

1932

## Enuresis as a behavior problem

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SENIOR THESIS

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##### April 9, 1932

Howard D. Cogswell

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## INTRODUCTION

Enuresis has been defined by Davidson (21) as "a persistence from early infancy or the development during childhood of unintentional and unconscious nocturnal or diurnal emptying of the bladder in the absence of demonstrable, organic, nervous or genito-urinary lesions." Calvin (14) calls this a symptom as does Ruhrah (58) who adds that some underlying cause should be sought.

There are few subjects concerning the management of children on which there has been more written than enuresis. It is a condition frequently seen by pediatricians and general practitioners and has been one of the poorest understood problems they have attempted to treat until the last few years. Such statements as the following certainly indicate that a portion of the medical profession still considers the condition a bugaboo: Davidson (21) says, "Much has been written but relatively little known of the condition which distresses mothers, shames children and baffles physicians." Woolley (77) says, "Many pediatricians feel quite hopeless about cases of enuresis in which no physical difficulties are discoverable.....they have found no successful way of dealing with such cases." Calvin adds, "Unfortunately it is true that many physicians dread to see a patient with enuresis come into the office or clinic because of the unsatisfactory response to the usual treatment."

This condition represents a typical example of the progress made by pediatricians in the sphere of knowledge of nervous disorders in children. Neurologists, while striving to arrive at a correct classification of nervous disturbances in accordance with the teachings of psychiatry, were handicapped by

their own slight knowledge of the constitutional peculiarities and diseases of children, especially of infants. The pediatrician had assisted in the progress of pediatrics by advances in the chemical, biologic and bacteriologic spheres. Certain authorities such as Czerny had advised that more attention be placed on the nervous disturbances in children which was ignored for some period by pediatricians. When they did, they started out with mistaken psychiatric suppositions.

In the early studies of enuresis the psychiatrist, urologist and pediatricians were disputing as to who should deal with the problem of enuresis. The urologist buried himself in the thought of the mechanism of the bladder and blamed disturbed innervation of the bladder, its capacity or other local factors for causing the disturbance. The psychiatrist regarded the disturbance as purely psychic and the pediatrician looked on it as a disease of unknown cause which he disliked and did not deal with any more than he could help.

As the knowledge of the subject has increased the idiopathic cases have gradually diminished and Bozy (quoted by Ruhrah) aptly remarked that "essential enuresis" means essential ignorance. There has been a great deal of general and would be specific discussion on the physical causation of enureses as should be expected, as physical medicine has always been in advance of mental medicine.

When Durham (22) stated, "Successful treatment of the patients with empirical remedies is frequently as surprizing as it is inexplicable. The element of mystery thus added temporarily enhances the virtue of the cure, until failures show up with its use." He brought out the fact that few remedies have ever

been continuously beneficial but that at time they have been of some aid. From this fact it seems probable that the suggestive effect of the treatment may have been the real therapeutic agent. It has been thought by many workers that the psychic and emotional factors play a large part in the problem, as orthodox medical methods have never proven highly efficacious. Quoting Mello-Leitao (45), "Each author has a theory as to enuresis' pathogenecy and seeks to bear it out." From the articles on the subject many authors have theories which their statistics prove to be correct, but Ruhrah remarks, "one is to be reminded of the blind men and the elephant." By this he means the physicians have seen the symptoms and have all interpreted them singularly, instead of seeing them as a part of the causative factor. Probably the reason for this is that the most valuable contributions have appeared in the psychologic and mental hygiene journals which, as a rule, are not read by general practitioners or pediatricians, who depend on the regular medical periodicals for their information.

#### HISTORY

It has been stated that the incidence of enuresis is on the increase (Mandel, 42). However, it has always been a problem to mothers, physicians and to the patients themselves, through the preceding decades. The Saxon Chronicle states, "The Magi taught the patient suffering from the disorder to drink the ashes of pigs pizzle in sweet wine and so to make water into a dog's kennel, adding the words, "Lest I like a hound should make urine in my own bed," showing that a certain form of sug-

gestion was used at this time. Shakespeare observed and recorded that incontinence of urine is in some produced by the screeching of bagpipes. This brought out one of the modern views that irritation of the mental peace in an emotionally<sup>UN</sup> stable individual will cause enuresis.

During the 17th and 18th centuries when medicine was still practiced with mysticism, the therapeutic measures were as bizarre in enuresis as in other bodily disorders. As late as the 19th century, one medical writer, Tollemand, recommended an aromatic bath as a cure. He steeped a hand-full of aromatic herbs and added to the infusion one cup full of brandy. The mixture was to be added to the bath and the child kept immersed for an hour daily for a period of several weeks. With this method he claimed many cures. In the 16th and 17th centuries various herbs were worn around the neck and certain procedures were done to cure this ailment. In 1784, Mitchel wrote on this condition as clearly as any subsequent writer up to the middle of the 19th century. The tendency at that time was to let it alone, for the most part, with a hope that puberty would restore the function of the bladder. In the early decades of the 19th century corporal punishment was advised for the cure. That this complaint should be treated with a birch rod is mentioned in a medical text book in the 18th century. Boehoove and Casper went so far as to recommend the burning of the skin of the buttocks with hot wires as a cure. Another advised blows on the buttocks with the palm of the hand. Forster in 1860 vigorously attacked these practices declaiming them cruel and unjust. He further called attention to the fact that fear of chastizement sometimes



causes serious results and showed how a boy had placed a tourniquet around his penis with a consequent production of gangrene because he was afraid of the punishment he received for incontinence. Trousseau (71), the French clinician first used belladonna for the treatment of enuresis in 1865. He had learned of its results from Bretonneau. Dittel, in 1872 thought that the condition was due to a lack of development of the prostate gland and of the internal sphincter of the bladder. The fact, however, that enuresis occurs nearly as often in girls as in boys suggests that the development of the prostate has no relation to this condition and this theory was never adopted. Thomson in 1870 used chloral hydrate for the treatment and considered the fact that enuresis might be a habit. In the same year stated it might be due to an "abeyance of the voluntary effort during sleep so that as soon as there was an accumulation of urine sufficient to stimulate the detrusor fibers to contraction, the sphincter vesicae gave away." He treated with belladonna. Teevan, in 1876, advocated slitting the meatus, as he thought it was too small in children with incontinence. In 1876, Corrigan sealed the prepuce with collodion by pouring it on and allowing it to solidify, preventing the escape of urine. Adams (2) in 1884, attributed atony of the sphincter vesicae, or to loss of the contracting power of the sphincter as the cause. Frankl-Hochwort reported in 1888 that many adults suffering from neurasthenia gave a history of enuresis in childhood. Gunion, in 1889, was also one of the first to emphasize the neurotic nature of enuresis. Sachs, in 1896, called attention to training the nervous system as a cure for the affection. Van Lienenhoven, in

1890 believed enuresis was due to weakness of the sphincter, because raising the head of the bed caused bed wetting in some children. Adams (1) stated in 1884, "If after the age of 18 months the urine is passed involuntarily, the tendency is to attribute the disgusting act rather to carelessness than to a pathological state. I am loath to accept this conclusion and am proud to state that all cases which have come under my observation have had specific causes." He added, "We all know that late suppers, rich food, wines, certain positions, profound sleep, amorous or lascivious dreams produce a nocturnal pollution in the adult and I am convinced that the same causes may excite a similar imitation in the child who empties the bladder in place of the seminal discharge." He gave belladonna for the treatment until physiological effects were produced. He also mentions cures by circumcision in 1887 (1).

Janet in 1890 stressed the importance of dreams and other psychiatric states as exciting factors in the disease (later Zappert called attention to the fact that these dreams usually develop after enuresis has been started and many enuretic children have no such dreams). Hippus advanced the idea in 1893 that the condition was hysterical. Guyon in 1897 suggested lowered tonus of the sphincters because in passing sounds he encountered subnormal resistance. Thiernich and Reinoch backed up the theory of hysteria in 1903. E. A. Graham (1904) thought belladonna and strychnine were specific if given sufficient amount. Kapsammer (1904) interpreted the beneficent results he obtained by epidural injections of normal saline as due to the stimulation of the spinal cord and a consequent increase in

the tonus of the bladder. Pfister (1904) thought that enuresis was evidence of an hereditary neuropathy. Fuchs (1910) claimed that enuresis was due to a lack of development of the spinal cord and believed that many cases had an undiscovered spina bifida which could not be discovered by roentgenology. Campbell (16) in 1918 expressed the belief that this condition was a juvenile equivalent of masturbation or of nocturnal pollution. He gives a clinical history of a girl studied from the age of seven to eleven who urinated for pleasure, wetting herself after deliberate retention. With this she also showed bizarre behavior exhibitionism and sexual perversions. It was suggested by Still (64) in 1920 that this might be due to disorders of the afferent nervous paths, for many patients do not know that they have urinated until they later discover that their bed clothing is wet. De Haan (1921) noted that enuretic children sleep very soundly. He therefore believed that slumber is so deep as to be below the threshold for the normal rousing reflex for the evacuation of the bladder. On the other hand, many children who are exceedingly difficult to waken never have enuresis and normal children who do not have to empty the bladder during the night even though they may contain a large quantity of urine. Laziness and lack of care are also believed to be the basis of enuresis, but the majority of patients examined by Davidson in 591 cases did not appear to be of this type. Zappert (1920) stressed faulty diet as a cause because during the World War, enuresis was more frequent in Germany. However, an analysis of many cases by Davidson shows that the diets of enuretic children are usually the same as those of normal children.

## STATISTICAL SUMMARY OF ENURETIC PATIENTS

Anderson (5) studied 108 boys and 40 girls who had enuresis and were seen in the out-patient department of the Orthopedic Hospital and Infirmary for Nervous Diseases in Los Angeles. With these cases he ran what he called "Organic controls", as he says, "It was believed that something of value might be obtained by comparative study of a small group presenting neurologic or psychiatric conditions in whom however, enuresis was not a symptom. If the children did not have enuresis, some evidence at least would be set forth that the pathological conditions in question were not etiologic in response to enuresis." After considering the age, color, nationality, home life, history, etc., of non-enuretic children and enuretic children he found that there was no great variance between the two groups. Some of his findings are here correlated with the reports of other men.

INCIDENCE - The incidence of enuresis seems to have increased during the last ten years. In Germany and Central Europe during 1920-29 over 130 articles appeared on this subject and the impression is that it is the after-math of the war (Mandell). Ostheimer and Levi (49) found that out of every twenty children, one had enuresis according to their observations. Townsend (70) of Boston found 21.5% of all the children applying for treatment at Childrens Hospital had enuresis or had had it. Partridge found enuresis in 10% of the feeble minded inmates at Vineland training school. Pese observed that in children asylums at Breslau during the war that 30% of all smaller children and 10% of the older children suffered from this complaint. Dunham said that among 800 nervous children admitted to Phipps

between the ages of 5-16 years, 7% were enuretics. Cimbal states it is seen in 12-15% of nervous children.

TYPE AND FREQUENCY - From a study of 591 enuretic patients, attended at the Harriet Lane Home from 1912-22 by Davidson, it was found that the percentages of types were as is recorded below. A comparison is also made here with other authors' findings:

Symptoms	Rachford	Davidson	Anderson		Zappert	Holt	Still
			Males	Females			
Nocturnal	55%	64.0%	76%	87%	56%	55.5%	44%
Noct. and Diurn.	40%	35.5%	14%	5%	44%	39.6%	52%
Diurnal	5%	1.5%	2%	5%	0	4.9%	4%
Enuresis & Soiling	?	?	8%	2%	?	?	?

Ostheimer and Levi's findings agreed quite closely to the above. Davidson found that an accompanying fecal incontinence was very uncommon except in those mentally retarded or very unstable emotionally. Burnet (12) claims it occurs most frequently in the first hours of sleep. The average number of enuretic periods of Anderson's cases was about five times a week. Rockford (57) has shown that this may occur several times a night.

ONSET - In 84% of the boys and 80% of the girls Anderson reported the onset as occurring in infancy. It is difficult to determine the time of onset of enuresis and this may be the reason why certain observers state that a preponderance of cases are initiated in infancy, while others believe with Guyon that the majority of children acquire the condition after a free interval. In half the cases in the Mayo Clinic, in which reliable information could be obtained, about half the children had been dry for a period when the condition started definitely (Amberg, 3). "Most normal children", says Davidson, "learn to

control or are taught to control the act of urination by the age of two and a half years so that after this age incontinence of the urine may be diagnosed. In the majority of children, enuresis dates from earliest infancy as they have never learned to control their bladders." The following is from a result of studying 591 enuretics by Davidson.

<u>Period when enuresis developed</u>	<u>Number</u>	<u>Percent.</u>
<u>Congenital (from infancy)</u>	510	86.5
<u>2 to 10 years (acquired)</u>	81	13.5

Schroeder (60) reports 37% of his cases dated from infancy, 9% acquired when school children, 2% in preadolescence and the date of onset undetermined in the other 50%.

