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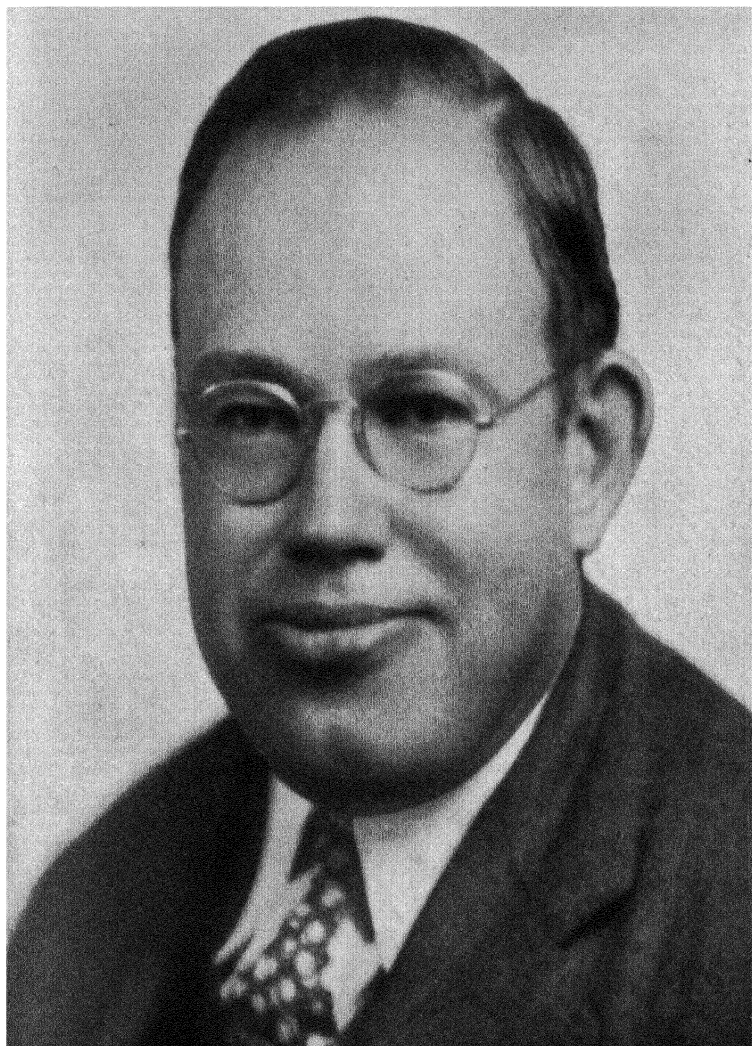
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BORN THAT WAY



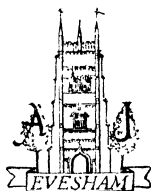
DR. EARL R. CARLSON

who was himself "Born That Way" but who by his own undaunted efforts has become a medical specialist and the world authority on this subject.

BORN THAT WAY

by

EARL R. CARLSON, M.D.



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FOREWORD

(By The Archbishop of Canterbury)

IT WAS not until I read this book that I became aware of the extent of the problem of the spastic condition in children and adults. My own deep concern led me to accept at once an invitation to be President of the British Council for the Welfare of Spastics.

This book would be valuable if it did no more than make us conscious of the terrible sufferings and sense of frustration caused by this condition to so many people, along with the distress which it brings to those who love them. But the book does far more than that: it reveals the astonishing spirit of one such sufferer which led him to fight against what appeared to be impossible odds, and to gain a resounding victory of the spirit. Because of his achievement this book will give new hope and inspiration to all his fellow-sufferers.

Dr. Earl R. Carlson, himself a spastic, spends all his time ministering to spastics in his own country. The publication of an English edition of his book will, I hope, win the attention and interest of the people here, and will encourage not only sufferers from this infirmity but all those who are working for their help and relief.

1952

GEOFFREY CANTUAR.



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I

CHILDHOOD

THIS BOOK would never have been written if my entrance into the world had been as simple and dramatic as my mother's.

Years ago, in Veberod in southern Sweden, a hearty country-woman sat out in her farmyard doing the evening milking. Suddenly she stopped work and started to her feet; and without further ado was delivered of her seventh daughter, *who landed in the milk pail*.

My grandmother rescued the child from this impromptu baptism, took it back to the house and cared for it, and then went on about her household duties.

With such sturdy ancestry and her own robust health, my mother, Margaret Anderson, had little reason to anticipate any difficulty in child-bearing. Nor was there a poor physical heritage on my father's side of the family. The Carlsons were a robust tribe in northern Sweden, and his strength and endurance were such that he was able to do the hardest sort of manual labour all his life. He went to America as a stow-away when he was sixteen years old, and some years later found his wife in one of the many Scandinavian colonies which sprang up in the Great Lakes region.

Like many other immigrants, my parents found no pot of gold awaiting them in the promised land of America; and in 1897, the year of my birth, they were living in a tiny house in the poorer section of Minneapolis. My father worked as a factory-stoker, with only a half-day's holiday every other week. His wages, eked out by my mother's earnings as a seamstress, gave them only a bare living.

On 25th March, 1897, Minneapolis suffered the worst blizzard of that notably hard winter. Our little house, huddled

between a livery stable and a church, was almost buried in the snow, which had drifted high above the window sills. All over the city, streets and side-walks were blocked and traffic was at a standstill. At the height of the storm my mother's labour began. The doctor was long delayed by the blizzard and found her in a critical condition when at last he arrived. He was obliged to use forceps in order to save her life, and I came into the world with a damaged left eye, which remained closed for weeks, and other head injuries. I still bear the scar of the forceps on my head.

It was a close call, for I was born blue and breathless, and my life was saved only by the doctor's blowing his own breath into my lungs. I was unable to "nurse" for several days and had to be given milk through a medicine dropper. In later life, as I sometimes despaired in the struggle against my handicaps, I often wondered whether that doctor should have saved a child that he knew could not be normal. For these birth injuries made me a victim of spastic and athetoid paralysis. I did not have a loss of motion such as is encountered in infantile paralysis, but rather an exaggerated motion. My arm would wander aimlessly, and the hand, in attempts to grasp an object, would remain fixed in that position and was relaxed with difficulty. When I was supported under the arm, the legs had a tendency to cross, and I could not bring the heels to the floor. Swallowing was difficult because I gagged easily.

I spent a large amount of nervous energy in attempts to move a single muscle group, and often the mere thought of moving a finger was sufficient to throw the entire body musculature into a chaos of writhing movements. When I was not afraid, self-conscious, or over-anxious about what I was doing, I was able to make a movement successfully. But this happened only when I was so absorbed in what I was doing that I forgot about the things I did badly.

My parents were not without hope for me, despite the doctor's blunt warning that the head injuries I had received would prevent me from ever developing into a normal child. My eye healed, and I seemed to grow like any other infant.

I weighed twenty-five pounds when I was six months old; but, unlike the normal baby of this age, I could not sit up without help. In the family album there is a picture of me taken at this time, a chubby, wide-eyed infant, surrounded by the billowing skirts which helped to conceal my mother's supporting hands.

She had just noticed that I could not use the muscles of my back properly. Later, when I failed to learn to walk and talk at the usual ages, my mother realized that I was going to be seriously handicapped. But she continued to hope that my development was retarded, rather than seriously restricted, by the injuries I had suffered at birth.

This hope seemed to be partially realized when I began to crawl at the age of two. I soon became so energetic that I was constantly getting into trouble, and I acquired hard calluses on my hands and knees. For a time my mother pared these with a razor, just as you would cut down a horse's hoofs; but then she hit upon the expedient of making little leather pads for me to get about on. For years I failed to progress from the crawling to the toddling stage, but nevertheless I managed to cover a surprising amount of ground.

One of my earliest recollections is of how I distinguished myself by crawling into a neighbour's garden—my family had moved from Minneapolis to the small town of Geneva, Illinois—and stealing some peas that had attracted my attention. My mother scolded me severely for this exploit, but she nevertheless regarded it as a major achievement since I had previously been unable to do anything at all for myself. I know now that it was the irresistible attraction that those peas held for me, and the resulting complete preoccupation with my purpose, that made this act possible for me.

In a year or two my family returned to Minneapolis to take advantage of a better job that came my father's way. We had a two-roomed flat in a red tenement, which was on the same street as a big brewery. Mother tried to teach me to walk by supporting my shoulders from behind as I tottered up and down the street. Sometimes she sat down on a bench to rest and to have a chat with her friend, Mrs. Gibson, who

was always loudly pitying me and telling my mother that she had the patience of Job.

Mrs. Gibson had the notion that my physical handicaps were accompanied by mental ones. Since she thought that I was mentally defective, she did not hesitate to talk freely in front of me. In fact, all the neighbours were anxious to know what was wrong with me, and held various theories involving "bad blood" and pre-natal influences which they often aired to Mother when I was about. Mother always tried to prevent me from hearing these conversations, but hear them I did; and her stock answer, that I was "just born that way," stuck in my mind. I sometimes wondered why I was an object of pity; I had no idea that I was abnormal—it was all natural enough since I was "born that way".

There was more wisdom in my mother's answer to the neighbours' questions than perhaps she realized. At birth every baby is without physical or mental control. His movements are un-co-ordinated and more or less at random. At birth the brain is unable to function properly, to select the relevant impulses from among the sensory impressions which bombard the nervous system, and to translate them into the purposeful action. Until this selective capacity develops with the growth of the cortex, the child grimaces and drools and wiggles quite unconsciously. He is unable to focus his attention upon any one object; he will pick up a toy only to reject it for another the following moment. His motions are without purpose.

As intelligence develops and concentration on a purpose is achieved, these aimless movements and reactions cease. Certain structural and chemical elements in the brain grow as use is made of them. This is particularly true of the substance which insulates the nerve fibres. The insulating material is least in amount at birth, when muscular control is at its minimum. It increases noticeably at the end of the first year at the time when speech and walking occur. It shows marked additions in adolescence as more connections are made between nerve fibres to facilitate the youth's ability to classify the knowledge to which he has been exposed in childhood. Before this insulation is built up, the nervous system of the brain is

like a switchboard with crossed wires, and impulses often bring the wrong muscles into action.

Spastic children do not develop concentration and selective ability naturally; the wires remain crossed and involuntary movements continue. Training is therefore even more important for the spastic than for the normal child; by education it is possible to develop unaffected centres of the brain, and a corresponding improvement of the damaged controls can be effected. The importance of concentration is evident in my ability to get at our neighbour's peas when my whole attention was set upon them, though otherwise it would have been impossible for me to reach them. *I was born with certain motor activities impaired, but I could control these activities when my brain was dominated by an impulse which demanded their use.*

I recall another incident in my childhood which shows how concentration makes the impossible possible. My uncle had a farm some sixty miles from Minneapolis, where my mother often took me for long visits during the summer. Father used to walk out from Minneapolis to see us, since he could not afford the railway fare. There were some cousins of mine from Chicago who also spent their summers at the farm. One day, when I was about four, they went off into the woods, searching for cleft branches out of which they could make slingshots. Not wanting to be left out of anything that was going on, I crawled after them on my hands and knees and returned home dragging a branch. I showed it to my mother and told her that we could make two walking-sticks out of it, so that I could walk like my cousins. My father carved them out of that branch, and I used them when I first began to walk. Long after they had been discarded as unnecessary aids, my mother kept them as evidence of my initiative in meeting the problem of my handicaps.

Another adventure at my uncle's farm is still very vivid in my memory. I was crawling along in his orchard in search of apples and plums which had fallen to the ground, when, in trying to reach a piece of fruit, I leaned against a heehive. The bees swarmed all over me, and in my overpowering desire to

get away from their stings I managed to take a few steps, though I had not yet learned to walk, before falling to the ground. My uncle heard my cries and rushed to the rescue, but he was not in time to save me from being terribly stung.

It has recently been discovered that injections of bee and snake venom produce a temporary alleviation of spasticity. But I was too young at the time to recall now whether this accident brought about any improvement in my condition. My ability to take those few steps may have been the result of concentration on escaping or have been caused by the therapeutic effect of the stings.

I LEARNED to take my first intentional steps at home in a curious fashion. My mother bought a sewing machine, which came in a large wooden crate, a mile long, as I remember it. My father knocked out both ends, so that its sides formed a pair of parallel bars on which I could support myself as I tottered up and down the length of the box. That was when I was five and a half years old; the normal child begins to walk soon after his first birthday.

Some of the delay in my learning to walk by myself was my mother's fault—I had become so used to her support from behind that, when I tried to walk alone, I was tormented by a fear of falling backwards. Many spastic children acquire this fear in the same way that I did; and in my practice today I overcome it by having them push a baby carriage as they learn to walk, which develops the sense of balance far better than support and guidance from the rear. Then when they try walking by themselves they will not stumble along blindly as I did; for, relying on my mother's guidance, I had never formed the habit of looking where I was going.

Though my family's poverty meant many deprivations, I have never regretted it, because it saved me from the sheltered life which would have made the conquest of my handicaps all the more difficult. If my family had been well-to-do, I would probably have been kept from contact with normal children.

and the result would have been a withdrawal into a world of introspection and day-dreams, and an increasing maladjustment to everyday life.

Play-life is essential for sound emotional development, which is vitally important to the spastic. The children of the poor cannot be sheltered from life and from association with their fellows, and I shall always be grateful that I was not deprived of a few firm friendships which I formed early in life and which still endure.

When I was three my friendship with Harold began. He was a tall, handsome boy, but shy and introspective in nature—perhaps that is why he sought my company. Despite my inability to walk, my aimlessly jerking arms, and my speech difficulties, I was something of a chatterbox and full of notions. As we grew older I devised stunts for his sound legs and arms to carry out. It was a partnership in which I was the brain and he was the body. And, best of all, I somehow knew that Harold's friendship for me was not motivated by pity or his mother's urging, like that of some of the children, but by real pleasure that he found in playing with me.

I remember vividly one early exploit of our partnership. My father had brought home a varnish-case from the paint-factory where he then worked, and had contrived out of it a wagon big enough for me to ride in. This contraption, gaily painted yellow, appealed strongly to my friends, and I had no trouble getting one of them to pull it and another to push, as I rode in state around our block.

One day Harold, another youngster, and I were making a tour of the neighbourhood when we saw a pile of luscious-looking apples in front of a fruit-stand. The next time we passed the stand I stared at the fruit in mouth-watering absorption. Before I knew what I was doing, I had stretched out my hand and grabbed an apple. This bit of petty thievery may seem a poor enough achievement, *but it was the first time that my hand had ever done my bidding.*

My friends were delighted by my success, but they wanted apples too, so we repeated the performance twice. All went well the second time because the fruit-stand was on a busy

intersection, and the owner paid no attention to a cripple being hauled along in a homemade wagon by two youngsters. But the third time he caught us red-handed.

He licked the others then and there; but, since I was a cripple, he took me home to my mother and told her what I had done. My mother said that I could not possibly have stolen the fruit, for I could not even feed myself, but that I certainly had enough of the devil in me to put the other boys up to it.

She spanked me on general principles, however, and later asked me whether I had really taken the fruit myself or just suggested the idea to the others. I answered her soberly, for the spanking had made me realize that something serious had happened.

"Mother," I said, "I looked at those apples, and the more I looked the more I wanted one; and finally I wanted one so much that my hand just reached out and grabbed it."

Apples seem to be the fruit of revelation as well as of temptation. A falling apple suggested the law of gravity to Isaac Newton; my stolen apples gave me the clue, not followed up for years, that the secret of control for the muscularly handicapped lies in concentration on a purpose. The more objective the interest in performing an act, the easier it is to do it.

There was another red-letter incident in my youth which bore out this truth, if I could but have seen it at that time. I was then just barely able to get around with the help of the walking-sticks my father had made for me; without them I was completely helpless.

Raymond, another good friend of mine, was much taken by the odd figure I cut as I struggled along on my canes. He suggested that we ought to play horse, since I had four legs. This seemed like a good idea, and I submitted to being harnessed up and driven for a while. Then Raymond's mother called him into the house. He had the canny notion that I might be tired of a game which he enjoyed, and he took my sticks with him, so that I couldn't run away, leaving me leaning helplessly against a house.

Suddenly the noon whistle blew at the brewery across the street. Its shriek always frightened the magnificent horses which were the pride of Minneapolis as they drew the big brewery wagons about the city. This time a team ran away, and I was so excited that *I ran away too—I ran a whole block without my sticks before I realized what I was doing. I could walk! It seemed too good to be true, and I rushed home to tell my mother the great news.*

I half-ran, half-lurched, into the room where she was having a coffee-party with some neighbours, and they all cried out in amazement:

“Your boy walks without his sticks! A miracle has happened; your prayers have been answered!”

My mother alone was calm. “No miracle,” she said quietly. “It’s the result of hard work.”

My mother was mistaken. All the training she had given me had helped; but it was my complete preoccupation with the runaway horses and the overwhelming impulse to join them that had made the impossible happen and had enabled me to run unaided. It was another instance of the control of the emotions over ordinarily helpless limbs, just as when I stole the peas and the apples.

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AT that time, of course, I could not analyse the incident rationally, and for many years afterward I believed that it was a miracle that had made walking possible for me. Even now, I am not at all sure that prayer did not have something to do with it. Through praying that I might walk, I achieved that concentration of purpose which is known to produce such seemingly miraculous results as occurred in my own case.

I had inherited a pious bent from my mother, who was a religious woman. This piety of mine strengthened when I discovered that my aimless movements ceased when I was absorbed in prayer. In the prayer-meetings that I attended as

a child, the ceremony of laying hands on the afflicted was observed, and often the congregation would be overjoyed by the miraculous effect this had on me.

But the cure was never permanent; what I might now, as a doctor, call the selective inhibition of irrelevant impulses lasted only as long as I was absorbed in the spirit of prayer. Later on in my life I took a passionate interest in Christian Science, hoping to be wholly cured of my infirmities through its technique of faith-healing. But this, like many other hopes, was never realized.

My mother, for all her piety, was a very practical-minded woman—as, indeed, she had to be in our circumstances. But she enjoyed dabbling in the supernatural. By age-old superstition, as the seventh daughter of a family of eleven, she was supposed to have certain psychic powers because of the occult significance of these numbers. She was in great demand as a reader of fortunes in coffee-grounds or tea-leaves, and could easily have made a good deal of money out of it. But my father, who was a Socialist and something of an atheist, distrusted these dealings in black magic and forbade her to accept any pay for her performances as a fortune-teller, though he allowed her to amuse herself at it. Certainly she made some remarkable prophecies as she pretended to peer into the future, and her rosy predictions doubtless made the hard present somewhat easier for her friends. I know that she strengthened my confidence in despairing moments by telling me that things would go well in the future.

Whether it was through faith in her prayers or in her own predictions, my mother never gave up hope of my cure. She had no money for private physicians, but she took me from one clinic to another during my childhood. None of the doctors that she consulted ever held out any hope for my physical recovery; invariably they assured her that medicine and surgery were helpless in cases such as mine. But at the clinic of the University of Minnesota Medical School, they did urge upon her the importance of stimulating my mind by regular education. It was made plain to her that my mind alone could provide an escape from my physical handicaps.

Yet sometimes she rebelled against this verdict and tried all manner of quack medicines and healing cults, as well as chiropractors and osteopaths, who are unable, of course, to deal with such conditions as mine. Time after time my hopes were raised high and then brought crashing down, though not always as quickly as upon one occasion when we journeyed to Wisconsin to consult a famous healer, only to find that upon the day of our arrival he had received a prison sentence for practising medicine illegally. The failure of these various expedients finally forced my mother to the conclusion that she had been soundly advised by the clinic doctors.

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MOST parents of crippled children are chiefly concerned with restoring physical health. They want above all to have their child able to run and walk and handle himself like other children. They—and the child—await the miracle of healing in a state of suspended animation, thus allowing the child to develop serious emotional maladjustments because he is not subjected to the same educational and disciplinary influences as other children.

Fortunately my mother did not make this common mistake. She soon discovered that I was happiest and best able to control myself when I was busily occupied. Actually she had little choice in the matter, because her hours were so filled with house-work and with the sewing which brought badly needed money into our home that she had no time to spoil me by constant attention. But I can remember how she told me that I must keep busy and work as hard as my father did.

Like most spastics, I had a tendency to grin all the time, quite regardless of whether I felt happy or sad. This habit is simply lack of control. My father broke me of it by constant rebukes. When he came home after a long day's work, and he and mother were constantly worried about how to keep a roof over our heads, it angered him to find me grinning away as if we did not have a worry in the world. Since I either got rid of the grin or got a licking, I soon acquired the self-

discipline which was invaluable in overcoming other difficulties. I had to learn to do as much as I could for myself, and to depend upon my own resources for amusement.

Today in clinics I treat children whose mothers have no choice but to leave them alone at home while working. These children must manage to crawl to the table to get their food and get to the bath-room without help. Invariably these underprivileged youngsters improve far more rapidly under treatment than children from wealthy homes, whose chances to develop are killed by kindness.

The situation becomes more serious as the child grows older, for the more accustomed he is to getting his own way, the harder it is for him to adjust to the everyday world. The difficulty experienced by spastics in obtaining and holding positions is owing to this spoiled child attitude rather than to their physical handicaps. I am eternally grateful to those doctors who urged my mother to concentrate on my mental development rather than on a physical cure which they deemed impossible. Through my experiences at school and college, I learned the great truth which governs all those afflicted as I was: *control of motions is won by control of emotions.*

But in my childhood I drew no moral from my experiences. I accepted as a miracle the fact that I was now able to walk unassisted, and I formed a passionate faith that a still greater miracle would be achieved when I grew up: that halting feet, shaking head, writhing arms and legs, and troubled speech would all be healed.

II

SCHOOL

MY MOTHER had quite a struggle with the Board of Education to get me into public school when I was eight years old. In their opinion the proper place for me was an institution, not a school. Even after the Board's consent was won through my mother's persistence, the teachers were so alarmed by my constant twitching that they did their best to have me sent home.

The nervousness caused by the strangeness of this new world into which I was thrust accentuated my handicaps, and I found it impossible to do many things at school which were easy for me at home. Mother persuaded the teachers to allow me to stay at school for two weeks on trial; and as soon as the new environment became familiar I calmed down considerably, and my instructors withdrew their objections. But at school I was always conscious of a nervous tension which did not bother me at home; and, though I soon got along there well enough, I hated to go.

So I worked on my mother's sympathy by exaggerating my handicaps and by seeming to lose all the control that I had slowly built up. At breakfast I would send cups and plates flying, in the hope that Mother would decide that I was not well enough to go to school. But she saw through these manoeuvres of mine. After giving me a good scolding and a lecture on how important education was for me, she would drive me off to school.

The same trouble always arose again whenever I was promoted from one class to another. For years new faces and strange situations petrified me with fear. I can remember once playing leave for a period of some days rather than face the unpleasantness of getting settled in a new class. Mother

gave me a sound licking when she found out about this escapade, and again made it plain to me that I had no chance of getting along in the world unless I got a good education. She hoped that I had taken her words to heart, but she made sure that I did not fool her again by getting another boy to take me to and from school.

