Rehabilitation of the Consumptive after the War

At the end of the war we shall be faced, as we were in the last war, by a still greater incidence of pulmonary tuberculosis and an increase in the foci of infection. The approximate mortality figures are as follows: In 1939 the deaths from pulmonary tuberculosis in England and Wales were 22,000 (war conditions prevailed in only a little over three months of that year). In both 1940 and 1941 the deaths had risen to 24,000. Fortunately, in 1942 they dropped to 21,000, a decline which, it will be noted, has coincided with a lull in enemy bombing attacks on this country. Notifications of pulmonary tuberculosis, as is well known, form an imperfect guide to the incidence of the disease, as so many cases are reduplicated. It has been estimated from the latest available figures that the numbers of the adult population suffering from pulmonary tuberculosis in Great Britain at Dec. 31, 1938, was nearly 140,000. Of this total about 70,000 were classified as being able to return to ordinary employment, while about 20,000—most of whom were undergoing treatment in hospitals and sanatoria—were regarded as unlikely ever to return to any form of employment. In the remaining 50,000 the disease had been arrested or had become quiescent, and there was good prospect of achieving full recovery provided that special measures of rehabilitation were made available.* These are pre-war figures; wartime conditions have intensified the problem, and the number to be dealt with in the post-war period will show a considerable increase. Since the onset of war some advance has been made by the inclusion, under the Ministry of Labour's Scheme for Training and Resettlement of Disabled Persons, of quiescent and sputum-negative cases of tuberculosis in which the individuals are reintroduced into whole-time employment under ordinary industrial conditions (Ministry of Health Circular 2576, Feb., 1942). This, however, fails to meet the needs of those ex-patients for whom a slow and graduated resumption of work under medical supervision is required.

Varrier-Jones's pioneer work was partly inspired by the needs of tuberculous ex-Service men in the war of 1914-18, and in the present war the same problem arises. It is more and more becoming recognized that he found the true solution. The Medical Research Council's Committee on Tuberculosis in Wartime issued a report in 1942, which refers to the fact that the Papworth and Preston Hall village settlements have demonstrated one possible solution of the industrial problem provided by the chronic active case of pulmonary tuberculosis. The important Interdepartmental Committee's Report on the Rehabilitation and Resettlement of Disabled Persons devotes special attention to pulmonary tuberculosis, and states:

"Perhaps the most complete type of care for the tuberculous person and his family is the combination of sanatorium and hospital treatment with a village settlement."

In accordance with the recommendations of the Medical Research Council's Committee the Government has recently provided special maintenance allowances for patients suffering from pulmonary tuberculosis (Memo 266T of the Ministry of Health, April, 1943). This enables these affected persons to give up work for a while and receive treatment. The allowances apply to everyone undergoing approved treatment. They are administered by tuberculosis authorities as part of local health services, and comprise "maintenance allowances" based on a standard scale and without any test as to means, to which can be added, at the discretion of the authority, extra grants or special payments towards commitments. For the first time official recognition is given to the fact, so often urged by Varrier-Jones, that economic circumstances again and again prevent the consumptive worker from seeking residential treatment for his disease.

Now village settlements are few and, in my experience, local authorities are reluctant to embark upon them, although the Nottinghamshire County Council, which established the Sherwood Village Settlement in 1936, is a notable exception. In 1919-20 Varrier-Jones, the late Dr. Nathan Raw, M.P., and I constituted a small Departmental Committee which explored the question of establishing village settlements for ex-Service men throughout England and Wales. In the end it was con-

sidered better to develop the existing settlements, at Papworth and Preston Hall than to provide new organizations. It is extremely probable that a committee of this character to-day would reach a similar conclusion.

In 1936 Varrier-Jones advocated the setting-up of a national board in order to co-ordinate the planning of a national rehabilitation scheme. This was endorsed by the late Lord Willingdon and the Joint Tuberculosis Council. The Medical Research Council Committee now favours the establishment of such a board. In view of the demands which will assuredly be made for village settlements and rehabilitation of the tuberculous ex-Service man at the end of the war, this board's work and direction seem to be urgently required.