SEX - Most authors state that the incidence in boys is slightly higher although this is not universal. Blau (8) found more girls with this condition than boys in his case studies. Burnet found the incidence of enuresis higher in boys than in girls up to the age of 16 years, 58% boys and 42% girls. Moss (47) states both sexes are equally affected, as does Bleyer (9). In Davidsons' article he says that in both races (white and black) enuresis is more common among boys than girls. Schwartz (61) had 226 cases and 148 of them males, leaving 78 females. Jacobs (35) showed one institution of 450 girls with only 8 cases and another of 650 boys with more than 100 cases. Walker (73) noted that the incidence was the same in both sexes. The general opinion, however, seems to be that the sexes are about equal but that there is a moderate preponderance in males.

AGE - The average age of the boys coming to see Anderson for treatment was 9 years and 2 months, and 8 years in girls.

This may mean however, that this is only the average age when the mother is exasperated enough to bring the children for treatment. Burnet believes the age incidence in boys is lower than in girls.

MENTAL STATUS - The average for the boys in Anderson's report was an I.Q. of 88% and the girls had 95%. The above figures contain several children of very poor intellect, thus it is to be noted that the enuretic child is one of average or above average mentality. Mohr and Waterhouse (46) found the enuretics below the non-enuretics in school. They studied 30 children, 15 of each class, enuretics and non-enuretics, the latter as controls. By comparing the two groups by a Stanford-Benet test, the groups seemed about equal, as follows:

Grade	Enuretics	Non-Enuretics
70 - 79	1	2
80 - 89	6	4
90 - 99	4	3
100 - 109	2	5
110	2	1

Schroeder in a study of enuretics reported the I.Q. below 70 in 7%, from 70-80 in 25%, from 80-90 in 30%, from 90-110 in 36% and from 110-120 in 2%. Feelings of inferiority were present in about 90% in Anderson's groups and right-handedness was noted in 87% (reference to the importance of this will be made later).

ASSOCIATED BEHAVIOR PROBLEMS - In the total number reported by Anderson, 76% of the boys and 60% of the girls with enuresis had temper tantrums. Thumb-sucking was noted in 36% of the boys and 36% of the girls. This accompanying symptom is also spoken of by Tisdall (69) and Thom (66), as is nail biting of which Anderson found present in 41% of the boys and 68% of the girls. It has been observed by Mandel, "Usually enuretics show other evidences of nervousness". He mentions nail biting,

thumbsucking, stammering, sinus arrhythmia, blushing easily, etc. 60% of Schroeder's patients showed other behavior problems such as stammering, tics, restlessness, etc. Masturbation has often been cited as causing enuresis. In a series of enuretic patients studied by Peasons he found that 63% of the males and 30% of the females were masturbating. Anderson found that 65% of the males and 30% of the females had the auto-erotic practice of masturbation and 27% to 25% of boys and girls gave history of sex play, respectively. Truancy was reported in 30% of the boys but many of the children in Anderson's group were under school age so that the percentage would have probably been higher if the children had been older. A number of the boys (33%) were reported as having stolen articles and 23% of the girls. 56% of all were felt to be good mixers and 60% gave obvious manifestations of jealousy. The latter trait was also noted in Thom's cases. Mohr and Waterhouse discovered 9% of the enuretics with other behavior complaints besides enuresis. 2/3 of Anderson's cases were timid.

NATAL CONDITION - Of Anderson's 108 boys, legitimacy could not be determined in 10 cases while of the remaining 98 cases, 89 (90%) were legitimate. Among the girls, facts were unknown in only one case. 37 were legitimate and 2 were not. Thus, the total illegitimate group numbered 11 or 8%. The term was determined in 85 of the males and all the females. Full term infants constituted 78 and 38 respectively, leaving 7 boys and 2 girls as variants (7%). Character of birth was known in 85 boys and 39 girls. 9 males and 5 females were delivered instrumentally and 2 boys were delivered by Caesarian section.



Thus in 124 known patients 13% were not spontaneous deliveries. The figures given corresponded closely to the control groups. Anderson also went into the post-natal conditions and had 10 boys and 5 girls who were never breast fed (16%). The average age of dentition was  $8\frac{1}{2}$  months in males and  $6\frac{1}{2}$  in females. The average age at which males walked was 14 months and females walked in 12 months.

PHYSICAL CONDITION - The following table is from Anderson's observations:

Physical Condition	Male	Female
Normal	35	16
Slight impairment	41	10
Moderate impairment	25	10
Definite impairment	7	3

Thus, 35% were in good physical condition while 35% more had slight evidence of physical impairment. Approximately 50% were in close approximation of the normal height-weight ratio. Of the boys, 8% were underweight and 7% of the girls. The remaining were overweight. Of 83 boys 76% had been circumcised and of 80, 12% had undescended testes. In the group, 30% had nutritional problems and 10% had infantile convulsions. The physical examination showed little difference in the two groups studied by Mohr-Waterhouse. They found evidence of vaso-motor disturbances in the enuretics as did Pototzky (53), Calvin and Mandell. They also found adherent or tight prepuce in 5 enuretic boys. This was not found in the other groups. Knee-jerks were increased and the blood pressure was increased in all of Thompson's (67) cases.

INFLUENCE OF HOME LIFE - Parental maladjustment was

found in 61% and 87% had faulty habit training in Anderson's groups. About 12% of these children had step-parents. Home economic status was poor in 80, fair in 50 and good in 18 cases. A more or less obvious relationship of malbehavior to other children in the family was noted in 50% of the boys and 47% of the girls. There was a family history in 30-40% in the series reported by Cimbal. Nearly 2/3 of the homes from which the enuretics came, in Anderson's report, showed a parental maladjustment. Grover (30) found 56% of such family histories in 200 cases.

COLOR AND NATIONALITY - Still says white children are much more commonly affected than colored children. It has been suggested by him that this may be due to the fact that colored parents do not pay much attention to "bed wetting". It is also probable that the relative infrequency of neurotic and neuropathic conditions of colored children is connected with this infrequency. In Anderson's cases 7 boys and 5 girls were colored. 50 boys and 24 girls were American, 11 boys were Jewish with 5 Jewish girls. There were 7 Italian boys. Mohr-Waterhouse studied Norwegian, German and Swedish stock and found no difference in these patients as to incidence. Since many men have stated that circumcision was a cure for enuresis, one would expect a lower rate of enuretics in Jewish children. Buckingham (17) however, has shown bed wetting to be as common in Jewish children as in any other race.

HEREDITY - Heredity plays a role. Familial bed wetters are common (13). It has been said (46) that familial enuresis is common, several children in the same family being

enuretics and the parents have been enuretics as well. Kraft (42) states that he believes there is a hereditary form of enuresis.

#### Summary

The incidence of enuresis is increasing. The most common type is nocturnal, the next most common is a combination of nocturnal and diurnal enuresis with the diurnal type coming last. The onset in the greater number of cases begins with infancy. Both sexes are about equally affected, but there appears to be a preponderance of the incidence in boys. The mentality of enuretics is equal to that of normal children, and their I.Q. may even be slightly higher. In nearly every case of enuresis there is some associated behavior problems. There is no material difference in the pre-natal or post-natal conditions in the two groups, and their physical condition is about the same. Parental maladjustment was evident in a great percentage of the enuretics. White children are more commonly affected than negro children. Nationality makes no apparent difference. Heredity seems to be an important feature in the role of a causative factor.

From this we can see that generally speaking, the enuretics and non-enuretics do not vary a great deal in their physical make-up, and this is substantiated by most writers of today.

## PHYSIOLOGY

Before any of the more modern ideas of the causation of enuresis are discussed it is well to have in mind the physiology of the bladder and its nervous system. Not all the process of normal micturition is understood. The act can proceed automatically and completely without any cerebral control. It has been shown (Emerson, 23) that the urinary reflex is of such a primitive character that it persists even after section of the spinal cord. Muller-Wurtzburg cites experiments in which the excised bladder of a rabbit emptied spontaneously when the filling from the ureters reached a certain volume. In the living animal the cord centers are necessary for prolonged automatic micturition. The possibility of voluntary control of the bladder by smooth muscles has raised some difficulty and this has been demonstrated by Rehfisch and confirmed by Cecil.

There are two centers recognized (Moss) which control urinary functions. The first is in the lumbar and sacral regions which maintains the tonic contraction of the sphincters and known as the tonus center. This center is bilateral and each half controls the bladder completely.

Guyon and Muller-Wurtzburg have shown that as long as the bladder mucosa is not diseased, it does not give rise to any secretion. With the filling of the bladder a sensation of distention arises which gives a definite desire for urination, these sensations arising from the wall of the bladder.

The nerve supply of the emptying mechanism comes from the upper four lumbar nerves, through the sympathetics and second and third sacral nerves through the pelvic visceral nerves,

or nervi erigentes. Starling (63) says that the upper lumbar nerves send white rami communicantes to the lateral chain of the sympathetic system, thence to collateral ganglia to the inferior mesenteric ganglia. A new relay of axons pass by the hypogastric nerves to the pelvis ending in the hypogastric plexus at the base of the bladder, whence nerves pass to the wall of the bladder. The pelvic visceral nerves are not connected with the sympathetic system but pass through the third and fourth sacral roots to the hypogastric plexus and thence the nerve proceeds to the vesical plexus directly.

Elliott has shown that the pelvic nerves cause the bladder to contract and inhibit the so-called sphincter\* and is motor to the detrusor, while the hypogastric represents the later refinements and is, at least theoretically, inhibitory. It has been shown in a cat that complete antagonism of action exists between the two nerves. There is probably a third or voluntary element in the innervation, viz. to the striated muscle of the urethra, the bulbo-cavernosus muscle via the pudic nerve (Anderson).

In this tonus center or the lower portion of the vesical nervous system, then, the distention causes afferent impulses to travel into the vesical center of the cord which is connected with motor reflex centers by association fibers. Irritation of the motor centers induces a reverse action and a negative impulse reaches the motor nerves of the sphincter while a positive impulse travels to the detrusor motor nerves. These

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\*- Wylder (78) claims there is no internal sphincter in man but the so-called sphincter is derived from two muscular loops, one from the circular and the other from the longitudinal muscular coat of the bladder wall.

later impulses travel via the pelvic, and hypogastric nerves discussed above. The filling mechanism of the bladder is purely involuntary and automatic and finds its center in the twelfth dorsal and first lumbar segments and is operated from the cord. The emptying process is mostly voluntary but not entirely and is not so much a direct voluntary action as an indirect action of the brain in removing or relaxing its control on the spinal center.

The whole automatic reflex is held in check by a second and higher center situated in the cerebrum, designated the inhibitory center. Gruinbaum and Sherrington (quoted by Wilson, 75) in their experimental work on apes place the cortical centers for the rectal, bladder and sexual centers at the apex of the motor convolution, or in the foot center. Czylhorz and Marburg place the cortical center in the hip area.

The act of micturition according to Fulton (27) is not a directly voluntary action but rather an indirect action of the brain which relaxes its hold on the spinal centers, thus permitting the reflex to operate.

In early childhood up to the age of two or three years, the cerebral inhibition is not yet established, probably due to the immaturity of the conducting tracts and cerebrum. The first response of the human organism to bladder stimulation is an involuntary process. During the first few months of life it represents the activity of an unconditioned reflex, the mechanism which lies in the sacral and thoracic autonomic systems. Awake or sleeping the child makes no attempt at voluntary control. Even after he is able to associate a manifest degree of discom-

fort with this unpleasant habit he is unable to readjust himself to the situation without assistance, and no voluntary control is possible until there is a linking up of the vegetative and associated nervous system. One may recognize herein another function of nervous tissue, that of forming new reflexes in order to adapt the organism to its social environment. The reflexes of recent formation (or conditioned reflexes) with the cortical association neurons are responsible for all higher nervous activities as they represent the reaction of the organism as a unit in response to a localized stimulus. Pavlov's experiments (Dunham) on animals indicate that fully formed conditioned reflexes exhibit great sensitivity to all sorts of conditions, on which account they are subject, in circumstances of every day life, to continual variation, often to complete inhibition. An example of this is given by Wile and Orgel (74) as they point out that the mere thought of voiding may influence the sacral vesical center and heighten its sensitiveness. Other examples are the fact that fear and excitement bring on frequent urination. Howell (37) states, "The bladder is very sensitive to reflex stimulation, every psychical act and every sensory stimulus being apt to cause contraction or increased tone in its walls." With this statement correlated with the above it can be seen that many factors can be responsible for an alteration in bladder control.

The average number of urinations a day have been recorded as follows(9):

Age of Child	Average Daily Number of Urinations
5 months	13 to 16
2 years	6 to 9
3 $\frac{1}{2}$ years	4 to 8
5 $\frac{1}{2}$ years	5
9 years	4.4
11 years	4.0

This shows the development of the cerebrum to control the bladder as a child grows older.



### CLASSIFICATION

As an introduction into the etiology I have listed the classifications of several of the better known writers on this phase of child behavior. From these one may gather, in outline form, the trend of ideas at the time the classification was made. By comparing some of the older classifications with some of the more recent ones, the reader may see the lines of advancement that have developed in the last three decades.

#### TOWNSEND (1887):

- I. Reflex.
  - a. Increased amount of urine
    - 1. Diabetes
    - 2. Nephritis
  - b. Irritant quality of urine
    - 1. Acid
    - 2. Alkaline
  - c. Vesical calculus
  - d. Hypersensitive state of external genitalia
  - e. Anal irritation
  - f. Psychological
  - g. Increased bladder irritability
- II. Atony of the sphincter vesicae.
  - a. General debility
  - b. Spinal lesions
  - c. Acute febrile diseases
- III. Malformations of bladder and urethra.

