PEDOLOGY AND ITS POSSIBILITIES.*

The Study, Treatment, and Education of Children Requiring Special Attention.

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Many great medical movements have been initiated by laymen, who by attempting a task for which they are inadequately fitted by training and experience, stimulate the interest of our profession through the creation of a demand for more complete investigation. Thus many developmental defects in childhood giving rise to retardation and deviation in mental and physical development received but scant attention from physicians until the necessarily incomplete investigations of psychologists and educators showed the necessity for their participation in the development of this large and important field.

Unless men with medical training familiarize themselves with the factors involved in retarded and deviate development, making a careful scientific study of etiology, treatment, and prophylaxis, they will leave unfilled a duty they owe humanity, for the solution of many of the problems besetting the sociologist and educator lies with the medical profession.

In early life body and mind are soft and pliable, capable of easy moulding in the potter's hands, though allowing for limitations and variations inherent in the clay. "Just as the twig is bent, the tree's inclined." Trite, but as true in child culture

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as in horticulture. The physician, often the family counselor in matters not only medical but legal, business, religious, and domestic as well, seems sometimes to exert little influence where important problems relating to the child's physical and mental welfare are concerned, except when these involve active disease states. The fault rests not entirely with the parents. The physician himself is too apt to limit his interest in the child to occasions in which his attention is claimed by acute infection or other condition calling for therapeutic intervention in the more strictly medical sense.

It is not to be expected that the busy general practitioner, pediatrician, or neurologist will have the time, inclination, or facilities effectively to study and treat the numerous classes of physical and mental variation with which he may meet. Hence the necessity for a branch of practice which will combine some of the functions of the pediatrician and neurologist with some of those of the psychologist and pedagogue. Upon the pages of medical and pedagogic history stand out prominently the names of physicians who have filled these joint functions with credit to themselves and benefit to humanity. Gugenbühl, Itard, and Sequin, though pathfinders who sometimes led their followers through devious ways, left to posterity a legacy which will never be dissipated. In our own day the name of Dr. Maria Montessori stands out as perhaps the best known, though there are many others, both in this country and abroad, who, approaching the subject from a somewhat different angle, by adding to our knowledge and stimulating interest in this subject, are accomplishing much in this field of endeavor. Two most excellent works from the pens of physicians of your own city, The Backward Baby, by Dr. Herman B. Sheffield, and Child Training as an Exact Science, by Dr. George W. Jacoby, have appeared in the last year or so.

It would seem that the field is sufficiently comprehensive and important to warrant a distinctive appellation for those who confine their practice to this medicopsychological pedagogic function. I have for some time made use of the term "pedology." According to Dr. Henry W. Cattell (1), the editor of Lippincott's Medical Dictionary, the term pedology, first used synonymously with "pediatrics," later made to designate "child study," may now be defined in a more restricted sense as "that branch of pediatrics in which the physical and mental defects of child development are especially studied and treated by the physician." It is not intended that the
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The pedologist shall usurp the field of, nor attempt to crowd out the clinical psychologist who, as Haberman (2) says, "must first and foremost be a physician." The pedologist must depend upon the highly specialized functions of the clinical psychologist, as upon those of other specialists for much that he converts to his own use.

The South Side Hospital of Pittsburgh has recognized "pedology" as a branch of medical practice by creating a staff position of "pedologist," which it has been my honor to occupy for the last three years. A clinic conducted in connection is known as the Pedological Clinic. The Juvenile Court and other agencies coming into close contact with children have given similar recognition.

As in other fields of medical endeavor, the first step toward accurate diagnosis and rational treatment is thorough study of the individual patient. Notation of gross somatic abnormalities with superficial examination of eyes, ears, nose, and throat, and the application of the Binet-Simon, Healy, or other tests is not sufficient, except for the purpose of selecting suitable cases for further study and as a prelude to more thorough investigation. These tests merely allow us to determine faulty function of one of the body's most important organs—the brain. They do not inform us regarding the cause of the disorder of function any more than the clinical thermometer tells us the nature of the pathological process behind a hyperpyrexia. Among those whose resources the pedologist must call to his aid are the ophthalmologist, laryngologist, röntgenologist, serologist, microscopist, and biological chemist. He must, to an extent, direct the line of their investigations, interpret their findings, and correlate them with his own observations.