Even when I had overcome my nervousness, school life was not easy for me. I constantly had to be helped, for I could not take off my coat or get to my desk by myself. I was allowed to enter and leave the classrooms early, in order to avoid the crowds, for I was so unsteady on my legs that the gentlest push would send me sprawling. Mother arranged with the janitor to take me to the bathroom, and with one of the older boys to carry me out and in whenever the fire drills were held—one of the Board of Education's chief objections had been that I would present a problem upon these occasions. Everybody went out of his way to be considerate once he understood my difficulties, but it seemed to me as if this understanding was hardly established before a change of teachers or classes made it necessary to start all over again.

AS I approached adolescence, I became so self-conscious about my handicaps and so introspective that I must have impressed my teachers as being mentally retarded. For the first time the realization that I was different from other people sank home. When I saw that none of my schoolmates was afflicted as I was, I began to wonder if there were some hereditary curse upon me. I fell into the habit of brooding upon my handicaps, and these seemed to grow steadily worse.

My parents were concerned about me, for now at periods I lacked any sort of control; and they took me round to the doctors again, who could do nothing more helpful than prescribe sedatives, which at least helped my confidence if nothing else. At school I was excused from writing since it

was difficult for me to hold a pencil, and from singing since I had no control of my voice.

This being set apart from the others only increased my sense of isolation from the rest of mankind. I never went out with the other children at recess, because if anyone so much as pointed a finger at me I fell down. I followed back alleys on my way to and from school to avoid being seen. It seemed to me that everyone I met was talking about and pointing out my handicaps, and the more self-conscious I became, the harder it was to maintain any sort of control.

I could not understand why it was impossible for me to do certain things in public which I could manage satisfactorily at home. But the difficulty was real enough, and in some cases took years to overcome. I could not eat by myself in public until I was eighteen or nineteen. Now I know that the more conscious a spastic is of his handicaps, the more difficult it is for him to overcome them. *Thinking of something associated with relaxation, rather than struggling to overcome the tension, is essential in avoiding this difficulty;* and I could not escape self-consciousness except when I was in my home or absorbed in work.

Since I was physically unable to take part in many of my schoolmates' pastimes, and barred from others by the psychological barriers which I erected myself, I got into the habit of reading a good deal. It was possible to do this at home, without the ordeal of going to the public library (through the kindness of one of the boarders Mother had been obliged to take in when Father was unable to find work during a period of economic depression).

Gustaf Erickson was a college graduate and had several hundred books which he allowed me to use. He lived with us for fifteen years and soon established himself as a member of the family. It was to him I turned when Father went off job-hunting in places far from Minneapolis. I can remember how Father heard of work as a harvest hand in the Dakota wheat-fields, and how he "rode the rods" of a freight-train to get there since he had no money for a ticket.

Mother and I were worried about Father when two weeks

went by without word from him, but Gus assured us that he would come safely home; and so he did. Gus opened new worlds for me by talking with me and lending me his books, and I found as much delight in this way as I derived from the pocket-money which this kindly soul often gave me.

Unfortunately one of these books was a health treatise, which I came upon just as I began to worry about myself. It started me trying to breathe correctly, and I soon discovered that it was difficult for me to breathe at all. I developed a diaphragmatic tic, which bothered me whenever I was nervously excited. When I was called upon to recite in school, I would get tense at the idea of being the centre of attention, my hands and legs would start shaking uncontrollably, my breath would fail me, and my actual speech-difficulty would be outrageously accentuated.

When I put on a show like this, there was nothing for the appalled teacher to do but get me a glass of water and send me home to calm down. This trouble afflicted me for months, and I wanted to give up school because of it. But Mother would not hear of my abandoning the course she had set for me, so back I went to struggle against this new complication, which I had brought on myself, for spastics are exceptionally prone to suggestion.

This troubled time in my life was brightened by the companionship of three faithful friends, Harold, Reynold, and Irving. Playing with them I forgot my selfconsciousness and forgot to worry about myself. Together we involved ourselves in considerable mischief, and I always resented any implication, no matter how tacit, that there were things they could do that I could not.

One day they decided to see the world, and rode the street-car to the end of the line, which was some miles outside Minneapolis. They came back full of accounts of the wonders they had seen, and told me what a pity it was that I couldn't have gone with them. This was a challenge to me; and, taking a long-treasured shilling, I made a solitary investigation of the city's transport system. When I finally got home *at two o'clock in the morning*, my distracted parents had

the police searching for me. The licking that I received was completely eclipsed by the glories in retrospect of that adventure and by the admiration I won from my friends for daring the unknown by myself.

It was at this time, too, that I made my first efforts to earn money. I sold newspapers on the streets for a few weeks until my father found out about it. He discovered, or thought he discovered, that people were buying their papers from me out of pity; and this he disliked intensely. He made me give up the job and told me that he could support me without my making capital of my handicaps. Thus brought up short in my attempt to improve the family fortunes, I proceeded to sell to our neighbours some of my mother's imitation jewellery for considerably more than its value. Mother made me return the money I obtained in this way, although I could not see why it was not good business to sell a sixpenny pin for a dollar, if you could find a buyer, no matter what his motives were.

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THE transition to high school when I was thirteen proved too much for me. South High had a great many more pupils than either of the two grammar schools I had attended, and the crowds of strangers swarming in and out of the classrooms terrified me. There was a bustling, impersonal air about the place, and no one seemed to have time to pay any attention to me and my difficulties.

After struggling along as best I could by myself for three or four days, I decided that South High was not the place for me and stayed home. But I was still anxious to obtain more education, and after a few weeks of trying to keep up with my friends by going over their lessons with them and studying in the library at home, I found a better answer to the problem. During the previous year our eighth grade teacher had taken the whole class on the street-car to St. Paul to see the legislature in action. About half-way between the twin cities we had passed the grounds of a private school called Bethel Academy. It had struck me as a wonderfully

attractive place, and I asked our teacher about it. I was told that it was a small Baptist institution which enjoyed a very good academic standing. At that moment was born the dream that I might some day be a student there; but, like most of my dreams, I never expected it to be realized.

Now, since public high school was out of the question for me, I thought it worth while to discover whether I could gain admission to this school which appealed so much to me. They were willing to take me after they had heard my story; and so, after spending six weeks at home, I went back to school again.

I felt a good deal more at home at Bethel than I had at high school. There were only from six to twelve children in each class, and I soon got to know my schoolmates and teachers. The worst part about the new arrangement was the long bus trip to school and back home again every day, which could not be avoided, though it was not easy for me.

My chief trial at school was reading aloud in class. I used another book to hold open the one from which I was reading, since I used my left hand to turn the page and had to keep my right between my knees in order to control it. When I came to the bottom of the page, even though it was in the middle of a sentence, I had to come to a full stop while I attempted to turn the page. The book had a perverse habit of not staying open during this operation, which always flustered me, and once I flipped it clear across the classroom in my anxiety to turn the page. Then, when I was trying to recite, my hand would start twitching, and when I tried to control it I would lose the thread of what I was trying to say.

But these difficulties lessened as I grew more accustomed to my new environment. It was not so long before I was trying to embarrass my schoolmates, rather than being embarrassed by them. At this time I wore leg-braces which extended from my waist to my ankles. I let them go un-oiled, so that I could squeak them and make the girls in the class think that a mouse was in the room.

At Bethel I found a way of circumventing my difficulty in writing. One of my classmates possessed a typewriter, which

he allowed me to use. I found that it was much easier for me to press the keys than to attempt to hold a pen or pencil. Typewriters were then very much more expensive than they are now, and a machine of my own was completely out of the question. But after my friend left Bethel, Mother rented a machine for me, and eventually I got a light typewriter of my own.

The development of electric typewriters which require only the slightest pressure on the key has provided a means of expression to many spastics who can neither write with a pencil nor speak. And these machines are a tremendous help to those who can write only slowly, poorly, or laboriously by hand.

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IN my studies I had a good deal of difficulty with languages, and especially with spelling. But I became very much interested in science, particularly physics, and won high standing in this subject. During the summer I took a correspondence-school course in chemistry; and my friends, Harold, Reynold, and Irving, helped me to do the experiments. Our operations must have been a source of constant alarm to my parents and our neighbours.

On one occasion we decided to experiment with gunpowder. We mixed up several pounds of salt-petre, charcoal, and sulphur, and some phosphorous according to the formula, wrapped the mixture in newspapers, and put it on the sidewalk behind the house. Then we dropped a flat-iron on it from the second-storey window. The iron almost took our noses off as we leaned out to watch the explosion, and it did splinter the eaves of the roof. The noise was terrific beyond our expectations and brought a policeman running to the scene. With the modesty befitting scientists, we spent the rest of the day hiding in the cellar. Whenever I return to Minneapolis I always make a point of seeing whether that house, with the scars of the explosion, is still standing.

Sometimes the explosions were unpremeditated. I recall concocting some mixture in a chocolate can and putting it on the stove to warm up. I left it there too long, and the

top of the can blew off with such force that it stencilled the trade-mark in the ceiling. On another occasion my friends and I had watched with great interest the building of a new house across the street. The men from the gas company came one day to put in a connection to the main. They did not finish the job that day and left their tools behind. We opened the main and set fire to the escaping gas with a torch tied to a fish pole. The flame shot up like a volcano in eruption. It was a thrilling sight, but we decided to leave it to the crowd which quickly gathered. Something told us that our experimental zeal had been carried a little too far.

The most serious of my scientific pursuits was electrical work. It started when Harold and I acquired a broken door-bell, complete with button, bell, wires, and battery. We fooled around with this device until we got it to work, and I learned the principle of the circuit in the process of repairing it. I soon became as much interested in electricity as in chemistry, and kept my friends busy stringing wires for me. When I was fifteen I could wire a building as well as a professional electrician, and thought of earning some money by my skill. But in Minneapolis there was a city regulation which provided that a wiring job had to be inspected when completed, and only a licensed electrician could ask for an inspector.

I solved this difficulty by going to see a man connected with the General Electric Company who was very much interested in crippled children. He told me to go ahead and do the work, and he would take care of having the request for an inspector come from a licensed electrician. Under this arrangement I earned quite a bit of money. I also did well in the summers equipping my uncle's farmer neighbours with the latest thing in city door-bells. The confidence in myself that I derived from these activities was far more important than the money I earned by them, for it helped me to overcome my self-consciousness and to stop brooding over my handicaps.

But I still feared the world for what it might think of my handicaps. This fear had one good point: it kept me hard at work and I never wasted much time in recreation. I stayed

home when the others were out playing, and my mother saw to it that I spent my spare time usefully. I got credit at Bethel for the correspondence courses that I took during the summers, and so I completed the high school course in two and a half years. My grades were good enough to entitle me to a part in the graduation exercises, but I was still so nervous about appearing in public that I could not even sit on the platform with the rest of the graduating class, much less make a speech.

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MY parents had never even considered the possibility of my going to college, but I had secretly dreamed of continuing my education and becoming an engineer or an inventor. For a year after I graduated from Bethel, college remained a dream which came to life in my mind whenever I passed the buildings of the University of Minnesota or saw one of my schoolmates who had been fortunate enough to go on to college. Meanwhile I continued my studies and scientific experiments as well as I could at home and in the public library.

My heroes were Thomas Edison and Steinmetz, and I wrote them about my ambitions. Their kindly replies strengthened my resolve to realize my dream. If Steinmetz, a hunchback, could win recognition as an electrical wizard, I felt that there might be hope for me despite my handicap. I drew up a plan for a gas engine which was conceived on a new and original pattern. Since everyone likes to encourage a cripple, my invention was highly praised by all who inspected the drawing.

As a confirmed reader of the popular science magazines, I knew how important it was to get your invention patented before it was stolen by some wily manufacturer, so I wrote to one of the patent lawyers listed in the advertising columns. My engine never took more substantial form than a drawing, but it involved considerable expense to my family. I paid a fee of £15 for a United States patent, and then the lawyer suggested that my invention ought to be protected in the

other great countries of the world, and for this purpose went most of my mother's hard-saved £100 bank deposit.

Nourished as I was on tales of millions acquired through simple inventions, I had no doubts about the advisability of spending the money thus until it was gone. When a stream of letters offering to promote my invention—for a consideration—started to arrive, there was nothing left, or otherwise we would have wasted more money. Though this inventive interlude was a costly one, it did give me a sense of personal worth. I could always point to my invention as an achievement in spite of my handicap.

During this period of preoccupation with mechanical devices, I had an experience which furnishes another example of the importance of concentration to the spastic. A cousin of mine, who was then boarding with us, owned an old Model-T Ford which he parked at the back of the house. I had gone on many drives with him, and thus learned how the car was operated.

One day when no one was about I used a hairpin to unlock the car and drove off down the street. In my anxiety to control the car, all the unsteadiness of my arms and legs vanished. I drove safely round the block and was passing the house again when Mother saw me, and my career as a driver was brought to an abrupt close!

No one could understand how I had managed to perform this feat. But the explanation is that my attention was concentrated on guiding that car without wrecking it and myself, and I was so absorbed in what I was doing that my muscles obeyed my bidding. I know a man so severely handicapped by spasticity that he cannot feed or dress himself, who handles a car admirably in New York City traffic and has driven across the country several times without the slightest mishap.

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I WAS desperately anxious to obtain some sort of employment. At the Minnesota State Fair I met a Mr. Daggett, who was general manager of a company which manufactured

gas engines and electric motors. I told him about my invention and my desire to go into research work. He took an interest in me and sent me to the company's plant at Beloit, where he thought that I might find a job.

This was my first trip alone, and it involved a good many problems for me, for I was still dependent upon my mother for many personal services. I could not feed or dress myself without great difficulty, so my outfit for the trip included a pullover sweater and shoes that could be slipped on without buttons or laces.

After our elaborate preparations for the expedition, it was disheartening to find that there was no job for me at Beloit. Mr. Daggett still felt that some job could be found for me, and he sent me to the company's works in Indianapolis; but the man I saw there discouraged me as far as getting a factory position was concerned. He told me that I might have better luck in the East, where there were research institutes in which my physical handicaps would be disregarded if my brain was good enough.

Eagerly I wrote to several of these institutes, only to be cast down when I learned that they employed only the most brilliant college graduates. After trying to obtain employment in many other places, I finally came to the conclusion that I must have more education—that a college degree, no matter how hard it might be to achieve, would open the door which seemed to stand tightly closed between me and a job.

A year after I graduated from Bethel Academy I learned of a chemistry course which was being given at the summer school of the University of Minnesota. It was just the sort of thing I wanted, but the tuition seemed beyond our means until one of my mother's friends offered to pay it. Only a few students were taking the course, and I got along all right, since I never had any trouble performing experiments when I was not conscious of being observed. I lost some of my self-consciousness when I discovered that after the first few days my fellow-students paid no attention to the twitching head of our professor, who suffered from a wry neck.

It was curious how well I could manage retorts and beakers

when my mind was absorbed in a chemical problem, though I was unable to feed myself when a stranger was watching me. I completed the course with a good grade, and my success in this convinced my parents that I could do college work, and in the fall I registered for a full course in chemical engineering.

My interest in science, which was first aroused by reading some books which belonged to my father and Gustaf Erickson, helped to carry me through a period of life which usually presents tremendous difficulties for the handicapped person. It is during the years of adolescence that a boy develops a desire to manage things and to acquire the ability to support a wife, while a girl begins to think about marriage. The handicapped are likely to despair of attaining their ambitions, and thus a psychological difficulty is added to their physical liability. And frequently their ambitions are impossible of realization.

Fortunately I was able, through the help of my friends, to translate into action some of the ideas which streamed through my head. There must be a balance between physical and mental activity at this age if a breakdown is to be avoided.

III

COLLEGE

I DID not get off to a good start in my college work that autumn of 1916. Ambition had led me to undertake a programme of studies beyond my powers. It did not take me long to discover that college chemistry courses were a good deal more difficult than those I had taken in high school.

I found it impossible to perform the complicated experiments and to make the drawings which were called for, in the midst of a large crowd of strangers in a packed laboratory. I worked so slowly that I was always falling behind in my work and having to take a bag of chemicals home to the makeshift laboratory that I had set up for myself.

The bustle and crowds at the university brought on again my fear of people, and I did my best to avoid them. One day I was picked up as a suspected saboteur as I walked along the railroad tracks with my bag of chemicals, and I had some difficulty in convincing my captors that I was not in the pay of Germany, that it was only a fear of crowds which had made me take that path homewards. The physical confusion which my embarrassment produced made my explanations all the more difficult and implausible.

At the mid-year examinations I got low marks in all my courses, and the dean advised my parents that it was useless for me to continue in college. It was only then that I realized it would have been far more sensible to have taken the regular academic course than to attempt studies which demanded skills which my handicap denied me. I was still interested in chemistry, however, and felt that I might do better in a smaller college.

A schoolmate of mine at Bethel suggested that Macalester College in St. Paul might be the right place for me. When

I learned that the classes there were small and that I would be allowed to go my own gait, I decided that my friend was right and went there for the next year and a half. As when I changed from public high school to Bethel, the more favourable environment was reflected in good grades.

As I look back now on that unsuccessful start in college, I feel that one of the causes of my failure was the helpfulness of the fellow who sat next to me in all my courses. He took very full notes in shorthand and later wrote them out on the typewriter. Since I could not take adequate notes because of my difficulty in writing, I borrowed his in order to type out a copy for myself. We continued this arrangement for several months, and then he had the bright idea of making a carbon copy, thus sparing me the trouble of writing out the notes for myself.

When the examinations came along, however, I could only remember the facts to which I had given motor representation by putting them on paper; the other ideas had slipped out of my head as easily as they had entered it when I read over my friend's carbon copy. Achieving motor representation of ideas is an important factor in the education of the handicapped. A young spastic who had done poorly in all subjects before receiving special training in writing was afterward able to attain the highest standing in his class.

MY mother died in January, 1918, after an illness of only three days. She was a victim of the terrible influenza epidemic which swept the country at that time. Since my father was also ill at the time, I had to take charge of the funeral arrangements, though her death was a tremendous shock to me. Whenever I had faltered in the struggle against my handicaps, she had been at hand to help and encourage me.

Our friends expected that this loss would make me go to pieces, and consoled me by saying that I would soon be with Mother. But I knew that nothing could bring her back,

and was able to rationalize her death¹ and keep control of myself even at the funeral. Yet only a few years before, when my mother had left me with my uncle for a month, I had been inconsolable. My behaviour in this crisis was typical of the spastic confronted with catastrophe. Such crises are often beneficial in bringing about a growth in personality, and an increased burden of responsibility often hastens this development.

After my mother's death our home was broken up. My father went to live in a hotel near his job, and I lived with the family of my old friend, Harold, who was then in the Army. After Harold got back from abroad, my father and I shared a furnished room, but I saw little of him since he worked nights and I was busy at college all day.

My mother's death made my lot harder until I got used to being on my own. I had depended on her far more than I ever realized until she was gone, both as a spiritual prop and for physical assistance in such matters as dressing and feeding myself. But losing her made me resolve to fight my own battles.

Whenever I heard of a handicapped person who made something of his life, I wrote to him for advice. One of the people I communicated with was a Mr. Dowling, editor, banker, and speaker of the Minnesota House of Representatives. At the age of fourteen Mr. Dowling was lost in a blizzard, his legs and arms froze and had to be amputated. He now devoted himself to encouraging men who had been crippled in the war. On one occasion someone in his audience of ex-Service men, who was unaware of Mr. Dowling's artificial legs and arms, had said it was all very well for a man who had all his limbs to talk about losing faith in life, whereupon Mr. Dowling promptly took off his coat and trousers to supply physical proof that he understood the problems of the crippled.

In answering my request for advice about employment, Mr. Dowling suggested that it might be a good idea for me to see a newspaper publisher, since I seemed to have some

talent for writing. My natural nerve carried me past the secretarial barriers into the office of Herschel V. Jones of the *Minneapolis Journal*, and enabled me to tell him my story. He was good enough to take an interest in me, and gave me some good advice. He also supplied me with an introduction to Dean Nicholson of the University of Minnesota, who he thought might be able to find a job for me. Dean Nicholson passed me on to Professor James T. Gerould, who was the University librarian. The library had just acquired some early English manuscripts, and Professor Gerould offered me a trial at the job of cataloguing them during the summer. He warned me that this employment would be only temporary, but this did not bother me in the least in my joy over finding work.

This cataloguing seemed made to order for me, since accuracy rather than speed was the important consideration. I was not a fast typist, and it seemed to me that I had little to show at the end of my first day's work, even though I had been given a room to myself, which saved me from the confusion that always attended my first appearance among strangers in new surroundings. So I took the manuscripts home in my brief case and sat up half the night working over the catalogue cards. The following day I was able to present a very respectable sample of my work to Professor Gerould, and he was very pleased at my ability to do so much in so short a time. The job was mine, and I shall never forget the thrill that my first week's pay gave me. I felt that I could rub shoulders with the world now, since I could earn my own living. My father was proud of me too, though all he said was, "I can die now that you can take care of yourself and make a living."

When the task of cataloguing was completed in a few weeks, Professor Gerould told me that the geology librarianship was vacant and that he saw no reason why I should not have it. A conference with Professor Emmons, the head of the geology department, resulted in my getting the job, which covered my tuition and board. Therefore I transferred from Macalester to the University that autumn. I retained this

post as librarian during the next four years while I took my bachelor's and master's degrees at Minnesota.

THOUGH my academic career prospered and I was set free from financial worries, I became very much concerned about my father. My mother's death had depressed him, and it seemed to me that he spent most of his spare time drinking. At that time I had a pious hatred of alcohol, and no doubt I thought my father's drinking was far more serious than it actually was. In it he doubtless found the outlet for his grief which another man might have found in religion.

After the first anniversary of Mother's death, he brooded more bitterly over his loss, and I was worried about him. When I discovered one day in February, 1919, that his revolver was missing from its usual place in the bureau drawer, I was very much upset. As I waited for Father to come home, my uneasiness about him became more and more acute. Finally there came a knock at the door, and one of the neighbours told me that my father had had an "accident".

As soon as she saw that I was half-prepared for the news, she told me that he had shot himself through the heart. He did not die until the next day and was conscious until the end. Somehow, as in the case of my mother's death, I kept control of myself, though the crisis was even more acute this time because I was left alone in the world.

Since there was now nothing in my life outside of my studies, I buried myself in work. I made myself into a competent librarian, and I did well in my geology major, despite my inability to go on field trips, by doing far more reading than most undergraduates. Through the force of circumstances I achieved in some measure the concentration which makes all things possible to those handicapped as I was.

People with whom I came into constant contact at the University went out of their way to be helpful when they learned that I had been left an orphan. Professor Emmons, who was a prolific writer of monographs on geological sub-

jects, gave me enough 'extra work to keep me in funds. Mr. Oscar Sullivan, the State Director of Rehabilitation, made it possible for me to buy the books and instruments I needed in my college work.

