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AMERICAN MATHEMATICS IN THE PRESENT WAR[1]

By DR. M. H. STONE

PRESIDENT OF THE AMERICAN MATHEMATICAL SOCIETY

THE topic of my remarks this evening is a rather serious one to take up after a dinner so pleasant and so friendly as the one we have all been enjoying. Moreover, I fear that the tone of my discussion can not be altogether gratifying to our professional pride, since the history of American mathematics in the present war has been in many respects a story of frustration. I believe, however, that we should all look at the record at this moment when the urgency of our national cause gives every detail of that record the fullest possible significance—and yet at a time when the inevitable note of protest can in no sense be interpreted as obstructing positive achievements on the part of those charged with the ultimate responsibility. The fact is that important lessons can be drawn from a recital of the record; and this is the time to draw them.

The history of American mathematics in the present war is complex and can be approached in a variety of different ways. I was rather at a loss to choose among them until finally the circumstances of this essay into historical expression made it clear to me that the most satisfactory plan would be to trace the sequence of events against the time-scale of the war itself. With this point of view in mind I spent part of the afternoon in drawing up a chronological table which I propose to follow this evening.[2] With all the cross-links displayed, I must confess that my chart is reminiscent of a topologist's nightmare!

Many of you will recall our summer meeting in Madison five years ago. That meeting began only a few hours after the invasion of Poland. The long-

[1] This paper represents the final version of an address delivered on August 13, 1944, before the American Mathematical Society at its summer meeting in Wellesley, Massachusetts.

[2] See the chart presented on page 533.

feared advent of war in Europe abruptly confronted us with concrete problems which called for our closest and most immediate attention. There were two steps which, it was felt, could and should be taken without delay; and both were completed before we left Madison. First of all, it was necessary to carry through the formal suspension of the elaborate plans, so long a-making, for an International Congress of Mathematicians to be held at Cambridge, Massachusetts, in 1940, and to file them safely away against some more propitious time. Also we knew that we must already look ahead to the possibility that our country would be drawn into the war and would then find urgent uses for our professional skills as it had in 1917–1918. It was decided to create a War Preparedness Committee[3] to guide our joint endeavors in making ourselves ready. During the three years following its formation, this committee bore the burden of organizing our voluntary efforts, until finally it was discharged in December, 1942. From the beginning the committee saw clearly that it would be concerned with several quite distinct kinds of activity—with educational services at various levels, for instance, and with research designed to increase the nation's military effectiveness along technical lines. With the experiences of 1917–18—and very little else—as a guide, the committee was at first hardly in a position to do more than to sketch out the lines along which it would later intensify its efforts. Indeed, as one looks back on the first months of the war, it is quite vividly apparent that awareness of impending catastrophe was still withheld from even the best informed. Under those circumstances it was not astonishing that the committee could discover no very active or perspicacious interest in its future services on the part of the Army or the Navy or of any other official body.

The appalling collapse of the French Army in June, 1940, aroused the nation to a sense of its peril and quickened the preparations for defense which had already been quietly begun. The activities of the committee were infused with a new sense of urgency and were given a much more definite direction. The atmosphere of apprehension which prevailed brought the committee its first opportunities for making contacts with governmental and other agencies which were then beginning to take open and public action to meet the impending danger. It was at that time that the committee, on behalf of the entire mathematical profession, made its first tentative offer of our services to the military establishments and to the then newly created National Defense Research Committee (N.D.R.C.). Apart from receiving acknowledgments of its offer, the committee made little progress towards a more specific understanding of its potential usefulness in the national emergency.

