blood of these animals are lowered considerably after 90 days of injection. 3. Marked decrease in daily excretion of these vitamins in urine has also been observed. 4. Animals show severe skin lesions over the nose, face, paws and legs.

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Effects of Proteins on Body and Organ Weights in Thyroid-Fed Rats. (20004)

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We recently reported the effects of defatted liver residue, Liver Concentrate N.F. and Vit. B_{12} on body and organ weights of thyroid fed rats(1). This confirmed the data of Ershoff (2,3), Betheil *et al.*(4,5), and Emerson and Folkers(6,7) that liver residue contains an "anti-thyrotoxic factor."

We have extended this study to include soybean alpha protein and the partially purified animal and vegetable proteins distributed by the Rutgers University Bureau of Biological Research.

Procedure. The basal diet and animals employed were identical to those previously reported(1). The protein supplements were added in isonitrogenous amounts. The following proteins were studied: *Casein (1.12; 13.66),* beef muscle (4.68; 14.92), egg albumin (7.03; 12.59), wheat gluten (0.67; 13.38), peanut flour (4.18; 9.61) and whole egg (5.1; 11.85).* These proteins were obtained from the Rutgers University Bureau of Biological Research. They have been the subject of many studies, and methods of their preparation have been published(8). *Alpha protein (1.52; 13.8),* obtained from the Glidden Co., Chicago, Ill. This was supplemented with 2% d,l-methionine prior to use. *Defatted liver residue (2.61; 13.92)* similar to that used in our previous publication(1).

* First figure in parenthesis is % ash. Second figure % total nitrogen.

Results and discussion. Our data are reported in Table I. As previously shown, defatted liver residue counteracts the growth retardation due to thyroid and permits maintenance of normal adrenal and thymus weights.

Since defatted liver residue is largely protein, it was of interest to examine other proteins as a source of "anti-thyrotoxic factor". Our results show that when tested by their

TABLE I. Effect of Liver Residue, Rutgers Proteins and Alpha Protein on Body and Organ Weights of Thyroid-Fed Rats.* (The experiment continued for 28 days; 8 rats started per group.)

Dietary supplement, %	Thyroid, %	No. surviving rats	Gain body wt, g (mean ± S.E.)‡	Adrenal wt, mg† (mean ± S.E.)‡	Adrenal wt,† mg /100 g body wt	Thymus wt, mg (mean ± S.E.)‡	Thymus wt, mg /100 g body wt
0	.0	8	101 ± 7.6	25.4 ± 1.29	18.6	436 ± 30	320
0	.2	6	74 ± 5.3	50.4 ± .88	46.5	213 ± 29	197
Defatted liver residue, 10	.2	7	99 ± 4.6	35.2 ± 1.37	26.2	344 ± 30	256
Casein, 10.2	.2	5	77 ± 3.4	39.2 ± .95	35.5	284 ± 31	256
Beef muscle, 9.3	.2	7	87 ± 5.6	30.6 ± 1.03	25.3	272 ± 23	224
Egg albumin, 11	.2	6	82 ± 7.4	47.8 ± 1.30	41	332 ± 11	284
Wheat gluten, 10.4	.2	7	88 ± 2.2	50.4 ± 1.52	40.5	293 ± 29	237
Peanut flour, 14.5	.2	3	96 ± 7.2	63.2 ± 1.81	48.3	336 ± 30	260
Whole egg, 11.7	.2	8	93 ± 2.6	60.8 ± 1.36	47.3	446 ± 42	350
Alpha protein,§ 10	.2	5	78 ± 7	49.6 ± 1.01	44.2	382 ± 24	340

* In one experiment a dietary supplement of 10% Wilson's edible porcine gelatin did not prevent weight loss in thyroid fed rats.

† In each case the figures represent the weight of both adrenals.

‡ Stand. dev. of mean = $\sqrt{\frac{\Sigma d^2}{(n)\ (n-1)}}$ where "d" is the variation of the individual measurement from the mean and "n" is the number of measurements.

