

THE PRINCIPLES OF TRAINING

BY

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Gentlemen: Since 1908, the doors of the War College have been thrown open for the reception and the instruction of naval officers from all branches of the service alike. As the officer representing the Medical Department of the Navy, at the present Conference, and, after some study of the question, I may be permitted to prophecy - and in so doing, I only voice an impression that has already become general - that this liberal departure from the previous policy of the College will, in more than one respect, turn out one of the most significant and portentous moves for the common good of the entire service that has ever been made during its brief, though remarkable history.

(The promoters of this plan have earned and will continue to earn in an increasing ratio as time goes on, the gratitude of all wellwishers of the service, for manifesting a nobility of purpose, for a serious attempt at subordinating the minor interests of the individual to the higher ones of the service as a whole and utilize and correlate them all to the one all-encompassing end and purpose for which alone our fleet does and ever can exist.

The substance of it all is well expressed and summed up in the few simple but significant words, spoken at a banquet in Washington by Admiral Sperry: "Loyalty to the entire service is better than loyalty to any one of its various branches.")

Henceforth, the War College should stand before all officers of the naval service as a very large and impressive interrogation point behind the simple words: "What can you do for the navy and the fleet?" And, measured by this simple standard of usefulness to the service and its high aims, we all ought to be and must be willing, either to stand and take rank accordingly, or fall and calmly submit to elimination.

The Medical Department and the Service.

Fortunately, the Medical Department of the Navy is in no great danger, even in the face of the most rigid standards of examination, of being eliminated, with regard to its usefulness to the naval service. Its usefulness to the service and the fleet seems, on the contrary, to be on the increase.

Leaving aside all humanitarian aspects of its mission and, considering its purely military bearing on the aims of the service and the objects of the fleet, the Medical Department is connected with them by a thousand threads, tending to make the Navy better during peace and the fleet stronger on the day of conflict.

My brief but rather intimate knowledge and experience at this College, this summer, however, has also taught me to circumscribe, with more insight and appreciation than before, its merely relative importance to the whole, as well as to note with a clearer vision the outlines of its limitations. And, I have come to believe that it is in the awakening of this consciousness on the part of the officers of the service of the exact relations of the parts to the whole, that all constructive and cooperative effort has and practically must have its beginning. Personal responsibility for work well done need not therefore be allowed to suffer.

The Functions of the Medical and
Sanitary Service in the Navy.

A systematic and discriminating exposition of the exact position and influence of a well organized sanitary service on the navy and the fleet would be a most timely and profitable undertaking, at the present junct^{ure}ion. The conviction has grown on me more and more with every day ~~of~~^{of} my attendance at this Conference, that the proper relations of the medical and sanitary service to the fleet should become the common knowledge of every officer of the service. It should be made the common knowledge

of every officer that there is a sanitary factor, well worthy of the highest consideration, in every war-plan claiming to be complete. *(see table)*

Naval Hygiene.

Materiel	Personnel
Construction of vessels	Training, moral, mental and physical
Living Rooms & Dormitories	Ailmentation
Engine and Firerooms	Nutrition
Storerooms and Magazines	Work and Recreation
Kitchen and Bakerooms	Rest and Sleep
Ventilation	Clothing and Bedding
Heating	Climate and Acclimatization
Lighting	Personal Cleanliness
Water-storage	Instruction of Men in Personal Hygiene
Bath and Washrooms	Prophylaxis of Disease
Laundries	Aid & Removal of Wounded.
Cold Storage & Ice Plants	
General Cleanliness.	

This, however, is not the work of a single day nor that of a single man. The short time at my disposal makes it impossible to do more, on this occasion, than to point out a few of the more vital ^{bonds} ~~forms~~ of relationship that exist between the medical and the other departments of the service. And moreover, these same relations and their relative importance to the whole must change under different conditions.

During the prevalence of peace, which is a time of preparation, it is through the various channels of Naval Hygiene that the medical department can exert its greatest and most beneficent influences on the service, as may be seen on the adjoining table. During war, it will be the preservation of the health and strength of the personnel to which all possible attention must be paid. On the day of conflict, all hands must be prepared to throw into the balance all they are and all they possess in strength, health and ability and life itself

has only value as used against the enemy. A prompt and safe removal of the sick and wounded is, on the day of conflict, the thing through which the sanitary service can effect the greatest good to a fleet in action.

My remarks will have to be limited to the Hygiene of the Personnel of the service and from among the subjects under this heading, I will speak first on "Training" and, tomorrow on "the care and removal of the sick and wounded."

No thoughtful observer, no serious minded student of his profession and its literature, whether belonging to the purely military or other branches of the services, can have failed to note the ever increasing amount of serious attention that is being devoted to the question of the Personnel of the services, throughout the world. The most recent literature abounds in treatises devoted to the study of the question of the Personnel of the services, in every one of its various branches.

Thus, with regard to and beginning with the person of the military surgeon, for example, and the characters and attributes that he should possess, Alessandro Basquale, colonnello medico nella Regia Marina. ("Organization of the Sanitary Service and the principles upon which should be based the Aid to the Wounded in Naval Warfare".) *Annali di Medicina Navale e Colonniale*, vol. II fase V, 1908 p 601., expresses himself as follows:

"The military physician has not merely the duty of curing but also and, to a much higher degree, that of preventing. In a military sense, it becomes his highest duty to coordinate his professional activities harmoniously with all the other military duties of the Navy or Army toward the one supreme end of all the other armaments."

