furnished practically all. In the first period, 5 rats received the corn germ diet while their pair mates received, in equal amounts, the beef diet. In the second period, all rats received the 4 per cent. egg protein (standardizing) diet, and in the third period the two diets were fed as in period 1, but to opposite pair mates. The results for true digestibility (corrected for metabolic nitrogen in the feces) and biological value (percentage of absorbed nitrogen retained for maintenance and growth) of the nitrogen in the two foods are summarized in Table 1.

It is evident from these data that the protein (nitrogen) of defatted (solvent-extracted at low temperature) corn germ is 85 per cent. as digestible as the protein of beef round, but that its biological value for the growing rat is as high as that of beef round.

The average biological value of 78 obtained for this sample of corn germ may be compared with values of 50 to 65 obtained for the cereal grains, 51 to 60 for a series of nuts widely used in the American diet, 72 for the cashew nut, 94 for whole egg, 90 for raw whole milk, and 62 to 77 for various cuts of meat and edible animal organs.[7] These values were all obtained in this laboratory by comparable methods.

A comparison of the utilization of the protein of corn germ with that of the soybean, a comparatively newcomer in the American diet, was also undertaken. The soybeans tested were dried, defatted and autoclaved at 17 pounds steam pressure for 1½ hours. The data presented in the right half of the table were obtained by an identical experimental procedure with beef protein as a reference food. From these figures, it is evident that soybean protein is about as digestible as corn germ protein, but that the digested protein is appreciably less available in satisfying the protein requirements of maintenance and growth.

Thus, corn germ prepared by dry milling is available in considerable quantities as a protein supplement to the American diet. It is a food rich in protein and also in thiamine. When processed in such manner as to preserve its inherent nutritive properties, its protein is well digested, and after digestion it is as well utilized in satisfying the protein requirements of the body as is the protein of the best cuts of meat. In the difficult times ahead, with food shortage at hand or in immediate prospect, and a protein shortage a distinct possibility, a full utilization for human needs of the corn germ already available as a by-product of the corn milling industry would seem to be a wise eventuality. Furthermore, the withdrawal of corn germ from the corn milling by-products used as animal feeds would not precipitate a serious situation in livestock feeding because the protein thus withdrawn can be amply replaced from sources unfit for human consumption or less well utilized by the human, while the withdrawal of its thiamine is of no significance to animals living so largely on whole grains or forages.

[7] H. H. Mitchell, *Proc. Seventh Convention of the Royal Academy of Italy, Rome*, 1937, p. 101.

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CONTROL OF AIR-BORNE MICROORGANISMS BY ULTRAVIOLET FLOOR IRRADIATION

STUDIES of air-borne bacteria in living spaces have demonstrated that bacterial counts are correlated with human activity and that the highest number of bacterial colonies are recovered in the lower levels of such spaces. There are also reports that cross infections can be reduced to a measurable extent by prohibiting the making of beds immediately before dressings are to be changed and by carefully oiling floors and avoiding dry sweeping. It has long been known that pathogenic microorganisms can be recovered from the dust of rooms where carriers of such organisms are present.[1, 2, 3]

From these facts it may be inferred that bacteria of the air are closely associated with dust particles on floors and lint and dust attached to blankets, linens and clothes. During periods of human activity the momentary turbulence of the air raises dust which quickly subsides after the room is emptied or activity is reduced.

Because of these considerations it was thought that ultraviolet floor irradiation might be more effective in controlling air-borne bacteria than upper-air irradiation or that the two in conjunction might be more effective than the present practice of merely irradiating the upper third of rooms or wards.[4]

To check the effectiveness of ultraviolet floor irradiation several experiments were conducted in a sheet-metal-covered experimental chamber of $9 \times 7 \times 8$ feet. The floor of this room was irradiated by 4 eight-watt low pressure mercury vapor glass lamps, 30 inches from the floor. All radiation from the lamps was reflected downwards. One half hour before each experiment a small amount of fine house dust was introduced into the experimental chamber. Two small fans were placed in opposite corners of the room. The fans were maintained at a constant speed throughout all tests.

Bacteria in the air were quantitated by the open

[1] E. White, *Lancet*, 1: 941, 1936.
[2] J. C. Thomas, *Lancet*, 1: 433, 1941.
[3] M. VanDenEnde and C. H. Andrewes, "Aerobiology," Am. Asn. Adv. Science, Misc. Publ. 17, 1942.
[4] W. F. Wells and M. W. Wells, "Aerobiology," Am. Asn. Adv. Science, Misc. Publ. 17, 1942.

plate method, the bubbler pump[5] and by the funnel device.[6] In each experiment four sets of samples were taken at 30-minute intervals. The effect of ultraviolet radiation was determined by starting the lamps after the second set of samples had been taken. As a control two sets of experiments were performed without lighting the lamps so as to estimate the effect of settling without radiation.

