ministration of a research institution, medical practice, industrial consultation, etc. In fulfilling these duties the scientist should be guided by a realization of their wider social implications and should steadily help to make society more humane, juster and more efficient. Scientists who are prepared to fight for freedom in science are as eager as any one to make contributions to social progress.

(6) In order to maintain scientific freedom in the countries where it still happily exists and to assist in its reestablishment in regions where it is now suppressed, it seems necessary to organize the forces which support the ideal of free science. It is desired to clarify and formulate the ideas involved in the phrase "freedom in science" and to help to support those institutions which now maintain this freedom. If this can be done successfully, a real contribution will be made to the general advance of freedom to which military victory will open the path and which alone can make that victory effective.

(7) The aim of the existing scientific societies as reflected in their publications is almost entirely the direct promotion of research: the independence of science is taken for granted. The Society for Freedom of Science, conscious that this independence is threatened, would work to frustrate the threat.

(8) A nucleus of members has already been secured and it is now desired to build up a large body of scientists, mainly active research workers, who subscribe to the following propositions:

(i) The increase of knowledge by scientific research of all kinds and the maintenance and spread of scientific culture have an independent and primary human value.

(ii) Science can only flourish and therefore can only confer the maximum cultural and practical benefits on society when research is conducted in an atmosphere of freedom.

(iii) Scientific life should be autonomous and not subject to outside control in the appointment of personnel or in the allocation of the funds assigned by society to science.

(iv) The conditions of appointment of research workers at universities should give them freedom to choose their own problems within their subjects and to work separately or in collaboration as they may prefer. Controlled teamwork, essential for some problems, is out of place in others. Some people work best singly, others in teams, and provision should be made for both types.

(v) Scientists in countries not under dictatorial rule should cooperate to maintain the freedom necessary for effective work and to help fellow-scientists in all parts of the world to maintain or secure this freedom.

(9) Membership of the society involves nothing beyond the support—if necessary the active support—of these principles. It is not proposed, in the first instance at least, to ask for a subscription, though some of the original adherents have contributed money to defray the necessary costs of copying and postage, and such donations are welcome. There is at present a small provisional committee, but it is entirely informal and will resign when the society is sufficiently organized to permit of an election. The present statement has been drawn up by the provisional committee, which is also actively contemplating the publication of a book of essays by several members of the society dealing with various aspects of freedom in science.

(10) Dr. John R. Baker, University Museum, Oxford, to whom the society owes its inception, is acting as secretary. Notices of adherence should be sent to him with any suggestions as to the policy of the society.

SPECIAL ARTICLES

WESTERN EQUINE AND ST. LOUIS ENCEPHALITIS ANTIBODIES IN THE SERA OF MAMMALS AND BIRDS FROM AN ENDEMIC AREA[1]

THE virus of Western equine encephalomyelitis has never been isolated from naturally infected mammals or birds, except man, horses and mules, although attempted by several workers. Howitt[2] noted the presence of antibodies to this virus in a few chickens and one quail. Hammon and Howitt[3] and Hammon[4] noted the presence of antibodies in 5 of 9 chickens, 1 domestic duck and 1 of 3 pheasants in an endemic area. The virus of St. Louis encephalitis has been isolated only from man, but neutralizing antibodies were found in horses during the summer of 1940 by Philip, Cox and Fountain,[5] by Howitt and Van Herick[6] and by Hammon and Howitt,[3] and their specificity confirmed and the susceptibility of the horse demonstrated, as a sequel to these findings by Cox, Philip and Kilpatrick.[7] Howitt and Van Herick[6] also found antibodies for this virus in the blood of certain domestic fowl in California.

In the Yakima Valley, Washington, in 1940, evi-

[1] From a Cooperative Survey of Encephalitis in the Yakima Valley by the University of California, the State College of Washington, the Washington State Health Department, the Yakima City-County Health Department and the U. S. Department of Agriculture, Bureau of Entomology and Plant Quarantine. Aided by a grant from the National Foundation for Infantile Paralysis, Inc.

[2] B. F. Howitt, *Jour. Infect. Dis.*, 67: 177, 1940.

[3] W. McD. Hammon and B. F. Howitt, to be published.

[4] W. McD. Hammon, *Jour. Am. Med. Asn.*, 117: 161, 1941.

[5] C. B. Philip, H. R. Cox and J. H. Fountain, *Pub. Health Rep.*, 56: 1388, 1941.

[6] B. F. Howitt and W. Van Herick. In press.