Conclusion

In this lecture I have endeavoured to describe the great contribution which Pendrill Varrier-Jones made towards combating tuberculosis, and its comprehensive character. In the brief time at my disposal I have been able to give only an outline of the many agencies which he employed. I have not told, for instance, how he arranged for the psychological treatment of certain of his patients. Indeed, different phases of this pioneer work pursued untiringly for many years would supply a wealth of material for many lectures. He faced much opposition; he crossed swords with those who preferred the ways of routine and established tradition. In the end he triumphed and had the satisfaction of knowing that his principles were sound—for, contrary to common belief, he had the humility of the true scientist in all his investigations—and that they had stood the tests of time and experience and were becoming generally accepted.

"Unto each man his handiwork, unto each his crown,
The just Fate gives;
Whoso takes the world's life on him and his own lays down,
He dying so, lives."

"Seeing death has no part in him any more, no power
Upon his head;
He has bought his eternity with a little hour,
And is not dead."

So Pendrill Varrier-Jones took upon him the consumptive's burden and made it easier to bear. He died too early, but his works do flourish and follow him.

NOTE.—The quoted passages from Sir Pendrill Varrier-Jones's published papers in this lecture are taken by kind permission of Mr. Peter Fraser, Sir Pendrill's literary executor, from *Papers of a Pioneer, Sir Pendrill Varrier-Jones*, collected by Peter Fraser, London, 1943. The quotation from Swinburne's *Super Flumm Babylonis* is by permission of Messrs. William Heinemann.

ACCELERATION OF CO-ORDINATED MUSCULAR EFFORT BY NICOTINAMIDE PRELIMINARY REPORT TO THE MEDICAL RESEARCH COUNCIL*

BY

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This report summarizes the results obtained from a series of experiments undertaken to demonstrate by means of a selected test the effect, if any, of certain vitamins on the physical efficiency and the fatigability of healthy young adults. Increased resistance to fatigue, or increased muscular ability, as a result of the addition of certain vitamins, especially B₁, to the diet has been reported by a number of observers. Others have failed to show, either in brief extreme exercise or in prolonged severe exercise and semi-starvation, indications of any effect of the vitamin supplementation to the U.S. Army rations on muscular ability, endurance, resistance to fatigue, or recovery from exhaustion. The present series of experiments, extending from April to December, 1942, tend to show that the addition of certain vitamins to the normal diet of healthy young men generally results in varying degrees of increased efficiency in carrying out a fairly severe test involving

* Report of Interdepartmental Committee on the Rehabilitation and Resettlement of Disabled Persons. Cmd. 6415, 1943, p. 11.

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both physical efficiency and co-ordination. The experiments recorded in this report, with the exception of the Stanmore group, were carried out on selected personnel of the R.A.F.—air-crew cadets—who were in excellent physical training. The actual tests necessitated the utmost co-operation from the subject; without this co-operation no results of any value could have been obtained. The condition of the subject at the end of the test and his performance during the test were carefully noted, and in addition pulse rates were recorded at varying intervals.

Preliminary Tests

The test chosen was a modified form of the W.O. agility test. This test involves running rapidly, bending and turning quickly, and dropping disks accurately on a closely fitting shaft. No undue emphasis was laid on either accuracy or speed in describing the test to the subject, but the importance of finishing "flat-out" was stressed.

Four groups of young men from the I.T.W., ranging in age from 18 to 32, were tested on several occasions. They were extremely co-operative. The average time score for the first test was 60.75 seconds, and for the second 56.69 seconds. The difference between the time scores of the first and second tests was marked and relatively constant. There was little difference between the scores of the second, third, and subsequent tests; the second test was therefore adopted as the control test. There was very little scatter either in any single group or in the groups considered as a whole. In less-selected groups, such as civilians or the Home Guard, the time scores were found to vary considerably both from time to time and from subject to subject.