TABLE 1

THE EFFECT OF ULTRAVIOLET FLOOR IRRADIATION WITH FOUR ULTRAVIOLET LAMPS ON AIR-BORNE BACTERIA. LIGHTS ON 10 TO 20 MINUTES AFTER THE SECOND RUN. TIME BETWEEN RUNS ABOUT 30 MINUTES. TEMPERATURE: 31–35° C. RELATIVE HUMIDITY: 53–63 PER CENT. ADDITIONAL FIVE EXPERIMENTS WITH LIGHTS ON AND OFF AND ONE ADDITIONAL CONTROL GAVE SIMILAR RESULTS TO THE ABOVE EXPERIMENTS

		Experiment 1					Control					
		Run	No. of observ.	Mean per plate	σ	No/10 c. ft.		Run	No. of observ.	Mean per plate	σ	No/10 c. ft.
Open plate	Lights off	1	10	20.3	2.04	...	Lights off	1	10	20.8	5.40	...
		2	10	21.1	1.83	...		2	10	17.5	4.45	...
	Lights on	1	10	4.5	1.25	...		3	10	20.5	8.20	...
		2	10	5.4	2.04	...		4	10	23.2	2.85	...
Bubbler pump	Lights off	1	12	4.8	.73	242	Lights off	1	12	4.5	1.32	225
		2	12	4.2	.74	210		2	12	4.3	.96	217
	Lights on	1	12	1.3	.38	63		3	12	3.3	.70	169
		2	12	1.9	.44	96		4	12	4.1	1.19	204
Funnel device	Lights off	1	2	49	...	49	Lights off	1	2	59	...	59
		2	2	43	...	43		2	2	50	...	50
	Lights on	1	2	29	...	29		3	2	47	...	47
		2	2	16	...	16		4	2	46	...	46

The results of these various runs are shown in Table 1. It will be observed that the ultraviolet floor irradiation produced a significant lowering of air-borne bacteria in the experimental chamber.[7]

The results are sufficiently striking to justify the suggestion that floor irradiation be combined with ceiling irradiation in practical tests in barracks or hospital wards to determine the effect, if any, of ultraviolet irradiation in lowering morbidity rates or preventing cross infection. If such experiments be attempted it must be borne in mind that certain types of flooring may prove to be capable of reflecting sufficient amounts of ultraviolet to cause harmful effects.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

SPECTROSCOPIC MICRODETERMINATION OF MUSCLE ADENYLIC ACID

THE absorption spectrum of adenylic acid in the ultraviolet shows a maximum at 2,600 Å, which is characteristic for the adenine group.[1] The deaminated product inosinic acid has its absorption maximum at 2,500 Å. This difference in absorption spectra between the amino and the hydroxy purine nucleotides was described as early as 1932 by Myrbäck, Euler and Hellström[2] and recently a corresponding difference in absorption spectra has been described for adenine and hypoxanthine.[3] Adenylic acid has a much higher absorption than inosinic acid in the range: 2,700–2,600 Å. At 2,650 the absorption of inosinic acid is only 40 per cent. of that of adenylic acid (see Fig. 1). This great difference in absorption spectra has been used in the present studies as a basis for a very sensitive and specific test for Schmidt's deaminase[4] or for identification and quantitative de-

[5] S. M. Wheeler, G. E. Foley and T. Duckett Jones, SCIENCE, 94: 445, 1941.

[6] Alexander Hollaender and J. M. Dalla Valle, *U. S. Public Health Reports*, 54: 574, 1939.

[7] A difference of three times the σ of the series between bacterial counts with lights on and off was considered as a criterion of significance.

[1] Ch. Dhere, *C. R. Soc. Biol., Paris*, 60: 34, 1906.

* The opinions advanced in this paper are those of the writers and do not represent the official views of the Navy Department.

[2] K. Myrbäck, H. Euler and H. Hellström, *Zs. physiol. Chem.*, 245: 65, 1932.

[3] M. M. Stimson and M. A. Renter, *Jour. Am. Chem. Soc.*, 65: 153, 1943.

[4] G. Schmidt, *Zs. physiol. Chem.*, 179: 243, 1928.