[7] H. R. Cox, C. B. Philip and J. W. Kilpatrick, *Pub. Health Rep.*, 56: 1391, 1941.

dence was obtained indicating the probable presence of both the Western equine virus and the St. Louis virus[8] in annual epidemics in man and horses (Hammon,[4] Hammon and Howitt[3]). This is a preliminary report of part of an extensive survey of the same region, started in May, 1941, and continuing during the epidemic of that year, in which the sera from mammals and birds, both domestic and wild, have been tested for the presence of neutralizing antibodies to both of these viruses, and to certain others to be reported later. Word now reaching us of extensive encephalitis outbreaks elsewhere in the West prompted the release of this report while the work was still in progress.

This approach through the neutralization test has proved useful in the study of jungle yellow fever reservoirs, and it seemed likely that as a preliminary survey it would yield more information regarding the extent of infection and possible reservoirs than a search for the actual viruses, since infection has never been manifested by any observed epizootic except in horses, thus differing from the Eastern equine virus.

Bloods were taken with aseptic technique, the serum separated in the field laboratory and shipped in CO_2 ice to the San Francisco laboratory. Tests for antibodies were made by using a carefully pretitrated, stable virus suspension, which was frozen and stored in ampoules at −76 degrees C. The standardized intracerebral technique employed has been described by Hammon and Izumi.[9] A positive for the Western equine virus indicated an ability of the serum tested to protect all mice against at least 10 times the greatest quantity of virus which would permit similar survival in the presence of a negative serum under identical conditions of time, temperature and serum concentration. Similarly, a positive for the St. Louis virus indicated protection against at least a 33-fold increase in virus. Many sera protected against a still greater virus concentration. Positive findings were confirmed by retesting, except in a few instances where the amount of serum available was insufficient. Sera which repeatedly protected only 2 of 4 mice in the higher virus dilution have been classified as questionable and have been omitted from the tabulated data. To date, the sera of 162 birds and 153 mammals have been tested against the St. Louis virus, and of 172 birds and 161 mammals against the equine virus. Those yielding clear-cut results are shown in Tables 1 and 2. No classification other than the categories of "domestic" and "wild" has been attempted.

Before these positive neutralizations may all be accepted as significant, *i.e.*, the virucidal properties demonstrated to be specific, much further work must be done. We have already studied control series, with significantly different findings in respect to both viruses for horses and cows from Massachusetts, Texas, Arizona and Nevada. Howitt[2] has done the same in California for chickens, turkeys, ducks, pigeons and quail with the equine virus, and for chickens with the St. Louis virus.[6] We have just completed tests with the equine virus on sera of 11 pigeons from Iowa and New York without finding any positives. Controls on a number of other species are being tested. Antibody response to virus inoculation has been demonstrated in the horse for the St. Louis virus (Cox, Philip and Kilpatrick[7]) and for the above-mentioned fowl and certain other birds for the Western equine virus, by Howitt.[2] It would seem probable, therefore, that the antibodies found in many of the species listed in the table are the result of specific infection, probably of a mild or inapparent nature.

It will be noted that for the St. Louis virus, 50.0 per cent. of 70 domestic birds showed protection, as

TABLE 1

NEUTRALIZATION TESTS ON SERUM OF BIRDS

	St. Louis Neg.	St. Louis Pos.	W. Equine Neg.	W. Equine Pos.
Domestic or in Captivity:				
Chicken (*Gallus domesticus*)	14	3	14	4
Duck, Common Mallard (*Anas platyrhynchos*)	4	1	3	3
Duck, Pekin (*Anas platyrhynchos*)	1	6	3	5
Goose, Domestic (*Anser anser*)	3	7	4	6
Owl, Great Horned (*Bubo virginianus*)	0	3	0	3
Pigeon, Domestic (*Columba livia*)	4	7	5	5
Turkey (*Meleagris gallopavo*)	3	3	3	5
*Miscellaneous	6	5	6	5
Total domestic	35	35	38	36
Wild:				
Blackbird, Brewer (*Euphagus cyanocephalus*)	19	0	14	0
Dove, Western Mourning (*Zenaidura macroura*)	2	3	6	0
Flicker, Red-shafted (*Colaptes cafer*)	1	1	3	1
Hawk, Sparrow (*Falco sparverius*)	2	1	1	2
Killdeer (*Oxyechus vociferus*)	9	0	5	3
Pheasant, Ring-necked (*Phasianus colchicus*)	4	0	3	2
Quail, California (*Lophortyx californica*)	6	3	6	3
Robin (*Turdus migratorius*)	4	3	4	5
Sparrow, English (*Passer domesticus*)	11	0	8	0
Woodpecker, Lewis (*Asyndesmus lewis*)	3	0	3	0
*Miscellaneous	13	2	11	0
Total wild	74	13	64	16
Total	109	48	102	52

* Only one or two examined of each species.