§ Alpha protein was supplemented with 2% d,l-methionine prior to use.

effect on growth and survival, proteins vary in their content of this factor. Casein and alpha protein are very poor sources. Beef muscle, egg albumin and wheat gluten are better sources, while whole egg is comparable to defatted liver residue in its effect on growth and survival. Peanut flower may also contain the factor, but survival is poor in our experiments.

Those proteins with an anti-thyrotoxic effect similar to liver residue, as measured by growth and survival, are not necessarily similar in their effects on organ weights. Egg albumin, peanut flower and whole egg, none of which affect the adrenal, maintain thymus weight. Alpha protein, when supplemented with 2% d,l-methionine, has an amino acid pattern equal to some of the best proteins, and yet gives poor performance for growth and the maintenance of normal adrenal weight. It is effective in maintenance of thymus weight. Beef muscle is the only protein tested which resembles defatted liver residue in all the anti-thyrotoxic effects measured.

More than one factor is necessary to counteract the effects of thyroid in the diet, since some proteins prevent growth inhibition but do not affect organ weight changes. Conversely, other proteins maintain normal organ weights but do not counteract growth inhibition. Whether these differences are due to unknown factors or to a proper balance of those already known, cannot be stated at this time. Since more than one factor is involved, it is possible that a mixture of several proteins would be more efficient than a single protein in counteracting all the effects of thyroid in the diet of the rat.

Summary. 1. Several proteins have been compared to defatted liver residue in their effects on body and organ weights of thyroid fed rats. 2. Beef muscle is the only protein studied which gives results similar to defatted liver residue. 3. Several factors are involved, since some proteins maintain body weight but do not affect organ weight. Other proteins affect organ weights, but do not maintain body weight in the thyroid fed rat.

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Effect of Pentobarbital Sodium Anesthesia upon Volume Blood Flow, Arterial Pressure and Heart Rate.* (20005)

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Pentobarbital sodium is one of the most widely used general anesthetics for animal experimentation. Few studies have been reported concerning the effects of this barbiturate upon peripheral circulation. Richter and Oughterson(1) reported that its administration was followed by a marked vasodilator effect. Tabern(2) found that this drug had little effect on blood pressure and respiration when administered to laboratory animals in doses of 30 to 45 mg per kg of body weight. Morrison, Walker, and Richardson(3) found that gradually increasing doses of pentobarbital produced a gradual fall in blood pressure and a marked increase in pulse rate of dogs. The experiments described in this report are concerned with the effects of anesthetic doses of pentobarbital sodium upon pulse rate, arterial pressure and volume of blood flow through the femoral artery of adult dogs.

Method. The methods employed in these studies permitted the continuous recording of volume blood flow, arterial pressure and heart rate before, during and after the intravenous injection of an anesthetic dose of pentobarbital sodium (35 mg per kg of body weight). Volume blood flow was measured through the femoral artery by means of an electromagnetic flow meter with the aid of heparin as an anticoagulant(4). Pre-anesthetic control measurements were made on trained animals. This procedure required infiltration of the area of cannulation with a 2% solution of procaine hydrochloride. A preliminary period lasting from 15 to 30 minutes was allowed for recording pre-anesthetic values, after which time anesthesia was induced by intravenous injection of 35 mg of pentobarbital sodium per kg of body weight. Injection time required approximately 30 seconds. The anesthetic was made up as a 7% solution of pentobarbital sodium in 15% ethanol.

Results. The results from experiments on 8 dogs are summarized in Table I. Administration of anesthetic doses of pentobarbital sodium was followed by a transient increase in the volume blood flow through the femoral artery, which usually returned to pre-anesthetic values within 15 minutes. In a few cases the increase in blood flow persisted for as long as 30 minutes. Mean arterial pressure declined after anesthetic administration and gradually returned to approximately pre-anesthesia values within 15 to 30 minutes. Increased pulse rate was noted throughout the duration of anesthesia. The administration of an amount of ethanol which would be present in an anesthetic dose of a solution of pentobarbital was found not to cause significant changes in arterial pressure and volume blood flow. In other experiments it was found that the administration of "booster" doses of pentobarbital sodium in amounts of 10 to 20 mg per kg of body weight was followed by transient changes in arterial pressure and femoral artery blood flow similar to those found for full anesthetic doses of the drug.

The results of this investigation indicate

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