"To still conceive today the military medical man as being simply a skillful surgeon, fitted out with a supply of surgical instruments and, accompanied by litter bearers and expert nurses and stretcher-bearers, would mean to ignore the most important

portion of the mission which he is called upon to fulfill. Physicians who would exclusively answer to the requisites of a cure, may be had under all circumstances. The meritorious red cross and all the other private benevolent aid societies, sprung up solely from humanitarian impulses, would quickly succeed in their efforts at mitigating the disastrous consequences of a war. Very different from this is the duty of the military physician who, already in the performance of his daily professional duties, must never loose sight of the chief object for which the navy and the army exist and incessantly contribute to that great object all his other special attainments, with all the despatch and zeal of which he is capable." Some of the brightest minds in both services in this as well as in foreign countries have devoted a great deal of their time to the study of the best methods of selection and training of the officers and of the best methods of recruiting and training of the men. In his classification of the functions of a well organized sanitary service in the navy, Pasquale (loc cit) places "the preparation of strong, healthy and intelligent men" at the head of his list and Lieut.Colonel Macpherson* in his recent lecture, delivered at the Staff College, Camberly, makes it the first duty of a well organized sanitary service in the army, to preserve the health and strength of the troops. Frequent references to the same subject will be found in the Reports of Military observers etc., collected by the General Staff of the U.S.Army. Thus, in Part V No. 8, of March 7, 1907, Edward McClermand of the Cavalry and Wm.V.Judson, Engineers, p 135, express themselves as follows: "To appreciate an army at its true value, it is necessary to study the character of its personnel." Finally, I may be permitted to quote a few lines from Commander T.L.Shelford,**R.N., who says, in his prize

* Macpherson, W.G. Lt. Col., C.M.G., Royal Army Med. Corps, "The Removal of Sick and Wounded from the Battlefield", the Royal Army Med. Corps, Vol. XII, No. 1, Jan. 1909, p 78.

** Shelford, T.L., "The Command of the Sea", of the United Service Institution, June 1909, vol. LIII, No. 376, p. 707.

essay very pertinently to our subject: "In every naval war the efficiency of the personnel stands predominant. Without its efficiency no navy is adequate for the purpose of its being. However efficient the strategy may be, however advantageous the position of the fleet for carrying it out, it is dependant for the success on the personnel and the efficiency of the personnel is dependant on training and practice - above all practice. No naval force, however large is worth its value, unless its personnel are so immured by practice and training as to get the utmost out of it." To all this we can only add our hearty approval. Lastly, the most weighty considerations regarding the personnel of the Fleet must, very naturally, gravitate around the person of the Commanding Officer who represents the source and center of that moral force which must, for either good or ill, animate the whole living machinery of the fleet's personnel.

In as much as the mastery of a vessel, the simple handling of the materiel of a fleet is but one of the provinces of command, the mastery over men being the other and, in so far as the training that officers receive at this College is intended to add value to their efficiency to take command, meaning to assume responsibility with alacrity, it would seem to be well within the scope of the functions of this College to bestow upon the question of the Personnel of the service a due amount of care and attention.

We may, therefore, say that it is by common consent, by an agreement almost unanimous, that the efficiency of a fleet or of a single ship, does not grow exclusively with the growth and the developments of the weapons of offense and defense, but that it, likewise, grows with the strength and with the ability of those who are to handle them against the enemy, and both ability and strength of the personnel develop and grow under the influence of proper training. It is in connection with this important question that the medical officers in the service

are in a position to render the ^{most} ~~best~~ valuable assistance and, wherever they have been taken into the confidence by the general staff of an army or navy, this function of the medical service has become more and more clearly recognized. As one of the latest results of a study of this question in the British service, ^{we} ~~one~~ may note that, for the last two years, all naval surgeons entering the British service, have been ordered to the Portsmouth school for Physical Training for a short course of instruction, not so much for the purpose of converting them into physical trainers as with the object in view of stimulating their interest in the subject of Training generally, as I understand it, and to cause them to see and realize how and where they, as medical men, may use their knowledge and assist in the carrying out of the best principles upon which a proper course of training of any kind must rest.*

For, and although the medical officers in the service will not have the last word to say on the subject, Training is essentially and fundamentally a biological process and, as such, subject to well known biological laws that are absolutely unchangeable. Medical officers in the service are trained in the biological sciences and therefore, the assumedly best interpreters of the laws of life, governing training. And, if today we ~~must~~ deplore the amount of misapprehension that exists on the subject of Training, it is directly and invariably due to a misunderstanding and a misinterpretation of the fundamental laws that govern this process.

What, then, may we ask, is this remarkable process we call training, what does it consist in and what principles does its success rest on?

*Bell, R.D. Surgeon, R.N. "Physical Training and the Medical Profession." Royal Army Medical Corps, June 1909, p. 639.

In the broadest and most general sense, it may be defined as a result of the inherent property of all living matter, of growing and developing, under the influence of the exercise of its special functions, within the range of its capacity.

The human organism, for example, must be looked upon as a compound of many very different and highly specialized tissues and organs, each one of which has a different function to perform. The living organism, in constant communication with the outer world through the channels of its five senses acts and reacts, in accordance with the changes in its surroundings and, thus, it gradually accumulates specific energies, that is, it grows stronger with every new exercise of its peculiar function through the various influences it constantly receives from the outside, providing the amount of work it is called upon to do, in doing the exercises, is kept well within the limits of its capacity and those limits are best summed up in what is known as fatigue. In this more general sense, brainwork, and muscular work rest on the same biological basis.

The eye learns to see, the ear learns to hear, the central nervous system to perceive, interpret and store up impressions, the muscle learns to contract and store up muscular energy and, thus, storage batteries, charged with all sorts of specific energies are distributed throughout the different organs of the body, all connected with and under the coordinating influence of an alert and wide-awake central nervous system, dominating them all.

Now, you will all admit, that between a simple visual perception of an external object in our surroundings, such as a house or a tree or a ship on the one hand and the reading of a book or interpreting microscopical pictures, or following the courses of the stars through a telescope or sighting a far distant target on the other, there is a considerable difference. Still more apparent becomes the

difference between simple perceptions of external objects, through the special senses of hearing and seeing when combined with orderly and purposive muscular contractions and, the remarkable performances of a piano or violin virtuoso bear testimony of that. The distances in time and the differences in the performances of these various functions of the human organism are covered by long years of training, that is, exercises of certain special organs or combinations of organs under the most favorable conditions of growth and with a definite, specific object in view.

