

The problematization of food as a war concern within the British state began late in 1915 and the government only approached scientific institutions with wartime problems of food and nutrition, beyond the sufficient rationing of troops, in 1916. When called upon to assist the state in its wartime efforts, biochemists seized the opportunity to increase their knowledge and understanding of the little understood and not yet isolated vitamins. The difficulty was that while British biochemists were certain of the power of the vitamins in nutrition, they had not yet been able to isolate them chemically. Attempts to isolate the substance had been unsuccessful as the 'active substance' could never be maintained through the different trials of isolation. Rather, scientists concentrated their efforts upon determining the function of the accessory food factors in animal metabolism and disease prevention and proceeded in their investigations through feeding experiments with live animals such as rats, pigeons, chickens or guinea pigs.

Because the isolation of the vitamins had eluded scientists for some years, in 1916 Robert R Williams decided to approach the

problem from another direction and attempted to create a chemical substance that had the curative properties specifically of the antineuritic substance (vitamin B) and in this way determine the vitamin's chemical structure. "The difficulties involved in the isolation of 'vitamines' from yeast or rice polishings have proven so serious that success seemed doubtful until a clearer idea should be gained of the chemical nature of these important substances. Accordingly attention has been directed to the preparation and testing of synthetic substances, which appeared like to display some curative properties similar to the 'vitamine fraction' of natural foodstuffs" (Williams 1916a: 437).

Williams concluded that, "the explanation of the results obtained appears to be that an isomer of adenine is the chemical entity responsible for the characteristic physiological properties of the 'vitamine' under investigation". He wrote, "The pathological conditions of polyneuritis are not due to a deficiency of a substance per se, but to a lack of a certain type of potential energy which only certain substances can supply. In other words, one is led to surmise

that it is the potentiality of isomeric change that produces the desired result”.

Here the power of the vitamins is exactly a power of incorporeal transformation, a potentiality, the power of the vitamins is a power of rearrangement, changes in state. The isomerization of the molecule works as a kind of spring in the metabolism of the organism. It is like a rubber band that has been tightly wound, so that the ends can be seen to be twisting, A on the left, B on the right, then B on the left and A on the right. With this movement of end A from left to right a certain amount of potential energy is released, energy which can be put to the establishment and maintenance of various systems, such as children’s wind up cars. The isomerization is a boundary practice (or performance) in the world. Health for the lab animal here is constituted in the boundary between one isomer and the other.

“In each case all the cures obtained were of those pigeons which were first treated with a given preparation, while those treated with the same preparation a few days or weeks later

invariably received no benefit. It was obvious that the substance had changed in some manner so as to lose the curative power. As there was no evidence of decomposition, it seemed probable that it was due to isomerisation” (440). And, “The antineuritic properties of these substances suggest that an isomerism is at least partially responsible for the instability of the ‘vitamines’ in foodstuffs, and that the antineuritic property may be inherent in this type of isomerism” (445).

Williams further proposes this potentiality is a regulator that might be rather more widely spread than his experiments indicate or than current science is aware. “Such rearrangement have greatly interested organic chemists for many years, but no definite evidence has been adduced that such transformations take place in the tissues as a fundamental part of a biological process, though they appear to be just such reactions as might easily occur within the living organism” (440). Therefore, in proposing the power of the isomeric transformation as the primary physiological characteristic of the vitamins, Williams is effectively flattening much larger

organic systems than even his own lab. “We may not conclude that ‘vitamines’ are necessarily hydroxypyridines since a similar isomerism may exist in substances containing other heterocyclic nitrogenous nuclei which are known to occur widely as constituents of animal tissues” (Williams I 445).

It is significant that Williams can propose that heterocyclic nitrogenous nuclei might be found quite widely in nature because of their widespread occurrence in animal tissue. The system of animal metabolism can only continue with the connections rendered by the vitamins. We might effectively think of the evolution of the need for vitamins as a system by which the organization of whole ecologies is maintained. If we no longer consider the relevant system to be the organism as bounded by its skin, we might readily understand the vitamins as regulators in and of much broader ecologies. When the organism is tied into different economies the vitamins also serve as a spring for the organization of that system, release that system as a possibility, release the possibility for a system of increased complexity, indeed.

