by (hose that follow it. Then the bad, vicious instinct should be treated not only for its own sake, but for the sake of those which are sure to manifest themselves later. If the later instincts are strong enough they may, and often do. change the habit's formed by the earlier ones. For it should always be remembered thai the instincts themselves are transient; The habits formed while they are passing are more enduring.

Now, if the sum of our habits depends upon the use we make of our instincts when they are ripe, we can readily see the importance of introducing the child to a new subject and modifying his environment at the right time. We must catch the instinct when it is ripe if we hope to have a habit formed as a result of it ; we must suppress the instinct when it is ripe if we wish to prevent the forming of a habit. It requires the closest watching to do this work in the best way. In an institution is the only place it can be done at all for the feeble-minded,

(a closing, I must ask you to remember that 1 have not exhausted the subject. I have only tried to present the fact that the beginning of knowledge has a physical basis; that there is a physical reason for the child's backwardness; that there are ways of partly and sometimes entirely overcoming these physical defects; that sensations must beat time and again upon the nerve tissue that is below the "normal consistency" if the impression is to be lasting. Second, I have tried to show that by persistent effort the nerve centers of the muscles can be trained to direct automatic action, even though the child has none of the higher centers to work' with; that the wise selection of a subject to teach and the time in the child's life it is to be taught must be governed by these underlying principles: that the institution is the best place in which to shape the environment to meet the peculiarities of feeble-minded children.

TASTE AND REACTION TIME OF THE FEEBLE-DUNDEE.

BY A. R. T. WYLIE, FARIBAULT, MINN.

The field of abnormal mind should be a most fruitful one for psychology for here nature makes experiments which no one can imitate. What has been done so far in this field has been confined to the criminal, and, more recently, to the insane *With* a view of adding his mite to this work, the author undertook the following tests on the taste and reaction time *of t*he feeble-minded, as a preliminary to more extended work in the future:

I.

The sense of taste is dulled or perverted to a greater or less extent among idiots and imbeciles. In some it seems to be absent altogether;[1] in others it remains in a rudimentary fate.- The instinct of self-preservation is the most fundaanial in animal life, consequently hunger and taste are of utmost importance to the individual. The absence of these we would expect to find in those lowest in the mental scale. Such we find to be the case. These individuals lead a purely vegetaive life. However, hunger can exist without taste. This is a fact of common observation among those who have to deal with the lowest grade of feeble-minded children, One child will eat salt with. the same relish that most children eat sugar; others will swallow bug surgicai dressings, quantities of pebbles, the dust and dirt of he floor, and even offal, while we meet some who seem to pre-er the refuse of the kitchen to a properly prepared meal.

Czerny has made use of this lack of taste as one of Ids

[1] Ireland: Mental Affections of Children, p. 308.
[2] J. Voisin: L'IDIOTIC, p.130.

tests for an early diagnosis of idiocy. He made use of solutions of sugar and quinine, claiming that the youngest normal children would react to the difference, while idiots would not. Preyer found that his child reacted to the difference from the eleventh day.

To study the condition of taste among the lowest grade of feeble-minded children, the author made use of sugar, quinine sulphate, tartaric acid and salt, applying them to the tongue and noticing if the subject gave any indication of a difference. Thirty-five boys and thirty-one girls were tested. Of these eight girls and fifteen boys, or twenty-four per cent of all, gave no indication of a difference. Eight boys and eight girls, or seventeen per cent of all, showed a difference for quinine; twenty-one girls and nineteen boys, or forty-one per cent of all, showed a difference for tartaric[1] acid; and fifteen girls and seven boys, or twenty-three per cent of all, showed a difference for salt. Thus the taste for bitter seems to be most frequently absent, while that for sour is most commonly present.

To study tin's taste of the brightest feeble-minded children, solutions of the above substances were made, and these were added a little at a time to a quantity of water until the subject perceived the proper taste, the tongue being cleaned and dried at proper intervals. From the quantity of taste solution and water taken the strength of the solution tasted could be calculated. Twenty children were tested. For fourteen of these the averages were:

For sugar, 1.3 %, *M. Y. 0.4, or 1 part to 77; for salt, 048 %, M. V. 0.19, or 1 part to 208; for acid, 0.41 %, M. V. 0.40. or 1 part to 244; for quinine, 0.0177 %, M. V. .0062, or 1 part to 5,694.

