Military Psychology in War and Peace

Walter V. Bingham

Personnel Research and Procedures Branch, Adjutant General's Office, War Department, Washington, D. C.

WHAT ARE THE CONTINUING PROBlems of military psychology? This is a timely question. It should be faced squarely, in these chaotic days between war and peace, before the cataclysm of World War II has receded too far into the past. Today it is possible to look closely at the varied kinds of professional work done by psychologists—more than 1,300 strong—who wore the uniforms of the armed forces or were employed by them between 1940 and 1946 (*2*). We can thrill with pride at their accomplishments, take note of serious discrepancies between need and fulfillment, and undertake to discern those problems of military psychology which undoubtedly will still be pressing a few years hence.

It should not be assumed that the pattern of warfare 5 years hence, or 50, will closely resemble that of World War II. A third World War will differ quite as much from the second as the second did from the first in magnitude and in the terrific destruction of civilian lives, dwellings, and industries. If it comes, it will be greatly depersonalized—relatively less man-to-man combat, we are told—and there will surely be increasing reliance on highly intricate mechanisms. Any future war, then, is likely to differ greatly from those of the past in scope, intensity, speed, civilian involvement, depersonalization, and mechanization.

In some respects, however, the pattern is bound to be a familiar one. Consider the practical certainty that an undeclared aggression, a surprise attack, will usher in any future war. Then recall the vast array of military activities which are rooted in basic facts of psychology—facts as to the limits of human capabilities, the modifiability of behavior, the processes of learning, the springs of action, the interplay of personalities, the nature and distribution of individual differences in capacity, knowledge, skill, temperament and leadership throughout the population, both military and civilian. War may change its aspect with every generation. Drastic changes in the nature of man take place more slowly. This is why it is reasonable to suppose that as long as there is need for an army of occupation, a world police, or a system of national defense, just so long will there be technical problems of military psychology (*10*).

Based on an address before the Psychology Section of the New York Academy of Sciences, January 20, 1947. The views expressed are personal and not official.

Problems of Biomechanics

In connection with the *design of new equipment*, for instance, urgent psychological problems will continue to arise out of hard facts regarding the limits of human capacity. There are bounds to man's ability to perceive, to discriminate, to judge, to respond with the requisite promptness, and to manipulate handles, wheels, triggers, knobs, levers, and pointers with the necessary precision, without succumbing to the effects of avoidable fatigue and distress which have too often been inadvertently imposed by designers of military as well as of industrial equipment. Ordnance experts and development engineers will be under pressure to produce better, more effective weapons, vehicles, airplanes, instrument panels, scales, signals, radar screens, goggles for night lookout or scouting duty, and complex fire-control systems for use aboard ship or on shore. Designers wrestling with such problems during the past six years have not infrequently called upon physiologists and psychologists to bring to bear their insights, their knowledge of human capabilities, and their methods of scientific experimental attack (*4, 5, 6, 8*). Psychological development of procedures for the most *effective use of equipment*—for instance, of electronic aids—also proved to be valued by technical services of Army and Navy. As a consequence, tasks have been made less complicated, performance easier and more precise, with diminished strain. The usefulness of new equipment has been broadened, and the precious time required to master it has been shortened.

These types of contribution are vividly illustrated by the accomplishments of the Psycho-Acoustic Laboratory directed by S. S. Stevens at Harvard. This enterprise markedly improved the transmission of speech by telephones and interphone equipment, developed better headsets and earphones, found and demonstrated the optimal position of the microphone relative to the lips of the talker, ascertained the speech sounds most frequently misunderstood, devised superior oral codes, and helped to work up a short, intensive training course in telephonic speech which increased intelligibility and reduced the errors in vocal communications. It is no rash assumption that rigorous, systematic, ingenious, practical laboratory research of this kind will continue to be demanded by the military services.

A similar area is the *design of clothing and gear* adapted to the comfort, the convenience, and the mental as well

as the physiological capacity of the wearer when campaigning in the desert, in the tropics, or in the frigid polar regions, when escaping from a submarine, or when bailing out of a jet-propelled airplane in the stratosphere.

Developing ways of reliably *ascertaining preference for duty* in a region of bitter cold or in the steaming tropics is a related field of inquiry into which military psychologists have hitherto made only exploratory forays.