#### WILE and ORGLE (1924):

- I. Peripheral
  - a. Malformations.
    - 1. Epispadias
    - 2. Ectropia vesicae
    - 3. Hypospadias
    - 4. Patent urachus
    - 5. Vesico-rectal fistula
    - 6. Phimosi
    - 7. Small meatus
  - b. Trauma, Inflammations and New Growths
    - 1. Balanitis
    - 2. Adherent clitoris
    - 3. Cystitis
    - 4. Preputial adhesions
    - 5. Calculi
    - 6. Stenosis
    - 7. Tumor of bladder

- c. Metabolic
  - 1. Acid urine
  - 2. Constipation
  - 3. Endocrine disturbances
  - 4. Diabetes mellitus
- d. Reflex
  - 1. Pin worms
  - 2. Vulvovaginitis
  - 3. Anal fissure
  - 4. Rectal polyps
  - 5. Masturbation
  - 6. Pertussis
- II. Spinal.
  - a. Malformation
    - 1. Spina bifida
    - 2. Occulta
  - b. Inflammations
    - 1. Trauma
    - 2. Potts disease
    - 3. Myelitis
  - c. Reflex
    - 1. Hyperirritability of spinal center.
- III. Cerebral.
  - a. Organic
    - 1. Malformations and retarded development
      - (a) Mongolism
      - (b) Infantilism
      - (c) Idiocy
      - (d) Cretinism
    - 2. Diseased states, trauma, new growths.
      - (a) Tumors
      - (b) Chronic meningitis
      - (c) Diabetes insipidus
      - (d) Epilepsy
      - (e) Chorea
      - (f) Hydrocephalus
  - b. Functional
    - 1. Metabolic
      - (a) General debility
      - (b) Malnutrition
      - (c) Rachitis
      - (d) Intoxication
      - (e) Pathologic sleep
    - 2. Psychic
      - (a) Neurasthenia
      - (b) Dreams
      - (c) Nervous
      - (d) Psychosis, weak attention
      - (e) Weak will
      - (f) Worry and anxiety
      - (g) Fear and malice

The above shows an improvement over the previous classifications, as it included the psychic etiology which is a direct

proof of more thought and study.

OSTHEIMER and LEWIS (1904)

- I. Reflex.
- II. Atony of the sphincter vesicae.
- III. Malformation of the bladder or urethra.

This is not as complete as the first given and shows no advancement as they place all the etiology on a physical basis.

COLLIN (1912) (20)

- I. Infantile.
- II. Digestive.
- III. Emotional.

Moss in 1925 made very little improvement over the preceding list. However, he did bring in psychic and neurotic conditions under the heading, "Reflex".

MOSS (1925)

- I. Pathological (Diabetes mellitus, cerebral conditions, etc.)
- II. Reflex (Phimosis, neurotic and psychic conditions, etc.)
- III. Idiopathic (Endocrine, imbecile, etc.)

Calvin wrote a modern classification in 1928 and it serves as a fine model to follow in listing the causes of enuresis. He states that in most cases bed wetting can be divided into two main classes.

CALVIN (1928)

- I. Organic or physical.
  - a. Diabetes Insipidus
  - b. Mental deficiency
  - c. Vaginitis, cystitis
  - d. Chronic interstitial nephritis
  - e. Diseases of the central nervous system
  - f. Interstitial glandular disturbances
  - g. Urinary changes as when the urine is too acid or in too large quantities
  - h. Diseases of the bladder
    - i. Local irritation.

(He states that the above make up only  $\frac{1}{3}$  of the cases)

~~II. Due to increased sensitivity of the urinary tract~~

- II. Due to faulty habit formation, lack of training or oversensitive nervous system.

Winnicott (76) does not include the physical causes as coming under the classification of true enuresis and divides the psychic causes into two parts.

WINNICOTT (1930)

- I. Due to increased sensitivity of the urinary tract.
  - a. Overexcitability
  - b. Restlessness
  - c. Exhibitionism
- II. Enuresis as a revival of real or phantasied sensation.

With the aid of capillaroscopy, Prototzky in 1930 suggested the following grouping of the different forms of enuresis.

PROTOTZKY (1930)

- I. Neuropathic children.
  - a. Hypersensitive children
  - b. Conditioned reflex
- II. Psychopathic.
  - a. Fright
  - b. Lack of concentration
  - c. Indifference
- III. Fetalistic.
  - a. Lack of harmonious development
- IV. Pathocranial.
  - a. Hypothyroidism
- V. Disturbed intellect.
  - a. Epilepsy
  - b. Post-encephalitis
  - c. Imbeciles.

This is a complete classification of true enuresis, but is no more inclusive than Calvin's.

MANDEL (1931)

- I. Vagotonic type.
- II. Psychopathic type.
  - a. Constitutional hypersensitivity
- III. Imbecile.
- IV. Hypothyroid type.
- V. Debilitated child (usually convalescing).

From the above groups, Calvin's seems to be the most

suitable to adopt as it is not sub-divided to a great degree and yet includes the different forms of this condition.

## ETIOLOGY AND TREATMENT

It is probable that, after reading the preceding review, the reader will be of the opinion that all modern writers accredit essential or true enuresis to a lack of training, a psychoneurotic or nervous basis. This is far from true. For this reason the theories of the etiology have been divided into two parts. The first contains a review of the literature which points to the cause as having a physical or anatomical basis. The second refers to those articles which have placed the condition on more of a functional basis. Thus far, neither has proven their stand. We can only judge their merits by weighing each side's argument and observing their results. It is this that we wish to do in the following part.

Enuresis is often caused by certain organic states, such as cerebral palsies, malformations of the urinary tract, tumors, glandular disturbances, etc. Townsend's classification gives most of these factors which will cause an incontinence of urine, but this is not the true enuresis, or better termed, "enuresis vera" (9). Kraft thinks that physical causes account for all cases and Angular was convinced that a study would reveal an anomaly or disease in every case. Nearly every form of pathology known has been assigned at some time or another by some authors as being the specific cause of enuresis. As stated above, every man has his statistics to prove his particular theory. Most of these theories have appeared in the literature and have added all the more confusion to the problems solution. The theories below are not all the ideas that have been published. They make up the groups of factors which have been more discussed in the literature.

PHYSICAL OR ANATOMIC BASIS

A. THEORIES

ATONY - Civiale, Rochet and Jaundonet (65) attribute enuresis to a distention of the atonic bladder. Blau thought he found vesicular atony, especially of the sphincter and believed this to be the etiological factor, as he backed up his idea by curing 75% of his cases with pituitrin. Ostheimer and Levi aid in supporting this view. It has been suggested, by Moss, that several children have a functional weakness of the sphincter, placing it as a subsidiary to the relatively strong detrusor. On the other hand, Freud noted (65) hypertonus of the leg muscles in about one half of his patients and therefore attributes the cause of enuresis to a hypertonia of the vesical muscles. This disagrees with the theory of atony as does Ruhrah who mentions hypertonia of the bladder musculature.

EPILEPSY - It has been shown (5) that epilepsy could be accompanied by an incontinence of urine. Mandel says, "In idiots, imbeciles, some cases of encephalitis and epileptics, enuresis is a common finding." Burnet does not credit all the etiology of enuresis to physical causes but he does mention epilepsy. But in these instances, incontinence was a symptom of the epileptic attack and could not be classed as enuresis vera. Some writers consider epilepsy as the cause of enuresis ver, for example, Pestallozi. Von Pfister believes all cases of enuresis after the age of 5 years are due to epilepsy. Zappert (21) makes the differential diagnosis clear between enuretics with epilepsy and enuretics without epilepsy and shows that epilepsy is not found in even a small percent. of all the enuretics.

INFLAMMATORY CAUSES - Vaginitis has been written in the literature, by some, as being a direct cause of enuresis. 8 of the 123 girls reported by Bleyer were suffering from vaginitis. This was cured in 2 without influencing the course of enuresis and 4 of the remaining were cured of enuresis without any attention to the vaginitis which continued active. Likewise, concerning pyelitis, in 5 cases, he cured the enuresis while the pyelitis continued. He did show that an acute pyelitis could itself cause what appears to be a true enuresis. Fleischner avered that 20% of the cases in his clinic were caused by colon bacillus infection. Shore presented cases based on treatment for cystitis. Under this heading we may also include chorea and rheumatism which has been mentioned by Still as the cause. This was not found true in Davidson's 591 cases.

POLLAKIURIA - Bakwin (?) speculates as to the etiology and offers the suggestion that a urinary frequency and urgency (pollakiuria) might be the cause. He says this is hereditary and not yet clearly understood. Janet ascribes to pollakiuria an important part in the development of enuresis but in Amberg's (4) cases marked degrees of this symptom did not exist. Frequency and urgency is present in many individuals who do not have enuresis and these men do not explain why these children are not enuretics.

TONSILS AND ADENOIDS - Fischer (61) found that 14% of his patients had adenoids. Nygin found diseased tonsils in 75% of 400 cases of enuresis. Grumbach found 14% in 427 cases and Llong found 16%. These men attributed enuresis as the result of these growths. Grover, in 200 cases, found that 36% of the



children had the adenoids already removed. Bleyer studied 129 boys and 123 girls to see if the factors accredited to the etiology of enuresis die act as definite causes. He found a cure of 2% after the removal of the tonsils.

NEUROLOGICAL BASIS - Kerly (78) mentions faulty development. He also quotes Church and Peterson (19) who make of it as a partial somnambulism and as a physiological stigmata of degeneration. It was believed by Sundell (65) that the predominating cause of enuresis was found in the dulling of cerebral perception, and by using thyroid extract he had good results, especially with those children with backward mentality. Gottfried said it was the result of subnormal development of the nerve control of the bladder. Turner also thought that enuresis was from a lack of development of the nerve center that controls the bladder as it always appears in young children. Bleyer defines the cause by saying it is a disturbance of micturation in which the physiological control of the brain is blocked by a stronger stimulus which may have to do with the nervous mechanism of the bladder. It is possible he believes that the incontinence may result due to stimuli from the bladder itself. Pfister believes that minute disturbances are possible between the bladder and the brain. In the child, owing to the high state of tension of the nervous system, various peripheral irritations may cause reflex impulses from the brain, throw the center into action and involuntary micturation is the result, according to the theory advanced by Ostheimer and Levi. This, they say, would occur most naturally during sleep, when the center for inhibition is least active, but if the irritation be strong enough, it may occur as well during the day.

DIET - Van der Bogert (72) believes that chronic gastro-intestinal disturbances play a great part in the production of enuresis, because condition occurs at the age when gastro-intestinal disorders and gross errors of diet are common. Noble, because of his results in withholding water and foods of high water content, Nieman by demonstrating that a potato and bread diet is rich in potash which causes increased nocturnal output, and Rietchel from his results obtained by dietetic treatment based on his experience with war diets, which were rich in water, common salt and carbohydrate, believe that diet plays an important part in the causation of enuresis.

EYE STRAIN - Redway said that on account of the close association of the optic and micturition centers in the brain, and the results of six cases treated, he believed that some, if not all cases of enuresis could be traced to errors of refraction. Now let us compare Bleyer's findings. In 38 cases with eye strain and enuresis he noticed no improvement after refraction.

SPASMOPHILIA - In 24 cases in which all recognized causes of enuresis "having been fully eliminated", Maciotta (41) directed his investigations with a view of establishing spasmodophilia as the basic cause of the disease. In 17 he found an increase in the galvanic irritability, a reduction in the calcium index, a moderate decrease of ionic concentration and varied signs of mechanical hyperexcitability. Furthermore ultra-violet rays with vitamin D and parathyroid extract gave excellent results.

REVERSAL OF CONCENTRATION OF URINE - After studying 39 cases, Friedell (26) concluded that those enuretics who had

a higher specific gravity during the day, than during the night were the most difficult to treat. The three cases treated in his series who did not respond were children who had a lower concentration at night than during the day. He puts this reversal of concentration forward as a probable cause of enuresis. No distinctive relationship between the specific gravity of urine voided at night and enuresis could be determined by Mohr and Waterhouse.

**HYPERACID URINE** - Ruhrah believes hyperacid or hyperalkaline urine may be the cause of this ailment. He also thinks that some cases are purely physiological as the patients drink too great an amount of fluid.

**MYELOYDYSPLASIA OR SPINAL PATHOLOGY** - Myelodysplasia or defective development of the spinal cord was pointed out early by Fuchs as being a causative factor and since that time has had many confirmities and denials. Proponents of the view are Arenson, Cozzolino, Leopold and Ezeckson (24). The latter urges a good physical examination on those children afflicted with this as he thinks there is some hidden spinal pathology in most of the cases and quotes a case of Debet and Levi who operated on a man 23 years old troubled with enuresis and removed a band of fibro-cartilaginous tissue compressing the cord, and cured the enuresis. Enuresis is thought to be a symptom of spina bifida by Pybus (55). Davidson mentions spina bifida as a probably cause of bed wetting. There is much evidence against this theory. Saenger examined every patient with enuresis with the roentgen ray and had but one with this condition. West, in 1911, found 50.6% cases of spina bifida occulta in 87 cases of enuresis but in 100 men without enuresis he found 48%. In X-rays

taken of 68 children, with enuresis by Carrau (18), 49 presented nothing abnormal. In the other 19 he found, (1) fusion of the fifth lumbar vertebra, (2) scoliosis, (3) Non-fusion of the posterior lumbar transverse processes.