The influence of defects of vision and hearing and of nasal obstruction upon mental development, particularly as a causative factor in aprosopia, is well known, though it will usually be found that these are simply manifestations of the more general hypoplastic condition. The examination of the fundus oculorum may give much information of diagnostic and prognostic value. Röntgenology not only allows us to determine deformity of the sella turcica with possible dyspituitarism, a condition in varying degree not rarely encountered, but, through a radiograph of the wrist, shows us the stage of epiphyseal development as well. Congenital syphilis may be detected by the Wassermann test or one of its modifications. A serological test offering the promise of unlimited possibilities, though its exact status has not yet been determined, is the Abderhalden reaction. Its chief value for our purpose would lie in enabling us to recognize conditions of faulty organization of the glands having an internal secretion, particularly, those which some believe are the cause or at least accompany dementia præcox. Any procedure which enables us to recognize the unfortunate persons predisposed to this common and terrible affliction sufficiently early to admit of even slight
hope of therapeutic and prophylactic measures being of service, merits our serious consideration. Studies of the constituents of the blood stream may give much information, such as, for instance, the polycythemia and lymphocytosis observed in the class of cases mentioned above. Deviation from the commonly accepted normal in the chemical constituents of the urine is a matter sometimes of great significance, indicating metabolic disturbances the interpretation of which in correlation with data obtained through other sources may throw light upon conditions otherwise obscure. Information gained through the various diagnostic aids mentioned above must be amplified and extended by examinations and investigations undertaken by the pedologist himself. The family history should be as complete as it is possible to obtain, though, as often elicited, it is of little practical value. In the large mass of institution cases we should expect to find—and do find—a history of alcoholism, insanity, tuberculosis, etc., in immediate and remote ancestry, though we find these conditions also in the ancestry of the supposedly normal inmates of orphan asylums and industrial homes. In private practice it is not always so easy to find a scapegoat, as defects are usually either less frank in expression or are more carefully glossed over and require either personal observation or intimate knowledge of individual family members for their detection. Of more comparative value to my mind, is the developmental history, especially when this is made to date, as it should, from the earliest moment of conception. The mother of a constitutionally inferior patient of mine attributes her son's defects to frequent hypodermic injections of morphine administered by her family physician during the early months of her pregnancy, though I attach even greater weight to the fact that she herself has been operated upon for cancer and that her husband shows acromegalic symptoms, though of mild and stationary character. Birth conditions, digestive disturbances, convulsions, age of sitting up, of walking, talking, etc., are all of diagnostic importance and are worthy of detail, as are all facts connected in even remote ways with the mental and physical development of the child. The physical examination should be thorough, from the top of the head to the soles of the feet, careful note being made of stigmata of degeneracy, gross and minor abnormalities and variations from the commonly accepted normal in any degree.

**FIG. 3.** Small deformed sella turcica in neurotic girl of twelve years.

In this day of “standardized” tests I may be considered iconoclastic in stating that in the matter of the mental examination, not so much depends upon the method of testing employed as upon the individual equation of the tester. It is upon his interpretation of all collected data, his almost intuitive recognition and selection of essentials, that the proper evaluation of psychic factors with their complex physical interrelations rests. For purposes of classification, for rapid or routine determination of
approximate mental capacity, such tests are indis-

tensible. The surest knowledge, however, is gained
through prolonged observation of the child's reac-
tion to a given environment, his adaptability to new
problems and conditions, aided by such tests as ex-
perience may select. In private practice I make it
a rule in all except evident cases to give nothing ex-
cept a tentative opinion without at least a three
months' period of such study and observation. It
not infrequently happens that I find it necessary al-
ost completely to revise early impressions.