Does it really matter whether a soldier is going to like it in the far North better than he would in a tropical jungle? Should this factor of his personal preference be given any weight when deciding as to his assignments? Isn't it of the essence of military organization and discipline that each soldier goes where he is needed and does what he is told? The answer is known to every leader. He appreciates how greatly his own tasks of direction and command are simplified when his followers have had at least some share in choosing their arm or service, their military specialty, their assignments, and their comrades, and have identified their own objectives with those of their organization and its commander.

Resources of Man Power

This leads headlong into the military problem of *the discovery, development, and conservation of aptitudes*, of human capacities and talents of every sort.

To maximize the Nation's human resources by facilitating the growth and optimal utilization of potential capabilities is a worthy goal during any period of peace. If again the war clouds gather, it will become an imperative of survival. The United States has traditionally been extravagant of its man power, as of water power, forests, grazing lands, oil deposits, wild life, and other endowments. During World War II we wasted a good many people, both in essential industries and in the armed forces. Certain chemists needed for technical research were, for example, kept on duty in hospitals making routine laboratory determinations which a careful high school boy could be taught to do with precision in two days. Fortunately, in spite of wasted skills, we still had a little man power to spare after all the really indispensable activities had somehow been staffed. But never again! If we should find ourselves once more at war, it is likely to be the enemy who will have man power enough and to spare. So, within the next few years, we must place ourselves in a superlative position to husband our abilities and strength.

Slow Learners

Sharply defined psychological problems of man-power conservation are seen at the two extremes of the ability scale. Toward the lower extreme is the Army's number-one headache, the slow learner. From this category I exclude the feeble-minded. The imbeciles and the morons, together with the psychotics, the epileptics, the inadequate personalities, should have been debarred, and commonly were, at the Induction Stations. Slow learners were those who, having been accepted, found the going pretty tough during the early months of training, required a longer-than-average period of basic instruction, and, even then, in most instances had to be either dropped from the service or assigned to noncombatant duty as unskilled laborers because they did not have what it takes to be infantrymen in these days when so much depends on the knowledge and resourcefulness of the individual soldier.

A large majority of these slow learners were illiterate, not necessarily in the sense that they could not read or write their own names. They were functionally illiterate in that they could not read well enough to make any practical use of the Army's instructional aids, when trying to learn what a soldier must know. This is the Army's definition of literacy: the ability to read as well as the average person who has had the benefit of four years of elementary schooling. (Hence, one sees occasional reference to "fourth-year literacy.")

There were altogether too many of these functional illiterates. During 1941 and 1942, thousands of them had to be released. Others continued to congest the training centers long after they were supposed to be ready for assignment to units or sent overseas as reinforcements. Since the War Department well knew that reinforcements would be in great demand in 1943 and 1944, the military psychologists and educators undertook a heroic job of salvage. They developed ingenious schemes and practical devices with which to teach grown men to read and to figure (*9*). Eighteen Special Training Units were established with a capacity of 30,000 men. Expert instructors were appointed to oversee the teaching, which had to be skillful, intensive, swift. To these Special Training Units, beginning in the late spring of 1943, went all illiterate inductees and also all who, though able to read some, did not pass the Army General Classification Test with a standard score of at least 60, *i.e.* two sigmas below the mean.

It was found that a large proportion of these slow learners could be salvaged within a period of 13–17 weeks, in the sense that they actually learned to read at the fourth-year level and, on transfer to the regular training camps, were able to keep pace with the course of instruction. Between June 1943 and September 1945 a total of 218,000 of these illiterates and 69,000 others who had not made at least Standard Score 60 on the AGCT were dispatched to one of the Special Training Units immediately after being accepted for military service; and 83 per cent of them in three or four months time learned enough reading, arithmetic, and Army discipline to enable them to go forward on a military career, instead of continuing to be a drag on the war effort or having to be discharged.

Today America is confronted squarely with these two astonishing facts: first, the disappointingly high rate of

functional illiteracy; second, a demonstration that this social disease can be greatly ameliorated whenever we decide to pay the cost in effort and in dollars.

The military psychologists have done their part. The civilian economy must now pick up the burden. This is not only the task of providing excellent educational opportunities for all the children, rural and urban, white and colored, north, east, south, and west; there is also the need of getting more than 1,000,000 young men now of military age over the barrier that separates the functionally illiterate from the literate and the distressingly slow learners from the rest of us. This will have to be done, if the Nation's resources of man power are to be maximized in this generation.