The 1940 summer meeting of the society was held in September at Dartmouth College. The program of addresses reflected the concern of the society, and of the committee, for the future: a number of the speakers had been invited to discuss mathematics of immediate relevance to the national defense. No program could have been more timely, when one recalls that the Battle of England began just at that moment. It is interesting to recall, too, that the speakers on ballistics at that meeting left us with a certain impression that the Army was then entirely prepared to handle its ballistic problems and probably would not require very extensive services from members of the mathematical profession. So far as the committee was concerned, the Dartmouth meetings were the occasion for a tightening and strengthening of its internal organization. Still guided largely by the lessons of 1917–1918, the committee formed three subcommittees to deal respectively with its three major problems. One of these subcommittees was to be concerned with basic teaching at the college level in the interests of the Armed Forces; a second with instruction and self-preparation at more advanced levels intended to equip the mathematically skilled with technical tools and information which would be specifically useful in war work; and a third with the actual research work which might, it seemed, be requested at any time in aid of the nation's military preparations. It was evident in the succeeding months that this scheme of organization was fundamentally sound. Yet it must be admitted, I think, that the great difficulty during those confused times lay in giving a more precise orientation to sound general principles in the absence of clear understanding and purpose among the authorities charged with the responsibility for the ultimate decisions. For example, we were quite correct in our estimate that the teaching of basic mathematics through the calculus to officer candidates and technicians would prove to be one of the major tasks of our profession in the years which lay ahead. But, on the other hand, the Armed Services—especially the Army—then showed no clear realization of the extent to which the building of our forces would involve them in this educational problem. In consequence a good part of our professional efforts in this field were ex-

[3] In its final form this committee was organized as follows: *General chairman:* Marston Morse; *Subcommittee on Research:* Dunham Jackson (*chairman*), Harry Bateman, E. J. McShane, M. H. Stone, J. H. Van Vleck, Norbert Wiener, S. S. Wilks; *Subcommittee on Preparation for Research:* M. H. Stone (*chairman*), B. O. Koopman, R. E. Langer, Hans Lewy, F. D. Murnaghan, H. P. Robertson; *Subcommittee on Education for Service:* W. L. Hart (*chairman*), R. S. Burington, J. L. Coolidge, H. B. Curry, E. C. Goldsworthy, F. L. Griffin, M. H. Ingraham, E. J. Moulton; *Consultants:* Aeronautics—Harry Bateman, *chief;* Ballistics—John von Neumann, *chief,* W. T. Reid; Computation—Norbert Wiener, *chief;* Cryptanalysis—H. T. Engstrom, *chief,* A. A. Albert, W. A. Hurwitz, Solomon Kullback, Oystein Ore; Industry—T. C. Fry, *chief;* Probability and Statistics—S. S. Wilks, *chief.*

erted on a local, individual basis through university, college or departmental organizations without any compelling or authoritative influence toward unification. Under the circumstances the committee could do little more than to stimulate local planning and to facilitate exchange of information among the active groups. Conditions in the other fields in which the committee worked were not dissimilar. It may indeed be said that the lack of any clear and specific demand for the kind of mathematical work which ultimately proved to be indispensable to the national security resulted in a definite retardation of the essential process of converting research mathematicians and talented students of mathematics from their peace-time orientation to a war-time one.

Nevertheless, it is my firm belief that the response of our profession to the obvious need for such a reorientation will come to be regarded as one of the interesting and significant episodes in the history of mathematical teaching in the United States. In order that mathematicians at various stages of advancement might be instructed in such obviously-to-be-used subjects as aerodynamics, ballistics, optics, and so forth, institutions all over the country introduced higher courses on applied mathematics of various kinds—in addition to those which were already well established. Usually the direction of this development depended upon local conditions, such as the availability of instructors or the presence of interested industrial neighbors. In many cases, such courses were sponsored by the U. S. Office of Education, which contributed funds to make them possible. The society exerted a certain influence in this direction not only through the War Preparedness Committee but also through a special committee appointed to arrange a program of addresses and symposia on applied mathematics in connection with the regular meetings.[4] No doubt the most ambitious and one of the most effective enterprises in the field of applied mathematics was the program inaugurated at Brown University with such conspicuous success. Having had the honor to be associated for some time with the Brown program in an advisory capacity, I may be pardoned if I now express my belief that the program has broken paths in the domain of American mathematical education which others too will follow and extend. There is no question, in any case, that as a war-time activity the Brown program has thoroughly proved its value in the training of needed technicians of the highest caliber. I am convinced that it and similar schools have before them a bright peace-time future, in which members of our profession will continue to enjoy genuine opportunities, hitherto all too rare in the United States, of preparing students for specifically technological careers involving industrial applications of higher mathematics.

