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THE SCIENTIST FIGHTS FOR PEACE

by LOUIS N. RIDENOUR

What is the scientist's duty towards the state today? This question which has troubled the conscience of many of the most brilliant physicists in the country — men who worked with utmost loyalty in the national defense and for the Office of Scientific Research and Development during the war years — was driven home by Norbert Wiener, one of our ranking mathematicians, in his letter, "A Scientist Rebels," which appeared in the January *Atlantic*.

Professor Wiener declined to have anything further to do with death-dealing research. His reasoning does not satisfy LOUIS N. RIDENOUR, who was Adviser on Radar to General Spaatz; who is Professor of Physics at the University of Pennsylvania; and who believes that scientists of every stripe have a larger duty to mankind than merely abstaining. — THE EDITOR

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Now that the war is officially over, everyone seems to be trying to guarantee the peace in his own individual way. The wrangles and name-calling among the various peace-lovers parallel some of the worst features of a war, though they stop short of bloodletting.

I am sure that there are few people who love peace more devoutly, or who wish more profoundly to guarantee and preserve it, than Norbert Wiener. Yet I find myself in violent disagreement with his views as stated in his letter, "A Scientist Rebels." The issues involved are so important that the point of view of a scientist opposed to Wiener should be clearly stated.

Fundamentally, our disagreement turns on two points.

The first concerns the social responsibility of the scientist. Wiener clearly believes that the scientist is the armorer of modern war, and as such holds a responsibility of unique importance. I feel that the social responsibility of the scientist is unique in no important way. It is identical with the social responsibility of every other thinking man, except for one special and temporary thing. It is necessary today to educate the non-scientific public to the Promethean nature of atomic energy and the true character of science (for example, that it contains no secrets). This education must be done, so that all the people can participate in the decisions they will have to make concerning the organization of society in such a form that wars become less likely.

This educational job was splendidly begun by our government with the publication of the Smyth

Report — a step that has recently been criticized by men who do not understand the meaning and the scope of the stupendous educational enterprise we have only just begun. Such an attitude toward the publication of the Smyth Report is the best possible evidence that, if the instruction of all people in these matters is not done promptly and well, we shall continue to wriggle out of the thinking that is demanded of us, using the well-worn old loopholes: "Not such a terrible weapon"; "Every offensive weapon brings a countermeasure"; "We'll keep the secret"; "We'll keep ahead in armaments"; "Let's have a cheap preventive war"; and so on.

Secondly, Wiener wishes to dissociate himself utterly from any activity connected with preparation for war, even to the extent of doing everything he can to make those preparations ineffective. I regard it as deplorable that our nation is preparing for war, and I prefer to leave to others the actual work involved; but so long as it is the policy of our nation to prepare for war, I shall certainly not attempt to impede such preparations. In fact, I have tried to help them by pointing out a way in which our anxiety to increase our military strength is harming our potential military performance: the hysterical insistence on secrecy in nuclear physics is slowing our progress in that field. I conceive the duty of the peace-lover to be that of working for a world in which national arms are no longer desired by a majority of the people of this country or of the world. Meanwhile, I do not believe in the wisdom, propriety, or effectiveness of attempts to sabotage the prepara-

impression, for there has never been an accurate census of the butterfly population of Chicago.

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WRITING of the apparent nervousness of the question-mark butterfly brings to my mind the characteristic differences in the flight and the behavior of the different species. These characteristics, it seems to me, are much more important to one who would like to watch butterflies than the detailed descriptions of their coloring and the markings on their wings that are usually given in books. Such descriptions are fine when you have a butterfly in your hand and can examine its colors and count the number of black spots on the under side of its hind wings. But they are of no value whatever when you see a butterfly flit by over your head, or even when you are able to watch one resting on a leaf for a few seconds.

Almost anyone can identify a monarch from its habit of hanging from a flower by its long black legs, its wings closed or only partly open. The mourning cloak usually perches on tree trunks or other dark surfaces, with its wings wide open. The fritillaries fly straight to their destination and then seem to disappear, but on closer observation can be seen standing on some flower with tightly closed wings. The purples, which are large, dark-blue butterflies, flap about in the air over a bush or clump of weeds as though trying to make up their minds where to land; while the little brown skippers actually seem to skip through the air from one plant to another. But the prettiest flight of all is that of the blues, those tiny, light-blue butterflies that never seem to rise more than three feet above the ground. The only word I can think of to describe their flight is liting; they lilt up and down among the tall grass and weeds like little puppet butterflies performing a dance. Try to catch one and you will see it bounce out from under your hand and lose itself among the vegetation, still liting gracefully just above the ground.

