	" "	
258	" "	10	6th	79	10	sub.	912	1,970	1,440	D 56	" "	
258	Metacarpal bone	6	5th	73	10	sub.	917	1,670	970	D 56	" "	
258	" "	6	5th	73	10	sub.	918	2,200	1,650	D 29	" "	

The following is a detailed account of the characteristics of these viruses. Their pathogenicity for rabbits is set out in Table V.

*Virus 29.*

From psoas abscess of boy, aged five years, through guinea-pig.

Tested on culture media up to the 15th generation. No pigmentation observed in serum cultures<sup>1</sup>. On glycerin-agar a quickly growing, translucent, finely wrinkled, moist layer; sometimes small warty colonies developed subsequently; the growth always remained inferior to the eugonic "human" bacillus; on glycerin-potato a thin layer of growth, beset with discrete colonies.

General tuberculosis produced in guinea-pigs inoculated with original material. Slight virulence for four rabbits (Table V, p. 306) killed 100 days after inoculation. A fifth rabbit died from intercurrent disease 53 days after inoculation and showed only slight tuberculosis. A sixth rabbit, not included in the table, died from intercurrent disease in 22 days, with only slight evidence of tuberculosis.

*Virus 32.*

Direct culture from spinal caries of girl, aged 10 years.

Tested on culture media up to the 24th generation. No pigmentation observed in serum cultures. On glycerin-serum a moist, greasy layer, rather better than on pure serum. On glycerin-agar similar to Virus 29. On glycerin-potato a scanty growth, consisting of discrete, warty colonies.

Two guinea-pigs were inoculated intraperitoneally, each with .1 mg. of culture; they died from general tuberculosis in 74 and 75 days. Two, also, were inoculated subcutaneously, each with 1 mg. of culture. The first died in 153 days. There was no visible local lesion, and, with the exception of purulent foci in both inguinal glands and one sternal gland, no tuberculosis of lymphatic glands; there were grey fibroid areas in the liver and spleen; the lungs were normal. The second guinea-pig died from chronic fibroid tuberculosis in 224 days. Virulence was slight for six rabbits.

*Virus 34.*

Direct culture from sacral abscess of man, aged 50 years.

Tested on culture media up to 19th generation. No pigmentation observed in serum cultures. Growth on glycerin-serum a uniform

<sup>1</sup> Subsequently, A. S. Griffith, making an independent investigation of the same virus, has obtained pigmentation on serum.

layer inferior to that on pure serum. On glycerin-agar after several weeks a thin layer composed of numerous microscopical colonies, upon which there was subsequent and slow development of a few large, opaque, convoluted, pinkish colonies. On glycerin-potato growth slow and persistent, giving rise to large colonies resembling the cast of earthworms. Growth dysgonic on broth, in form of delicate grey islands.

Virulence of cultures high for guinea-pigs; low for rabbits and not raised by passage through a second series of rabbits. The characters of the cultures were unaltered by passage through rabbits. In addition to the nine rabbits shown in the table, one rabbit died from diarrhoea 42 days after intravenous inoculation with .01 mg.; there was only slight tuberculosis of lungs and kidneys.

*Virus 42.*

Direct cultures from (1) sacro-iliac abscess and (2) lumbar abscess of woman, aged 40 years.

Cultural characters of both strains identical. Thick growth on serum with marked yellow pigmentation. Growth on glycerin-serum similar to that on pure serum. On glycerinated agar, potato, and broth, identical with Virus 34.

Virulence of both strains identical; high for guinea-pigs, low for rabbits, and not increased by passage through rabbit. No change in cultural characters by passage through rabbits.

*Virus 67.*

Direct culture from psoas abscess of man, aged 36 years.

Tested on culture media up to 18th generation. Identical in every detail with cultures of Virus 42.

Virulence high for guinea-pigs, low for rabbits, and not increased by passage in the rabbit. In addition to the seven rabbits in the table, a rabbit died from intercurrent disease, 17 days after inoculation; there was no tuberculosis beyond the glands nearest to the local lesion. No change in cultural characters by passage through rabbits.

*Virus 83.*

Culture from lumbar abscess of boy, aged five years, through guinea-pig.

Cultural characters identical in every respect with those of Viruses 67 and 42.

Fully virulent for guinea-pigs; of low virulence for rabbits.