When the invasion of Russia began in June, 1941, our profession was far from being drawn into adequate contact with the national mobilization which was then gathering speed. Matters were advanced little further by the time of our summer meeting, held that year in September at the University of Chicago. One problem which was discussed at the meeting there, on the basis of a report from a special committee,[5] was the one which was injected into our professional deliberations by the Selective Service Act of 1940. In due time the operations of the act were to occupy a great deal of our professional time and attention; but in those early days we did not yet realize the extent to which we would have to rely on our own efforts to prevent the depletion of our professional ranks below the level needed for the performance of essential wartime mathematical services. Indeed, our first reaction, as formulated at Chicago, was to take only the most restrained measures and to make only the most limited representations to General Hershey's office. Later we were disabused of our hopes that the provisions of the act, and those of the Army for the assignment of technically trained selectees, would be administered in such a way as to keep the nation's scientific potential at its highest during the war and during the early years of the peace to follow. But of this I shall speak at greater length a little later on.

So far I have touched exclusively upon matters which fell within the scope of the War Preparedness Committee or of other committees in the society. But I shall now digress to pick up the story of other, quite unofficial, efforts which have not been made a matter of record before to-night. The events which I am about to relate seem to me to form a small but vital part of the scientific history of the war. They originated at the Chicago meeting in 1941. It will be recalled that in June of that year President Roosevelt by executive order created the Office of Scientific Research and Development (O.S.R.D.), absorbing therein as a subordinate unit the National Defense Research Committee. This visible expansion of the Government's scientific activity in the interests of national defense had inspired hopes in various quarters that greater use would immediately be made of the whole range of scientific resources of the country than had been physically possible in the preceding stages. By September, when the Chicago meeting brought many of us together, it was apparent that such hopes were not likely to be very rapidly realized so far as mathematics might be concerned, unless the mathematicians bestirred themselves. In consequence steps were taken

[4] Richard Courant (*chairman*), R. M. Foster, Harold Hotelling, R. G. D. Richardson.

[5] Committee on Supply and Demand for Mathematicians: T. Y. Thomas (*chairman*), Harry Bateman, E. T. Bell, G. C. Evans, W. M. Whyburn.

to form a small group of mathematicians who could speak in this matter for all of us without being in any sense official representatives of the society or of the Mathematical Association. As finally constituted, this group consisted of the following: G. A. Bliss, G. C. Evans, Dunham Jackson, Marston Morse and M. H. Stone. In due course, the group drew up a memorial setting forth its views on the use of mathematics in the work of the N.D.R.C. and requested Chairman Conant of that body to receive Professors Morse and Stone as delegates to submit the memorial. A meeting was finally arranged to take place at Washington in the early spring of 1942. Chairman Conant and Dr. Jewett, the latter in his capacity as a member of N.D.R.C., received Professors Morse and Stone; and Dr. Vannevar Bush, chief of the O.S.R.D., joined the meeting a few minutes after it had convened. After the memorial had been presented as a document and its substance had been outlined orally by the two delegates, Dr. Bush and Dr. Conant at once put forward the proposal that a formal committee on mathematics be appointed by Dr. Jewett, in his capacity as president of the National Academy of Sciences, to function within the academy and the National Research Council. I hardly need say that this solution did not correspond to the views expressed in the memorial. Nevertheless, the alacrity with which it was put forward suggested that a full consideration by the O.S.R.D. of the more fundamental solution sought in the memorial which had just been presented was very unlikely. The meeting broke up in about an hour on the conclusion that the Committee on Mathematics should be appointed as I have just described it; and this was later done and made a matter of record.[6] While this committee, as a consultative body, performed a number of useful functions, especially in connection with research problems of interest to the Navy Department, very little use was ever made of it by O.S.R.D. or N.D.R.C. Under the circumstances of its formation it is of peculiar interest to observe that the committee was not consulted in any way when, at a later time, the N.D.R.C. became aware of its own vital need for a mathematical organization to handle its mathematical problems and thereupon created the Applied Mathematics Panel as one of its units. Before speaking again of the panel, I wish to emphasize the fact that the Committee on Mathematics, divorced as it was from the functioning organization of the O.S.R.D. and supplied with quite negligible funds, was able to do great good—though on a rather limited scale—by the simple but fundamental process of facilitating contacts between first-class mathematicians and difficult technical problems which were held secret by the Services for reasons of security. The projects which the committee helped launch have since found lodgment in appropriate places and have proved to be of real value. The committee itself still exists and may perhaps now be called upon to perform an entirely different function within its own parent organizations.