To many people who have had little actual experience with insects, there probably seems to be a great difference between butterflies and moths. After all, butterflies are dainty little things that flit about on flowers, whereas moths are among the more destructive of our insects. Everyone has had some experience with the moths whose larvae eat clothing, and the larvae of other moths destroy crops and shade trees. And then most people think of moths as they do of bats — as shadowy creatures that slink about in the darkness on their

nefarious business. But actually there is little difference between butterflies and moths, and I have always thought it unfortunate that there is not one common word to designate the two, as one can refer to both rats and mice by speaking of rodents. Scientifically one can use the word *Lepidoptera*, but in common speech there is no word for it.

As a rule moths have feathery antennae, while those of butterflies are thin and end in a knob; but there are so many exceptions to this rule that it is not of much service. Most moths are nocturnal, but one can find enough of them in the daytime to make this distinction, too, ineffective. Then moths spin cocoons of silk from their own bodies, while butterflies go through their metamorphosis in a chrysalis made of their own hardened skin; but if one saw a winged insect on a flower, one could hardly be expected to follow it about until it went into its metamorphosis, before deciding whether it was a butterfly or a moth. The best policy, it seems to me, is to disregard distinctions altogether and, unless one is certain of one's facts, call any doubtful species butterflies. Most people do anyway.

On warm evenings in late summer I like to go into some empty lot and sit quietly on the ground, screened from passers-by on the street by tall grass, weeds, or bushes. With the sound of crickets all about, and the higher, more strident shrilling of katydids, I wait until darkness comes. There is a period of perhaps half an hour, while it is still possible to distinguish moving objects above the grass, when everything seems to partake of some universal air of mystery. Then it is that I sometimes see one of those large, narrow-winged moths, the sphinx, the death's-head, and the hawk moth, hovering over a flower with wings vibrating swiftly but silently, then shooting like a bullet to some other plant.

These moths are probably out all night, sipping the nectar of flowers with their long probosces, searching for mates, and doing the other things normal to moths. But I have never seen them except just before darkness, and so in my mind they are an integral part of the mystic hush of twilight, like ghostly beings from another world who haunt the earth for a few minutes just before night sets in. When I was a boy I once caught one of these moths in my hand, and for half a minute I could feel its powerful wings beating against my palm. Then it got away; and looking down at my hand I felt as though I had held some unearthly sprite or elf imprisoned there, a tiny being that had left a smudge of powder as a remembrance of its presence.

tion of arms when these arms are as widely believed to be necessary as they are today.

Wiener's views in these matters are best stated in his own words. The occasion for the letter that was printed in the January *Atlantic* was that Wiener had been asked, by an employee of an aircraft company engaged in work on guided missiles, for a copy of a National Defense Research Committee report he had written during the war. This report was out of print, and Wiener's correspondent had assumed that the simplest way to get a copy was to appeal to the author. In denying the request, Wiener said:—

The policy of the government itself during and after the war . . . has made it clear that to provide scientific information is not a necessarily innocent act. . . . The interchange of ideas which is one of the great traditions of science must of course receive certain limitations when the scientist becomes an arbiter of life and death. . . .

The measures taken during the war by our military agencies, in restricting the free intercourse among scientists . . . [will] if continued in time of peace . . . lead to the total irresponsibility of the scientist, and ultimately to the death of science. Both of these are disastrous for our civilization, and entail grave and immediate peril for the public. . . .

I will not accept a censorship in which I do not participate. . . . To disseminate information about a weapon in the present state of our civilization is to make it practically certain that that weapon will be used. . . .

The practical use of guided missiles can only be to kill foreign civilians indiscriminately. . . . Their possession can do nothing but endanger us by encouraging the tragic insolence of the military mind. . . .

I do not expect to publish any future work of mine which may do damage in the hands of irresponsible militarists.

No doubt Wiener's letter sounded eminently sensible, and even lofty, to many who read it. The motives that lie back of it are certainly lofty, and with them I have no quarrel. But the assumptions on which it rests are open to the gravest question. Wiener encourages his readers to believe that, since technology is the daughter of science, and war is increasingly shaped by technology, the scientist has a unique moral and social responsibility. He must guide his work along peaceful channels; he must suppress such of his findings as apply to war.

