for the same period (one hour) to test the reproducibility of this effect.

The values obtained for the mean duration of the prepupal period, expressed in days, were as follows:

Experiment	*Irradiated*	*Controls*	*Difference*
1	8.35	5.18	3.17
2	8.37	5.04	3.33
3	8.04	4.83	3.21

In another group of experiments larvae were irradiated with radiations, a larger proportion of the energy of which was due to radiations of short wavelength. The conditions of irradiation were as follows: Spark gap 8 cms. between spheres; M. A., 5; target distance 54 cms.; filter 1.0 mm. aluminum and 0.5 mm. copper. The X-ray bulb was contained in a lead drum with a circular aperture of 13.5 cms. diameter. The periods of irradiation were varied, being 50, 100, 150, 200, 250 and 350 minutes, respectively, the corresponding mean duration of the prepupal period, *expressed in days,* being 5.76 ± 0.08; 6.02 ± 0.04; 6.39 ± 0.11; 6.77 ± 0.05; 7.02 ± 0.10; 7.46 ± 0.08; 7.87 ± 0.12, while the value for the controls was 5.63 ± 0.05 (where the precision measure is the a. d. and the number of independent observations for each irradiation interval was four). *These data indicate that the mean duration of the prepupal period is an increasing function of the period of irradiation, under otherwise fixed conditions of irradiation, at least within the interval studied.*

These results suggested the possibility of observing an effect of the radiations just described when employed in a manner similar to that utilized in determining "depth dosage" in radiation therapy, where either water or paraffin phantoms are used in conjunction with the ionization chambers placed at various depths. To this end paraffin blocks were prepared, 25 by 25 by 2.5 cms. with cylindrical wells at the center of one of the large faces of each. These wells were 2.5 cms. in diameter and 0.5 cm. deep. The larvae to be irradiated were selected from a batch of prepared larvae by a method of random sampling and distributed in the wells mentioned above and in a similar well utilized for the controls, aseptic technique being employed throughout. The wells were then covered with a piece of paraffin-permeated paper and sealed, following which perforations were made in the paper lid. The blocks were now stacked so that the edges of the square faces coincided and the wells were accordingly co-axial. Previously air vents had been arranged in the paraffin for ventilation which was facilitated by the use of an electric fan. The stacked blocks were so placed under the X-ray bulb that the centroid of the target lay on the common axis of the cylindrical wells.

Experiments were performed in accordance with the procedure just outlined, in which the period of irradiation was six hours and the distance from the target to the upper face of the top paraffin block was 54 cms. The resulting mean duration of the prepupal periods, *expressed in days,* for the larvae in the various blocks was as follows: 8.37; 7.90; 7.16; 6.47; 6.17; while the mean value for the controls was 5.57 days.

Obviously, it would be desirable to have a measure of the time of irradiation required to produce the same extension of the mean prepupal period in the different layers rather than or in supplement to the data given above. We have been unsuccessful with experiments of this kind, because the facilities for producing a sufficient radiation intensity available at present in our laboratory are such that the period of time required to effect significant changes in the larvae irradiated at the lower levels is so great that it is disadvantageous to maintain the larvae in the unnatural environment. In the experiments performed so far we have not obtained reproducible results.

We hope that in the near future we shall have the necessary facilities for completing these experiments and extending our work to include observations of other biological processes in the same as well as in other systems. Such experiments will undoubtedly lead to a better understanding of how radiations affect biological processes and it is possible that methods may be made available which will permit the measures of biological effects and those of ionization effects to be contrasted.

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THE ANTI-STERILITY VITAMIN E AND POULTRY[1]

HERBERT M. EVANS and George O. Burr,[2] of the University of California, stated in a paper presented at the Washington meeting of the National Academy of Sciences, and reported in Volume LXI, No. 1585, SCIENCE, that "sterility is a dietary deficiency disease for it can be cured or prevented by a change in dietary régime, a change involving the addition of certain single natural foods high in a food factor or the addition of very much smaller amounts of extracts of those foods." The work reported was with rats.

In this report they state that Vitamin E is present

[1] Published by approval of the Director of Agricultural Experiment Station as Technical Paper No. 47.

