our experiments in utilizing vein segments from a living, heterologous source of a lower class exhibited unexpected results, they are being reported.

Chickens weighing 2.2 to 3.6 kgm were anesthetized by intraperitoneal injection of 2 cc Veterinary Nembutal—Abbott (sodium pentobarbital-alcohol mixture); turkeys, weighing 5 to 9 kgm, were injected intraperitoneally with 0.45 cc Veterinary Nembutal per kgm. After securing the fowl to the operating table, the neck was plucked, shaved and the skin prepared with a disinfectant. Following sterile draping of the neck, the midportion was exposed. Then the right jugular vein was excised following ligation with fine silk of venous branches, usually from 7 to 15 in number. The vein segment was irrigated thoroughly with physiologic saline, sometimes containing heparin.

The dogs used were healthy mongrels weighing from 15 to 25 kgm. They were anesthetized by intravenous injection of 0.45 cc Veterinary Nembutal per kgm. The femoral and carotid arteries of the dogs—in one case the aorta—were severed and bridged with the fowl's vein, using the one-tube and two-tube non-suture methods of Blakemore, Lord and Stefko.[3] Presumptive patency or occlusion was detected by palpation[3] of the vessel distal to the graft on various days following operation. Conclusive evidence was obtained by exploratory operation which terminated the experiment.

In Table 1 a brief summary of our findings is presented. In 37 heteroplastic grafts, 9 anastomoses were patent upon exploratory operation after 2 to 12 days, while partial or complete occlusion occurred in 24 instances and disappearance of the graft in 4 cases. Sloughing of the graft from one or both arterial ends was observed in 7 instances, 6 being associated with thrombosis, and one with disappearance of the graft. These results are significant, as in only a small number (10 out of 37 transplants) either sloughing or disappearance of the graft occurred. Thrombosis was observed only after several days of presumptive patency.

TABLE 1

SUMMARY OF EXPLORATORY FINDINGS OF VEIN TRANSPLANTS FROM CHICKENS AND TURKEYS IN THIRTY-SEVEN ARTERIAL ANASTOMOSES IN DOGS

Exploratory finding	Artery of dog	Jugular vein of fowl	Number of transplants	Day of exploration
Patency	Femoral	Chicken	5	2,6,7,8,12
	Carotid	"	3	2,4,5
	Aorta	Turkey	1	6
Occlusion (partial or complete)	Femoral	Chicken	11	5,7,7,7,9,10,12,14, 14,14,18
	Carotid	"	8	2,5,5,6,6,8,10,67
	"	Turkey	5	5,5,6,10,14
Slough from arterial end(s)*	Femoral	Chicken	4	7,8,12,14
	Carotid	"	2	10,67
	"	Turkey	1	14
Disappearance of graft	Femoral	Chicken	4	8,14,20,71

* The 7 transplants are recorded twice, since in 6 cases sloughing occurred with occlusion and in 1 case with disappearance of the graft.

Bacterial cultures of the vein segment made immediately after removal from the fowl and of the anastomotic site in the dog during the original operation were negative. All cultures of the vein graft, the anastomotic site and the thrombus made after exploratory operation showed bacterial contamination. It is quite possible that thrombosis in the majority of anastomoses was enhanced because of bacterial influences, and that the few cases of disappearance of the vein graft may also have been effected by bacteria. The precaution of employing aseptic technique may not be sufficient because of the common occurrence of transient bacteriaemias in animals in the absence of a traumatic lesion. This problem has been discussed by Haines.[4] It is possible that the infection of our vein transplants may have resulted from such a bacteriaemia.

In spite of the generally accepted contention that heterotransplants can not be expected to survive, the period of continued function of these transplants compares favorably with the work on autotransplants in dogs by Blakemore, Lord and Stefko.[3] These authors in 25 arterial anastomoses found 12 to be patent and 13 to have complete or partial occlusion on final exploration 2 to 69 days later. Further experimentation on heterotransplants in animals should be made before vein transplantation from the fowl to the human being can be considered. Such experimental work should include the combined use of sulfonamides or penicillin with heparin or other anticoagulants.

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[3] A. H. Blakemore, J. W. Lord, Jr. and P. L. Stefko, *Surgery*, 12: 488–508, 1942.

THE EFFECT OF PENICILLIN IN EXPERIMENTAL RABBIT SYPHILIS[1, 2, 3]

IN the November 3, 1944, issue of SCIENCE[4] I presented experiments dealing with the therapeutic effect of penicillin sodium dissolved in water and the same substance suspended in peanut oil. At that time my

[4] R. B. Haines, "Microbiology in the Preservation of Animal Tissues." Food Investigation, Special Report No. 45. London, His Majesty's Stationery Office, 1937.