ASSOCIATION TO THE SEXUAL CENTERS - Moss states that since the vascular and nervous supplies of the bladder and sexual organs are so closely related, it is probable that the development of the latter may have some influence on the urinary apparatus, and in this way might be responsible for the disturbance in the function of micturation. Ostheimer and Levi, as an explanation for the cessation of incontinence with the onset of puberty, say that the incontinence of the child acts as an escape valve for reflex action, which after puberty is relieved by menstruation in the female and nocturnal pollution in the male. Adams gave practically the same explanation in 1884. Jelliffe (36) believes that defecation and urination are in themselves the earliest sources of pleasurable sensation and activity, and that this may be the cause. He states they never entirely lose their share in association with the genital organs and their function. Stekel referred to the tendency of aged men to return to this habit, constituting a form in infantile sexual activity, agreeing with Jelliffe's statement that the association is never lost. The pleasurable sensation ascribed to urination in infants might return to the aged after they are impotent and this is the outlet for their sexual urge.

BLADDER HYPERESTHESIA - Schwartz speaks of an extraordinary hyperesthesia of the bladder to distention in typical cases of enuresis, and forwards this as the probable factor.

Wietz and Gotz (4) differ, and think that bladder contractions occur without the sensation of a desire to micturate in enuretics. Amberg could not duplicate their findings in similar experiments and proved that enuretic and normal children's sensations were similar. Thompson injected fluid believing that dilatation of the bladder was necessary to cure enuresis. After filling the bladder he removed the catheter and allowed the patient to pass the retained fluid. It is interesting to note that he accomplished the procedure with demonstration to the patient of the quantity that had been retained and it is probable that the suggestion offered in this treatment may have been the cause of beneficial results obtained.

ENDOCRINES - Leopold - Levi believe enuresis is caused by thyroid insufficiency. Williams and Hertoghe have noted thyroid insufficiency associated with this. Haas on the other hand, reports some cases of enuresis associated with hypothyroidism. Jacobs thinks these cases may have a hypoactivity of the posterior lobe of the pituitary gland which would result more or less in an atonic condition of the nervous system in the bladder region. Zanoni considers this a functional disorder of the suprarenals. Mello-Leitao believe that it may be due to an alteration of the hormone of the internal secretion of the kidney which becomes unable to work on the bladder sphincter.

POSTURE - Lippman believed that there was a probability of stimulated renal activity under certain postural arrangements. He therefore placed his patients in extreme kyphotic positions for one hour before retiring, then had them empty the bladder before going to bed. He found that most children remained dry

all night. Defective posture did not seem to alter materially the course of enuresis in Bleyer's series.

**TUBERCULOSIS** - Keersmacher believes that enuresis is a manifestation of pulmonary tuberculosis and malnutrition. He points out the fact that these two conditions are both prevalent at the same age in children and claims good results from tuberculin. This is not probable, since tuberculin has no certain beneficial effect on active tuberculosis. Chronic malnutrition, such as tuberculosis, syphilis and rheumatism, according to Rachford, are important and he says they cause 50% of the cases. They bring about a malnourished condition of the nerve centers which not only increases the reflex irritability of the spinal centers but lessens the functional activity of the higher centers of the brain, in this way weakening the inhibitory control. Bleyer could find no evidence that malnutrition was an agent in bringing on enuresis.

**MASTURBATION** - It has been often written that masturbation caused enuresis. Anderson says, "Enuresis may be an almost conscious erotic sensation derived from emptying the bladder and the securing of a sexual satisfaction without the arousal of feelings of guilt." Pearson thinks enuresis and masturbation are equivalents, as many times masturbation starts when training for the control of the bladder is started. This can be argued in two directions as most children brought in for bed wetting are within the period of masturbation. If enuresis were a real equivalent one would expect a lessening in the incidence of masturbation among those patients with enuresis and figures (see "Associated Behavior Problems") do not prove this.

It is probable that masturbation is even more common than statistics show as many patients will admit an enuretic history when they won't admit the other. Saxl and Kurzweil (59) believe this to be at least a predisposing cause, as in their treatment they advise keeping the child's hands out of the covers to prevent rubbing the genitals.

PHIMOSIS - Townsend and Hamonic (61) thought that phimosis or adhesions between the prepuce was the cause and reported good results from circumcision. In Grover's cases however, 51% had been circumcised before they came in for treatment. After curing 14 cases of nocturnal enuresis by removing adhesions between the glans and prepuce, Simmonds (62) brought out the idea that these adhesions might be the specific cause of bed wetting. Klingersmith (38) was rewarded with three cures after circumcision. These results do not explain the enuresis in female patients. Among 129 boys in Bleyer's clinic, 33 had been circumcised and still had enuresis, 14 had transitory relief and in 2 instances the parents believed that a circumcision done before entering the hospital, had caused the condition.

SMALL MEATUS - A small meatus has often been written of as the direct factor in causing the incontinence. Bleyer had 18 cases which presented what he considered small meati, in which there was no improvement after meatotomy or dilatation.

CIRCULATORY - Bossert-Rolett discovered that certain children, when allowed in bed all day, had no enuresis and concluded that a circulatory disturbance was basic.

SLEEP - Sundell hinted that this condition might be due to a profound sleep. Pleasant (52) believes that enuresis

is brought on by sleep because the sympathetics are meant to be at rest, hence the predominance of the vagus (cranial) nerves. Therefore, in sleep, he reasons that one would expect to find a predominance of the sacral nerve impulses in relation to the body. For this reason he used pituitrin as the method of therapy and had good results. Nevertheless, this does not explain diurnal incontinence. De Haan said that these children slept so deeply as to be below the threshold for the normal rousing reflex for bladder evacuation. Courtin's (4) accurate observations revealed that the period of enuresis did not occur at the time of deepest sleep and found that the sleep of bed wetters was somewhat lighter than in normal children. If two children are compared, equally difficult to awaken, and only one with enuresis, this would demand attention to the enuretic only. There is the more or less unconscious desire to create an alibi in the defense of undesirable habits in one's children so that this reason is often given. Another point to consider, if it is true that the sleep is below the threshold for the normal rousing reflex, is, why doesn't fecal incontinence occur more often during sleep?

ALLERGY - Bray (11) found that 5% of 1,000 allergic children over 7 years of age have enuresis. He divides enuresis with allergy into three classes: 1. Enuresis occurring along with allergic manifestations or asthma, hay fever, urticaria, etc. 2. Cases in which enuresis is present along with conditions that have proven to be allergic in origin, 3. Cases where enuresis occurs as the sole manifestation of allergy. He compares the nerve supply of the bladder and lungs and shows the innervation is similar so that the bronchi are dilated through



the sympathetics and the internal sphincter of the bladder and the trigonal region are contracted and the detrusor muscle inhibited by the same nerves. Thus stimulation of the parasympathetics may lead to a broncho-spasm or to the discharge of urine. He believes that stimulating the sympathetics may counteract the asthma and relieve the bed wetting. It seems probable that all infants who are victims of incontinence, if they are allergic, do not show more anaphylactic reactions.

Not one of the theories given above has been proven. Many of them conflict with other theories in their principle which naturally prevents them from being accepted. Some are offered which are the result of a lack of study and from drawing conclusions after seeing too few patients. It is highly improbable that any of these theories can be applied to every case. Why not, then, look at the cause in a different light and seek some explanation which does not have conflicts, applies to every case and which is supported by results?

B. TREATMENT

The various treatments given at this time are those which are given with the idea that the cause of enuresis is an anatomic maladjustment of some order. Some forms of treatment have been given above to offer proof for some writers' theories; mention of these will be made again to complete the following list.

1. Drugs - Zappert has compiled a list of over 30 drugs that have been in the literature in the last few years which have been advocated as cures for enuresis (5). Many of these have no value of any kind. A few examples of some of those cited are - valerian, antipyrine, rhus aromatica, salicylates, taka diastase (56), strychnine, arsenic, iron, sulphanol (28), citrates and benzoates. The authors who presented most of these offer no explanation as to their therapeutic action. Atropin has been given for relaxing spasmodic contraction or hypertonus of the vesicular musculature (Thompson, Thursfield, Amberg, Bokay, Ostheimer and Levi). Thyroid and pituitary extract have been used by many men who have claimed remarkable results (Anderson, Jacobs, Pleasant, Thompson). Silver nitrate has been injected into the bladder to increase the sensitivity of the mucosa and some report 50% cures by this method (Amberg). Testicular extract was given by Fischer as he noticed that many enuretic patients have unilateral or bilateral cryptorchidism and concluded that the treatment would be of aid in these cases. Ergotoxine is favored by some as it is supposed to stimulate the motor myoneural junction while other extracts of ergot work directly on the unstriped musculature (5). Camphor was used by

Deangeles who improved 6 cases after giving 2 grains. Pototsky also had good results in some cases which he believed was due to stimulating the circulation.

2. Injections - Epidural injections were first used by Cathelin in 1901 and his method was published and immediately translated into many languages and a flood of publication followed. Some recent writer also advises this procedure (Freeman, 25, Gonzalez<sup>(29)</sup>). The rationale of this method is based upon the epidural pressure effect upon the filaments of the cauda equina, and the reflex tonic effects upon the lumbar center. Perivesical injections have been tried with results (21). Saline is injected between the coccyx and the rectum followed by a spinal puncture.

3. Electricity - Some, working on the belief that the cause was a relaxed sphincter have employed electricity using galvanic, faradic or high frequency current (Gibbs, Davidson, Johnson, 37).

4. Sphincter Exercise - The stop and start method has been used. This is where the patient starts the stream and then stops it several times voluntarily (Thompson, Davidson, Herman, Pesik, Carter). This treatment aims at training the musculature controlling the bladder and strengthening it. Neave has a child sit on a stool and hold urine after having the desire to void in the hope of strengthening the vesicular muscle.

5. Change in Position - Raising the foot of the bed has caused improvement in some cases (Davidson, Saxl and Kurtzweil). Lippman placed his patients in a kyphotic position for relief. It has been said that the position of lying on the back while sleeping should be avoided (5). This is based on the ob-

servations of greater activity of spinal centers in the supine position as evidenced in dreaming, erections and enuresis.

6. Baths - Hot or cold Sitz baths, showers to the shoulders or cold spongings have been used in an effort to increase the muscle tone of the bladder (49, 21).

7. Massage - Abst, Davidson and Bleyer suggests a a bimanual massage with one finger in the rectum and the other hand over the symphysis. Others have had good results by massaging the prostate (28).

8. Passing Sounds or Bougies - The passing of a bougie is thought (21,23) to possibly cause an irritation of the posterior urethra and the vesicle neck, thereby intensifying the sensory impulse to the brain sufficiently to attract the patient's attention by causing pain when the urine passes into the posterior urethra, until the habit of control is established.

9. Dilatation of the Bladder - This procedure was discussed above (67).

10. Closing the Meatus - Corrigan advised sealing the urethral opening at night with collodion. Others have tried pressure bandages over the meatus as well as pressure on the urethra applied through the rectum. Blum has devised a penis clamp which can be had in various sizes and for which he claims good results.

11. Restriction of Fluids - Nearly all men agree that fluids should be restricted after a certain hour in the afternoon (13). Thursfield stated no attempt should be made to diminish the fluid intake since such a course leads to a highly concentrated urine which is likely to excite the bladder. Kraft

has also cautioned against this procedure.

Other treatments which should be mentioned are wearing of urinals (Plato, 51), surgical operations on the adenoids, tonsils, clitoris and penis. Diets have been discussed. Alkaline waters and dilatation of the meatus have been suggested.

It seems likely that since practically any treatment will give results in some cases, regardless of its physiological or pharmacological action, that the benefit is psychological. The value of drugs is questioned when we consider the fact that as many cases recover without drugs as recover with them. Evidence for this statement is given by the results obtained by Wile and Orgel. Two series of fifty children were treated with and without medication. The results were 38% cures in each series. Focher, who so strongly advocated the endocrine theory said, "The child must always have the feeling that one means well" - which can be interpreted as suggestion with medication in his treatment.

Suffice it to say that as most cases can be cured without anatomically correcting the supposed defects mentioned, they may be considered as overrated in their importance numerically.

#### FUNCTIONAL BASIS

An objective psychological approach is necessary for any physician in studying enuresis, and when such an approach is made it will be seen that persistent cases are in almost every instance, associated with disorders of behavior and personality. There is a general trend

in late literature which gives the idea that anything which disturbs us mentally or physically may give rise to this symptom (78). This is true in part, for where the tendency for enuresis exists, numerous factors may cause it to appear (Zappert) and "a flight into enuresis may be an escape from an intolerable situation" (61). Most well-informed writers in this field today agree that enuresis is due to lack of proper training or to an oversensitive nervous system (13) or both.