[8] Since writing this, Hammon, Reeves, Brookman, Izumi and Gjullin have isolated the St. Louis virus from mosquitoes of this same area, thus definitely proving its presence (to be published).

[9] W. McD. Hammon and E. M. Izumi, to be published.

TABLE 2
NEUTRALIZATION TESTS ON SERUM OF MAMMALS

	St. Louis Neg.	St. Louis Pos.	W. Equine Neg.	W. Equine Pos.
Domestic or in Captivity:				
Cat, House (*Felis domesticus*)	8	0	8	0
Cow (*Bos taurus*)	10	6	9	5
Dog (*Canis familiaris*)	8	3	6	2
Goat, Domestic (*Capra hircus*)	3	3	3	3
Horse (*Equus caballus*)	0	12	0[T]	9[T]
Pig (*Sus scrofa*)	3	1	3	1
Sheep, Domestic (*Ovis aries*)	8	2	10	1
*Miscellaneous	8	2	9	2
Total Domestic	48	29	48	23
Wild:				
Chipmunk, Great Basin (*Eutamias minimus*)	5	0	6	0
Ground Squirrel, Townsend (*Citellus townsendii*)	11	0	12	0
Mouse, Field (*Microtus montanus*)	8	0	8	1
Mouse, White-footed (*Peromyscus maniculatus*)	2	0	4	1
Pocket Gopher (*Thomomys talpoides*)	5	0	4	0
Rabbit, Cottontail (*Sylvilagus nuttalli*)	7	1	9	0
Rabbit, Jack (*Lepus californicus*)	5	1	10	0
Rat, Brown (*Rattus norvegicus*)	4	3	10	0
Rat, Black (*Rattus rattus*)	4	1	5	0
Weasel (*Mustela frenata*)	4	0	3	2
*Miscellaneous	4	0	3	0
Total Wild	59	6	74	4
Total	107	35	122	27

* Only one or two examined of each species.
[T] Not vaccinated for Western equine encephalomyelitis.

against 15.0 per cent. of 87 wild; and for the equine virus the respective percentages are 48.7 per cent. of 74 and 20.0 per cent. of 80. Of 77 domestic mammals tested, 37.7 per cent. protected against the St. Louis virus in contrast to 9.2 per cent. of 65 wild, and for the equine virus 32.4 per cent. of 71 domestic as against 5.1 per cent. of 78 wild. Caution is suggested in interpretation of these differences between the domestic and wild animal groups until both the areas of sampling and the species sampling can be more carefully analyzed. However, both the domestic and wild species were collected principally in areas where cases of encephalitis had occurred in 1939, 1940 or 1941. The only species of which an overly large sample was taken, which might exaggerate the above difference, is the Brewer blackbird.

If the apparent significance of these findings is confirmed, it will indicate a much more wide-spread potential reservoir for both viruses than has generally been suspected, especially for the St. Louis virus. It would appear that barnyards and fowl runs, found in large numbers in small towns, rural and suburban areas, are the principal foci of infection for encephalitis of either the Western equine or the St. Louis type. The distribution of human and obviously of horse cases has conformed with this pattern.[4,10,3] Final results, together with other aspects of the survey and with more adequate discussion of the potentialities of the findings, will be published following completion of the survey.

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A SYNDROME IN MACACUS RHESUS AFTER INOCULATION OF STOOL FROM CARRIERS OF POLIOMYELITIS VIRUS[1,2]

DURING a study of stool specimens from contacts and patients in an outbreak of infantile paralysis in a rural community, certain monkeys (*Macacus rhesus*) that failed to develop anterior poliomyelitis nevertheless showed signs of disease. The clinical symptoms ordinarily appeared from the tenth to the fifteenth day after inoculation. They consisted of some change in behavior, that is, lethargy or excitement, diarrhea and loss of appetite, associated with a slight febrile temperature lasting from twenty-four to forty-eight hours. After it became apparent that such mild illness followed stool inoculation and that the incubation period compared closely with that in monkeys developing poliomyelitis, all animals were killed and autopsied after the twenty-first day following inoculation.

Tissue was taken from the following regions of the

[10] *Public Health Bulletin*, No. 214, 1935.
[1] A preliminary report.
[2] Aided by a grant from the National Foundation for Infantile Paralysis, Inc.