A STUDY
of the
MENTAL EFFECTS OF PELLAGRA
As Measured by
The Bellevue-Wechsler Scale
by
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W. H. G.
The opinions and assertions contained in this paper are those of the writer and are not to be construed as official or reflecting the views of the Royal Canadian Army Medical Corps or the Canadian Army at large.
INTRODUCTION

The following study was made at a west coast Canadian Army Conditioning Centre in British Columbia, during October and November 1945, with thirty liberated prisoners of war from Japanese prison camps.

In September, 1944, this Camp, which had accommodation for twelve hundred officers and men when it had previously been used as an officers' training centre, was opened as a conditioning centre. Its new purpose was to recondition physical and psychiatric casualties, in order to return them to the reinforcement "stream". For this purpose it was equipped with barrack blocks to house five hundred men with ease, a hospital with physio-therapy wing, a psychiatric wing (in which the author served as psychologist), two large mess halls, a drill hall and gymnasium, playing fields, two recreation rooms, a lounge and library, an occupational therapy shop, a movie hut, two canteens, lecture rooms and administrative buildings to accommodate a complete administrative staff.

By September, 1945, the number of patients had dropped to a small figure as the need to fill the reinforcement stream, had, of course, ceased with V-J day; and all reconditioning now was to be a form of civilian rehabilitation. The policy was to let the Department of Veterans' Affairs, the government civil
Consequently when the commanding officer received instructions in mid-September to prepare for the reception of several thousands of prisoners of war from Japan, the camp was ideally suited in many ways for just such a task. The ships could unload the men at Esquimalt (two miles from Victoria) and transport them by bus seven miles to the two camps being used. This, in fact, was done.

The first draft arrived on October 3rd, and the group sent to our camp consisted of ten Canadians and three hundred British Army personnel. In the next eight weeks, six thousand British and Canadian personnel were to pass through the two camps. After a complete medical examination, a brief dental inspection, an out-fitting of new clothes, a brief interrogation by the Intelligence Corps, an orientation lecture by a psychiatrist, a rehabilitation lecture by an army counsellor, and a pay parade, the Canadians were quickly dispatched to their homes. The British personnel received a similar treatment, after which they were held until enough men were rated "fit to travel" to make up a draft large enough to warrant a chartered boat to Vancouver and a troop train to Halifax or Debert. Because drafts (some large 300, and some small 10 or 15) continued to arrive nearly every day during the period of the programme, the turn-over was, of necessity, rapid. Of the Canadian personnel, only those not rated "fit to
travel" were kept more than about three days. A large draft of the "fit" British ex-prisoners of war went out every week. In all over three thousand went through this centre during the six weeks.

Because of this rapid turn-over of the men, any research work was limited. The army policy was to run the men through the programme quickly and efficiently, and to dispatch them to their homes as quickly as possible. Only those too sick, or those requiring immediate medical treatment were held longer than the minimum length of time determined by the problems of transport and administration. This was a sound policy, as no therapy (especially psychotherapy) can be fully effective with a liberated prisoner of war until the man has seen his family and home again. Later, he may return to an army centre for treatment.

The Appendices of this paper include in addition to Appendix I, three parts which are not directly concerned with the principal problem involved, but contain information connected with the liberated prisoner of war programme, and as such, are included here for their interest and value as a background to the consideration of the actual problem of the mental effects of pellagra. These Appendices include (1) a paper on the psychology of the prisoner of war prepared by the author, prior to the arrival of the men on October 3rd, to serve as an orientation to the problem; (2) the first-hand report of Capt. Thompson, which while not a totally representative picture, being the account of one man, is never the less
valuable as the report of an intelligent and very ob-
servant British officer; (3) the results of a quest-
ionnaire originally intended for most of the men, but
which was answered by only a few, because of reasons
explained on page 99 in Appendix IV.

THE PROBLEM

For some time it has been known that Pellagra man-
ifests certain psychiatric symptoms such as profound de-
pression, insomnia, restlessness and visual hallucina-
tions, usually in the form of bright lights. Cases were
known, too, where severe attacks of the disease, persist-
ing for a considerable length of time, resulted in var-
ious types of psychoses. If these psychiatric disabilit-
ies could result from the effects of Pellagra, the ques-
tions arise: How permanent are these defects? What na-
ture of mental impairment results? Are some mental fun-
ctions more impaired than others, and if so which are
these? The problem of this study is to attempt answers
to the last two of these three questions. At the date
of testing (November 1945) it was impossible to answer
the first.

Due to certain uncontrollable factors this study has
some weaknesses. First, most of the men were not at the

1. The psychiatric manifestations and the pathology
of Pellagra are discussed in more detail on page 6.
reception centre long enough to be available for a complete Wechsler Test. Second, all research work had to be considered secondary to the administrative problems of out-fitting the men and sending them home quickly. Third, the psychologist doing this study had no help, due to the shortage of staff, and at times he had to be taken off his own duties to be put on administrative duties. Fourth, the controls in the study are limited, although as much care as possible has been taken to overcome the weaknesses this might incur.

The sample group was made up of both British and Canadian personnel. It is felt however, that this is not a serious weakness, because for the purposes of the study all had basically the same environment. Some of the men in the group of thirty possessed a psychiatric disability and some did not. To overcome this the psychiatrist interviewed twenty-two of the men and gave a brief psychiatric analysis of them. As a result eight men were later removed to make a "purer" sample (see Table III p. 32.). This variable will be borne in mind when interpreting the results of the scattergrams. Men with I.Q.'s ranging from 84 to 130 were included, and the ages of the men ranged from 23 to 44, with most of the men under 32. This latter point does not seem to have lessened the value of the results as much as might have been expected, since the ages of the men showing marked

2: For the ages of the men see Appendix I, p. 68.
deterioration due to Pellagra were 23, 29, 32 and 44 - ages representing the whole range of the sample. As a result of the limited number of cases it is not possible to predict any tendencies, but it is possible to observe patterns on the scattergrams, and deductions will be made interpretively from them.

Fortunately some important controls were present:
(1) The time factor - all patients were tested in November, 1945, so that all had been on good food for the same length of time.
(2) All the members of the sample group were subjected to basically the same environment, food and treatment.
(3) The length of time of imprisonment was the same (three years, eight months).

PATHOLOGY OF PELLAGRA

Since Pellagra is a condition of avitaminosis of the body, a study of the measurement of its mental effects would not be complete without a brief consideration of its pathology.

Pellagra is a nutritional disease due to a deficiency of the heat-stable components of the vitamin B complex. It is characterized by a symmetrical dermatitis, by disturbance of the gastro-intestinal tract and by certain mental symptoms. If their condition is not too far advanced, pellagrins respond specifically to the administration of nicotinic acid or nicotinamide. However,
the relation of this vitamin to the dermatitis is not clear. The disease is, in fact, a mixed deficiency and in many instances there is evidence of the lack of other food factors. Peripheral neuritis responding to thiamine administration is not uncommon and cheilosis and vascularization of the cornea which has been ascribed to riboflavin (B₂) deficiency are not unusual.

Secondary Pellagra is not an uncommon complication of chronic alcoholism and of various gastro-intestinal diseases which are associated with inadequate utilization of a normal diet.

In acute cases active inflammation of certain skin areas and of the mucosa, particularly the mouth and the pharynx, takes place. Dermatitis may or may not occur, but it usually affects areas which are exposed to irritation such as the dorsum of the hands and wrists, the elbows, face, neck, the skin beneath the breasts, the perineal region, the pretibial areas and the dorsum of the feet. In most instances it is restricted to the parts exposed to the sun.

Rosenau reports outbreaks resembling epidemics occur in localities with restricted food conditions; sporadic cases may crop out anywhere and have a world-wide


distribution under unfavourable dietary and economic conditions in endemic localities. Simmons reports Pellagra common in the northern part of China as the "diet of the poorer classes is low in calcium, vitamin A and vitamin C; but the intake of vitamin B is sufficient". He states that in China it is not as common as Beri-beri but that it is encountered throughout the country. He reports it is rare in Hawaii and uncommon in the Philippine Islands. In Europe, the disease has long prevailed in Portugal, Spain, Italy and Rumania, while the northern countries have been slightly, if at all affected. Pellagra is also unevenly distributed in America. It has prevailed especially in the southern part of the United States and some of the West Indies, while Canada, Mexico and South America have remained almost free.

Pellagra may recur year after year, giving a false impression of chronicity. The nervous manifestations begin with weakness, vertigo, insomnia and paraesthesias, and about 2% of Pellagrins develop mental disturbances severe enough to require institutional care. Cecil reports that the mental disturbances in Pellagra vary from emotional instability to profound agitated depression and permanent impairment of the intellect. When changes in the nervous system are demonstrable, they are characterized

by irregular areas of degeneration, often involving the posterior and lateral columns of the spinal cord, the posterior spinal ganglia and the Betz and Purkinje cells.  

Price reports that "the early mental depression may suggest a functional disturbance, but the late neurological features resemble those of a subacute combined degeneration of the cord with spastic paraplegia, sensory disturbances and even sphincter trouble (incontinance) accompanied by increased knee-jerks and ankle clonus, absent epigastric (abdominal) reflexes and an extensor Babinski response".  

The skin eruption is the most characteristic sign. It begins as an erythema affecting especially the backs of the hands, fore-arms, face, neck, feet and genitalia and develops into a thickening pigmentation, with excoriation, and finally ulceration. The symptoms vary greatly in severity.  

The disease may develop at any age, but is rarely seen during the first year of life. It attacks both sexes about equally during childhood and adolescence, but many more cases are seen in adult women than in men.  

Sporadic cases may occur anywhere at any time, even in well-to-do families. These are due to eccentricities of diet, food fads, gastro-intestinal diseases, chronic alcoholism, deranged mentality, or other conditions which

cause the diet to become one-sided, restricted, monotonous and faulty in one or more respects.

Many different views have been advanced as to the cause of Pellagra but it is now agreed by most students of the disease that it is brought on by a deficient diet. Casal long ago (1735) associated the disease with diet. Then came a theory that it was caused by spoiled corn, but this theory was abandoned when non-corn eaters took Pellagra. Later followed a theory that the disease was carried by a species of Simulium or buffalo gnat, but this theory, in turn, was disproved. Even as late as 1916, Pellagra's cause was thought by some to be connected with insanitary methods of excreta disposal, although the United States Public Health Service in 1914 had proved unmistakably, by their experiments with convicts at a prison farm near Jackson, Mississippi, that the primary factor in the causation of the disease was faulty diet.

The thirty ex-pellagrins used as subjects in this study had spent their terms of imprisonment in Malaya, Siam, Korea and Japan. All had suffered from dermatitis, gastro-intestinal disturbances and mental or emotional disturbances in some degree.

10. Smith, Pollitzer and Mustard in South Carolina expressed this view in 1916.
RATIONALE OF THE ELEVEN SUBTESTS OF THE BELLEVUE-WECHSLER SCALE

Before describing the test results or attempting to interpret the patterns it will be necessary to discuss briefly the Rationale underlying the eleven subtests on the Bellevue-Wechsler Scale. The eleven subtests are: Vocabulary, Information, Comprehension, Digit Span, Arithmetic, Similarities, Picture Arrangement, Picture Completion, Object Assembly, Block Design and Digit Symbol. Wechsler has classified the ten tests (other than the Vocabulary test) as verbal (the first five mentioned), and performance tests (the last five). The achievement on the Vocabulary test is used, in this study, as a basis of reference for measuring the degree of mental deterioration on any of the other subtests.

For example, let us suppose that a patient achieves the scores in the following list. It should be noted that these scores, as are all the scores in this study, are "weighted score" units. They are weighted standard 11 scores calculated, as explained by Wechsler, by assigning a new mean of 10 and a S. D. of 3 to each test result.


Taking this Vocabulary score of 12 as a basis of reference, we find that relatively his score on Information is +3, on Comprehension is +1, and Digit Span -3, and so on. Charted, his scattergram would look like the profile shown on Plate I (See p. 13).

It is assumed by Rapaport that "a well adjusted person should have little discrepancy among his eleven weighted scores". Clinical experience confirms this assumption. For practical purposes Wechsler's rule of thumb is used to determine "normal achievement". That is, any deviation up to ±2 weighted standard score units from the mean subtest score is considered normal. Any deviation of more than ±2 from the mean subtest score, Wechsler considers significant. Usually the total mean subtest score and the Vocabulary score are within 1 point of one another, so for the purpose of this study we have transferred Wechsler's rule to read that any score up to ±2 from the Vocabulary score is considered normal. For


GRAPH I
a practical measure of impairment from Pellagra we have considered only those scores more than -2 points below the Vocabulary level as significant of mental deterioration. We feel justified in this assumption as the 2 points "leeway" will absorb any inconsistencies in scoring the Vocabulary test which, in spite of the list of accepted answers at the back of Wechsler's book, has a certain subjective element in its marking. For this study then, any score below -2 is considered mental impairment in the particular mental function measured by the particular subtest, relative to the achievement on Vocabulary. Rapaport makes the same assumption with Digit Symbol; that is, that a "score of 3 or more units below the Vocabulary level indicates significant impairment of visual-motor coordination and speed". Brody does the same when he says, "The discrepancy between present mental test ability and vocabulary ability can thus be used as a measure of intellectual deterioration."

Referring again to our example on page 12; the patient's scattergram shows that superior ability is indicated on the Information subtest, but that mental impairment is indicated on the Digit Span and Picture Arrangement subtests. This impairment may be due to (1)


temporary causes, such as extreme fatigue or over-
anxiety, (2) brain injury, either physical injury or
neural degeneration as in the case of Pellagra, and
(3) the natural deterioration or changes in mental
capacity which occur with age. The clinician must de-
cide, when he discovers impairment on a patient's scat-
tergram, which of these three types it is, but in this
study we have to consider only the first two types, as
the I.Q. tables in Wechsler's book allow for the third
type of deterioration.