It was through the friendliness of a doctor that I had my first chance to take part in the social life of the University, which I had previously decided was not for me. One Saturday afternoon when most of the students and faculty were watching the football game, Dr. George McGeary found me hard at work and fell into conversation with me. When he asked me why I was not at the game, I replied that I was afraid of disturbing other spectators by the involuntary movements of my arms and legs, and explained how I controlled them by holding one hand between my crossed legs and the other on my chin. He told me that I was working too hard and getting too introspective, and that I ought to get more recreation. As a starter, he suggested that I come over to his rooms that evening to play cards. I told him that I appreciated the kindness, but it was impossible for me to hold cards in my hand.

Dr. McGeary would not take no for an answer and dismissed my objections. So there was nothing for it but to go to his bridge-party, even though I dreaded the fuss I might make in the embarrassment of meeting a group of strangers. I under-estimated Dr. McGeary's understanding of my problem, though, for he introduced me to his other guests as a "funny sort of fellow who walks as if he were doing the Charleston", and told them not to feel sorry for me if I knocked things over.

This may sound brutal, but it put me at my ease. I never minded my unpredictable performances if those who witnessed them knew what to expect, and would laugh instead of pitying me. So I enjoyed the companionship of this evening, though I declined the refreshments, for fear of sending a plate flying across the room.

Though the nervous tension which was partly responsible for such incidents diminished as I grew up, I had by no means achieved complete physical control. Once I stopped

at a soda fountain for a milk-shake, and the boy behind the counter was so busy that he threw my change to me instead of putting it down. I was holding the milk-shake stiffly in one hand, which flew up when I tried to catch the coins with the other and sent the glass crashing to the floor. Everybody in the store stared at me, wondering what was wrong with me, and so intense was my embarrassment that I could never bring myself to enter the place again.

There were many such incidents in which I tried to move one muscle and found my whole body involved in unexpected movements. I particularly dreaded the coming of winter, for icy streets meant constant tumbles for me. I dreamed of arranging my life when I grew up so that I could spend the winter in the south and thus avoid such difficulties. A sudden gust of wind was enough to send me sprawling when the pavements were slippery. There was a policeman on duty near the University who picked me up once after the wind had blown me clear across the street. We often travelled on the same streetcar and he used to bellow at me: "Remember when you were so badly off that I had to pick you up out of the gutter?"

To the other passengers, this remark implied that I was a hardened drunkard, and they used to shrink away from me. But I never minded having fun poked at me in a joking way; it was openly expressed pity that upset me and made things harder for me.

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OFTEN I had to leave theatres or concerts because one leg would start jerking and the more I tried to control it, the worse it got. This difficulty of mine was like the stage fright which often paralyses a normal person when he first appears on a platform; the harder he strives to overcome it, the harder it is for him to deliver his speech.

Gradually I worked out a solution: instead of thinking about controlling my muscles, I thought of some act that I had successfully performed in the past. But it was always hard for

me to do something in public until I had established the habit of doing it with other people watching. Physical control came slowly through establishing control of my emotions, and gradually the fright that crippled me wore off as I became used to mingling with people whose arms and legs, unlike mine, had always done as they were told.

Despite the pleasure I obtained in associating with other people, I was always reluctant to go out socially. This reluctance became greater after I overheard a conversation between a friend who had taken me to a party and our hostess, in which he was taken to task for bringing a person like me to a social gathering. On first acquaintance people always thought I was a hopeless case, an unfortunate to be sympathized with but not a person you wanted to have around. Later, when they learned that I possessed normal intelligence and had used my head to compensate for my physical handicaps, their attitude toward me usually changed.

My unwilling hostess of that evening has since become a very good friend of mine. The difficulty was and is that most people do not realize how closely akin the problem of the spastic is to that of the stutterer. The spastic stutters with his muscles and, like the true stutterer, gets along much better if he can let the other fellow know his handicap and get him to laugh at it instead of being overly sympathetic.

Though Dr. McGeary drove me into having some sort of a social life, I did not slacken my scholastic efforts. Geology was my major and anthropology my minor, and the courses that I took in these subjects under Professors William Harvey Emmons and Ernest Jenks were the high spots of my college career. I was also very much interested in Professor Andrew Stomberg's Swedish literature course. Swedish, which I learned at home, was the only foreign language that came easily to me, and I had never been able to get very far with French and German.

This lack of knowledge was a drawback in my work as librarian, and would have been a severe obstacle to my obtaining my master's degree if I had not chosen the geology of the Scandinavian peninsula as my thesis subject. Such

scholastic ability as I had was in science, and I had a terrible time with subjects outside this field. My interest in anthropology led me to take a course in anatomy, which gave me some idea of the processes involved in my affliction. These facts were easy to acquire, since they had a personal bearing; but it was a different matter in English courses where activities in which I had never been able to partake were assigned as theme subjects. My concentration on science courses helped to improve my muscular control for laboratory work is excellent training in muscular co-ordination.

My ability to do the college work satisfactorily and to earn my way brought about a great physical improvement; I acquired a sense of personal worth and lost the sense of shame about my physical handicaps which had made me afraid of being stared at and pointed at.

After I had taken my master's degree in 1923, since I had nothing to do during the summer, I asked Professor Emmons if I could clean up the geology museum and rearrange the specimens. It was a job that badly needed doing, and he told me to go ahead and have a try at it. I scrubbed the cases in which the specimens were displayed and mounted each piece of mineral on a block and relabelled it. At the end of a week Professor Emmons came in to see what progress had been made. He was pleased with what he found and arranged to have a couple of scrubwomen help me. When I finished up the job, he asked me if I would like to do museum work regularly in addition to my librarian duties. Of course I replied that I should be only too glad to have such work, and without saying anything more to me, he got the legislature to make an appropriation for the post that he wanted me to fill.

When he revealed what he had done, I was placed in an embarrassing position, for Professor Gerould, who had gone to Princeton, had offered me a job in the geology library there, at a better salary than my Minnesota post. But I was still none too anxious to confront new situations. My mental picture of Princeton was a college run on snobbish lines for the sons of the rich, and I was not at all sure that I could fit into

that picture. At Minnesota I was known and allowances were made for my difficulties. Then, too, I knew that I could do the work at Minnesota, but was not so confident of filling the Princeton position satisfactorily. For the life of me I could not arrive at a decision.

In my dilemma I consulted Mr. Jones, whom I went to see about a job which would tide me over the summer. He got me to tell him all the factors in the situation, and then reflected for a while. Finally he asked me if I could get along on £3 a week. When I replied that I could very easily, he said: "Well, I have no job for you, but I'll give you that if you will do nothing except get into the best possible shape to go to Princeton in the autumn and to do a good job when you get there. If the job doesn't turn out well, you needn't feel that you've burned your bridges behind you by refusing the Minnesota offer. You can fall back on me; I want you to feel that I'm taking the place of your father. But understand this: I shall expect you to pay me back when you can."

Later on I learned the remarkable story of Mr. Jones's life. He had started as a type-setter and made his own way to the proprietorship of a newspaper for which he refused an offer of £2,000,000. In his early years he had borrowed £20, put it into the bank, and returned it six months later with the interest which had accumulated. He did the same with a £100 loan, and over a period of years built up his credit standing and the bankers' confidence in him to such an extent that he was able to borrow a large amount of money when he wanted to launch his own paper. It was typical of him that he never acknowledged my cheques as I gradually repaid his loans to me, but when the indebtedness was completely paid off, he told me to come to him whenever I had need of "some healthy lucre".

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THANKS to Mr. Jones's help, I spent a restful summer building up my health. As the time for going East to Princeton drew nearer, I became apprehensive. It meant a

complete break with all my associations so far in life, and the building of a new world on my own. When I considered how slowly I made friends, the best that I could expect was a period of desperate loneliness. And I felt less and less confident about my ability to perform the tasks required by my new position.

When I set off for Princeton in August, 1923, I did not enjoy the train-trip East—for which Mr. Jones had supplied me with funds—because every mile took me farther from home and closer to the dreaded unknown. But, as matters worked out, I did not have an opportunity to feel lonely once I reached the end of the journey.

I had to change at Trenton, and I was having a terrible time managing my possessions when a fellow traveller helped me out. He was also bound for Princeton, where his home was, and I plied him with questions about the place. When he learned that I had come East to take a job at the University and did not even know where to spend the night, he urged me to come to his house until I could find a place to stay.

There was a party at his home when we arrived there, and I was reluctant to go with him, but he insisted on my doing so. It turned out that his family were friends of Professor Gerould and had heard him talk of me, so they promptly took me under their wing. I was told to make myself at home with them until I got settled. My new friends soon discovered that my resources were modest, and they very kindly arranged room and board for me at the Princeton Theological Seminary at considerably less expense than would have been necessary elsewhere. With their help I found that the worst of the difficulties that I had anticipated melted away.

Princeton was nothing like my mental picture of it. I thought it the most beautiful place I had ever seen, and if the majority of the students came from wealthier homes than my class-mates at Minnesota, they did not show it by being stiff with one who did not share their background. Professor Gerould's familiar presence soon banished my fear of being alone in a strange place, and it did not take me long to get

used to my duties of issuing books, filing library cards, and cataloguing new books.

The library where I worked was in Guyot Hall, and was not confined to geological books, since the biology department had its stacks in the same room. My desk stood between the two sections of the library, and I soon fell into the habit of browsing in the biology books, which treated of matters relatively unfamiliar to me. There was a biology seminar room adjacent to the stacks, and I got into the habit of listening to the discussions that went on there while I was on duty at the desk. In this way my interest in the subject was aroused, and I decided to take some courses in it.

After my first few days at Princeton it seemed ridiculous that I had dreaded making the change so much, and I soon felt perfectly at home in my new world.

IV

WORK AT PRINCETON

DURING my first few weeks at Princeton I met Professor Charles Freeman Williams McClure, who taught anatomy and was a very well-known embryologist.

One day he came into Guyot Hall with a new book by Dr. Frederick Tilney, the Columbia neurologist, which he wanted to donate to the library. It was called *The Form and Function of the Central Nervous System*. He suggested that I might be interested in reading it, since it would throw some light on my handicap, and that its author might be able to help me overcome my difficulties.

As a matter of fact, Professor McClure wrote to Dr. Tilney, who happened to be a close friend, and arranged an appointment for me without saying anything more about it until the matter was settled. Naturally I was only too eager to take this opportunity to consult one of this country's most eminent neurologists, and I went off to New York confident that I would acquire a better understanding of my problem.

After explaining my neurological symptoms to me, Dr. Tilney offered me some real encouragement by saying that I had done wonders in overcoming my handicaps to such a degree by myself. He made me understand how fortunate I was to be able to earn my living, since the very struggle for a livelihood, hard as it might seem, would have a good influence on my progress. He made me feel that he was very much interested in my career and urged me to come and see him at least once a year.

Though I deeply appreciated his kindness and meant to keep in touch with him, I did not return to his office for some years. Nevertheless, it was a real shock to me when Professor McClure told me one day in the library that Dr. Tilney had

suffered a severe stroke and would be crippled if he recovered. Later I heard the story of his indomitable struggle to regain his health, and of how he produced numerous scientific papers while he was still confined to a hospital bed.

It was not long before I started enjoying life a good deal more than I had at Minnesota. I made many acquaintances in my work at the library, and I soon had plenty of companionship. My particular friend at this time was a young theological student, with whom I had some amusing times. One day he asked me to go canoeing with him on Lake Carnegie. I got the loan of a canoe from a faculty friend of mine, and we started off. But there was a slight difficulty: neither of us knew how to paddle, and we soon tipped over. Though the water was only a foot deep, I almost drowned in my excitement over the accident.

Another time he came to my room one warm evening with two open ginger-ale bottles and asked me if I wanted to have a drink with him. I agreed, and very shortly became aware of a rapidly mounting sense of well-being. I announced that I had never felt like this before, but the only reply he made was a chuckle. When I poured out the first glassful, I had needed two hands to hold the bottle; now I could fill the glass with one hand and raise it to my mouth without spilling a drop. This was so unusual that it seemed a miracle, and I was marvelling about it when my friend took pity on my innocence and informed me that the ginger-ale was strongly laced with gin. It was the first alcoholic drink of my life.

Much to my surprise, I found that alcohol, of which I had always had a pious hatred, had a curiously stabilizing effect on me. My friend told me that I seemed more sober after several drinks than I normally did. But I discovered that the improvement in my muscular control was only temporary, that the original difficulties were increased for a short period after the effect of the alcohol had worn off. These facts, coupled with my feeling that drinking had played a part in my father's suicide, were enough to deter me from habitual use of alcohol. But I began to wonder if there was not some other

way of achieving the same loss of self-consciousness which brought about such a miraculous improvement in physical control, and eventually I found it.

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TO my inability to walk properly at this time I owe another friendship which completely altered the course of my life. One winter day in my first year at Princeton I slipped on some ice-covered steps and took a bad fall. A fellow named Stillman, with whom I had had a few conversations when he was taking books out of the library, happened to be there at the time. He picked me up and saw that I was taken to the college infirmary.

Not content with that good turn, he came to see me while I was recuperating from the effects of the fall, and we soon became friends. We were in the same course in biology, which I was taking mainly as an aid to my library work; and he arranged matters so that he was my laboratory partner and could help me when I found myself at a disadvantage because of my lack of manual dexterity.

This Bud Stillman was a tall, red-haired chap, who put on no airs at all and seemed very shy. From all appearances he had no more money to spend than I did, so that it was some months before I connected his name with that of the wealthy Stillman family, whose marital difficulties had filled the newspapers in 1921.

At that time I held some of my father's socialistic views and his contempt for the much-publicized doings of the rich, and I had paid little attention to these stories. If anyone had told me then that the Stillman family would one day play an extremely important part in my life, I should have thought him mad. It certainly was improbable that the paths of a Minneapolis labourer's son and of a New York banker's son should cross, and that two people of such different backgrounds should become friends. It was something that could happen only in America, where friendship is not dependent upon birth or wealth.

Though I began to see more and more of Bud after fate had thrown us together, I had other friends during this first year at Princeton. One of the best of them was Dr. Stewart Paton, a psychiatrist, with whom I came in contact when he conducted a biology seminar. He was a friend of Dr. Tilney and developed an interest in me after I had told him how much insight into my difficulties I had gained from a visit to the New York neurologist. By giving me a copy of his book on human behaviour and discussing the questions that arose in my mind as I read it, Dr. Paton furthered the growth of this insight. In turn I made a note for him of anything that had a bearing on his special interest among the new periodicals and books that came to the library. Sometimes we continued, in his home, discussions that had begun at the library.

During the summer I had a month's vacation from my library job, which I spent working at the marine biology laboratory on Mt. Desert Island in Maine. It was wonderfully cool there after the hot Princeton summer, and I enjoyed my stay very much. A number of eminent scientists took a busman's holiday at the laboratory, and I acquired a good deal of knowledge while having a very pleasant time. The general atmosphere was unacademic, though a lot of serious work was accomplished during the course of the summer.

My stay at Mt. Desert was my first taste of New England life, which appealed very much to me. Since my blood is Swedish on both sides of the family, I am at a loss to account for the lasting fondness I acquired at this time for the Puritan ritual of baked beans and brown bread on Saturday night.

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WHEN I returned to Princeton for my second year, I took on an instructorship in bibliography in addition to my duties as librarian. This gave me a substantial increase in salary, so that I did not have to worry about making both ends meet, and I could reduce my debt to Mr. Jones. I moved from the theological school to the Nassau Inn,

and then to a room in Brown Hall, one of the campus dormitories.

These changes in living quarters brought me more into the life of the college, and I began to see more of Bud Stillman and to become less of an academic recluse. One week-end Bud suggested that we go up to New York and see a show or two, as a break in the routine. I agreed, saying that I had to go to Baltimore the following Monday for an operation on my foot, which might help me to walk more easily. We spent the night in an inexpensive hotel in the Times Square district. Bud left me on Sunday, saying that he wanted to see his father before going back to Princeton, while I stayed on at the hotel until it was time to go to Baltimore.

The trouble with my foot was a spastic condition which stiffened my toes at right angles to the foot. Whenever this occurred it was extremely difficult for me to walk or even to put my boot on. One remedy that had been suggested was a tendon operation that would affect all the toes. But Dr. George Bennett of Johns Hopkins, whom I consulted in Baltimore, discovered that the increased spasticity was caused by the rubbing of the little toe against the shoe, and by amputating this toe he eliminated the difficulty. This minor operation brought about a great improvement in my general condition. I gained twenty pounds and was soon able to take ten-mile walks.

While I was in the hospital, Dr. Bennett brought Dr. Walter Dandy, the famous brain surgeon, to see me. Dr. Dandy got me to tell him my story and took X-rays of my head in order to find out what portions of the brain had been affected by my birth injuries, and what hope there was for further improvement.

He came to the same conclusion as the other doctors who had examined me: that mine was a case that neither medicine nor surgery could help. He advised me, however, to continue trying to win control over the muscles that would not obey orders, and made me promise to let him know from time to time how I was getting on.

I returned to Princeton before my foot had completely

healed, so I lived for several weeks in McCosh Infirmary, which was across the street from Guyot Hall, in order to avoid using it too much. They treated me so well at the infirmary that I soon felt more at home than if I had been in my own quarters. Bud Stillman was laid up there with a cold, and we shared a room, so I did not lack companionship.

It rather surprised me that he asked no questions about my operation, but I forgot all about the matter until we went up to New York again together and spent the night in the same hotel. As we registered, the desk clerk gave me a letter which by some mischance had not been delivered to me before I left for Baltimore. It contained a large cheque from Bud, and a note asking me to use it to see myself through the operation in style with a private room and a special nurse. Only then did I realize that he must be a member of the wealthy family I had read about in the newspapers.

Before we went back to Princeton, Bud took me up to his father's Park Avenue house and introduced me to him. I must have given a very poor impression of myself to Mr. Stillman, because the novelty of my surroundings gave me an appalling case of stage fright.

The house seemed to me a combination of a palace and a museum, and I was tormented with fear that one of my unanticipated motions might destroy some valuable ornament. We had tea, and my unruly muscles sent a tea-cup crashing to the floor just as I was trying my hardest to appear at ease. Bud, I knew, would not mind, for he had become used to my impromptu performances of this sort; but I did not dare to speculate as to what Mr. Stillman thought of me. But seemingly he did not notice what had happened, and went on talking to me in the pleasantest sort of way. In fact, he asked me to come and stay at the house whenever I was in the city.

Nevertheless, it was a great relief when we had to leave for our train, and I could relax once more. I had never lost my childish dread of new faces and situations, and this glimpse into a world utterly unfamiliar to me made it worse

than ever. As I left the Stillman house that day, I never dreamed that it would become a second home to me within the next few years.

MY work at Princeton went well enough, but gradually I became aware of the fact that I was in a blind alley. The instructors and students whom I encountered at the library were engaged in research work which led to the writing of books and papers for the scientific journals and to promotion in the academic world, while I just went on performing the duties of a routine job which led nowhere.

I recalled my earlier ambitions and decided that I did not want to be a librarian all my life. I was no longer content just to earn my own way; I wanted to make my life a more useful one. Bud and I often had long discussions in which we settled the fate of the world to our momentary satisfaction, and in one of these sessions he suggested medicine as a career for me. He himself was planning to go to medical school when he finished college, and he made a good advocate for the profession he had chosen.

He pointed out that I had taken most of the required pre-medical courses simply because of my interest in them, and suggested that it might be sensible to make a vocation out of what had previously been only an avocation. As a matter of fact, I had already considered the idea, because one of my Chicago cousins was going into medicine, and I had a jealous desire to imitate him. But I had dismissed the idea as both physically and financially impossible for me.

Now it occurred to me that I might be able to help others who suffered from the same handicap as I did by acquiring at least the fundamentals of a medical education, even if I could not become a doctor. I thought enough of the idea to go down to Baltimore and talk it over with Dr. Dandy. He told me that the success I had had in overcoming my own handicaps should be valuable in helping others, and that a medical degree would be essential if I wanted to do any

serious work of the sort I had in mind. Though he foresaw that it might be difficult to win admission to medical school, he expressed confidence in my ability to overcome this obstacle, and topped off his encouragement by offering to finance a year of my professional education.

Once I had decided upon medicine as the career I wanted to follow, I took courses in bio-chemistry and physiology and read everything in the library that looked as if it might be helpful in attaining my new goal. Before I left Princeton that summer for another working holiday at the Mt. Desert laboratory, I wrote to Mr. Jones in Minneapolis about my plans, and asked if he would be willing to help me again financially, provided I could win admission to a medical school. I wanted to be sure of at least two years' freedom from money worries before I abandoned a field in which I was successful in order to prepare for another in which my prospects were doubtful, to say the least.

Through an accident I did not get Mr. Jones's affirmative reply until I returned to Princeton, and I had a bad time of it until I heard from him. Then I started my campaign to get into a medical school.

It proved to be a long-drawn-out campaign. I was turned down by the deans of several medical schools on the grounds that I was too severely handicapped to be able to practise medicine, even if I could get through the four-year course—which most of them seemed to doubt.

One dean with whom I had an interview happened to have a spastic child, and told me quite frankly that he was not spending any money on the child's education, because "there was nothing to do but to try and keep the poor kid happy". This dean said that he admired my ambition, but could not help me to waste four years and a good deal of money in attempting the impossible.

All this was rather discouraging, and if it had not been for Dr. Dandy's encouragement when the prospects seemed darkest, I doubt if I would have kept up the fight. In the end I won admission to the *Gale* Medical School as a special student, on the basis that my showing in the first two years

was to determine whether I should be allowed to continue studying for a degree.

Dr. Dandy had suggested that I apply at Yale because of a new system which the medical school there had adopted. During the first two years of the course there were optional quizzes, but no examinations until the student felt ready to take a comprehensive test on everything that he had studied. In this way a student could accomplish his work at his own pace, without having to devote all his attention at regular intervals to examinations in particular subjects.

The system was much more like that which is traditional in the English universities than any other American educational plan of the time. Examinations always put me into a state of extreme nervous tension, and under any other system than this one, I probably could not have gone through medical school.

THE lack of confidence displayed by a number of competent authorities in my ability to realize my ambition made me less optimistic than when I first decided on medicine as a career. I managed to obtain a two-year leave of absence from my Princeton job, so that I would have something to fall back on if the medical school work proved too much for me. It was not difficult to obtain this leave, since the courses that I was going to take would give me a better equipment as a librarian.

The feeling that I had not burned my bridges behind me made the prospect of another transition much easier for me than when I had to decide between staying on at the University of Minnesota or going to Princeton. But before embarking on my new career, I was glad to renew old friendships by going to Minneapolis to spend my last vacation from Princeton.

V

YALE MEDICAL SCHOOL

I ENTERED the Yale Medical School in September, 1926. Thanks to the kindness of Dr. Dandy and Mr. Jones, I was free from financial worries for the time being; and my three years at Princeton had increased my self-confidence.

My old dread of meeting new faces and situations was allayed when I found my Princeton friend, Dr. Stewart Paton, had come to Yale as head of the psychiatric department. Seeing his familiar face made me feel at home. He took a great interest in getting me off to a good start and gave me a dictaphone, which proved most useful in my written work.

