than three years they gave to our troops, and to those of our British allies, huge supplies of this tremendous weapon against infections. Thus, a permanent asset to the health and welfare of the human race was created.

These and many others are concrete, tangible additions to the resources of physician and surgeon which have resulted from energy liberated by the impact of war upon American investigators; their continuing and permanent usefulness is certain.

Other less tangible but no less real results can be identified. Some of them are: (1) Recognition by Government, by the public, and by scientists themselves of the value of science as a national asset; (2) increased recognition—indeed, concrete demonstration—of the essential identity of the spirit of scientific inquiry wherever it is to be found throughout the world. The friendships which have been engendered by the collaborations of our own scientists among themselves and by our scientists with those of Canada, Britain, and Australia represent, to my mind, a priceless acquisition; (3) recognition that regimentation in any restrictive sense is abhorrent and that such financial support to science as may be conditioned upon it is unacceptable and adverse to its interests; (4) realization of the advantages which are to be gained from frequent conferences of workers with free exchange of ideas and experience; (5) recognition that scientific industry, unrelieved by leisure, can defeat itself; and (6) recognition—I hope by all of us—of the part played by fundamental, in contrast with applied, research in the advance of science.

The implications of these categories of gains are sufficiently obvious. I should, however, like to say something more concerning fundamental *vs.* applied research.

I think it safe to say that most, if not all, of the useful results which have come out of medical scientific war efforts are in no real sense discoveries; they are rather the developments of discoveries made long before the war in laboratories where knowledge is pursued for its own sake with little regard for utility. Given our scientific population, stirred by the national danger and an intense desire to take part in the war effort; given opportunities which enabled them to understand, define, and discuss the problems which needed solution; given also the money with which to obtain equipment and help for their experimentation—a broadly accurate prediction could have been made of the usefulness of the outcome of the national effort which I have been discussing. Indeed, such a prediction actually initiated the effort.

To me it seems utterly improbable that the factors just named, in any combination, could have produced during the period of the war the discoveries from which these practical results have emerged. Those were the fruits of informed and ardent curiosity together with freedom and means with which it could be satisfied. The only leadership required is that within the mind of the investigator himself. To provide for the future advance of science and the true discoveries which will inevitably accrue, it is only necessary that the present generation of productive scientists be given freedom from intellectual restrictions, optimal facilities, and discriminatingly selected disciples.

Anatomy and the Concept of Analogy

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OVER A HUNDRED YEARS AGO Richard Owen formulated two fundamental concepts, homology and analogy. A homologue is "the same organ in different animals under every variety of form and function" (*3*). For instance, the foreleg of a mammal, the wing of a bird, and the pectoral fin of a fish are homologous. An analogue is "a part or organ in one animal which has the same function as another part in a different animal" (*3*). Thus, the gills of fishes and the gills of crustaceans are analogous. These two concepts appear of equal importance, and one might expect that both are by now well documented. Actually, however, comparative anatomy has practically identified itself with the exclusive study of homology. Analogy is considered by many anatomists as a subordinate concept the study of which does not come within the province of comparative anatomy (*7*).

It is true that the concept of homology has provided the basis on which definite morphological and phylogenetic relationships could be established. Whatever work there is still to be done in this field must be oriented along these lines, and the great historical significance of the idea of homology remains undisputed. However, it is also true that the purely morphological and phylogenetic approach to problems of structure has reached a static condition. As in the case of other useful concepts, the heuristic value of homology is not without its limits and has become nearly exhausted. Efforts to develop further the idea

of homology have not stimulated anatomical research to any noticeable degree (*6, 10*); indeed, the idea largely disintegrated when faced with the results of experimental morphology (*9*). Some of the defenders of the primacy of homology corroborated rather than refuted this fact (*8*).

In view of the sterility of an anatomy interested only in the historical aspects of structure, it would seem worth while to examine the potentialities inherent in the study of that neglected concept, analogy, *i.e.* the functional correspondence of organs.

The study of analogy offers a wide perspective, inasmuch as it permits the analysis of structures as they represent solutions of functional problems. Böker (*2*) has demonstrated how fruitful this approach is, although he restricted his "Biological Anatomy" to the vertebrates. Actually, the field is much larger, for without the dominating presence of the concept of homology the barrier between vertebrates and invertebrates disappears. This barrier has been magnified out of proportion to its true significance and has rendered anatomy no service other than to limit the study of many problems to the vertebrates. But in spite of their great variety, animals with and without vertebrae are faced with basically similar functional problems—orientation in space, conservation of water, disposal of waste materials, to name only a few. The interest lies in discovering how many different fundamental structural solutions of the same problem have been "invented" by different organisms. The broader the basis on which such inquiries are conducted, the more valuable will be the insight gained with respect to the functional significance of anatomical structures.

The great promise of a reorientation of comparative anatomy along such lines is not hypothetical; it can easily be estimated by glancing through Meisenheimer's (*5*) monumental study of reproduction, Krogh's (*4*) analysis of the mechanisms of respiration, or Baldwin's (*1*) delightful essays on comparative biochemistry. It is difficult to see why this type of investigation should not come within the province of comparative anatomy, even if it is in one way or another based on the concept of analogy. The value of concepts is measured by their influence on research. By this standard the concept of analogy will probably not forever hold the subordinate place which is still assigned to it in comparative anatomy.

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Universal Military Service in Peacetime

A Statement by the American Mathematical Society and the Mathematical Association of America

THE WAR POLICY COMMITTEE of the two mathematical organizations was formed to study the many questions of professional and scientific policy arising out of the war. No subject has been of greater interest or more vital concern to the Committee than the relations between scientific effectiveness, on the one hand, and the military requirements of the Nation, on the other. A most important aspect of this subject is treated in the report on "Universal Military Service in Peacetime," recently made public. This report is directed in the main at points upon which mathematicians, as such, are particularly qualified to express informed opinions. Whatever view may ultimately prevail—and it should be emphasized that there are many citizens, mathematicians included, who doubt the wisdom of introducing

In July 1945 a report on this topic was prepared by a subcommittee of the War Policy Committee which consisted of W. L. Hart (Chairman), Saunders MacLane, and C. B. Morrey, Jr. The report, which was approved by the War Policy Committee, the Council of the American Mathematical Society, and the Board of Governors of the Mathematical Association of America, was published in full in the *Bulletin* of the American Mathematical Society. Chairman Marshall H. Stone, of the War Policy Committee, has furnished this summary statement.