It is now generally conceded that the chain of
ductless glands is of the greatest importance in the
development of the cerebrospinal and osseous sys-
tems in early life, and that impairment of function
of one or another of these glands underlies the dis-
orders of nutrition which inhibit proper develop-
ment. Under the caption, The Ductless Glands and
Constitution, Falta (3) says, "we must not accept
the ductless glandular system for itself alone, but
must regard it as a constitutional component; the
ductless glands as vegetative organs together with
the nervous system regulating their functions.”
While our knowledge of the normal action of these
glands is still somewhat hazy, yet they are found to
preside, in some manner, over certain correlations
of the body. These correlations are exceedingly
variable, and this variability is most apparent when
and where circumstances are abnormal. The ad-
justing mechanisms of development are more or less
reciprocal; thus a ductless gland not only influences
development, but is itself influenced by changes in
general development. There is reason to suppose
that in the harmony produced through the concerted
action of the ductless glands, the leading role is
played by the thyroid, which supplies the stimulus
for bodily metabolism. As a check upon the in-
fluence of the thyroid in infancy and childhood, the
thymus, the general lymphatic system, and perhaps
the pineal gland, become active. In addition, these
produce that delay of sexual activity which is essen-
tial to the proper maturation and stability of the
somatic functions. In due time the adrenal system
stimulates the sexual organs to activity, and hastens
as well the growth of the muscular and skeletal sys-
tems. Of great importance at this time is the action

Fig. 4.—Long tapering fingers and
delayed epiphyseal ossification in case
of infantilism shown in Fig. 11.
psychic development is shrouded in a greater degree of obscurity, though our knowledge is rapidly increasing.

I believe it may safely be stated that all conditions of retarded and deviate development, except those due to purely accidental and environmental causes, have their immediate origin in a faultyly organized physical constitution, which I have—following the example of Noble (4)—been accustomed to designate as hypoplasia. This faulty physical organization may be due to causes distinctly hereditary in origin, to antenatal agencies affecting the child in utero or to a combination of these with exciting factors, toxic, emotional, or traumatic, operating post partum. Thus conditions, having a vitiating influence upon cell development, result in growth disturbances in the developing embryo, and as a further interference with growth forces, in the first few weeks of fetal life, when the ductless glands begin to appear, the cells of which they are composed also grow imperfectly, and as they fail to secrete to the extent to which they were destined, further defective development ensues. As the result we have constitutional inferiority, infantilism, hypoplasia, degeneracy—call it what you will—in varying degree. Of these terms I prefer “hypoplasia.” Constitutional inferiority is liable to confusion with Dr. Adolph Meyer’s more specific term, “psychic constitutional inferiority,” which is often used without the qualifying adjective. “Infantilism” has come to be considered a clinical entity. “Degeneracy,” from long misuse, carries with it a stigma of moral obliquity. “Hypoplasia,” on the other hand, seems to be a generic term admitting of wide application. Hypoplasia may affect any organ and any structure and to almost any degree. Thus hypoplasia of the nervous system gives us the idiot at one extreme, and the so-called neurotic make-up at the other. The various stigmata of degeneracy are somatic manifestations of hypoplasia. Certain
neuroses and psychoses, drug habits, alcoholism, etc., if not the direct result, are prone to occur in persons presenting symptoms of hypoplasia. Chlorosis, appendicitis, tuberculosis, and a host of other dyscrasias, diatheses, infections, and morbid states are common in the hypoplastic. Harrower (5) states in his excellent book: "At a recent Italian congress an official report was made and adopted, in which it is deemed established that the \textit{endocrinous system}—the internal secretory system—exerts an influence on anomalies of growth, morphogenesis, and organic metabolism, and on nutrition and inherent excitability of the nervous system, and on resistance to infections and intoxication, and also that it has a preponderating influence on the causation of dyscrasias and morbid tendencies. The equilibrium of the nervous system, the sympathetic in particular, is also regarded as maintained by the internal secretions. In nervous diseases \textit{per se} they act probably as indirect or predisposing factors."