Various members of the medical faculty went out of their way to be helpful—not so much because I was handicapped, but because I wanted to aid others who had difficulties similar to mine. I plunged into the medical school work with the resolve that I would make a good enough showing to eliminate all doubts about my ability. But I soon discovered that medical school was a different matter from college, and that the work was much more extensive and demanding. After a day of classes I was so exhausted that often I went to bed directly after dinner, and then got up a few hours later and studied until three or four in the morning in preparation for the next day. I found it difficult to study in the boarding house where I had taken a room.

When I mentioned this to Dr. Harold Burr, the professor of neurology, he gave me an office in the laboratory. Here I kept my typewriter and books and could work at any time of the day or night. This arrangement was a great help, because it was still hard for me to get much done in the midst of a crowd.

That first year I had courses in anatomy, bio-chemistry, physiology, and bacteriology. Anatomy is traditionally the terror of medical students, and I was no exception to the rule. Only its connections with other matters in which I was more interested made its dryness endurable. I had a good deal of trouble with the dissecting which is such an important part of the study of anatomy, and had to get help from the other student who was working on the same cadaver.

As long as I was completely absorbed in my work, everything went well enough, but I started to worry about controlling my hands, I was likely to jerk the piece of tissue to pieces. My dissecting partner's assistance had its disadvantages, for though I remembered without difficulty the grosser muscle groups which I could dissect myself, I had a hard time recalling the structure of more delicate systems, in dissecting which I had received help.

As in the case of the borrowed lecture notes at Minnesota, those ideas which received motor representation were more firmly fixed in my mind. At the Columbia College of Physicians and Surgeons the students are obliged to reconstruct muscle groups and other portions of the body in plasticine, as well as to dissect a cadaver. Thus the anatomy of the human being is doubly fixed in the memory by the process of taking it apart and putting it together again.

This hand-in-hand relationship of physical and mental activities has an important bearing on the proper treatment of the spastic. Many parents feel that their handicapped child can be cured simply by a course of exercises designed to develop the affected muscles, and put off schooling until this cure can be brought about. This is a tragic error, for exercises are useless without simultaneous mental training. I was fortunate in not having as a child systematic physical training based upon the principle of motion for motion's sake, but rather in being forced by circumstances to move my muscles purposefully.

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ALMOST everything I studied gave me some further insight into my difficulties. I learned that every human being passes through stages of development which parallel those of the lower orders of life: first squirming like the simplest forms of marine life, then wriggling like a snake, then going on all fours like a dog, and finally learning to walk unsupported on its legs.

During this evolution, there is a simultaneous development of the brain and nervous system. The mind learns to associate a certain sensation with a certain muscular movement, and gradually the muscular response to the sensation becomes automatic. The ability to recall the sensation determines the ability to perform the movement.

I had to struggle against wrong motion patterns: various irrelevant and involuntary movements had become associated with each conscious movement. My difficulty was like that of the beginner at the piano, who finds it impossible to move one finger without also moving several others. The remedy is the same in both cases; only through exercises which develop the ability to perform precise movements at will can the desired control be obtained.

Even so, the correct motion patterns may be obliterated by fear or anxiety. A normal man finds no difficulty in walking along a narrow plank which lies on the ground. If the plank is raised twenty feet in the air, he will go through the same motions painfully and hesitantly, granted that he can perform them at all. *He is experiencing the difficulties which beset the spastic at all times.*

"To be scared stiff" is no empty figure of speech, but a singularly exact one when applied to the spastic. Fear destroys the concentration which enables him to control his unruly muscles.

A good many of the facts I had to learn in medical school seemed at first to have no bearing on my particular interest, and I felt that studying them was a waste of time. One such matter was the bio-chemistry of respiration, which I subsequently found far from irrelevant to the problem of spasticity.

Irregularities in breathing cause certain chemical changes in the blood which result in increased muscular tension.

The effort to make my arms and legs obey orders always made me hold my breath, as the normal person does momentarily in threading a needle. Only in my case I would stop breathing so long that my mother thought I was going to choke, and then gulp in the air. This marked irregularity in breathing, of course, increased the muscular disorder by increasing the muscular tension. Training in correct breathing is important to all spastics, and I have seen tremendous improvement brought about in some cases by breathing exercises alone.

It is dangerous for the medical student to undertake his professional training as I did, with his life work already determined, for he is apt to neglect the acquisition of the broad background essential to later specialization. Too much concentration in medical school on a special interest may make him unable to see the woods for the trees when he starts practice.

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IN addition to the regular medical school work, I had a daily session of physical training under the direction of Dr. Winthrop Phelps, the professor of orthopaedic surgery. Noon was the only time I had free for taking this training, and I shall always be grateful to Mrs. Caroline M. Brown, the chief of the physical therapy department at New Haven Hospital, for giving up her lunch hour in order to put me through my exercises.

Both Dr. Phelps and Mrs. Brown were somewhat sceptical about my deriving much benefit from physical training at an age when I had so many well-established wrong motion habits to overcome. They were amazed by the improvement I soon began to show, in which a number of factors were undoubtedly involved. The exercises themselves played an important part in it, and I was fortunate in having a trainer who knew how to teach the concentration which kept the old motion habits in abeyance.

My own past experience in controlling these patterns, when it was essential to do so for some absorbing practical purpose such as a chemical experiment, was also helpful. But what seems to me one of the most important factors in the situation was my state of mind. The exercises went well when other things were going well, and poorly when I was upset about something.

During my training periods I discussed with Mrs. Brown this connection between the physical and emotional aspects of my handicap. The conventional orthopaedic view was that improving the physical difficulties would bring about a better psychological attitude, but I felt that the way to better physical control lay in control of the emotions.

Whenever I received congratulations for showing physical improvement, I could always find an explanation in some incident which had increased my self-esteem. At the time when my physical progress was most marked I was enjoying a greatly increased sense of personal worth, thanks to having won the affection of a girl for the first time in my life.

The usual intensity of a first love affair was augmented in my case by the fact that with the spastic love is a much more serious matter than with the normal person. He who has thought of himself as being cut off from the rest of mankind by his handicap suddenly discovers that the barrier has vanished, and he idealizes the girl who has released him from isolation. This avalanche-like emotional reaction makes love a serious problem for spastics, because it is difficult for them to choose the right mate when they are apt to be swept off their feet emotionally whenever anyone takes a personal interest in them.

Mrs. Brown and her husband became friends of mine, and I spent many pleasant week-ends at their home in the country outside New Haven. I felt more at home with them than I had at any time since leaving Minneapolis, and these week-ends put me into fine shape for the work of the next week. The poise and self-assurance that I gained in this way were always reflected by improvement in my muscular control and a better showing in my physical training.

Whenever I succeeded in losing the feeling that I was alone and helpless in the world, the benefits obtained from my exercises would be carried over into everyday life. Whenever I became dejected or depressed about the future, this important carry-over was not achieved. I do not wish to belittle the value of physical training for the spastic, but the importance of the patient's own emotional attitude and of the trainer's ability to promote a favourable attitude is too often neglected.

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BUD STILLMAN was to be married in July at his mother's camp at Grande Anse in Canada, and he insisted on my coming to the wedding. So at the end of my first year of medical school, I started off for Canada.

I had to take one train to Montreal, another to Trois Rivières, and a boat for the last seventy miles up the St. Maurice River. The "camp" proved to be a large modern house which stood on a bluff over-looking a bend in the river and was the centre of a domain extending for hundreds of square miles. Forty or fifty servants were needed to run the estate, which was on a scale so tremendous and luxurious that it frightened me.

In the bustle and confusion of the wedding-day I had little chance to do more than congratulate Bud, and he and his bride left immediately after the ceremony on their honeymoon, a year in Europe.

On the following day, when most of the guests were preparing to depart, Bud's mother, whom I had just met for the first time, urged me to stay on at the camp. She was not a woman whose requests could easily be refused—and, besides, it did not need much persuasion to make me fall in with her idea.

Mrs. Stillman had heard all about me from Bud, and she felt that a summer of outdoor life would be the best possible preparation for my next year's work in medical school.

Under her guidance I had the most active time of my life. She never allowed me to avoid taking part in whatever was

going on because of my handicaps. She drove me to a morning dip in the icy water like a hard-hearted drill sergeant; she made fun of my fears when I found myself in new situations. She told me that I had to paddle my own canoe in life, and that I might as well start by going out on the river alone.

Remembering my near-escape from drowning while canoeing at Princeton, I kept close to shore and found comfort in the fact that there were several Indian guides within call on the bank. Gradually I lost my timidity and ventured farther from shore. Then I got caught in a current which drew the canoe toward some dangerous rapids. Fear seized me and seemed to make it impossible for me to use my arms. I looked ashore for help, but there was not a soul in sight. I realized that I would have to save myself.

Somehow I managed to free myself from that paralyzing fear and to paddle steadily back to shore. As the canoe touched the bank, the guides stepped out from behind the trees where they had been hiding all the time at Mrs. Stillman's orders. She had wanted me to gain self-confidence by getting out of the difficulty by myself, without knowing that help was at hand if I should not succeed.

The next morning at breakfast I complained that I had not had much sleep because of a nightmare. Mrs. Stillman, who had been psycho-analysed by Jung, was very much interested in the interpretation of dreams and got me to recount mine. It had seemed to me that I was out in the middle of the river in a canoe, and instead of having the muscular control which I had built up in thirty years of my life, I had only as much as when I was ten. I had upset the canoe in my flurry of unintended movements—and then I woke up and found that I had fallen out of bed. Mrs. Stillman thought this dream most interesting, and said it showed that I was the victim of infantile fears. Whenever I got into difficulties thereafter and started to complain about my inability to do something, she would tell me not to let the ten-year-old Earl get control.

I acquired some valuable bits of psychological insight from my conversations with Mrs. Stillman. She showed me how

brooding and introspection destroyed one's character, and how important it was to translate one's fantasies into reality. Much of what she said fitted in with what I had learned during my first year of medical school, and helped to increase my understanding of myself.

THE outdoor activities which occupied most of our time at the camp provided many opportunities to increase my muscular control. Though learning to shoot was a somewhat painful process for me—the first time I fired a heavy deer-rifle the recoil knocked me sprawling to the ground—it gave me useful training in co-ordinating vision with a muscular act. I made a bull's-eye once by accident when I was still new to shooting, but could not even hit the target for a long time thereafter because I tried too hard and became too tense. Eventually I learned how to avoid expending too much effort, and I became a better marksman. Later on in my life I learned of several cases in which spastics made great physical improvement by engaging in regular target practice.

The long camping-trips over rough country increased my ability to handle myself satisfactorily in everyday life. Spurred on by Mrs. Stillman's constant reminders about banishing the ten-year-old Earl, I managed such feats as crossing streams on fallen logs and struggling over rough portages. I ate meals of heroic proportions because Mrs. Stillman told me that it would be criminal to waste food which had been brought into the wilderness at considerable expense, and also because my appetite had grown enormously.

The world of the Canadian woods was completely new to me, but I quickly learned to enjoy it under Mrs. Stillman's guidance. I got used to seeing big game at home in the woods; to eating fresh-killed moose steak and fried fish that had been swimming in lake or stream an hour before.

As a grown man I was doing all the things that Harold and I had played at back home in Minneapolis as children, and sometimes I wished that he could share the delights of these

new occupations with me. It occurred to me that this sort of life gave those who didn't have to do physical labour the motor activity that the human system demands if it is to remain healthy. My socialist father, who was convinced that rich people never lifted a finger if they could avoid it, would have been amazed to see how cheerfully they sweated under heavy loads on a camping trip. That summer did me a tremendous amount of good, and I returned to New Haven in the fall in far better mental and physical shape than when I had left in June.

During my second year of medical school I took a course in pathology under the dean of the medical school, concerning whom there were many legends. His manner was harsh and exacting, and he kept his students on their toes. He demanded clear answers to his questions and could not be put off with a comprehensive medical expression which covered a complex mass of facts. When such an answer was given, he would say: "Now tell me what that means in simple terms, such as you would use to describe an apple to an Eskimo."

Often when I was called upon, embarrassment would make me forget what I knew. I would get completely flustered and be unable to say what had been at the tip of my tongue the moment before. My mental confusion would bring on an uncontrollable shaking. Instead of being sympathetic, the dean would say: "Carlson, you're nervous because you don't know. Don't think we're going to pass you just because you're a cripple. Go home and study harder!" And he was right about it. In trying to keep up with the work, which is difficult enough for the unhandicapped person, I was not studying thoroughly enough.

Though the dean gave me some very bad times, I am grateful to him for finally knocking out of my head the tendency to take advantage of my handicap. I studied harder, and the next time I was called upon I could recite without shaking.

But at the time, these rebukes were terribly discouraging, and I told my adviser that I never expected to get through

medical school while a man who had such a poor opinion of me was dean. The adviser replied that the dean was as much interested in my progress as anyone, but that he was opposed to babying students along.

To illustrate his point that the dean's bark was worse than his bite, he told me how one applicant had won admission to Yale. The would-be medical student was looking for the dean's office, when he encountered a short figure in a dirty laboratory coat, clearing up after an experiment, whom he mistook for a janitor. Asked where that tough little so-and-so could be found, the dean gave the young man directions, got dressed, and went to his office. He then opened the interview by telling the applicant in detail just why the medical profession had no place for someone so completely lacking in the instincts of a gentleman.

The young man finally managed to get in a few words to the effect that he had already been accepted at the Harvard and Johns Hopkins medical schools; and, since it looked as if there was no place for him at Yale, he would go where he was more welcome. The dean liked this reply, which showed that the young man had some reason for being cocky, and promptly accepted him for Yale.

There was another incident which revealed the dean's habit of saying exactly what he thought: he once called upon a student named Brown, and when an obviously Jewish person answered to that name, the dean quickly said in Yiddish: "You're no Brown. Why did you change your name?" It was just the natural reaction of a man with a passion for exact definition.

The dean's driving energy and executive ability made him a remarkable administrator, as well as an excellent teacher. Under his guidance the Yale Medical School expanded tremendously, and its resources in many special fields were greatly increased. The growth was so rapid that I had difficulty in recognizing the place from year to year. The dean always managed to raise funds for any new project that seemed useful to him, and his success in this respect was outstanding even in a period when the whole

university was undergoing a period of remarkable physical growth.

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AT the end of my second year at Yale I took the comprehensive examination which covered all the pre-clinical work. In my struggle to keep up with the heavy load of work, I had insufficient time to review, and my nervousness over the examination made me forget what I knew perfectly well.

The examination involved both written and oral tests, and in the latter my old difficulty with new faces and situations caused me to make a miserable showing. The medical school authorities decided to take these factors into consideration and allowed me to continue my studies in the pre-clinical courses during the following year, and to take examinations in each subject as I was ready for them. Matters were arranged so that I took these tests in the privacy of the professor's office, and was allowed more than the usual time to complete them in, since I wrote more slowly than the average person even when I typed. But I was held strictly to the same standard of knowledge as the other students.

At this time I had to decide whether to continue in medical school or to return to library work at Princeton, for an attempt to get my leave of absence extended for another year failed. In my perplexity I wrote Bud Stillman that I thought of going back to Princeton because of lack of financial security to finish my medical course. He loaned me a sum large enough to cover my expenses for another year, saying that he did not want me to give up the idea of becoming a physician and that I was not to worry about money.

This generosity made it possible for me to resign the Princeton librarianship, and once I had abandoned all thought of going back to the old way of life, I was able to settle down and concentrate on preparing myself for my new career. Knowing that I had nothing to fall back on, if I failed in medical school, acted as a psychological spur, and I did much better in my work once this decision was made.

Mrs. Stillman invited me to return to Grande Anse that summer, and I was only too glad to do so. Bud and his wife also spent the summer at camp, and we had some great times together.

I shall never forget one expedition Bud and I made that summer. We started off alone one moonlight night in a canoe to reach one of the log-cabins scattered at convenient intervals over the Stillman property. I was in the bow keeping a lookout for rocks and snags, while Bud paddled. I warned him of a big rock which loomed up ahead; and, just as he swerved the canoe to avoid it, the "rock" revealed itself as a bull moose which went splashing off into the darkness. We came to a portage, over which Bud gave me a hand, for all my old helplessness returned when I could not see where I was going. He left me at the foot of a waterfall and went back for the canoe and our packs.

It seemed a long time before he reappeared, and I was glad that the noise of the falling water drowned out the mysterious rustlings I had heard in the woods as we came along the trail. A few days before I had seen a bear and its cubs close to the spot where I now sat alone in the dark, and somehow I was not anxious to renew my acquaintance with the family. That night after we had gone to bed I thought I heard some animal moving about close to us, and the next morning we found what we thought were the tracks of a wolf. This theory was soon disproved by the appearance of a dog which had followed us unseen the previous night.

Such experiences as these, in which there was sometimes real cause for fear, did not disturb me as much as some trifling occurrence in everyday life, because I was too absorbed in what I was doing to worry about what might happen. In my desire to keep up with the others and not be in the way, I acquired accomplishments far beyond the wildest expectations of my earlier days.

That autumn Bud entered the Harvard Medical School, and we saw a good deal of one another again. Every few weeks we would get together in Boston or New Haven, and occasionally we went to New York. His father set aside a room for

me in the Park Avenue house and made me feel like a member of the family.

Gradually I lost my dread of the surroundings which had been so strange to me, except in one respect. In the centre of the dining-room table there was a boat made completely of glass, which I knew to be a very rare and valuable piece, and I never felt comfortable when seated near it. I was positive that some day an unexpected movement of mine would send that ornament crashing to the floor in a thousand pieces; but fortunately this forboding was never realized. Mr. Stillman was extremely kind to me, and when I spent my Christmas vacation with him, he presented me with some fifty medical reference books, which were most welcome. Whenever the grind at New Haven became too much for me, I went to New York for a few days of luxurious coddling, during which I kept up with my studies while resting in bed.

One of my visits to Bud in Boston had an amusing sequel. We spent an evening building castles in the air about our plans after we were both qualified physicians. We evolved the notion of a model clinic for those handicapped as I was, and worked out all the details. Much to our surprise, we found the whole scheme reported satirically in the next day's newspapers. A servant smarting under a recent reprimand had overheard our conversation and taken revenge on his employer in this way.

Meanwhile I passed the examinations in the pre-clinical subjects one by one and worked on my thesis, a bibliography of the basal ganglia. This most primitive part of the forebrain has been the source of much speculation since the beginning of anatomical study of the brain. Swedenborg, who was a great anatomist as well as a religious leader, thought this part of the brain the seat of primary sensibility of body and soul, and he added that "all determinations of the will descend by that road".

Injuries to this brain structure produce loss of motion as well as excessive movement. In the basal ganglia explanations may also be found for rigidity, postural disturbances, partial paralysis, tremor, tics, gait disturbances, personality changes,

and many other disorders. With so many functions attributed to one structure of the brain, it was no wonder that I found more than ten thousand articles on the subject. But it was surprising how little research had been devoted to methods of therapy. There was abundant material on the anatomy, physiology, and pathology of the basal ganglia; but the few suggestions about treatment did not go much further than the common-sense methods which my mother had adopted in my case out of necessity.

As I sifted this enormous mass of material, I recalled the unsatisfactory hours that I had passed in clinics as a child, when there seemed to be a great deal to say about all aspects of my handicap except the treatment of it. Yet this was the affliction of which Dr. Bronson Crothers, the Harvard neurologist and pediatrician, has said: "It is probable that injury of the central nervous system during birth, or immediately thereafter, accounts for more than half of the deaths of viable babies. Furthermore, it is almost certain that such injuries are responsible for the disability of more children suffering from organic diseases of the nervous system than any other single etiologic factor except infantile paralysis."

I decided then and there to devote my attention mainly to the neglected therapeutic, educational, and vocational aspects of the spastic problem.

On one of my visits to New York during this third year at Yale I received further encouragement in my purpose. Somehow it occurred to me to call up Dr. Frederick Tilney, who remembered me though five years had passed since my interview with him, and insisted that I come to his office and let him know how I was getting along. He congratulated me upon my remarkable physical improvement and asked me about the library work at Princeton. I told him that I had given that up some time ago and was now halfway through medical school. When he heard why I wanted this training, he told me to come to him when I got my medical degree and he would give me an opportunity to do clinical work with spastics at the Neurological Institute in New York.

Doubtless Dr. Tilney took such an interest in me because since his stroke he too had had handicaps to overcome. When I saw him, his recovery had progressed to the point that he could walk, though with a limp, and he had taught his left hand to do everything that his right had previously performed. He told me that as a matter of fact he got more work done after his stroke than he had before, and that the probable explanation was that natural left-handedness had been suppressed by training while a child.

This offer of Dr. Tilney's was enough to sway the scale of my fortunes. I had now passed all the requirements for admission to clinical work at Yale, but the authorities of the medical school were somewhat doubtful about letting me go on, since they felt that my physical handicaps would bar me from practice and would even prevent my getting hospital training after graduation. Dr. Tilney's offer helped to eliminate their objections, and I was accepted as a regular student for the degree.

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AFTER being admitted to clinical work, I had another summer at the Stillman's Canadian camp. The strenuous outdoor life there was the best sort of vacation from the intense mental activity demanded by medical school.

Bud and his mother were pleased that I was getting along so well, and Mrs. Stillman insisted on backing me for the remaining two years of medical school. She asked me how much I would need, not just to scrape along, but to have some pleasure as well, and then gave me a generous allowance for the rest of my medical school days.

The freedom from financial worries thus provided enabled me to make the most of my last two years at Yale, and I had less difficulty with my work. Once I got my studies in hand, I joined a medical fraternity and enjoyed a more normal social life. The dean happened to belong to the same fraternity, and after I had known him as a pleasant social companion, he seemed much less terrifying.

As a result of my newly-won sense of security and of fellowship with the other medical students, I developed greater poise and social ease, though these were still likely to desert me in moments of stress and excitement. I can recall how at a lecture the man sitting next to me rapped my kneecap—we had just learned how to test reflexes—and I promptly kicked over the chair in front of me and it sent half a dozen others down like nine-pins into the amphitheatre pit. The confusion brought the lecture to a full stop, and I suffered agonies for the next few minutes.

But I was doing my best now to avoid being crippled by embarrassment, no matter what the circumstances, for I knew that in the work I wanted to do it would be necessary to meet new situations and people calmly. In the past I had always taken a front-row seat at lectures, because then my attention was concentrated on the lecturer and I was not conscious of the rest of the class. But now I tried to accustom myself to being in the midst of large groups.

My difficulties with the clinical work were not as great as I had anticipated. I found it easy enough to make examinations of patients during ward rounds, in comparative privacy with only a few other students about. But I looked forward with some trepidation to the time when it would be necessary for me to make an examination in the amphitheatre before the whole class.