*Virus 138.*

Culture from abscess of hip of boy, aged four years, through guinea-pig.

Tested on culture media up to the 14th generation. Thick growths on pure serum and glycerin-serum, the latter with yellow pigment. Very minute colonies on glycerin-agar slowly becoming confluent but not raised. No growth on glycerin-potato. Dysgonic on glycerin-broth, a small grey island alone being formed.

Fully virulent for guinea-pigs; of very low virulence for rabbits.

*Virus 183.*

Culture from ankle of boy, aged three years, through guinea-pig. The boy afterwards died from tuberculous meningitis.

Highly pigmented on serum. Delicate, confluent colonies on glycerin-agar, a few becoming subsequently large, convoluted and pinkish. Discrete, irregular colonies on glycerin-potato. Dysgonic on glycerin-broth, like Viruses 67 and 42.

General tuberculosis produced in guinea-pigs inoculated with original material and with culture. Slightly virulent for two rabbits.

*Virus 192.*

Culture from hip of boy, aged 12 years, through guinea-pig.

Tested on culture media up to the 11th generation. Markedly pigmented on serum. Delicate, confluent colonies on glycerin-agar, a few becoming raised, large, convoluted, and opaque. Raised, pigmented colonies on glycerin-potato. Dysgonic on glycerin-broth. Identical with Viruses 67 and 42.

The original material produced general tuberculosis in guinea-pigs. Slightly virulent for rabbits; virulence not increased by passage through rabbits.

*Virus 262.*

Culture from psoas abscess of girl, aged 12 years, through guinea-pig.

Tested on culture media up to the 10th generation. Not pigmented on serum. A typical dysgonic "bovine" growth on glycerin-agar. A few minute opaque colonies on glycerin-potato.

Of somewhat lower virulence for guinea-pigs than the ordinary human or bovine bacillus. The two animals inoculated subcutaneously, each with 1 mg. of culture, survived 128 and 135 days, respectively.



Only slight disease was produced in two rabbits inoculated subcutaneously and in one inoculated intravenously with the original culture. Generalised tuberculosis with death in 77 days was caused in a second rabbit intravenously inoculated, a companion to the former. Virulence was not increased by passage through rabbits.

Of cultures obtained from three of the above mentioned rabbits, the culture from the severely affected intravenous rabbit produced only slight disease in a second pair of rabbits. The characters of the cultures remained unaltered.

The above atypical viruses may be compared with the following three, which have already been recorded in our previously published reports on the incidence of tuberculosis in children and tuberculosis in swine.

*Virus H 99.*

Culture, through guinea-pig, from mesenteric glands (obtained Dec. 6th, 1912) of male child,  $9\frac{3}{4}$  years, showing, post-mortem, spinal caries, ascites, and tuberculosis of the mesenteric glands and spleen.

Culture retested, November, 1914, in 16th generation. No pigmentation on serum. A thin grey layer on glycerin-serum. On glycerin-agar, after several weeks delay, numerous minute, almost microscopic colonies. On glycerin-potato discrete, large, raised and contorted colonies.

General tuberculosis was produced in a guinea-pig inoculated with the original human material. Tested on seven rabbits, with slightly virulent results. No increase of virulence after passage in a rabbit.

*Virus P LXXI.*

Direct culture obtained from the submaxillary lymphatic glands (obtained April 19th, 1912) of a pig. A case of localised tuberculosis.

Culture retested, November, 1914, in 22nd generation. Grey growth on serum. Very poor growth on glycerin-agar, consisting of three opaque, raised, umbilicated, slightly pink colonies. A crop of minute, raised colonies on glycerin-potato.

General tuberculosis produced in guinea-pigs after inoculation with original material and culture. Only slight virulence for nine rabbits. No increase of virulence after passage in rabbits.



*Virus P LXXVII.*

Direct culture obtained from the submaxillary lymphatic glands (obtained May 15th, 1912) of a pig. A case of localised tuberculosis.

Culture retested, November, 1914, in 21st generation. No pigmentation on serum. On glycerin-agar numerous discrete colonies, afterwards becoming raised, opaque, and confluent. Opaque, raised colonies on glycerin-potato.

General tuberculosis produced in guinea-pigs, but duration of life longer than the average. Of relatively low virulence for 11 rabbits. No increase of virulence after passage in rabbits.