Under this definition, training includes study and practice. The two are in reality one and indivisible, two steps in the same process, imperceptibly merging one into another, meaning work, whether done by braincells or muscle-cells or both these combined. All general training, in this sense, is physical, because it means the development of the normal function of a part of our physique to a higher degree of efficiency by exercise.

Work, therefore, as will be seen, in the truest and most general sense of the word, is not done by muscles alone, nor is it the muscles of a man that do the largest amount of it in this world; neither is, in this general sense, the man with the most powerful muscles, necessarily also the greatest nor the only kind of an athlete. Man owes his dominant zoological position in the world of living things to brainwork and it is through a higher development of brain function that he will continue to advance it.

We have seen, not only to what an astounding perfection our own individual latent energies may be developed by proper training, but we, likewise, have seen that the particular training we wish to attain or ^oemply must be determined and governed by a definite and clearly defined object which it is the purpose of our training to accomplish. It is, indeed, always essential to keep in mind the particular ~~energies~~ or

combination of energies we wish to develop and store up ready to convert into power, when occasion demands, are specific energies, intended only for a specific object and capable of being developed, consequently, only by special methods. ~~It is also necessary to remember, while in training for any purpose, that our total available energy, although capable of a gradual increase, is limited and that we must, therefore, concentrate our training upon the specific methods.~~ It is also necessary to remember, while in training for any purpose, that our total available energy, although capable of a gradual increase, is limited and that we must, therefore, concentrate our training upon the specific object before us and not scatter our available energy upon a variety of objects, if the highest perfection in the shortest possible time is expected.

This property or capacity of the living human organism of developing its faculties through appropriate methods of training with a definite object in view, to such an astounding perfection, is at the bottom of all successful specialization. The physiological law under which it is done and to which it must conform needs no further demonstration. The value of the object must decide whether or no it is worth the price. The law itself remains unchanged and it is as useless to attempt to get around it or swim against its mighty current, as it is to ignore the law of gravity itself.

No one ever learned to handle an oar by swinging dumbbells. Even as an introductory or preliminary exercise it would only mean a useless waste of time and energy, as long as the joints are in a normal condition. If it is through football that you wish to conquer your enemy, it will be by studying football strategy and tactics on the one ~~hand~~ and by playing that game on the other, through which alone you can develop that combination of strength and ability which will enable you to attain your object. If it is the science and art of war that form the objects of your endeavors, it will have to be by playing that game that your training must depend upon ~~and must~~

and must have its beginning and, before you can possibly be expected to practice, with any possible chance of success, on that more expensive and complicated instrument, a fully manned and equipped fleet at sea and in action.

Neither horse-back riding nor playing at lawn-tennis will furnish you ^{that} ~~with the~~ specific endurance ^{which} ~~that~~ you need for the command of ships at sea. From the point of view of training with a definite object in view, both the study of the science of war at this College through map maneuvers and the maneuvers of the fleet at sea, are but different halves of the same game, ^{mutually} eventually self regulating and self correcting parts of a whole ^{each} ~~each~~, equally necessary in your training.

But what I, as the exponent of the biological side of this question consider it as my special duty to impress upon you in this connection and what is of special importance for you to value and realize, is, the great general principle, namely: that all Training, whether called mental, moral or physical or all three combined, whether for professional, scientific, technical industrial, military or naval purposes is indissolubly bound up with the development of faculties resident ^{within} ~~neither~~ the living individual man and a part of his physique, in accordance with physiological principles and laws; that it can be only through the observance of these principles and laws that the highest attainable development of certain faculties, hereditary in the human race can be expected and that the object of all training must ever form your most reliable guide in the selection of your methods of training and, finally, that you must concentrate your available energies upon your object and not scatter them upon a variety of unrelated objects.

The great importance of the special object in view in all processes of training may, perhaps, with some advantage be illustrated by an example:

Command has been defined by La Bolina* as the "dynamic manifestation of the influence which one man exercises over a group of men in such a manner as to bend them, without the use of violence, to do his own will." We must consequently assume that there is, in the art of commanding, ^{an} ~~as~~ emanation of moral force. This force must, moreover, be strong enough to overcome all possible countercurrents in ^{those} ~~them~~ who are supposed to receive and execute the orders received. This psychical force, thus translated into Kinetic energy, is as much subject to an increase in strength by the proper methods of training, in harmony with the laws of biology as is the strength of our muscles. The methods alone differ. The special object in view, the concentration upon the particular aim by the necessary mental faculties engaged in the process, will, not only suggest the most suitable methods of training, it must also determine the result in one case as it does in the other.

You will admit that the object in the inventor's mind who constructed the sewing machine was a different one from that in the mind of him who designed the triple expansion marine-engine. While the performances of either are wonderful in their way, neither could take the place of the other. Nor can it be said that the knowledge of how to construct the one is a necessary preliminary step in the process of training a man up to construct the other, without considerable deviation from a preconceived purpose and dangerous loss of energy and time. The one needs a good tailor, the other will give up its maximum efficiency only to a highly trained and experienced marine engineer.

So much for the subject of Training and its principles in general. I pass on to the subject of

Training, Termed Physical.

The greatest misapprehension exists as regards the training called physical and one of the greatest mistakes that can be made is to use the ^{term} ~~term~~ athletic training as if it were but another

*La Bolina, Jack. "Riflessioni sul Comando Navale."

term for physical training. The distinction between physical training and athletic training must be sharply defined, since the objects aimed at by either are very different.

