seems inevitable. Burhoe believes that the fundamental knowledge of social structure necessary to bring about peace is relatively simple and well known. Bateson feels that this is definitely not true and suspects that the simplicity is an illusion and that until the knowledge is forthcoming the social world is in mortal danger. Considerations of the following kind appear to indicate unequivocally that Bateson is correct:

(1) Naïve inspection of the earth's surface may indicate that large areas are at peace because "each person within them has the same rights and privileges as the others and may obtain what he wants by his own peaceful efforts" (Burhoe). Such inspection of, for example, the whole of Europe also should indicate that large areas have recently been at war and even now are hardly at peace because people have attempted to obtain what they wanted by war and have failed, practically everyone being worse off than before. This has happened twice in less than half a century. On both occasions the result has been essentially the same. There is a good deal of older history suggesting that only a moderate probability should be assigned to the statement that a war is a practical way to achieve economic and material ends. It is not unlikely, moreover, that if colonial or expansionist wars against technologically undeveloped regions are excluded as being (with one important exception) irrelevant to modern conditions, the probability of the thesis being correct is very low indeed. Yet the danger persists or even increases, and the geographical danger spots are still localized in regions where experience might be supposed to indicate the futility of the whole procedure. Clearly there must be other factors involved.

(2) Burhoe's remark, "by his own peaceful efforts," really begs the question and converts his argumbent into a circular one reminiscent of the *virtus dormativa* of Molière —one can have peace by being peaceful. This is to be done by the process of social engineering founded on a theory which is simple and well known but unfortunately not stated. Actually, it is reasonably certain that the values of many communities have included terms which could only be realized in warfare. If what one wants includes victims for human sacrifice, or enemies' heads, or the glory gained by rescuing distressed maidens from wicked men, then one cannot obtain these by one's own *peaceful* efforts. The examples (Aztec, New Guinea, Medieval Europe) are chosen not because they are exotic or picturesque but because they are extreme and therefore easily recognized. Their recognition immediately places on us the duty to ascertain if any of our own wants are of this kind. Moreover, the existence of such wants implies enemies who can be defeated, but if they are too thoroughly defeated, new enemies must be found to maintain the stability of the system of values. Burhoe postulates a world composed of people like himself, Bateson, and the present writer, who want primarily to continue their work peaceably. Unfortunately, there are other sorts of people, and they are not scattered at random but are aggregated into cultural groups. Bateson and the present writer, at least, would probably also consider that certain other specific values have arisen in such non-peaceful cultures which are worth preserving if it can be done without endangering the world.

(3) The factors determining the values of a culture are obviously largely unconscious, or, expressing the matter more operationally, they cannot be changed by a mere logical demonstration of their invalidity. Hence, they give rise to misunderstandings and suspicions which, when reciprocal, tend to grow by mutual stimulation unless there are mechanisms that tend to inhibit their growth. Relative to one group, the other appears unreasonable, unable to see the logical consequences, folly, and immorality of its own actions, and acquires definite psychopathic symptoms. Here we enter very difficult ground precisely because there is *no generally accepted*, inductively verified theory of such phenomena or indeed of the individual psychological phenomena which are integrated to produce the apearance of psychopathic symptoms in the behavior of a group.

(4) We are faced with three alternatives: (a) to wage a colonial expansionist war while we alone have atomic bombs, so gaining the world and losing our own souls; (b) to wait while the inevitable interaction of mutually stimulating suspicions leads through an atomic and bacteriological armaments race to an atomic and bacteriological war, causing unbelievable suffering to millions of people, destroying the material culture of a large part of our own country and of the world and with it much of the intellectual, artistic, and moral heritage dependent on that material culture; or (c) to work to find a way out of the apparent dilemma. The dilemma may prove real, but until this has been unequivocally established, the third alternative is the only one that can appeal to anyone of spirit, intelligence, and decency. If it were as theoretically easy as Burhoe believes, such people would already all be moving, perhaps too slowly, but at least in the same direction. The social engineering comes in when the direction in which we are to go is reasonably well established.

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Coordination of Cancer Research

Dr. Hammett's letter (*Science*, 1946, **103**, 714) regarding cancer research and especially his suggestion of a large-scale, coordinated research program directed toward practical benefit for the cancer patient are so important that they should not be allowed to be shelved for future consideration.

Our attitude toward the problem of malignancy has been, and continues to be, too complacent. Faced with a problem of such magnitude and complexity, we are inclined to think that its solution must await the chance discovery of some lone worker in the field at some unknown date in the future. In the meantime thousands annually die a lingering death at the hands of this killer.