This simply does not fit with the basic character of science. By definition, science consists of a completely open-minded probing into the unknown. No man can say what will be found as the result of a given investigation; and certainly no man can predict the nature of the practical

engineering outcome of a given scientific investigation. Lee De Forest, the inventor of the three-electrode vacuum tube that is the basis of all present-day electronics, is said to be appalled at the babel and cacophony his invention has loosed upon the world. But De Forest was an inventor, not a scientist. The inventor or the engineer knows the goal of his work; the scientist has no goal but truth. He may have a preconception, based on existing theory, of what he will find in a given experiment, but he is ready to discard this in a moment if his results fail to bear it out.

To continue with our example, then: if De Forest is amazed at the results his invention has brought, imagine how Clerk Maxwell and Heinrich Hertz would feel if they could spend a day with the networks. Before Maxwell, the notion of electromagnetic radiation—radio waves—had never been conceived; before Hertz, radio waves had never knowingly been generated by man. With sufficient imagination, De Forest might have foreseen mass entertainment as the result of his improvement in the existing wireless communication art. It is altogether unthinkable that either Maxwell or Hertz could have had the slightest notion that he was providing a medium for the advertising of soap.

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THIS essential unknowability of the practical ends of scientific investigation makes it senseless to speak, as some do, of "the planning of science for human betterment." This bit of Marxist doctrine is widely met nowadays, even in the best circles, and Professor Wiener does himself and his colleagues a disservice by embracing it. Since we cannot guess how technology will use the still unknown results of a proposed scientific investigation, we must therefore conclude that either science as a whole is good for mankind or it is not. We can "plan" science only to the extent of turning it off or on. Since science, through technology, really means material civilization, the question becomes: Is material civilization good for mankind or is it not? There are arguments on both sides of that question, but clearly its resolution is by no means the concern of the scientist alone.

Other meaningless phrases are finding their way into conversation and the public prints. According to this country's announced policy for the international control of atomic energy, we desire "the interchange of scientific information for peaceful purposes." What can this possibly mean? Either

scientific information is exchanged or it is not. No man can say what the practical effect of such interchange will be, and the nature of that effect depends fundamentally upon political and social factors, not upon the nature of the scientific information that is exchanged.

What I have said thus far about the unknowability of goal applies to science. What of technology, which by definition has a definable goal? Should an effort be made to guide technology toward peaceful ends? Professor Wiener thinks that it should. While objecting to the military interference with scientific publication that took place during the war and is still going on, he himself feels competent to perform intelligent censorship. He proposes to perform this censorship on the basis of the practical use that is contemplated for his own ideas. He states flatly, for example, that the only possible use of guided missiles is to murder foreign civilians indiscriminately.

Overlooking the astonishing lack of logic that is involved in imposing one's own censorship while simultaneously rejecting that of others, I feel that Wiener is wrong in this attitude. In a peaceful world, work even on guided missiles would proceed, though not on the same scale or with such desperate intensity as now. Guided missiles would be developed for a wholly peaceful and scientific purpose, not a military one. Given peace, they will carry man's instruments, and finally man himself, through outer space to the planets and the stars.

Here, as before — here even in the branch of engineering that Wiener regards as the farthest-north of militarism — here still the principle holds. If the world is "postured for peace," as the Senators say (some of them say it in a way which implies that the posture involves a barrel), science, technology, and the useful arts contribute to the enrichment and the improvement of peaceful life. If the world is racked with suspicion, preparing for war, or in the throes of combat, the identical arts, techniques, skills, and individuals will contribute to the frightfulness and the horror of war. The decision rests on the contemporary character of world thought and world organization.

This is the basis for my assertion that the "social responsibility of the scientist" is identical with the social responsibility of every thinking man. Each must do his best to make sure that science, the canning industry, young men, the railroads — in short, the entire rubric of our society — are used for harmless and laudable purposes, and not for war. This desirable end can be at-

tained only in a world where measures short of war are applied to solve international frictions. The scientist can no more choose whether he works for war or for peace than the Western Electric Company can choose whether the telephone instruments it manufactures are used on domestic circuits or as Army phones on a field of battle. The scientist does science, and Western Electric makes telephones. The use of either product is determined by society as a whole.

Anyone who feels a *special* sense of guilt because he helped create an atomic bomb, or anyone who believes that the creators of the atomic bomb should feel so, is confusing two quite different things. He is identifying the profound immorality of murder with the relatively insignificant matter of improving the means of murder. God told Moses, "Thou shalt not kill" — not "Thou shalt not kill with atomic energy, for that is so effective as to be sinful." The immorality of war is shared by all. Technical improvements in weapons can influence only the logistics and the strategy of any war that may occur; whether a war occurs or not is the crucial matter, and this is determined by the current "posture" of the world

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AMONG the social and political factors that influence the posture of the world at any given time, the state of armament of the nations is of great importance. So is the rate at which this state of armament is increasing or decreasing. There is some evidence to suggest that arms beget war, and presumably this is what causes Wiener and others of similar views to do personally whatever they can to retard the arming of our nation. Wiener's refusal to supply the report for which he was asked, though a purely formal matter, can only be regarded as an action taken in the belief that arms are bad in themselves, and that the more feebly this nation is armed, the less likely is war. Such a belief may be partly or entirely correct. I simply do not know whether, in a feral world, it is wiser for a nation to be strong or to be weak. And since I do not know, I do not feel it my privilege, much less my duty, to challenge by individual action the clear decision in favor of armaments that has been made by our government.