In physical training the object is to raise the standard of normal health and strength up to their highest level during the developmental or formative stage of life and all unnecessary strain and fatigue are carefully avoided, while all the normal functions are exercised, within the ever increasing limits of their normal capacities until the highest attainable degree of development is attained.

In athletic training the object before the trainer is to bring the human machine up to its highest point of efficiency, to perform a certain definite feat and everything interfering with this object, including the machine itself, is sacrificed. During such training, the heart is made stronger and larger than necessary for all other vocations of life, if the feat, to be performed, happens to be one requiring endurance. The nervous system is made more alert, if speed is one of the factors in the problem. Special muscles are developed at the expense of and the neglect of others and the normal store of fat is lessened if agility is a necessary requirement.

The object is not primarily health but superlative ability in a definite direction, regardless of health. It is either strength, speed or endurance or all three combined for the accomplishment of a certain object, without regard to the general health of the human body and, certainly, the undue absorption of fat, leaves the constitution less able to withstand the siege of constitutional infection. This is shown by the increased number of cases of typhoid fever and pneumonia that occur in athletes, either during or immediately after a course of such training, fat within normal limits being one of the most valuable assets in resisting disease.

Although, in deciding the value or harmfulness of athletic training, the physiologist may not always have the last word to say; in considerations regarding the service, it should never be lost sight of that the athletic class rarely exceeds ten percent and that it is the main body of the men and not the athletes at all that need physical training most and to whom our efforts should be directed, if they are to be made stronger than they are and the general average of the strength of the ship's complement is to be raised! And this is and must remain our chief aim!

"Physical training must not be regarded as an end in itself, but as an essential means toward the equipment of the individual for the work in which he may engage" (Hough). The athletic ideal is entirely different from that. It does constitute, at the time, an end in itself; its primary aim is not the cultivation of health and strength but that of excelling some one else. Physical risks must be taken, if necessary, risks which may end in permanent injury, and even in death, in order that one's foot-ball team shall prove itself superior to that of some other institution.

The relation of physical training to athletic training is perhaps similar to the relation existing between undergraduate and post-graduate or university instruction, in that the former is simply a means of preparation for the more successful instruction in the latter. And, in as much as the course of undergraduate studies, selected by the individual is supposed to be the one best adapted to prepare it for the life's work in which it intends to engage, so will the ends of physical training be met, when it prepares a man for his work in which he sees his future life must play a part. (Developmental and Athletic Phys.Tr.).

General Exercises.

There is, however, a third kind of training and which cannot be called either athletic or developmentally educational and preparatory in the sense in which physical training has been interpreted above. This may best be spoken of as "General Exercise".

"The human frame is constructed for a life of muscular activity" and the "fact that until very recently (when master mind began to take control of mistress muscle), mankind has supported itself by physical (muscular) rather than by mental exertion, must have led to the survival of those with bodies adapted to physical exertion." So essential was it that this adaptation should be of a very high order, that we are not surprised to find that it went to the extent of producing a body not only capable of sustaining, but even of profiting by physical (muscular) exertion." (Hough). (*Italics my own*)

It is, then, on this principle of the peculiar constitution of our bodies, that we continue to profit throughout life, by taking general muscular exercise and, even after physical training has done its work of completing all possible normal development and growth of which our bodies were capable. The muscular activity however, which should continue to form a part of the daily work of our lives as it formed a part of the lives of our ancestors, although hard and vigorous at times and periods, is moderate work. While admitting, as we must the necessity of taking a moderate amount of daily exercise for the maintenance of general health, it must never be forgotten that our capacities for taking such exercises as well as our needs of them like life itself, follow the lines of a binomial curve. The amounts that are necessary, as years go on, have a rise, a prime and a decline. What is merely moderate exercise at twenty, may become hard work at forty and what was moderate exercise at forty may turn out to be a dangerous athletic feat at sixty. For the maintenance of health moderate muscular exercise during

every period of life is all that is needed. The training, necessary for beating a record as in foot-ball or any other athletic sport is something distinctly in excess of what is needed. All the so called good effects of exercise, experienced during physical training, are derived from the moderate muscular exercises and not from those that approach the athletic ideal. These are so well known to you that it is unnecessary for me to enumerate them. But it may be well to impress upon you, once more, the fact that these very desirable effects of general moderate muscular exercise on the digestive functions, on sleep, etc., can not be secured in any other way than by muscular activity.

Fatigue.

As was mentioned at the beginning of this lecture, all exercise, whether psychical or muscular, administered with the object of developing a definite function of the human organism to a higher degree of perfection or efficiency, must absolutely be kept within the bounds of the normal capacity of the individual under training. These bounds or boundaries are formed by a condition, known to physiology, as fatigue.

This interesting biological phenomenon has been the subject of the most profound studies on the part of the best physiologists in the world, for many years, but without its yielding up all the secrets of its nature and causation. Without even attempting an analysis of the phenomenon, I shall try to give you just enough of what is known about it, as may serve you as a working hypothesis in your efforts at training.

Wherever protoplasm exists in a living organism, there, also, work of some kind is being done and, on the other hand, wherever work is done, there fatigue is possible.

From the beginning, it should always be kept clearly in mind that all extreme exertion of any kind, is a debauch, and not an exercise, leaving the individual in a condition of depletion; and, that it would have been much better for the health, strength and the continued well-being and progress of the indi-

vidual under training had the debauch never been indulged in.

While it remains true that training in any direction should be made to approach these limits of the normal capacity of the individual, it is safest to avoid transgressing that border line that separates the normal from the abnormal. This is not only the teaching of sound physiology but also that of sound common sense. And, since it is the average man and not the exceptionally gifted who does the world's work, all successful mass training must aim at keeping within the limits of the capacity of the average man, if it is expected that it shall be administered successfully and the object of training shall not be defeated. The exceptionally gifted and more highly endowed may conform to higher averages. The exceptionally gifted cannot be allowed to set the pace for the average man.