[2] "Anti-Sterility Vit. E.," Evans and Burr, SCIENCE, 61, 519–520, May 15, 1925.

but extremely low in milk fat and that cod liver oil is notably lacking in Vitamin E and that throughout the life of the animals 9 per cent. by weight of the ration may be constituted of cod liver oil and yet sterility results.

Vitamin E has been found to exist in oats, corn and especially wheat. The wheat germ is said to have an extraordinary richness of E Vitamin. Other feeds reported to contain it are lettuce, dried alfalfa, pea seedlings, rice, yellow corn, rolled oats, velvet bean pod meal, egg yolk and cooked meat.

Katherine Scott Bishop, of the University of California, assisting Herbert M. Evans, and Barnett Sure, of the University of Arkansas, have carried on experiments leading to the same conclusions as those reported in SCIENCE on a diet composed of milk casein for protein, cornstarch for carbohydrates, lard for fat and the proper mineral salts, with the addition of a little butter for Vitamin A, yeast for B, orange juice for C and cod liver oil for D. The rats grew normally and thrived but they failed in fertility.[3]

The addition to the dietary of a little lettuce or rice enabled the rats to reproduce. Four successive generations have been raised on such a synthetic diet.

Evans and Bishop have found that the male as well as the female is affected by the lack of this substance and they have been able to extract it from favorable foods by alcohol and ether.

Recent experiments conducted at the University of Idaho on the influence of hatchability of certain feeds of high vitamin content and certain animal protein feeds indicate that nutritional conditions affecting hatchability in chickens apparently differ from those in other animals. In these experiments the hens all received wheat for their scratch feed. During 1923–1924, the basal mash (B) was composed of equal parts of wheat bran, shorts, cornmeal and ground oats, to which was added two pounds of charcoal and four ounces of salt per one hundred pounds. In addition to the mash the birds received grit, oyster shell and water. This ration was lacking in animal protein content. The no-high vitamin feed pen received no feeds in addition to this ration. The dry yeast pen received 2 per cent. dry yeast in the mash and the cod liver pen received 2 per cent. of medicinal cod liver oil in the scratch feed. This oil was mixed into the wheat about every five days.

During 1924–1925, the basal ration was changed. Twenty per cent. peameal was added to the mash and unlimited sour milk was given. No water was available to the hens. This ration (A) contained ample animal protein content for egg production. In 1924–1925 they had the run of pens 8′ x 40′. During 1925–1926 the ration was the same, but the birds were confined the entire year. During 1924–1925 and during 1925–1926, the lawn clippings pen received five pounds of lawn clippings per one hundred birds daily. These lawn clippings contained blue grass and Dutch white clover and had been cured in the sun and then sacked. They were soaked in water before being fed. During 1925–1926, alfalfa leaves and blossoms, prepared in a similar way, were fed in one pen. Both the lawn clippings and alfalfa leaves and blossoms may have some Vitamin D content due to the method used in preparing them.

The following table shows the results of the experiment during the three years, 1923–1926.

TABLE I

INFLUENCE OF CERTAIN VITAMIN FEEDS ON HATCHABILITY

Feed	Basal Ration B—No Animal Proteins		Basal Ration A—Animal Proteins	
	Year	Per cent. hatchability	Year	Per cent. hatchability
Cod liver oil	.....	.....	1924–25	61
	1923–24	26	1925–26	57.9
No vitamin feed	.....	.....	1924–25	26
	1923–24	24	1925–26	37.4
Dry yeast	.....	.....	1924–25	38
	1923–24	30	.....	.....
Lawn clippings	.....	.....	1924–25	54
	.....	.....	1925–26	59.6

SUMMARY OF AVERAGES

Feed	Years	Per cent. hatchability
Cod liver oil	1923–26	48.3
No vitamin feeds	1923–26	28.1
Dry yeast	1923–25	34
Lawn clippings	1924–26	56.8

During 1923–24, when the ration was low in animal protein feeds, none of the pens gave good hatchability. The addition of feeds of high vitamin content to this ration was of little value of increasing hatchability. During 1924–1925, the hatchability in the no-high vitamin and dry yeast pens was very poor, while in the cod liver oil and lawn clippings pens it was high. The addition to the ration of animal proteins in the form of sour skim milk was apparently an important factor. During 1925–1926, when the birds were confined during the entire year and the ration again contained sufficient animal proteins the no-high vitamin pen again gave very poor hatchability compared to pens getting cod liver oil, lawn clippings and alfalfa leaves and blossoms.