Williams concludes that his initial problem in fact supports the very solution that he is proposing to that problem. “If the isomeric forms exist in equilibrium and there is fairly rapid transformation in any direction, one would suppose that the granular form would, when injected into the body, rapidly convert itself into the curative form as the latter was removed from solution by absorption in the tissues or fluids requiring it. That such is not the case suggests strongly that the pathological conditions of polyneuritis are not due to a deficiency of a substance per se, but to a lack of a certain type of potential energy which only certain substances can supply. In other words, one is led to surmise that it is the potentiality of isomeric change that produces the desired result” (444).

In suggesting that the power of the vitamins is its transformative capacity, Williams also speaks to his initial problem of the isolation of the vitamin substance. That is, instability is an inherent characteristic of the vitamins. Indeed, Williams is suggesting that the vitamin is this very instability. No wonder

scientists until this point have had difficulty in maintaining the vitamins curative power through their attempts to isolate a chemical. As they searched for an effective substance, they would not recognize their encounter with the vitamin because a transformation, rather than a substance, the production of a difference, rather than the determination of a representative molecule would characterize the meeting.

The problem that emerges as a result of this work is no longer the isolation of the vitamins, but their stability and their stabilization. These results therefore produce a two-fold shift in the terrain that the scientists were working on. While biochemists had been working to isolate and determine a chemical substance, results published by Williams point to the relative uselessness of that search for the time being. The problem therefore is neither the chemical nor is it the role of the vitamins in the metabolism of individual animals. Rather now the vitamins must be stabilized in the food supply that is organized at the state level for distribution to a civilian and military population of a nation at war. The search now

is for the stability of the vitamin in the food and in the food supply through the vagaries of wartime. The vitamins are known to be biochemical instabilities that are more or less stable in the whole food supply.

The vitamins and their power of transformation are stabilized conceptually as they are integrated to state strategies by the British government as a power by which food supply might be regulated and maintained. This transformative capacity become stabilized as vitamins and this instability gets built into the British wartime food strategies and becomes therefore the capacity to sustain a transformative power at a population level and also contributes to the changing object status of the vitamins. As such, the vitamins emerge as bio-political objects. Further encounters with the vitamins as objects, therefore occur within the framework of the vitamins a biopolitical objects. That is, the deterritorializing power of the vitamins is increasingly established as a reality for the ends of a nation state at war. The changing object status of the vitamins occurs as a reterritorialization of their deterritorializing power. The



power of the vitamins to transform possibility for food systems becomes a state power by which to negotiate various and emergent political and economic situations.

Given that their regulatory function lay in an instance of transformation, the stability of the vitamins proved to be a concern for a nation at war that required the transport of foods sufficiently rich in the vitamins. Because the vitamins proved to be a biochemical instability but were also known to be found in whole foods, the stability of the vitamins was sought in the food supply. The problem scientists pursued for government was the stability of the power of the vitamins in whole foods through various food processes that food would undergo as they were moved through the system with the power of the vitamins. The concern is with conditions of keeping the stimulating substance. Maintaining precisely its power of conversion.

At the Lister Institute Harriet Chick and Margaret Hume undertook a good deal of just this kind of research. Specifically Chick and Hume had been asked to assist the government when

Australian troops in Egypt were overwhelmed by beriberi, a disease caused by a lack of vitamin B in a carbohydrate rich diet. In an article entitled, “The Effect of Exposure to Temperatures at or above 100 degrees C upon the Substance (Vitamine) whose Deficiency in a Diet Causes Polyneuritis in Birds and Beriberi in Man,” Chick and Hume state the problem as follows, “The fate of the vitamins during this treatment becomes a vital matter where preserved foods from the staple article of a diet, as may be the case with troops on active service, separated from fresh food supplies” (61).

In formulating her results this way, in terms of the ‘fate’ of the vitamins Chick folds futures and action at a distance into the oat kernels. In this formulation of the problem, the future and destiny through space are the primary elements of concern regarding the vitamins. I argue that with the stabilization of the vitamins in food, the flow of time through biological processes therefore now has a fold of time and space, a pleat that can be stored in oat kernels to be unfolded and released at later times and further distances. Further,

Chick's purpose through this research is to stabilize this fold in time and space of biological processes for governmental purposes. With the fatefully isomerization of the vitamins, a site of crossing, of transformation for both food supply and population health emerges. The specific and significant power of this site of crossing is that it is not a crossing to another time or place specifically. The power of the vitamins now is specifically to allow food supply and population health always to be dragged into the beyond, the power always of new life is stabilized in the food supply of the British Government during WWI. A flow of biological time is assured through changes in the space of the population or their food supply.

