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for Degree of

DOCTOR OF MEDICINE.

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"Some observations on Age in Relation to Disease"

by

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## Some Observations on Age in Relation to Disease.

In taking up this subject it is my intention to discuss especially those diseases in which the factor of age would appear to have a distinct significance - etiological or incidental.

A definite classification according to Age is difficult owing to the considerable overlapping that must necessarily occur; but I will endeavour to place the diseases under consideration into three groups.

1. Diseases of the Age of Growth comprising the first twenty-five years of life.
2. Diseases peculiar to the age of Decay (*45 years and over*)
3. Diseases common to all Ages, including those of the Age of Maintenance (from twenty-five to forty-five).

This classification is a convenient one and adapts itself to the requirements of my Thesis, though each "group" would seem to need qualification. For instance, in placing at forty-five years, the age of commencing decay, I am not insensible to the many exceptions to this rule. Nor, can I agree with the statement ascribed to Osler, that a man is old at forty and should, (presumably for economic reasons), be chloroformed. How many individuals we meet with daily, who have reached what is called a ripe old age, and yet show no evidence of degeneration. On the other hand, there are a few who manifest signs of decadence prematurely, but they are exceptional.

### I. Diseases of the Age of Development.

These are diseases to which young, actively growing tissues are specially susceptible; Diseases to which the immature body cells are prone to offer least resistance. In a consideration of this class we find, that many predisposing agents are at work. While some of these are actually dependent on the immaturity of the growing organism and its lessened power of resistance, there are many other causative factors to be reckoned with, which have their origin, without the body, in heredity, environment, and the nature of the infective agent.

Although the tissues during the stage of active growth, have a far greater reparative power than those on the verge of commencing degeneration, it would seem as if this power were mainly expended in the development of the organism, rather than in its defence. That this is specially true of the very young, is evidenced by the high rate of mortality in the early years of life. In the young, the soil is new, the defensive tissues, namely the body sera and leucocytes, have not yet come in contact with disease, and thus have not been educated up to ~~the~~ resistance as have mature tissues. The process of immunisation, so to speak, has hardly begun. As on a par with this, I may cite the case of races among whom certain diseases are introduced for the first time, with such appalling results. As a result of hereditary influence we find some families so curi-

ously susceptible to certain infectious diseases, that the members are liable to be attacked, even if they are widely separated from each other, while members of other families not so predisposed, escape. Again, an unhealthy environment - using the term in its widest sense as embracing every thing connected with the rearing of the individual, food, clothing, etc. - tends to still further reduce the vitality of the growing organism to a minimum. It is during this age of growth that Nature may be assisted by careful attention to the diet and hygienic surroundings of the young, and those apparently simple ailments avoided, which so often pave the way for more serious troubles in the future. The process of accustoming the body to variations in diet and atmospheric conditions, ought to be a gradual one. Extremes are to be avoided, and the over-clothing of children, with its consequent liability to catarrhal affections, is almost as harmful as their injudicious exposure in all weathers with a view to "hardening" them.

Then again a great many of the "simple" ailments of childhood, <sup>such as</sup> colic, constipation, diarrhoea, etc. are, in great measure, the result of dietetic errors. These have all a weakening influence, and those children who suffer continually from one or other of them may escape more serious consequences at the time, but the seed has been sown and, later on in life, <sup>the child</sup> they go out into the world ill-equipped to fight its battles.

DIARRHOEA. Is the most fatal ailment of infancy with

which we have to deal. For its incidence at that age, three reasons have been given. The first is that the sterilizing power of a child's stomach is small, the amount of Hydrochloric acid formed being insufficient to destroy the organisms swallowed with the food. The second is that, children are mainly fed upon milk, which is anything but a germ free fluid; and the third reason is that children are particularly liable to chill, the consequent lowered vitality favouring the growth of micro-organisms in the intestinal tract.<sup>(i)</sup> As regards the first of these, the fact that breast-fed babies are comparatively free from diarrhoea seems to indicate that the stomach secretions in childhood are sufficient for their purpose and that it is the food or the method of giving it that is at fault. In fact all three causes can to a large extent be avoided by the adoption of precautionary measures, simple in themselves but of vast importance considering the issue at stake.

