

TABLE II.
Mean Daily Changes in Tumor Weight (gm./day).
Groups: As in Table I.

Group	Control	100 i.u. theelin	200 i.u. theelin	Diff. (d)	n*	t*	P* for abs. val. of (d)
I	+.218	+.029		-.189	14	1.808	.093
II	+.218		+.057	-.161	14	2.996	.163
III		+.029	+.057	+.028	14	0.728	.480
IV	+.218		+.043†	-.175	22	0.995	.333

*n = "degrees of freedom."

t = difference of means/standard error of that difference, adjusted for "n."

P = probability of a difference as great or greater than that obtained, occurring by chance alone. See Fisher, R. A., "Statistical Methods for Research Workers," London, Oliver & Boyd, 1934, 5th Ed., Chap. V.

† It is proper to combine these into one group as there is no significant difference between the administration of 100 i.u. and 200 i.u.

Conclusions. In spite of long-continued injections of theelin, a rapidly growing mammary adenofibroma of the white rat transplanted into 32 rats lost a large part of its adenomatous content. No unusual growth behavior attributable to the injection of an estrogenic hormone could be demonstrated in the tumor tissue either grossly or microscopically. Theelin decreases body weight, but the size of the dose, in the limits given, is not significant. In other words, the loss in weight is not significantly greater when administering 200 i.u. than it is when administering 100 i.u. However, theelin has no significant effect on the mean daily changes in tumor weight.

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Filtrability of the Chinese Strain of *Spirochaeta recurrentis*.

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Novy and Knapp¹ first demonstrated that after having gone through Berkefeld filters, the filtrate of blood from animals infected with the American strain of relapsing fever spirochaetes was infectious; these workers concluded that the form present in the filtrate represented an invisible developmental stage. Later Breinl and Kinghorn² working with *Sp. duttoni* arrived at the same conclusion. Todd

¹ Novy, F. G., and Knapp, R. F., *J. Infect. Dis.*, 1906, **8**, 291.

² Breinl, A., and Kinghorn, A., *Memoir XXI, Liverpool School of Tropical Medicine*, September 1, 1906.

and Wolbach³ reported that *Sp. duttoni*, *Sp. kochi*, and 2 other strains of African tick-borne relapsing fever spirochaetes could be forced through a "V", "N" or "W" Berkefeld filter under a pressure of 50 lb. to the square inch, but not under atmospheric pressure. These two authors, however, did not examine the filtrate under the microscope for spirochaetes, but based their conclusion on the results of animal inoculations with the filtrates. In regard to *Sp. obermeieri* Todd⁴ stated that in its typical form it can be forced through a "W" filter. The present report presents the results of studies on the filtrability of the Chinese strain of *Spirochaeta recurrentis*.

Material and Method. Bacteria-proof Berkefeld filters "V", "N", and "W", were used. The patency of the filters was tested in every experiment by mixing the material to be filtered with pure cultures of *B. dysenteriae* Shiga, and *B. typhosus* and by culturing the filtrate for these organisms. In all instances the filtrate was sterile. Altogether the spirochaetes from 6 Chinese patients suffering from relapsing fever have been studied. The blood was taken during fever and contained in every instance more than 10 spirochaetes per oil-immersion darkfield. Only plasma was needed. It was obtained as follows: To a 250 cc. sterile Ehrlenmeyer flask containing 10 cc. sodium citrate glucose mixture (10% sodium citrate and 10% glucose) and 40 cc. normal saline solution, 80-100 cc. blood freshly obtained from a relapsing fever patient was added. The flask was gently rotated a few times and then allowed to stand for 2 hours or so in order to obtain about 80 to 100 cc. plasma. After eliminating the blood cells, the number of the spirochaetes present in the plasma is almost double that present in whole blood, provided there is no anemia.

As it is very difficult to filter plasma under atmospheric pressure, filtration was facilitated by a special suction pump. The pressure applied varied from 5 to 25 lb. The duration of suction or filtration varied from 10 to 40 minutes.

Only specimens of plasma containing numerous spirochaetes were used. The filtrate was centrifuged at high speed for half an hour in an ice-cup. A drop of the "filtrate sediment" was obtained by means of a fine capillary pipette and examined under the darkfield microscope for spirochaetes. At least 4 drops of the "filtrate sediment" were examined for not less than half an hour before the result was declared negative. In most instances the filtrate was also inoculated into splenectomized but otherwise normal squirrels, all

³ Todd, J. L., and Wolbach, S. B., *J. Med. Res.*, 1914, **30**, 27.

⁴ Todd, J. L., *Parasit.*, 1920, **6**, 152.

TABLE I.
Table Showing Filtrability of Chinese Strain of *Sp. recurrentis*.

Exp. No.	Pt.'s. hosp. No.	Pt.'s. temp., °C	Duration of illness, days	Berkefeld filter	Pressure applied, lbs./sq. in.	Suction applied, min.	Darkfield examination of filtrate	Squirrel inoculation		
								Filtrate cc.	Squirrel No.	Result
1	53528	40.2	18	V N	5-10 20-25	20 20	+ 0			
2	53571	40.0	3	V N W	20-25 20-25 20-25	10 20 20	+ 0 0	0.5 I.P.	163	+++
3	54017	39.4	9	V N	5 5-10	15 20	+ occ. 0	3 I.V.	182	+++
4	54155	39.4	30	V N W	5-10 5-10 5-10	15 15 15	+ + occ. 0	1 I.V. 2 I.V.	172 197	+++ +++
5	55162	38	32	N	5-10	20	+ occ.	{ 3 I.P. 2 I.V.	228	+++
6	55218	39.6	5	V N	5 5	15 40	+ occ. 0	5 I.P. 5 I.P.	230 231	+++ 0

occ. = spirochaetes occasionally present. I.P. = intraperitoneal. I.V. = intravenous.

but one of which subsequently developed relapsing fever and showed spirochaetes in the blood.

The results of the experiments are summarized in Table I. It is clear that under a pressure of 5 to 10 lb. to the square inch, a number of spirochaetes in some form pass through Berkefeld filters "V", "N", and "W". Spirochaetes were easily found in all the "V" filtrates, but only occasionally in one of the "N" filtrates. The "W" filtrates showed no spirochaetes under the darkfield microscope, but the filtrate caused relapsing fever when inoculated into a squirrel.

The fact that the "W" filtrates and most of the "N" filtrates failed to show spirochaetes under the darkfield microscope does not necessarily mean that these filtrates actually contained absolutely no spirochaetes in their normal form, for it remains possible that the spirochaetes present were so scanty that they were missed when looked for under the microscope. Hence, the fact that such a filtrate caused relapsing fever when inoculated into a splenectomized squirrel does not prove that the spirochaetes were present in an invisible or granular form. Further, since spirochaetes in their usual form have been shown to pass through Berkefeld filters, more direct evidence than has been offered is needed to establish the existence of an invisible or granular form.

Conclusion. The Chinese strain of *Sp. recurrentis* passes through Berkefeld filters "V", "N", and "W" under a pressure of 5 to 10 lb. to the square inch.

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Susceptibility of Rodents (*Myospalax fontanieri*) to Experimental Infection with Rickettsiae of Chinese Typhus.

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In general, guinea pigs have served satisfactorily as the experimental animal in the study of rickettsial diseases. However, when dealing with the European type of typhus fever, which occurs locally, these animals presented certain disadvantages. The only clinical manifestation of this disease in guinea pigs is a more or less typical period of fever following an average interval of incuba-