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{image.png}
\caption{Modified sleeping porch. An ideal arrangement for delicate children, as by closing windows and turning on heat, a warm room for dressing is provided. Note sleeping garments of nurse and child.}
\end{figure}

Falta applies Wunderlich's classification of \textit{stabile}, \textit{debile}, and \textit{labile} vegetative nervous systems to the ductless gland system, and suggests the intimate relations that exist between both systems lead us to expect that the same type of constitution would very often be found united in the same individual, or that where one is present the other is at least suggested. Lack of space forbids further discussion of this phase of my subject, though to me it seems most important, as it is upon the conception of constitutional anomaly (hypoplasia) as a basis, that the proper understanding of conditions of defective and deviate mental and physical development rests.

The hypoplastic child is distinguishable from his more normally constituted fellows by anatomical, physiological, and psychic characteristics, the interpretation of which serves to implicate the glands of internal secretion as factors of etiological significance. The clinical picture most often seen is the undersized, badly nourished child, whose unstable nervous system is still further handicapped by the effects of reflex disturbances arising from nasal obstruction, defective vision, or perhaps phimosis. Other symptoms are delayed epiphyseal union (as revealed by the x-ray), hypotonicity of ligaments and muscles, postural defects, visceroptosis, and hernia. Incontinence of urine and feces is frequently present. Deficiency of the eyebrows in the outer third, the \textit{signe du sourcil}, is considered a symptom of thyroid deficiency. Delayed sexual development is common, though sexual precocity may be found, suggesting hypophyseal involvement. Premature eroticism leading to sexual misdemeanors is frequent in hypoplastic children, especially in emotional, psychically inferior girls with enlarged thyroids. The high arched palate, produced by yielding of the palatine bones, owing to their relative poverty in calcium salts, is a fairly constant symptom of hypoplasia, and dental malocclusions are likewise common. Variations in bodily temperature are fre-
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I shall not attempt a classification and description of all the various conditions of childhood which require the attention of the pedologist. A brief discussion of a few, either of especial interest or of frequent occurrence, may not be amiss.

Feeblemindedness or amentia is defined by Treggold as "a state of mental defect from birth or from an early age, due to incomplete cerebral development, in consequence of which the person affected is unable to perform his duties as a member of society in the position of life to which he was born." In the lower grades the diagnosis is usually a matter of little difficulty, as the condition presents physical and mental anomalies which "he who runs may read." In the highest grade, however, the moron, the borderland case, the determination of the character of the defect, its differentiation from psychopathy, from heboid states, constitutional psychic inferiority (used in a restricted sense), from retardation due to removable causes, or from merely slow rate of development, is a matter sometimes requiring much study.

When we have demonstrated that feeblemindedness is present, we do not fulfill our whole duty by stating our diagnosis and recommending special educational methods, for this condition, while essentially incurable, is improvable to an extent difficult for those who have not followed the progress of
such cases under intensive cultural methods to realize.

Speech defects or, more properly, defects involving the zone of language, include stuttering or stammering, word blindness, word deafness, idioglossia, and lisping.

Stuttering. Although stuttering is generally considered to be a purely psychic condition, depending upon incoordination of the mechanism controlling the organs of speech, I am still inclined to follow Claiborne's (6) suggestion that it should be classed among the conditions having as their basis congenital defects in the special centres controlling speech. Scripture (7) has observed that practically all stutterers habitually speak in a monotone, that they lack the power of speaking rhythmically. Several years ago I (8) suggested that there exists a distinct relationship between stuttering and a partial congenital amusia.

The hypothesis advanced by Browning (9) that stammering is associated with an enlarged thymus which produces the defect in speech by a reflex inhibition of the ordinary respiratory rhythm, is not untenable with my theory, as what Browning speaks of as "a stammer diathesis or complex" is what I should call hypoplasia, in which an enlarged thymus, as well as other ductless gland anomalies, are not unusual.