By folding, or winding, time and space into the vitamins in this manner, Chick has also effectively changed the perceptual field available to the government bureaucrats at work on the problem. They are provided with a new event horizon when thinking about food supply and population health. With the vitamins, it becomes possible to see and seize the possibilities and potential for population health in relation to food supply, as they arise as these

relations are navigated through the course of history, politics, government. The vitamins as a fold in time and space within the food supply brings into view futures and action at a distance for the bureaucrats facing these problems. As biopolitical objects, the vitamins are packages of emergence, packages of the power of life's unfolding. Chick's attempt is to stabilize this transformative power. The sites of potential in nutrition are harnessed and it follows that the normative power of our organism is contained for governmental purposes. Stabilized vitamins grant to governmental power the capacity to conceive of and to render anew (time and again) nutritional ecologies.

Once stabilized the vitamins sustain a threshold in which the life form necessitated by war can emerge. Vitamins allow for the state always the conversion to health of the population and the conversion of the food supply for war or profit. To stabilize the vitamins is to stabilize a tension, a potential and most significantly, the future release of that tension. To stabilize the vitamins is to stabilize a futures component in food.

With the emergence of the vitamins as scientific and biopolitical objects through the course of WWI, the notion of food supply is complexified. To the ‘actual’ food supply is added now a ‘virtual’ food supply. The vitamins make possible new and different spatial and temporal possibilities for food supply. This is the power to transform what was not previously food, into a food supply. There exists within the food supply now and within the bodies of the population, the mechanisms by which food supply might be changed, rearranged to accommodate emergent economic or political problems. The vitamins enable innovation in the food supply and allow the government to summon into being a healthy population within any given food supply situation. Population health can now be created, regardless of spatial arrangements of the population (soldiers at the front, civilians in the factories) or the food supply (a diet of polished rice is supplemented with the vitamin B from oats).

The vitamins mean that food supply and population health might be regulated in the face of and even at the site of new

economic, political, even technical problems. If we return to the example of the Australian troops, we see that a diet of polished rice was failing the troops. This is a technical problem, in one respect, because milling practices certainly aren't going to change in the middle of a war. The power of the vitamins can be deployed at precisely this point of the technical problem because the troops can get their vitamin B from oats.

Again, the object status of the vitamins changes in the moment when Chick stabilizes the vitamins as virtual food supply for the government. Where a diet of polished rice had not previously been 'food supply' insofar as it did not sustain the health and vitality of the troops, with the vitamins, Chick hands the government the power to render that rice into food. With the vitamins comes the potential to develop 'food' from what previously had been inadequate.

Where previously the development of 'food' and a food supply would have meant the development of a whole system of whole foods and establishing their interaction, with the stabilization of the

vitamins as biopolitical objects, the ‘food’ supply is now predicated on the movement through time and space of individual nutrients. These sites of virtuality are no longer potential for the organism, but potential for the economy and for the government to regulate population health. As biological objects, the vitamins were the physiological capacity for humans to adjust to new food distribution systems. As political objects, the vitamins’ regulatory functions were effective in allowing the government to establish new norms of food distribution.

The vitamins are regulators by which meaningful notions of health can be developed in new situations and with new food supply arrangements time and again. Once vitamins are integrated as regulator mechanisms within economies of food distribution they enable the development of meaningful notions of health within emergent economies of food. Considerations of more or less effective sources of vitamins are also considerations of the sustainability of various food distribution patterns.

Vitamins develop as sites at which the population and the food distribution system can each be undone and retied according to wartime or economic needs. The vitamins are precisely the power to sustain this threshold this capacity for metamorphosis within the population. The vitamins are sites in the food distribution economy or moments in the emergence of population health at which the body of the nation might always be taken beyond the limit of its current state of food distribution. They are a point at which the state might effectively re-invest the health of the nation, in corn, for example, rather than wheat. The vitamins then are integrated into the body politic as this rough edge, the point at which the body politic can go beyond its current limits.

A bio-political complex that includes the vitamins as part of its apparatus does not need to struggle to maintain the same norms in the face of changing economies and political situations, but is able to adjust and establish new norms. A bio-political complex with vitamins is therefore that much more robust in the face of political changes and instability. The vitamins are not only objects deployed



for British food supply problems during the Great War, they become stabilized as objects that can be deployed as needed in each war thereafter as well.