The most recent contribution to our knowledge of fatigue has been made by the German physiologist, Weichardt. Weichardt claims to have found among the products of extreme muscular activity a specific toxin which is analogous to bacterial toxins *capable of producing the symptoms of fatigue when injected into animals; he, likewise, produced* a specific anti-toxin, possessed of striking recuperative powers. The preparation of his anti-toxin in this country is now protected by patents, issued from Washington, and it is gratifying to feel that if it proved to be the long-sought antitode to fatigue, now commercialis^{ed} will come within the provisions of our pure food laws" (Lee).

While there must be different causes to different forms of fatigue, one thing seems to be certain, namely, that the cause of muscular fatigue at least, is, in the main, a toxic substance. Most all of the other energies, outside the purely muscular, are specific energies and every organ, having a special function, may therefore also be supposed to produce its own specific fatigue substance, when worked to excess. But all exact knowledge of this subject is as yet wanting.

We do know that all excessive effort in any direction frequently brings on high temperatures, lasting for days; like the fevers, caused by bacterial toxins, these are undoubtedly due to the action of fatigue substances.

From this point of view, then, one important element in all training would be the adaptation of the tissues to the toxic fatigue substances. "Without this all the other benefits of training would avail nothing." (Lee).

Moderate and increasing amounts of exercise, producing moderate but increasing amounts of fatigue substances would put the tissues, by degrees, into a state of tolerance or resistance, so that, when the supreme effort is demanded, these do not succumb. The whole process of training could, therefore, be explained on the basis of an auto-immunization against fatigue toxins, subject, so far as it can be controlled, to the same biological laws.

That which it is for us, above all else, to remember is that it is fatigue that loses battles and that it is absence of fatigue that wins victories. It is, consequently, most pertinent to the work of this conference to bestow upon this part of the Hygiene of the Personnel in the Navy, its due amount of consideration. The battle of Tsushima was decided in great part by fatigue on one side and absence of fatigue on the other.

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Naval War College,
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LECTURE II

The Care and the Removal of Sick and Wounded on
Shipboard during and after an action.

Gentlemen: A very able lecture on the subject of "Wounded in battle on Shipboard" was delivered at this college last year by Surgeon E. S. Bogert, U.S.N.* Since that time, several important additions to the literature have appeared in several foreign medical journals on the same subject, and to which I deem it very desirable that your attention should be called. It appears that the more we study the important bearing which a prompt and careful removal and treatment of our wounded in battle has, even from a purely military and naval point of view, the greater also it becomes. It is indeed to this particular side of the subject to which my remarks will be limited.

Baron von Schellendorf in his "Duties of the General Staff" states that "the system of evacuating the sick forms the basis of the entire medical service in the field."

Lieut.Col. Macpherson,** in a lecture delivered at the staff college, Camberly, Dec. 14, 1907, after dividing the work of the medical department of the army into four sections, puts special emphasis on that section of his classification which is concerned with the removal of the sick and wounded, stating that, to the staff officer, the evacuation of the sick and wounded is perhaps the most important of all the functions of the medical service in the field, and that failure to realize this fundamental principle has led, among other things, to the so-called medical scandals of war." An administrative and general staff should understand and appreciate the organization by which the removal can be accomplished most effectively." Similar, if not identical, remarks with reference to the naval service have been made by Pasquale,*** and Suzuki, as well as many others, after a careful study of the subject.

* Bogert, E.S., Surgeon, U.S.N., "Wounded in Battle on Shipboard", Archives, Naval War College, Session, 1908.

** Macpherson, W.G., Lieut.Col., R.A.M.C.; "The removal of the sick and wounded from the battle field." Jt. at the Royal Army Medical Corps, Jan. 1909. p.78.

*** Pasquale, Alessandro, Col. Med. nella Regia Marina. "Organization of the Sanitary service and the principles upon which should be based the aid to the wounded in Naval warfare." Annali di Medicina Navale e Coloniale, vol II. fasc V, 1908, p.601.

The most eloquent story comes to us in the form of figures furnished us by Surgeon General Suzuki after the war was over. He reported that 82.07% of all their wounded were returned to their stations and resumed their positions on fighting ships, either during the same or a subsequent battle and that of these 51.86% did so from treatment received on their own ships and 30.21% from treatment received at hospitals. Assuming, for the sake of giving a more concrete illustration by figures, that the Japanese naval forces numbered 20,000 men, their total casualties (15.86%) were 3130. Of this number 1627 were recovered by treatment on board their own ships and 939 more, by treatment at their hospitals, making 2566 recoveries in all, while the war was still in progress; a number equal to manning three battleships *with trained men!*

What this means becomes at once apparent when we stop to realize the sudden rise in value of a single useful life on board ship on the declaration of war, the scarcity of trained men, and the familiar fact that, without men, there can be no shooting. Here is also the principle military reason, why a naval sanitary service should be well organized. We should ^{only} not/try to do as well as the Japanese but we should try to improve upon the figures by improving our methods.

That the sanitary service on board Japanese ships was well organized, we derive without difficulty from the report of Surgeon General Suzuki, in which he reports the delightful fact that the number of their injured never exceeded the limits provided for their comfort below. When we, moreover, take into consideration that, although victorious, there were 120 injured on the flagship Mikasa alone, the provisions on board that ship must have been very liberal and the sanitary service excellent.

That the sanitary service on board the Russian ships was not good, we may derive from reading Seminoff's description of the piles of dead and wounded lying about the decks of their ships and that some of them were actually thrown overboard -

"to prevent the disastrous effect on the morale of those left uninjured!" While, then, we have ample proof that, on the Japanese side, the wounded were promptly removed and successfully treated, on the Russian side, they were left where they dropped and were thus lost forever. The moral effect of such conditions on those that remained alive is now a matter of history.