Word blindness. Medical literature contains but little reference to congenital word blindness previous to 1896, though Clara Harrison Town (10) finds that Broadbent, as early as 1872, described a case which combined total word blindness with very limited power of speech. In 1896, both James Kerr and W. Pringle Morgan reported examples of this condition, followed by Thomas, Fisher, Stephenson, Hinshelwood and others. In 1909, I (11) was able to collect descriptions of forty-one cases, to which I added one with which stuttering was associated. I have since studied a number of other well marked cases, and sufficient have been described by other observers to show that the condition is relatively common. The most satisfactory explanation of the cause is that congenital word
blindness is due to a biological variation, an isolated defect of structure, or, we might say, is one of the stigmata of degeneracy (hypoplasia) in the visual word centre, and is closely related to such conditions as color blindness, lack of musical sense, impairment of ocular fusion sense, etc. Of word blind children, about one half are also letter blind, while but a small proportion are unable to recognize figures. Poor visual memory for figures may exist independently of word blindness. The diagnosis of word blindness presents little difficulty, though as word blindness is a manifestation of hypoplasia, it is necessary for prognostic purpose to determine whether it exists as an isolated defect or whether sufficient other defects are present to constitute feeblemindedness, in which condition it is frequently found. Treatment consists in the application of special educational methods and treatment of the underlying hypoplasia.

**Congenital word deafness** has received less attention than congenital word blindness, though Gall (12) as early as 1861 described a class of children, which, in my opinion, exhibited many of the symptoms of this condition. It is obvious that the child who, although possessing the ability to hear ordinary sounds, is unable to appreciate and retain impressions of spoken language, will fail to acquire the faculty of speech. To differentiate mutism resulting from word deafness from that which is entirely motor or peripheral in character, often requires close and prolonged observation.

Partial word deafness gives rise to speech so peculiar as to give the impression that the child uses a language of his own. To this condition the name of "idioglossia" has been given by Hale White and Golding Bird (13). The speech of the child with idioglossia is almost unintelligible, except to those who have become accustomed to it. While upon analysis it will be found that in each individual the sounds substituted are always the same for the same words, our first impression is that we are listening to meaningless gibberish. The condition must be differentiated from defective speech due primarily to mechanical causes and to partial deafness. This condition, like word blindness, is common in those presenting the symptom of complex feeblemindedness, though usually in the feebleminded its characteristics are different. Treatment, as in the other conditions mentioned, consists of measures directed toward stimulation of the forces underlying development and the institution of highly individualized special training.

**General treatment** of the hypoplastic consists of various, 1, hygienic, 2, medical, and, 3, educational measures, directed toward the stimulation of the correlative development of growth forces and the maintenance of somatic and psychic equilibrium.

**Hygienic measures.** Regular habits of sleeping and eating, of bathing and exercise cannot be inculcated too early, in fact much in this direction may be accomplished in early infancy. Stimulation of metabolism and of growth may be brought about by air, rain, and sun baths, and by various hydrotherapeutic measures. Radium, in the form of emanation drinking water and baths, seems to exert a beneficial influence in quieting excessive nerve irritabil-
ity and stimulating general metabolism. Swimming and bathing in open air pools (I have little use for those indoors) is a valuable adjunct to treatment. Swedish and other gymnastics, massage, folk and esthetic dancing, the medicine ball and bean bag, and various other sports and activities all have their value as means, not only of stimulating the forces of growth, but in correcting defects of posture and psychomotor control. Open air sleeping I consider a necessity for hypoplastic children. At this place

Blood analysis of boy of sixteen years of hypoplastic type. Positive Adenohypophysis reaction to sexual and pineal gland tissue.

