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PHYSICAL AND HYGIENIC BENEFITS OF MILITARY TRAINING AS DEM- ONSTRATED BY THE WAR

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Probably no other class of men have the vision, as medical men have, to see the good that would result from universal military training.

There never has been a real survey of the man power of the United States, but all of us know that many surprising facts would be developed if such a survey were made. The Civil War gave a certain indefinite survey at that time, but during the last fifty-five years tremendous changes have taken place in our mode of living, and the human mechanism has not adjusted itself to the changes of civilization. We have had no opportunity to judge the defects among our male population. For a long time the finger of scorn has been pointed at the Army and Navy because we had such a high percentage of venereal disease. I have been interested in this subject for a quarter of a century. The only reason we had a high percentage of venereal disease was that we knew the amount of this disease among our soldiers and sailors and published it to the world. We always knew that the rate of venereal disease did not represent the rate in the Army but did represent, to a fair degree, the rate in the civil population in the vicinity of our military posts. We do not contract venereal disease in the Army to any extent, but acquire it almost exclusively from without the military reservation. With a distinct understanding of the meagerness of the information we had at the beginning of the world war, it is most interesting to review the statistics furnished by the draft, the report covering the mobilization of nearly 5,000,000 men in the military forces of the United States (Army, Navy and Marines).

BENEFITS RESULTING FROM THE WAR

The cessation of hostilities at a period in the war when the American battle casualties had been insignificant, in comparison with the losses of other belligerent countries, offers a favorable opportunity to consider the brighter side of the war and to estimate what benefits have accrued to the nation as a whole, and to the individual soldier in particular, from calling to the colors approximately one twentieth of the entire population of the United States. These benefits are manifold and may thus be roughly classified:

1. Improvement in physical development as a result of outdoor life, good food, regular exercise and strenuous physical training.

Alertness, activity, strength, endurance and discipline, combined with a body free from disease, are the first requirements of a soldier. These qualities are largely obtained by gradual and well regulated physical training. As applied to the recruit, this training enables him to bear the hardships and to overcome the difficulties of warfare. The beneficial results of physical exercise during the training are supplemented by the outdoor life, the regular hours required, the plain, simple food, the good sanitary surroundings, and the many other features that promote the development of a high type of physical manhood. The improvement in the physical development of the young man in the Army was most striking. Our sanitary inspectors visited dozens of camps to investigate the thoroughness of the examination made on the arrival of the recruit at camp, and they made the same investigation of the soldier before his demobilization. At the first of these examinations, the inspector was greatly impressed by the stream of naked men who were awkward, narrow chested, with flabby muscles and often with a stoop. Contrasted with this picture, he was tremendously impressed by a similar line of naked men who presented themselves for examination before demobilization. They were bronzed, erect, broad-chested soldiers with fine muscular development and a characteristically alert and self-confident air. Many exaggerated statements have been made as to the gain in weight soldiers have acquired during the war. Some day these statistics will be available, but at the present time no correct statement can be made. The officer in charge of the sanitary division of the Surgeon-General's Office estimates that the average gain in weight in the first year of military service is from 15 to 20 pounds. The actual records of one company of National Guard troops under the semitropical conditions existing on the Mexican border in 1916 showed an average gain of 12½ pounds a man in nine months. Studies on this subject during the war made by the division of foods and nutrition in the office of the Surgeon-General showed in one infantry company an average gain of 10 pounds a man after four months of service, and in three artillery batteries an average gain of 6¼ pounds in six months. Another study showed 2½ pounds gained in five weeks. There is no doubt that this gain in the soldiers' weight was almost entirely muscular tissue. It is reasonable to believe that a six months' training of the youths of our land during the year they are 19 years of age would produce similar good results from the physical standpoint.

2. Detection and cure of many obscure and latent pathologic conditions, particularly hookworm, malaria, venereal disease, tuberculosis and focal infection.

The examination of a young man for universal training would bring similar results. Many of the disabili-

ties detected would not be disqualifying for military service, but could be remedied during the period of training. Notable examples would be: painful feet, weak backs, hookworm infestation, malarial infection, venereal disease, and focal infection from diseased tonsils and diseased teeth. In the examination of the draft it was ascertained that 29 per cent. of the men had physical disabilities that were disabling for military service. A small list is given in the accompanying table. Suffice it to say, however, that of the 225,000 cases of venereal disease in the Army during the war, prior to May 1, 1919, 200,000 were contracted before enlistment, that is, before the men joined the Army. This statement was made from incomplete statistics and is only relatively correct.