Let me remind you that the events I have just been describing took place almost without exception *after* the attack at Pearl Harbor. They illustrate the conditions affecting the mobilization of American mathematics throughout the entire first year of our active participation in the war. There was in fact nothing resembling a systematic mobilization of our mathematical resources to be discerned during most of 1942, though an increasing number of individuals found their way into war work of a mathematical nature and an increasing number of others prepared to join them. The need for mathematicians, while not yet very clearly understood by the authorities, was inherent in the development of important scientific projects in the Army, the Navy and the O.S.R.D. and became pressing by the end of the year. During this same period, the draft was creating ever more difficult problems for our profession even as its war usefulness increased and the prospects of a heavy teaching task for the growing Army and Navy became more certain. So it was that one year after the United States entered the war, there were very few who knew whither we were going, mathematically speaking.

Just at that moment, a number of important organizational changes were made. The N.D.R.C. revised its own internal arrangements and took the opportunity to provide itself with a mathematical arm, the Applied Mathematics Panel, in order to deal more effectively with one aspect of its numerous and ramified activities. The society and the association, impressed by the growing urgency of the Selective Service problem and the increased need for governmental contacts at many different points, decided to set up a joint War Policy Committee[7] responsible to the governing bodies of the two organizations but nevertheless equipped with somewhat vaguely defined powers of action rather wider than those granted the War Preparedness Committee, which it replaced, the latter being discharged in December, 1942, after three years of faithful and devoted service.

The creation of the Applied Mathematics Panel and the selection of its chief in the person of Dr. Warren Weaver, well known to all of us as a member and an officer of the society, gave us every reason to believe that the relations between the N.D.R.C. and the mathematical profession would become more cordial than they had been hitherto and would re-

[6] Marston Morse (*chairman*), Walter Bartky, Harry Bateman, G. D. Birkhoff, G. C. Evans, Dunham Jackson, H. P. Robertson, M. H. Stone, Oswald Veblen, Warren Weaver.

[7] M. H. Stone (*chairman*), W. D. Cairns, G. C. Evans, L. M. Graves, Marston Morse, Warren Weaver, G. T. Whyburn.

sult naturally in the rapidly increased enlistment of our outstanding mathematical talents in the war effort. I regret to say that these hopes were quickly discouraged, if not entirely dashed, by the realization that the panel would display considerable reluctance to call on the leaders of our profession or to seek out those talents which had displayed themselves in the field of pure mathematics as distinct from applied. While this state of affairs has been altered with the growth of the panel, it is nevertheless true that only comparatively recently could the direction and constitution of the panel be regarded as in any way representative of our profession as a whole. It is my considered judgment that the principles which appear to have guided the panel have been reflected in certain unfortunate consequences, for which our profession should explicitly disclaim the responsibility. Let me hasten to add, in the same breath, that none of us should desire by such a disclaimer to detract from the positive achievements of the panel or to withhold honor from those mathematicians whose individual contributions to its work are found deserving of our deepest scientific respect. In appraising the work of the panel, when the time comes to do so, it should be remembered also that a great many of our ablest mathematicians are now working directly for the Army or the Navy, where their achievements have an even closer bearing upon the scientific and technological aspects of the war and are likely in the long run to receive far less public attention.

