

and from D qualitatively as well as quantitatively, sera giving the strongest agglutination with D^u cells are not always those with the highest titres when tested against D-positive cells. In carrying out an examination of D^u cells, using incomplete anti-D sera and the Coombs test or albumin test, the sera have also to be specially selected for this purpose.

The observations made in this paper apply, in the main, to the differentiation of D^u from d. The determination of D^u cells and their isolation and differentiation from the D-containing erythrocytes, on the other hand, is a difficult and complicated matter. The differing reactions of D^u blood and the difficulties of knowing precisely what antibodies anti-Rh sera contain add to these difficulties.

To overcome this it is necessary to examine large numbers of cells of all types containing both the D antigen and the D^u antigen combined with C and/or E, as well as cells containing the C and E antigens alone (i.e., types Cde/cde and cdE/cde); each type should be examined with very many varieties of anti-Rh agglutinating sera and incomplete antisera. The results should be tabulated and compared one with another, and any new cell should be put through this process and its reactions compared with those of other cells; by this means it is possible to give the type of the new cell which has been tested. In making our comprehensive table, for example, we used 49 Rh-agglutinating sera and 12 incomplete Rh antisera.

Full theoretical and explanatory results are not given in this short paper, but a further publication will show these and the manner in which they have been worked out.

REFERENCES

- Mollison, P. L., Mourant, A. E., and Race, R. R. (1948). "The Rh Blood Groups and their Clinical Effects." M.R.C. Memo. No. 19. London.
 Race, R. R., Sanger, R., and Lawler, S. D. (1948a). *Ann. Eugen. Camb.*, **14**, 171.
 ——— (1948b). *Nature*, **162**, 292.
 Stratton, F. (1946). *Ibid.*, **158**, 25.
 ——— and Renton, P. H. (1948). *Ibid.*, **162**, 293.
 van Loghem, J. J. (1947). *British Medical Journal*, **2**, 958.
 ——— (1948). *Ibid.*, **2**, 326.

New regulations have been introduced by the Government to improve the standard of purity of milk. The Minister of Agriculture and Fisheries becomes responsible for the registration of dairy farmers and farms, the inspection of cattle on dairy farms, and the enforcement of the regulations on dairy farms (unless they relate to diseases communicable to man). If the Minister proposes to refuse or cancel a registration, provision is made for objections to be referred to a tribunal and for representations to be made to the Minister. Local authorities are still responsible for the provisions which apply to milk distributors other than dairy farmers and for the registration of these milk distributors and of dairies. Local authorities also continue to be responsible for the provisions relating to diseases communicable to man. The present powers relating to infected milk are extended to enable a medical officer of health to stop the sale of milk, or to require milk to be diverted for heat treatment, if there is evidence that it is infected with organisms of disease communicable to man. A medical officer of health may also require milk to be diverted for heat treatment if he has reasonable grounds for suspecting that it is so infected. There are a number of minor changes in the regulations relating to buildings, the cleansing of vessels and utensils, and the distribution of milk and its protection against contamination. In particular, provision is made for modern practices in dairying, including the use of mechanical refrigeration for cooling and approved chemical agents for the cleansing of appliances. A Central Advisory Committee and County Advisory Committee will be set up to review and make recommendations on the operation and administration of the regulations.

NOTES ON AN EXPERIMENTAL STUDY OF INTELLECTUAL DETERIORATION

BY

SIDNEY CROWN, M.A.

Research Fellow, Department of Psychology, Institute of Psychiatry, Maudsley Hospital, London

The term "intellectual deterioration" means for the clinician a decline in intelligence as a result of a brain lesion, chronic mental illness, or old age. The psychologist has been satisfied to define intellectual deterioration operationally in terms of the tests he uses to measure it. These tests have been designed on the assumption made originally by Babcock (1930) that vocabulary level is a valid index of the pre-morbid intelligence of the patient. By a comparison of the score on a vocabulary test with the score on a pure test of intelligence an assessment of the degree of deterioration is made.

Hunt (1944), however, has questioned the assumption that vocabulary level is a valid index of pre-morbid ability. He points out that vocabulary may suffer as a consequence of the disorder; also that for unintelligent subjects vocabulary may be an imperfect indicator of ability.