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observations covered a period of 42 days. My records showed the disappearance time of *Spirochaeta pallida* under the influence of penicillin, as well as the healing period required for the testicular lesions. It is well known that normal testicles following antisyphilitic therapy do not constitute reliable evidence of the animal's cure. An additional period of 3 to 4 months' observation after the testicles become normal again is necessary to ascertain the fact of cure. At that time the popliteal lymph nodes are removed from the rabbits and tested for spirochetes by means of their intratesticular transfer into a healthy rabbit, which in turn is observed for 3 months to note evidence of testicular infection.

In this paper I am offering the final results obtained by removing the popliteal lymph nodes 100 to 115 days after the testicles of penicillin-treated rabbits became normal. As stated in my original paper,[4] one syphilitic rabbit received intramuscularly 2,500 Oxford units in aqueous solution, twice a day for 8 consecutive days—a total of 40,000 Oxford units per kilogram body weight. The popliteal lymph node transfer test proved negative and thus indicated cure. The other two syphilitic rabbits were each treated by intramuscular injections of 5,000 Oxford units of penicillin in oil suspension, once a day for 8 consecutive days—again a total of 40,000 units per kilogram body weight. The popliteal lymph node transfers also gave negative results or cure.

Additional experiments, conducted subsequent to our publication, consisted of the treatment with penicillin sodium of 3 syphilitic rabbits. One was given 3,300 units of penicillin sodium in aqueous solution three times daily, *i.e.*, 9,900 units per kilogram body weight per day, for 8 consecutive days. The total penicillin administered in this case comprised 79,200 units (about twice the amount given to the first animal treated with aqueous solution, as described in the previous publication). The result of the popliteal lymph node transfer was negative, indicating cure. Although in both cases cure resulted (negative popliteal lymph nodes), the record shows that the lesions in the animal treated with the higher dosage were freed of spirochetes and healed in a shorter time.

Two more syphilitic rabbits received twice daily 5,000 units per kilogram body weight, of penicillin sodium in oil suspension, *i.e.*, 10,000 units per day for 8 days consecutively. Each animal was given a total of 80,000 units. The syphilitic animals were cured (negative popliteal lymph nodes). Again with the double dose the curative effect was more rapid. The spirochetes disappeared more quickly from the testicular lesions, and the lesions returned to normal sooner than with the smaller dosage.

From my experiments, one may infer that syphilitic rabbits which received 40,000 Oxford units per kilogram body weight in a period of 8 days, whether in aqueous solution or in oil suspension, were cured by every accepted standard of cure for rabbit syphilis. Translated into a treatment schedule for a patient weighing 60 kilograms, the total dose for the patient should be 2,400,000 units. One ought to keep in mind, moreover, that the animals getting twice the dosage used in the original experiments, namely, a total of 80,000 units per kilogram body weight, were not only cured but were cleared of lesions faster. A somewhat more rapid curative effect was noted with penicillin in oil suspension. Since the double dose of penicillin in oil suspension was 80,000 per kilogram body weight, it suggested that total treatment for a patient weighing 60 kilograms should be 4,800,000 units.

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NON-TOXICITY OF DDT ON CELLS IN CULTURES

IN an attempt to find a standard cell system for studying the effects of DDT (2,2 bis (p-chlorophenyl)-1,1,1-trichloroethane) a number of experiments were performed with cultured tissues. The negative results obtained are presented here briefly.

HANGING DROP CULTURES

A small drop of a saturated alcoholic solution of DDT was allowed to dry on a coverglass. Hanging drop cultures of heart and intestine from 7- to 8-day chick embryos and brain and spleen from a 1-day rat were set up in different combinations of Locke solution, chicken plasma, chick embryo extract and human placental serum, so as to include the dry DDT which remained stuck to the coverglass. The cytology and migration of fibroblasts, entoderm and macrophages were not appreciably different from the control cultures without the DDT during a period of 3 days to one week. Fibroblast mitoses were about as in the controls.

A similar series of cultures of the intestine from 8-day chick embryos and brain and spleen from a 1-day rat, in which saturated DDT in acetone was dried on the coverglass before the cultures were made, were set up in different media. There were no appreciable differences between their outgrowths and those in control cultures. Living fibroblasts as they moved about in the cultures sometimes touched or even migrated over DDT crystals without any appreciable injury to themselves during a period of several days.

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[1] From the Dermatological Research Laboratories, Philadelphia, Division of Abbott Laboratories, North Chicago, Illinois.

[2] The author wishes to acknowledge with thanks the cooperation of Dr. Herman Beerman, University of Pennsylvania.

[3] Dr. Raiziss died on July 16.

[4] George W. Raiziss, SCIENCE, 100: 412, November 3, 1944.