The replacement of the War Preparedness Committee by the quite differently organized War Policy Committee provided our profession with a machinery which seems to have functioned reasonably well in handling the problems of military training and selective service in which we have been extensively involved from the beginning of 1943 to the present. The War Policy Committee, modeled upon the like-named committee of the American Physical Society, was authorized to represent and to act for both the society and the association. While its authority was never very precisely defined, the committee has always acted promptly and without hesitation in reference to the various war problems which have arisen since its formation. I hope and believe that it has acted with discretion though that is, of course, a matter for the governing bodies of our two organizations to decide. In any event, the committee has had a tangible and increasing influence and will undoubtedly prove to be a most useful instrument for taking up the many important tasks which will come to us during the remainder of the war and during the subsequent period of reconstruction.

The role played by the committee can be most clearly seen in the history of our relation to the various educational programs instituted by the Armed Services. From the beginning the Army and the Navy have sought some professional advice in setting up the mathematical parts of their training programs. Often, I regret to say, the consultation has been somewhat belated or rather on the perfunctory side; but on other occasions it has been serious and fruitful. The contrast between the planning of the Army Specialized Training Program and that of the Army Air Forces Meteorological Program comes to mind as an illustration. Our profession was well represented in the planning and administration of the meteorological program, with what I believe to have been outstandingly good results. On the other hand, the plans for the mathematical courses under A.S.T.P. were brought close to maturity before a small number of professional mathematicians familiar with collegiate teaching problems had a brief, last-minute opportunity to contribute to

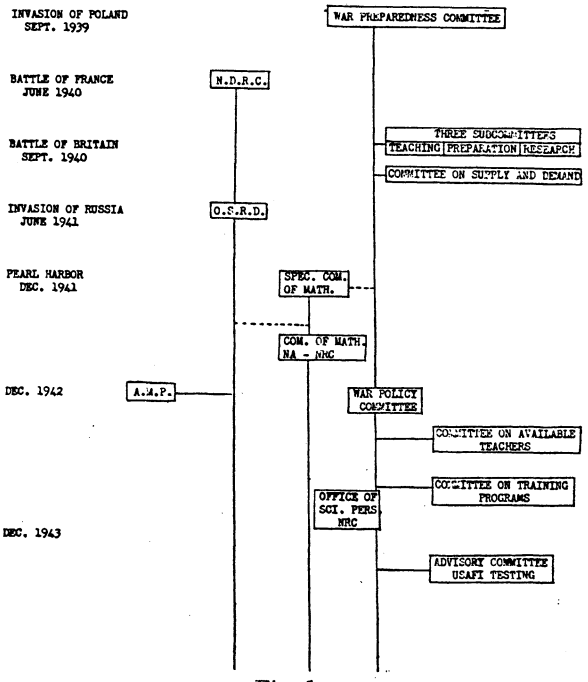

Fig. 1.

those plans. Indeed, it was felt in some quarters that the contrast between the vastness of this program, of which at least twenty per cent. involved collegiate mathematics, and the pitifully small number of man-hours spent by members of our profession in official consultation over it actually bordered upon the absurd. Fortunately the departures from normal teaching procedures were not so radical as to produce any grave or serious difficulties. I should add, too, that the men in charge of the A.S.T.P. had so many more troublesome problems to resolve in their planning that the time given by them to examination of the mathematical problems could not have been expected to be