SOME IMPORTANT DEFECTS REVEALED BY THE DRAFT

	Per Cent.
1. Defects of feet (flatfoot, 11 per cent.).....	13
2. Venereal diseases:	
During first period of draft.....	2.9
In later period of the draft.....	5.7 8.6
(Increase due to improvement in method of examination and tabulation, and also to the larger percentage of negroes inducted during the later period.)	
3. Hernia and enlarged inguinal rings.....	4
4. Defective vision (largely refractive errors).....	3½
5. Defective physical development (including underweight and underheight).....	3½
6. Organic diseases of the heart.....	3
7. Deformities or loss of extremities.....	3
8. Tuberculosis.....	2.50
9. Hypertrophy of tonsils.....	2½
10. Defective and deficient teeth.....	1½
11. Mental deficiency.....	1.25
12. Otitis media (purulent).....	1
13. Hemorrhoids, varicocele, varicose veins (combined).....	1
14. Goiter (simple and exophthalmic).....	0.75
15. Deformities of hand.....	0.75
16. Cardiac arrhythmias and tachycardia.....	0.50
17. Asthma.....	0.25

3. A determination by examination of the actual physical condition of the adult male population of military age, and a consequent awakening of the nation to the necessity for efforts directed toward limiting the possibility for the continued evolution of physically defective citizens.

The examination of the registrants before Dec. 15, 1917, resulted in the rejection of 29 per cent. This was before the industrial and economic classification of all registrants had been made. After this classification had been accomplished, 14.5 per cent. were rejected by the local boards, and approximately 7 per cent. were rejected by the boards at military camps. This gives a total rejection by camps and local boards of 21.2 per cent. Forty-seven per cent. of the men examined were found to have certain defects. Fifty-three per cent. were accepted as fully meeting the physical standard, with no defects recorded.

4. Instruction in sanitation and personal hygiene gained by both precept and practice in camp. A great part of this acquired knowledge the discharged soldier will take back to his home and transmit to his family and fellow citizens.

As you know, a great effort was made at our concentration camps to provide every requisite for high-grade sanitation. Camps were models of cleanliness. An ample supply of potable water was furnished; shower baths were unlimited; sewage disposal was complete, and the best of food was provided. Every effort was made to have food properly prepared. The men were protected against flies and mosquitoes. Food handlers were examined to detect possible carriers of typhoid, paratyphoid and dysentery. Modern laundries were established. Vice and liquor selling were abolished or limited. In addition to what the soldier saw of sanitary methods at the camp, he was given instruction in sani-

tation and personal hygiene; he was provided with suitably fitting shoes, his teeth were examined and put in condition, and he was vaccinated against typhoid, paratyphoid and smallpox. He was frequently examined to detect incipient disease. A great part of this knowledge the soldier retained to take back with him into civil life. It will have a marked influence on his method of living, and he will transmit a part of his knowledge of hygiene to his family and neighbors.

5. Education in sex relation and in the matter of protection from the dangers of illicit sexual indulgence. This subject is of so great importance that it is given a special heading.

There is no one thing which demands greater attention from the people of the United States than does the widespread prevalence of venereal disease. The discussion of this subject has been tabued in polite society until quite recently. The examination of the men between 21 and 31 years of age developed the fact that more than 5 per cent. were suffering from manifest venereal troubles. The Wassermann test was not taken, so cases of syphilis which did not present local manifestations were not detected. The wide prevalence of venereal disease among our young men was a revelation to the people at home and I think that from now on the campaign against venereal disease will be one of the good results from the war. While the soldier was in camp he was protected in every conceivable way from venereal disease—by education, by law-enforcement, and by early treatment. The low record for venereal disease in the American Army in France was a revelation to our allies. It is believed that the education on this one subject alone will be of tremendous value to the country in the future.

6. Training in discipline and the development in the soldier of respect for authority.

Among those promoted to commissioned and non-commissioned grades, there was developed the faculty to command and exact obedience. I do not think too much importance can be laid on this subhead. I am certain it is accepted by all that in recent years the tendency of the American youth has been in the direction of disrespect for authority, whether parental, municipal or national. I think the discipline of military life has had a most wholesome effect on the American soldier, and will in a marked degree make him better material for citizenship. The experience which these men gained will be of inestimable value in civil life.

7. Protection, by vaccination, of 5,000,000 men against the danger of contracting typhoid, paratyphoid and smallpox for several years to come.

This will have a far-reaching effect on the population of the United States for many years. We have learned to control typhoid fever and have practically eliminated by sanitary measures dysentery and malaria. Even as late as the Spanish-American War, typhoid fever, dysentery and malaria filled our hospitals. During the world war those three diseases were practically negligible quantities in our sick report. Until May 1, 1919, we had only 213 deaths from typhoid fever, thirteen deaths from malaria, and forty-two from dysentery. Think of the great change that has taken place in this respect as contrasted with the Civil War and the Spanish-American War.

BENEFITS OF UNIVERSAL MILITARY TRAINING

The statements that I have made refer to the good the Army did the American soldier during the world

war. There is every reason why this good could be multiplied with the youth of the land by universal military training. It would give us a wonderful opportunity to make a physical survey each year of the youth of the land. It would enable us to detect physical disabilities that could be remedied and would make the man economically more valuable for the rest of his life. Many of the disabilities which men carry through life and which interfere with their value as citizens are remediable. At one time during the war, 10,000 cases of hernia were awaiting operation. All of these disabilities could be corrected during the period of military training. Defective vision could be corrected; men with weak feet and weak backs could be relieved. The mental defectives could be classified; the young man would be given an object lesson in discipline and be taught respect for authority—the good that could be accomplished is unlimited.