EPIDEMIC DIARRHOEA. Is a form of the disease dependent on a micro-organism which flourishes during the heat of summer and is most active when the soil-temperature is highest. As might be expected those most liable to infection are children living in unhealthy surroundings in an overcrowded locality. There, the germs abound, and the dirty ill-ventilated rooms, so common to certain localities of our cities, are well calculated to favour

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(i) Robert Hutchison. "Diseases of Children" - page 58.

their rapid growth. Milk is probably the means of conveying them to the alimentary tract in the majority of cases; and the milk in turn may have been infected from the dust of the room or by flies from neighbouring dunghoops or cesspools. The simple expedient of boiling the milk may be sufficient to avert the danger of infection, and especially should this precaution be taken in hot weather. The reason why diarrhoea is such a fatal disease in children is because of the rapid absorption of toxins from the bowel denuded of its protective lining by the persistent and rapid passage of its contents. This view is supported by the frequency with which we see in children, a cutaneous eruption, most probably toxic, follow the giving of an enema.

rickets. Is a disease to which children living in the slums of our large cities are peculiarly liable. It has been variously attributed to defective absorption of lime salts and to insufficient fat and proteids in the food. <sup>(2)</sup> The latter view receives the greatest support from recent observers, and certainly the comparative success of treatment based on that view would seem to justify its acceptance. But the fact that country bred children very rarely suffer from rickets, whatever their food may consist of, suggests that the absence of fresh air as a predisposing cause is a factor of the first importance.

scurvy. Is another disease of infancy due to faulty nutrition. The etiological importance of age as a factor, is recog-

nised in the fact that about four-fifths of the cases occur between the sixth and fourteenth month. - the age at which most children are weaned. "No one fact" says Holt, "in the Etiology of Scurvy is better established, than its development after the prolonged use of condensed milk or the proprietary infant foods."<sup>(3)</sup> This is the experience of most observers, though it is still an open question as to what exactly constitutes that error in diet. Some observers have found that sterilizing the milk is a cause, and that in cases, treated by giving raw milk, recovery has been rapid. The diet which seems to act best in the treatment of scurvy is one of fresh cow's milk with the addition of fresh fruit juice. From this, Hutchison argues that there is something in the fruit juice that is wanting in the milk, and from a series of simple observations has come to the conclusion that what may be required is Citrate of Potash or Citrate of Lime. He has found however that these do not have the same beneficial result when given in pure form, and that a radical change in the diet of the patient is necessary at the same time.<sup>(4)</sup> From a study of both rickets and scurvy we are forced to the conclusion that both are eminently preventable diseases and that the exercise of a little more care on the part of parents in the matter of feeding their offspring would go a long way towards lowering the infant mortality rate. Something is already being done in the direction of

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(3) Holt "Diseases of Infancy" 3rd. Edition. Page 245.

(4) Hutchison. "Diseases of Children" - page 132.



improved hygienic surroundings, and if the public could be brought to realise the vast importance of these in the prevention of disease, it would not grudge the expenditure of still further sums towards the bringing of fresh air and sunshine into the lives of its poor members.

There are three diseases of the eye to which children are particularly susceptible and these are Ophthalmia Neonatorum, Blepharitis ciliaris and Phlyctenular conjunctivitis. I refer to them at this stage, because they so frequently result - at least the two last mentioned - from the effects of mal-nutrition and neglect and of an unhealthy atmosphere.

OPHTHALMIA NEONATORUM. This is the result of gonococcal infection of the conjunctival mucous membrane, during the birth of the child. The gonococci are present in the vaginal discharges of the mother, and the absence in the child of the protective influence of tears increases the risk of infection. In untreated cases the progress of the disease is usually rapid. The acute inflammatory condition of the Conjunctiva very soon becomes purulent, involvement of the corneal epithelium follows and perforation ensues. Even now under treatment the process may stop with anterior staphyloma but in neglected cases the vitreous chamber is infected and the whole eyeball becomes a purulent mass with permanent loss of the sight in at least one eye. Whether as some observers state, strepto-cocci and pneumococci alone can produce

this condition is very doubtful, and the researches of such careful observers as Neisser, Haab, and Bumm clearly point to the gonococcus as the specific cause.

BLEPHARITIS CILIARIS or tinea tarsi as it is sometimes called is an eczematous inflammation of the margins of the lids. It is most frequent in children who are strumous or who are suffering from the effects of mal-nutrition and neglect. If the condition is not attended to, ulceration takes place leading to destruction of the hair follicles, and the eyelashes are lost. I have seen several adults in whom this had occurred in infancy, and they all seemed to suffer <sup>from</sup> a more or less persistent form of chronic irritation of the lid margins, and a certain amount of injection of the conjunctiva giving the eyes a "bleary" look. This is accounted for by the absence of the protection afforded by the eyelashes and the consequent exposure to dust and other irritating substances. The individual thus <sup>a</sup> affected usually suffers from a persistent photophobia, his eyes are almost expressionless, and the result is a ~~gr~~ regrettable disfigurement.

PHLYCTENULAR CONJUNCTIVITIS. Is a distinct type of conjunctival inflammation which is most frequently found in early life. As in Blepharitis, with which indeed it is not infrequently associated, the cause is usually to be sought for in some inherent constitutional weakness. It may be a manifestation of the tuberculous diathesis or it may follow some debilitating illness. The disease is a most intractable one, and I have treated several

patients suffering from it with apparently good results, only to be met with disappointment in the frequency with which relapses took place, in some cases, several times a year, in others, perhaps only once. A slight cold or mild digestive disturbance may be quite sufficient in some cases to bring about another attack. When Blepharitis ciliaris is superadded - judging from my own experience, a very frequent occurrence - the difficulties in the way of treatment are much greater.