Modification of Test

It was obvious that this test in its original form would not produce any measurable degree of fatigue in subjects who were as physically fit as the I.T.W. Increasing the number of disks from 16 to 24 raised the average time score to 85.62 seconds; the time taken to complete 8 rounds (the original test distance) remained unaltered. Consideration of the clinical condition of the subject in conjunction with the time scores indicated that the test was still not severe enough. The effect of multiple vitamin tablets given to a small group who were retested was neither marked nor constant.

The distance of the test was finally increased from the original 170 yards to approximately 300 yards. In addition to the time taken to complete the test the number of disks dropped or misplaced was noted. The average time taken to complete the first test was 113.64 seconds; and for the second test 105.43 seconds. There was no obvious increase in the relative time taken to cover the last 4 rounds; the number of dropped or misplaced disks, however, was greater with several subjects, especially towards the end of the test. During the standardization of this test over 100 subjects were tested. The test was severe, and only a limited number could reasonably be carried out on any one subject. Two control tests were recorded on one day—the interval between the tests being 30 minutes—and two "experimental" tests on another day. The interval between the experimental tests was reduced to 15 minutes.

Effect of Multiple Vitamins

Experiments were carried out on 20 subjects, 10 of whom received on three successive days vitamin tablets containing vitamin A 8,000 i.u., vitamin D 1,200 i.u., thiamin 2 mg., riboflavin 4 mg., ascorbic acid 100 mg., and nicotinamide 40 mg. The remaining 10 received tablets indistinguishable from the vitamin tablets. The results of these experiments are recorded below; the mean time (in seconds) is for the complete test. Negative differences indicate that the experimental times are shorter than the control times.

Control Group: Control time, 104.22; experimental time, 104.11
Difference, -0.11
Vitamin Group: Control time, 107.59; experimental time, 104.75
Difference, -2.84

Tests were carried out on two larger groups using vitamin tablets which contained: aneurin 5 mg., riboflavin 5 mg., ascorbic acid 100 mg., and nicotinamide 50 mg. One group received vitamin tablets on four successive days; a control group received tablets indistinguishable from the vitamin

tablets. Tests were carried out on the fifth day. The results of these experiments were as follows:

Control Group (22 subjects):
Control time, 107.43
Experimental time 1, 108.43; difference, +1.00
" 2, 107.30; " -0.13
Vitamin Group (22 subjects):
Control time, 110.30
Experimental time 1, 109.66; difference -0.64
" 2, 106.98; " -3.32. Significant

A comparison of the experimental time scores with the control time scores shows that in the control group a diminished score was recorded by 5 in the first experimental test and by 3 in the second; in the vitamin group a diminished score was recorded by 12 subjects in the first test and by 15 in the second test. Co-ordination, as demonstrated by the number of disks dropped or misplaced, was better in the experimental tests in the vitamin group; in the control group there was deterioration in the co-ordination, especially towards the end of the experimental tests. The pulse rate was taken before each test and again within 10 seconds of the end of the test. The interval between the experimental tests being 15 minutes, the pulse rate at the beginning of the second test was therefore a measure of the return of the pulse to normal after the first test. It is noted that the original pulse rates are higher in the majority of these subjects than the generally accepted figure. The drop in pulse rate during 15 minutes is also less than was anticipated.

These experiments were carried out during the spring and summer, and it was noticed that exhaustion appeared to be less marked in subjects who had received vitamin tablets. This observation was not made during later experiments using other vitamins.

Stanmore Experiments

A series of experiments were undertaken using vitamin tablets from which (1) the aneurin was omitted, and (2) both the aneurin and the ascorbic acid were omitted. Personnel from No. 3 Balloon Centre were selected, ranging in age from 18 to 34, and divided into three groups. Group A received tablets containing ascorbic acid 100 mg., riboflavin 5 mg., and nicotinamide 50 mg. Group B received tablets containing riboflavin 5 mg. and nicotinamide 50 mg. Group D received control tablets.