While some of us, no doubt, may have been carried away by a temporary enthusiasm, aroused within us, at their wonderful work and given the Japanese more credit than they actually deserved, others seem, on the other hand, a little too prone to question the reliability of their statistical returns, upon which our deductions, nevertheless, must be based. Thus, we find in the last lecture, delivered on this subject, at this college, last year, the absolute reliability of certain figures questioned, for apparently very good reasons. The official reports with regard to the number of wounded on the Mikasa gives that number a value of 63, while the reports from another, equally official source, state that number as having been 120. How is this difference to be reconciled? Convinced that neither side was trying to make a false report and, after some research for the cause of the discrepancy, I believe, it may be found in the following considerations. The official reports which state the number of wounded on the Mikasa as 63 are reports from hospitals, the reports that state the number of wounded on the Mikasa, as having been 120, are reports made immediately after the battle of Tsushima, and are therefore ships' reports. This conclusion is based upon the calculation, that 51.86% of all the wounded never left their ships but joined their comrades in the fight after having been treated on board. Upon a little further calculation, I find that after deducting 63 from 120 we obtain the number 57 and this number is about 48% of 120, a percentage quite near enough to 51.86, the general average, derived from all the ships, to satisfy any

one of the fact that this is the actual cause of the differences in the two reports. The resulting difference in the figures is, therefore, merely apparent and satisfactorily explained.

The sanitary services of the Army and Navy,
during active operations,
compared.

After a rather careful study of the work of the medical and sanitary service in the British Army, ⁱⁿ ~~is~~ the paper by Lieut. Col. Macpherson, (Loc. cit), its various divisions into zones of field work and links connecting them, we cannot help arriving at the conclusion that there is much that is identical in the sanitary work of both army and navy, both with regard to the aims and the means by which they may be accomplished (~~see~~ ^{insert here} chart). Leaving aside, for a moment, the technical details of the medical work to be **done** in the different zones and at the various connecting links between them and considering merely the broad principles and skeletal outlines of the system itself, we may, almost without a single change, transfer all these to the field of operations of the sanitary service of the navy, during war, whether it concerns a single ship or a whole fleet in action. Thus, beginning with the three zones, the ~~collecting~~ collecting zone, the evacuating zone, the distributing zone, with their two connecting links, the clearing hospitals and the stationary hospitals, as forming a complete field-cycle within which the whole work can be accomplished, we may apply the principles of the system either to a single ship or to an entire fleet in action.

Taking, first, a single ship in action and, keeping in mind the particular function of each one of the five parts of the cycle of the army service in the field, we would, accordingly, have to place the collecting zone in ships on the different gundecks and bridges and ^{other} ~~after~~ exposed parts. The clearing hospital would include the corresponding sheltered first-aid and transport stations, near the fore and after lowering hatches on one of the upper decks, the evacuating zone

would become the vertical hatch with the lower deck passages, leading from the sheltered first-aid and transport stations to the **action** dressing room and the latter, that is, the action dressing stations, would, with their adjoining rest or recovery rooms, take, from necessity, the place of both the stationary and general hospital all in one of the army in the field, for the time being. The distributing zone could not be realized in a single ship.

Taking, next, a whole fleet in action and translating the activity of the medical department of the fleet, during an action, ^{into} ~~with~~ terms of the army system, we could, without serious alterations give each point in the cycle a somewhat broader sphere; The collecting zone would practically remain the same; the sheltered first-aid and transport stations, near hatches, would more nearly correspond to the area of the work done by tent divisions of field units; the passage between transport stations and action dressing stations would, then, correspond to the class of work done by ambulance and ~~sheltered~~ ^{stretcher-} squads, carrying the wounded from the field of active operations to the clearing hospitals. In addition, we would have the evacuating zone represented by small boats, carrying the permanently disabled to a hospital-or ambulance-ship, itself forming the temporary base of the distributing zone, leading to the general naval hospitals at home ports, as the final destination of the sick and wounded and, thus, completing the larger and more complete cycle of the sanitary work to be accomplished in a fleet in action. And just as important as it is for an army in the field, that the machinery should work perfectly and that there should be no clogging in any part of the system, just so is it for a fleet in action.

We see, therefore, in this simple comparison, used merely ^{for} pedagogical reasons, a singular and most striking agreement as regards the main points in the two systems and the chief pur-

poses to be fulfilled and accomplished at those points, by the sanitary officers of the two services, when in active service, and whether in the field or on the high seas.

It cannot here be my purpose to go into a lengthy description of the numerous technical and purely medical details of the work to be done at the different points of the system and I must absolutely limit myself to the broadest possible outlines and the points of contact with other departments at which the work in order to be accomplished without friction, is in need of tolerance, if not of intelligent cooperation.

But this, I hope, I have made clear to you, namely, that, aside from all humanitarian considerations, the prompt and efficient removal of the injured from the decks of a fighting ship and in action against the enemy, is one of the important considerations that must influence for either good or bad the outcome of it and it becomes clearly the duty of the medical department of the navy to relieve commanding officers of that part of their responsibility in an action.

When we take into closer consideration that this importance is derived solely from considerations of the military effectiveness of an army in the field and not from any reasons of the humanitarian character of the work, we ought, perhaps, realize, as we never did before, what an efficient removal of the sick and wounded in future battles will mean and how much it will contribute to the fighting efficiency of armed forces whether on land or on sea.

To a naval surgeon, accustomed to work within the restricted area of a single ship, the first sight of the elaborate preparations for the removal of the sick and wounded in the rear of an army in the field must come as a positive surprise. The army of litter bearers, ambulance men, the immense park of ambulance and hospital supply wagons with their horses, the large number of trainmen at work on ambulance trains and engaged in the laying of light field railways on the lines

of communications for the prompt despatch of the wounded in the direction of the base hospitals, all of which are found in the rear of an advancing army in the form of mobile units, must lead him to infer the immense importance attached to the functions of the sanitary service in the field, from the large amount of labor and expense alone that are devoted to them. Both from my recent experience as Fleet Surgeon and from a study of the subject on board the ships of our fleet and a perusal of the literature of the same subject as regards foreign navies, I am led to the inevitable conclusion that the elaboration of an effective system for the removal of the sick and wounded from the area of active operations in the navy, is considerably behind the army, mainly, as I believe, for the reason that it is not generally recognized and more commonly known, how important a subject it has come to be.