Actually, this menace should be regarded in the same light as any military foe that might claim the lives of thousands of Americans before their time—that is, the situation should be considered a national emergency. This is no place to await the gradual acquisition of bits

of knowledge by independent groups working on isolated phases of the problem. What is needed here is a well-planned and completely coordinated program, directed by a group of experts in the field and serving to organize the activities of all competent investigators. This program should be financed by a Congressional appropriation of $50,000,000–$100,000,000 annually, a pittance compared to the cost of some of our war projects. It would not even buy a great many heavy bombers. It should be used to support both clinical and laboratory research along every channel considered to be of possible interest directly or indirectly in attaining the goal. There are certainly promising leads to be investigated. Several clinical workers have found sex hormones to have definite suppressive influence on certain types of carcinoma. The new availability of radioactive isotopes opens numerous possibilities to the investigator of the metabolism of malignant tissue. These are only two out of many. If we await their development along the leisurely lines of individual peacetime research, a great deal of time and thousands of lives will be lost.

Dr. Hammett has pointed out the results obtained by a coordinated national research effort in the field of atomic physics. Other examples might be cited where, under the pressure of war necessity and as a result of cooperative effort, results were obtained in one or two years that would normally have required 10 or 15. Typical of these are the development of penicillin, antimalarials, agents for bacteriological warfare, etc. Certainly the need in the cancer problem justifies no less supreme an effort. It may well be true that any practical solution will have to await a chance discovery not yet conceived. The important point is that with a large number of trained investigators working in a coordinated program the opportunity for such a discovery to be made is increased almost proportionally to the number of workers. The statistical likelihood of the lucky accident occurring is greatly enhanced.

Furthermore, it is important that we do not delay. The present program for cancer research should be expanded tenfold, organized and coordinated by a group of our best experts, and financed by government appropriation. The bill recently proposed in Congress along these lines should be supported, if adequate, and action obtained on it without delay.

It is up to the scientists of the country to back such a program and see that it is put into effect. They are in by far the best position to realize what may be accomplished and how little progress is being made at present. The AAAS is the official organization representing the majority of scientists in this country. Is there not some way in which the influence of this organization may be brought to bear to expedite an all-out, large-scale research campaign against public enemy No. 2?

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Human Breast Cancer and the Milk Factor

Dr. Hammett (*Science*, 1946, **103**, 714) appears to favor that women with a history of breast cancer should not nurse their children, this recommendation arising out of the observation that a milk factor or virus has been found to be productive of breast cancer in mice. The following facts and observations should be brought forward to make us cautious in having such advice until our facts with respect to breast cancer in man are better understood:

(1) There is as yet no proof that a baby *exclusively* fed with artificial formulas from the moment of birth on has as good a chance of survival as has a baby which is breast fed—at least, breast fed in the early months of infancy. Experimental evidence shows that a mouse put to the cancerous mother's breast even once will absorb enough of the virus to produce breast cancer later on. Therefore, until such time as we have reliable evidence that the baby raised exclusively on artificial feeding has as good a chance of survival as has the breast fed infant, it is doubtful whether we should run the risk of killing the child in infancy in order to save it from dying of breast cancer in middle age.

(2) Experimental evidence shows that stagnation of milk in the breast plays a role in producing breast cancer in mice. This would seem to be partially substantiated by observations (which should be thoroughly checked) that human breast cancer occurs with undue frequency in women who have not borne children, next most often in women who have borne children but who have not nursed them or have had the nursing period unduly shortened for some reason or other, and least often in women who have nursed successfully a family of offspring. If these observations should prove to be facts, we should be subjecting the mothers of this generation to an increased risk of breast cancer in order to prevent the child of the next generation from having the same condition. Although not exactly a case of robbing Peter to pay Paul, it would be one of inducing cancer in Jennie to save Jane.

(3) Breast cancer in women has its peak incidence around the ages 45 to 50, but many cancers of the breast arise in much older women. This means that such a woman may have had all her children, and they in turn have had all of theirs, before their mother develops her breast cancer. Are we then to urge that these granddaughters should refrain from nursing their children because their grandmother had breast cancer? Were breast cancer so obviously transmitted, we should find a much more frequent familial incidence than we do. Moreover, had the grandmother died a year or two before she developed breast cancer, and hence had she been listed as cancer free, her granddaughters would not have been warned against nursing their offspring, but would have been passing on the virus (if that is the explanation of human breast cancer) nevertheless. This brings us to the statement that I enunciated several years ago, namely, that we cannot breed out cancer, whether it be conditioned by a gene or a virus, unless it be a form of cancer that arises in early childhood before the age of procreation, or unless we stop all the race from breeding or all women from nursing.

(4) If the observations listed in (2) are correct, it is