[3] "Fertility Vitamin," E. E. Slosson, *Sci. Monthly*, 18: 447–8, April, 1924.

Additional experiments involving the influence of different animal protein feeds on hatchability bring out some very interesting and valuable results. Sour skim milk has proved especially valuable. Pens getting sufficient vitamins rarely give poor hatchability when the birds are getting unlimited sour skim milk. It is necessary, of course, that other conditions be right.

The extensive experiments in the feeding of poultry at the University of Idaho Agricultural Experiment Station show conclusviely that reproductive disorders in poultry can not be remedied by simply adding wheat, yellow corn, oats or other feeds which have been found to contain Vitamin E. From the nutritional viewpoint, a combination of factors is necessary for maximum hatching power. In addition to the feeds that the breeding stock are given, there apparently are many other important influences.[4]

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THE AMERICAN ASSOCIATION OF MUSEUMS

THE twenty-second annual meeting of the American Association of Museums was held in Washington, D. C., from May 23 to 25. The marked feature of the conference was the extent to which the program was in the hands of members and delegates rather than of scheduled speakers. This circumstance, and the almost complete absence of questions of business, which, during the recent years of association growth have so absorbed attention, produced a meeting of unusual profit.

Coming at the end of the fourth year of the association's work since permanent headquarters were established, the meeting gave opportunity for an appraisal of progress. The reports of officers indicated that the organization has now emerged from the class of experiments and has taken its place squarely in the ranks of established institutions. Its progress has been partly in the nature of financial development, accompanied by increased service, and partly of broadened outlook attendant upon the growth of projects. Among the undertakings completed are the Yosemite Museum—erected by the association and now turned over to the Federal Government; an important traveling exhibit of industrial art objects brought from the recent International Exposition of Decorative and Industrial Arts and circulated to the larger art museums of the country; reports of two surveys of European museums; a field study of small museums in this country, and a report of this work in the form of a "Manual for Small Museums."

The report of the treasurer showed total income for all purposes to be $56,277.41 and total disbursements to be $41,915.98.

Among new projects undertaken during the meeting were an effort in cooperation with the National Education Association to secure the services of a specialist on school museum relations, and establishment of a demonstration small museum. A course of training for museum work, which has been under contemplation for some time, was announced for next fall, and progress was reported in the development of a clearing-house service for exchange and redistribution of museum collections.

The general sessions of the conference were held on three successive mornings—at the Smithsonian Institution, the American Red Cross National Headquarters—where the Red Cross Museum is located—and the Corcoran Gallery of Art, respectively. One principal paper on each morning was followed by a full discussion and a series of committee reports. There was an outdoor afternoon session following luncheon at the Great Falls of the Potomac; an evening devoted to simultaneous sessions on art, science and history problems, and a final banquet at which the speakers were: Dr. E. E. Lowe, of Leicester, England, representative of The Museums Association of Great Britain; Lorado Taft, of Chicago, and Dr. L. O. Howard, of Washington, D. C. The presidential address was delivered by Chauncey J. Hamlin, president of the Buffalo Museum of Science.

The free discussion, which figured so prominently in the meeting, was responsible for two impromptu sessions devoted to educational work—a subject of outstanding importance to museum workers at the present stage in the development of their technique. The ranks of museum educational workers were supported by a number of school representatives, whose presence indicated a new tendency on the part of school boards to inquire actively into museum cooperation.

Officers were elected for the coming year as follows:

President, Chauncey J. Hamlin, Buffalo.

Vice-presidents, Fiske Kimball, Philadelphia; Arthur C. Parker, Rochester; Charles R. Richards, New York, and George H. Sherwood, New York.

Secretary, William deC. Ravenel, Washington.

Treasurer, George D. Pratt, New York.

LAURENCE VAIL COLEMAN,
Director

[4] "The Feeding and Management of Breeders," R. T. Parkhurst, Agricultural Experiment Station Circular No. 44, April, 1927.