By coincidence, Wiener's position in this particular matter bears a very close relationship to an important misconception widely held among those having no knowledge of science. The latter

view can be called, for short, the small-war philosophy. The small-war men desire to restrain technology (which they often miscall "science") with a view to making the next war as much like the last as possible. The bombs that dropped on North America in World War II were few and small, the reasoning runs. If we can only stop weapon development at its present level, the coming war will leave our children the chance to live it through.

There are two important defects in this reasoning. First, it cannot work. Under present political arrangements, the only weapon development it lies in our power to stop is that of our own country, and stopping this could in no way guarantee that World War III would resemble World War II. Second, the small-war philosophy entirely misses the moral point; one war differs from another by not one whit of principle. The effectiveness of the weapons used in a war in no way increases or diminishes the moral guilt of murder.

I am dubious of proposals for instant unilateral disarmament and uncompromising individual pacifism. It seems to me that this country offers the best current approximation to freedom of the individual, under law, that can be found anywhere in our admittedly imperfect world. The status of the individual in our society contrasts markedly with the freedom that the individual is said to enjoy in Russia. I recognize fully that most of the desirable freedoms of the individual would be submerged, even in this country, if we had another war; but I feel that the tradition of their former existence would bring them back, if we had a succeeding peace. Given lasting peace, I am sure that the freedom of the individual would emerge everywhere in the world, under any form of government whatever; because the craving for this freedom is one of the basic human hungers, and our present peaceful technology is so abundant that we can fill even this expensive appetite, if war can be avoided. Even though I am thus convinced that freedom of the individual will appear eventually under any form of government, I am interested in preserving the form that has so far afforded the greatest freedom: our own.

Thus it seems to me deplorable but understandable that this country, while desiring and working toward peace, feels it necessary to be strong in a military sense. I shall be seriously worried about our arms only if we commence to put reliance in them as our guarantee of peace. Armaments are neither designed for this role nor useful in it. So long as we continue in a sincere effort to create a successful world organization by participation in

and modification of the United Nations, it is idle to object to our possession of arms in a world of the present sort. Worse, it may be dangerous as well. I am sure that we should be regarded as a nation of lunatics if we engaged today in any thorough unilateral disarmament.

The scientist, on whom so much attention has focused for the past year and a half, is in a difficult position at the present time. Because he wishes to re-establish the traditional internationalism of his profession, he is a Communist. Because he served his country well in the war just past, he is an irresponsible armsmonger, with a childish delight in frightful new technical weapons. Because he is concerned over the damage that an uncritical policy of continued secrecy can do to our scientific and technological progress as a nation — whether for peace or war — he is an idealist who wants to give the bomb to Russia, and he "nauseates" Mr. Baruch. Because some scientists, such as Wiener, are devout pacifists, the scientist is an un-American fellow who cannot be trusted. Because certain other scientists are still working for the Army and Navy, helping to arm our nation in accordance with the overwhelmingly expressed desire of the people of the country, science is the whore of the military. Because, among the perhaps ten thousand scientists and engineers who had contact with the atomic energy project, one has been convicted of a breach of secrecy, scientists are Red spies.

What I am claiming here is that scientists are people like everybody else. In common with all other citizens of the world, they have a heavy responsibility to work toward a world-wide political organization, social philosophy, and public morality that can be adequate to prevent wars between nations. To suggest that the scientist has an outstanding responsibility in terms of this entirely unscientific problem is misleading and harmful, for it encourages the lazy to fob their own responsibility off onto someone else. Wiener, in the name of science, is cheerfully accepting a unique social responsibility, while lasting peace demands that the responsibility be shared by all.

Finally, I reject the defeatist withdrawal from the world as it is, that is implicit in Wiener's letter. The only hope for man today is to work for a better world within the framework of what we have, imperfect as this is. It *can* be improved, and such improvement must arise not from withdrawal, but from intelligent and vigorous participation in existing affairs. Most scientists stand ready to do their part.