Bleyer showed that 25% of the enuretic children he studied seemed to show disturbances of the nervous system, evidences of what the physicians are given to call "instability". Anderson (6) believed that one fourth of his cases were emotionally unstable. It is wondered by some whether the incontinence precedes the neuropathic tendencies or aids in its production. Anderson, Moss, Holt and Howland believed that in a great number of cases the condition was primarily habit, often associated with other habits which indicates an instability or a slightly susceptible nervous system. Many authors think that the condition is brought on by mental distress (15) or a nervous disorder (42). Church and Peterson say nocturnal enuresis is a common disorder of weakly and neurotic children, and it has been found that most children who are enuretics are offspring of neuropathic parents, (Konrad (39) and Rachford) and are more liable to suffer later from functional disorders (73). Robson (6) adds, "Excluding gross disease, enuresis is primarily a functional nervous disorder", and Klotz obtained excellent results by basing his treatment on the assumption that these patients were of a neuropathic constitution. "There can be little doubt," states Herman (32), "that the vast majority of cases represent a pure functional neurosis, for we rarely find any marked

changes in the urine or genito-urinary tract." He believes it is primarily a psychical disturbance which may be compared with stuttering, in the latter the patients' vocal and respiratory organs are normal but the patient does not use them properly. As was stated it appears that the enuretic child is somewhat superior to the average in mentality (5). These observations indicated, however, that they were less stable mentally, evidencing some neurosis (46). An explanation for this is attempted as follows: "The intensity of emotional sensitivity has some correlation with the intellectual status so that the brighter child comes to regard his enuretic habit as undesirable and shameful early. This is less the case with a duller child. This gives the setting for loss of confidence and much over concern in the brighter child" (6).

Calvin believes that faulty habit formation accounts for two thirds of the cases of true enuresis, i.e. the enuresis not caused by organic or physical defects. Tisdall writes that the emptying of the bladder is out of voluntary control in the young infant. The amount and type of fluid ingested are the chief factors involved, but, as the child grows older, it is necessary for him to learn that in social life such functions must be performed according to set rules, and these are learned by proper training. The cessation of enuresis in the adolescent occurs gradually and depends partly on a desire to be socially acceptable with the assumption of personal responsibility (60). Training may be needed to stimulate this desire, especially in nervous or emotionally unstable children, and the lack of this training is often times the cause of poor results.

# I. ETIOLOGY

A. OVERSENSITIVE NERVOUS SYSTEM - Under this heading comes those children who have acquired or inherited a nervous constitution, i.e. the high tension, emotionally unstable, nervous, restless, very active child (14); the hyperkinetic type with an over sensitive nervous system. With these symptoms an anxiety state exists which shows itself by increased frequency and urgency of urination (76), and exhibitionism is important in some of the cases. The children with this type of enuresis are hypersensitive in the broadest sense of the term and respond to every instance of unusual excitement in the form of a reflex disturbance of the mechanism of the bladder. This sensitive nervous system probably tends to respond too quickly to impulses sent to it from the bladder.

Another explanation is offered (22) as to why these children exhibit enuresis as a symptom of their condition. It will be remembered that under "physiology", a reference is made to Pavlov's animal experiments which "indicate that fully formed conditioned reflexes exhibit great sensitivity to all sorts of conditions, on which account they are subject in circumstances of every day life to continued variation, often to complete inhibition." Krasnogoski's observations show the same results in children.

Three distinct types of inhibition have been recognized. 1.- Conditioned by sleep. 2.-The synchronous arrival at the higher centers of intrinsic and extrinsic stimuli giving rise to other reflexes. 3.- a disharmony between conditioned and unconditioned stimuli from which the reflex was formed, (22). The former theory is the most logical to accept. It



should not be surprising then, in children with nervous instability to find the inhibitory control easily unbalanced, as in these individuals there are the the interferences, mentioned above, of cerebral correlationship (42).

Factors causing an over-stimulation of the hypersensitive nervous system are numerous. Overwork in school, extra music or elocution lessons, movies and radio programs, quarreling in the home, excitement, etc., certainly contribute to the cause of enuresis. Pototsky has demonstrated that this often follows, or happens in the nights of excitement, during the day or evening, after hard vigorous play, arrival of relatives, tantrums and the like.

Fatigue is important in this class of cases. A number of men have discussed this type. Grover from his study based on 200 cases, and Fulton both thought that enuresis was a disturbed symptom complex due to a neuromuscular fatigue. Griffith mentions fatigue as a cause and advises against placing too heavy articles of bed clothing over the patients to prevent further fatigue. Many cases in Dr. Jahr's Behavior Clinic have cleared up following a short rest in the afternoon. Most of these children are too active, they are highly strung and study too hard, play too hard and work too hard, always "being on the go" and exciting themselves. The tension is not only physical but mental as well, causing a neuromuscular fatigue. The rest that normal children require is not enough for these individuals as they have used more energy than the non-nervous child, especially mental energy. Thus when they rest they are fatigued to such an extent that there is a complete relaxation psychic-

ally and physically, so that enuresis results due to a lack of inhibition and the higher centers responding too quickly to the bladder impulses. Sleep is not essential for this, as it can occur any time that the child attempts to rest. The awakening therapy is unsuitable here as it is necessary to be careful with these patients, who, owing to their greater excitability, possess a low awakening point and are wakened out of sleep by every outside indication. The object should be to quiet the child's nerves and transform restless sleep into peaceful slumber in order that the child can recuperate his strength for the following day. Fatigue played a part in one girl who was normal but over-excitabile and over-exerted herself. The enuretic symptoms improved under a rest regimen but lapsed when her mother no longer insisted upon the rest regimen. Another good instance of this type was one we saw in the University Clinic:

Pearl is a girl 7 years old; her entrance complaints were nervousness, restlessness, cries easily, poor appetite, pain in the stomach and enuresis. Physical and laboratory examination were negative. She was very shy and backward on the first visit, talking very little and clinging to her mother most of the time. Her mother stated that the patient played too hard and worried a great deal about school. Due to the tension that was apparent the child was advised to take an hour of rest per day and to limit the fluid intake after 6 P.M. She was also given a card with stars and convinced that she was going to get well within a month. Some suggestion was tried on the patient also, by having her read a few lines that she would not wet the bed, to her mother before retiring. She returned in two weeks

and all the nights were dry except Saturday and Sunday. On questioning, it was found that on these days she had not taken her nap, as the mother had not understood that it was to be every day instead of only school days. Pearl came in again in two weeks and had only one attack of enuresis which had occurred the previous Saturday. This case shows the value of rest in this type of case.

In one series studied (6) nearly one fourth of the group gave a history of being ambidextrous or left-handed, becoming more set in the use of one hand as training proceeded. This may have some bearing on enuresis theoretically, by virtue of the psychic distress resulting from too vigorous efforts in replacing the right for the left hand. This appears to be a trivial matter, but in this cases, a small factor is a big factor due to the fact that it is just "more coals on the fire". It has been noticed (12) that a child who is enuretic, is much worse during the school period and that this symptom disappears in many cases during the holiday season. The worry so often associated with school life of nervous children is the source of many psychic upsets in the child's life.

When a relationship exists between stealing and enuresis, which is not uncommon (6), it is often what one expects. After stealing, one can imagine the psycho-emotional upset, and this is a fertile field for enuresis. The relationship does not need to be confined to stealing alone, this being cited only as an example; for any condition such as masturbation, truancy, shame, sexual irregularities, lying, disobedience, etc., could cause this upset with similar results.

The worry brought on by the feeling of insecurity increases the child's anxiety and raises their nervous personality to even a higher pitch. In non-enuretics it may start the habit, and in enuretics it may implant the habit more deeply. Children in foster homes live a less secure existence than they would in their own homes, as any form of undesirable behavior often results in a rejection. A child, especially after being removed from several homes, due to his enuresis, successfully tends to lose his stability (6). There is also the child, usually the first born who has had the individual love and attention of his parents, who, after the birth of a baby brother or sister, starts wetting himself. Some cases in which this appears do this to regain some attention (discussed later). However, some children get a feeling of insecurity and worry. They see the new member of the family getting most of the attention and they wonder if their parents have forgotten them, since the parental interest is so rapidly diverted to the newcomer. Many children, after their confidence has been gained, will tell the physician that they don't think the parents care for them any more and the mental concern tunes them up to a high emotional key, and their condition becomes worse. This tends to prove that whatever the cause of enuresis, its persistence is almost directly proportional to the emotional stress (6).

The emotions contribute their share in adding tension and nervous strain to this unfortunate type. Fear, concerning the ability to control the bladder, brought about by being shamed or punished repeatedly in spite of every good intention, concentrates the child's mind on his difficulties of bladder

control. Fear and anxiety of committing the act, the suggestion working on the enuretic's mind that he has failed to control a nasty problem is the cause of the difficulty (14). Anger and jealousy, when they are present, have the same reaction as fear and unless the emotions are curbed, the condition usually becomes more severe.

Ten of the children in a small group studied (46), showed mental conflict and in nine of these the conflict settled around the parents. If the child is subject to emotional tension which may cause enuresis, then certainly, in poorly adjusted families, the causal factors occur more often, than in the adjusted families. It can not be stated what the actual connection between the conflicts and the parents is in many instances, but often home atmosphere is clearly basic to the child's emotional disturbance.

Earl D. came into the University clinic on May 16, '31, when he was 5 years old. Physical and laboratory examination were essentially negative. His complaint was nervousness and diurnal and nocturnal enuresis. His mother is a woman of some literary talent and is quite a day dreamer which probably is the cause of the home being kept so poorly. The father is a hard-working man with an irate disposition. There are frequent family quarrels. This seems to cause a mental conflict in Earl's case as his incontinence increases after family quarrels according to his mother. He has been observed in the Behavior Clinic but once (4/2/32) and results have not been noted at this time. Undoubtedly his condition would improve if he were removed to another home away from the disharmony which now exists in his

own home.

Parental disharmony over religion may be an indirect factor. This brings on quarrels and involves family relationships. Since the quarrelings are usually precipitated by the question of the child's religious beliefs, the child becomes the cause and result and feels that he is the cause, so that a feeling of depression is aroused increasing his nervous tension. The economic status of certain families may precipitate enuresis in susceptible children. The spoiled child of wealthy parents is more prone to develop enuresis than the child of more moderate means. These cases are usually due more to lack of training than to an emotionally unstable constitution, However. In the poorer families there are pressing problems which demand their attention, as they are prone to be depressed or quarreling over matters concerning their poverty, impressing and worrying the children, this paving the way for enuresis and other problems which grow from the seed of a nervous constitution. The relationship of the child with enuresis to the other children of the family is important, from infantile despondency to acute jealousy and antagonism. Too many parents have the "expected failure" attitude instead of the attitude of confidence and success (14). To overcome the disorder the child must have confidence but in a great many instances the child and mother have lacked confidence and given up after many attempts to cure the condition, and wait for the child to outgrow the condition. To illustrate the succeeding case is presented (6).

A boy 8 years old, and a girl 5 years old, in the same family had persistent enuresis. Various remedies had been

tried and had met with no success. The mother had become convinced that nothing could be done and had conveyed this idea to the children. When confidence was restored the disorder ceased.

Many conditions which increase the nervous tension have not been mentioned. Space would not permit listing them all; it is probable that all the factors are not yet known. It is not necessary to include many of them here as they all exert their force in a somewhat similar manner. The object in placing the ones above was to give them as examples, and show how such factors could cause worry, mental conflicts, increase the nervous tension and cause enuresis or to make the established condition more difficult to cure.

B. LACK OF PROPER TRAINING - The children under this division have been called psychopathic, in whom enuresis is a behavior complex (42). In fifteen enuretics studied (46), training had never been established in eleven. Walker is of the impression that a great number of enuretics have the condition due to arrest of education and discipline of the bladder. Konrad says that besides heredity a second element enters, imperfect training. Porter and Carter give as the principle cause - improper training and the establishment of a neurotic habit. It is usually the result of poor training so that the child has not learned the dry habit. Calvin believes training is the most important factor as does Thom and Hamill (31). These above writers' ideas parallel one another as they all state that lack of training is the fundamental cause in most instances. The relationship between training and nervous instability should not be overlooked as lack of training can increase the nervous

stress due to the worry of not being able to control the habit. These children may develop an oversensitive nervous system and be much more difficult to treat. Here a vicious circle exists. The distress over the act brings on a greater nervous strain and this being a predisposing factor, causes more frequent periods of incontinence. "A general improvement in the child's behavior and attitude accompanies improvement in this habit and one is led to believe that the feelings of inferiority and shame are in many cases associated with enuresis and often color the entire mental life of the child" (66).

In the majority of cases in which the child is not properly trained at 2½ years of age, the fault can be attributed directly to the parents. They have failed to establish the dry habit. This may have been because they were ignorant of the importance of habit training. Often it is indifference or laziness on the parents' part; they feel that it is too much work to take the child up at inconvenient hours and therefore permit the child to become accustomed to wet diapers. Parents are inclined to accept such parts of their own childhood experiences as they remember as being fair guides for what to expect from their own children (66). Unfortunately, many of the memories carried over consciously into adult life are deeply charged with emotions, which may be either pleasant or unpleasant. So the parent, who, because of enuresis, was shamed, humiliated, punished and frightened through the efforts of those concerned to overcome the habit will probably be very sympathetic toward her own children who have the same trouble. If it were true that fear, humiliation and punishment were essential to treatment,



this parent would be quite right in avoiding it, but fortunately they play no part in the proper treatment of enuresis. In fact, the most important feature of the treatment is to prevent the child from developing a feeling of inferiority because of the habit (66).