This applies not only to naval officers generally, but also to some of the medical officers themselves.

Why is it, then, it might be asked, that the great importance and necessity of the work to be done in the medical departments of the two services should be so much better appreciated by the General Staff of an army than is the removal of the wounded from the decks of ships in action by the officers of the navy?

The answer to this is not hard to find. It can only be because that most strenuous of all teachers and task-masters "experience" has long since taught army officers what naval officers still have to learn.

The number of battles fought to a finish on land is so very much greater than that of the battles fought out between ships at sea, that, what has long since become a hard, fast and well established factor in battle organization in armies, always to be reckoned with, is still an imperfectly known quantity in fleet organization on the high seas.

Since, in principal at least, we must assume that the prompt removal of the sick and wounded from the decks of fighting

ships, although seemingly less complicated, certainly less expensive, than on the field of battle, is at least of equal importance to the efficiency of a ship or fleet in action, as it is to the efficiency of an army in the field, my plea would be for us, as naval officers, to accept, without further hesitation, this one great lesson, without waiting for the ~~most~~^{more} expensive demonstration, involved in actual experience to specially impress it anew upon us. If the art of war consists in trying to get as many of the chances as possible in your favor and if, moreover, a great success is often only the direct consequence of a remembrance, I should be inclined to point to the great necessity of remembering that the prompt and careful removal and treatment of the wounded is a matter of long preparation and drill. It is the duty of the medical department of the navy to do this work, the responsibility for doing it effectively will remain with the commander-in-chief of the fleet.

The calculation of material and time required for removal of the sick and wounded.

It may become desirable or even necessary, both before and after an action, to remove the sick and wounded. Before an action, a certain number of sick encumbering the ship's hospital must be sent ashore or on board an ambulance ship, preparatory to an action possibly within a short time. After a fleet action, the removal of at least the seriously wounded, able to be transported, will always have to be effected.

The question arises, what losses are we to expect and to prepare for. The statistical material in our possession upon which to base our probability calculations is very meager. Most of this material has come to us from the reports of the Russo-Japanese war and is practically summed up in the adjoining table:

Table of Casualties

Ships	Approx. number of crew	killed	Seriously wounded	Slightly wounded	total	% of whole crew injured.
Mikasa	800	8	63	57	120	15.0
Rossija	1000	57	150	--	207	20.7
Gromoboi	1000	91	279	--	370	37.0

The figures are too few to base our calculations on for the future. What seems, however, to be plainly shown is that the percentage number of casualties is very much smaller on the ships of the victorious side than it ^{is} ~~is~~ on those of the defeated side and the latter is the one that got hit first. The same is ~~done~~ ^{true} with regard to the character of the injuries inflicted. The most serious injuries occurred on the defeated ships, as is shown by the ratio of the killed to wounded on the two sides. This would perhaps have been the case even if the removal and treatment on both sides had been equally good which however as we now know, was not the case.

The general staff of the army is in possession of a very much larger and a much more valuable statistical material than is the navy. The number as well as the character of the injuries, likely to occur in the future wars and under the influence of the small caliber projectiles, is very much more accurately known to the officers of the army than is the number and character of the injuries to be expected from large explosive shells on the deck of ships to naval surgeons.

"A Japanese naval surgeon has estimated the probability of 25-50 wounded to every large shell bursting on board, of which 10% are killed outright and 30% seriously wounded" (Bogert)

In the absence of more accurate statistics, an average of 20%

of casualties has been adopted as a basis for calculation by the navies of civilized countries. A fleet, composed of sixteen battleships and eight armored cruisers would be manned by 21,000 men. Assuming that all the vessels of the fleet should engage in general action, we would be led to expect and prepare for 4300 wounded. At least 10% of these would be expected to be killed, leaving 3870 on our hands to be cared for. According to Japanese figures 52% (round numbers) of all their wounded were successfully treated aboard their own ships. With the same good luck and under the employment of the same good methods of removal and care, the 3870 injured would be reduced by 2012 and the number to be removed from ships and to be sent to hospitals would be 1858. It becomes absolutely necessary to remove these men, no matter what was the outcome of the battle and, therefore, both sides will probably be engaged in the same maneuver, at about the same time. The only question is, which of the two sides will be ready first, either for the purpose of reaping the fruits of victory by pursuit or to escape capture by flight. In exceptionally smooth weather the five hospital ships of 6-8000 tons that would be required to be in readiness to take on board that number of wounded, might come along side and the transfer could be effected through gunports and from several decks at once. In moderately rough weather, however, small boats would be the only convey^{ances} and to be thought of and the question will then come up as to how many of such boats would be required and what would be the time consumed in the maneuver. The number of boats available and the allowable time may both be limited.

It may, under these circumstances, be convenient to employ certain formulas, in use for the same purpose in the ^{Army} convey, (see Macpherson, loc.cit.)

Taking T to represent the time allowed, W the number of sick and wounded, t the time required for boats to make one trip to the hospital ship and return, M the number of boats available and n the number of patients each boat can carry, we get the following formula:-

$$M = \frac{W \times t}{T \times n}$$
 for the number of boats required for the transfer of a given number of wounded to the nearest hospital ship, or

$$T = \frac{W \times t}{M \times n}$$
 for the time required with a given number of boats to evacuate a given number of wounded to a hospital ship.

For example, our 1858 wounded are to be transferred to a hospital ship in four hours; how many boats would be required to effect their transfer?