anything but relatively limited. Whatever uneasiness may have been caused by initial lack of contacts, I would say that the tendency soon established was the one, most satisfactory to us, of relying increasingly upon the knowledge and experience of members of our profession, not only in the planning of courses but also in the highly important operation of testing. The War Policy Committee has helped supply consultants when requested and has also taken the initiative in preparing critical studies of certain of the service programs. For the latter purpose it created sometime in the summer of 1943 a special subcommittee[8] which has prepared two careful and detailed reports, one on the A.S.T.P. and the other on the Navy V-12 and related programs. Copies of these reports were forwarded to the competent authorities in each case and appear to have been received in a cordial and interested spirit. It has certainly been our desire in undertaking these studies to turn our critical remarks in helpful and constructive directions and I trust that this desire on our part has been apparent to all concerned. At this time, of course, the elimination of A.S.T.P. is well advanced and the Navy programs are no longer expanding. In consequence the related teaching problems have lost their urgency and now occupy very much less of our time and attention. Another important opportunity has been opened up for us, however, in connection with the U. S. Armed Forces Institute (U.S.A.F.I.). I am happy to report that we were asked to appoint a consultative committee to work with the examinations staff of the institute on the testing problem in mathematics.[9] Since the aim of the institute is to foster self-education among service men and women, some of whom will later desire college credits for what they have achieved, a sound testing program is of the greatest importance for all concerned. We are therefore very much gratified by the opportunity to cooperate in this manner with the U.S.A.F.I.

The War Policy Committee exerted itself in other ways as well in order to assist the mathematical profession in the training responsibilities which were placed upon it. A modest but most useful effort was made through the Subcommittee on Available Teachers of Collegiate Mathematics[10] to assist in the readjustment of teaching staffs in response to the requirements of the service programs. While the operations of this subcommittee have been carried out on anything but a large scale, they appear to have filled a real need. There is every reason for us to continue the work of this subcommittee, especially through the reconstruction period when there will undoubtedly be extensive realignment of college staffs as the effects of the war are gradually unscrambled. Through generous grants from the Rockefeller Foundation, the War Policy Committee has been enabled to lend support to the Office of Scientific Personnel in the National Research Council. In company with other scientific groups we have thus been in the position of fostering an office which, directed until recently by Dr. Homer Dodge and at present by Dr. M. H. Trytten, has made most valuable contributions to solving the problems of personnel placement in the scientific field. On our side we have derived special benefit from our association with the office by virtue of its great usefulness as a source of information concerning the often erratic operations of the Selective Service System and of the War Manpower Commission, all of which we have had to follow as closely as possible since the time when the need for mathematicians became really critical.

The experiences of the War Policy Committee in meeting the responsibility imposed upon it by this critical need would take a much longer time to recount than I have at my disposal this evening. We were very fortunate in having the aid and advice of physicists who had already acquired much experience relevant to the problems we ourselves had to face from the moment when it became apparent that A.S.T.P. and the Navy V-12 programs would require the maintenance of full or expanded teaching staffs in universities and colleges all over the country. Nevertheless the negotiations which had to be undertaken with the Washington authorities in order to protect mathematics departments and research groups against crippling inroads at this critical time were difficult and often disappointing, even though they were attended with a certain measure of success. From my own observations—especially those made during a brief term as departmental chairman—I have the impression that in general the local selective service boards have understood the usefulness of scientists in the war effort and have made intelligent efforts, within the scope of Washington's directives, to keep our young scientists at scientific work. If we have had trouble, it has been mainly in persuading the Washington authorities to issue directives which would be intelligent guides for the work of the local boards. Fortunately the profession of mathematics was included during the most critical period in the long list of essential occupations and activities drawn up by Selective Service Headquarters. For a short time an interesting and, I believe, most progressive device for handling the deferment problems at professional levels was placed in operation in Washington. After most strenuous persuasive efforts on the part of various scientists, Selective Service set up in the National Roster of Sci-

[8] W. L. Hart (*chairman*), C. R. Adams, H. M. Bacon, Ralph Beatley (replacing G. B. Price), B. H. Brown, H. J. Ettlinger, C. V. Newsom, W. M. Whyburn.

[9] W. T. Reid (*chairman*), Ralph Beatley, L. L. Dines, W. L. Hart, C. C. MacDuffee.