Let us now examine the eleven subtests of the Bel-
levue-Wechsler Scale. The Information subtest is a
list of twenty-five questions of increasing difficulty
and has been said to measure memory (not rote memory),
"the subject's general range of information" and "the
alertness of the person toward the world about him".

The Comprehension subtest comprises twelve ques-
tions pertaining to every-day situations, and Rapaport
claims that it tests the Patient's judgment. The Sub-
ject is called on to mobilize such information as will
lead to an appropriate and relevant response to a sit-
uation. Wechsler says it measures "common sense".

Wechsler claims that the Digit Span test is a mea-
sure of immediate rote memory, and Rapaport that it is
a test of attention. We prefer Wechsler's description.

17. Wechsler, op. cit., p. 79.
since rote memory involves attention and the ability to form vivid mental images.

The arithmetical reasoning test is made up of ten problems involving common-place situations and practical calculations. It correlates well with the total score. Its "r" varies from .63 to .67 with various age groups. Rapaport considers the test a measure of concentration and Wechsler a test of mathematical reasoning.

The Similarities subtest comprises twelve pairs of simple words; and the patient is asked to say in what way they are alike. His responses may be on the abstract, functional or concrete level, and as such, they serve as an indication of the patient's ability to form verbal concepts. Wechsler reports that the subtest shows a positive correlation of .73 with the total scale score.

The Picture Arrangement subtest contains sets of cards with cartoons (in some cases from the New Yorker magazine). The tester places the cards before the patient in a standard wrong order; the patient is required to study the mixed cards, comprehend the intended situation and rearrange the cartoons in an order that gives sense and continuity to the story. Wechsler claims that the test measures a subject's ability to comprehend and size up a total situation. Its "r" with total score is .51.

The Picture Completion subtest includes fifteen cards each with a picture of some commonplace (person- or thing. Each drawing has something missing and the patient is asked to name the missing part. Wechsler says the test measures "the individual's basic perceptual and conceptual abilities". This test was given to all thirty of the Pellagra cases.

The Block Design subtest consists of sixteen colored blocks with which the patient is asked to reproduce geometric designs shown him on cards. It is claimed by Rapaport to be a test of visual-motor coordination. Wechsler says that it is one of the best tests for showing up early as well as late disturbances in the higher perceptual processes. Since Pellagra is known to cause neural degeneration in the brain centres, then impairment of the mental functions required for the successful achievement on this test should be indicated quickly. For this hypothetical reason, all thirty cases performed the test. But as the results show, we were wrong in our assumption, as the impairment on this test was relatively negligible. Since impairment of visual-motor coordination has been shown on Digit Symbol and not on Block Design, the writer believes that the Block Design test is not a good test of visual-motor coordination. Rather, success on this test requires a good ability at visual imagery, and to see the gestalt or parts of a pattern; pattern analysis must be good in a subject who gains
success on this test. In this way this test is more a measure of a purely mental function, than a performance one. This writer agrees with Wechsler's claim that it shows up higher perceptual processes.

The Object Assembly subtest requires the patient to assemble figure form-boards. It is a difficult test as the subject is not told what the finished product of the jigsaw pieces will be, and the Pellagra group found more trouble with this test than any of the others. It gives a measure of visual organization and pattern anticipation which Rapaport calls "pattern coherence". As a perceptual-conceptual test it was given to all thirty of the Pellagra patients.

The Digit Symbol test requires the patient to substitute symbols for digits in writing as quickly as possible. As a test of visual-motor coordination the test was given to all thirty of the Pellagra patients in an attempt to discover neural degeneration.

The Vocabulary subtest contains 42 words of increasing difficulty. As has been explained, it is used as a reference for a measure of mental deterioration, since clinical experience has shown that Vocabulary is usually the subtest most resistant to impairment. This fact that vocabulary ability is usually well maintained throughout life has been demonstrated by several experimenters. "Willoughby (1927), in a study of parents and children found little decline with increasing age on vocabulary
compared with other tests. Miles (1933), analysing the results on the Otis S.A. scale, of 856 adults aged 15 to 94, indicated that verbal associations and interpretations of meaning showed 'marked resistance to the influence of age'.... Beeson (1920), Grace (1932), Gilbert (1935) and Wechsler (1938, 1939) have also reported the preservation of vocabulary until an advanced age*. The Vocabulary test on the Wechsler scale besides being used as a quick measure of total intelligence (Wechsler reports an "r" with the total scale score of .85) is qualitatively of great clinical use.

The above discussion of the eleven tests on the Bellevue-Wechsler Scale is necessarily brief, but even a limited understanding of the rationale of the tests in the scale is necessary to an appreciation of the scattergrams of the Pellagra patients. For a fuller description of the tests the reader is referred to Wechsler's text and Rapaport's book.


21. For the clinical use of this subtest see Wechsler, op. cit., p. 99.
A CRITICAL EVALUATION OF THE BELLEVUE-WECHSLER SCALE

Since the Bellevue-Wechsler Scale has been our instrument in this study for measuring the nature and intensity of mental effects of Pellagra, it is important to examine our test for validity. This can best be done by an inspection of some studies made by others who have used the Scale.

A general survey of the literature makes several points clear: (1) The I.Q.'s of mental patients are higher on the Bellevue-Wechsler Scale than on the Stanford-Binet Scale, (2) Correlations of I.Q.'s of mental patients on the Bellevue-Wechsler and the Revised Stanford-Binet are high, although higher between the Stanford-Binet and the Verbal Scale than between the Stanford-Binet and the Performance Scale. (3) At the college level the Revised Stanford-Binet test yields higher I.Q.'s than the Bellevue-Wechsler, but the 1916 scale of the Stanford-Binet yields lower ones. (4) A marked superiority of the Bellevue-Wechsler Scale over the Stanford-Binet in the effectiveness of the tests as instruments in clinical diagnosis of mental deficiency is apparent.

Although our sample is neither at the college level or mentally defective, the knowledge obtained by these studies is valuable in evaluating the Bellevue-Wechsler Scale for the purpose of the present study.

For the past thirty years the Stanford-Binet has enjoyed the importance in psychometrics of being the
basis of intelligence classification in most parts of
the United States and Canada, and it has been used more
than any other one test for recommending the commitment
of a mental patient to an institution. Balinsky et al
point out in their defence of the performance scale as
a measure of general intelligence that the common pract­
ice among most psychiatrists, when a great discrepancy
occurs between verbal and performance scales, has been
to accept the Stanford-Binet as a "true" measure of the
subject's native intelligence; they usually look upon
the performance rating as measuring some special abil­
ity or disability. Balinsky, Israel and Wechsler do
not agree with this a priori assumption regarding the
inferior value of the performance tests as a measure of
general intelligence. With a group of 49 retarded ad­
olescents, Balinsky et al found an "r" of $0.577 \pm 0.095$
between I.Q.'s on the Bellevue-Wechsler Perform­
ance Scale and a recommendation by the psychiatrist
for commitment or non-commitment to a mental institut­
ion. With another group of 89 retarded patients they
found a correlation between the same two measures of
$0.688 \pm 0.055$. These findings show the Bellevue-Wechsler
Performance Scale to be a significantly valuable clin­
ical instrument for use with mental defectives and
borderline cases. The correlations between the com­
mitment and non-commitment and the total scale were

22. Balinsky, B., Israel, H., and Wechsler, D.
"Relative Effectiveness of the Stanford-Binet
and Bellevue Scale etc.», "Amer. J. Orthopsychiat.
1939, 9:798-801."
found to be even higher, viz. .753 ± .072 and .791 ± .048 for the same two groups. The Stanford-Binet 1916 for these same two groups gave "r’s" of .664 ± .073 (with an N of 50 of the same first group) and only .325 ± .071 (with an N of 116 of the same second group). Balinsky and his co-writers point out that their findings indicate a "marked superiority of the Bellevue-Wechsler full scale over the Stanford-Binet in the effectiveness as instruments in clinical diagnosis of mental deficient". They further point out that the forecasting efficiency (as obtained from the biserial "r’s" of one of their groups) of the Bellevue-Wechsler Scale is about 40% as against only about 5% for the Stanford-Binet. They also emphasize from their findings, the importance of including performance tests when attempting to differentiate between borderline intelligence and mental deficiency. To prove their point they found that the Bellevue-Wechsler full scale "r’s" (and it is noted that this includes the Performance scale) with commitment and non-commitment are consistently the highest. They also found that the "r" between the Performance scale I.Q.’s and commitment is higher than that for the Stanford-Binet in the larger group.

It is true that our sample group cannot be considered feeble-minded or defective since the mean I.Q. was 107.9 but the particular mental functions showing impairment are certainly in the borderline area and as


* See Explanatory Note p. 113
such a knowledge of the efficacy of the Bellevue-Wechsler Performance scale and the full scale as a clinical instrument is important.

24 Mitchell in a study of 277 Iowa mental patients found the Bellevue-Wechsler scale gave slightly higher I.Q.'s than the Revised Stanford-Binet (Form L), and also that the "r's" between the Form L and the Bellevue-Wechsler were high. Between the Verbal scale and Form L, she found an "r" of .91; with the Total scale and Form L an "r" of .89; and with the Performance scale and the Form L an "r" of .80.

25 On the college level Fishbein found that the 1916 Stanford-Binet gave lower I.Q.'s (about 10 I.Q. points lower) than the Bellevue-Wechsler and that a correlation between the 1916 Stanford-Binet and the Bellevue-Wechsler total was .57 ± .04. This is not nearly as high as Mitchell's findings (see above) but probably the more varied responses of the college group would account for this variation. Fishbein found the performance I.Q. of the Wechsler scale of little predictive value on the college level.

26 E.E. Anderson et al corroborated this finding when they found correlations of the Performance scale


with other measures (viz: the Stanford-Binet, Form L, the 1940 ACE and the 1941 ACE) approximately .20 to .30 points lower than similar correlations with the Verbal scale. They state that the "Performance scale is therefore of doubtful value at the college level unless it can be shown to be related to other important functions (i.e. other than 'ability markedly involved in scholastic success or other intelligence tests') not measured in the present study". They found the "r" between the Form L and the Verbal scale to be the highest of the three Wechsler measures (viz. .65). They also found the Bellevue-Wechsler to yield lower I.Q.'s than the Form L at the college level.

We feel the Bellevue-Wechsler to be well suited for the problem of this study and findings of other experimenters have shown it to be a valid clinical instrument. Its advantages are:

(1) It is a point and not an age scale.

(2) It has been standardized on adults as well as adolescents. (The final standardization of the Bellevue-Wechsler was made on 1081 adults, as compared with only 62 adults over 16 in the standardization of the 1916 Stanford-Binet, and 209 under 19 years in the standardization of the Revised Stanford-Binet of 1937.)

(3) It consists of performance as well as verbal tests.

(4) It allows for changing ability with increasing age.

27. Fishbein, op. cit., p. 34.
(Wechsler was the first ever to do this, and he did it as late as 1939.)

(5) Its vocabulary test correlates so highly with the full scale that a quick vocabulary I.Q. may be computed.

(6) Its tables of sigma scores make the results of each test directly comparable, and these intertest relationships are clinically useful and valuable in psychological analysis.

(7) The profile graphs show a quick indication of mental impairment in various mental functions.

(8) It gives three I.Q.'s, the inter-relations of which are psychologically significant.
Group Results

An Inspection of Table I reveals an irregular number of tests administered to each patient. It should be noted that a zero (0) indicates that the test was administered but no degeneration is shown; a blank means that no test was administered. This was a result of the restrictions imposed by the army administration. When the task of testing Pellagra patients was first considered, a "short" Wechsler scale had to be chosen. The short stay of the men and the complete lack of a psychological testing staff (other than the writer) determined a maximum time of approximately one hour per man. Then, if the men were still available when all thirty patients had received the short form of the scale, other subtests could be administered when possible; this, in fact, was done. With no previous experience of measuring mental effects of Pellagra to refer to, the short scale was chosen hypothetically. It included the Vocabulary, Picture Completion, Block Design, Object Assembly and Digit Symbol tests. The Vocabulary test was chosen to give a quick Vocabulary I.Q. and to gain a measure of reference for detecting mental impairment. The other four tests were chosen, as it was thought they were the best measures of perceptual and motor functions; and if Pellagra showed mental deterioration due to neural degeneration it should become evident in this realm first. Our results show that
Table I

Results of the Bellevue-Wechsler Scale administered to the 30 ex-Pellagra patients, showing mental impairment scores.

<table>
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<tr>
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<th>B</th>
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<th>PC</th>
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<th>OA</th>
<th>DS</th>
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<th>(P)</th>
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Gross Impairment: 8 9 41 20 25 58 34 22 85 59
No. of Cases: 21 22 26 26 26 26 30 30 30 30
Aver. Impairment: .36 .41 1.58 .77 .96 2.76 1.13 .73 2.83 1.97
this was not the best minimum selection of tests, but fortunately it was possible to administer more than the minimum scale to twenty-six of the thirty cases.

At first it was hoped that some measure of the permanence or temporary nature of the mental symptoms of Pellagra could be made. For example, almost all the men complained of profound feelings of depression during the worst attacks of the disease. Was this effect of very brief duration, or did it last one month, two months or six months after the attack? Unfortunately none of the patients could say when his Pellagra occurred and when it stopped. For example, none could say that his attack lasted for, let us say, two weeks in October 1942. The disease is by nature usually recurrent. But the total study seems to indicate that in most cases mental deterioration does not persist following Pellagra. Of the thirty cases, only four showed mental deterioration which could be safely attributed to it, and the impairment in one of these cases was due to the super-imposed effects of schizophrenia. Six others showed deterioration which could partially or indirectly be due to Pellagra.

Ideally a control group of non-Pellagra-non-Beriberi cases free of any psychiatric disability would have given the best control sample with which to compare our Pellagra cases. We included non-Beriberi in our ideal control too, because the two diseases are due to a condition
of avitaminosis, and because of this, could cause the same kind of neural degeneration in the brain centres. The men too, were sometimes undecided whether it was Pellagra or just Beriberi that they had had, and as may be expected, medical reports from the prisoner of war camps were sketchy and variable. Consequently, a search for such a control group netted only seven. Nearly everyone had had Beriberi at some time during his captivity, and about a third of the men had had Pellagra. Because a control group of seven is of no use in predicting, to gain a larger group we added twenty "non-Pellagra" Canadians, who, in most cases, had never left Canada. The results of the two groups appear in Table II, p. 30.