The theory underlying the design of tests of intellectual deterioration can be verified only by a large-scale study of individuals suffering from a disorder known to cause intellectual deterioration which responds to clinical treatment. The present investigation was performed as a preliminary to the design of a large-scale investigation, and the results seemed of sufficient interest to report.

The Investigation

The subjects tested were three women and one man suffering from myxoedema. This disease seemed suitable for the investigation, as it causes apparent intellectual deterioration and responds rapidly to treatment by thyroxine. The main disadvantage from the point of view of research is its rarity. In the course of over a year only four subjects were found at the endocrine clinic of a large hospital. These were tested before starting treatment and three months later, when by clinical criteria they had recovered.

Tests Used

1. *Raven's Progressive Matrices Test*.—This is a non-verbal intelligence test. The untimed version was given.

2. *The Mill Hill Vocabulary Scale*.—This is a 32-item vocabulary test of the synonyms type. The scores on both these tests were converted into intelligence quotients (S.D. 16 points) by means of a table constructed in this department. An index of deterioration is obtained from these two tests by the formula:

$$\frac{\text{Matrices I.Q.}}{\text{Vocabulary I.Q.}} \times 100.$$

A quotient below 90 implies a certain degree of intellectual deterioration.

3. *The Shipley (1940) Test*.—There are two subtests: (a) A 20-item "abstractions" intelligence test consisting of a series of problems graded in difficulty in which the subject fills in a missing letter or figure. The first of these is: 1, 2, 3, 4, 5, — and the reasoning becomes more complex as the test progresses. There is a ten-minute time limit and the score is expressed as an abstractions mental age. (b) The second part of the Shipley test is a 40-item vocabulary test of the synonyms type, with a ten-minute time limit, from which a vocabulary mental age is obtained. From a comparison of the abstractions and vocabulary raw scores Shipley gives an index of deterioration (called by him a conceptual quotient) which is designed on virtually the same principle as the matrices/Mill Hill vocabulary

index. He considers any C.Q. over 90 as probably normal, under 70 as pathological, with various gradations between these.

The scores on the matrices and abstractions tests were not corrected for the natural decline of intelligence with age, as we were interested not in an individual patient's score on the tests but rather in the changes in the scores on the tests after treatment.

Results

The test/re-test results are given in the accompanying Table. The most obvious result is that the intelligence level of the group tends to rise. On the matrices test the

Table Showing Test Results

Case	Sex	Age		Matrices	Mill Hill Vocab.	D.I.	Abstr. Mental Age (months)	Vocab. Mental Age (months)	D.I.
1	F	60	Test	72	94	77	—	181	—
			Re-test	94	100	94	—	194	—
2	F	27	Test	66	97	67	125	189	66
			Re-test	84	111	76	125	208	60
3	F	46	Test	80	100	80	177	189	93
			Re-test	98	100	98	207	198	104
4	M	45	Test	78	106	74	162	204	88
			Re-test	102	106	96	166	204	89

D.I. = Deterioration Index.

Statistical significance of the differences between test/re-test scores :
 Matrices Students t = 13.67; P = <0.01
 Mill Hill vocabulary = 1.51; P = 0.23
 Shipley abstractions = 1.20; P = 0.35
 Shipley vocabulary = 2.57; P = 0.08

gain is of 22, 18, 18, and 24 points, giving a mean gain of 20.5 I.Q. points. The results on the abstractions test are equivocal, partly because one paper was spoiled. One subject's score rises by 2½ years of abstraction age and one by four months; the other remains unchanged.

However, the most important result from both the theoretical and the practical points of view is that the vocabulary scores also show a tendency to rise (though less markedly). Thus the Mill Hill vocabulary I.Q. rises in two out of four cases by 6 points and 14 points, which gives a mean gain of 5 vocabulary I.Q. points for the whole group. The Shipley vocabulary mental age rises in three cases by 13, 19, and 9 months—a mean gain on the whole group of 10.2 months of vocabulary mental age. This finding would seem to undermine the assumption that vocabulary level is unaffected by pathological processes in the brain and that it is a valid index of the pre-morbid intelligence of intellectually deteriorated patients. The variability of the vocabulary scores also raises interesting problems regarding the nature of the aphasic disorder suffered by patients who are intellectually deteriorated.