PATHOLOGIC ANATOMY OF TRAUMATIC FRACTURES OF CRANIAL BONES

AND CONCOMITANT BRAIN INJURIES*

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This attempt to consider the injuries of the brain and cranial bones when the latter are broken by external violence is based on conditions encountered in 504 postmortem examinations made by one of us during the years 1911 to 1918. It does not include all the postmortem examinations during that period of the bodies of persons with such traumatic fractures, for in about sixty instances the measurements and other steps necessary in the interests of precision were not so detailed as in the 504 here reviewed. The patients were cared for in the Cook County Hospital or the Hospital of the House of Correction, and some postmortem examinations were of bodies of persons who were found dead or who died en route to a hospital.

SIX FUNDAMENTAL CONSIDERATIONS

Notwithstanding certain still mooted questions regarding the mechanism whereby the injuries of both the cranial bones and the brain are produced, and especially the influence a whirling motion of the falling head and body may have on the characteristics of the injuries, there are six facts that are generally accepted and need brief mention as a background for what follows:

1. There are six regions where the greater thickness of the cranial bones forms arches thicker below and gradually thinning out in the vault: one in front from the root of the nose and glabella; one behind, including the inion and the external and internal crests of the occipital bone, as well as the torcular eminence; one on each side from the external angular processes of the frontal bone and prolonged obliquely back and into the body of the sphenoid in the bones of the skull base, and finally one on each side formed by the petrous bones and continued externally in the protuberance of the mastoid (Figs. 1, 2 and 3).

2. With violence applied to the cranium, these arches hinder horizontal bending; whereas the bone between the arches can more easily bend vertically. As a result, the bone between

the arches flattens the more in a horizontal plane and breaks across, the linear fractures radiating up into the vault and down into the bones of the base of the cranium between the arches.

3. With the head in motion, the brain lags behind the more rapidly moving cranium, and as a consequence is closer to the cranial bones *opposite* where violence is applied; and with the axis of the skull abruptly shortened at right angles to where violence is applied, the brain is the more bruised opposite that place.

4. The resistance (weight) of the trunk and extremities transmitted to the skull via the condyles of the occipital bone tends to bend in the bottom of the skull, especially the arches, and is one factor determining the course and distribution of the fractures.

5. When the cranial bones are broken with the head in a fixed position, contrecoup bruising of the brain is reduced to the minimum and the bruises are direct, at the place of fracturing.

6. The general direction taken by fractures which course between the arches is also well known, and is shown in Figures 4, 5, 7, 10, 19, 23 and 29.¹

NATURE AND LOCATION OF FRACTURES

About 85 per cent. of the 504 cases here considered were simple linear fractures or linear fractures with branches; in the remainder, the bones were extensively comminuted and with some of the fragments depressed. With the bones of the cranial base involved slightly more than those of the vault, both were involved in varying degrees in all but about 8 per cent. of the 504. When grouped according to the fossae chiefly involved, with one group for the vault and one for fractures so extensive that several fossae and part of the vault as well were broken, the incidence is as shown in the accompanying table. In this table are

LOCATION OF FRACTURES

	Pos- terior Fos- sae	Mid- dle Fos- sae	An- terior Fos- sae	Vault	Ex- ten- sive	Totals
Total number.....	178	166	61	49	50	504
Some depression.....	6	11	6	4	7	34
Mode of injury learned.....	120	124	51	33	42	380
Short falls.....	36	43	9	2	2	92
Longer falls.....	48	37	13	16	13	127
Street car.....	17	12	16	4	13	62
Automobile and autotruck.....	11	17	7	2	11	48
Assault.....	18	15	6	9	3	51
Meningitis.....	15	7	13	3	1	39
Healed fractures.....	7	6	4	1	0	18
Decompression operation.....	15	27	3	8	6	59

included a few fractures partly healed or so healed that their courses could still be followed. Many of the fractures of the back fossae ran forward to end in the ethmoid bone or one of the foraminae of the middle fossae. Violence for these fractures as indicated by the scalp injuries was usually to the back of the head. Of the sixty-one fractures of the anterior fossae, seventeen were simple linear, from 2 to 5 cm. long and in the roof of one orbit. Of the extensive fractures, usually with comminution, the violence was to the back of the head for twenty-seven, to the side for nineteen and in front for four. The average of the total linear length of these fractures was 70 cm., the greatest 138.9 cm. (Fig. 19). With the vault fractures, some traumatic diastasis of sutures was not rare: in twelve of the forty-nine, part of the sagittal or its entire length was affected; in three, the coronal

*From the Coroner's Medical Service at the Cook County Hospital.

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1. We have made no attempt to cite from the literature, but wish to refer especially to the work of Tilmann (Arch. f. klin. Chir. 66:750, 1902; 59:236, 1899) and that of M. Auvray (Maladies du crâne et de l'encéphale, Paris, 1909).