As matters turned out, this crisis was passed with the greatest ease. A new professor was in charge, and he called upon the first name on his list, which happened to be mine. I did not have time to become apprehensive, and went down and put on a satisfactory demonstration. My attention was so concentrated on what I had to do that my shortcomings were forgotten. This initial success gave me confidence for the future, and whenever I started to feel apprehensive in similar circumstances, I could overcome my misgivings by recalling it.

Dr. Phelps had already brought me into contact with the clinical examination of spastics, since he knew my purpose in studying medicine; but now I had an opportunity to make a

thorough study of an interesting case, a seven-year-old boy who had been receiving treatment for three years in the orthopaedic section of New Haven Hospital and in the Yale Psycho-clinic. Dr. Arnold Gesell, the director of the latter, came to the conclusion that this mute and almost entirely helpless boy had an intelligence commensurate with his age, despite his inability to walk, talk, and write.

The evidence provided by this case that mental growth can proceed without motor experience encouraged my belief that the mental and physical training of spastics should be carried on simultaneously, and that education should not be deferred until the patient's motor development was improved. Through social contact with this child's parents, I was able to supplement the findings I made about him under clinical conditions, and thus gained some extremely valuable insights into the problem of the treatment of the spastic.

It encouraged me to discover that I had less difficulty with clinical work than some of my fellow students, whose ability to reel off masses of facts had far outstripped mine when we were learning anatomy during the pre-clinical course. At the end of his first two years, the medical student has to adjust himself to working under new conditions. Instead of acquiring a mastery of a more or less fixed body of facts and the ability to perform experiments under carefully arranged circumstances, he must now select from his store of knowledge the facts relevant to a situation which changes before his eyes and whose origin is often shrouded in mystery. Diagnosis and methods of treatment must be quickly chosen from a host of possibilities. Until experience is acquired the student's perplexity is often extreme.

When I was on the accident service, an Italian child was brought to the hospital in an unconscious state by a truck driver whose story was that the boy had hailed him for a ride and keeled over shortly after boarding the truck. We put the child on the examination-table and were debating which of the various possible factors might have produced unconsciousness. One of us happened to lay a hand on the child's distended abdomen. The child promptly threw up and sup-

plied all the evidence necessary to determine that his condition was simple dead drunkenness brought on by too much red wine, which we later learned he had consumed in his father's cellar a few minutes before he had hailed the truck driver. I regret to say that intoxication had never occurred to any of us as a possible cause of his unconsciousness.

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FOR a course in public health, which I took under a prominent advocate in socialized medicine, I wrote a paper on the problem of training the spastic, which I based on my study of Dr. Phelps' and Dr. Gesell's case. The time and money expended in caring for this child had drained the family's resources and lessened its value to the community. Since treatment would be necessary for many more years, the best solution for both the child and its family would be institutionalization. But unfortunately there was practically no provision for care of the multiple-handicapped.

The child could have been admitted to a school for the crippled if he had not been mute; to a school for the dumb if he had not been crippled; or to an institution for the feeble-minded if his freedom from mental defect had not been established. What the child needed was a co-ordinated programme of mental and physical training over a long period of years. Such a programme was beyond the means of his parents, and of those of many other similar cases. Therefore I came to the conclusion that state and philanthropic sources should provide funds for the institutional care of the spastic. Through training, a large number of such cases, commonly placed in institutions for the feeble-minded and insane, could be made useful members of the community instead of a permanent drain upon it.

Though this conclusion seemed inescapable to me then and still does, I found when I started practice that there were all manner of difficulties in establishing an integrated programme which applied the resources of both education and medicine to the spastic problem. The spastic should receive

such help as the various medical specialties can give to his multiplicity of handicaps, and generally does, but it is infinitely harder for him to get the education which may do still more for him. He is barred from the public educational system, and yet the hospital where he receives medical care feels that educational work is no part of its responsibility. Unless his family possesses sufficient resources to afford the services of a private tutor, or he is as fortunate as I was in being blessed with friends who opened the way to education, he is denied the chance to overcome his handicaps through schooling.

There are adequate facilities in the hospitals in most of our larger cities for diagnosing and prescribing treatment for the spastic, but the prescription is one that cannot be filled without the help of a school programme. The establishment of special schools running in conjunction with the local board of education where the mental and physical development can be simultaneously controlled will enable the spastic to receive the prescribed treatment.

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SHORTLY before the end of my fourth year in medical school I received an invitation from Mrs. Stillman to come down to her place in Pleasantville, New York, as soon as I finished my work. When I did so, I tried to return to her a considerable sum which I had saved up during the year from the allowance which she had provided. But she refused to accept it and told me to use it for a trip abroad. She thought I had been working too hard, and urged me to spend the summer having a good time in this way.

I had always wanted to see the land from which my parents had come to America, and during the past year I had entertained the hope of taking a year of study in Sweden on a fellowship. That scheme had not worked out, but now I had a chance to spend at least some weeks in the old country. I crossed the Atlantic in the company of a young Swedish doctor who had been interning at New Haven, and then travelled through Sweden, Denmark, and Germany by myself.

I had hunted out the addresses of my parents' friends and relatives before I left, and now I called upon them. Far up in northern Sweden, in the land of the midnight sun, I visited my father's brother and was received so hospitably that I wondered if my constitution would survive the strain. After my first night there, I was aroused by my aunt's coming in with a tray of coffee and cakes. After consuming these, I started to go out for a walk, when she asked me if I were not going to have breakfast, and made me sit down at a table loaded with food. There was more coffee and cake at eleven; then a big meal at noon; coffee and cake again at four; then a big supper; and finally more coffee and cake just before bedtime. There was no escape from all this eating and drinking; my aunt made it quite clear that her feelings would be hurt if I slighted anything she had prepared.

Sometimes I had difficulty in convincing my relatives of my identity. One of my mother's sisters lived in a place so remote that she had never seen a train or an automobile. My arrival in a car at her door created a considerable stir, and when I tried to tell her who I was, she could not believe that I was the poor crippled child of whom she had read in letters from America long ago. She had assumed that I had died soon after my mother, since she had heard nothing more of me since that time. When I succeeded in convincing her that I was indeed her nephew, we went out for a ride in the car and for dinner. Her enjoyment of the occasion was constantly interrupted by expressions of amazement that she should encounter Maggie's poor son under such circumstances. I met with a similar reaction from other relatives, who found it strange that their contact with members of the family who had gone to America should be resumed through the appearance of the one least fitted for survival.

I had heard so much of Sweden and Swedish ways from my parents and from Professor Stomberg at the University of Minnesota that I found little in my travels that was completely unfamiliar to me. But there were certain features of Swedish life, very different from American ways, that appealed strongly to me. The immaculate cleanliness of the humblest

restaurants made a great impression on me. The people seemed to enjoy life a good deal more than Americans, though they generally had less on which to do so.

To one who had always been oppressed by the rush and bustle of American cities, it was pleasant to find a land where this was completely absent. No Swede would risk breaking his neck in order to catch a street-car; if he missed it, he would walk calmly along until another appeared. The class distinctions were something new to my experience, and I must often have violated Swedish etiquette. I remember one occasion when I transgressed in this respect. I was having difficulty in getting my suitcase out of a street-car, and a policeman came to my rescue. He insisted on carrying the bag to my destination some four blocks away, and was highly insulted when I offered him a tip. He explained that he had helped me because he wanted to do so, not because of the possibility of a reward, which was beneath his dignity as an officer of the government.

At the University of Lund I looked up Dr. Sven Ingvar, whom I had met through Dr. Burr when he lectured at Yale on his work on the basal ganglia. It was with him that I had hoped to work if I had won a fellowship to study abroad. He gave me a warm reception, and introduced me to several other doctors who were working in the field which interested me. Dr. Ingvar reminded me of Dr. Tilney in his ability to combine a large practice with important research work. Both men were of a type which is too rarely found in medicine today. From this meeting I obtained an acquaintance with the trend of the latest research on neurological problems.

I had booked passage home from Hamburg, so I had a few days in Berlin and Hamburg before I sailed, which were enough to give me an intense admiration for German medical research. The very quarters of the experimental animals were better kept than many American hospitals, and this fact was just one evidence of the thoroughness and attention to detail which characterized German science. At the University Clinic in Hamburg I met Dr. A. Jakob, author of an exhaustive work on the diseases of the basal ganglia. He showed me experi-

ments which he was conducting at the time on the relation of muscular movements to these diseases, and when I told him of what I planned to do, he offered the greatest encouragement.

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AFTER this summer, which had proved both pleasant and profitable, I returned to New Haven for my final year of study. In addition to my routine work I attended various conferences which promised to throw light on some phase of the problem that concerned me.

I have a vivid recollection of an incident which occurred at one of these medical meetings. A famous speech specialist asked the audience, which consisted largely of physicians who had devoted their careers to speech disorders, if anyone had actually cured, not merely helped, a stutterer. Not one of these specialists could give an affirmative answer to the question. Whenever I was advised thereafter to give up my plan of specializing in the treatment of spastics, since nothing much could be done for them, I told that story and pointed out that, though a cure was impossible, a great deal could be done to alleviate their difficulties and to aid them to a better adjustment to life.

Another objection that I frequently encountered to my plans was that there were not enough such cases to justify concentrating my attention on them. I was told that the average practitioner saw only two or three such cases in a lifetime. But I had the feeling that thousands of spastics never came to the attention of doctors and that, if proper facilities for their training were established, the extent of the problem would be revealed to be much greater than was commonly held.

Then again there were those who felt that I would be like a blind man attempting to lead the blind. A bald-headed nose-and-throat specialist, seeing me struggle as he swabbed my throat with iodine during an illness, remarked that it was as absurd for me to think of helping the spastic as it would be for him to specialize in the treatment of baldheadedness.

He, and many others, urged me to go into a field of medicine unrelated to my own difficulties.

I grew familiar with the stories of many handicapped physicians who had found ways to be useful to society by circumventing their handicaps. There was a blind heart-specialist whose overdeveloped sense of touch enabled him to make better diagnoses of heart ailments through the use of his finger-tips than an unhandicapped doctor. There was a famous psychiatrist who treated his patients from a wheelchair. It was suggested to me that X-ray diagnosis or the treatment of skin diseases were fields of medicine in which I could work without suffering disadvantage from my handicaps. But I could not be shaken in my conviction that my experience in overcoming my difficulties would give me a special advantage in helping other spastics to conquer theirs.

I realized that my handicaps would offer obstacles in the work I wanted to do; but there were plenty of people who refused to allow a handicap to stand in the way of what they wanted to do. I had only to recall the example of a very eminent Harvard neurologist afflicted by a bad stammer, who lectured to halls so packed that there was scarcely standing room. There would be those who would find the text, "Physician, heal thyself," applicable to my case; but I felt undismayed at the prospect of becoming too familiar with these words.

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THE last few months of medical school fled by, and I did better in my final examinations than my friends had anticipated. I had wanted Bud Stillman to be on hand for my graduation, for I felt that he was in large measure responsible for it, but he could not get away from Boston because of the pressure of his own examinations. His wife came down, however, to see me through my graduation day, and took me to Pleasantville, where Mrs. Stillman, who had been divorced from Bud's father, was to marry Fowler McCormick that same week.

While I was near New York, I visited Dr. Tilney and told him that I had my medical degree. He congratulated me and said that he wanted me to take the summer off and start work at the Institute on an extern fellowship that autumn.

With that off my mind, I went up to Canada for a last summer of outdoor life before I buckled down to practising my profession.

VI

STUDY OF THE BRAIN

DURING the summer at Grande Anse I had an opportunity to familiarize myself with some of Dr. Tilney's work.

At the time of her wedding to Fowler McCormick, Mrs. Stillman had given me Dr. Tilney's books, *The Brain From Ape to Man* and *The Master of Destiny: A Biography of the Brain*.

One sentence from the latter made a lasting impression on me:

"If, for example, Laura Bridgman, deprived as she was of sight, hearing, taste, and smell, with only a fifth of her brain areas accessible to satisfactory contacts with the world, made an adjustment to life equal to the average of such adjustments; if Helen Keller, almost equally deprived of sensory impression, is rated by many as belonging to the class of genius; then the rank and file of mankind uses but a small fraction of its potential brain power."

Since the spastic has far more contact with reality than either Laura Bridgman or Helen Keller, he has a much better chance to become a useful citizen.

When the cold weather began, about the first of September, I left Canada for New York. Dr. Tilney had reserved quarters for me in Bard Hall, the Columbia College of Physicians and Surgeons dormitory, which was most convenient for me since it was only a few steps from the Neurological Institute. This bit of thoughtfulness was typical of the man. He also informed me that Mr. Stillman had provided funds for my fellowship, on the grounds that he felt it was time for him to take a hand in helping me to do the work I wanted to do.

Once I had brought down my belongings from New Haven and installed them in Bard Hall, there was a month free before I was to begin work. So I went to Minneapolis to visit Harold and to see Mrs. Herschal Jones, whose husband had recently died, and other old friends before I entered upon another new phase in my life. A medical degree had been my goal for so long that, now it was attained, I felt somewhat lost and was anxious to gain confidence from seeing familiar faces and places.

But the process of adjustment to my new life was easier than I had anticipated, mainly because of Dr. Tilney's guidance and encouragement. He was one of those people who radiate cheerfulness and strength, who make you feel better by their very existence. The amount of work that he got through every day was tremendous. His office was filled with patients all day, but somehow he managed to put in several hours of teaching at the medical school and of research work in the laboratory.

His studies were devoted to the correlation of behaviour with the structural development of the brain. For this purpose he had built up a collection of models of the brains of the opossum, the rat, the guinea-pig, the cat, and man. Many of the models were of embryo brains, so that the structural development could be studied at various stages. They had been constructed after the following fashion:

The brain was sliced into thin sections, which were then mounted on slides and stained so that the various nerve tracts differed in colour. The slides were then studied under the microscope, and the images projected on the wall. This enlargement was traced on sheets of paper, which provided patterns for wax models.

The data furnished by these models was supplemented by the study of the behaviour of new-born infants, when the reactions are found in their greatest simplicity. Such a procedure was necessary to his basic purpose of finding out why we behave as we do, since the adult human reactions are difficult to analyse because of their complexity.

One day when I was assisting Dr. Tilney in the work with

the models, he glanced out of the laboratory window and saw a battleship moored in the Hudson River. He remarked that if the amount of money which it took to build that ship could be devoted to the study of the brain, we could achieve an understanding of human behaviour which would probably eliminate war. The funds for research were limited to the point of crippling investigation while millions were available for building instruments to destroy men.

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MY work with Dr. Tilney gave me the point of view that the disorders of the spastic should be studied from the point of view of the structural development of the brain, rather than from his obvious muscular handicaps. Observation of the normal child immediately after birth, during his stay in the maternity nursery, and at intervals during his first two years revealed that the unco-ordinated movements are readily adapted to environmental conditions. Correlation of these studies with the birth-injured might reveal better means of adapting him to his handicap.

Most of my time was taken up, however, with ward rounds, clinical conferences, and examining patients in the Vanderbilt Clinic. I also attended the lectures on neurology and psychiatry for graduate students. In the clinic, the term "infantile cerebral palsy" was applied to cases of muscular disorder arising from damage to the brain occurring before, during, or after birth. Such conditions are popularly known as spastic paralysis, which is a term properly applied to one type of cerebral palsy. For reasons of convenience, the term "spastic" has previously been used in this book as synonymous with "cerebral palsied".

The determination of the cause of such disorders was often difficult, because any one of a number might be to blame. Faulty obstetrics was often unjustly blamed for producing these conditions, as in the case of identical twins whom I examined. Their disturbance of gait and speech and their general lack of co-ordination were blamed on the fact that

instruments had been used in their delivery. Had only one twin survived, this conclusion might have been tenable. But special X-rays of their heads taken after removing cerebrospinal fluid and injecting air or oxygen (encephalograms) revealed identical defects, and conclusive evidence was thus provided that *faulty development* instead of birth injury was to blame.

Man is a continually changing organism, and this change is most rapid from the time of his conception until his birth. During the short span of nine months he develops from a single cell, infinitesimal in weight, into the average seven-pound baby. But a slip in the building blocks may produce a club foot or, as in the case of the twins, a brain defect. In the latter, the amount of disability will depend upon the location and extent of the faulty development.

Should it be confined to an area of the brain that is primarily concerned with muscular activity, the child will suffer no greater mental handicap than the child with the club foot. Both must endure the stigma of being "born that way", as I did. But every man varies from his fellows in some respect; and, in the last analysis, success or failure does not depend upon what we lack but rather upon the use we make of what we have.

Haemorrhage in the brain at birth is the most common cause of infantile cerebral palsy. It is known to have occurred in normal delivery, in Caesarean birth, and in precipitate delivery, as well as in labour accompanied by the use of instruments. My own handicaps were owing to the use of forceps, whose mark I still bear on my skull. In precipitate delivery the head is sometimes pushed through the birth canal with such rapidity that there is no time for moulding, and the over-swollen blood vessels burst. The delicacy of the blood-vessel system predisposes the premature infant to brain haemorrhage.

Prolonged interference with the fetal circulation, such as occurs when the navel cord becomes twisted round the neck, is known to have caused multiple haemorrhages of the brain.

King Richard III of England is thought to have been the victim of such birth injuries. Sir Thomas More reports that "the Duchess of Gloucester had much ado in her travail, being born the feet forward", and in the soliloquy assigned to Richard by Shakespeare there is a suggestion that premature delivery was a factor:

*I, that am curtailed of this fair proportion,
Cheated of feature by dissembling nature,
Deform'd, unfinish'd, sent before my time
Into this breathing world, scarce half made up.*

Another probable spastic in literature is the crippled beggar in de Maupassant's story, *Fecundity*, whose mother died in labour. He is portrayed as one who limps, blurts out words almost inarticulately, and has the appearance of an idiot.

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MANY patients came to the clinic with a history of infections, toxic factors, and hereditary degenerative diseases. In a few cases tumour of the brain was revealed in examination. An infection shortly after birth is more likely to have severe consequences than one which occurs after the brain is more fully developed. Cerebral palsy resulting from toxic factors, such as severe jaundice, which persists for several months after birth, has a bad prognosis because the injury to the brain is more diffuse than the common type.

This should not be confused with the normal physiological jaundice in the new-born, which is of short duration. I examined a four-year-old boy, who had been as yellow as a Chinese for four months after his birth. He displayed a lack of concentration, and uncertainty in the use of hands, feet, and speech, showed no response to treatment, and, while there was hope of helping him physically, there was little chance of mental development.

An example of the prospects in the case of hereditary degenerative diseases was furnished by a seven-year-old girl, who was walking unsteadily and able to go to school when

first examined. Several other members of the family had been similarly afflicted and had died. In spite of treatment this girl became progressively worse, and in two years' time was completely helpless. The course of the disease is usually progressive in such cases. Tumour of the brain should be diagnosed as soon as possible, for the successful removal of the tumour depends upon early recognition, before its early manifestation is obscured by muscle-training.

In all cases we found it essential to determine whether the disease was progressive and what degree of mentality was present. Evidence that the disease was progressive placed the case beyond the reach of effective treatment; a profound degree of mental defectiveness excluded the case because there was no undamaged residue with which to work. Before a child was accepted for treatment and recommendations were made for his education, he went through a very thorough examination to determine the type of muscular disturbance, the severity of the damage to the brain, the degree of intellectual impairment, and the degree of improvement that could be expected.

In infantile cerebral palsy almost every conceivable type of muscular disturbance or combinations of types may be encountered. The chief types of muscular disorder are spasticity, athetosis, chorea, ataxia, and tremor. Though these disorders are often grouped under the term "spastic paralysis", they are not really a true paralysis in the ordinary sense of the word, implying loss of motion or sensation. Instead there is an exaggerated motion, and often the musculature is surprisingly good.

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SPASTICITY is a stiffness of movement. The limb moves as a solid piece; the hand in attempting to grasp an object may remain in a fixed position and is relaxed with difficulty. This condition is spoken of as a springy or clasp-knife rigidity, because if the muscle is moved by another person, a certain degree of resistance is encountered which is intense at first

and then diminishes rapidly as the range of movement increases, as in opening a clasp-knife.

In his early years the spastic cannot support himself, and even if support is given, the rigidity of his legs prevents him from walking. As time passes he may learn to walk after a fashion, and the gait is quite characteristic—the toes scrape along the ground, the heels are not brought down, and the spasm of the thigh muscles makes the legs cross at each step in what is known as “scissors gait”. Speech is difficult, and not infrequently profuse watering of the mouth and consequent drooling reflect unfavourably on the mentality, which may be quite normal.

In contrast to the fixed type of rigidity just described, **ATHETOSIS** (from the Greek, “without fixed position”) is a mobile spasm which may occur either alone or in combination with spasticity. Athetosis signifies involuntary, slow wiggling movements, like those of a worm. It is a “plastic rather than a spastic rigidity”: the movement has no spring to it, but rather a stiffness like that of a very dense putty. Upon attempted movement, there is an accompanying overflow reaction of the muscles, causing the athetoid individual to exhibit writhing movements of the limbs and the grimaces which resemble caricatures of normal facial expressions.

In athetosis the emotions exert a profound influence on the individual's ability to control his symptoms. Excitement and unpleasant emotional reactions aggravate the condition, while a favourable environment and state of mind may enable the athetoid to gain almost perfect control over his movements. Thus, with the same individual, at one time the disturbance may not be apparent at all, or may be limited to only one or two muscle groups, while at other times the mere thought of attempting to move a finger may throw the whole body into a chaos of writhing movements, with such violence that one would think that the entire store of volitional impulses within the central nervous system had been set loose.

CHOREA may be described as an involuntary, irregular jerkiness, such as characterizes the movements of a puppet.

The term comes from a Greek word meaning dance, and is particularly apt, since a hopping gait is produced when the legs are affected. The popular term for this disease, St. Vitus' Dance, came into being in the fifteenth century, as a result of an incident in Strasbourg, Alsace. So many persons were afflicted with what was then known as the "dancing sickness", and they caused so much excitement and disorder in the town, that the magistrate ordered them taken to the Chapel of St. Vitus in a near-by village.

The dancers accepted St. Vitus as their patron saint because of a legend that just before he was beheaded during the persecution of Diocletian in A.D. 303, he prayed that he might protect from the dancing mania all those who should solemnize the day of his commemoration. While chorea is a disease that generally occurs in children between six and the age of puberty, it is sometimes congenital, and in such instances is usually associated with athetosis.

ATAXIA is a lack of balanced action between opposing muscle groups, with a consequent clumsiness of movement. The ataxic person suffers from slurring of speech, tremor, and rolling or staggering gait, like that of a drunkard. The muscles tend to be more flaccid than rigid. When asked to pick up a small object, the ataxic person brings his hand down with a swoop—"like an eagle on a rabbit", in Charcot's classic description. There is a disordered sense of position: the ataxic individual is not always aware of where his arms and legs are.

TREMOR, or involuntary rhythmic trembling, frequently accompanies spastic and athetoid conditions. If the tremor ceases when the affected part of the body is at rest and reappears when movement is undertaken, it is described as an intention tremor. Essential tremor, or tremor of rest, is one which ceases on the carrying out of an intentional act. I know of a surgeon with a tremor of rest that occurred in later life who was able to perform skilled operations, although he could not keep his hands still when he was not using them. The intention type of tremor is more frequently encountered in infantile cerebral palsy than the tremor of rest.