The strength of solutions for normal people as determined by Bailey and Nichols is for sugar 1 part to 199, for salt 1 part to 2,240, for sulphuric acid 1 part to 2,080, and for quinine L part to 390,000. A marked dullness throughout, and especially so for bitter.

*Mean variation.

Six of those tested were unable to recognize the taste of one or more of these substances even when used full strength. With two of them salt was wanting, with three of them sour, and with two of them bitter, in every case being identified nth another taste.

Hence, with the feeble-minded, as with criminals,[1] we find a marked dullness of taste. With a few some of the tastes are lacking, while with the lowest grades only one or two may be present.

II.

The reaction times were taken with a Hipp's chronoscope and the common touch key; for sound an electric hammer was used. The current through the instrument was reversed after each reading. Of those making the test twenty-two, sixteen boys and six girls, were considered to have made the test properly. Their ages varied from eight to thirty-seven years, he average being twenty years. The average number of tests "or each was twenty-one. The average reaction time was 0.338 seconds, with a mean variation of 0.08 seconds. The normal reaction time lies between one-tenth and two-tenths seconds,[2] say 0.148 seconds, and the mean variations can be put at 0.04 seconds.[3]

In the number of tests made the effects of fatigue and practice seemed to about balance each other. Twelve other children were tested. Of these five were unable to perform the test, and seven of them had an average reaction time of 0.538 seconds, with a mean variation of 0.1G4 seconds.

Sixteen children made the tests for sound reaction. The average number of tests was twenty-four. The average reaction time was 0.293 seconds, with a mean variation of 0.0S5 seconds. The normal time has been found to lie between 0.120 and 0.180 seconds, with a mean variation of 0.022 sec-

[1]Lombroso: L'Hourme, Criminal, Vol. I., p. 323.
[2]Ladd: Physiol. Psych., p. 47G.
[3]Studies from Yale Psych., Lab., Vol. II., p. 78.

onds. However, fifty three men in the University of Minnesota gave an average reaction time of 0.214 seconds. The reaction time of the insane to sound has been found to vary from 0.200 and 0.340 seconds, with a high mean variation.[1] On being directed to be quick, eleven children, in a series of five tests, succeeded in reducing their reaction time by an average of 0.012 seconds. Five who did the touch reaction tests were unable to do the sound reaction tests.

Among the children tested there were fourteen Mongols. Of these eight were regarded as having made the tests successfully. Their average touch reaction time was 0.300 seconds, with a mean variation of 0.00.1 seconds. The average of the other six was 0.570, with a mean variation of 0.100 seconds. Seven of the Mongols performed the sound tests with an average of 0..'!(i0 seconds, and with a mean variation of 0.113 seconds.

As would be expected, the feeble-minded have a long reaction time, and the high mean variations seem to be characteristic. To one watching the tests the stimulus often had the appearance of "worming its way through," especially so with those making the slower reactions.

Gilbert found, in his tests of New Haven school children, "that the brighter the child the more quickly he is able to act:2

'•Luke: Dict. Psych. Med.
-Studies from Vale Psych. Lab.. Vol. II., p. 04.

RATIONALE OF THE GYMNASTIC TREATMENT OF THE FEEBLE-MINDED.

LUTHER GULICK.

(From Physical Education.)

You will notice that I do not attempt to speak of the whole subject of the relations of gymnastics to medicine, I do not even take the whole of the subject of gymnastics for nervous diseases. I am to speak only of those central disorders which are due to the lack of development, and which can be treated by systematic insistence upon the performance of function.

Before considering the details of the application to this class of cases of the remedial agent under discussion, I wish to very briefly review the more prominent points in connection with its physiological effects on the nervous system. I do this without apology, for while the subject is a simple one, it is ordinarily ignored by both the popular and scientific physiological text-books.

In order to a simple muscular twitch, there is necessary: First, a central organ which is capable of and will originate a peculiar and definite form of molecular vibration. Second, some means of communication between the central organ and the muscle. It is important that this communicating medium, shall deliver as much as possible of the original vibration. Third, an organ which will contract under the influence of the stimulus furnished by the central organ.

In order to a complicated muscular movement, such as jumping a high fence, there are needed in addition, nerve centers that shall, from the picture of that fence on the retina, calculate its distance and height, that shall so co-ordinate the nervous discharges which are being sent to the muscles of the body, that the following complicated processes shall occur: The body as a whole is to be maintained in an erect posture; steps are to be taken, whose length is calculated so that