Supposing that our boats can make one round trip in two hours and could accommodate either eight lying down patients or thirty sitting up ones. We assume the boats to be the ordinary sailing launches in ~~two~~^{two} of steam launches. 2/5 or 743 of our 1858 wounded require lying down transport and 3/5 or 1115 of them can sit up.

For the lying down cases we would require:

$$M = \frac{743 \times 2}{4 \times 8} = 46.50 \text{ boats;}$$

For sitting up cases we would require:

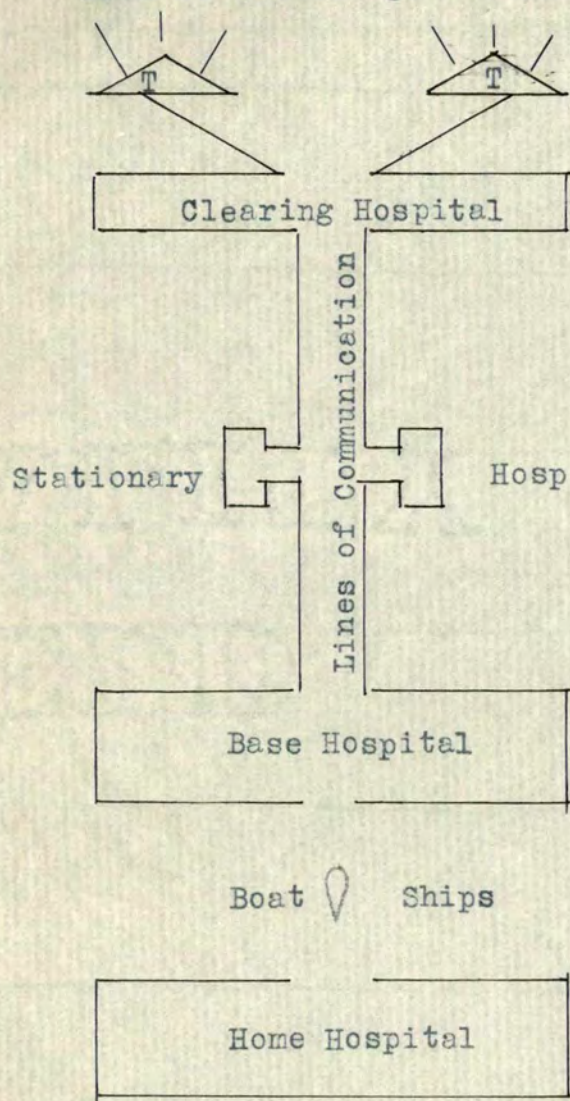
$$M = \frac{1115 \times 2}{4 \times 30} = 18.63 \text{ boats;}$$

Total number of boats required = 66.

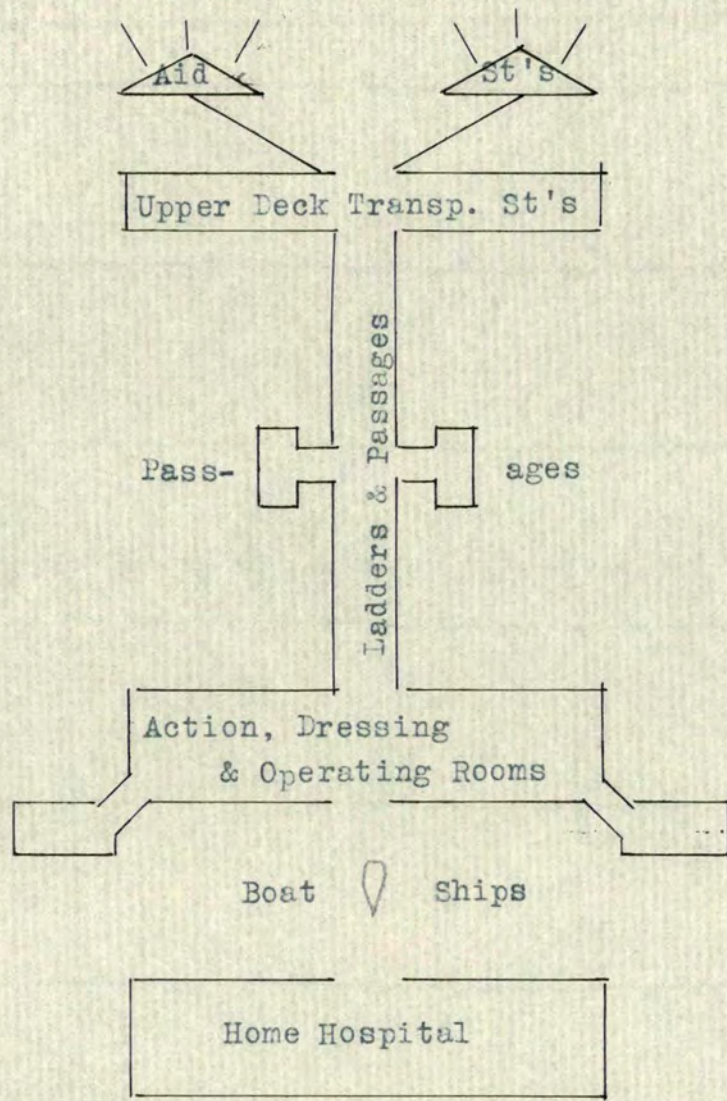
Since, moreover, small boats as well as steam launches belonging to battleships may be scarce after a battle, it would point to the necessity of fitting out hospital ships with ~~our~~^{on} unusually large number of such boats as well as with transport material, as stretchers, etc., only a limited amount of which can be stored on battleships.

This, gentlemen, is but one of the many problems before a well organized and administered medical service that has grown with the growth of our fleet and which claims our most serious attention and consideration.

Area of Active Operations



D. B. C.M. D. B. C.M.



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