As the child grows older, the mechanism inhibiting reflex acts, become better developed and the normal incontinence gradually disappears, this taking place in many instances around puberty. In some cases enuresis continues until relieved by treatment, or until the inhibitory centers are better developed and the nervous system which controls urination is more stable, (57). Sensible and consistent training on the parents' part aids in developing the inhibitory centers. The educational procedure adopted by the attendant of the child, if it is the right type, induces voluntary control in the child by presenting frequently a temporary association stimulus coincident with the biologic stimulus. That is, the child is seated on the nursery stool at the same time that the desire stimulus is about to react. Through this the child is able to build up a control. Impulses which formerly went to a particular region of the nervous system become directed to a different one, thereby inducing controlled action in the nature of a conditioned reflex. Thus the child acquires the habit thereafter voluntarily cultivated.

The chief causes of failure (14) to train the child properly and consequently the psychologic causes of this behavior problem, are:

1. - Postponing the training beyond the natural age. This delay establishes the bad habit more firmly and also forces

one to deal with a more negativistic (older) child. This accounts for the reason that better results are obtained with younger children (46).

2.- Arousing fear and shame concerning the ability to control the bladder. Shaming, segregating and punishment concentrate the child's mind on the difficulties of bladder control. By using some such severe methods of training and surrounding the child with an atmosphere so repressive and unhelpful, he develops a fear of wetting which is enough in itself to make him do it. He gets obsessed by the idea of doing it and loses faith (77). One should never use severe punishment or arouse fear in connection with the use of the toilet. A mishap should be treated in a casual and kindly way. Faith that he can succeed can be aroused by emphasizing the successes with much praise and rewards, and not mentioning the failures. Lack of faith in the child should never be expressed. Henry, aged 9, came into the University Dispensary last December. Physical and laboratory examinations were negative. He complained of a pollakiuria and enuresis. He was bright but seemed greatly concerned with some introvert tendencies. He liked his teacher at school and got good grades, but he had no boy friends and the boys in school called him "cry baby", and chided him for his diurnal enuresis. He stated that he worried about his condition and tried to keep from urinating, but incontinence often occurs before he feels the urge. He was seen in January in the Behavior Clinic, and had not wet the bed since the time he was in in December, but had had irregular attacks of diurnal enuresis. He was encouraged and when he came in in April, stated

that no diurnal attacks had occurred since his last visit in January although he had a wet night the week before coming in. I believe this boy's plight was due to the attitude of his school mates who shamed him and caused him to be greatly concerned over his condition. A similar cause was the factor in Donald's case. He was seen in the University Clinic (3/15/32) by Dr. Jahr. The boys grandparents "nagged" him a great deal, and one constantly mentioned his slack habits. He is a nervous child and this no doubt adds to his nervousness and lack of ability to control his bladder.

3.- Arousing a feeling of antagonism as a result of the spirit of training. In some instances the training is conducted in such a spirit that the child's antagonism is aroused and he comes to desire to wet himself to annoy his parents. In a foster home some children were noted to be aggressive and the enuresis was considered as a nature of revolt or antagonism (46).

A case illustrating how antagonism may manifest itself is Everett. His mother had left him exposed so that he became ill. He realized this and acquired an antagonism for his mother, exhibited in part by enuresis. He promptly recovered after he was sent to a boys' camp. Another case is a boy, 12 years of age, who, after every admonition by his parents, would wet himself. The wetting was not reflex but happened about two hours afterward. Conditions grew so bad that the boy was boarded away from home under a sensible master and the child kept himself dry, but upon returning home, enuresis again appeared after punishment. Charles (6), who usually lost his battles with a younger brother by virtue of the mother's interference,

soon learned that enuresis, while not gaining favorable comment at least attained some satisfaction for him in antagonizing his mother.

Negativism should be avoided by not dominating unduly and unreasonably, and by not being impatient and inconsistent in one's methods. One should avoid making the toilet a battle ground for discipline. Children will then wet merely to annoy and get their own way.

4. - Making this behavior problem the occasion for an emotional scene of an exciting kind. Emotional scenes on the part of the mother or nurse concerning the use of the toilet, such as weeping, showing great concern over accidents, petting or coaxing excessively. Children love emotional scenes, which make them the center of attraction, and wetting, especially diurnal, may serve to keep them in the limelight, especially the child with an inferiority complex who has difficulty attracting attention by other means. This type is shown by the succeeding case (53). A girl 3 years old, intelligent and with a likeable disposition, with overly-anxious parents. The girl's bed wetting had been a source of worry to the whole household. Every morning with a great deal of anxiety the whole family examined the bed to see if it was wet or dry. The patient's trouble was related before the child to a physician and the mother was told to pay no attention to this as it would clear up in two years. Results followed in several months as the child was dethroned from the position as center of attraction in the family, who were no longer worried and upset by this, and became dry.

Enuresis is particularly manifest in the first born or

in only children who remain the center of attraction for a longer or shorter time (7). They become accustomed to their dominant position and enjoy it, resenting any division of the affection.

5.- Failure resulting from undue emotional dependence upon the mother. This is brought on by the mother by excessive "babying", by over affection. This leads the child to attempt to continue the period of infancy and enjoy maternal care. In the case of Margaret (77), the doctor gave her bitter medicine saying it would cure her bed wetting. Margaret wished to be cared for (infantile) and showed them that she couldn't be cured by medicine by wetting the bed all the more.

6.- Emphasizing organic ailments to the children or in their presence without sufficient basis for such statements, i.e. speaking of weak kidneys or "weakness of the bladder". The child may feel justified in persisting in the habit because he is sure that he has "weak kidneys" which he will outgrow when a man.

7. - Allowing the enuresis to serve as an alibi. In some cases this serves as an alibi, thus relieving the child of the blame and thus receiving relief from many emotionally depressing scenes such as scolding, teasing, whipping, etc.

A case to show this is a girl 5 years old who had had her way and just about ran the household because any upset would give her an attack of enuresis. The family was worried but had had no success in treating the child/<sup>i</sup>s disorder. The key to the solution was obtained by overhearing the little girl tell some

friends that if she didn't get her way she would "wet her panties". When she found that no one cared particularly about whether she "wet her panties" or not she immediately recovered. Another girl, Mary H., 7 years old had developed clear cut feelings of inadequacy and social inferiority through too much companionship with a more gifted sister and wet herself to get attention and to show why she was unequal.

It was observed in cases from the Philadelphia Child Guidance Clinic (6) that the incidence of enuresis was high in those with physical impairments. While it may be not the physical inferiority per se, that causes enuresis, it may well be the attitude of the patient or the parents to that inferiority. Many cases date back to an illness. From the behavioristic point of view, less depends upon the illness itself than upon the mutual attitudes developed between the child and parents, because of the illness. The habit regimen may be well established to be interrupted by the illness. The illness passes and the endeavor is made to reestablish the non-enuretic routine, the child opposes and falls back on the bulwark which has proven to be so effective, complaints of illness. This gives the child an alibi to refuse to accept the responsibilities placed upon him which he does not care for.

8.- Indifference on the part of the child. This group includes the individual who is absolutely indifferent to the disturbance and seemingly fails to understand what the reproaches are about. Children of this type are the hardest to cure. One usually finds them with an imperfect development of the sense of shame. On close inquiry there is also the lack of

moral feeling. In most cases however, their education is much to blame. Just as it is utterly wrong in the case of hypersensitive children to offend their sense of shame, so is it equally wrong in dealing with these children for parents to treat the trouble with an attitude of indifference. Goldstein in his treatment of older children puts them in a perambulator, parades them before other children as if they were babies. To show that they can control their enuresis if they so wish to take the responsibility is shown by a physician's daughter (53), age 13, who came in with the complaints of bed wetting with indifference. The parents were much troubled but were unable to bring themselves to a pitch of adopting somewhat severer educational methods. The girl had shown no improvement under the usual methods of treatment. The parents were going on a trip and wanted to take the daughter along but the consultant would not allow her to go on account of her enuresis. Immediately she stopped the habit.

9.- Imitation of older children by younger children, or by children who are suggestible. In boarding schools or in cases where there are two or more cases of enuresis in the same family, this is sometimes a result of imitation. To support this idea is the fact that enuresis breaks out in epidemic form in schools and institutions. The disturbance ceases as soon as the affected children are isolated (39).

An illustrative case is that of a boy (46) who, being generally suggestible was influenced by the attitude of the other boys and became enuretic along with them. Another case of this type seen in the University Clinic was Robert, a brother

of Pearl, mentioned before. He is 5 years old and 2 years younger than his sister. He is a normal, not overactive boy and has no other associated behavior problems. His mother's account of her training method seemed satisfactory. He was dry a short time a few years ago, then the habit started again. In this case the boy was apparently normal and had good training but had imitated his sister who was an enuretic. This is further substantiated by the fact that Pearl came in for treatment two months before he did and started improving. An improvement was immediately noted at this time in Robert, again imitating his older sister.

10.- Shamming on the part of the child. There are some cases reported (40) which were due to feigning this behavior disorder. These occurred in older children of exceptionally high mentality, usually about the time that they were sent away to school. They develop nostalgia and resort to this method in trying to be sent home.

11.- Laziness is one of the elements which contribute to this condition claims Petit. Some children are too lazy to arise from bed. A normal child feels uncomfortable in wet bed clothing but if the mother has allowed the child to remain with this apparel on, the child soon becomes accustomed to the discomfort and does not notice the damp clothing. Hence if the child has not been properly trained and has slovenly habits, he reasons that it is going to be much easier to wet the bed than to get up in the dark. When this state of mind exists it is certainly the mother's fault, first because the child should have been taught more sanitary habits, secondly because the



mother has set an example for the child by not changing his wet bed clothing, and thirdly because she has allowed the child to acquire such a slack attitude.

Under the heading, laziness, comes the non-energetic or less forceful child. Some statements made by this type, in answer to the question, "Why do you wet the bed?", suggests that they are awake at this time or else consciousness extends into children's sleep as it does in that of adults (31). The consciousness referred to here can be best illustrated by examples. For instance, mothers with sick children will awaken with a change in the sick ones' breathing, but will sleep through the roar of a passing train, trolley car or automobile. Noises of a storm may be ignored but the sound of one's name, much less in volume, will arouse. (31). This is evidence that mankind can be responsible for himself while asleep if he desires, as he knows what is going on. In response to the aforementioned question the child says, "It's too cold (or it's too dark) to go to the toilet." This is equivalent to saying, "I felt I wanted to urinate, thought I ought to go to the toilet, but made up my mind that it was too dark (or too cold)." The sleeper makes a choice between the cold and a wet bed, or else wakes to make the decision and takes the easiest course.

The treatment here is to train the child to assume more responsibility, and to become more aggressive. Some children will improve if they have some incentive to work, as was the case of a boy seen in the University Clinic. Richard is 8 years old; when he was 11 months old he received a head injury; following this the child had convulsions at intervals until 1926.

Since that date no attacks have occurred. In October, 1921, he was brought into the dispensary complaining of nervousness, headaches and enuresis. Physical and laboratory findings were negative and in November he appeared in Dr. Jahr's Behavior Clinic. At this time his mother stated that he had been sent home from school on several occasions for vomiting. The child was the typical oversensitive child and the complaints were symptoms of this condition. He was advised to rest one hour a day and his teacher was urged not to send the boy home for vomiting. He returned in February and the vomiting had ceased but his bed wetting was no better. At this time he was given a chart with stars and seemed interested. The following week he came in with two stars and seemed proud of them. He was promised a present when he had seven stars in a week. The following week he had four stars and asked if he could earn some Lincoln Logs for a reward - this was promised. Two weeks later he came in and had been dry all during these two weeks. This case is typical. The mother was over-concerned about his early injury and neglected to train him properly, consequently he developed many evidences of behavior disorders. When he was given an incentive to overcome his condition it immediately cleared up.

## II. TREATMENT

PROPHYLACTIC TREATMENT - This consists of properly training the child from the start and preventing the formation of this behavior problem. With the proper care and management most children will not be oversensitive nor will they have faulty

habits such as enuresis. Very little can be done in the way of training before the child is walking about. The mother must devote herself to the problem for from a few weeks to several months, as socializing the excretory functions is a difficult lesson. Habits of cleanliness do not come naturally. The excretory habits can not be suppressed like other bad habits but must be properly directed instead (14). It becomes a business of forestalling the child and keeping him dry by taking him frequently to the toilet. The natural rhythm of urination as already established may be determined by making a chart recording the time, stimulus and conditions under which an infant wets, i.e. relation to feeding and napping. The best results are obtained by anticipating the involuntary act by voluntary emptying of the bladder. The child should be placed in the chair about one half hour before the period recorded arrives (Newlin, 48). Placing the child upon the chair is important because if the infant is allowed to void in the recumbent position and is not trained early in the upright position, there after results a fixed conditioning to infantile elimination, (Markey, 43). Steam arising from a little hot water in the chamber serves as an artificial stimulus to induce urination and then makes the desired association with being placed on the chair and aiding in strengthening a conditioned reflex. No playthings should be given the child while on the chair, nor should his attention be diverted in any way. Frequently the child will fall asleep at stool without emptying his bladder so that he must be watched and aroused (21). Individuals this young should not be left on the chair for over five minutes.