When a single part of the body, as the foot or arm, is affected, it is called a **MONOPLÉGIA**. **HEMIPLEGIA** means a paralysis of one side of the body. **QUADRAPLEGIA** is a paralysis of all four limbs.

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THE significance of these various forms of involuntary movement can be better appreciated through speculation on their appearance in the lower animals. It is hypothesized that one of the necessities of marine existence is constant automatic movement of fins or extremities. The function of sending stimuli to cause such movements is assigned to a nucleus of brain tissue that plays an important part in fish and animals below them in the evolutionary scale.

This nucleus, which is part of the old brain, is also present in man. Upon acquiring a terrestrial habitat, however, these continuous movements became unnecessary and even a hindrance, so that a brake had to be applied to that part of the brain where they originated. This brake action is assigned to the new brain or cortex, which first appears in reptiles and reaches its highest development in man. The movements of the normal human infant are unco-ordinated and occur more or less at random because the new brain has not yet reached a state of development in which it can check the automatic action of the primitive brain. Therefore the baby grimaces and drools and exhibits various movements suggestive of very mild spastic and athetoid conditions, which subside as fuller cortical control is established. At a later stage of development, phenomena of similar origin can be found.

When it comes to very delicate performances, the balance between the old brain and the new brain is hardly ever well established. The state of the muscles is so closely related to the state of the emotions that it has been said, "We think with our muscles." Disorganized thought processes are often reflected in postural attitudes, as well as in the character of the co-ordination and integration of muscular reactions.

Verecellini cites the example of a normal boy who attempts to write as well as he can. His hand is not as steady as that of a fully-grown man, because there is as yet no harmonious teamwork between the incomplete functional development of the new brain and the already perfected functions of the old. Despite this unsteadiness, the writing proceeds well enough if he is undisturbed and not under the necessity of succeeding on the first attempt.

But if he is conscious of being watched critically and has only one sheet of paper, he becomes tense and nervous, and finds the act of writing more difficult than it really is. His face becomes flushed, and he begins to tremble and sweat. The tension may reach a point where the emotions gain complete control, and he abandons the attempt to write in rage and tears. If he does not thus give outright expression to his passion, more intense flushing, twitching of the body, and facial grimaces may occur. In either case the delicate balance between the new brain and the old has been disturbed, and the old brain has become dominant.

Sometimes one of these overflow movements which accompany the acquisition of a skill may persist long after the skill has become second nature, as with the adult who sticks out the tip of his tongue as he writes.

In the adult these biologically older mechanisms are laid bare by disease or injury, or in moments of excessive strain. Dr. Strong gave us a vivid illustration of this point in his lectures on anatomy by showing pictures of the facial expression and hand positions of a pole-vaulter going over the bar, which were strikingly similar to those of an athetoid, whose grimaces and splayed hands are due to birth injury. Dr. Strong explained this similarity as being due to the fact that the pole-vaulter tries so hard to get over the bar that he exerts the full force of the old brain as well as that of the new, with the result that the primitive automatic responses of the former gain expression.

Dr. Tilney's models clearly demonstrated that the parts of the brain known as the frontal lobes reached their highest development in man. Their function is to interpret and

apply knowledge, to understand a situation as a whole. Among those cases which I examined, those whose freedom from damage to the frontal lobe was revealed by the encephalogram, showed a greater determination to overcome their physical handicap and a better response to treatment.

In one twelve-year-old boy who could not walk or talk, the X-rays showed severe damage to the brain but none to the frontal lobe. Though the damage to the speech areas of the brain was so extensive that he was mute, he quickly learned lip-reading.

On the other hand, there was a nine-year-old boy in whom the X-ray revealed injury to the frontal lobe. He was so slightly handicapped physically that he had been admitted to a regular school. He displayed a good memory for isolated facts, but failed when he reached a grade where he was expected to combine ideas. In behaviour he displayed a lack of judgment and reserve and a tendency to foolish cheerfulness, which made it impossible for him to profit from treatment.

As I correlated these two cases with Dr. Tilney's studies, I realized that the severity of the physical handicap was a poor criterion of the spastic's fate, and that a study of his behaviour in relation to the structural brain defect gave a much better idea of the prospects of helping him.

VII

IN THE CLINIC

IN THE work at the Neurology Department of the Vanderbilt Clinic I found it discouraging that so little could be done beyond making a diagnosis and discussing the future prospects of the case. Hundreds of the cerebral palsy cases I examined had received no training, though many of the patients were thirteen or fourteen years old. This was tragic; for, unless treatment is started at an early age, wrong motion habits become too firmly established to be eliminated. And such cases have a tendency to become neurotic, even psychotic, unless they receive careful guidance in adjusting to their handicap.

Their lack of self-discipline was clearly evident when they came to the clinic for examination. Almost invariably they were highly excited, and their parents would assure me that I was getting a poor impression of them—Johnny or Betty was much better behaved at home. Neither parents nor children realized that I understood the difficulty, having often been rendered helpless myself when thrust into new situations.

The examinations were conducted under a stream of admonitions from the parent to the child to stop drooling, to sit up properly, to stop squirming. Such suggestions, of course, did nothing to improve the child's behaviour; they made him more self-conscious. I would ask the mother if she could think about breathing without finding that her rate of respiration was upset, or about her mouth watering without finding it necessary to swallow.

Invariably she found that she could not, and thus she came to understand that the spastic is exceptionally subject to suggestion and that it is important to avoid drawing his attention to his difficulty. The simplest muscular act demands from him the same concentration that a normal man would

bring to bear in learning to walk the tight rope, and diverting his attention is like attempting to draw the tight-rope walker into conversation.

From my own experience I knew that the best way to put the child at his ease was to get him to recall some pleasant association, so I would ask him if he had a cat or dog at home and get him to talk about that while I went on with the examination. The parents were amazed to see how the child quieted down at once, and wondered why they had never thought of so simple an idea. Since we had no facilities at that time for muscle-training or educational activities, the best I could do was to offer a few suggestions which the parents could apply at home. Among them were: to interest the child in what he was doing; in walking to get him to look where he was going; in shaking hands, at the hand he desired to grasp; and in speech, at the lips of the person to whom he was speaking. It was surprising how much progress was brought about in some cases through such simple means.

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THERE was so many cases of cerebral palsy that I was kept very busy. It was a far cry from the "two or three cases in a lifetime" which some of my advisers at Yale had suggested. Making examinations and writing up case histories, which was a severe chore for me, took up all my time. But from day to day I grew more convinced of the necessity of a broader treatment than was then possible.

It seemed useless to make thorough examinations of these cases when we had no opportunity to help them through muscle-training and education. My little lectures to the parents seemed a pitifully inadequate sort of treatment. Only the wealthy could afford the services of a technician especially trained in treating these conditions, and there was none on the staff of the neurology division of the clinic.

Dr. Tilney's answer to my complaints on this score was to let me see some cases in which the parents' means were adequate to meet the cost of a technician. I found a therapist

who was adequately trained for work with the birth-injured, and her treatment of one little girl produced such good results that I kept a moving-picture record of the child's progress. Here was proof of what therapy could do, and more than ever I wanted the services of a muscle-trainer in the clinic. I finally induced the therapist to give her services for one afternoon a week, since the Neurological Institute had no funds available for this purpose.

Under this arrangement it was possible to do little more than to prescribe a set of exercises for the patient and demonstrate to the mother how they should be performed at home. But even under these conditions some of the cases showed so much improvement that I later found it possible to enlist Dr. Tilney's support for a further extension of the work. A private clinic was established on the seventh floor of the Neurological Institute with a full-time therapist, and examinations to determine the nature and the extent of the difficulty could be followed up by muscle-training especially adapted to the needs of the particular case.

The value of muscle-training depends upon a number of factors. Before the exercises are started there should be a preliminary relaxation period. A calm and quiet atmosphere is essential, and the teacher should be a person with a temperament and a personality conducive to relaxation. The chief aim of the exercises is to teach the patient to make each active movement with a minimum of muscular effort. With younger children it is necessary to assist them passively until they are able to carry out the movements by themselves. This ability is built up by daily repetition of the movements. As a rule it is better at first to allow the child to do the exercises as best he can, though erroneous and unessential movements may accompany the first attempts. Later the incorrect movements may be gradually eliminated.

It is very important to determine which type of muscular disorder is predominant, for the treatment of athetosis is quite different from that of spasticity and ataxia. Therefore, the physical trainer should be guided by a medical diagnosis. The technician should be present when the examination is

made or have a good record of which muscles are strong and dominating in tension and which ones are weak.

In the normal person, when the arm is hanging quietly by the side, it may be said for the purpose of explanation, the tension of the flexor muscles of the elbow is at par with the tension of the extensors. When the tension of the flexors does dominate, the arm bends upward. The flexors shorten, and the extensors stretch as the movement progresses.

In ataxia there is a lack of balanced action between opposing muscle groups. Instead of there being a definite enhancement of tension in the flexors and a definite diminution of tension in the extensors to produce the smooth, sweeping, continuous movement we see in the normal when he raises the hand to the face, there is a generalized diminution of muscle tension and strength with the result that the movement is done jerkily. This unsteadiness can often be overcome when somebody lends only slight assistance, like placing the hand lightly on the arm as the patient makes a movement.

An ataxic who reeled drunkenly when he attempted to walk by himself required only slight support of a trainer to walk normally. Since the cortex plays the most important part in voluntary movement, it can be trained to compensate in large measure for the defects in the brain that give rise to ataxia. Such training places a great deal of reliance on vision. The ataxic must look where he walks or focus on the object he is attempting to reach.

In spastic conditions the flexor muscles are usually more powerful than the extensors, and the thigh muscles which bring the legs together are stronger than the opposing groups. This is why the legs become crossed on each other when the spastic attempts to walk. When the spastic flexes a limb, there is usually a powerful simultaneous contraction of both extensors and flexors, and the limb becomes rigid. Treatment attempts to overcome this condition by teaching the patient to relax one set of muscles as the opposing muscle group is brought into action.

The child with the scissors gait, for instance, is taught to spread his legs apart after he has relaxed the muscles that

keep them crossed. This is usually done while he is on the treatment table or in the pool. The child spreads his legs apart with as little assistance from the trainer as possible, and the trainer then brings them together when the child relaxes. The trainer must not be discouraged—it often requires a long time before the child learns to relax individual muscle groups satisfactorily.

In spastic conditions the degree of rigidity decreases as the range of motion of the spastic member increases, and it is advisable to begin training of the larger muscle groups first and to defer training of the smaller groups until control has been established in the former. If it is necessary to stretch a tight muscle group, it should be done gently and when the patient is relaxed, to avoid any muscle spasm. The application of heat and a gentle massage is sometimes helpful for producing relaxation. Stimulating massage is contra-indicated because it increases muscle tension.

Sunlight is supposed to increase muscle tension, but I have seen no deleterious effects from it. In fact, the general benefits derived from sunlight are so great as to offset any increased tension that may occur before the spastic becomes acclimated to it.

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BEHAVIOUR problems often interfere with successful treatment. A spastic who was prone to show an attitude of foolish cheerfulness toward treatment began to realize the importance of exercises when he developed an interest in helping a girl who could not walk.

Great resistance to exercises is usually encountered in the spastic with superior intelligence. He likes to day-dream instead of exercising. A girl of seven who was in the fourth grade in school required six months to show any active degree of co-operation. At the time I first examined her, she held her legs rigidly and was scarcely able to move one in front of the other when she was held supported under the arms. Her speech was good, and she had fair control of her hands.

She became interested in exercises simultaneously with a desire to ride a tricycle. The latter was a feat she felt she could accomplish sooner than learning to walk.

She learned to ride a tricycle in a short time and later was able to walk with the aid of crutches.

The athetoid is not the day-dreamer that the spastic is. He is eager to co-operate and is not as easily discouraged. Fear, anxiety, and self-consciousness aggravate his writhing movements, while agreeable emotional reactions enable him to gain almost perfect control of bodily movements.

The public speaker and the athetoid have much in common. Both are helped by exercises that teach relaxation; but such measures are useless to the public speaker in overcoming stage fright if he has forgotten what he is to say, and are equally ineffective in helping the athetoid if he is unable to forget himself in his work. Treatments should, therefore, be directed toward keeping the athetoid occupied and at the same time keeping his mind off his muscles. This can be done by directing his attention to the purpose of the act rather than to the muscles which perform it.

It is, of course, very difficult to lay down or prescribe any one set of rules for specific types of exercises, especially since combinations of motor disability occur more frequently than does a pure type of motor disturbance. It must furthermore be remembered that the individual is born that way. His motor disturbance is, in fact, so intimately tied up with his mental and emotional processes that it is as difficult to conceive of the abnormal movements as being something apart from his feelings as it is to think of a smile as being something separate from the thought which evoked the smile. The muscles should, therefore, not be treated as if they were independent from the rest of the body.

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THE treatment room should contain practical and attractive furnishings. A child is less apprehensive about falling when he is treated on a wide table. Mechanical apparatus for

exercising are of little value. A stationary bicycle may sometimes prove useful.

The Adirondack style of armchair, with its inclined seat in which a child fits snugly, is helpful in teaching a child to sit alone. If the sides of the chair are fitted with boards sloping outward at a thirty-degree angle, they will prevent the child's head from falling over the edge of the chair. When such a chair is fastened by means of hooks to a sturdy table built with elevated edges to prevent toys from falling, a seriously handicapped child will often be able to do more for himself than when he is held in the arms of an attendant.

Even before the child acquires ability to hold an object, toys should be put into his hands, so that he may get as much as possible of that type of mental development which proceeds by grasp and touch in every normal child. As he learns to associate the object by name and one toy holds his attention more than another, there will be a corresponding decrease in disorganized activity.

Parallel bars, chalk lines on the floor, and mirrors on the walls of the treatment room help the child to guide his motions with his eyes. Such apparatus must not be relied on entirely, or the child will find it difficult to control his movements when he is not in the treatment room. Before the exercises have been repeated a sufficient number of times to become automatic—that is, so that they can be done with the least amount of conscious effort—the child will do badly in situations where he is easily distracted.

To help him on such occasions he must learn to inhibit the sensory stimuli which are irrelevant to his activities. When he is walking on the street, looking along a crack in the side-walk will direct his attention to where he is going. When he finds his bodily reactions are about to end in a whirl of confusion, he should stop everything and think. I have frequently seen a frustrated child attain relaxation when the teacher has directed his attention to a card on which was printed the word, THINK.

Recalling a picture that he has seen during moments of relaxation will help a child to gain control over his move-

ments. This is why it is important to have interesting pictures on display in the treatment room. Pictures of subjects in repose have a relaxing effect on some children, while in other cases a picture that portrays action is better in helping the child to collect his thoughts when his muscles seem to be getting the best of him. A picture of a hunter killing a bear that hung in my uncle's living-room, helped me to overcome the fear of having my face shaved. I used to imagine the barber's hand was as jerky as mine, and I would go into a panic whenever he came near me with the razor. When my friends heard of my dilemma, they teased me by tying me to a tree and pointing knives at me. The more I screamed and squirmed, the more they enjoyed the prank.

One day when they were wielding their knives at me I tried to forget my fear by thinking of the picture in my uncle's living-room. I imagined I was the hunter and concentrated on killing the bear. As I did this my squirming movements suddenly ceased, and the boys were amazed to see that I was no longer afraid. I subsequently learned to relax in a barber's chair without thinking about anything in particular.

The principle of working from the larger to the smaller muscle groups was upset when I encountered a spastic girl who was unable to feed herself, but could play the piano beautifully. I found an explanation for this phenomenon in a report by Dr. Brickner and Dr. Lyons on the case of a man who had been a star pitcher for the New York Giants before he contracted sleeping sickness. He was able to walk only with difficulty, and all his motions were retarded. In their test the man stood on the hospital lawn, with stooped head and shoulders and trembling hands, in an attitude of rigidity and immobility. When a baseball was thrown to him, his whole body immediately became plastic, he made a perfect catch, and at once threw the ball back with all his former skill and grace.

It occurred to me that there might be a common factor in the ability of the pitcher to recall a familiar acquired skill and of the spastic girl to acquire a skilled act, and I found it in *interest*. At meal-time the girl was too conscious of her

unruly muscles to be able to control them, but when she lost herself in music she played without conscious effort, just as my overpowering interest in the runaway horses had enabled me to take my first unsupported steps. The elimination of emotional factors, such as anxiety, fear, and self-consciousness, from the muscular act by developing the patient's interest in what he is doing often does more for his physical development than any amount of conscious muscle-training.

Occupational therapy is one excellent way of arousing the patient's interest. Those children who received training in basketry, weaving, and wood-working in the occupational therapy department of the clinic evidenced a remarkable improvement in muscular control. One girl, so athetoid that she was unable to bring her arms together, learned to knit when her wrists were tied so that they could not fly apart. Another athetoid was able to weave and paint when her unruly arms were controlled by bandages wrapped around the elbows. A boy whose right hand was usually extended at shoulder level became so interested in manual training that he was able to wield a mallet accurately with this hand.

Children who soon became bored with their exercises, with moving their muscles simply for the sake of moving their muscles, delighted in using their hands purposefully and soon won much better control over them.

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FROM time to time Dr. Tilney would ask me how the children were responding to physical training, and I replied that some showed remarkable response to the exercises, while others gained little benefit from the repetition of movements.

He called my attention to Dr. McGraw's finding, in her study of normal human behaviour during the first two years of life, that repetition of an activity during certain stages of development does not establish improved performance. Stepping movements show themselves almost immediately upon birth, but no amount of exercise is going to enable the

normal infant to walk until his nervous system has attained sufficient growth, which usually occurs at the age of about one year.

The physical improvement that is possible through exercise for the cerebral palsied person depends upon growth factors. In one child the structural development of the brain may be arrested as far as motor abilities are concerned, and the repetition of a physical act will result in no improvement, while in another there may be unlimited possibilities of developing muscular control. The mother who ties up the good hand of the hemiplegic child, thinking that the more he uses the maimed member, the sooner he will become normal, often creates speech disorders and behaviour difficulties which are far more serious than the original difficulty. The paralysed arm should not be neglected as far as treatment is concerned, but attention should not be concentrated upon it.

In the normal as well as in the spastic, emotional factors have a tendency to increase muscular tension and thus affect posture and movements. Many of the children brought to the clinic for muscle-training were so petrified with fear in their new surroundings that they could not co-operate, although at home they enjoyed doing the few simple exercises we were able to teach the mothers. Fear exerts an inhibitory influence on motor activity, and with the cerebral palsied there is a constant conflict between the desire to make a movement and the recollection of having failed to make it successfully in the past.

This difficulty can often be overcome by psychological means. A spastic-athetoid girl was afflicted with an uncontrollable twitching of the eye muscles which became particularly acute when she was conscious of other people noticing it. I urged her to wear dark glasses, and when she had thus lost her fear of attracting attention, the twitching ceased. Another girl whose facial grimaces made her speech difficult to understand found herself able to speak clearly when she wore a mask at a costume party. In both cases the discovery that the difficulty was not unconquerable, but largely the

result of self-consciousness, made it possible for the patient to overcome it.

Though it is true that the cerebral palsy's difficulties are primarily due to an injury of the brain, the psychological element is so important that the physical difficulties may be minimized by increasing his assurance and self-confidence.

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WHILE surgery offers no cure for cerebral palsy, operations have been devised for particular objectives which often help along a programme of muscle-training. It used to be thought that the sympathetic nervous system governed the state of tension in the muscles, but the Hunter and Royal operation on this system has been of little value, according to the consensus of opinion.

Splendid results are often obtained from muscle-transplants, nerve-sutures, tenotomies, and alcoholic nerve injections, when these procedures are followed up by a thorough programme of exercises. Operations on the brain or spinal cord decrease involuntary movements in many cases. In nearly half of the cerebral palsy cases, the eye muscles are affected. Since in training a great deal of reliance is placed on the co-ordination of vision with muscular movements, surgical correction of cross-eyedness will often bring about a remarkable improvement in the general condition.

I recall the case of a cross-eyed ataxic boy who was able to maintain his balance, but could not walk at all, when I first examined him. Two weeks after the eye condition had been corrected by an operation, I saw him again and he was walking, because he could now use his eyes to guide his steps.

Many of the parents who brought their children to the clinic expected that medicine would be prescribed. But in these conditions drugs are mere palliatives because of their transitory effect. Sedatives, such as luminal and bromides, should not be used except in cases of convulsive disorders. Any drug which tends to depress the mental activity makes

the patient less responsive to treatment, and a cup of coffee will often do more good than a sedative.

Alcohol temporarily eliminates the uncontrollable movements but should not be resorted to frequently because of its habit-forming tendencies, though it may be useful upon occasion. I recall one instance when the mother of a cerebral palsied child telephoned me for advice from a dentist's office, where the child was writhing about in the chair in such a way as to make removal of a tooth impossible. I suggested administering a glass of sherry, and I later learned that the tooth was removed without any difficulty.

Spasticity may also be lost for a short period after recovery from ether anaesthesia. One mother told me that the first time she had ever been able to understand the speech of her spastic child was when the child was coming out of the ether after a tonsillectomy. As the ether wore off, the child's words became less and less distinct, and finally his speech was as poor as before the operation.

Convulsions are sometimes encountered in cerebral palsy, and occur most frequently in hemiplegic cases. Every convulsive child should receive all the tests necessary to determine the factors which produce convulsions. Surgery is sometimes indicated.

The general everyday care of the spastic with convulsions is important. Fatigue and all unnecessary excitement should be avoided. No stimulants such as tea, coffee, or chocolate should be given. The attacks are closely related to constipation, and the bowels should be kept open by suitable means. The child may be sensitive to certain foods that precipitate attacks. Convulsions sometimes cease at adolescence or with the onset of menstruation. The attacks frequently disappear when the child is placed in an environment governed by regular routine, but may return in a less settled one.

A diet high in fats and low in sugar content, and restriction of fluid intake are beneficial in some cases. The attacks may be set off by a low blood sugar. Such attacks usually occur in the early morning before breakfast. Combination of thyroid and luminal has been used with some success in relieving

convulsions. A new treatment for convulsions has been discovered which employs the drug dilantin. This drug is particularly valuable because it diminishes the attacks without giving rise to drowsiness as other sedatives do.

Experiments are now being made with snake venom, bee venom, and curare, a South American Indian arrow poison, which produce partial relief of muscular tension for a short time but seem to have no permanent effect.

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FEEDING difficulties occur in all cerebral palsies. Inability to suckle shortly after birth may require the use of a medicine dropper in giving milk to the infant and is one of the early signs of birth injury. Anti-spasmodic drugs may be necessary to relax the muscles of the digestive tract. A hyperactive gag reflex may cause vomiting when solid foods are introduced. It subsides if the situation is handled in a matter-of-fact way.