The tablets were given on six successive days, and tests carried out on the seventh day. These men were drawn from various trades, were not volunteers, and were extremely co-operative. The results of these experiments were as follows:

Group A:
Control time, 111.26
Experimental time 1, 109.86; difference, -1.40
" 2, 107.58; " -3.68. Significant
Group B:
Control time, 115.81
Experimental time 1, 114.93; difference, -0.88
" 2, 113.23; " -2.58. Significant
Group D:
Control time, 120.98
Experimental time 1, 119.68; difference, -1.30
" 2, 120.53; " -0.45

A diminution in time scores was therefore recorded after both aneurin and ascorbic acid were omitted from the vitamin tablets. Co-ordination appeared to be better in the vitamin groups than in the control group.

Brighton Experiments

Experiments were carried out at Brighton during October and November on the effect of nicotinamide alone. The subjects were physically fit young men with 6/6 vision selected from U.T. air-crews, and in some cases were volunteers. Control times were recorded on one day, and on the following day each subject was given 50 mg. of nicotinamide at 9 a.m. Tests were carried out at 10.30 a.m. on 23 subjects and at 2.30 p.m. on 16 subjects. The test times of the 23 subjects who were tested 1½ to 2½ hours after receiving nicotinamide were:

Control time, 116.22
Experimental time 1, 111.57; difference, -4.65. Highly significant
" 2, 111.35; " -4.87. " "

The test times of the 16 subjects who were tested 5½ to 6½ hours after receiving nicotinamide are recorded below and indicate that the effect was considerably less than that recorded above.

Control time, 116.31
Experimental time 1, 115.25; difference, -1.06
" 2, 114.00; " -2.31. Significant

In November tests were carried out on another group of 19 subjects, all of whom had received 200 mg. of nicotinamide $1\frac{1}{2}$ to 3 hours previously. The test times were:

Control time, 122-26
Experimental time 1, 117-84; difference, -4-42. Significant
" " 2, 115-21; " -7-05. Highly significant

The suggestion was made by Dr. Platt that a single dose of nicotinamide should be given at specified times before the experimental tests, and the experiments were carried out in conjunction with him. It is noted that a somewhat different pattern in the results was obtained.

Having demonstrated that the effect of a single dose of nicotinamide resulted in a well-marked diminution of the time taken to complete the test and that this effect was most marked $1\frac{1}{2}$ to 3 hours after administration of the vitamin, it was essential to ascertain if similar effects would be obtained when tablets were given on six successive days and tests made on the seventh day. This investigation was therefore carried out on 24 I.T.W. subjects at Cambridge in November, and the results were:

Control time, 118-58
Experimental time 1, 116-54; difference, -2-04. Significant
" " 2, 114-62; " -3-96.

The pattern of these results is somewhat different from that of either of the other groups.

Summary

It has been shown in a series of carefully controlled experiments that the addition of nicotinamide alone, or of nicotinamide and certain other vitamins, to the diet of fit young men results in increased efficiency in carrying out a fairly severe test involving both physical effort and co-ordination.

The test chosen was severe, and called for the utmost co-operation from the subject, whose condition at the end of the test was just short of distress, as evidenced by his breathing and pulse rate.

In earlier experiments the subjects appeared to be less exhausted after the administration of vitamins.

Later experiments appear to indicate that continued heavy or exhausting physical stress may necessitate increasing the dose of nicotinamide.

Experiments which were carried out in conjunction with Dr. Platt and Prof. Ellinger will be reported jointly.

The whole of the work described in this report, and all the projects indicated, have been carried out or planned at the instance and with the support of the Medical Research Council.

I should like to acknowledge my indebtedness to Prof. F. C. Bartlett for his constant help and advice, to Sir Edward Mellanby for his interest and guidance in the administration of the vitamins, and to the many officers of the R.A.F. without whose unflinching help and co-operation this work would not have been possible. I should also like to thank Mr. E. G. Chambers, to whom I am indebted for all the statistical results, and to Sgt. J. M. Yallop (W.A.A.F.) for her assistance in the experiment and for all the clerical work.