Rapid Learners

Studies of our civilian army make it clear that the national economy also has unfilled obligations to a great many young men who, on the AGCT, would score in the top third of the distribution, in Army Grades I or II, *i.e.* Standard Score 110 or better. Within this upper range the armed forces find all their potential commissioned officers and many able noncoms. Leaders in civilian undertakings likewise tend to come from these intellectual levels. Here are most of the successful professional men, scientists, engineers, architects, technological specialists, general managers, editors, teachers, social workers, psychologists. More than half of the their schooling had not been interrupted, since half of the men in this sample had been only 18–24 years old when they joined the service. Nor does our coverage include those men who had gone to Officer Candidate School and been commissioned. Their records would have increased the proportions in Army Grades I and

TABLE 1

DISTRIBUTION OF 105,521 ENLISTED MEN BY TEST SCORE AND SCHOOLING

	AGCT Grade					Total
	V	IV	III	II	I	
A. College graduates.....	3	51	343	2,111	1,201	3,709
B. 1 to 3 years college.....	27	400	2,694	7,781	2,478	13,380
C. Finished high school....	100	2,102	9,362	13,239	2,232	27,035
D. 1 to 3 years high school	757	8,184	12,533	7,508	624	29,606
E. No high school.....	6,354	15,765	7,446	2,076	150	31,791
Total.....	7,241	26,502	32,378	32,715	6,685	105,521

II and in the higher educational categories. Even so, the conclusion cannot be escaped that the number presumably having the intellectual capacity to benefit from higher education is substantially greater than the number actually permitted to carry their schooling into that zone of achievement.

Another study discloses the sobering fact that, among more than 3,000,000 men in these higher levels of learning ability, the personnel classification interviewers found almost 1,000,000 who had not even completed a

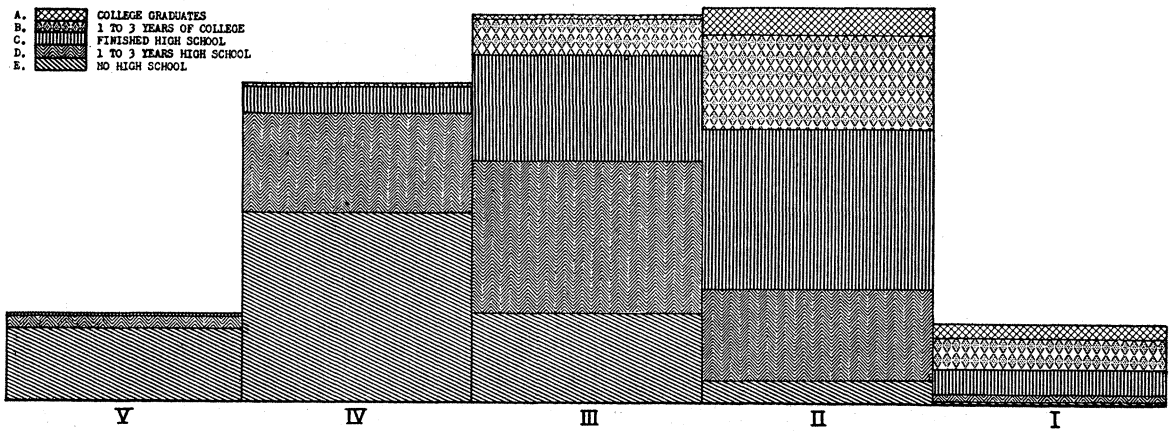

FIG. 1. Relation of learning readiness to educational level.

West Point Cadets are in Army Grade I; none is below Grade II. An overwhelming majority of college men score within this range. In Fig. 1 and Table 1 may be seen the relation of learning readiness as measured by this test to level of education achieved before entering the Army, in a population of 105,521 enlisted men constituting a thin cross section of the enlisted strength of the Army as of March 31, 1944. A large fraction of group B, those who had begun but not completed a college course, would have graduated in due time if high school course, much less gone on to a technological institute, a college, or a professional school (*1*). Why? For some, their calling, their vocation, had led elsewhere. Schools and colleges are not the only places in which education, cultivation, personal effectiveness, and professional competence can be achieved. But for the majority of these bright soldiers, the decisive reason for discontinuing their education had been economic. Here, then, is a pool from which to augment the Nation's short supply of scientists, technologists, scholars,

professional men, and military leaders. An ample number of competitive scholarships providing for board as well as tuition would be one form of insurance against unnecessary waste of such intellectual resources. The National Science Foundation, if established, will help in some measure to meet this need.