[10] W. D. Cairns, Arnold Dresden, J. R. Kline.

entific and Specialized Personnel an official advisory committee, finally known as the National Committee on Physicists and Mathematicians, with the primary function of advising local boards and appeal boards on the merits of scientific grounds put forward in support of requests for individual deferments. Our own contacts with this committee were notably short-lived, since our representatives began their services as members of the committee just in time to witness its dissolution as a result of bureau politics at their worst. The disappearance of this committee was a bitter disappointment, since it gave real promise of providing an intelligent, democratic and practical solution to our deferment problems. However, enough had been accomplished during the first half of 1943—even if at times the accomplishment was like that of a stubborn rear-guard—to secure our essential professional activities until the early months of 1944, when the sharp alteration of policy by the Selective Service System introduced a state of affairs with which most of those present are better acquainted than I am. The prevailing principles of Selective Service leave us very little room for present helpful activities, though there are few of us who fail to realize that those principles, if long maintained in operation, threaten the destruction of our supply of young scientists and technicians. It may therefore be anticipated that the current inactivity of the War Policy Committee in respect to draft problems will presently give way to renewed concern and renewed activity.

A problem which is, so far as the scientific professions are concerned, inseparable from the whole fundamental concept of Selective Service is that of the assignment of selectees to duty within the Armed Services after induction. It is certainly of the utmost importance for the national security that the training of the scientist should not be lost by virtue of his induction and subsequent assignment. In the case of doctors and medical scientists, the organization of both Army and Navy eliminates their diversion to other than medical service and thus insures against the waste of their professional preparation. In the case of other scientists, equally essential to the proper functioning of a modern military organization, this is not the case. Indeed, examples of vital needs for scientific personnel which remained unfilled while qualified scientists were occupied in the non-scientific non-technical duties of some earlier assignment are all too common. It is quite clear that the military services need to develop a flexible and accurate mechanism for segregating scientific personnel and reserving it for the technical requirements of the organization. I have no doubt that the Army and the Navy, on the basis of the lessons of this war, will find their own solutions for this problem. However, it remains a fact that during this war the problem has not been satisfactorily solved so far as scientific or other rare skills are concerned. I mention this matter in emphatic terms because it explains in part the resolution and firmness with which we have insisted in all our dealings with the Washington authorities that the mathematician employed in essential teaching or in essential war research, and also the student of mathematics preparing himself for such essential employment, should be given the greatest consideration for individual deferment under appropriate directives.

At the present time the War Policy Committee is working largely toward the future. It is plain that we shall meet many new and altogether different problems, some of which we can already recognize while others can still hardly be guessed.

To-night, however, my theme has been historical and I do not propose to venture into the realm of the future. At the historical level it has not been possible for me to give more than a rapid sketch of events, as I have seen them. You will all realize, I am sure, that a completely adequate account of these matters is not possible at the present stage. I hope you will agree with me that a thorough and painstaking history of this war period of American mathematics can and must be written when the time is ripe. With this thought in mind, I have taken the preliminary steps towards setting up a committee of the society to undertake this important task. We shall all await the fruits of its labors with the deepest interest—and also, of course, with patience.

MALARIA AND THE WAR[1]

By Lieutenant Colonel O. R. McCOY, M.C.,

DIRECTOR, TROPICAL DISEASE CONTROL DIVISION OF PREVENTIVE MEDICINE SERVICE, OFFICE OF THE SURGEON GENERAL[2]

NEVER before have millions of men engaged in tropical warfare. Disease prevention, always a major factor in military operations, now must include protection from all maladies that thrive in warm climates. Of these, malaria is by far the most important.

The military prowess of malaria has been demonstrated in other wars, but never before has this great disease predator had such an unsurpassed opportunity to exert its influence on the armies of many

[1] Presented at the symposium on "Parasitology in Relation to the War," held at the meeting of the American Association for the Advancement of Science in Cleveland, Ohio, September 12, 1944.

[2] On leave from the School of Medicine and Dentistry, University of Rochester, Rochester, N. Y.