ANXIETY STATES IN THE NAVY A CLINICAL SURVEY AND IMPRESSION

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A survey has been made of approximately 1,300 cases of anxiety state which have been under our care in a Royal Navy hospital during 1940 and 1941. These impressions have been amplified and modified by later experience in the hospital and in a naval depot.

The term "anxiety state" does not reflect the whole picture, but is a convenient designation; the basic condition is considered to be anxiety in its psychosomatic manifestations, and it is this reaction that is regarded as releasing the varied psychopathy of the constitutions affected. Depression in some degree was an almost constant finding in the more established cases, and for descriptive purposes the diagrammatic concept was formed of a straight line with a pure anxiety reaction at one extreme and a depression of the reactive type at the other; clustering around this line there is a big constellation of

symptoms and signs, including hysterical features, any of which may be present or absent. The syndrome may therefore present a very varied picture.

Points of prognostic import in the routine case-history are enumerated, stresses are discussed, the three main phases of development of the anxiety state are outlined, symptomatology as it affects the various systems is reviewed, and a brief summary of methods of treatment is made with a note on the chief elements in prognosis.

Anamnesis

In reviewing the cases an attempt has been made to assess significant factors emerging in the routine anamneses. In the direct family history—i.e., parents and siblings—there is in most cases a sufficient degree of instability to be realized, and quoted by the patient, as "nervous," "worrying," "hysterical." Psychosis is relatively rare. In infancy the more inadequate types produce with monotonous regularity claims that they "were difficult to rear," "have been given up," or "have had pneumonia" an astonishing number of times. By such reflections can one see the image of poor home conditions and an over-worried mother. During school years shyness, timidity, seclusiveness, fondness of reading as recreation or of swimming and walking as sports, all suggest a tendency to withdraw from the demands of schoolboy life and augur difficulty in adjusting later to the very similar claims of the fighting Forces. At the opposite extreme, "the young devil," "always in mischief," and "never out of trouble" indicated by these excesses a temperament often incapable of withstanding the threats and dangers of war.

The standard attained at school was used as a rough preliminary indication of the intelligence level. Truancy in the great majority of cases signified simply marked mental backwardness. Minor degrees of backwardness were by no means of bad import, but if breakdown did occur in such cases prognosis for recovery and return to duty was poor. More valuable, however, was the work record in rapidly assessing a man's prospects in the Service. Frequent changes of job justified in such phrases as "could not stand the heat (noise) in the factory," "had to give it up," "wanted a change," "got fed up," indicate a personality which will adapt poorly to Service conditions. Endless changes of job suggest marked mental defect.

Sexual maladjustment was conspicuously rare as an overt factor in breakdown compared with experience in civilian psychiatric practice. In part this is explained by Service psychiatry's dealing with a much wider group than would in peacetime attend a psychiatric clinic.

Previous organic illness was of importance in focusing anxiety on a system or the basis of hysterical phenomena. Age beyond middle life and arteriosclerosis facilitated the development of symptoms and impaired prognosis.

Stresses

The stresses to which the individual is subjected in the Service are remarkably constant. Separation from home and family bears heavily on the youth, particularly the only or youngest son, for whom the solicitude of the mother is still the criterion of what he may expect from the world: discomforts and hazards are magnified by too sympathetic an appreciation of their importance in her eyes. The older man experiences the rupture of recently established ties or the absence from wife and family, for years an integral part of his daily life. For certain men, to whom the establishment of a home has through the circumstances of their own early lives assumed a peculiar importance, its break-up through conscription and evacuation is often enough to precipitate breakdown. By no means rare, however, were the men in the later thirties for whom war meant a fresh lease of youth and an unacknowledged relief at sloughing, if only temporarily, the burdens and responsibilities of domesticity. For them Nemesis lay in the reaction and behaviour of a wife unreasonably, but with intuitive justice, resentful of the claims of duty.

Particularly difficult situations arise, too, where marriage has been the episode of a short leave and a young wife finds herself still living in the home of his or her parents, with but a wedding-ring to remind her of her altered state and that many barriers