If the child is made the centre of attention he is likely to acquire the habit of vomiting whenever he feels neglected. He sometimes refuses food for similar reasons. A spastic who had to be hospitalized on this account was broken of the habit when the nurse gave his plate to another child when he refused to eat. He ate the next meal without a temper tantrum.

Bronchial and asthmatic attacks occur frequently in cerebral palsy cases. They usually subside when the child is placed on a regular routine and seem to be related more to the emotional disturbance than to an allergic condition.

Mothers who brought spastics to the clinics were surprised to learn how easy it was to teach a child to feed himself. If it was at all within the child's ability to bring his hand to his mouth, he was encouraged to feed himself. This can be accomplished by using a deep dish with vertical edges, placing it in a plank of wood in which a hole to fit the dish has been made. When the child feels there is no danger of pushing over the dish, he will be less apprehensive. Placing a rubber coin-change mat under the dish will also keep it in place.

A dish with a rubber suction cup that prevents it from being pushed off the table is on the market. A spastic can handle a glass of water with ice in it better than he can manage a glass without the ice. Anyone who has eaten on a Pullman diner when the train takes a curve has observed that the coffee spills more easily than does the water with ice in it.

It was pitiful to see mothers bringing older children to the clinic who had not been trained in toilet habits. If the child shows any mentality at all, it is possible to train him by using a comfortable toilet seat on which he feels secure. The trouble is the child cannot relax sufficiently to empty the bladder or move the bowel when somebody is required to hold him on the seat. Then when he gets to bed and he relaxes, the accident happens. The child should be left alone on the toilet the same time each day and not be removed until he is finished even if he cries during the first attempt.

The frequent sipping of fruit juices or chewing gum will help to overcome drooling. The spastic has difficulty doing two things at the same time, such as swallowing and using the hands. The child may require so much effort and concentration for using the hands or walking that the saliva fails to evoke the reflex of swallowing and dribbles down the chin. Excessive salivation ceases as the child becomes accustomed to tending to several things simultaneously without directing attention to drooling.

SOMETIMES it was possible to improve the patient's muscular control by prescribing braces or special shoes. In severe athetosis and spasticity, braces often do more harm than good, while in milder cases they may be of great benefit. Braces that guide the legs in the correct motion patterns are important in teaching the child to walk. They may also be used to advantage at night to keep the muscles in normal position during sleep. One child who had been unable to write learned to do so almost immediately after being fitted

with leg braces. The braces held his unruly legs still and brought about an unexpected improvement in his control of his hands and in his speech.

Similar results often follow surgical procedures which relieve tension in a single muscle group. Where there is a tight heel cord, high-heeled shoes will often prevent the occurrence of deformities in other parts of the body, as may happen when the cord is kept stretched by the use of a low heel. High shoes are invariably better than low ones, because the spastic has weak ankles which are apt to become deformed unless supported. Girls who are reluctant to wear high shoes because of their unstylish appearance may use ankle supporters beneath their stockings.

With those children who had difficulty in walking, I suggested various practical principles that the parents could put into force at home. Pushing a baby carriage and walking between parallel bars help the child to maintain his balance by looking where he is going. The use of walking-sticks and crutches are helpful. If the child is so unsteady on his feet that a walker is necessary, it should be so designed that he must push it in the direction in which he is looking.

I urged the mothers to avoid giving the child a faulty sense of balance by supporting him from behind when teaching him to walk. He must learn to go forward rather than backward when falling, and it is often better to let him acquire the experience of falling than to guard him too carefully from it. Outdoors, grass or sand will save him from injury, while indoors a mat may be used. Through experience he will learn to preserve his sense of balance.

If walking is delayed too long, it will become a more difficult matter than if it is acquired during the period of development, when the centre of balance is constantly changing with growth. McGraw cites the case of normal twins who learned to roller-skate at a very early age but lost this ability after being off the skates for six months. During that period they had grown so rapidly that they had to adjust themselves to another centre of gravity when they were again placed on skates.

I constantly had to warn parents against lavishing praise on their children when they took their first unsupported steps. The child is apt to attach too much importance to the newly-acquired act, and to become afraid of spoiling his record by later unsuccessful attempts, and thus normal development of the ability is interfered with by emotional factors.

There was one striking example of this in the clinic. The child had learned to walk under our guidance. Then his mother took him away from the city for six months. When they returned, she brought him in to see me and said that he was no longer able to walk. I had a notion of what was wrong, and told the child to walk across the room. He did so successfully until his mother started to praise him for what he had done. The child became emotionally upset and consequently lost control over his motions. To avoid this, it is better to wait two or three days after the child has acquired a new skill before praising him.

It is said that we learn to skate in the summer and to swim in the winter. This saying might well be taken to heart by the spastic, who is likely to feel that his exercises have no relation to reality during a long period of muscle-training. Since he derives no benefit from exercises when he performs them in this mood, it is better to suspend them for the time being. But often he will find that he can do normal acts which were impossible for him before he started the muscle-training.

When I saw the physical improvement brought about through occupational therapy, I wished that the children who came to the clinic had the same opportunities to put their training into practice as I had had at the Stillman camp. The difference between the very best muscle-training and the use of the muscles in the practical activities of everyday life is as great as that between setting-up exercises and participation in competitive sports.

Parents are frequently more grateful to the physician when he prescribes a pill that temporarily improves the spastic than when he spends hours in discussions about the importance of exercises and education. It is the general disincli-

tion of the spastic to depart from the path of least effort that has made his progress so slow.

If involuntary movements can be temporarily abolished by using drugs, then other means giving lasting results should be possible. The answer lies in education. But real education implies real hard work and perseverance. It is not so much the teacher or the trainer that counts, as the efforts made by the spastic.

VIII

MENTAL TRAINING

MY FIRST few months at the Institute confirmed my belief that the answer to the spastic problem was not simply a matter of physical therapy. The traditional view was that a crippled child could not develop mentally beyond the limits of his motor experience, since he had to translate ideas into muscular activity in order to grasp them, and that therefore the first object in treating a spastic was to educate his muscles until some control had been obtained. The question of academic training was put off until this goal was attained, or neglected entirely.

But I believed that the mental growth brought about through academic training promoted an improvement of physical control, or at least developed the ability to circumvent the physical difficulty. In some cases I found there was definite physical improvement through academic education unaccompanied by physical therapy.

A most remarkable example was furnished by a young man who came to see me in the summer of 1932. His name was Theodore A. Bretscher, and he had just obtained the degree of doctor of philosophy from the University of Cincinnati, despite his very severe physical handicaps. He had learned to walk when he was six years old, and had passed through the first and second grades of school. Then a setback prevented him from walking again until he was twelve, and his family gave up the idea of further schooling for him. At twenty he was selling newspapers on the street and was unable to read or write. He determined to educate himself, and with the aid of a kindly librarian and many hours in the public reading rooms, he succeeded so well that he was finally

admitted to the university as an auditor, since he had no credits for grade or high school work.

After four years the authorities decided that he could be accepted as a regular student and receive credit for courses, though he was still physically unable to write and had to dictate his class-work. He took his B.A. degree in 1928 and his M.A. in the following year. An appointment as a graduate assistant in the department of philosophy enabled him to complete his work for the doctorate in the usual period of time. He emerged with great success from a two-hour oral examination, having received tributes from his examiners on the breadth and solidity of his scholarly attainments and on his capacity for clear and original thought. His grades were all A's with the exception of one C. In addition to his academic work he had contributed a paper to the *Psychological Review*, one of the outstanding journals in that field, and a number of articles to the book page of the *Cincinnati Times-Star*.

During his ten years at the university his ability to walk, use his hands, and talk clearly improved steadily and noticeably. One instructor who had known him as an undergraduate did not recognize him when they met again in the graduate school so great had been the improvement. While at the beginning of his university career he had been completely dependent upon the care of his sister, at the end he was able to take care of himself and live alone.

He came to me for advice about his vocational problem, for he found that prospective employers were too repelled by his obvious handicaps to recognize his abilities. He did not wish to rest upon the remarkable record he had made, but was anxious to make remunerative use of the mental equipment which he had developed so painstakingly. I was glad to be able to place him in a practicable line of work, through the help of Dr. Tilney, and to give him what therapeutic assistance I could.

Dr. Bretscher's history confirmed my notion about the importance of academic education for spastics. As I told him, the real tragedy of the spastic is that his physical lack

of control suggests a lack of mental balance, for the body may completely belie the intelligence it harbours.

He had an unfortunate proof of this statement one day, when I asked him to meet me at a clinical conference in the Psychiatric Institute. Two attendants saw him, decided that he was an escaped inmate, and put him under restraint. The excitement rendered him unable to give a coherent account of himself, and the situation was not straightened out until the arrival of a doctor who knew him. I myself have had similar experiences, and heard of many more in my practice.

But the deceptive character of physical appearance is not confined to spastics. I remember another clinic attended by a number of distinguished neurologists including two strangers. The staff of the clinic all happened to be handicapped in one way or another: one limped as a result of cerebral palsy, another wore a brace, a third wobbled about on crutches as a result of infantile paralysis, a fourth had a tic in his shoulder and was deaf as a post. There was a delay in the arrival of the patients who were to be examined, and one stranger turned to the other and said, as he pointed to his fellow specialists, "What are we waiting for? The patients seem to be on hand."

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TOO frequently the spastic is barred from school, even if his handicaps permit him to reach it, on the grounds that his presence will upset the class. In New York City, the Board of Education provided home teachers for those cripples who could not walk; but this arrangement was not satisfactory from my point of view, since the child had no competition, and hence no chance to attain the psychologically vital sense of personal worth. Also he had no opportunity to accustom himself to the new situations that he must encounter some day. And, finally, these home teachers were available only for children over six years old; and with the spastic it is important to start training at a much earlier age.

Lacking adequate means of expression, the sound mind

behind the crippled body will also become crippled. It is an overflow and energy that causes many of his difficulties. Given the opportunity for education, he can divert some of this energy into mental channels, with a consequent improvement of his physical abilities. Indeed, the fate of the patient depends upon the use of this overflow. Either it is directed through practical training and put to use in such a way as to help the spastic to find a place in the social order, or else he is destined to remain an unhappy stranger to himself as well as to society. What the patient will be able to do with his excess energy in the way of creating a philosophy and finding a way of life which will lead to the realization of this philosophy depends upon his mental endowment, his moral character, and the opportunity which society is willing to give him.

I talked over the problem with Dr. Tilney, and as usual he helped me to a solution. I told him that I did not want the clinic to become just another physical therapy department, but rather a centre where the birth-injured child could be taught to adjust his behaviour as adequately as possible within the limits of his abnormal structural development. The clinic as I saw it would be a parallel to Dr. McGraw's Normal Child Guidance Clinic, whose findings helped the normal child to adjust his constantly changing environment.

The spastic is ordinarily a badly spoiled child, completely lacking in self-discipline and the power of concentration. Yet it is only through acquiring these qualities that he can overcome his handicap. A school programme was obviously the best way of developing them, and it also provided an excellent means of taking the child's mind off his difficulties and thus increasing the benefit he obtained from physical therapy.

Through the help of Dr. Tilney and the director of the social service department, the Institute was induced to provide space and equipment for such a school. The Board of Education was glad to supply the services of a teacher, since the scheme relieved them of the necessity of sending a teacher to each child's home. A definite daily routine of simultaneous mental and physical training was adopted. One hour was allotted to muscle training, followed by an hour of rest, and

during the remainder of the day the children were kept occupied by studies and such games as tended to develop co-ordination.

Occupational therapy was provided once a week. A close contact was kept with the home to make certain that the parents were co-operating in the programme, which was designed to make the child self-dependent. This was necessary in order that the emphasis on discipline and regular routine at the school might not be offset by home influences. I observed that we obtained the best results with those children who lived at the hospital, and thus had no distraction from the regular routine. But of course residence at the hospital was out of the question for the majority of cases because of the expense, and the parents had to bring the children to the hospital every morning and call for them in the afternoon. Eventually the Board of Education provided a school bus, which picked up and left the children at their homes.

We did not have facilities to take care of half the children who came to us and who could have derived benefit from the programme, even though we had adopted rigid principles of selection. The patients were carefully chosen, and none showing marked mental deterioration or progressive disturbances were admitted to the class. Psychological tests were made—various types being used because of the wide variety of handicaps which were encountered—and where the intelligence quotient was above 70, the child was regarded as teachable.

In some cases a high degree of intelligence was revealed, although seemingly the child was mentally retarded. Sometimes psychiatric and sociological investigation revealed that home conditions were responsible for the child's failure to adjust to school life. More often the explanation lay in some special disability, as in hearing, speaking, reading, or writing.

Care was exercised in differentiating between a special disability and a deficiency. There is no treatment for the latter, while the former can often be overcome under special training. The child who is good in arithmetic but poor in reading, or vice versa, suffers from a special disability. The child who

does poorly in both is probably mentally defective. And, finally, we accepted only cases in which there seemed to be a good chance that treatment would enable them eventually to take a place in the normal educational system.

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THE Board of Education arranged for a showing of educational films at the school once a week. I was particularly interested in the reaction of the children to the performance. They became so completely absorbed in what they saw on the screen that all involuntary movements ceased, and for the duration of the performance they appeared perfectly normal. *This observation furnished a clue to the principle that visual education is more important than any other form of training for the spastic.*

I found further support for this conclusion in one of Dr. McGraw's observations on the behaviour of the normal infant. In the case of a child just beginning to extend his arms to reach for an object in the visual field, she found that if the sight of the object is excessively stimulating, the energy which should be directed toward extension of the arm in the direction of the object becomes converted into disorganized general body activity. Too little interest in the object would fail to stimulate movement in the direction of the object, and too much interest would interfere with the child's control over the motor activity involved.

I made a related observation in the case of a spastic athetoid patient who was given blocks to pile up on a table. He placed the first one on the table with only slight athetosis. The placing of the second block on the first involved an increased amount of overflow activity, which was further augmented when the third was placed on the second. The fourth could not be placed at all, and the whole pile was knocked down. The process was repeated several times with similar results. Then the patient was equipped with pin-point blinders, such as are used in the treatment of cataract, which cut down his vision to the blocks and a small part of

the table. He was then able to place the blocks on top of one another more successfully and with less overflow activity.

In further experiments I found that the cutting down of excess stimuli from the various sense organs brought about an improvement in motor control. In the schoolroom various means were used to concentrate the pupil's attention on the task in hand. As he projected himself more and more into his work and forgot himself and his difficulties, there was a very noticeable improvement in the quality and quantity of his work, and also in physical control. One boy was so handicapped that he was constantly sliding off his chair on to the floor. Yet when this same boy was told to correct the arithmetic problems of the other pupils, he kept his seat without difficulty for long periods of time.

Children with a speech handicap were asked to give dictation to the other pupils, and they became so engrossed in the assigned task that they forgot their difficulty and spoke more easily. Typewriters, particularly the electric model which requires practically no muscular effort to operate, proved invaluable in the school-work. For some, who could neither write with a pencil nor speak, they provided the sole means of expression. For those who wrote very slowly and laboriously, they brought about a great improvement in the quality of written work. The hand and eye co-ordination achieved by the use of the typewriter cuts down the number of stimuli, and the resulting concentration is reflected in better work.

A teacher whom I had engaged to tutor a private group of spastic children furnished the clue that lip-reading was valuable even with those children who had no impairment of hearing. I was unaware of her deafness when I engaged her. When I commented on the attentive behaviour of the children while she was conducting the class, she told me that she was stone deaf and that the children had been told to look at her when reciting, so that she could read their lips. The children became interested in lip-reading and learned it as a game. Concentration on the speaker's lips reduced their overflow muscular movements, and also through imitation they acquired better articulation.

• Practically all the children in the school at the Institute had speech defects. The disturbance was part of the general condition, and often cleared up as the child acquired better control of his muscles, without special emphasis being placed on speech training. There were various devices which we used when this improvement did not occur. Many spastics speak while inhaling instead of while exhaling, as the normal person does. Talking before a lighted candle and keeping the flames slanted away instead of toward the patient served to overcome this fault.

Talking while writing was found useful in lessening the tension of the muscles used in articulation. The normal person who suffers from stage-fright finds similar relief by making gestures while talking. Since the spastic has a tendency to hold his breath during moments of conscious effort, exercises that improved the rhythm of respiration aided speech by reducing the general muscular tension. Tongue exercises in front of mirrors were occasionally given, but they tended to make the child too speech conscious.

The spastic's speech difficulties are often the result of trying too hard to talk. I learned a way to overcome this difficulty when I made my first radio talk. The announcer told me to speak just above a whisper without a strain. Friends who heard the broadcast said that they had never heard me talk more distinctly. So I adopted the use of microphones and loud-speakers for speech training, and found that the spastic soon acquires the correct articulation patterns when he can make himself understood with a minimum of effort.

The mirror phone, a recent invention that reflects the voice and enables the spastic to hear the words he has spoken, is valuable in teaching correct enunciation.

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THE educational programme of the school at the Institute was not designed to give the children as much as they could absorb without discomfort or merely to keep them occupied, but rather to develop concentration, perseverance,

and the ability to do hard work. Basically, its aims were to help the handicapped individual to make a healthy adjustment to his condition, and to open the way to a purposeful and useful life.

Too frequently parents and teachers make special concessions to the spastic because of his handicap. I know of one case in which a boy completed high school and went to college for four years, but was never required to take an examination, although he was perfectly capable of writing. His actual academic grade, as revealed by careful tests, was well below the college level. He lacked the proper training to secure employment and to do a job well, and since he was in the habit of having concessions made because of his handicap, he developed into a behaviour problem when confronted with normal standards.

It is mistaken kindness to adopt unrealistic standards in educating the spastic, particularly considering the remarkable improvement often shown when the child is held to a rigid routine. An illustration is furnished by the case of a considerably handicapped boy of twelve. At home he had received instruction from a tutor for two-hour periods three times a week. He admitted that these periods were frequently cut to as little as fifteen minutes by his complaining of fatigue or headache. After attending a special school for a year this boy had no trouble in going to school from 9 A.M. to 3:30 P.M. and in spending two to three hours more on homework every day. He learned to feed himself, partially dress himself, and even would attempt to walk upstairs alone.

There were so many instances of remarkable improvement under our scheme of simultaneous mental and physical training, and so much interest in the work of the clinic was shown, that the need for more space became acute. It was Miss Esther F. Rivington, superintendent of the Institute, who came to the rescue. She induced a philanthropic friend to give a sum sufficient to convert the basement of the Neurological Institute, which had previously been used as servants' quarters, into a home for our clinic, with a special entrance on Fort Washington Avenue, so that the patients did not

have to come through the regular hospital entrance. Here we had eight rooms, which gave us the first really adequate facilities for our work.

There was a railed ramp to the door from the street entrance, so that ambulatory patients could come in without assistance; a hall-waiting room, an office for the clinic secretary, an office for myself, the schoolroom, and four rooms for physical therapy. We had four full-time therapists on the staff, and were able to do far more for the cases that came to us than ever before.

As a result of the attention given to the clinic in the Press, children were brought to us from great distances for examination and treatment. In many cases, of course, an examination revealed that the child could not be helped by our programme; in others, though the child could benefit from training, it was financially impossible for the parents to leave him at the Institute. In such cases I advised the parents to go home and try to form a class for handicapped children under local auspices.

A father brought his boy to me all the way from Port Arthur, Texas, in a dilapidated car. He told me that he could not afford to stay in New York while the boy received treatment, but that he wanted my opinion on the case. After examining the child and finding that he could benefit from treatment, I had a talk with the father. I suggested that he find out if there were enough spastics to justify starting a special class in his home town, then get in touch with the Board of Education and the societies interested in crippled children, and that I would be glad to come down and explain our methods if the community was willing to co-operate.

He seemed doubtful that there would be enough handicapped children to justify such arrangements, but shortly after he got home, he discovered fourteen in Port Arthur alone. He enlisted the aid of the Board of Education to supply the services of a teacher, and of the Crippled Children's Society to furnish a therapist. St. Mary's Hospital supplied space for a clinic, for which almost a hundred spastic children registered. I went down to conduct the clinic and to deliver

several lectures on the spastic problem, using moving pictures to illustrate the methods of treatment used at the Institute in New York. Shortly afterward classes were started, and eventually the school was established in a building of its own. In a similar way special schools modelled on that at the Institute were established in Birmingham, Alabama; Sharon, Pennsylvania; San Francisco; and other places.

A SUMMER spent as medical adviser to a camp for handicapped children suggested a way of increasing the benefits of special education for the spastic. I found that the children at the camp obtained more benefit from physical therapy and educational work than those at the hospital, because these activities were coupled with natural play and outdoor life. The physical, mental, and emotional improvement of these children was so marked that I decided that a regular school for spastics should be established in the country.

Running a school was really no part of a hospital's work, yet education was a vital part of the treatment for the spastic. There were many cases in which a long period of special training was demanded by the seriousness of the handicap, and we had been unable to accept these at the Institute because of our limited facilities. I also felt that a country boarding school would enable handicapped children to forget to think of themselves as patients and make it easier for them to develop their potential social usefulness. At a boarding-school the children would have no opportunity to lose what they had gained in self-discipline from a combined mental and physical training programme during the day by being spoiled when they returned home at night.

From observing the children at the camp, I anticipated that many cases would show startling improvement when disturbing home influences were removed, and that they would be free from nervous tension and emotional strain once they settled down to the regular routine of life in a boarding-school. At first the idea of such a school seemed something

of a dream, and then I decided that I had found the person to help me make my dream a reality.

While I was laid up in the hospital with a bad cold, I became interested in one of the nurses who took care of me. This Miss Schneider had a ring in her voice that made me forget that I was sick, and her cheery way appealed to me. Every morning when she came in to take my temperature and pulse, she would tell me how much better I was; that yesterday my hand had shaken so much that she could hardly take my pulse, while today it was steady. What had happened was she had made me forget myself, and consequently there had been the usual improvement in my physical control.

We had a number of talks, and I told her that she would make a good supervisor for the spastic children in the clinic, since she had this ability to make patients forget themselves and their troubles. I made her promise to look over the clinic when I was back on the job again. We became good friends, and one day she asked if she might take a private call on the phone in my room. I consented, of course, and though she talked in German, I could gather that she was making a date with somebody. When she hung up, I promptly asked her when she would make a date with me. I got scolded for eavesdropping, but I did get that date once I was well again.

Ilse Schneider had a car, and we made many excursions in it. I forgot myself in the excitement of going out with a pretty girl, and felt more poised than ever before. She was interested in my work, and I talked over with her the cases I had examined during the day. Usually we had these talks over *smörgåsbord* in a Swedish restaurant, where the atmosphere and the food reminded me of home. I was fond of having a bottle of wine with my dinner, and Ilse noticed that I seemed to have better control over my hands after drinking the first glass. She asked whether she or the wine had a steadying effect on me, and I replied—both tactfully and truly—that is was a little of both.

