starvation the mean supine venous pressure in 32 men was 4.80 cm. of saline solution with the needle in an arm vein and the manometer zero at 10 cm. above the table level. Control measurements on 12 normal men gave averages of 9.7 and 10.3 cm. on two occasions five months apart. Data on two of the subjects who showed only moderate clinical edema after six months of semistarvation are given in Table 1. During refeeding, the venous pressure gradually rose to normal values.

TABLE 1

	Body wt. (kg.)			SCN- Space		Plasma Prot.		Ven. Press. Cm.
Subject No.	Control	Starv.	Diff.	% Wt.	Edema* Kg.	Grams/100 cc.	A/G	Saline
109	79.3	59.5	−19.8	31.0	5.4	6.44	1.79	4.8
112	61.4	49.0	−12.4	32.3	5.0	6.78	2.01	4.5

* The figure for "edema" represents the excess extracellular water as calculated from the proportion in the normal state.

The more prominent factors in the Starling concept of edema formation would not seem to explain famine edema unless we accept the unlikely hypothesis of a remarkable hydrostatic pressure gradient between the capillary and the larger veins. Parenthetically, it may be noted that there was a moderate arterial hypotension at both systole and diastole. Of the items in the Starling equation as elaborated by Schade and Claussen, Krogh, and others, there remains only the tissue pressure. Youmans, *et al.* (*12*) emphasized this neglected factor in their attempt to explain endemic edema in Tennessee, but their calculations as to the magnitude of this pressure have been properly rejected (*2, 8*). Although we must agree that there is great uncertainty about the actual tissue pressure at the site of filtration, normally it is probably only a small fraction of the plasma colloid osmotic pressure. From digital examination it appears that the tissue pressure in starvation is subnormal, but even a profound decline could scarcely surpass 10 per cent of the intracapillary pressure. By exclusion, then, it appears that the balance between blood plasma and interstitial fluid does not represent a simple equilibrium, as is customarily postulated.

The assumption of actual equilibrium in such a dynamic situation as that at the capillary wall would seem to be unduly optimistic on *a priori* grounds. The fact of lymph flow is itself an indication of imperfect balance. It is well known that the prediction of rates of reactions or other events in nonequilibrium states from equilibrium equations is both hazardous and complicated. There is no reason to believe that the exchange between plasma and tissue fluid is an exception.

Summary

Famine edema was produced experimentally in 34 normal men who lost a quarter of their body weight while subsisting for 6 months on a European type of semi-starvation diet. The ratio of extracellular water to cellular tissue was roughly doubled. Their clinical state closely resembled that seen in Europe in 1945. There were no signs of renal or cardiac failure. The plasma protein concentration fell only slightly and the A/G ratio remained within normal limits. The venous pressure was roughly 50 per cent below normal. Data from the field lend support to these indications that famine edema is not simply a result of hypoproteinemia or of renal or cardiac failure. It is concluded that there is a dynamic nonequilibrium state of the capillary wall and, accordingly, calculations from equilibrium equations are inadmissible.

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Antibacterial Action of Phenanthrene-related Substances

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Intrapleural injection in tuberculous empyema (some mixed infected) of a vitamin A and D concentrate, considering it as a topical application of the cod-liver oil vitamins, resulted in disappearance of the pathogenic organisms (*4*).

In further clinical work, vitamin D alone proved to be responsible for the antibacterial action against tubercle bacilli, *Proteus vulgaris, Bacillus aerogenes,* nonhemolytic streptococcus, and *Staphylococcus aureus.*

In vitro vitamin D inhibited the growth of tubercle bacilli if added (50 units/cc.) to the culture media (Hohns, Loewenstein, Corpers Potato Media). By using the plating method, *Staph. aureus, P. vulgaris,*

and *B. aerogenes* were inhibited. These clinical and laboratory findings are being reported elsewhere in detail (*4, 5*).

Vitamin D (activated ergosterol) is chemically ergosterol (*i.e.* characterized by the phenanthrene ring), the antirachitic property being due to intramolecular changes (*1*).

Since ergosterol (nonactivated) added to culture media inhibited tubercle bacilli and *Staph. aureus,* thus excluding the antirachitic factor as being responsible for the antibacterial action, we can assume that the chemical structure of vitamin D and ergosterol is responsible.

Cholesterol (a phenanthrene-related substance) added to culture media also inhibited tubercle bacilli and *Staph. aureus.*

Substances related to phenanthrene are very common in nature (e.g. sex hormones, heart glycosides, cholesterol, ergosterol, vitamin D, etc.) (*2*).

The substances reported here—cholesterol, ergosterol, and vitamin D—have in common the phenanthrene ring and the antibacterial action.

In vivo, in preliminary experiments, tuberculosis in guinea pigs was suppressed by injection of large doses of vitamin D (viosterol, 5,500,000 units D or more).

Bile salts are also phenanthrene related and have been known to have "bacteriostatic action on some species of microorganism" (*3*).

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News and Notes

Valy Menkin, assistant professor of pathology at Duke University School of Medicine, has been appointed associate professor of experimental pathology in the newly created Department of Surgical Research at Temple University Medical School, Philadelphia.

Harold Hotelling was guest of honor at a testimonial dinner given 3 May by the Statistical Techniques Group, New York Chapter, American Statistical Association. Dr. Hotelling is leaving Columbia University at the end of the academic year to become professor of mathematical statistics at the University of North Carolina.

On behalf of the Group, Helen M. Walker presented gifts to Prof. and Mrs. Hotelling. The chairman, Irving Lorge, introduced the distinguished visitors who came to honor Dr. Hotelling. Among the speakers were: P. C. Mahalanobis, of Presidency College, Calcutta, India; Stuart Rice, chairman of the Statistical Commission of the Economic and Social Council of the United Nations; and Dean Pegram, of the Graduate Faculties of Columbia University.

Prof. Hotelling reviewed the changes in statistical theory and techniques that were developed during the 15 years of his professorship at Columbia University.

Fritz Lenz, former professor of eugenics at the University of Berlin and long-time editor of the *Archiv für Rassen- und Gesellschafts-Biologie,* is at Obernfelde bei Lubbecke, not far from Osnabrück in the British zone of occupation. All of his family survived the war.—*Paul Popenoe* (American Institute of Family Relations).

Roger Adams, head of the Chemistry Department, University of Illinois, was presented the Theodore William Richards Medal of the American Chemical Society's Northeastern Section at a meeting Thursday evening, 9 May, in Huntington Hall, Massachusetts Institute of Technology, Cambridge.

James Bryant Conant, president of Harvard University, reviewed the life and scientific achievements of Prof. Adams, who is a native of Boston and a Harvard graduate. Prof. Foster, head of the Chemistry Department in the State Teachers College, Framingham, Massachusetts, and Section chairman, presented the medal.

Norman W. Pirie, virus physiologist at the Rothamsted Experiment Station, England, is at the Worcester Foundation for Experimental Biology as a fellow of the Foundation.

Ottavio Munerati, well known for his genetical studies on sugar beets and other crops, writes that he has continued as director of the R. Stazione Esperimentale di Bieticultura at Rovigo, Italy. Dr. Munerati is anxious to renew contacts with scientists in the United States. During the war he was able to publish only one paper: "Duration of the beet