I wish to state that while proper treatment may be approximated in the city it can almost never be carried out to the same advantage as in the country, where the supply of fresh air and sunshine is at a maximum. Hit or miss methods of feeding children beyond the stage of infancy are still prevalent. The diet of the hypoplastic child should be based upon scientific principles. Not only should the caloric value be regulated according to his needs, but the proportions of proteins, fat, and carbohydrates as well. These children, as a rule, make better progress on a diet relatively free from animal proteins.

Medical measures. I have come, after a number of years of fairly wide experience in the treatment of hypoplastic children, to rely upon but few drugs. The iodide of iron, nux vomica, and other tonics and alternatives may have their temporary use, antisyphilitic remedies are, of course, indicated in congenital lues, but my chief reliance is upon such physical measures as are outlined above and upon the administration of the glands of internal secretion. We are far removed from the crude empiricism of the days

of Brown-Séquard and his overenthusiastic followers. A fund of knowledge has been acquired that has placed endocrinology upon a rational foundation and has furnished concise indications for the administration of definite gland substances in definite diseased states. In cretinism, thyroid is indicated, in infantilism of the dystrophia adipose-genitalis type or the type Lorain, pituitary gland is of value. Kerley and Beebe (14) reported a case of greatly retarded physical development in a boy in which thymus apparently gave brilliant results. Dana and Berkeley (15) have reported the results of investigations in which pineal gland was fed to a number of defective
children in whom no grave organic brain defect existed. Though their cases showed a steady and gratifying improvement, such improvement as reported was no more marked than I have observed in cases treated with other glandular substances, alone or in combination. It is my opinion that the benefit

is derived through the stimulation of metabolic processes by bringing into equilibrium the various glands with their common though tangled relationship, rather than through any selective action upon a particular gland. Usually it is impossible to implicate any one gland, though there are numerous cases in which the symptoms involving one gland are more prominent. With a pluriglandular disorder to treat, the indication is for polytherapy. I am in the habit of administering to hypoplastic children small doses of pituitary, thymus, thyroid, and adrenal glands in combination. For male children, testicular substance is added, for females ovarian and mammary. These combinations are put up for me in tablet form by a well known English firm. A later formula has the addition of pineal gland. The description of surgical measures for the correction of deformities and of removal of sources of reflex disturbance and nasal obstruction, or of mechanical aids to treatment, as orthodontia, fitting of glasses, etc., are not within the scope of this paper, though they should be used whenever they are indicated.

General educational measures. It is a difficult matter to separate education, in its broader sense, from hygiene, especially from mental hygiene, for education, according to the new Standard Dictionary, "includes not only the narrow conception of instruction, to which it was formerly limited, but embraces all forms of human experience, owing to the recognition of the fact that every stimulus with its corresponding reaction has a definite effect upon character." Every act of the child's daily life should be utilized for educational purposes in the systematic development and cultivation of the normal powers of intellect, feeling, and conduct. Froebel's appeal, "Come let us live with our children," would, if intelligently answered, be of untold educational and prophylactic value.

Hypoplastic children, more than others, require measures directed toward the instillation of habits of self reliance and fearlessness. I know of no better methods of developing these characteristics than the activities mentioned under hygiene. Vague and even definite fears tend to disappear when a day of healthful, purposeful activity is followed by a night in the open under the stars. If the fundamental primitive fear instinct alone, as Boris Sidis (16) believes, is the source of all psychopathic mal-
adies, it should be the first aim of education to cultivate the traits of character which would lead to its subjection. In the application of more formal educational measures the specific requirements of the individual child must be considered. For the child not yet ready for the three R’s and for many who are, the methods in use in the kindergarten and in the Montessori system offer much that may be used advantageously. As both of these systems are essentially group activities, to use either in its entirety interferes with the individualization necessary in hypoplastic children. For this reason Mrs. McCready and I are accustomed to choose from each what is suited or may be applied to our needs, combining with it the other special measures required. The special educational and corrective principles and methods involved in the treatment of stuttering, lisping, word blindness, word deafness, idioGLOSSIA, deafmutism, postural defects, etc., require more detail of description than the reader’s patience, already overtaxed, would permit.

REFERENCES.