Column C in Table II is so limited that it might be wondered why it is included. The scale is so coarse that even half the tests show no discrimination. Its only value is to show that the sample in column B is a good one. As has been mentioned, this sample was made up of a mixed group of liberated prisoners of war and Canadians both Military and civilian. They were picked carefully to avoid any serious psychiatric disability. They were non-Pellagra-non-Beriberi. The comparison of columns B and C would seem to indicate that our control group sample is a good one since the first four tests are the same, and the first two of them show the same
<table>
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<tr>
<th>Test</th>
<th>Average Impairment Per Patient</th>
<th>Test</th>
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<th>Test</th>
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**Table II**

<table>
<thead>
<tr>
<th>A</th>
<th>PELLAGRA GROUP</th>
<th>(30 cases)</th>
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<tbody>
<tr>
<td>B</td>
<td>NON-PELLAGRA GROUP</td>
<td>(27 Cases)</td>
</tr>
<tr>
<td>C</td>
<td>NON-PELLAGRA-NON-BERI-BERI Group</td>
<td>(7 cases, totally LPW)</td>
</tr>
</tbody>
</table>
order of impairment.

According to the rule of thumb that only scores of less than -2 are considered indications of mental deterioration, then only the first two tests in Column A can be considered significant. The Digit Symbol test may be considered as being on the borderline. Then the fact that the tests in the last half of the list in Column C show no discrimination does not matter, since we are only concerned with the first three tests, or at the most the first five.

In considering these results, we cannot forget that effects other than Pellagra are superimposed on these total results. Several patients in our group of thirty Pellagra cases were psychoneurotic and schizoid personalities, and these cases are bound to "blur" the direct effects of the Pellagra in the scattergrams. As we mentioned previously, a psychiatric analysis was made, so that those cases with serious psychiatric defects could be excluded and the results of the remainder studied. These "screened" results appear in Table III. Eight cases were removed from the original group; three marked schizoids, four psychoneurotics, and one inadequate psychopath.

The most marked difference in a comparison of the two lists is the change in position of Digit Span in the original group- from #4 in column B to #7 in the altered group, Column A, and a drop in impairment score of from -1.58 to -.66. This is interesting and significant since
TABLE III

Pellagra group with 8 cases removed because of psychiatric disability. (22 Cases)

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<tr>
<th>TEST</th>
<th>&quot;A&quot; AVERAGE IMPAIRMENT</th>
<th>&quot;B&quot; TEST</th>
<th>AVERAGE IMPAIRMENT</th>
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<td>1. Object Assembly</td>
<td>-2.83</td>
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<tr>
<td>2. Picture Arrangement</td>
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<td>-2.76</td>
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<td>3. Digit Symbol</td>
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<td>-.21</td>
<td>10. Comprehension</td>
<td>-.38</td>
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Original Pellagra group (30 Cases.)
the Digit Span subtest nearly always shows impairment with psychoneurotics. Of those cases removed, the psychoneurotics showed impairment scores on this test of 0, -9, -5 and -3; one of the schizoids a score of -6; and the inadequate psychopath a score of -6. Impairment scores are slightly less on all but two of the tests in the altered group (Column A) and of these two, Arithmetic is the same (viz. -0.77) and Comprehension shows 50% more impairment (i.e. an increase from -0.38 in Column B to -0.61 in Column A). In general, this indicates that superimposed psychiatric effects of the eight most psychiatrically defective patients have been removed, and that the impairment due to Pellagra is more truly portrayed in Column A of Table III. It is not safe to conclude that judgment (as measured by the Comprehension test) is more affected by Pellagra than the effects of schizophrenia and psychoneurotic traits, as our sample is too small, but this tendency is suggested by the marked shift of Comprehension in the two lists.

It is safe to conclude, however, even with our small sample groups, that the Pellagra patients show decidedly more impairment than the non-Pellagra subjects, and that they show impairment on tests which held no particular difficulty for the normal group. Using Column B of Table II as an indication of difficulty of the tests by our normal group, we may see the differences of the Pellagra group. Although our normal control group contains only twenty-seven cases, the results compare
favourably with Rapaport's control group of over two hundred cases, (in which Picture Arrangement, Object Assembly, Digit Span, Arithmetic and Picture Completion show difficulty in that order and impairment scores of -1 or more.)

The Pellagra group shows much more average impairment than the control group (-1.14 as compared with -0.68). These figures mean nothing alone, but the comparison is significant. They mean that the Pellagra cases show almost twice (1.68 times, to be exact) the impairment of the normal group.

The Pellagra group shows considerable impairment (the first four tests on the list) only in the Performance tests, while the control group shows deterioration equally on the Verbal and the Performance tests, on the first four tests of the list. See Table IV.

The Pellagra group shows marked deterioration on the Object Assembly test (-2.41 average impairment as compared with -0.70 in the normal control group). Rapaport's study shows that this test is vulnerable to any tendency toward maladjustment, and personality maladjustment as a secondary result of Pellagra may contribute largely to this marked impairment. This view is strengthened by the fact that Block Design shows negligible impairment.

28. Rapaport, op. cit., p. 101, Figure 2, Graph 8.
29. See page 17 of this study.
<table>
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<th>Test</th>
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If the low scores on Object Assembly are due to neural degeneration causing a deterioration of perceptual-motor abilities, then it would be reasonable to expect simultaneously low scores on Block Design since it is claimed by Rapaport that both tests are a measure of visual-motor coordination. But this is not so. The answer to this apparent irrelevancy is that Pellagra varies with intensity and causes personality maladjustments which are indicated in the poor results on Object Assembly. In only three, and possibly four cases of the thirty are the effects serious enough to conclude that there is neural degeneration. But in all the cases, the men exhibited mild psychoneurotic or schizoid symptoms. Both types show low scores on Object Assembly. Another reason is that Block Design is more a test of a purely mental function, and Object Assembly is a measure of sensory-motor ability.

The Picture Arrangement subtest was done badly by both the Pellagra group and the control group (see Table IV), but the Pellagra group showed more impairment (-2.39 as compared with -1.48 of the control group). As in Rapaport's control group with a rural background "the impairment on Picture Arrangement is referable to the highly sophisticated nature of the anticipations required, which puts the control group, with its rural background, at a disadvantage". The same may be safely

said of the liberated prisoner of war who for three and a half years lived in an "unsophisticated" environment, had few or no magazines or books to read, and carried on activities unlike any of the anecdotes depicted on the cards. The last three sets of cards "Flirt", "Fish" and "Taxi" require a highly sophisticated sense of humour, and have been found very difficult by many patients in the superior and very superior intelligence groups. The low scores on Picture Arrangement, besides being due to the non-sophisticated experiences of the liberated prisoners of war during the last three and a half years may be attributed to psychiatric symptoms of maladjustment, secondary effects of Pellagra.

The marked impairment of the Pellagra group on the Digit Symbol test (-1.82 as compared with - .65 of the control group) is in the opinion of the writer the strongest indication of some imbalance in perceptual-motor ability due to Pellagra. Wechsler states that "in organic brain cases, the greatest and most consistent falling off is on the Digit Symbol test". Our study corroborates this statement. Of the four cases directly attributed to Pellagra, all but one showed impairment on the Digit Symbol test. Their scores are -4, 0, -6, and -6. The six cases attributed to partial effects or secondary effects of Pellagra showed scores on this test of -4, -4, 0, -6, -3, and -3. From this evidence it is safe to

conclude that Pellagra, in most cases, causes a degree of mental impairment on visual-motor coordination as measured by the Digit Symbol test of the Wechsler scale. The marked inferiority of the Pellagra group as compared with the control group on the Picture Completion subtest, indicates that Pellagra either directly or indirectly impairs perceptual ability. The comparative scores of average impairment of the two groups on this test were -1.05 and -.37, which indicated almost three times the impairment of the normal group. The condition of avitaminosis resulting from Pellagra affects the sensitivity of the retina, which in turn seriously impairs the efficiency of the individual's basic perceptual and accompanying apperceptive ability. Medical examination revealed that scotomata were present in some cases. This statement is supported by the evidence that deterioration on this test occurred in all I.Q. groups (from an I.Q. of 91 to one of 124) and is accompanied by impairment scores on Digit Symbol (the best single measure of visual-motor deterioration) in only half the cases.

The remaining tests on Table IV (i.e. Similarities and etc.) in a group of only twenty-two cases cannot be discussed as group results to mean anything. The average impairment score on each test was less than -1, and as such, collectively these scores cannot be considered significant group deviations. On three of the remain-
ing six tests the Pellagra group even showed less impairment (viz. Arithmetic, Digit Span, and Block Design). Consequently the mental deterioration shown on these six tests are not to be ignored, but will be discussed in the following section on the analysis of some of the more significant cases.
SOME CASE ANALYSES

(Note: To conceal the identities of the patients discussed here, fictitious names have been used in each case. All other details are true.)

Case I.

Pte. McEwen showed the most marked mental deterioration due to Pellagra, of any of the thirty cases. He was an Irishman from Londonderry and had had a good schooling. After matriculation he had spent two years at a seminary where he said he had done well in Latin, Greek and Mathematics (all of which studies require a good memory and mathematical-reasoning ability). One of his brothers was a superintendent of police in Ireland and another had held a responsible executive position in a bank. Apparently Pte. McEwen's family was of above average intelligence, and the chances are good that he himself had possessed an I.Q. of 120 or more.

He had joined the Londonderry police force after leaving college, and had had a good record there. At the outbreak of war he had joined the British army and was sent to the Far East.

At the time we saw Pte. McEwen he was 44 years of age but looked at least 60. He possessed a likable personality being very grateful for anything done for him; but when speaking, his voice was soft and tremulous, and his whole manner lacked confidence. He was deaf to some degree and it was necessary to speak loudly to make him hear. He suffered from several dizzy spells a day during
his incarceration, and while at the camp he still com-
plained of two or three a day. They were, however, de-
creasing in number and intensity. These spells were
accompanied by feelings of profound depression and white
lights before the eyes. Pte. McEwen showed a positive
Rhomberg reflex. All these have been reported as typ-
ical mental symptoms accompanying Pellagra:

His scattergram showed impairment on all but Digit
Span, although as explained above, for our study we will
not consider Comprehension and Information as indicat-
ions of deterioration since their impairment scores are
not more serious than -2.

For a patient showing such marked impairment it
seems remarkable that his best mental function should
be memory span for digits. This was a puzzling point
until the patient revealed that when he was in the pol-
ce force, he had always made great use of his ability
to remember numbers, by remembering cell numbers, lic-
cence plate numbers, addresses, etc. It is highly prob-
able that the patient's score on Digit Span was higher
before his attacks from Pellagra, and that this ability,
although still good, was impaired to some degree.

The Picture Completion test showed the most deter-
ioration with an impairment score of -8. This indicated
degeneration in either the retina, optic nerve; or vis-
ual brain centers, thus impairing Pte. McEwen's percept-
ual and apperceptive abilities.
Pte. M^Ewen's Scattergram

GRAPH II
The next most significant test result was the patient's score of -6 on Digit Symbol. His difficulty in perceiving the digits and their accompanying symbols, and his lack of speed in executing the test, indicated a marked deterioration in his visual-motor coordination.

The low score on Picture Arrangement was more indicative of an unsophisticated mentality and psychoneurotic over-anxiety than any degeneration of the nerve centers. Of course, the impaired perceptual abilities would limit his achievement on this test.

Object Assembly and Block Design both showed marked impairment indicating deterioration in the patient's ability to coordinate his visual and motor concepts.

On the Similarities test Pte. McEwen showed a functional level for almost all his concepts. This was no doubt a marked drop in his previous ability to verbalize his ideational thinking, since a man with his education would be sure to form abstract concepts on some of the questions. Even with the simple examples requiring the common factors of an orange and a banana, he gave the functional idea that "they both grow in tropical countries". When asked in what way coat and dress are alike he answered, "They are made from the same material". He gave answers on almost all the examples but maintained his functional level (one answer was on the concrete level) on all of them regardless of their difficulty.

His mathematical reasoning was more impaired by his psychoneurotic over-anxiety than any other factor,
but this was a secondary result of Pellagra.

Brody's remarks are particularly pertinent in considering Pte. McEwen's symptoms. He (Brody) points out that intelligence "depends, as age increases, more and more on the products of ability and less and less on ability itself". This and the fact that "general information" and "comprehension" resist the usually deteriorating effect of age, account for the relatively higher scores on Vocabulary, Information and Comprehension. Pte. McEwen's case seems to indicate that Vocabulary is also resistant to the deteriorating effect of organic degeneration. However, preservation of vocabulary ability and closely related functions is not good evidence against deterioration.

Brody also states, in his remarks regarding the mental changes accompanying age, that his results "strongly suggest a genuine decline in ability, possibly associated with organic changes in the brain. Other possible factors include lack of practice, unfamiliarity with the test material, lack of interest, loss of memorizing ability rather than 'g', and loss of 'speed' more than of 'power'". Pte. McEwen's achievement would seem to suggest that these remarks (with the exception of "loss of memorizing ability") may be applied to him, in addition to the reasons we have already suggested as possible causes of his impaired performance.

This patient continued to improve mentally, so he said, during his stay at the Reception Centre, although

it was not possible to test him at a later date to give a measure of his improvement. To state conclusively what mental impairment persists from Pellagra in this case, it would be necessary to test Pte. McEwen six months or a year from now. At present (December 1945) no statement can be made in this regard.

On the Minnesota Multiphasic Personality Inventory Pte. McEwen rated high on the neurotic scale, showing abnormally high scores on the depressive, hypochondriacal and hysterical scales.