Potential Leaders

The problem of selecting military leaders is not solely one of identifying the highly educated competitors, or the brightest. Indeed, beyond a certain indispensable minimum of knowledge and intellectual acumen, the factors which tend to differentiate the best officers from the very good are not measured with precision by means of tests of educational achievement or scholastic aptitude. This was one of the impressive findings from a notable research project of the War Department which had as its purpose the development of sound procedures for use in selecting from among the wartime officers those who would receive commissions in the Regular Army.

This study, ordered by the General Staff early in 1945, was planned in detail and carried to completion by The Adjutant General through the Personnel Research Section of the Classification and Replacement Branch of his office. It came to be known as the Officer Integration Project. Thirteen thousand officers collaborated as subjects in the field trials. Others took part as interviewers, examiners, or evaluators of efficiency. It was in many respects the most searching, thorough, ingenious, and fruitful research project in personnel selection of which I have knowledge.[1]

The story, told in the *Infantry Journal* by J. M. Clarke (*3*), emphasizes the stark necessity for procedures that validly differentiate the best from the very good; for in the first integration, which took place in June 1946, only about 9,000 could be chosen from among 108,582 officers who had filed applications. Competition was especially stiff in the Air Forces, where 59,000 had applied for the 3,900 commissions available at that time. The question was: Which ones among the superior applicants would be of greatest value to the service during the years ahead? Instruments of prediction had to prove their validity within the topmost range. Another challenging prerequisite was that choice had to be made by procedures which do not permit bias, prejudice, or favoritism to creep in and corrupt judgment.

[1] The following officers and professional staff members were immediately responsible for preparing and validating the procedures recommended for adoption: Lt. Col. M. W. Richardson, Lt. Col. D. E. Baier, Major Roger M. Bellows, Capt. Reign H. Bittner, Capt. E. A. Rundquist, Robert J. Wherry, William R. Wilson, Francis F. Bradshaw, Edwin R. Henry, Douglas H. Fryer, and Harold A. Edgerton. Indorsement of the recommendations of this technical staff was made, after careful study of the procedures and the results of the practical tryouts, by the following members of the Committee on Classification of Military Personnel Advisory to The Adjutant General: W. V. Bingham, H. E. Garrett, C. F. Hansen, L. J. O'Rourke, C. L. Shartle, and L. L. Thurstone.

Among the instruments which survived extensive experimental tryouts were: first, a General Survey Test of educational background, which served as a preliminary hurdle to screen some applicants from further consideration but which carried no weight in the final combined score; next, a very detailed Biographical Information Blank, on which many of the statements to be checked get at the candidate's attitudes toward himself, toward other people, and toward the work and career of an officer; third, an Officer Evaluation Report, which utilizes several ingenious devices for securing information that is at once impartial and significant; and finally, a session with a practiced Interview Board whose procedures and ratings are concentrated on eliciting, observing, and reporting only those aspects of behavior which can be drawn out and reliably appraised during a group discussion.

These instruments had to be tailor-made, to fit the Army officer population. In the long biographical inventory lists and the officer evaluation reports, words and phrases were used which officers are known to employ when describing fellow officers of whom they approve or disapprove. Officers in the experimental population had been given a chance to write sketches about other officers, good and poor; and from about 800 such essays were culled phrases, trait terms, and characterizations to be tried out. Which of these actually apply to the best officers more often than to others? That was a crucial question.

The psychologists did not try to decide such questions by arguing about them. Instead, they used the empirical, experimental approach. They first established three criterion groups, made up of best officers, average officers, and poor officers, using a procedure called the nominating technique. As Mr. Clarke says (p. 10):

> There is no way of knowing that a leader actually is a leader until other men have acknowledged his leadership, and the acknowledgment is demonstrated by results. Those who are best able to judge whether a man is achieving results that demonstrate leadership are his fellow officers. It seemed certain that if all the officers in a battalion, squadron or similar unit rated a fellow officer as outstanding, he was actually outstanding, and that if they unanimously rated him as poor, he was actually poor.

With this as a basic working principle, War Department experts visited installations all over the United States and supervised the rating by their fellow officers as well as by their commanders of 13,000 wartime officers—many of whom had been in combat together. On 3,000 out of the 13,000 the ratings by all who made them were in close agreement. There were 1,127 outstanding, 1,019 mediocre (that is, near the average) and 854 poor. On the other 10,000 there was some, though often merely a slight, difference of opinion among fellow officers and superiors taken together. But on the 3,000 all equals and all superiors agreed. And when all a man's fellow officers and superior officers agree that he is outstanding (or mediocre, or poor) as a leader there is not much

doubt about it, especially when actual performance in combat and elsewhere is part of the basis for judgment.