TABLE V. Rabbits inoculated with Atypical Viruses.

No. of case	Source of Cultures	Details of Cultures				Age of subculture in days	Generation	Total duration of infection in days	Dose (mg.)	Mode of inoculation	No. of Rabbits	Weights of Rabbits in grammes		Duration of Experiment (days)	Post-mortem Results				
		Initial	Final	Local lesion	Local glands							Lungs	Bronchial glands		Spleen	Kidneys			
29	Psoas abscess	5	4th	92	14	sub.	474	2,000	2,150	K 100	Cystic	Caseous	Caseous patches on surface	Nil	Nil	Nil	A few caseous nodules		
"	"	10	5th	166	10	sub.	625	1,520	1,120	D 53	Caseous	Caseous foci	One translucent focus	Nil	Nil	Nil	Nil		
"	"	10	5th	166	10	sub.	626	1,650	2,120	K 100	Cystic	Nil	Eight small nodules	Nil	Nil	Nil	Nil		
"	"	7	10th	236	-01	i.v.	722	2,380	2,570	K 100	—	—	A few tubercles and slight marginal caseation	Nil	Nil	Nil	One minute tubercle		
"	"	7	10th	236	-01	i.v.	723	2,010	2,000	K 100	—	—	A few small tubercles	Nil	Nil	Nil	In one, a few tubercles and pus in pelvis		
32	Pus from spine	11	5th	92	10	sub.	500	2,700	2,440	K 101	Caseous	Caseous	A few tubercles	Nil	Nil	Nil	Three grey foci		
"	"	11	5th	92	10	sub.	501	2,100	2,240	K 101	Caseous	Caseous	A few translucent foci	Nil	Nil	Nil	A few scars on surface		
"	"	6	10th	294	17	sub.	877	1,600	1,650	K 100	Cystic	Caseous focus	Several translucent foci	Nil	Nil	Nil	One small tubercle		
"	"	6	10th	294	17	sub.	878	1,670	1,670	K 100	Cystic	Nil	A few caseous tubercles and some marginal caseation	Nil	Nil	Nil	A few tubercles		
"	"	6	10th	294	-1	i.v.	879	1,900	1,320	K 100	—	—	Crepitant; numerous small, discrete tubercles	Caseous foci	A few minute tubercles	Nil	Numerous small tubercles and caseous streaks		
"	"	6	10th	294	-1	i.v.	880	1,750	970	D 94	—	—	Not enlarged, but numerous small, discrete, caseous tubercles	Caseous foci	One yellow tubercle	Nil	Numerous tubercles and pus in pelvis		
34	Sacral abscess	10	5th	45	10	sub.	430	1,660	—	D 85	Caseous	Caseous	Almost completely replaced by caseous tissue	Nil	A few grey foci	Nil	Nil		
"	"	10	5th	45	10	sub.	431	1,650	1,620	K 101	Cystic ulcer	Caseous	Small caseous nodules on surface	Nil	Nil	Nil	One tubercle		
"	"	8	9th	141	-01	i.v.	604	1,770	1,600	K 101	—	—	Some small tubercles	Nil	Nil	Nil	Nil		
"	"	8	9th	141	14	sub.	605	2,050	2,000	K 101	Cystic	Cystic	Several discrete tubercles	Nil	Nil	Nil	Nil		
"	"	8	9th	141	15	sub.	606	1,920	1,800	K 101	Caseous	Caseous foci	Partial caseation of surface	Nil	Nil	Nil	Three small tubercles		