Case II

Pte. Bloom was a short stocky Lancashireman aged 32. His movements, when we saw him, were slow and deliberate. He had rather a dazed expression all the time and often smiled and grinned for no apparent reason. He had trouble in concentrating on what was said to him, and he often asked for a repetition of a question during the test. In spite of this, he showed a good knowledge of commonplace events on Information, a good ability on arithmetical reasoning, a good comprehension of practical situations on Comprehension and a fairly good memory span for digits. He scored a verbal I.Q. of 111.

On the performance tests he was usually accurate in what he did, but the time limits on these tests cut his scores. He worked at an extremely slow and deliberate rate. Time, apparently, meant nothing to him. In the Block Design test he would sometimes study the design for twenty seconds or more before making another move.
Pte. Bloom first had Pellagra in October 1942. This attack was accompanied by a bad memory for past events, but it passed off. In February 1944 he had Beriberi, and from this time on his extreme mental and physical slowness remained. No doubt the Beriberi in February 1944 was accompanied by another Pellagra attack which caused marked degeneration in the neural centers which have to do with sensory-motor coordination. (In his case, it is very likely that the Betz cells suffered serious degeneration). His low scores on Digit Symbol, Object Assembly and Picture Completion indicate a marked impairment in these functions. His achievement on Block Design was significant; he did every design correctly but so extremely slowly that he received only one time credit on the whole test and that was on the first design. He got a zero score on the last design, because although he completed the design correctly, he took eleven seconds over the generous maximum time limit of three minutes and fifteen seconds. The interesting point in this performance was the fact that the effects of Pellagra had not impaired Pte. Bloom's superior ability in visual imagery, but it had impaired the motor phase of his performance by seriously reducing his speed and reaction time. Of all the thirty ex-Pellagra patients, only two showed a marked deterioration in their motor speed, and Pte. Bloom showed this impairment far more than Pte. Cooker the other patient. This indicates that Pellagra can and will cause neural degener-
Pte. Bloom's Scattergram

Graph III
ation in any of the neural centers and leave others intact.

This finding is corroborated by medical investigation which has discovered that Pellagra, due to the lack of nicotinic acid causes a partial degeneration of the Betz cells in the ganglionic layer of the cortex; that is the motor layer of the cortex. Cecil states, "When changes in the nervous system are demonstrable, they are characterized by irregular areas of degeneration, often involving the posterior and lateral columns of the spinal ganglia and the Betz and Purkinje cells." 33

In the case of Pte. Bloom it was his motor centers (the Betz cells in the cortical layers) which were affected, but the centers to do with the higher mental and ideational processes appeared to be impaired very little or not at all.

However, the patient had developed a marked schizoid personality, and the super-imposed effects of this maladjustment are not forgotten in the above item analysis. For example, his psychometric shows a schizoid pattern by the fact that the verbal scores were much higher than the performance scores, very low Picture Arrangement score, very low Digit Symbol score with a simultaneously high Digit Span score, a discrepancy between Information and Comprehension in favour of the former, a low score on Object Assembly and a large intertest variability. 34


34. For more information on these psychiatric patterns see Wechsler, op. cit., Chapter XI.
Case III

CSM McDowell was a likable Canadian lad of twenty-three. When he first arrived, he was in a highly emotional state, and suffered with crying fits in bed at night. He stated that all during his term of captivity he had always been able to endure the hardships without undue emotion, but now that he was so near home and faced with seeing his family soon again, he felt peculiarly insecure. He did not understand the reason for this, and it worried him. He was afraid that he was "losing his mind". He said he liked reading but that he found difficulty in concentrating, and often had to leave a book unfinished. While at the Reception Centre, he read most of "Anthony Adverse", but had to leave it, one hundred pages from the end, because he became too restless. At this time CSM McDowell was overly-concerned about his future; he was afraid that "mentally" he was not as able as he formally had been. He thought he was losing his memory; and his concentration, he "knew", was very bad.

The Wechsler scale revealed a psychiatrically maladjusted personality, and his scattergram showed marked mental deterioration in the perceptual functions. He showed mental impairment on all the performance tests, especially those measuring ability on perceptual-motor coordination, pattern analysis and coherence (spatial visual imagery) and pattern anticipation. CSM McDowell's mental impairment is jointly a result of neural degeneration (a primary symptom of Pellagra) and psychoneurotic
C.S.M. McDowall's Scattergram

GRAPH IV
over-anxiety (a secondary symptom of Pellagra.)

The neurotic pattern of his psychometric is indicated by the fact that his verbal score is much higher than his performance score, high Comprehension and Information accompanied by very low Digit Span, low Picture Arrangement and low Digit Symbol.

The patient was verbally a very intelligent lad, scoring a verbal I.Q. of 127; but his visual-motor abilities were markedly impaired, showing a performance I.Q. of only 99. It seems highly probable that with an adequate diet, the patient will regain his perceptual abilities again. When his good intellectual score was shown him, he gained back much of his old self-confidence and lost much of his attitude of over-anxiety toward his environment.

Case IV

Pte. Drage, aged 29, was a Canadian lad from Winnipeg. On arrival he was in an emotionally unstable condition and complained of nightmares at night. The Minnesota Multiphasic test showed this lad to be extremely high on the neurotic scales (especially on depressiveness), to be subject to an abnormal number of fears and phobias, and to possess marked schizoid tendencies.

The Wechsler scale revealed a lad of average intelligence (I.Q. 101) with mental deterioration indicated on all mental functions. Impairment scores ranged from -1 to -6. It is true that some of Pte. Drage's mental impairment on the test resulted from this over-anxiety and
Pte. Drage's Scattergram

GRAPH V
lack of self-confidence, but much of it can be traced to the psychological effects of Pellagra.

His motor functions were only slightly impaired as his Digit Symbol impairment score was only -1, and other than Vocabulary it was his best score. However, his low scores on Picture Arrangement, Block Design, Object Assembly and especially Picture Completion showed deterioration in Pte. Drage's perceptual powers. This indicates either peripheral neuritis in the optic nerve, or central neural degeneration in the visual centers of the occipital lobe, or a mixed picture of both. No visual test was made during his stay with us, so we have only Pte. Drage's achievement on the subtests which involve perceptual functions to guide our judgment. The scattergram pattern indicates the high probability of a mixed picture due to the combined effects of Pellagra and Beriberi.

Case V

Spr. Gray, aged 28, was a native of Hong Kong. He grew up in a "broken" home atmosphere. His parents continually bickered and because of his unhappy childhood, the patient quit school at the age of twelve and went to sea. He worked on boats plying the waters of the China coast, and for more than a year, he travelled about from Shanghai to Manila and back to Hong Kong. As he explained, "I learned a lot of things I shouldn't".

Spr. Gray was an inadequate psychopath with a pleasant personality but an amoral approach to his social
Spr. Gray’s Scattergram

GRAPH VI
environment. His Wechsler scale revealed an average intelligence (I.Q. 103) with marked mental deterioration on almost all the tests. He possessed a quick social alertness which gave him a relatively good score on Picture Arrangement, and a certain facility with words which gave him good scores on Vocabulary and Similarities. His achievement on Picture Completion revealed normal perceptual powers. But on all the other tests he showed marked mental deterioration as compared with his achievement on Vocabulary.

Spr. Gray possessed the restless, opportunist type of mentality, so common with psychopaths. Because of this, his scores were low on Comprehension, Information, Arithmetic and Digit Span. His impairment on these tests cannot be safely attributed to Pellagra. His poor school and home histories indicated the strong probability that he had never possessed a good achievement on them. However, the very marked deterioration on Block Design, Object Assembly, and especially Digit Symbol indicates the degenerative effects of Pellagra on the motor areas of the brain, coupled with the personality defects of restlessness and superficial effort. Normally, it would be surprising that a lad who quit school at an early age to make his living with his hands, should be so poor at visual-manual problems; but the presence of Pellagra and the resultant neural degeneration would account for this deterioration.
Case VI

Sgt. Owen was one of the most marked cases of perceptual impairment as measured by the Picture Completion subtest. He was a quiet, likable Englishman, aged 28, of very superior verbal intelligence (Verbal I.Q. 133) and erratic performance ability (Performance I.Q. 109). This variable achievement gave Sgt. Owen an I.Q. of 124 on the total scale which put him in the classification of superior intelligence.

His extreme intertest variability indicates psychiatric maladjustment - in this case a schizoid pattern; but his particular deteriorated performance was on Picture Completion and Object Assembly. Since he showed such a superior abstract mental level, this deterioration was not accompanied by a lack of apperceptive ability, but perceptual. The lack of any visual test results is a weakness here again, but from the scattergram on the two tests the impairment seems to be rather the result of peripheral neural degeneration of the optic nerve than central degeneration of the neural centers of the visual areas of the occipital lobe. The reason for this belief is the simultaneously high score on Block Design. Were the central visual centers impaired, it is likely that low scores would have been achieved on both Picture Completion and Block Design, since the pattern analysis ability required on the latter test would have suffered. But with perceptual impairment due to peripheral neuritis, the small detail in the Picture
Sgt. Owen's Scattergram.

Area Indicating Mental Impairment

<table>
<thead>
<tr>
<th>Area Indicating Mental Impairment</th>
<th>COMPREHN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>INFORM'N</td>
</tr>
<tr>
<td></td>
<td>DIG. SPAN</td>
</tr>
<tr>
<td></td>
<td>ARITH.</td>
</tr>
<tr>
<td></td>
<td>SIMILAR.</td>
</tr>
<tr>
<td></td>
<td>PIC. ARR.</td>
</tr>
<tr>
<td></td>
<td>PIC. COMP</td>
</tr>
<tr>
<td></td>
<td>BLK. DES.</td>
</tr>
<tr>
<td></td>
<td>OBJ. ASS.</td>
</tr>
<tr>
<td></td>
<td>DIG. SYM.</td>
</tr>
</tbody>
</table>

GRAPH VII
Completion subtest could be easily missed, while the much larger red and white squares and triangles of the Block Design test would be perceived with relative ease.

The good score on Digit Symbol and Block Design indicates that Sgt. Owen's motor ability had not suffered from the effects of Pellagra.
PERSONALITY TRAITS OF ELEVEN OF THE EX-PELLAGRA PATIENTS AS INDICATED BY THE MINNESOTA MULTIPHASIC PERSONALITY INVENTORY

The mental and personality changes resulting from Pellagra have been known for some time* and an attempt to measure some of these was made. While the Wechsler scale is a useful measure of the intellectual impairment, the Minnesota Multiphasic Personality Inventory has more use in measuring various personality traits or tendencies.

This test is self-administered and consists of sorting 550 cards into True or False groups. These cards each possess a question which, when answered by True or False, is designed to indicate a particular mental or behavior tendency. The test attempts to show these tendencies on the following nine scales: Hypochondria, Depressiveness, Hysteria, Psychopathic, Masculine-Feminine Interests, Paranoia, Psychasthenia, Schizophrenic and Manic. A score of 50 indicates the theoretical normal, but for practical purposes, scores deviating as high as 70 or as low as 30 are considered in the normal range. Any score over 70 is considered abnormally high and in the sphere of maladjustment. As with the administration of the Wechsler Scale we were sadly handicapped by lack of a testing staff. The writer spent most of his time administering the Wechsler scale, but since the Minnesota

35: See page 8 of this study.
test is self-administered it was kept in the hands of some one of the patients most of the time. The test takes about an hour (and some times much more) to complete by the patient, and almost three quarters of an hour to chart, score, and plot. Consequently it was only possible to obtain 11 of the 30 Pellagra patients to do this test. Most of them were in the higher I.Q. brackets. The I.Q. range of these eleven cases was 91 to 130, but the average I.Q. of the group was 113.

The results of the eleven cases are shown in Table V. Any score within the normal range (i.e. less than 70) is charted with an "N". Any score over 70 is considered abnormal and is indicated. The average scores are calculated purely to supply a comparative score, to indicate a comparative degree of maladjustment.

The nine scales are listed in Table VI in the order that the eleven ex-Pellagra cases showed their measures of intensity. Again we are limited by the very small sample group, but even so there are a few conclusions which can be made safely from these limited test results:

First: Even after two to three months of freedom, good food and good treatment, depressiveness is the most marked personality tendency of the ex-Pellagra patient.

Second: Hypochondriacal, Schizoid and Hysterical tendencies are also marked, but from our small sample group it is impossible to say in what order these three would show intensity in a more representative sample.
### TABLE V

Scores of Eleven ex-Pellagra Patients on the Minnesota Multiphasic Personality Inventory

<table>
<thead>
<tr>
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<td>N</td>
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<td>N</td>
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<td>70</td>
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<td>N</td>
<td>N</td>
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<td>N</td>
<td>N</td>
<td>93</td>
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<td>11</td>
<td>N</td>
<td>82</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
</tbody>
</table>

Total 326 592 222 151 149 0 160 291 172

Average Score 29.6 53.8 20.2 13.7 13.5 0 14.5 26.4 15.6
# TABLE VI

Intensity of Personality Tendencies of the same eleven Patients measured by the Minnesota Multiphasic Test

<table>
<thead>
<tr>
<th>SCALE</th>
<th>AVERAGE SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Depressive</td>
<td>53.8</td>
</tr>
<tr>
<td>2. Hypochondria</td>
<td>29.6</td>
</tr>
<tr>
<td>3. Schizophrenia</td>
<td>26.4</td>
</tr>
<tr>
<td>4. Hysteria</td>
<td>20.2</td>
</tr>
<tr>
<td>5. Manic</td>
<td>15.6</td>
</tr>
<tr>
<td>6. Psychasthenia</td>
<td>14.5</td>
</tr>
<tr>
<td>7. Psychopathic</td>
<td>13.7</td>
</tr>
<tr>
<td>8. Masculine-Feminine</td>
<td>13.5</td>
</tr>
<tr>
<td>9. Paranoia</td>
<td>0</td>
</tr>
</tbody>
</table>
Third: The remaining personality traits show negligible abnormality and cannot be attributed, even indirectly, to Pellagra. They are less changeable personality traits and more the product of the basic personality in each case. It is highly probable that when these men returned home, and enjoyed the normal environment of their own homes again, their abnormally high neurotic traits would disappear to a large degree. The schizoid tendencies would likely decrease in intensity much more slowly.