The three groups among the 3,000 men (1,127 outstanding, 1,019 mediocre, and 854 poor)—groups of men who had all been rated with the greatest possible precision and practical care—were used in the final tryouts of the leadership tests.

It was required of every biographical item, test, or rating instrument that it contribute to the differentiation of these groups. For instance, it had been remarked of certain officers that they "had had Junior ROTC training in high school." But a check of biographical data showed that this statement applied equally often to officers in the poor, average, and best groups; so, into the wastebasket it went, along with many other characterizations. Only statistically significant items were given appropriate weights in the final scoring scheme.

Another step consisted in finding out what officers think as to which of these traits and phrases are the more laudatory or the more derogatory. After these data were systematically secured and the trait rankings brought into relation with the validity data, it was possible to select pairs of terms which match in that they are commonly considered to be equally favorable, but which are actually far apart in discriminatory effectiveness. Suppose, then, that we were to bring together into one cluster five of these terms, two of which are commonly considered to be equally unfavorable, two favorable, and one indifferent or intermediate. You are asked to check with a plus mark the term that most nearly characterizes you, and with a minus mark the one which least applies to you. Suppose, further, that you are a very superior officer. If you check this and all other items on the form conscientiously and accurately, the scoring scheme will give you a high rating. But if you are a superior officer in all respects except that you are not quite frank about yourself and decide to mark the items, not as truthfully as you can, but in the way in which you imagine that they had better be marked in order to get a high score, the consequence is that your score tends to be nearer the average or mediocre than it ought to be.

Similarly, suppose a Major is evaluating a Captain who is the poorest leader in his battalion, an officer he personally dislikes; and suppose, in order to rid the Army of such riffraff, the rater decides to mark the Evaluation Report in a way which he thinks will surely make the Captain out to be a very poor officer, instead of marking in each instance the trait term which most nearly characterizes this Captain and the one which least applies to him, as the instructions prescribe. Again the attempt to beat the game defeats itself. The final score tends to drift away from the bottom of the scale in the direction of the colorless average. This pairing of valid and invalid terms, matched for apparently equal value on a scale of desirability, marks a distinct step forward in the evolution of rating systems.[2]

How good is this program of selecting wartime officers for integration into the regular establishment? It appears, from evidence accumulated in 1945 and early 1946, that if traditional procedures had been used, approximately 70 per cent of the officers chosen would have been above average and 30 per cent subaverage; while of the 9,000 chosen with the new procedures, statistical analysis indicates that less than 2 per cent are in the subaverage category. Mr. Clarke mentions estimates of the money savings expected to accrue from the elimination in advance of so many mediocre officers. The new system should eventually save around $250,000,000. Inept leaders are an expensive luxury.

Still better tests of leadership will be constructed in due course. Already steps have been taken to improve the methods of evaluation developed for the integration project and adapt them to peacetime requirements for a periodic officer-evaluation procedure. Appraisal of leadership in noncommissioned officers is a related topic of current research, as is the selection of enlisted men for Officer Candidate School. In the *Army Information Digest* (7) is a crisp description of the forced-choice technique and other features now embodied in the Biographical Information Blank and the Evaluation Report as adapted to such purposes.

Other Continuing Problems

The problem of selection for *assignment in the higher ranks* is certain to be brought forward from time to time. Only recently an officer distinguished as a combat commander and also as a policy maker inquired: "How can we pick the best planners—officers of the rank of Lieutenant Colonel or higher—for duty on the General Staff? Several Generals here, and at other headquarters too, would like to know." Of course I countered by asking whether he could supply some authentic criterion groups: officers who have proved to be superb planners, and officers with similar assignments who have been unable to deliver the goods. With such a start, a typical inquiry might be made into the significance of detailed biographical inventory data, interest schedules, test performances, interview procedures, and rating items chosen with an eye to their possible validity as indicators of exceptional ability to think out plans. Which stigmata are really significant only research will tell—research conducted outside of the library and requiring close observation, ingenious experimental design, patient follow-up, and sound statistical analysis of all relevant data. This problem is one of many in the quest for superior talents—problems that call for scientific attack

[2] The principle was developed by R. J. Wherry, of the Personnel Research Section, Adjutant General's Office, who credits the germ of the idea to Paul Horst, supervisor of Personnel Selection Research, Procter and Gamble Company.

during a period of peace and tranquillity. A good time to mend the roof is between rainstorms.

