and 7 mg. for the succeeding 8 months. (0.0001 mg. of the irradiated ergosterol per rat per day produced a continuous line in rickets rats in 7 days.)

Physical examinations of the children were made periodically as well as blood pressure readings, urine analyses, roentgenograms and analyses for serum calcium and phosphorus. The results may be summarized as follows:

1. The daily addition of a large amount of vitamin D did not produce any detectable acceleration of the healing process.

2. Such doses of irradiated ergosterol produced no discernible deleterious effects. According to some observers, toxic symptoms, *e. g.:* anorexia, vomiting, pallor, loss of weight, hematuria, hyperphosphataemia and hypercalcemia, follow the administration of this agent. Our cases showed no such harmful effects.

3. The administration of irradiated ergosterol for 12 months produced no increase in either serum calcium or phosphorus.

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Identification of Blood Serum by Precipitin Reaction.*

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The precipitin reaction has been used extensively in medico-legal work for almost 30 years. Nuttall[1] used the precipitin tests in zoological relationships and Boyden[2] confirmed the work of Nuttall and stressed the principle of reciprocal relationships. The methods used in medico-legal work have been entirely of the "trial and error" type and no satisfactory method is known for identification of the individual bloods of a mixture, often an important item in criminal trials. Zoological relationships based on serological evidence can give a basis for a less cumbersome technique in medico-legal work.

In verifying the principle of reciprocal relationships and the per cent values of relationships the methods of Boyden were used. Two per cent antigen solutions of human, horse, sheep, beef, pig, cat and

* The writer wishes to express his appreciation to Dr. A. A. Boyden of this University for his suggestions, aid and criticism of the problem investigated.

[1] Nuttall, G. H. F., Blood Immunity and Relationship, Cambridge University Press, 1904.

[2] Boyden, A. A., *Biol. Bull.*, 1926, vl, ...

rat sera were made and the protein percentage determined. Antisera of all but the cat and rat sera were used. Two and often 3 readings, were made of each reaction and they agreed very well within themselves. A comparison of some of the relationships obtained with those of Boyden and of Nuttall showed a good agreement. The general correspondence of these results demonstrates the value of this biological method for the study of relationships.

The reciprocal values of the antisera employed in the preceding experiments are shown in Table I. Of the 18 reciprocal values shown, 13 are within the range of the error of the test (100% possible error). Three of the remaining 5 which show a greater divergence are anti-horse sera reactions, which have been consistently irregular in previous tests.

The work shows that in all cases the heterologous reactions were weaker that the homologous ones by definite per cents of the homologous titers. Hence in the identification of an unknown stain, if the protein content is determined, the first test can give a clue as to the possible origin of the blood by the percentage of the reaction. For example, if an anti-pig serum of known strength was used to identify a blood stain, a 100% reaction would indicate a homologous serum. On the other hand, if the reaction was only 5% of the homologous titer we would draw a tentative conclusion that the

TABLE I.
Reciprocal Values of Antisera.

Anti-serum	Antigen	% Relationships	Antiserum	Antigen	% Relationships
♀D Beef	Sheep	37.5	Sheep ♀H	Beef	37.5
	Horse	12.5	Horse ♀F	"	12.5
	Pig	37.5	Pig ♀C	"	9.47
	Human	4.67	Human ♀G	"	6.25
♀H Sheep	Pig	37.5	Pig ♀C	Sheep	18.75
	Horse	18.75	Horse ♀F	"	1.56
	Human	18.75	Human ♀G	"	3.1
♀F Horse	Pig	1.56	Pig ♀C	Horse	9.47
	Human	7.56	Human ♀G	"	12.5
♀C Pig	Human	2.33	Human ♀G	Pig	3.1
♀B Pig	Beef	25.0	Beef ♀D	Pig	37.5
	Horse	3.1	Horse ♀F	"	1.56
	Human	3.1	Human ♀G	"	3.1
	Sheep	18.75	Sheep ♀F	"	37.5
♂A	Horse	12.5	Horse ♀F	Beef	12.5
	Sheep	50.0	Sheep ♀H	"	37.5
	Human	12.5	Human ♀G	"	12.5
	Pig	25.0	Pig ♀B	"	25.0

stain was due either to the presence of human or cat serum. (This conclusion can be drawn from the relationship values previously obtained.) The next step would be to test for human or cat blood. The investigators using the "trial and error" method would (if the reaction was not 100%) proceed to test for beef, sheep, horse and other bloods until they got a positive test. Certainly this latter method is laborious and indirect.

In experimenting with the value of the precipitin test in the identification of mixtures of unknown bloods 3 methods were tried, only one being successful. The successful method was that of specific absorption. Various antisera were absorbed with heterologous serum and this took out the antibodies for the heterologous serum and left only specific antibodies. This absorbed antiserum would then identify only a homologous serum in a blood mixture. By using several different absorbed antisera the components of a mixture could be positively identified for the "Mammalian Reaction" of Nuttall did not occur in the dilutions of antigen employed. Two controls, besides the usual antiserum control, are necessary in performing these tests. One control contains the absorbed antiserum plus the heterologous antigen used for absorption and the other contains the absorbed antiserum plus the homologous serum. Practice in diagnosis included, first, tests of known mixtures and, secondly, unknown mixtures prepared by Dr. Boyden. The individual bloods of 4 unknowns were identified and the quantity of each was closely approximated, thus showing the trustworthiness of the technique employed.

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Dietary Requirements for Fertility and Lactation: XXI. Further Studies of the Role of Wheat Oil in Lactation.*

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In the early attempts to prevent sterility on a skimmed milk powder reproduction-deficient diet, the addition of wheat oil resulted not only in fertility, but also in excellent lactation when that oil constituted as much as 3% of the ration. The reduction of the concentration of the oil to 1% did not produce any significant change in fer-

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