THE INCIDENCE OF MENTAL SYMPTOMS

As each man was tested, he was asked to describe his symptoms during his Pellagra attack. Some of these descriptions were quite definite, while others were the reverse. In the latter case this was often due to the fact that the man did not know, at the time, that he was suffering from Pellagra. When questioned at our army center, he sometimes found it difficult, in retrospect, to describe his feelings. Consequently, a few of the thirty cases were unreported.
TABLE VII

Incidence of Mental Symptoms as reported by the Thirty ex-Pellgra Patients

<table>
<thead>
<tr>
<th>SYMPTOM</th>
<th>REPORTED PRESENT</th>
<th>REPORTED ABSENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor memory and difficulty in</td>
<td>30</td>
<td>0</td>
</tr>
<tr>
<td>concentration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depressiveness</td>
<td>14</td>
<td>3</td>
</tr>
<tr>
<td>Restlessness</td>
<td>13</td>
<td>4</td>
</tr>
<tr>
<td>Dizzy Spells &amp; Black-outs</td>
<td>13</td>
<td>3</td>
</tr>
<tr>
<td>Hallucinations (white lights &amp; silver stars)</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>Insomnia</td>
<td>8</td>
<td>9</td>
</tr>
</tbody>
</table>

In most cases, however, if the symptom is not reported, it is assumed to have been absent. In several cases, the men stated, when questioned, that a particular symptom was not present during the Pellagra attack; these cases are recorded in Table VII.

SUMMARY OF CONCLUSIONS

I Pellagrins seem to suffer mental impairment, in some degree, during the Pellagra attack.

II Pellagrins may or may not suffer continued mental deterioration, depending on the severity and length of the period of the disease.

III Pellagrins in general, suffer mental impairment more of a visual-motor type than a purely intellectual type.
IV Pellagra may impair the perceptual powers by causing degeneration in the peripheral nerve areas (retina and optic nerve) and the central visual neural centers in the occipital lobe of the brain. From our study, the evidence indicates that the perceptual abilities, which have to do with anticipating an unknown whole from its parts, show the most impairment.

V All thirty of the ex-Pellagra patients complained of retarded mental abilities during the attack of Pellagra, but our study shows that in most cases such mental impairment is only temporary. We have evidence, in only a few cases, to show that memory is organically impaired by Pellagra. In most cases, this impairment is only of a temporary nature and due to a psychological temporary inefficiency.

VI Emotionally Pellagrins become unstable and tend to develop feelings of depression in varying degrees. These depressive feelings may persist as long as three months, in a physically normal and adequate environment, and may last much longer.

VII Schizoid patterns were prominent among our thirty Pellagrins, but it is difficult to localize the cause of this. It is possible that it might be precipitated by the Pellagra attacks, or the psychological maltreatment during the period of imprisonment.

VIII Besides depression, Pellagrins may experience poor memory and inability to concentrate, restlessness, dizzy spells, hallucinations (white lights and silver stars), and insomnia.
BIBLIOGRAPHY


APPENDIX I

Among the duties as psychologist, the writer was required to administer tests and submit brief analyses of his results to the psychiatrist. In some cases a full analysis was required in particular cases.

The thirty brief reports follow; and after them are three full reports on Privates McEwen and Drage, and Lance Corporal Locksley.

As in the section, "Some Case Analyses", on page 40 of this study, the names are fictitious to conceal the identities of the patients, but all other details are true.

PSYCHOLOGICAL TEST RESULTS
of the Thirty Pellagra Patients

1. L/Bar. Barrow, A. J.; British, Age 27. Completed Elementary School. Psychoneurotic showing emotional instability partially due to terrifying experience lasting 24 hours during the sinking of the Lisbon Maru. This man cannot swim. I.Q. 101 and showing no mental deterioration. He showed fairly good ability at the perceptual-motor type of tests, good ability for mental verbal concepts, and fair ability on comprehension. A likable, shy, insecure lad.

2. Gnr. Bellows, H. N.; A socially and mentally dull lad with very little emotional response. No mental deterioration apparent but a consistently low mean sub-test score of 8.5 (out of a possible 18) with very little scatter. I.Q. 95


4. Pte. Bloom, H.G.; Completed elementary school. A retarded schizoid—Very slow response, but fairly accurate on anything he did within minimum time limits. Fairly good verbal I.Q. (111) with fairly good reasoning, attention and information but poor ideational conceptual ability—On performance tests he was deliberate and fairly accurate, but extremely slow. Total I. Q. 100; Performance I. Q. 88—Deterioration evident on Social intelligence (P.A.), Object Assembly and Digit Symbol.

6. Dvr. Chapin, G. E.: British, Age 40. Partial elementary school. Verbally a very dull type with an average ability for perceptual-manual ability. I. Q. (T) 94; (V) 82; (p) 110. Extremely poor conceptual ability and comprehension; very limited knowledge of common facts evident on Information Subtest. Deterioration evident on comprehension, Digit Span and Similarities.

7. Pte. Cooker, C. A.: Partial elementary school. Deterioration on Similarities, Object Assembly and Digit Symbol. I. Q. (T) 98; (V) 99; (P) 97. The patient showed a very shallow mood swing and an extremely slow reaction time in all but the Information Subtest. In the Vocabulary test he would sometimes wait a minute, before being able to put his ideas in words. British, Age 30.


9. Pte. Drage, E.: Canadian Age 29. Completed Grade VIII. Average intelligence, showing deterioration on all tests but Comprehension and Digit Span. By the differential-test-score method, he shows a mental deterioration of over 8%. This could be due to Pellagra, but also due to the superimposed effects of his psychasthenic and schizoid tendencies. I.Q. 100.

10. Sgt. Owen, J. British, Age 28. Two years secondary school. A man with a good verbal score (I.Q. 133) but showing a schizoid scattergram pattern. Considerable intertest variability (especially between V. and P. 133 and 109) indicates this. Extreme impairment on P.C. and O.A. This marked perceptual impairment in one with such a superior abstract mental ability (A and D) indicates the strong possibility of the degeneration of the lower brain centers.

11. Spr. Gray, W. A.: British (Native of Hong Kong) Age 28. Completed Elementary in Hong Kong. Psychopathic personality with average intelligence. I.Q. 103; (V) 104; (p) 101. The impairment on the verbal tests can be attributed to the erratic school record of the patient, but his poor performance on B.D., O.A., and D. Symbol is rather surprising in one who left school at 15 to earn his living with his hands. This scattergram pattern indicates a strong possibility of degeneration, due to Pellagra, of the lower brain centers. His relatively good scores on P.A. and Vocabulary are typical of psychopaths.
12. **Sgt. Gluck, G.** : Completed Elementary School. British Age 31. A Shy man with schizoid tendencies indicated by his scattergram pattern. Good intelligence. I.Q. (T) 121; (V) 123; (P) 115. The low score on P.A. can be attributed, I think, to the basic shyness of the patient, and also to the fact that for four years he had not been called on to size up social situations such as are depicted in this test. The impairment indicated on O.A. and D. Symbol could be attributed to Pellagra, or the super-imposed effects of his schizoid and neurotic tendencies.


15. **Dvr. Hulme, J. V.** British, Age 26. Completed Elementary School. Poor intelligence with marked schizoid tendencies—(e.g. Large intertest variability between V (101) and (P) 66. No effects of Pellagra.


17. **Pte. Irving, T. R.** British (Native of Hong Kong) Age 32. Matriculation and partial accounting course. A lad of superior intelligence with neurotic traits and marked feminine interests—Denied homosexual interests. Mental impairment apparent in D. Span (this was due to his over-anxious approach), P.A., O.A., and D. Symbol. No effects of Pellagra. I.Q. 130; (V) 130; (P) 125.

18. **Tpr. Lancaster, W.** British Age 37. Completed Elementary School. I.Q. 109; (V) 114; (P) 102. A psychopathic personality, who quickly loses interest in anything in which he doesn't meet with success—He has a certain facility with words, and as a result his effort on the Verbal tests was more than on the Performance tests—His score on Arithmetic indicates a good reasoning ability, but on anything which required persistent effort such as D. Span, P.A., P.C., O.A. and D. Symbol his scores were low enough to indicate impairment. There is no evidence of any effects of Pellagra. On the Minnesota test he showed marked schizophrenic tendencies.

20. L/Cpl. Locksley, J.J. British, Age 28. Elementary School education. Poor mental type. I.Q. 91; (V) 89; (P) 94. A deteriorated dull individual of average intelligence with shallow mood swing, exhibiting depressive, psychopathic, psychasthenic and schizoid tendencies--Mental impairment on D. Span, Similarities, Pic Compl. and B.D.


22. Pte. Lent, J.J. British Age 26. Elementary School education. Superior intelligence I.Q. 122; (V) 125; (P) 114. No deterioration indicated--This man shows superior reasoning ability in Arithmetic, and a decidedly better Verbal ability than Performance. Socially this man appears a little awkward and not sure of himself, and consequently does not impress others as well as he might by his superior mental ability.


24. Pte. MoEwen, S. British, Age 44. Secondary school and two years of College (Seminary in Ireland). I.Q. 96; (V) 104; (P) 88. A schizoid neurotic showing very marked mental deterioration (probably 20%) due to Pellagra. Deterioration indicated on Arithmetic, Simil., P.A., P.C., B.D., O.A. and D. Symbol--His relatively good score on Digit Span may be attributed to the fact that when he was on the police force he made great use of his ability to remember numbers, by remembering licence plates, addresses, and cell numbers.

25. Sgt. Malton, R. T. British, Age 28. Completed Elementary School. A man of average "verbal" intelligence, but with superior perceptual-manual ability--This man has done a considerable amount of artistic work, water-color painting etc. I.Q. 110; (V) 99; (P) 121. No deterioration evident and no effects of Pellagra.
26. C.S.M. McDowell, L. Canadian Age 23. Completed High School. I.Q. 116; (V) 127; (P) 99. A psychoneurotic, over-anxious lad who was in a high emotionally unstable condition when he first reached the Centre. Mental deterioration indicated on D. Span, P.A., B.D., O.A. and D. Symbol—The low score on the Digit Span subtest can be directly attributed to the patient's psychoneurotic reaction to the test, and indirectly to Pellagra. He showed mental impairment on all the Performance tests but P.C., and I feel that this is due to residual effects of Pellagra. This man was overly concerned about his emotional instability and his future in civilian life. After his good verbal score on the Wechsler and his normal profile on the Minnesota test, he improved considerably in gaining back his self confidence. He had no more sessions of crying while he was here.

27. Pte. Muir, W. O. British, Age 31. Completed Elementary School. Average Intelligence. I.Q. 106; (V) 111; (P) 98. Mental impairment evident on P.A., P.C. and Digit Symbol. I feel that this impairment is due partially to neurotic reactions on the test and partially to Pellagra. The whole pattern shows a tendency to impairment.

28. Bdr. Prince, G.K. British Age 40. Four years of secondary school. This man is an obsessive-compulsive neurotic with above average intelligence—no indications of schizophrenia on either the Wechsler or Minnesota tests. I.Q. 118; (V) 118; (P) 116. He shows a superior ability in arithmetical reasoning, but impairment on both P.A. and D. Symbol. I do not feel he shows any direct effects of Pellagra.

29. Pte. Warner, J. British Age 32. Matriculation and evening classes in real estate. A timid neurotic lad with depressive tendencies and superior intelligence. I.Q. 127; (V) 129; (P) 120. Impairment is indicated on Compr. and O.A. I feel that this man shows evidence of very slight mental deterioration due to Pellagra, because his whole scattergram pattern shows a tendency to perceptual-motor impairment. It is peculiar, too, that a man familiar with clerical work and with as high an I.Q. would not have done relatively better on the Digit Symbol subtest. The Wechsler test indicated Schizoid tendencies.

CASE I

PSYCHOLOGICAL TEST ANALYSIS

Patient: Pte. McEwen, S., British Army, Age 44.

Tests and Dates of Administering

1. Minnesota Multiphasic Personality (31 Oct. '45.)
   Inventory

2. Wechsler - Bellevue Scale. 1, 2, and 3, Nov. '45.)

Results

1. Intelligence Quotient (Wechsler)

   Total scale  96
   Verbal scale  104
   Performance Scale  88

2. Intellectual Rating (Wechsler)

   Average intelligence.

3. Personality Traits:

   (a) Minnesota:
       A depressive neurotic with marked hypochondriacal and hysterical tendencies. Although the Schizophrenic scale is not high the high scores on the L and F scales indicate schizoid tendencies.

   (b) Wechsler:
       Deteriorated neurotic with schizoid tendencies

4. Detailed Remarks:

   (1) Neurotic Tendencies.

       (a) Minnesota:
           High neurotic rating (especially depressive with a score of 99) See 3 (a) above.

       (b) Wechsler:
           Neurotic indications are: The patient during the test often became "blocked", was over critical and erratic in his achievement. His performance on object assembly is low, and his good achievement on Digit Span is typical of many neurotics who are preoccupied with numbers. Verbal higher than performance. Relatively good information and comprehension. Low picture Arrangement and Digit Symbol.
PSYCHOLOGICAL TEST ANALYSIS

(iii) Schizoid Tendencies:
   (a) Minnesota: See 3 (a) above.

   (b) Wechsler.

   Psychometric indications are:
   Verbal much higher than Performance;
   low Picture arrangement; low Digit Symbol
   simultaneously with high Digit Span; low
   Object Assembly. In Picture Completion
   he completely missed the point of cards
   5, 11 and 15, by answering, "I think
   there should be another leg somewhere"
   and "The shadow in the mirror is wrong.
   It should be more to the right" and
   "there shouldn't be any shadow behind the
   tree. It should be on the man" (and here
   he indicated the wrong side of the man.)