Nothing has been said of the recurring and insistent problems of *clinical psychology*, a field of highest practical importance in any fighting force. Military psychologists specializing in this difficult subject are wanted today, not only in neuropsychiatric wards of Army hospitals, but also in the consultation services at training centers, to help in preventing minor maladjustments and forestalling serious mental illness. Their usefulness will increase with the completion of current and projected studies of exceptional behavior in relation to the psychiatrists' diagnoses, treatments, and follow-up.

The systematic study of *attitudes and opinions*, too, is a technical field not to be neglected by an army which aims to keep a finger on the pulse of its personnel. Opinions flow along. You can treat them scientifically or unscientifically. You ignore them at your peril.

Equally essential in war is contact with the mind of the enemy. How best can we monitor and analyze his broadcasts? How should we ascertain the effects of military campaigns or of different patterns of strategic bombardment on the morale of his civilian populations and his troops? What truths of ours, what ways of informing him, are our most potent weapons of *psychological warfare*?

If ever again America should approach the catastrophe of war, answers to these imperative questions of military psychology should already be at hand.

References

1. BINGHAM, W. V. *Science*, 1946, **104**, 147–152.
2. BRITT, S. H., and MORGAN, JANE D. *Amer. Psychologist*, 1946, **1**, 423–437.
3. CLARKE, J. M. *Infantry J.*, 1946, **59**, 7–13.
4. FITTS, P. M. *Amer. Psychologist*, 1947, **2**, 93–98.
5. HUNTER, W. S. *Amer. Psychologist*, 1946, **1**, 479–492.
6. KAPPAUF, W. E. *Amer. Psychologist*, 1947, **2**, 83–86.
7. SISSON, E. D. *Army Inf. Dig.*, 1946, **1**, 46–51.
8. TAYLOR, F. V. *Amer. Psychologist*, 1947, **2**, 87–92.
9. WITTY, P. A., and GOLDBERG, S. *Elem. Engl. Rev.*, 1943, **20**, 306–311.
10. ———— Post-war psychological services in the Armed Forces. *Psychol. Bull.*, 1945, **42**, 396–398.

Obituary

Sir Joseph Barcroft 1872–1947

With the death of Sir Joseph Barcroft on March 21, the School of Physiology at Cambridge, England, lost one of its most distinguished and best-loved members. A student of the founders of the School—Foster, Langley, and Gaskell—Sir Joseph, perhaps more than anyone else, preserved its traditions and, through the host of students and collaborators he attracted, brought those traditions to international recognition.

Joseph Barcroft was born on July 23, 1872, at Newry, County Down, Ireland. He received his early education at Bootham at York and the Leys at Cambridge. After receiving the B.Sc. at London he went to Kings College, Cambridge, in 1893 with an exhibition. There he gained first-class honors in Parts I and II of the natural sciences tripos and was graduated with the B.A. in 1896.

Barcroft then began to study the mechanisms which provide the tissues with oxygen, an aspect of physiology then unexplored at Cambridge and the one which formed his dominant interest during almost half a century of active investigation. The earliest studies were designed to estimate the rate of oxygen utilization by a variety of tissues—the submaxillary gland, the kidney, the pancreas, and the heart in activity and at rest. These, some of which were made alone and others in collaboration, provided the basis for the recognition in quantitative terms of what Barcroft phrased as "the call for oxygen."

With the cumbersome apparatus for the estimations of the blood gases available at the turn of the century, data on gaseous metabolism of tissues were hard earned. Extraction methods were time consuming and required relatively large amounts of blood. To facilitate his estimations, Barcroft devised and improved the differential manometer, an instrument which opened new possibilities for the study of tissue metabolism and one which today, either in its original form or Warburg's modification, is used in biological laboratories throughout the world for the study of the respiratory exchanges of small amounts of tissue as well as for following the reactions of isolated enzyme systems. The invention of the differential manometer opened the way for Barcroft's classical studies on factors affecting the combination of oxygen and hemoglobin, to which his attention was drawn by a desire to estimate the oxygen or pressure in tissues at rest and in activity. For this purpose he sought to use the dissociation curve of the blood, but the variations in the form of the curves he prepared, as well as those of others, led him to investigate the effects of acids and salts on the affinities