34	Rabbit 430 (lung)	9	4th	51	10	sub.	659	1,660	1,570	K 100	Caseous ulcer	Caseous	Superficial caseation	Nil	Nil	One grey focus
	"	9	4th	51	15	sub.	660	2,180	1,440	D 75	Caseous	Cystic	Superficial caseous patches	Caseous foci	Nil	A few grey foci and streaks in cortices
	Rabbit 431 (scapular gland)	6	5th	63	11	sub.	697	1,490	1,520	K 100	Cystic	Nil	A few superficial caseous patches	Nil	Nil	Nil
	"	6	5th	63	11	sub.	698	1,620	1,500	K 100	Caseous ulcer	Caseous	Small caseous patches on surface	Nil	Nil	One grey focus
42	Sacro-iliac abscess	8	3rd	30	10	sub.	444	2,030	2,100	K 100	Caseous ulcer	Caseous	Largely replaced by caseous tissue	Nil	Nil	Nil
	"	8	3rd	30	10	sub.	445	1,330	1,400	K 100	Caseous ulcer	Caseous foci	A few small tubercles	Nil	Nil	Nil
	"	8	7th	115	01	i.v.	607	2,100	1,970	K 101	—	—	A few small tubercles	Nil	Nil	Several small tubercles
	"	8	7th	115	20	sub.	608	1,670	1,850	K 101	Caseous	Nil	A few caseous patches	Nil	Nil	A few small tubercles
	"	8	7th	115	01	i.v.	609	1,470	970	D 95	—	—	A few small tubercles	Nil	Nil	One grey focus
	"	8	7th	115	20	sub.	610	1,680	1,550	K 101	Caseous ulcer	Caseous foci	Surfaces nearly covered with thin caseous layer	Nil	Two minute foci	Numerous small tubercles
	Rabbit 444 (scapular gland)	6	4th	53	10	sub.	695	2,040	2,100	K 100	Cystic	Nil	A few translucent foci and slight marginal caseation	Nil	Nil	One small tubercle
	"	6	4th	53	10	sub.	696	1,630	1,470	K 100	Cystic	Nil	Caseation of surface; caseous nodules in substance, with cavity formation	Nil	Nil	Nil
	Lumbar abscess	7	5th	95	01	i.v.	575	1,920	2,150	K 100	—	—	Slight patches of caseation	Nil	Nil	A few grey foci and scars on surface
	"	7	5th	95	01	i.v.	576	1,650	1,550	K 100	—	—	Slight patches of caseation	Nil	One minute tubercle	Pus in pelvis of one; several tubercles
	"	7	5th	95	10	sub.	578	1,970	1,900	K 100	Cystic	Caseous	Many early tubercles on surface	Nil	Two grey foci	A few small tubercles
	"	7	5th	95	10	sub.	579	1,590	1,800	K 100	Cystic	Cystic	A few translucent tubercles	Nil	Nil	Nil
67	Psoas abscess	7	3rd	40	10	sub.	464	2,370	2,220	K 100	Cystic	Nil	Caseous nodules and patches on surface	Nil	Nil	Nil
	"	7	3rd	40	20	sub.	465	1,970	1,900	K 100	Cystic	Cystic	Caseous patches on surface	Nil	Nil	Pelvis of one caseous
	"	7	6th	102	01	i.v.	569	1,400	2,100	K 100	—	—	Numerous early tubercles; bulk of tissue crepitant	Nil	Nil	Several small tubercles

TABLE V. Rabbits inoculated with Atypical Viruses—(continued).