(iii) Organic Brain Disease (Wechsler)

   Psychometric indications of this are the simultane­
   ously low scores on Picture Completion; Block
design, Object Assembly and Digit Symbol; large
discrepancy between Verbal and Performance in favor
of the former. While all of the test scores on the
Verbal part of the examination are average or above,
the two lowest are similarities and arithmetic
which are in line with the organic picture.
(See Wechsler, p. 161)

   Mental deterioration due to brain disease
   (In this case Pellagra) is indicated by the patient's
poor achievement on all the subtests, but Digit-
Span. His relatively good performance on this sub-
test may be explained by the fact that he had a good
education and in his work in the police force he
was required to remember numbers (licence plates,
addresses, cell numbers etc.) His deterioration
loss, calculated by the differential-test score
method shows nil, and obviously this is wrong. How-
ever, if his Digit span score is set back even to 8
(still above his "Don't Hold" average he shows a
loss of 16%. Allowing for normal loss of 8% for a
44 year old (see Wechsler p. 66) this gives the
patient a net deterioration loss of 8%. This would
seem nearer the truth, since the patient claims to
have had a "college" education in which he was pro-
efficient in Greek, Latin and Mathematics. Since these
all require a good memory it is fair to believe his
mental deterioration is at least 8% and probably
more.
75

(1111) PSYCHOLOGICAL TEST ANALYSIS

Mental effects of Pellagra:
(a) Minnesota:
   Very marked depression.
(b) Wechsler:
   Mental deterioration - See 4 (iii) above.
(c) In addition the patient complains of intense
   depression, reeling (vertigo) followed with
   "sort of white stars", insomnia, claustrophobia
   and restlessness.

5. Summary

A schizoid neurotic of average intelligence showing
marked mental deterioration (probably 10% to 20%) due
to Pellagra.

CASE II


Tests and Dates of Administering

1. Wechsler - Bellevue Scale 31 October, and 1 and 2 Nov. '45.
2. Minnesota Multiphasic Personality Inventory 29Oct '45.

Results

1. Intelligence Quotient (Wechsler)

   Total Scale 101
   Verbal Scale 100
   Performance Scale 101

2. Intellectual Rating (Wechsler)

   Average intelligence

3. Personality Traits.

   (a) Minnesota:
   A marked neurotic showing strong tendencies of
   depression, hypochondria, psychasthenia, and to a
   lesser degree hysteria and schizophrenia - This
   man is quite high (71) on the feminine interest
   scale.

   (b) Wechsler:
   A neurotic showing deterioration on all mental
   functions, as measure by the subtests.
4. Detailed Remarks:

(i) Neurotic tendencies:
(a) Minnesota:
His high D score (96) is accompanied by lack of self-confidence, worry and introversion. The psychasthenic score (75) is accompanied by useless thinking of obsessive ideas.

(b) Wechsler:
Neurotic indications in the psychometric are:
Relatively high comprehension and Information, and low Picture Arrangement and Arithmetic. Verbal and Performance scores are not markedly different. This is not uncommon in duller neurotics. (see Wechsler's text, Third Edition, p. 166)

The patient's performance on the Object Assembly was marked by many random movements, and trial-and-error procedures. After completing the hand, except for the small piece, he tried to fit it on one of the fingers, before placing it in its proper position.

The erratic achievement of the neurotic and the schizophrenic is present on Information, Arithmetic, Picture Completion and Similarities.

(ii) Schizoid tendencies:
(a) Minnesota:
The simultaneous upward tendency of the F scale (55) and the schizoid scale (72)

(b) Wechsler:
Erratic achievement on several tests as described above;

5. Mental Deterioration

(as calculated by the differential-test-score method,)
see Wechsler's text, p. 62-67. Deterioration loss 8% plus.

6. Summary:
A depressive neurotic of average intelligence, with definite indications of mental deterioration, and showing psychasthenic and to a lesser degree, schizoid tendencies. Deterioration may be due to Pellagra.
CASE III

Patient: L/Cpl/ Locksley, J. J.  British Army, Age 28

Tests and Dates of Administering
2. Minnesota Multiphasic Personality Inventory - 24 Oct 45.

Results:
1. Intelligence Quotient (Wechsler)
   - Total Scale 91
   - Verbal Scale 89
   - Performance Scale 94

2. Intellectual Rating (Wechsler)
   Dull normal showing mental deterioration, possibly due to Pellagra.

3. Personality Traits.
   (a) Wechsler:
       Schizoid tendencies with mental deterioration.
   (b) Minnesota:
       Marked depressive, psychopathic, psychasthenic, and to a lesser degree schizoid tendencies.

4. Detailed remarks:
   (i) Deterioration is indicated on the Wechsler scale by the fact that all but three of the sub-tests score less than the vocabulary level. Deterioration is indicated particularly in attention (Digit Span, significant difference -4.2) and in forming verbal concepts (Similarities, significant difference -2.2). Far-fetched associations on the Similarities sub-test (e.g. "Tree climbing and flying are much the same. It's hard on you. It will tell whether you can stand heights.") indicates deterioration.
    The patient's inability to see the important point on card #5 of the picture completion test shows deterioration e.g. "I know nothing about crabs."
   (ii) Schizoid tendencies
       (a) Minnesota: The patient scored on the borderline of the schizophrenic scale, but at the same time rated 66 on the F scale. Experience has shown that schizophrenics show a simultaneous upward tendency on these two scales.
PSYCHOLOGICAL TEST ANALYSIS

(b) Wechsler: On the Similarities sub-test the patient showed perseveration both in repetition of the word "essential" and in the idea that "both are essential to you". This latter answer was given to both questions 8 and 11. Schizophrenics usually exhibit this type of perseveration.

On the Vocabulary sub-test the patient exhibited incoherent associations such as "bacon-something you develop great hate around" and "catacombs-a tree". This indicates schizoid tendencies.

(iii) Prepsychotic symptoms. (Wechsler)

The patient maintained a somewhat apathetic manner showing a shallow emotional response to his environment, many of his responses were a quiet, but decided "No" but in general his attitude toward the test and the tester was cooperative. His attainment was erratic on Comprehension, Similarities, Block Design, Information and Vocabulary. His complete ignorance of the meaning of bacon on the Vocabulary test seemed to be psychotic in nature. Even after the tester said, "Bacon, like bacon and eggs for breakfast," he still seemed puzzled, and replied "It must be a food. No, I guess I don't know."

Summary

A deteriorated dull normal individual with shallow mood swing, exhibiting depressive, psychopathic, psychasthenic and schizoid tendencies. Deterioration may be due to Pellagra.
The following paper was prepared by the author in September, 1945, in preparation for the reception of the prisoners of war who began to arrive in October. The paper is not the product of first-hand experience as no ex-prisoners had arrived at the date of writing but it is useful and informative as the result of the findings of several British medical and psychological observers. It also has a certain historic interest, in that what was anticipated and was actually experienced differed in some instances. A few remarks in this connection will come after the paper itself.

The following is the text of the paper:

"The Psychology of the ex-Prisoner of War

To date (September 1945) only a handful of prisoners has returned from Japanese camps, and consequently only a few people have had first-hand experience in meeting them and dealing with their problems. However, a study of the literature written by British medical officers, who have themselves been confined by the Germans as prisoners of war, and who have since been treating ex-P.O.W.'s in England, will serve as a helpful introduction to the problem of handling ex-P.O.W.'s of the Japanese."
"Many of the following remarks may seem unnecessary, but experience has proved that the general public is curious and unintentionally thoughtless in its remarks to returned veterans and ex-P.O.W.'s. This is because the public, in many cases, has a poor understanding of the veteran's or P.O.W.'s problems, and makes little or no attempt to understand them. In handling these men, it is the responsibility of all personnel who treat them to make some study of their psychology.

At the outset, these men should not be considered as mentally abnormal; however, many (and probably most) will be suffering from mental and emotional conflicts as the result of their treatment at the hands of the Japanese, and because of this they will need psychological rehabilitation. Such a programme should not be isolated in the office of the psychiatrist or psychologist but should pervade the whole programme of treatment. To do this effectively all personnel entrusted with the handling of ex-P.O.W.'s, should have some knowledge of the type of problems which they may expect to meet.

As Major Newman (an ex-P.O.W. himself and a British medical officer) states, "the advice, help, and treatment must be unobtrusive, sympathetic, skilled, and above all, personal and individual".

Mr. A. W. Vaughan Eley (regarding the last two points) suggests that the ex-P.O.W. should be treated in his home, "where are concentrated all his longings, thoughts, and desires." This, of course, is impossible at this center, since we will be treating British personnel who are still several thousands of miles from their homes; but we can do the next best, we can simulate the English environment as much as possible, and offer that as a substitute measure.

This will be the job of Victoria's citizens' committee outside the army camp, the local Red Cross, in and out of camp, and the Canadian Legion War Services within the camp, and other agencies active in the welfare of these men. This can be done in several ways, and Victoria probably offers a better environment than any other place in Canada.

Conducted sight-seeing tours of Victoria and her environs may be arranged, conducted by English civilians living in Victoria. (This was done with great success in England and Scotland when entertaining Canadian lads. Psychologically it is much more successful and more enjoyable from the point of view of the serviceman sightseer to be shown around by a civilian. This also removes the "officialdom" from the conductor of the tour—something most P.O.W.'s may want to forget.

"In regard to the last point Mr. Vaughan Eley says, "the magnificent and life-saving Red Cross organization, to whom the prisoner is anything but 'written off', should be entrusted with this problem (i.e. psychological readjustment), and they alone. I believe that any government organization devised for this purpose, or anybody savouring of authority or officialdom, would be psychologically wrong and would immediately antagonize the returning P.O.W. in need of help". This statement may be a little drastic as it rules out all army personnel as harmful to such a programme. Mr. Vaughan Eley may be correct, but from a practical administrative point of view we are not able to exclude service personnel here in Victoria, since it would throw an impossible task in the hands of Red Cross and other civilian organizations. However, Mr. Vaughan Eley's point is a good one for all personnel concerned with this project to remember, that all evidence of officialdom should be erased.

Psychiatrists treating ex-P.O.W.'s in some cases have found a "guilt complex". This apparently arises from the fear that on their return home, their friends and family may think they lost their nerve and gave up rather than fight to the death. Even Lt. General Jonathan M. Wainwright showed indications which might be interpreted as guilt feelings when he said at the time of his liberation, "I have had little contact with the outside world, but I... believe the war department and the American people have
accepted my dire disaster with a forebearance and generosity greater than any in the experience of any other defeated commander...." In all treatment this fact should be remembered and the P.O.W.'s confidence built up, and his feelings of guilt dispersed. This can be done by a positive attitude at all times on the part of the supervising personnel.

Mr. Vaughan Eley claims that anticipation for food and eagerness for mail from home were the two strongest motives in the behavior of the P.O.W. "He acquires a marked 'food complex', a manifestation of self-preservation which will persist throughout his P.O.W. days and probably for some time after his ultimate release. Food, usually favorite dishes, is the main topic of conversation and of thought." From this fact it is to be expected that the ex-P.O.W. will put great importance upon food, even perhaps to a childish degree. Any attitude on the part of Canadians to take their food for granted, or worse still, to complain of it, would likely have an emotional effect on the P.O.W. comparable to waving a red flag in front of a bull.

Major Newman reports that "during the repatriation period abnormal reactions are common, e.g., restlessness, irritability, disrespect for discipline and authority, fear of enclosed places, cynicism, and embarrassment in

40. op. cit., p. 403.
society. In the majority of returned prisoners these symptoms pass off after six months to one year." This time limit is only Major Newman's opinion, but regardless of the length of time of Psychological rehabilitation, certainly a well-planned programme of retraining will hasten a return to normal. Vaughan Eley says, "the P.O.W. of long standing merits a long period of psychological readjustment on his return home and should be very compassionately handled".

Restlessness is apt to be one of the ex-P.O.W.'s commonest symptoms, and as Millais Culpin, (a British psychologist who has handled thousands of P.O.W.'s in both wars) has pointed out, it is liable to continue into civilian life. Culpin says in referring to a particular case, "I recognize his state (tendency to fugues) as probably identical with that of other men whose repeated efforts to escape depend upon a pathological compulsion that persisted ....after return to civil life".

As in any psycho-therapy programme, occupational therapy has been found valuable. Capt. A. R. Dearlove (an ex-P.O.W.) has written an important study of the activities of officer prisoners held by the Germans. His study covers 1700 P.O.W.'s in Oflag VII/B Camp, and his statistical analysis of the prisoner's leisure time is thorough and

42. Vaughan Eley, A.W. loc. cit.
"revealing. In general, he found "that those who made good use of their leisure time (in creative activities, i.e. art, music, sports, hobbies etc.) complained of the least mental and emotional impairment, while those who "devoted most time to vegetative and time-consuming pursuits (i.e. sleeping, eating, gossiping, card-playing) had a greater tendency to admit physical and mental impairment."

The exact nature of handling the P.O.W.'s at present is indefinite, and any such programme will take shape quickly at the time of arrival of the men, when their immediate problems become apparent. It will be largely determined by the length of time spent here, by the desire of the men themselves to seek psychological help, by the available staff, and by the intensity of conviction on the part of the responsible authorities regarding the importance of such a programme. Regardless of a professional psychological programme, this paper is offered as a help to the understanding of the psychology of the ex-P.O.W. and is a product of the writings of several British doctors and psychologists and a knowledge of the basic psychology of human behavior."

Looking back on the problems and findings actually encountered in the handling of the men during the two months they passed through our reception center, the consideration of several points mentioned in this paper is note-worthy.

Our first impression of the ex-Prisoner of War (as he swarmed into our army camp in large numbers by chartered bus) was a shy, smiling, slight, yellow-skinned fellow in baggy American Army fatigue clothes. He was pleasant, cooperative, nervous, talkative and grateful for anything done for him. If we had expected a frightened, antagonistic, suspicious individual from our perusal of the literature in the medical journals and from accounts in the newspapers, we were mistaken. True, his most striking behavior trait was his lack of confidence socially, but this did not prevent him from laughing and talking continually. He knew he was among friends and he responded warmly to the friendly treatment.