Teaching the child to use the chair is the first step. Next, at about 14 months, he must be taught to refrain from functioning during the day except on the chair. At this age the child begins to use a few words, one word should be chosen to signify the desire to empty the bladder, (Tisdall). The mother should never disregard a request for attention. By eighteen months at the latest, knit drawers or panties should be substituted for diapers. Drawers feel cold and uncomfortable when wet. By the time the child is 2 years of age, day time accidents should be rare and hourly intervals should be adequate to keep the child dry in the day time. A few dry nights may be expected at this time also. No forcing should be used as it leads to poor results. Beyond 2 years the intervals should be lengthened because the child is old enough and has language enough for adequate explanation of the procedure.

After the child is trained for the day time, night training should be attempted as follows: Restrict fluid after 5 P.M., be sure that the child urinates just before being put to bed, forestall the first wetting by awakening the child between 9 and 10 P.M. and keeping him on the toilet until he urinates and place him on the toilet as soon as he awakens in the morning. Dry nights should be the rule by the time the child is  $2\frac{1}{2}$  to 3 years of age. If the bed is wet in the morning, however, Tisdall advises a second awakening about 2 or 3 A.M. If after a short period the early morning time for picking up is dropped and the child is observed to be dry this period of awakening may be dropped. In waking a child at this age, advises Woolley, be sure that he attends to all his toilet needs

himself, i. e., put on his own bathrobe and slippers and walk to the toilet unassisted. A child should not be shaken and picked up, but should be touched and spoken to a number of times and taught to awaken at a touch or a sound of a voice.

As soon as the rhythm and habit of urination are fairly well established, the child should be taught to feel that it is distinctly his task and responsibility to keep dry.

**ACTIVE TREATMENT** - The active treatment of established enuresis can be easily and successfully carried out if certain fundamental principles are adhered to. Most cases can be cured within a few weeks time (14), but the success of the treatment depends not only on the cooperation, of the patient, but of the parents as well (6). This "cure" must be carried out by persons who have good control of the child, have confidence in their ability to cure this condition, and can communicate this confidence to the child. The parents usually fail to meet these requirements and so the treatment should be largely in the hands of the physician. Every case presents a different angle to be studied and consequently they must be treated differently.

Any physical defects such as were enumerated should be corrected or eliminated if possible as well as any other conditions causing frequency and urgency. General improvement should be brought about in the physical condition by proper diet, hygiene and tonics, as many children are under par and anemic. It is oftentimes an advantage to begin the treatment by a rest. Pisek starts with a two day rest cure requiring the child to eat breakfast in bed and not allowing him out of bed until lunch time.

The following general rules will aid and will result in improvement in most cases:

(a): Fluid (milk, water, soup) should be restricted after 4 P.M. The evening meal should be light and dry, i.e. consisting of cereal, custard, junket, bread, jello or fruit. Tea, coffee, pepper and condiments should be avoided. Especially sweets and salt should be avoided as they increase thirst.

(b): The child should empty the bladder before retiring and again at 10 or 11 P.M. The child should be kept at the toilet until urination occurs. In some cases a child will not empty his bladder until he has been at stool for half an hour or more. It will be found that some children will wet the bed before 11 P.M. so that awakening at 9 or 10 P.M. may be necessary.

Regular times of urination during the day must be insisted upon, probably about 5 or 6 times is normal. If this treatment is unsuccessful after two weeks an additional awakening and urination at 2 or 3 A.M. are advised (21).

(c): The parents or attendants should show utmost patience and tact in handling these patients. Gentleness is important but with this firmness is essential. One of the first important steps in the treatment is to interest the child in making an effort to overcome the habit. This attitude is seldom brought about through punishment. A feeling of martyrdom may be created by this treatment and establish the habit more firmly (4). There are some children in whom punishment of some nature is required to affect a cure. This is the indifferent and lazy, or non-energetic child. These children must be taught by

more severe training methods in order to impress them that they must get over this habit. Present the problem to the child as something worth while overcoming. Make him feel bigger than the habit. Rewards may be offered to stimulate an interest in control.

If the parents will not cooperate the treatment outlined must be carried out in the hospital. In order that recurrences may not take place as soon as the patient returns home, hospital treatment must be carried on at least three weeks. Usually by that time the patient has acquired the habit of emptying his bladder before retiring and of awakening spontaneously before midnight to urinate again. Enuretic patients should be followed, instructed and encouraged for at least a year to prevent another attack.

(d): The oversensitive child should not be subjected to the awakening treatment. They should secure rest. Afternoon naps and sedatives should be prescribed in these cases. These measures at least conserve the child's output of energy, even if he only rests and does not sleep (66). Generally speaking, these children are not emotionally as stable as those who do not wet the bed. Consequently, there should be no excitement or high tension after 5 P.M., such as exercise, reciting, competitive games, loud laughter, emotional scenes, movies or radio programs. The child should sit and play quietly after 5 P.M. He should not become too fatigued before retiring and should retire early; elevating the foot of the may be advisable.

Psychotherapy through proper instruction of the mother

is necessary to eliminate the psychologic causes of bed wetting enumerated previously. Certainly in older children (5 to 6 years and up) fear and anxiety of committing the act (15), the suggestion acting on the child's mind that he has failed to control a nasty situation, is a prominent cause of the difficulty. This type of child must be taught that the habit is not desperately tragic and must <sup>be</sup> impressed with the fact that the trouble always gets well and that it continues now because he is worried and keeps thinking about it. The mother must ignore the mishaps and praise the success highly, a difficult attitude for mothers to assume. The problem should never be discussed in the presence of the patient. In younger children especially, (from 3 to 5 years) the mothers should avoid emotional scenes when mishaps occur. In general, centering the attention of the enuretic child on his problem and shortcomings, should be avoided. One should also avoid stressing sex in the treatment if possible. Psychoanalysis is rarely indicated except in adolescent children.

After fear and anxiety and emotional scenes have been eliminated, confidence must be restored in the child that he can be cured, as usually the child and the mother have given up. One should build up the faith that success can be attained and encourage each child. This is accomplished by suggestion. Usually some outside source of stimulation and inspiration is necessary. The physician rather than the parent can build up this faith in the child. The physician must insist to the child that he can cure him, but to drive this thought home in the



child's mind it is necessary to perform some striking yet harmless procedures, i.e., sterile water placebos, using 1 C.C. once a week with the assurance that this will cure. With this treatment one man reported 87% cures (26). Another form of suggestion was used with good results in the form of self-suggestion. The patient was required to say to his mother before going to bed the following lines: "I am not going to wet the bed, I am going to wake up at midnight, I shall get up and pass water, I shall not wet the bed any more." This was also repeated 8-10 times during the day (22). Walker employed suggestion during the waking state, half asleep and half awake, by repeating to the child in simple expressions that the next time he wants to pass urine he will wake up and know it, get out of bed and empty his bladder. In six cases where nail biting and thumb sucking accompanied enuresis the children were assured that as soon as these habits were discontinued, the enuresis would cease, and it worked in each case (Pendergrast, 54).

A visible record of successes is a very good method of helping to cultivate an atmosphere of optimism and confidence. A date card should be given to the parent with red and gold stars. The mother should mark the successful days on the card with red stars and when the child has had a dry week a gold star should be placed on the card as a reward. High praise should be given, thus emphasizing the successes with commendation and reward. Leave the other days blank and never mention or indicate these failures. The star calendars should be brought to the physician's office with the patient at weekly intervals. Here the physician should further encourage the child.

With some children there is the danger of taking away the responsibility from the child in quite a different way, i.e. by making him feel that so many people are already concerned about this problem of wetting the bed, that there is little for him to contribute. Certainly, mother and father are doing all they can, and from what he hears they think of nothing else. The nurse has it ever on her mind, and under doctor's orders she is planning all the time to institute helpful measures. The foot of the bed is raised, fluids are restricted, food is selected carefully and the child is awakened at all hours of the night to go to the toilet. Just as has been suggested, those measures have all been tried and have failed. The important aspect of the treatment in this type of case has been neglected. The child has not grasped the idea that the wetting is his problem and responsibility, and that the parents, nurse and doctors can not do more than help him after he has made his mind up to overcome the habit.

T. G. (66) was a boy, 8 years old who had bed wetting at night and during his naps. No physical cause had been found and in spite of all forms of treatment tried he had wet the bed every night. The boy was seen on two occasions when the bed wetting was not ever mentioned. Everything that one could think of that might interest a boy of his age was taken up as a matter of conversation, except bed wetting. In the meantime all the therapeutic measures were discarded without comment. During the third visit the boy finally broke out with the remark, "I thought you were going to cure me of wetting the bed, and you haven't said a thing about it." The doctor replied in a rather

casual and indifferent way as follows, "Why, I had almost forgotten that. Now that you speak of it, I remember your mother mentioned it to me. But of course that is your job. Any boy who stands as well in his class as you do, who plays baseball and football and rides a horse like a man, who has so many friends and gets on so well with people, can get over a simple habit of wetting the bed just as soon as he makes up his mind that it is worth the effort. And medicine, charts and doctors can not do it for you." Nothing more was said about it, the conversation continued about the best way to throw a particular curve with a baseball. The boy was told to return in a week, and his first remark was, "I haven't wet the bed since I was in here the last time." In this particular case the only possible thing to do was to do absolutely nothing and place the responsibility on the child.

Much of the wetting that occurs during the day in children over 3 years of age is found in the busy, active, excitable youngster who is so engrossed with the outside world that he is hardly aware of the calls of nature whether it be to empty his bladder or to fill his stomach. Children have not the voluntary control of the sphincter that adults possess, and when they wait to urinate beyond a reasonable period they are lost, regardless of their good intentions and will power.

In dealing with this particular group of cases, something must be done to impress the children with the importance of attending to their physical needs. They must learn by experience that wetting their clothes is not a paying proposition, that it will invariably work out to their own disadvantage.

Inasmuch as these children are greatly concerned with the outside world there is no more effective punishment than isolation. Being kept by themselves after an accident, not in bed but at rest without companionship, works wonders in a short time. If the child is prone to look upon this isolation with resentment it can always be carried out on a medical basis, the child being told that much of his trouble is due to excitement and fatigue and that he needs rest. This takes away any feeling of injustice that he may entertain.

The children with mental conflicts are hard to treat until the cause of the conflict is uncovered. Each one of these cases needs to be carefully studied, if possible by some one particularly interested in the mental life of the child. But if such a person is not available, one should not give up, for often in a study of the situation as a whole, some obvious cause will reveal itself, and the parents will be surprised that it had not occurred to them before. The cause must then be removed.

Although most authors agree on the fact that drugs will not cure enuresis by their pharmacologic action, they are often of major importance in speeding up the recovery provided the drug is carefully selected to meet the indication (14).

Phenobarbital as a sedative is valuable in the therapy for the nervous, high-tension child. This may be used in the maximum doses possible without producing lethargy. If the enuresis is purely nocturnal, the drug is administered at bed time (1 grain or .065 gram to a child of 4 or 5 years). If diurnal it is given in directed doses T.I.D. The phenobarbital must be

continued for at least two weeks until the habit is broken, and then the dose gradually reduced and discontinued unless there is a recurrence, when the course of treatment is repeated. The phenobarbital apparently raises the threshold of the nervous system response, so that the psychic factors do not make suggestion to or otherwise intrude on the deeply sleeping brain, and the high-tensioned overresponsive nerves are quieted, thus breaking the vicious circle.

Atropine or belladonna in large doses will greatly help in certain selected cases, I.E., those in which there is a frequent desire for urination during the day associated with bed wetting at night. In Calvin's Clinic it was found that normal children, when taking large doses of belladonna, urinated much less frequently in twenty-four hours, but passed about the same total in this time, as when not taking the drug, providing the fluid intake was constant. This is explained by the fact that belladonna relaxed the smooth muscles of the bladder and so increased its capacity to hold fluid (4). Tincture of Belladonna or a solution containing 0.1% atropin sulphate in doses of 5 gtts. t.i.d. (6 years of age), are given until the physiological effect is secured.

Changing the reaction of the urine with acids or alkalis may be of value at times.

Finally, the easiest method of curing enuresis, but one seldom agreeable to the mother, is to change the whole environment by removing the child to another home, boarding or nursery school, or hospital. These children almost invariably control the habit soon after being placed there. The following

questionnaire is a combination of other questionnaires (Calvin and Carter), and which simplifies the history-taking in the clinic and also prevents the physician from overlooking any possible causative factors.

### ENURESIS CLINIC QUESTIONNAIRE

Name. . . . . Age. . . . . Sex. . . . .  
Address. . . . .

Nocturnal. . . . . Diurnal. . . . .