The assessment of intellectual deterioration is a practical problem in the psychiatric clinic. The results provide evidence on the use of indices of deterioration to express the differential decline in abilities. As patients recover clinically these indices should rise, thus approaching the normal. This is so for all indices derived from the matrices and Mill Hill vocabulary tests. But of the three indices of deterioration derived from the Shipley tests one actually falls, thus showing the patient to be more deteriorated after treatment, despite the fact that her intelligence level has risen by 18 points of I.Q. on the matrices test. The other Shipley indices of deterioration rise after treatment, but neither before nor after treatment do they indicate any degree of deterioration, although this is clearly shown in the indices derived from the matrices and Mill Hill vocabulary tests. Further, statistical tests of significance show that, whereas the changes in the scores on the abstractions test are insignificant, those on the Shipley vocabulary test

approach the 5% level. The evidence would seem to speak against the use of the Shipley test for the estimation of intellectual deterioration, and would suggest that an index of deterioration derived from the matrices and Mill Hill vocabulary tests is more valid. Further, no provision is made by Shipley for correcting scores on the abstractions test for the natural decline in intelligence with age. This is essential in estimating the extent of intellectual deterioration for any individual case. It may be done for the matrices test from data provided by Foulds and Raven (1948).

The criticism may be levelled against our findings that the increase in the intelligence and vocabulary scores could arise simply as a result of the practice effect of repeating the tests. Statistical tests of significance show, however, that the changes in scores on the matrices test are significant at the 1% level, and that the changes in scores on the Shipley vocabulary test approach the 5% level. Although the changes in scores on the Mill Hill vocabulary test are not statistically significant at the usually accepted levels, it must be noted that this vocabulary test is untimed, which would tend to diminish the possibility of practice effect. Also the alternative version of the test, given additionally to the first patient, showed a similar rise in vocabulary. It therefore seems unlikely that the changes after treatment in the intelligence and vocabulary scores are entirely the result of practice.

Summary and Conclusions

The intelligence level of three patients suffering from myxoedema was raised greatly after treatment by thyroxine.

Scores on two vocabulary tests also rose, but by a smaller amount.

The results provide some empirical evidence contrary to the general assumption that vocabulary level is unaffected in cases of intellectual deterioration.

Until a more accurate method is available a comparison of scores on the matrices and Mill Hill vocabulary tests is recommended for the estimation of intellectual deterioration.

I would like to thank Dr. P. M. F. Bishop, Guy's Hospital, for allowing me to test patients under his care.

Note.—I would be grateful if any physician in charge of patients suffering from myxoedema who is interested in having them psychologically tested would inform me at the Institute of Psychiatry, Maudsley Hospital, London, S.E.5.

REFERENCES

Babcock, H. (1930). *Arch. Psychol.*, N.Y., 18, No. 117.
 Foulds, G. A., and Raven, J. C. (1948). *J. ment. Sci.*, 94, 133.
 Hunt, J. McV. (1944). *Personality and Behaviour Disorders*, p. 971. Ronald Press Co., N.Y.
 Shipley, W. C. (1940). *J. Psychol.*, 9, 371.

The place of clinical pathology in medicine and the status of its practitioners have lately been engaging the attention of the health authorities of Cuba. As a result of negotiations between the Sociedad Cubana de Medicos Laboratoristas Clinicos and the Cuban Health Authorities the following principles have been accepted by the National Council of Public Health of Cuba and approved by the Cuban Minister of Public Health, Dr. Carlos M. Ramirez Corria : (1) It is acknowledged that clinical pathology is exclusively a branch of the medical profession, and as such it should be subject to the laws that govern the practice of medicine in general. (2) The director of any clinical laboratory should be a fully recognized medical practitioner. (3) It is to be understood that the clinical laboratory is where the physician specializes in this specific branch of medicine by practising clinical analysis and following scientific laws, with the purpose of guiding the practitioner in diagnosis, prognosis, and treatment. (4) The clinical pathologist should keep secret the results of his work, with the exception of those which are specified by law.