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AS A result of the interest that was aroused by the Institute school, I began to receive requests to address various groups and tell them about its programme. There was no question in my mind that it was important to bring the spastic problem before the public, but I did not feel that I, with my handicaps, was the person to do it. The idea of getting up on my feet before a large audience filled me with dread, for I remembered all too vividly how I had become tongue-tied with embarrassment when called upon to recite in class at school and college. Now I felt at ease in small groups, even when there were many strangers present; but public speaking was another matter entirely.

I talked over this problem with Ilse, and she urged me to make an attempt at it, since it would help the work so much. Reluctantly I accepted an invitation to speak at a national conference on social work in Philadelphia.

For weeks beforehand I could not sleep, so much did I dread the prospect. I thought of developing a convenient illness which would provide an excuse for not going through with the arrangement, as all my past difficulties in public passed and repassed through my mind. But Ilse told me that I had no choice in the matter, now that I had accepted the invitation, and I went over to Philadelphia feeling more dead than alive. As I waited my turn to speak, I began to tremble. The audience seemed perfectly enormous, and I could imagine no possibility that they would listen to my fumbling attempts at a speech.

I tried to concentrate on the few familiar faces I saw there, but I could not calm myself in this way. Then I remembered my old trick of taking off my glasses, so that my field of vision was narrowed down to the platform on which I stood. This device worked, and my talk went better than I had ever dreamed it could. I felt jubilant when the ordeal was over, and wired Ilse that all had gone well. She met me at the station upon my return to New York, and we had dinner together to celebrate the occasion.

As with many other activities, once that first speech was

made with some measure of success, I had less difficulty thereafter in public speaking. Since then I have given an increasing number of talks to organizations interested in the plight of the spastic. Each speech has made the next easier to make, just as the first few steps on a slippery pavement made it possible for me to walk without the constant fear of tumbling down. But just before I give a talk, I still feel a little bit as Mark Twain did when he began his career as a lecturer. He appeared upon the platform white, trembling, perspiring freely, and barely able to utter these opening words: "Julius Caesar is dead; Napoleon is dead; and *I* am far from well." Like him, I always try to let the audience know my deficiencies as a speaker, before I settle down to the subject of my address, which makes matters easier for both my hearers and myself.

In my talks with Ilse I discussed my dream of establishing a boarding school for spastics. She offered to help me start such a school and to manage it for me. I left the problem of finding a suitable place to her, and she discovered a house in New Rochelle that seemed ideal for our purpose. She had far more confidence in our undertaking than I had, and it could not have been carried through without her. I had to give a lecture in Chicago on the day set for the opening of the school, and on my way out there and back I had a wretched time regretting my foolhardiness. Upon my return, however, I found that we had got off to a good start. The school flourished from the beginning, and its success was due in large measure to Ilse's efforts.

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DURING that first year of the school's life, I asked Ilse to marry me. I knew that in her I had found the perfect partner for the life I wanted to lead, and I was overjoyed when she accepted me.

The wedding date was set for her birthday, and on the day before we obtained a marriage licence from the city hall. Since I had no sectarian religious convictions, I suggested that we be married by the magistrate. But Ilse was a minister's

daughter, and she insisted on being married by a minister. This raised something of a problem for me, since I knew no clergyman whom I could ask to officiate.

The difficulty was solved in a curious way. When we returned to the school from the city hall, the head nurse told me that a Dr. MacGregor wanted to be shown over the school. I took him round, using medical terms to describe the handicaps of the children, and he seemed very much interested. But just before he left, he asked what some of these terms meant in everyday language. When I sputtered, "But aren't you a doctor?" he explained that he was a doctor of divinity, not of medicine. I told him he was just the man I wanted, and asked him to marry us the next day. So we were married in his rectory, with my old friend Harold as best man.

In excursions to the shore at New Rochelle, we found that many of the children whose ability to walk was retarded by the fear of falling did very much better on the beach, when they realized that they could not hurt themselves if they tumbled on the sand. They also derived so much benefit from playing out of doors that we wished it were possible for them to do so all the year round.

One of the parents suggested that we conduct the school in Florida during the winter, where the climate made that possible. It did not take much persuasion to make me fall in with this idea, for I had not lost my childhood desire to avoid snow and ice and their terrors for the spastic by spending my winters in the south. We decided to test the scheme, and opened a small school in Miami Beach. My wife took charge of the new establishment, while I supervised the New Rochelle school, travelling between New York and Florida.

It was the custom at the Institute for members of the staff to take their vacations during the summer, since many of them gave courses in the medical school during the academic year; but I arranged to take mine piece-meal during the winter in these trips to Florida. The children derived so much benefit from the sun and sea in Miami, and we had so much less trouble with the colds which are more serious for the

spastic than the normal person, that we decided to bring our northern school south each winter in the future.

Eventually our school, which now provides training from the nursery level through high school, was established in permanent homes by the sea during the summer at East Hampton, Long Island, and during the winter at Pompano, Florida, where the children lead an outdoor life all the year round, with the same programme of mental and physical training and recreation.

IX

EVERY LIFE HAS ITS PURPOSE

I HAD a curious and moving experience when I was invited to Minneapolis to conduct a clinic at the University Hospital where I had been examined as a child. I felt a little bit like Rip van Winkle returning to the scenes of his youth. When I had come to the hospital as a patient, I had been examined in a small building which was quite adequate for the purposes of the clinic at that time. Now there was a great medical centre, covering scores of acres, which possessed the most modern equipment and afforded all the resources that medical progress had made possible.

In my own field of neurology, however, there had been pitifully little advance in the understanding and treatment of disorders, although they were recognized to be increasing.

The night before the clinic I gave a lecture to the Minnesota Association for Crippled Children, and showed movies which illustrated the methods of treatment used at the Institute. I was introduced by the same Oscar Sullivan who had helped me to obtain an education at the University, and he made much of the contrast between my coming to him twenty years before to ask for funds for text-books and instruments and my return as a specialist in helping the spastic. He pointed me out as an example of what the handicapped person could do if he determined to help himself.

Yet the next day, when I went over to the University to conduct the clinic, I was mistaken by a campus policeman for a patient and instructed to get in line with the adults and children who were waiting to be examined. So it was through the patients' entrance that I returned to the University clinic.

When I was recognized by the other doctors and introduced in my role of specialist, the patients were delighted

by what had happened. I took advantage of the occasion to read a little sermon. I told how I had come twenty years before to be examined at the neurological clinic, and my mother had been advised that there was no hope for me physically, though I could benefit from education. The diagnosis was so correct that I had returned as a physician and had been mistaken for a patient.

I supposed that a great many of those who came to the clinic hoped, as I had hoped, to be told of some miraculous cure for spastic paralysis. But I had to echo as physician what I had been told as a patient. In education and in self-discipline lay the greatest hope of overcoming the handicap. Surgery and physical therapy could help the spastic to better control of his disordered nervous system, but they could not cure it. The spastic must not live in the false hope of getting completely well, with all his attention centred on physical improvement. He must accept the fact of his limitations, and develop his potentialities as fully as possible within the limits set by the nature of his handicap.

And finally I warned the patients that too much attention to treatment might hamper the natural development of their abilities.

In my practice I encountered a case which provided an excellent illustration of the foolishness of living in hope of a cure by special treatment, and of ignoring the possibility of natural development. It was a boy of good intelligence who was unable to walk or talk. His parents, who were wealthy, provided him with a corps of specialists: a private physical-trainer, a private tutor, a private speech-trainer, and a private nurse. The efforts of all these therapists showed no evident results over a long period of time.

Then one day when the family was away, the chauffeur took the boy over to his cottage to watch his children play football. The boy wanted to join the game, and he was given a helmet to wear. He took a few steps and fell down, but the helmet saved him from hurting his head when he fell. So he tried again, and his interest in joining the other children in their game soon enabled him to walk without falling. All the

therapy he had received had doubtless helped to make walking possible for him, but the unco-ordinated programme of training had hampered his natural development and had not given him the desire to overcome his handicap which the competition with the other children provided.

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THE over-emphasis placed by most parents on the physical improvement of their handicapped child always brings to my mind the case of the spastic horse. I was asked by the owner of a string of race-horses to examine a birth-injured colt which had been bred from very valuable stock, and to see whether anything could be done to help it. I found that the colt could not get up by itself, and that when it had been placed on its feet, it could not decide where to go and wandered aimlessly.

When it saw its mother, however, it would follow her and imitate her actions. I suggested using blinders, which by cutting down the visual stimuli brought about a great improvement in the colt's sense of direction. The owner asked me whether a complete cure might be hoped for, but I had to tell him that, while improvement might be expected with growth, the colt could never become a race-horse. As this became evident after a few months, the owner had the animal shot. In the animal only the physical abilities are important. But with the human being the intelligence can be developed by training to overcome the physical inadequacy, and it is a great mistake to treat the spastic child as though he were an animal rather than a human being.

Yet frequently the right of the spastic to education is questioned, though it is only through education that he has a chance of becoming socially useful, instead of a burden on society. All spastics, of course, cannot benefit to the same degree from an educational programme. The severely and hopelessly handicapped no doubt must be institutionalized. They should not be treated as idiots, however, receiving only custodial care; ways must be found to keep their brains

busy, in order that they may develop mentally as much as they can.

Others whose physical handicap is not too severe, although their low-grade mentality prevents them from benefiting from education beyond the lower grades, must be guided into routine occupations whose duties they can perform adequately despite their limitations. Those with good intelligence should not be barred from obtaining as much educational training as they can benefit from, even though their physical handicaps are of such a nature as to close many vocational avenues which are open to the normal person.

Much can be done for the spastic child if his parents can be made to realize that the problem is not an individual one and that co-operation with others is the best approach to it. Recently I received a letter from Brazil, asking whether I could come to Rio de Janeiro to examine a patient or whether it would be necessary to bring the child to me in New York. Since I had received similar requests from a number of other South and Central American countries, I replied that I should be glad to go simply for my expenses and suggested that I would get in touch with my other correspondents so that the financial burden might be shared.

So it came about that my wife and I travelled twenty thousand miles by plane and visited sixteen countries in one month. We flew down the west coast of South America and up the east coast. After leaving the La Guardia Airport in New York in the evening on a sleeper plane we awoke the next morning in Brownsville, Texas. From there we went to Mexico City for a three-day stay. Other stops included Guatemala City, Cristobal, Cali, Lima, Santiago, and Buenos Aires, where we spent four days. Then we went to Rio de Janeiro, for five days, visiting São Paulo, Asunción, and Igazu Falls while en route. We then flew to Belem, Trinidad, San Juan, and Miami, arriving in New York City again on the thirtieth day of the air-cruise.

Wherever it was possible, I held clinics and talked to medical groups, using movies to illustrate methods of helping the spastic to find himself. Since I do not speak Spanish or

Portuguese, my wife often had to translate my talks into French or German where English was not generally understood. In the past, many South American doctors were trained in France or Germany, and the well-to-do South American was more likely to consult a Paris or Berlin specialist than a compatriot. Recently there has been a growing tendency to look to the United States for medical leadership.

In the surgical approaches to the spastic problem, the South Americans had nothing to learn; but educational therapy was entirely neglected. This did not surprise me, since less than a score of our states make any provision for the education of non-ambulatory cripples. I found that excellent institutions existed for the care of the feeble-minded, and that they were given as much education as they could absorb and were encouraged to find useful occupations. I urged my audiences to do as much for the spastic, and not to keep him buried in the seclusion of the home. Since the sense of shame about having an abnormal child is less intense and lasting in Latin America than in this country, I found it easier to induce the parents of afflicted children to start special schools.

The trip was one of the most enjoyable in our lives. Everyone was kindness itself, and we were overwhelmed with hospitality. I have always enjoyed air-travel, for the altitude up to 10,000 feet improves my physical control. When we went up to 21,000 feet in crossing the Andes from Santiago to Buenos Aires and were given oxygen tubes to use in case the rarefied atmosphere induced faintness, I found that the increased oxygen intake brought about a miraculous improvement in my steadiness of hand. The experience provided another illustration of the importance of correct breathing for the spastic. I trust that my ability to make the trip served to convince my South American friends that the spastic can become self-dependent if given educational opportunities and that schools should be provided for him.

The role of these special schools is not confined to helping children to develop as fully as possible within the limits of their handicap. There have been many instances in which

the example furnished by the children has helped adults to overcome their handicaps.

A man who was unable to walk although he could maintain his balance, as a result of a stroke, came to my school in Florida and insisted on my prescribing treatment for him, though I told him that I confined my work to children. He was disgruntled when I suggested a system of exercises, and he dismissed them as being just the same sort of treatment as he had undergone for months without deriving any benefit. But his wife insisted on his going through with them, and he came to the school regularly to do his exercises under the supervision of one of my physical trainers. When he saw some of the children, who were far more handicapped than he, making light of their difficulties, he forgot his own troubles.

He became particularly interested in one child, and told me that he wanted to finance his way through school. In a few weeks he was walking without assistance. He could have benefited just as much from similar treatment elsewhere if it had not been for his preoccupation with his difficulties. As soon as he saw that those more seriously handicapped than himself were making better progress, he realized that he could get well, and did.

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THE great unsolved aspect of the spastic problem is the question of vocations. And since the sense of personal worth obtained by being economically self-dependent and socially useful is the best medicine for the spastic, often bringing about the most remarkable physical improvement, too much attention cannot be devoted to finding suitable vocations.

In all programmes of training and education for the spastic, the goal should be not merely getting well but becoming socially useful. We do not feel sorry for the blind beggar because he cannot see, but rather because he has to beg. The plight of the spastic will be less pitiful as more means are found of making him a self-dependent member of society.

The solution of the spastic's vocational problem is dependent upon many factors. One of the most important is his own attitude toward his handicap. As a small child the intelligent spastic is happy, no matter how seriously he may be afflicted. The normal person feels sorry for him, and cannot understand his happiness. But he has been "born that way", and is as yet unaware that others are free from the physical afflictions which have always been his. As he grows older and becomes more self-conscious, there is serious danger of his becoming a social misfit unless he receives careful guidance.

During adolescence the child is likely to develop a morbid attitude toward his handicap if he finds that it stands in the way of realizing his ambition. A young man whose one ambition was to become an aeroplane pilot lost all interest in his studies when he realized that his physical condition could not be improved sufficiently to make that career possible. But usually it is possible to divert the spastic's interest into related fields where his handicap will not be an insuperable barrier. In this case the young man was induced to take up factory-work with the view of becoming an aeroplane mechanic. His successful progress in this field gave him the assurance and self-confidence necessary to further physical improvement.

If the spastic is unable to face the world of reality despite his shortcomings, he falls into despair, and his only desire is to live apart from society in a world of his own. The usual result is mental and physical deterioration, or at best an unhealthy attitude toward life.

The special school can save the spastic from developing into a social misfit by teaching him to accept his handicap and to find some means of compensating for it. Once the sense of personal worth is established by competition with other handicapped children, the individual can usually take his place in normal society. But if the spastic is deprived of these opportunities, a less fortunate development may take place.

I know of a young man of high intelligence and good speech, who could not walk or use his hands and therefore was not put in school. His wealthy parents gave him every

attention, but he was conscious of being kept out of sight and of being ostracized from normal society. His brooding over his plight made him sympathetic to the social underdog and he became a Communist, devoting his intellectual energies to attempting to bring about the downfall of the society in which he had found no place.

On the other hand, I know of a young man who had fewer advantages and made a much better use of his opportunities. He came to me for vocational advice while he was in college. He had his heart set on becoming a lawyer, although this ambition was opposed by his parents, who felt that he could never hope to practise law because of his physical handicaps and that the expense of his professional training was unjustified when money was needed for the education of his unhandicapped brothers and sisters. He overcame their objections, however, and succeeded in taking his degree at law school.

He found it difficult to obtain employment in the field for which he was trained, though all the prospective employers who interviewed him congratulated him on his achievement and regretted that they had no job for him. Knowing of President Roosevelt's interest in the handicapped, he wrote him an account of his difficulties and received a cordial reply. He went to Washington and saw the President, and with his aid obtained a position doing legal research for a government agency. He has been so successful in his chosen career that he is able to help put his brothers and sisters through college.

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THERE is almost always a way of circumventing the handicap if the spastic's ambition is reasonable in the light of the extent and nature of his difficulties.

The spastic's success or failure in life is not dependent upon his physical development. I know of one man who was physically unable to write. He made a success in business and employs several secretaries to do his writing. A spastic who wanted to be a geologist, though unable to do extensive

field-work, became a successful geological librarian. A girl who had won a college degree, finding that the presence of strangers brought on nervous tension which accentuated her physical difficulties, made a career for herself as a teacher of the blind. Freed of the sense of being the object of curious observation, she forgot her difficulties and evidenced remarkable physical improvement.

One patient who was affected only in the legs has done well as a plumber. One severely handicapped spastic earns his living by devising crossword puzzles for the newspapers and writing radio scripts. Another is a copywriter in an advertising agency. A third teaches in a university, where his lectures are so popular that they are attended by many students not taking his course. Still another has made a reputation as a photographer.

There is no question that the spastic has a hard row to hoe in the matter of finding employment. Lack of understanding on the part of the general public is in large measure responsible for the fact that less than a hundred of the more than eight thousand patients whom I have tried to help have made a completely satisfactory adjustment to society. It is not that they lack ability, but that they have so much trouble in getting an opportunity to exercise their ability. The spastic child is cute and appealing, and arouses the sympathy of the normal person. The spastic adult is not appealing and meets a less fortunate reception. When he tries to get a job and describes his struggle against his handicaps, he is congratulated on the courage he has shown, but he is not given a chance to prove his worth.

Many spastics are so grotesque in appearance that they cannot fit into normal business and social life. They must learn to accept this situation, and not allow it to turn them against society. But they should be given a chance to become economically self-sufficient in positions where they do not come too much into contact with many other people. Those whose handicaps are less severe may succeed in obtaining employment, but have difficulty in keeping the job once they get it. *

Frequently the spastic's thought processes are as hyper-active as his muscles, and he has a tendency to fly off the handle on slight provocation. The average employer, no matter how kindly disposed, cannot tolerate such behaviour. He dispenses with the services of the individual in question and forms a prejudice against hiring another spastic. The spastic's lack of self-discipline may take another form: he may become sulky and dissatisfied when he discovers that in real life praise is not awarded for every act that he performs successfully, as he may have been in a misguided scheme of special education.

If the spastic does not learn self-discipline during his school years, and expects to go through life receiving special concessions and being catered to because of his handicap, a happy solution of his vocational problem is almost out of the question. On the other hand, every spastic who acquires self-control despite his affliction and makes a satisfactory adjustment to society supplies a good example to his fellows and opens new occupational avenues to them. I know of one spastic who became a successful theatrical director because he could impart to normal people the lessons in self-control which had helped him to overcome his affliction.

The spastic's success or failure in meeting the vocational problem is not dependent upon the extent of his handicap. The same factors of personality and temperament which play a part in the case of the normal individual also operate in the case of the spastic.

The highly sensitive, introvert type may never escape from brooding over his difficulties, which seem insurmountable barriers between him and the rest of the world. This is particularly likely to be the case with an only child who is not forced to do as much as he can for himself, who is kept from school and deprived of the companionship of his contemporaries, and thus falls into the habit of living completely within himself. Lacking competition, he ceases to struggle against his handicaps and becomes reconciled to them. He is doomed to be a life-long burden to society.

Another child whose physical condition is similar at the

outset may develop quite differently. The circumstances of his environment may demand that he meet the realities of life as best he can, despite his handicaps. If there are other children in the family and he has to struggle for his rights, so much the better for him. If poverty keeps him from being coddled and forces him to do things for himself, he is really more fortunate than if he were pampered. If he is bold and insensitive by nature, he will find it all the easier to face the world and make a place for himself in it.

I know a boy of this extrovert type who, in spite of his unsightly appearance, ungainly gait, and a severe speech difficulty, did not hesitate to take on a door-to-door selling job. When he lost this job because of complaints to the company about his appearance, he worked his way over to Europe and back on a cattle-boat. He learned to ride a bicycle and then to drive an automobile. He found work as a manual labourer where his appearance did not matter, married, and had children. His nature and environment enabled him to become a useful member of society in spite of his handicaps, and in the process he improved his physical condition tremendously.

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A SENSE of humour is an exceedingly valuable asset for the spastic. If he can laugh at the embarrassing incidents in which his physical handicaps involve him, and dismiss them jokingly, he can save himself from the crippling effects of fear, anxiety, and self-consciousness. But his ability to control his emotions, and through them his motions, is dependent upon his sense that his physical inadequacies are compensated for by some other ability which makes him a useful member of society. Those of us who are concerned with the training and education of the spastic try to develop this sense of personal worth by every means in our power.

I have seen it acquired slowly through years of education and destroyed in a few weeks or months when the spastic found employer after employer unwilling to give him a chance

to use the ability he had so painfully developed. If it is completely destroyed, there is a distinct danger of suicidal impulses developing. On the other hand I have seen a revolutionary change in the mental attitude and physical condition of the spastic brought about by the securing of employment. Even part-time jobs can make the spastic feel that he has a place in the world.

Though there is need for funds for establishing institutions and special schools for the care and training of spastics, there is a still greater need for philanthropic gifts which can be used to make employment available to handicapped individuals who cannot find opportunities to earn their living. Once the sense of personal worth has been established by the successful performance of remunerative duties, the spastic can usually stand on his own feet economically. A relative of one patient of mine made it possible for me to employ the boy on a part-time basis. There was such an improvement in the boy's physical condition and psychological attitude after a few months that he was able to obtain a full-time job and become self-supporting.

I have seen similar results in enough instances to be convinced that providing employment is often the best form of treatment in cases where the handicap is not too severe. When one considers the millions of able-bodied unemployed and that the mental hospitals are full of physically unhandicapped individuals who were unable to harness their energies properly, it does not seem too much to ask aid in providing vocational opportunities for the spastic which will make him useful to society instead of a burden upon it.

Schools that I have helped to establish have been built up round a child so hopelessly handicapped that there was little hope of restoring him to an approximately normal condition by treatment. I know of one family which had no financial worries but came to feel that life was not worth living because they could not find any doctor who would promise that their spastic child could be restored to health.

In the fruitless search for a cure, a once happy marriage had reached the point where the husband and wife were

thinking of committing suicide and taking the child with them. An examination disclosed that the child was intelligent, though helplessly crippled, and I told them that they had made their problem too self-centred. I suggested that they organize a nursery-school group in which their child and other handicapped children could receive education and treatment.

Since the parents were not willing to have their neighbours know that they had a spastic child, they showed reluctance in accepting my scheme. Finally they adopted it, and their interest in the progress of their own child and in that of the others in the school made them feel that life was worth living.

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EVERY human life has its purpose, and even the most hopelessly handicapped can be useful to society.

I have sometimes been embarrassed by being hailed as an example of what the handicapped person can do if he determines to overcome his difficulties. But what I have accomplished is really due to the help and guidance, throughout my life, of a host of teachers and friends. They kept me struggling against my difficulties and encouraged my belief that, by making the most of my opportunities, I could help other spastics to free themselves from the shackles of their handicap and to become useful citizens.

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