No. of case	Source of Cultures	Details of Cultures				Age of sub-culture in days	Generation	Total duration of culture in days	Dose (mg.)	Mode of inoculation	No. of Rabbits	Weights of Rabbits in grammes		Duration of Experiment (days)	Post-mortem Results			
		Initial	Final	Local lesion	Local glands							Lungs	Bronchial glands		Spleen	Kidneys		
67	Proas abscess	7	6th	102	20	sub.	577	2,070	2,300	K 100	Cystic	Caseous	Several small tubercles	Nil	One caseous tubercle	One grey focus		
"	"	7	10th	187	.01	i.v.	724	2,500	2,450	K 100	—	—	Numerous soft, discrete nodules	Nil	Nil	Four caseous tubercles		
"	"	7	10th	187	.01	i.v.	725	1,950	2,040	K 100	—	—	Extensively replaced by caseous tissue	Nil	Nil	A few caseous tubercles		
Rabbit 465 (lung)	"	6	3rd	46	10	sub.	714	1,700	2,070	K 100	Cystic	Nil	Numerous discrete tubercles	Nil	Nil	In one, a few tubercles and pus in pelvis		
83	Lumbar abscess	9	7th	118	10	sub.	653	2,650	2,200	K 100	Cystic	Caseous focus	Several small tubercles	Nil	Nil	Two minute tubercles		
"	"	9	7th	118	10	sub.	654	1,660	1,570	K 100	Caseous foci	Nil	A few small tubercles	Nil	Nil	Nil		
"	"	9	9th	177	.01	i.v.	792	1,990	1,550	K 100	—	—	Caseous patches on surface	Nil	Nil	Three tubercles		
"	"	9	9th	177	.1	i.v.	793	2,050	1,520	K 100	—	—	Slight caseation of surface and margins	Nil	Nil	A few caseous tubercles and several scars on surface		
"	"	9	9th	177	15	sub.	794	1,110	1,090	K 100	Caseous	Nil	Thin caseous layer on surface	Nil	Nil	Nil		
"	"	9	9th	177	20	sub.	795	1,120	1,070	K 100	Cystic	Nil	Partial caseation of surface	Nil	Nil	Nil		
138	Abscess of hip	7	5th	101	10	sub.	736	1,720	1,750	K 100	Caseous	Nil	Two small tubercles	Nil	Nil	Nil		
"	"	7	5th	101	10	sub.	737	1,740	1,950	K 100	Caseous	Nil	One minute tubercle	Nil	Nil	Nil		
"	"	10	8th	182	15	sub.	927	2,070	2,220	K 103	Cystic	Nil	Small tubercles on surface	Nil	Nil	Nil		
183	Dressing from ankle	10	8th	182	15	sub.	928	2,170	2,000	K 103	Cystic	Nil	Small tubercles on surface	Nil	Nil	Nil		
"	"	10	8th	182	15	sub.	927	2,170	2,000	K 103	Cystic	Nil	Small semi-translucent tubercles	Nil	Nil	One tubercle in cortex; pus in pelvis of one		
192	Dressing from hip	18	6th	143	16	sub.	907	2,370	2,020	K 100	Cystic	Caseous focus	A few tubercles on surface	Nil	Several small tubercles	One grey focus		
"	"	18	6th	143	16	sub.	908	2,150	2,240	K 100	Cystic	Nil	A few tubercles on surface	Nil	Nil	Two small tubercles		
Rabbit 907 (kidney)	"	8	6th	95	15	sub.	139	2,550	2,800	K 101	Caseous ulcer	Nil	Small caseous patches	Nil	Nil	One minute tubercle		
"	"	8	6th	95	30	sub.	140	2,200	2,100	K 101	Cystic	Nil	Small tubercles on surface	Nil	Nil	One minute tubercle		

662 Psaos abscess:	6	6th	77	10	sub.	931	1,670	1,370	K 103	Caseous	Caseous foci	Small grey tubercles on surface	Caseous foci	Nil	Several tubercles
"	6	6th	77	10	sub.	932	2,100	2,100	K 103	Cystic	Nil	A few caseous patches on surface	Caseous	Nil	Nil
"	9	10th	126	01	i.v.	105	1,200	1,900	K 102	—	—	One caseous patch and several discrete tubercles on surface	Nil	Nil	A few small tubercles
"	9	10th	126	01	i.v.	106	2,030	1,500	D 77	—	Caseous	Almost completely replaced by caseous tissue	Caseous	Caseous	Abundant projecting tubercles
Rabbit 106 (propleteal gland)	8	6th	50	10	sub.	141	2,500	1,800	K 101	Caseous ulcer	Caseous	Scattered tubercles on surface and in substance	Nil	Nil	Numerous tubercles, projecting on surface
"	8	6th	50	10	sub.	142	2,150	1,720	K 101	Caseous	Caseous	Ramifying caseous areas on surface and in substance	Nil	Nil	Several tubercles and scars
Rabbit 931 (kidney)	16	5th	144	10	sub.	149	1,850	1,900	K 100	Caseous ulcer	Caseous	A few foci on surface	Nil	Nil	Nil
"	16	5th	144	10	sub.	150	1,880	1,800	K 100	Caseous	Caseous	A few small tubercles	Nil	A few small tubercles on surface	Small tubercles and depressions on surface
Rabbit 105 (kidney)	14	3rd	96	10	sub.	151	1,870	1,920	K 100	Caseous	Caseous	Numerous small tubercles, mostly superficial	Caseous foci	Nil	Small tubercles and depressed scars
"	14	3rd	96	10	sub.	152	1,620	1,700	K 100	Cystic	Caseous	Discrete tubercles on surface and at margins	Nil	Nil	A few small tubercles