As reported in the above-quoted paper Mr. Vaughan Eley stated that "anybody savouring of authority...would immediately antagonize the returning P.O.W. in need of help". We did not find any hostility or resentment because of this fact, but this may be explained by the more restricted

45. The American Army had treated the British and Canadian ex-prisoners wonderfully, taking them by boat and plane to Manila where they were given American Army clothes and money. These clothes were returned to the U.S. Army stores after arrival in Victoria.
officer-non-commissioned-rank relationship in the British Army as compared with the Canadian Army. During the entire programme the Canadian Army was responsible for handling the men, and although they were helped admirably by the Red Cross, the Canadian Legion War Services Organization, volunteer women's groups and citizens' committees, the actual treatment, out-fitting and care was carried out successfully by army personnel. Many of the officers entertained some of the men in their homes. The men enjoyed this and did not appear to be socially uncomfortable. Their treatment at our center was good, and most of those treating the men avoided any officiousness. As a result the men were cooperative, friendly and very grateful for what was done for them. As a show of gratitude they showered the officers with gifts of Japanese money, fans, carved boxes and in one case a short sword. Many had beautiful Samurai swords but none was seen to part with one.

Regarding the guilt complex we saw no evidence, but since most of our psychiatric treatment was of a superficial nature (except in the thirty Pellagra cases) no definite statement can be made in this regard. Since more responsibility for surrendering would fall on the officers, it would seem reasonable to believe that they, as a group, rather than the men, would be more susceptible to this feeling. In this regard, the few officers who were questioned were found to be far more defensive in answering questions of a highly personal nature than the men.
Vaughan Eley's claim that anticipation for food and eagerness for mail from home were the two strongest motives in the behavior of the P.O.W. was corroborated by our findings. This was indicated by the men during their "psychological orientation" talk (given in groups varying from 30 to 400) during which they were asked to indicate by a show of hands which urge was the strongest during the worst periods of their incarceration. In every group, to a man, they indicated the urge for food as being the strongest and the eagerness for mail the next most intense. (The results of the Questionnaire in Appendix IV, page 99 substantiate this.)

Major Newman's abnormal reactions of restlessness, irritability, disrespect for authority, claustrophobia, cynicism and embarrassment in society were apparent in some cases. All but the last mentioned trait were not generally apparent during our handling of the men because they were kept in a whirl of activity during the day (being rushed from a medical exam to the dental office to the quarter-master's stores to the theatre for a talk etc.) and the civilian groups and individuals gave the men so many invitations that they could only accept a fraction of them. During an active stay of this type, basic restlessness would not be apparent; and since the men were given so much friendly attention by everyone they had no need to be irritable. However on
questioning they said that irritability in the prisoner
ow war camps was common. We found disrespect for author-
ity, except in a very few cases, was generally absent;
the men on the other hand, were extremely cooperative.
Their social embarrassment was common because they had seen
no women for over three and a half years. They were not
used to making social decisions for themselves, and for
this period they had been unable to maintain their own
personal prestige. The author on one occasion drove four
Canadians to his home - the first time these men had been
outside the camp. They were almost childish in their
naive appreciation of the car, the comedy radio programmes,
the over-stuffed furniture at home (one said, "I used to
look at chairs like this when ever I saw them in Japan and
wonder if I would ever sit on one again.") the fire-place,
and all the other common-place comforts of Canadian life.
Although there were no other guests present, one of the
four sat stiffly on his chair and never spoke unless he
were spoken to. This same man had held up about a hundred
Japanese officers single handed (after V-J day) and strip-
ped them of watches money and other souvenirs.

During the orientation talks which were informal and
conducted as group discussions the two problems which
interested the men most were (1) the problems concerning
the mental and physical effects of masturbation, and
(2) the misinformed ideas of the effects on sexual potency
of a poor diet, over a long period of time. Misinformation
regarding the injurious effects resulting from both masturbation and poor diet, had large numbers of the men believing they were mentally impaired and sexually impotent. Memory lapses for common-place names and words seemed evidence to them that the former was true; sexual inability in the few cases of men who had already attempted sexual intercourse unsuccessfully was frightening and convincing knowledge, and this information spread quickly among the men to corroborate the misinformed opinions they had on the subject. A medical officer explained the true reasons for these memory lapses and seeming impotency, and attempted to dispel the prevalent fears due to the men's misunderstanding.

The typical ex-prisoner of war may be restless, irritable and uncooperative during treatment over a long period of time (as the literature of the British medical officers has indicated) but the typical ex-prisoner of war whom we saw for an average time of two weeks, was as a group, the finest, most cooperative, tolerant, generous, and genuinely friendly man (both British and Canadian) with whom the author has had the privilege to work.

APPENDIX III

The Story of Captain M. W. Thompson

Capt. Thompson was a very intelligent British officer of the Royal Army Service Corps whose keen memory for detail and knowledge of rations combined to give an extremely interesting and informative account of life as a captive of the Japanese. The text of his story follows:......
STORY OF CAPTAIN M. W. THOMPSON, R.A.S.C.

I was taken prisoner at Singapore in February, 1942 and sent to Changi Camp in Malaya. I stayed there 15 months, and at first conditions were not too bad. We were housed in our own Barracks which had been emptied by the Japs.

For the first month we were on our own rations, but when these became exhausted, the Japs issued a daily ration, consisting of 18 ounces of rice, approximately 2 ounces per head per week, of fish or meat, and canned pineapple cubes when available. We had no vegetables of any kind, and water was short until the water mains were repaired.

At first there were about 65,000 to 70,000 in our Camp, including Civilians and troops. The latter were made up of about 30,000 British, 14,000 Australians, and 20,000 Indians, but gradually the Japs withdrew groups of prisoners for work parties, and marched them into Singapore to clean up the City, and do general duties. A bitter example of the latter was the building of a Japanese War Memorial at Bukit Jima. As time went on, more work parties were sent to Thailand to work on the railway, and at the end of fifteen months, there were only 5,000 left at Changi, and 2,000 of these were in Hospital.

The prisoner Officers were sent with the men, in most cases to supervise, but once as a work party to Thailand. According to one report from an other rank who was there, the Officers worked as hard or harder than the men and were treated worse.
At Changi, I worked on parties cutting trees for fuel, and also as one of the Purchasing Officers in the "Local Purchase" scheme which the Japs allowed us after August 1942. Until this August we were not paid, and we lived on the limited ration described above. Many were sick with dysentry and Pellagra; I, myself, had the latter for six weeks. In August, 1942 the Japs began to pay us, and as this gave us purchasing power, they gave permission for Officers who spoke Malayan to go with Japanese escorted work parties, to meet local traders, mostly Malayans and Chinese, to purchase available food stuffs. This system worked well, and we augmented our rice diet with Soya Beans, Towgay, a kind of bean, dried fish, pineapples, coconuts, sweet potatoes, cooking oil, and cigarettes. The reason for this apparent generosity was that there was no food shortage in Malaya, and the Japanese got a "rake-off" from this "local purchase" trade. They made the contacts, and we paid them.

From Changi I went on a prison ship to Moji, Japan. We made one stop at Saigon. Conditions aboard were frightful; crowded and lacking in adequate sanitation. We left Singapore, May 15, 1943, and arrived at Moji June 8. Meals on the boat consisted of rice and vegetable soup three times a day. There was plenty of rice.

I was in five camps in Japan, the first one at Yakimo on Hokkaido, where we built a runway for an airfield. As an Officer I had only to supervise the digging and other labor. This being a summer camp, we left in four months
for Muroran on the same island. The food and treatment at Yakimo and Muroran were good for the officers but the troops did not fare so well.

The Japanese gave the officers exercise, carrying coal for our own fuel. The men were badly treated, being beaten up, given insufficient food, and made to work shovelling iron ore in a steel works. The men's rice ration was about 520 grams per day, as well as pumpkin soup, (mostly water) and soya beans about twice a week.

In February, 1944 we left Muroran for Hakadate which was Headquarters Camp for all Prisoner of War Camps on Hokkaido. The train journey from Moji (in northern Kyushu) to Yakimo took two days and three nights. The food was good; apples, bento boxes, and fifty cigarettes being supplied. At Amori (northern part of Honshu) we were marched around the town with our baggage while the civilians laughed at us.

At Hakadate, the officers were well treated, not having to work, except for camp duties, and we received the same food as the men. The diet consisted of dried fish, potatoes, leeks, cucumber soup, pumpkin soup and rice. The men did dock work at Hakadate. We had passed through Hakadate on our way to Yakimo on arriving in Japan, and frightful conditions existed, with atrocities and deaths common. But on arriving in 1944 there was a new Commandant, Colonel Imoto, who spoke English, French, and German. He made this about the best camp in Japan.
Colonel Imoto interviewed every Officer and man in camp and endeavoured to improve conditions. We were allowed Sunday free, and once he, at his expense, removed a British lad from the Military Hospital immediately prior to an amputation, and sent him to a civilian hospital where his leg was saved.

On August 28th, we left for Zentsuji, on Shikoku. We travelled third class by train, with lunch boxes of rice and fish. We looked forward to the train journeys; men and officers travelled in the same way. We arrived at Zentsuji, August 31st. It was an old Jap Cavalry Barracks, where we slept on shelves the length of the room, having no heating, and only three blankets each. There were only officers at Zentsuji, 700 in all consisting of 160 British, 350 American, 100 Dutch, and 100 Australians. Germans were kept there in the last war. In 1942 the Japs proclaimed they were treating officers O.K. as they were at Zentsuji. They had Red Cross parcels once a month, batmen, etc., but in 1943 after the place had become sufficiently publicized, there was a gradual falling off in conditions. No Red Cross, no milk, bread, and a smaller rice ration, and the American men who had been orderlies for officers were formed into work parties on the docks at Takamatsu. Officers kept gardens and received the produce as part of their ration, not in addition. Chickens and rabbits were also kept, but the Japs got the rabbits. Except at Zentsuji, housing included board shacks, and in one case stamped dry manure formed the floor.
When we arrived at Zentsuji, we were comparatively fit and healthy, but the prisoners we saw were so thin, and emaciated, we thought we were going into a Hospital. The men in the work party were deliberately fed better than the Officers to play the men against the Officers. Our rice ration was 342 grams a day (about 12 ozs) with sea weed. Men were on 700 grams per day with thick vegetable soup (usually pumpkin). The Japs allowed 700 of us to be represented by an international committee of one man of each nationality, 4 altogether. Representations re food etc. could be put up to the Camp Commandant, who was very anti-officer, and disliked us.

The Colonel made officers work. A Jap Naval Officer from War Prisoners Bureau in Tokyo visited the camp and senior officers protested. On his return to Tokyo he telegraphed the Colonel to stop making officers work and as a result of this the Colonel lost face, and he became very tough with the officers.

We had to do gardening two mornings a week, but the produce was not in addition to our rations. As well as rice and seaweed, we had daikon (turnips) and sweet potato tops.

Things here became serious because everyone became afflicted with Oedema. One Officer died as a result of starvation. I became so weak that I would only wash once a day because it meant going downstairs to wash, and it was a great effort to get back upstairs. Once a week we were given a pail of water to bathe with, and soap, and we were
weighed every month.

Starvation affects a man in slow grim stages; first the ribs stick out, then the cheeks sink in, and finally the buttocks waste away. Seeing the men so thin was psychologically bad, and many gave up. Because of the officer dying October 20th, the authorities agreed that the camp at Zentsuji be allowed to release shipment of Red Cross supplies. Each officer had one food parcel every fifteen days, which was more than most received, but as we ate 342 grams per day instead of the 600 and 700 grams consumed in the work camp, we really needed them.

In June, 1945, the entire camp was disbanded. The unofficial reason given by the Japanese was that we had complained too much, and from now on we would work in order to qualify for more food. Actually, with the invasion coming, Zentsuji was in a strategic position, and the Japs did not want 700 officers in one place. The Australians went to Hokkaido and received fairly good treatment. The Dutch and Americans went to different camps in Northern Honshu. I do not know how they got on. The British were divided into two parties, 44 went to Fukuoka in Kyushu, and 100 went to Mitsushima, which was a Tokyo area camp in the mountains, 100 miles north-west of the city. I was in this lot. In his opening speech, the camp Commandant said he had received bad reports about us from Zentsuji. A number of the officers were on a black-list, and would have to work in order to eat. We were medically examined, and the Japs actually agreed that we were in bad condition, and also that we would not have to work until we fattened up. We were then given 650 grams of rice per
day and barley, with plenty of seaweed, as well as dried fish and cucumber twice a week, and potatoes occasionally.

After three days (our fattening period) we were divided into working parties of thirty men each which included a party of the "old and bald"—men over forty—and a party of ten officers who did camp work. Work to begin with was comparatively easy, for example carrying stones and sand to build a pig sty in the camp. This work continued for nearly three weeks.

At the end of this time our senior officer was told that a Sergeant Watanabe from Headquarters was coming especially to look after the officers. He put us one parade and told us he would teach us Japanese discipline. He started by punching us, and then he beat up our Senior Officer severely. We left camp at 6:30 A.M., returning at 5:30 P.M., at which time we had an hour drill parade under Watanabe with Japanese orders. During the day we marched about three miles, climbed a mountain of 800 to 1,000 feet and rested 15 minutes. The party was divided into three groups—one to chop down trees, another to drag them away, and the third to scythe the land to ground level, to make ground for a bean crop. During this time we continued to lose weight, even on the increased ration. As the officers became too weak to work, they were allowed to do straw work in the camp.

On V.J. night Watanabe informed us that there would be no more work parties. We were officially informed of the Armistice about a week later by the Camp Commandant who
instructed us that:-

1. We should put "P.O.W." on our roofs in large white letters.

2. We should avoid incidents.

3. Our food ration would be increased.

4. Planes would drop us food.

We heard that other camps had food dropped to them from planes but no planes came over our camp, and we were annoyed. One of our officers had contracted Typhus. The Japs agreed he should be put aboard a Hospital Ship, and he and our own British Doctor were allowed to leave and go to Tokyo, where he contacted the American Navy, informing them that we had no supplies, and giving them our exact location on a map which was sent to Gen. MacArthur's H.Q. The next day American torpedo bombers from the Lexington dropped us supplies. This was approximately August 28th. At this time a civilian from the Scandinavian Legation came to the camp. He told us that as we had been overlooked we would be at the top of the list for evacuation from the Tokyo area.