Age of onset? . . . . .  
    Continuous or intermittent since? . . . . .  
Number of nights weekly. . . . .  
Number of times a night. . . . .  
    How soon after retiring? . . . . .  
    Does patient awaken? . . . . .  
    Does patient sleep soundly or lightly? . . . . .  
Frequency of urination during the day. . . . .  
Amount of fluid taken daily and when. . . . .  
Familial (Do other children have the habit?) . . . . .  
Heredity - Present in parents? . . . . .

Previous treatment and methods of control:  
    Fluids restricted? . . . . . How often? . . . . .  
    Awakened at night? . . . . .  
    Medicines prescribed. . . . .  
    Punishment? . . . . . What type? . . . . .  
    Emotional concern? . . . . .  
    Arguing and rowing? . . . . .  
    Babying? . . . . . Shaming? . . . . . Rewards? . . . . .  
    Attitude of family. . . . .

Nervous System:  
    Emotional condition. . . . .  
    Nervous high-tentioned type? . . . . .  
    Play. . . . . Active. . . . . Quiet. . . . .  
    Disposition. . . . .  
    Masturbation? . . . . .  
    Personal habits--careless and slovenly. . . . .  
        careful and neat. . . . .

Progress in school:

Physical Examination:  
    General nutrition. . . . .  
    Special factors bearing on enuresis, as phimosis, etc.  
    . . . . .

Urine Examination:

### Directions to Mothers

- Stop all punishments or any action that will arouse fear in connection with the habit.
- Stop shaming.
- Stop all arguing and rowing and dominating unreasonably--the question of the use of the toilet should not be a battleground for discipline.
- Stop all displays of emotional concern and substitute an indifferent attitude. Treat mishaps in a casual and kindly way so as not to concentrate the child's mind on the failures and difficulties.
- Stimulate interest in success by much praise, ado and rewards for dry nights--avoid mention of wet nights. Never express lack of faith in the child.
- Keep a gold star calendar of dry nights only.
- Stop "babying" the child by overaffection, etc.
- Never mention to the child that he has "weak kidneys," etc., or that he will after years outgrow the habit.

#### General Rules:

1. Restrict fluid (milk, water, soup, etc.) after 4 p.m. The evening meal should be light and dry; i.e., cereal or custard or junket, bread, jello, fruit, etc. Avoid coffee, tea, salt and sweets after 4 p.m.
2. Emptying the bladder before retiring and again at 10 or 11 p.m. Be certain that child urinates freely at these times.
3. Rest: An afternoon nap if possible; no excitement or high tension after 5 pm. such as exercise, reciting, competitive games, loud laughter, movies or exciting radio programs. The child should sit down and play quietly after 5 p.m. The child should not become too fatigued before retiring and should retire early. Elevating the foot of the bed 6 inches is advisable.

(The above printed instructions may be given to the mothers for the established cases' treatment) (14)

## BIBLIOGRAPHY

1. Adams, S. S. - "Incontinence of Urine" - Arch. of Ped., Vol. April, p. 13, 1887.
2. Adams, S. S. - "Incontinence of Urine in Children" - Amer. Jrl. of Ob. - Vol. 17, p. 657, 1884.
3. Amberg, S. - "Some Aspects of Enuresis in Children" - Med. Clinics of N. A. - Vol. 7, p. 151, 1923.
4. Amberg, S. - "Certain Aspects of Enuresis" - J. A. M. A., Vol. 83, p. 1300, 1924.
5. Anderson, F. N. - "The Psychiatric Aspects of Enuresis" - Amer. Journ. of Diseases of Children, Vol. 40, p. 591, 1930.
6. Anderson, F. N. - "The Psychiatric Aspects of Enuresis" - cont'd., Vol. 40, p.818, 1930.
7. Bakwin, H. - "Enuresis in Children" - Arch. of Ped., Vol. 45, p. 664, 1928.
8. Blau, A. I. - "The Treatment of Enuresis" - Med. Journ. and Rev., Vol.124, p. 492, 1926.
9. Bleyer, A. - "A Clinical Study of Enuresis" - Amer. Journ. of Dis. of Children, Vol. 36, p. 989, 1928.
10. Bokay, S. - "Incontinence of Urine in Children" - Ab., J.A.-M.A., Vol. 78, p. 987, 1922.
11. Bray, G. W. - "Enuresis of Allergic Origin" - Arch. of Dis. in Child., Vol. 6, p. 251, 1931.
12. Burnet, J. - "Enuresis" - Internat. Clinic, Vol. 21, No. 4, p. 1, 1911.
13. Calvin, J. K. - "Enuresis" - Med. Clin. of N.A., Vol. 12, p. 131, 1928.
14. Calvin, J. K. - "Enuresis" - J.A.M.A., Vol. 90, p. 820, 1928.
15. Cameron, H. C. - "Enuresis" - Pract., Vol. 100, p. 112, 1918.
16. Campbell, C. M. - "A Case of Childhood Conflicts with Reference to the Urinary System" - Psychoanalytical Rev., Vol. 5, p. 269, 1918.
17. Carter, W. E. - "Enuresis" - Arch. of Ped., Vol. 38, p. 285, 1921.
18. Carrau, A. - "Enuresis in Children" - J.A.M.A., Vol. 78, p. 549, 1922.



Bibliography (Cont'd)

19. Church and Peterson - "Nervous and Mental Diseases" - p. 645, W. B. Saunders Co., 1908.
20. Collin, A. - "Idiopathic Enuresis" - AB., Brit. Journ. of Dis. of Child., Vol. 9, p. 128, 1912.
21. Davidson, W. C. - "Enuresis" - Abt's pediatrics, Vol. 4, p. 867, 1924.
22. Dunham, - "Suggestion as a Therapeutic Measure in Nocturnal Enuresis" - Amer. Journ. of Dis. of Child., Vol. 12, p. 618, 1916.
23. Emerson, W. R. P. - "Treatment of Enuresis Without Drugs" - Amer. Journ. of Dis. of Child., Vol. 15, p. 339, 1918.
24. Ezickson, W. J. - "Enuresis with a Report of Two Interesting Cases" - Med. Journ. & Records, Vol. 124, p. 493, 1926.
25. Freeman, W. T. - "Epidural Injections in Treatment of Enuresis" - Brit. Med. Journ., Vol. 1, p. 1237, 1914.
26. Friedell, A. - "A Reversal of the Normal Concentration of the Urine in Children Having Enuresis" - Amer. Journ. of Dis. of Child., Vol. 33, p. 717, 1927.
27. Fulton, G. - "Nocturnal Enuresis" - Ky. Med. Journ., Vol. 19, p. 736, 1921.
28. Gibbs, D. H. - "The Psychologic Factor in Enuresis" - Calif. & West. Med., Vol. 22, p. 427, 1924.
29. Gonzalez, F. - "Incontinence of Urine" - Ab., J.A.M.A., Vol. 74, p. 988, 1920.
30. Grover, J. I. - "Etiology and Treatment of Enuresis" - J.A.M.A., Vol. 71, p. 626, 1918.
31. Hamill, R. C. - "Enuresis" - J.A.M.A., Vol. 93, p. 254, 1929.
32. Herman, C. - "The Treatment of Enuresis by Reeducation" - Arch. of Ped., Vol. 27, p. 600, 1910.
33. Holt, L. E. and Howland J. - "The Diseases of Infancy and Childhood" - p. 665, 1919, Appleton & Co.
34. Howell, W. - "Textbook of Physiology" - p. 786, W. B. Saunders Co., 1907.
35. Jacobs, F. B. - "Diagnosis and Treatment of Nocturnal and Diurnal Enuresis" - Penn. Med. Journ., Vol. 25, p. 867, 1923.

Bibliography (Cont'd)

36. Jelliffe, S. E. - "Sexual Life of the Child" - Abt's Pediatrics, Vol. 7, p. 819, 1925.
37. Johnson, H. F. - "Urinary Disturbances" - Pract., Vol. 102, p. 239, 1919.
38. Klingersmith, I. D. - "Incontinence of Urine" - Arch. of Ped., Vol. 1, p. 577, 1884.
39. Konrad, E. - "Enuresis in Childhood" - J.A.M.A., Vol. 81, p. 152, 1923.
40. Kraft, J. E. - "Enuresis" - Ill. Med. Journ., Vol. 39, p. 50, 1921.
41. Macciotta, G. - "Spasmophilic Form of Enuresis" - Ab., Amer. Journ. of Dis. of Child., Vol. 41, p. 968, 1931.
42. Mandel, T. - "On Enuresis" - Brit. Journ. of Child. Dis., Vol. 28, p. 1, 1931.
43. Markey, O. B. - "Psychiatric Approach to Enuresis" - Cent. States Ped. Soc., Oct., 1927, p. 44.
44. McDonald, R. L. - "Reference Handbook of the Medical Sciences" - Vol. 4, p. 2, 1887.
45. Mello-Leitao - "Treatment of Nocturnal Enuresis in Children" - Brit. Journ. of Dis. of Child., Vol. 9, p. 454, 1912.
46. Mohr, G. J. and Waterhouse, E. H. - "Enuresis in Children" - Amer. Journ. of Dis. of Child., Vol. 37, p. 1135, 1929.
47. Moss, S. A. - "Enuresis" - Med. Journ. & Rev., Vol. 121, p. 22, 1925.
48. Newlin, A. - "The Management of Enuresis" - Arch. of Ped., Vol. 32, p. 753, 1915.
49. Ostheimer, M. and Levi, I. - "Enuresis in Childhood" - J.A.M.A., Vol. 43, p. 1844, 1904.
50. Pisek, G. R. - "Enuresis" - Med. Clin. of N.A., Vol. 3, p. 350, 1919.
51. Plato - "Urinal in Treatment of Enuresis" - Ab., J.A.M.A., Vol. 78, p. 1937, 1922.
52. Pleasants, H. - "Discussion of Enuresis" - Penn. Med. Journ. Vol. 25, p. 868, 1922.
53. Pototzky, C. - "Enuresis" - Amer. Journ. of Dis. of Child., Vol. 40, p. 46, 1930.

Bibliography (Cont'd)

54. Prendergast, J. F. - "A Simple Remedy for Enuresis" - N.Y. Med. Journ., Vol. 64, p. 49, 1896.
55. Pybus, F. O. - "Spina Bifida" - Lancet, Vol. 11, p. 599, 1921.
56. Radcliffe, A. A. - "Taka-Diastase in Nocturnal Enuresis" - Ped., Vol. 23, p. 617, 1911.
57. Rachford, B. K. - "Neurotic Disorders in Children" - p. 175, E. B. Treat & Co., 1905.
58. Ruhrah, J. - "Treatment of Nocturnal Enuresis" - Amer. Journ. of Med. Sci., Vol. 143, p. 115, 1912.
59. Saxl, N. and Kurzweil, P. M. - "Enuresis in Children" - Arch. of Ped., Vol. 40, p. 159, 1923.
60. Schroeder, P. E. - "Enuresis in Adolescent Boys" - Arch. of Neur. & Psych., Vol. 18, p. 1053, 1927.
61. Schwartz, A. B. - "A Study of Two Hundred and Twenty Six Cases of Enuresis" - Boston Med. Journ., Vol. 171, p. 631, 1914.
62. Simmonds, D. B. - "Nocturnal Incontinence of Urine in Boys" - Amer. Journ. of Ob., Vol. 13, p. 431, 1880.
63. Starling, E. H. - "Human Physiology" - p. 931, Lea & Febiger, 1930.
64. Still, G. F. - "Common Disorders and Diseases of Childhood" - Oxford Univ. Press, p. 861, 1920.
65. Sundell, C. E. - "Incontinence of Urine in Childhood" - Pract., Vol. 106, p. 293, 1921.
66. Thom, D. A. - "Child Management" - Bureau Publication No. 143, U. S. Dept. of Labor, p. 11.
67. Thompson, R. - "Some Cases of Incontinence of Urine" - Brit. Journ. of Child. Dis., Vol. 19, p. 10, 1922.
68. Thursfield, H. - "Treatment of Enuresis" - Lancet, Vol. 2, p. 528, 1923.
69. Tisdall, F. F. - "The Home Care of Infant and Child" - p. 255, 1931.
70. Townsend, C. W. - "Incontinence of Urine in Children" - Arch. of Ped., Dec. 1887, p. 744.
71. Trousseau, A. - "Lectures in Clinical Medicine" - Vol. 3, translated by Cormock, 1870.

Bibliography (Cont'd)

72. Van der Bogert - "Enuresis and Chronic Digestive Disturbances" - Arch. of Ped. Vol. 30, p. 547, 1913.
73. Walker, K. M. - "Essential Enuresis" - Pract., Vol. 110, p. 145, 1923.
74. Wile, I. S. and Orgel, S. Z. - "The Nervous Basis of Enuresis" - Arch. of Ped., Vol. 41, p. 232, 1924.
75. Wilson, G. - "Crural Monoplegia of the Cortical Centers and Paraplegia of Cortical Origin" - Arch. of Neurol., Vol. 10, p. 669, 1923.
76. Winnicott, D. W. - "Enuresis" - Proc. of Roy. Soc. of Med., Vol. 23, p. 255, 1930.
77. Woolley, H. T. - "Enuresis as a Psychological Problem" - Ment. Hyg., Vol. 10, p. 38, 1926.
78. Wylder, M. K. - "Treatment and Etiology of Enuresis" - Med. Journ. & Rec., Vol. 123, p. 358, 1926.

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