We left the camp, September 7th, 1945. Our rations after the armistice included Soya beans in addition to our previous fare, which was now in unlimited amounts. But there was still no variety except dried fish.

Capt. M. W. Thompson
APPENDIX IV

The Questionnaire

Before the arrival of the men in October, 1945 it had been hoped that a questionnaire, which had been prepared by the army psychiatrist and the author, be distributed among and answered by about two hundred men. About this number of copies had been prepared, but on arrival of the men it was decided not to distribute the forms.

The men said that they had already filled out numerous questionnaires at Manila for the Americans and on board ship, and they assured us that if we distributed the forms for routine answering that because of being bothered with so many questions, many of the men would deliberately give wrong answers. Since they all had to answer a questionnaire for the Canadian Army Intelligence Corps, we decided against worrying them with further questions. Fifteen answered the questions voluntarily and the results follow:

I General Information

1. Distribution of personnel answering the questionnaire. British (officers 2 men 9 Canadians 4 Total 15

Army 13; Merchant Navy 1; Civilian (Hong Kong Civilian Defence Corps)1.

2. Number of Prison Camps

The number of prison camps in which each man
was held, varied from 1 to 18 per man. The average number of camps per man was 4.6; and the total number of camps was 23.

3. Names of Camps

Of the 15 men answering the questionnaire
8 were held in Shamshuipo Camp, Hong Kong,
4 were held in Changi Camp, Singapore,
3 were held in Hakodate, Hokkaido, Japan,
3 were held in Muroran, Hokkaido, Japan,
2 were held in 3D Tokyo, Japan,
2 were held in 6B Ohashi, Japan,
2 were held in Yakimo, Japan,
2 were held in Kobe, Japan,
2 were held in Formosa,
1 was held in Thailand,
and the rest were held in various camps in Japan.

II The Questions

1. "Did you meet any Japs who treated you decently?"
   
   Yes 11
   No 4

Many of the men told stories of humane actions on the part of the Japs, and many made good friends with some. One English soldier who had had to work at the docks in Japan loading ships, told the story of how he had spent the week-end (after V-J day) at the home of his former dock foreman. The Jap had always been good to him during the war period and
they had become good friends; when he visited his Japanese friend after his liberation, the Jap put him up at his house for a week-end, and gave a party in his honour, serving the best wines.

Captain Thompson's account of Colonel Imoto's humane treatment of the prisoners is interesting, and is contrary to most popular ideas of Canadians regarding the Japanese.

2. "Did you ever hear from your family during the time you were a prisoner of war?"
   
   Yes 12
   No 3

3. "How many times?"
   
   Never 3
   Once 1
   Twice 1
   Three times 1
   Six times 2
   Eight times 1
   Twelve times 1
   Fourteen times 1
   Fifteen times 1
   Fifty times 1
   "Numerous" 1

The last two on the list (who indicated they had received mail "numerous" times and 50 times) were the two officers in the group. This would
seem to indicate that the officers, as a group, received more mail than the men.

One man answered the question with, "Once a month in Hong Kong; never in Japan." Answers to this question in conversation indicated this as true in many cases.

4. "What was the condition and the nature of these letters? - censored, printed cards?"

Mail consisted of letters (100 words) and post cards (25 words); and all mail was censored. Some of the men indicated that their first mail arrived in July, 1943, eighteen months after their capture.

5. "Did you ever receive Red Cross parcels?"

   Yes  14
   No   1

6. "If you did, how many did you receive?"

   The two officers reported that they each received 10 and 12 parcels respectively. The men, however, did not fare as well; their average number of parcels during the three and a half years was $4\frac{1}{2}$ each. Of the thirteen men, the number of parcels per man ranged from 0, in one case, to 8; one man reported receiving $1/3$ of a parcel after V-J day, none before that. Most reported no parcels before the fall of 1944.
7. "Describe your food briefly."

In all camps a poor grade of rice constituted the main diet. This was supplemented by one or two of the following: sea-weed, vegetable tops, thin soup (often pumpkin), barley, grass, boiled rhubarb, weeds (e.g. thistles), beans (very little). Occasionally a very little meat or fish was supplied. One man reported, "once we got 11 lbs. of meat for 687 men." Another wrote, "It was a treat to steal the pigs' food."

Captain Thompson reported that, "During the worst period the ration scale included 342 grams of rice per day plus thin soup."

8. "Approximately what did you weigh when you were captured?

9. "What did you weigh when liberated?

10. "What do you weigh now?"

Average weight at time of capture 164 lbs.
Average weight at time of liberation 129 lbs.
Average weight at end of October 1945 157 lbs.
Average loss of weight during captivity 35 lbs.
Average increase in weight (Sept & Oct'45) 28 lbs.

One man who was barely 17 years of age at the time of his capture gained weight due to growth during his time in prison camp; he increased from a weight of 105 lbs. in 1941 to 152 lbs. in August 1945.
His figures are not included in the above results. Of the remaining 14 men, one man dropped in weight from 160 lbs. to 105 lbs. This decrease of 55 lbs. is the greatest of the 16 men recorded in this survey. The man showing the least loss of weight lost only 4 lbs. during his captivity. Eight of the 14 lost more than 40 lbs.

11. "What did you crave most during your captivity?"
All the men answered food. Other things were added and these included: sweets, fats, baths, clean clothes, cigarettes, books, tobacco, meat.

12. "What else did you crave?"
 actually all the non-food articles in the supplementary list above may be considered answers to this question. But in addition, other answers included: freedom, privacy, news from home, photos from home, war news, cigarettes, tea, recreation and dancing with girls.

One man showed a marked bitterness by answering this question with, "To see these Japs crawl as they made us crawl; they laughed at a 90 lb. man."

An inspection of the answers to these two questions indicates that hunger is the strongest drive in human life - in agreement with Jung's theory.

As mentioned in Appendix II, page 88, the men's groups expressed the same belief.

13. "Did you get much news about the war?"
   Yes  13
   Yes a little 1
   No  1

14. "How did this news get in to you?"
   Answers to this question varied but included:
   newspapers (smuggled by Japanese labourers), Japanese workers' reports, secret radio, stealing newspapers and deciphering them by means of a dictionary, and bribery.

15. "Were many attempts made by you or fellow prisoners in your camps to escape? - Explain."
   No  6
   Yes  7
   Not answered 2
   Some answers to this question were:
   "Escape from Formosa and Japan was impossible and the penalty for attempting escape was death.
   "We could escape easily at Osaka, No. 1 Camp, but we could not get past Chuko Island which was well fortified.
   "Some attempts were made at Hong Kong; none in Japan.
   "Yes. Collective punishment stopped it.
   "In Malaya 7 officers escaped but were caught 80 miles north."
"In Siam (Thailand) it was an impossibility. We could roam all over the place.

"Many attempts. All ended in death. Actually I only witnessed one myself – an American who was beaten to death for 13 days.

"One attempt was made but persons were recaptured and executed."

16. "Did you ever receive brutal treatment at the hands of the Japs?"

Yes - Often 5
Fairly often 7
Seldom 2
No 1

18. "If you want to, explain some of this treatment."

Some of the men did not answer this question but some of the answers included:

"Beatings, face-slapping etc. on an average of once a fortnight. (This from an officer.)

"I was caught thieving sugar, and was slapped around for two hours. Then I was made to hold a heavy weight over my head until they thought fit to release me."

"(1) Face slapping by hand, (2) Face-slapping with a ¼ inch wooden board, (3) beatings with a stick across the back, (4) holding heavy weight above head for long periods.

"Face-slapping and solitary confinement.

"Beating up with hands and with a shovel."
"I was beaten so badly with a stick I could not sit down for a month. My buttocks were swollen and black and blue.

"After the torpedoeing of the Lisbon Maru off Shanghai, we were shot at while we were struggling in the water. Of a total of 1800 only 875 were saved; all could have been saved as the ship remained afloat for 29 hours.

"Beatings with bamboo sticks, iron bars and fists for trivial offences such as failure to bow to soldiers.

"In the streets of Singapore we were tied to public railings.

"Beatings and subtle mental torture which was even worse than the physical torture.

"Standing to attention for two or three hours for trivial offences, slaps in the face, beaten with sticks.

"Beatings and standing at attention in the cold with nothing to eat."

19. "Does the thought of returning to civilian life scare you?"

Yes 6
No 9

20. "Have you developed nervousness, shakiness, stomach trouble, insomnia, head-aches, lack of sex abilities, feelings of bewilderment, or any other nervous disorders?"

Yes 11
No 4

21. "Explain your answer to question #20."

Answers to this question included:

"Shakiness.

"Nervousness, shakiness, loss of appetite, lack of confidence, palpitations."
"Stomach trouble.

"Trouble remembering things at times.

"Nervousness and shyness.

"Too hard to explain.

"Feel nervous and bewildered when among people, also when eating in public places.

"I am very nervous and shaky and have lost confidence.

"I am unable to make up my mind as to what to do."

22. "We feel that we can help you. Do you feel you need help at present?"

<table>
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<th></th>
<th>Canadian</th>
<th>British</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>3</td>
<td>5</td>
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<tr>
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<td>-</td>
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</tr>
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</table>

The British were asked to ignore this question since their relatively short stay in Canada would make treatment over a long period of time impossible. The fact that 5 of the 11 of them answered "Yes" anyway is indicative of the need of help that most of the ex-prisoners of war experienced.

23. "Do you consider that the Canadian authorities have looked after you, to date, well enough?"

Yes 14

No 1

Some of the Englishmen had added remarks to the "Yes" such as: "Very well indeed! Very definitely! Excellent, better than anyone imagined."
The one "no" answer came from an unfortunate French Canadian lad who was detained for medical treatment. His enforced stay seemed unnecessary to him and he resented it.

24. "If not, explain."

Only one man, the French Canadian lad, responded to this question. He said, "I am left behind. I can't go and see my family and I don't know the reason why. I was never told anything."

Conclusions from the Questionnaire

1. Some of the Japanese treated their captives humanely.

2. Most of the men heard from their families a few times during their captivity.

3. Most of the men received a few of the Red Cross parcels, although in most cases this was not until toward the end of their third year as prisoners.

4. The food for the most part was grossly inadequate containing about one half of the calorie content of a normal diet consumption of 3000 to 3500 calories per day for a working man. In some of the worst cases the diet was reduced to about 1000 calories per day (i.e. 345 grams of rice per day).

5. The average loss of weight per man was about 35 lbs. but most gained back almost what they had previously lost, during their two months of freedom and good food.

6. The strongest craving was for food, then news of home, and small luxuries.

7. Most of the men received war news by various methods, mainly by smuggled newspapers and secret radio.
8. Some attempts to escape were made but few were successful, and those who were caught were punished by death.

9. Brutal treatment was common and almost all officers and men received it.

10. A large number of the men, after liberation, feared the prospect of facing civilian life.

11. All had developed nervous symptoms of some kind although lack of self confidence socially was the commonest.

12. Most of the men wanted help to overcome their nervous troubles.

13. Most of the men were extremely grateful for what was done for them at the center, and felt that the Canadian authorities had done a good job.
QUESTIONNAIRE FOR EX-PRISONERS OF WAR
OCTOBER 1945

Name_________________ Rank__________________
Canadian Forces British Forces

Age__________ Racial Background___________________________

Navy Army Air Force Civilian

Marital Status__________ Civilian Job___________________

Income________________________

Educational level - Grade or Form reached_____________________

Religious Denomination__________________________

Length of time as a prisoner______________________________

Date of Liberation____________________________________

Number of Prison camps held in__________________________

Names of Prison Camps__________________________________

Date of Landing in Canada______________________________

QUESTIONS:
Note: THESE QUESTIONS DO NOT HAVE TO BE ANSWERED IF YOU DON'T WANT TO ANSWER THEM.

1. Did you meet any Japs who treated you decently? Yes No

2. Did you ever hear from your family during the time that you were a prisoner of war? Yes No

3. How many times?____________________

4. What was the condition or nature of these letters? - censored, printed cards? Explain__________________________

5. Did you ever receive Red Cross parcels? Yes No

6. If you did, how many did you receive? ________________
7. Describe your food, briefly________________________________________________

8. Approximately what did you weigh when you were captured? ____________

9. What did you weigh when liberated? ________________

10. What do you weigh now? ________________

11. What did you crave most during your captivity? _______________________

12. What else did you crave?______________________________________________

13. Did you get much news about the war? Yes? No

14. How did this news get into you?______________________________________

15. Were many attempts made by you or fellow-prisoners in your camps, to escape? Explain______________________________

16. Did you ever receive brutal treatment at the hands of the Japs? Yes? No

17. If you answered "yes" in #16 did you receive brutal treatment

   Often    Fairly often    Seldom

18. If you want to, explain some of this treatment.

   ________________________________________________________________

19. Does the thought of returning to civilian life scare you? Yes? No

20. Have you developed nervousness, shakiness, stomach trouble, insomnia, headaches, lack of sex abilities, feelings of bewilderment, or any other nervous disorders?

   Yes? No
21. Explain

22. We feel we can help you, do you feel you need help at present? Yes? ? No

23. Do you consider that the Canadian authorities to date, have looked after you well enough? Yes? No

24. If not, explain

EXPLANATORY NOTE

On Page 22 of this study, the term "forecasting efficiency" is used in connection with the biserial correlation measurement in Balinsky's study. The statistical technique of biserial correlation is one which is used to correlate one variable (in this case scores on the test) with a dichotomous variable (in this case commitment or non-commitment to a mental institution). Balinsky and his co-workers have found that the Bellevue-Wechsler scale is 40% correct in forecasting commitment or non-commitment from the score result, as against only 5% efficiency for the Stanford-Binet Scale.