The importance of the early recognition and prompt treatment of these three conditions is very great when we consider to what serious consequences they may lead if neglected. In the light of the fact that the vast majority of children are born into the world healthy, that Nature seems at the outset to give them a good start, even though their parents be in a continual state of ill-health, it seems a pity that so many of them should have the value of this advantage discounted and their chances of health and even of life itself threatened by the morbid conditions under which they are destined to struggle for existence.

OTITIS MEDIA. Is the most important affection of the ear met with during the age of growth. The disease as it occurs in the adult is in most cases a recurrence, and there is usually a history of previous attacks in early life. Catarrhal conditions of the Naso-pharynx, enlarged tonsils and adenoids are all predisposing causes of acute otitis. It also frequently follows one of the infectious diseases such as measles and we may find it associ-

ated with dentition. The relative frequency in the young of these causative agents accounts largely for the age incidence of otitis. The fact too of the Eustachian tube in childhood being shorter, wider and more horizontal than it is in the adult may be of importance, as allowing more easily of its invasion from the inflamed pharyngeal wall. The condition may vary from a simple catarrh of the mucous membrane to an acute suppuration attacking the tympanic membrane and bone. The acute phase may pass off and the disease become chronic, with a purulent discharge from the external auditory meatus, finding exit through a perforation in the tympanic membrane. The disease may remain quiescent showing no outward manifestations of its presence for a long time. But it is apt to light up as a consequence of some other debilitating illness. The inflammation may spread along the nerve sheaths and set up a meningitis or it may, by erosion of the bone, invade the lateral sinus setting up sinus thrombosis or brain abscess. Chronic Otitis may be tuberculous and tubercle Bacilli are sometimes found in the discharge.

INFECTIOUS DISEASES. The Infectious or so called zymotic diseases though they may be found at any age are most common during childhood and adolescence. The factor which is most potent in determining the age incidence is immunity, and with few exceptions one attack affords protection against further infection. The mode of onset, the course and the general characters of these diseases point convincingly to the presence of some specific

micro-organism in each, though their individual cultural and microscopic appearances have not as yet been demonstrated in a number of the fevers. When this has been done we may hope to have a means not only of treatment by the respective antidotal sera but of early diagnosis in doubtful cases, as we already have in Typhoid in the Widal Test.

MEASLES. Does not follow the rule of immunity as rigidly perhaps as do Scarlet Fever and Whooping Cough for instance, and this no doubt accounts for the comparative frequency with which it occurs in adults. But even then the disease is distinctly one of childhood. For this reason, too, second attacks are not infrequent, and even third and fourth attacks have been noted. That the question of immunity is of first importance in relation to the age incidence is evidenced by the disastrous results of introducing measles into a virgin soil. When this occurred in the Faroe Islands in 1846, the death rate was enormous - all ages alike proving susceptible to infection. Uncomplicated measles is not of itself a deadly disease, the high mortality rate among children being mostly due to pulmonary complications.

WHOOPIING COUGH. Is a disease rarely found after childhood and the immunity conferred by one attack is almost absolute. Second attacks are extremely rare, but the primary infection may last in some cases for a considerable time. I have seen one case which continued to manifest the typical symptoms of Whooping Cough for a period of nine months. The prognosis is influenced

to a certain extent, by the age of the child, its state of health at the time of infection, and the care and attention it is likely to receive. In very young infants, especially if they are rickety or mal-nourished the risks are greater. Collapse of the lung may occur, due to a weakened condition of the chest-wall, and an accumulation of viscid mucus in the bronchial tubes. Where there is an inherited neurotic element the paroxysms of coughing are apt to be more severe. Neglect of a child while it is recovering from Whooping Cough may permit of its getting a chill and developing a broncho-pneumonia. The Catarrhal condition of the throat may be followed by chronic enlargement of the bronchial glands, and these at a subsequent period exposed to infection by tubercle bacilli may, in their weakened state, offer a suitable nidus for the growth of these organisms.

SCARLET FEVER. is more frequently found to occur during childhood and adolescence than at any other period of life. Among children too the mortality is higher. The immunising power of an attack of Scarletina is greater than in Measles though second attacks are by no means unknown. Its mode of onset varies with age. In children, for instance, vomiting, diarrhoea, or rigors may usher in the attack - indeed vomiting might almost be regarded as a constant initial symptom. In adults; on the other hand, sore throat and headache are usually among the earliest symptoms. It has been observed that very young infants are less liable to infection than older children. It is just possible however that they do not run the same risk of coming into con -

tact with the disease.

As regards the complications, it may be noted that among those to which children are more prone, Otitis media and glandular affections figure largely, and next in frequency come Nephritis, Impetigenous eczema and Ulcerative Stomatitis. All these conditions are, under ordinary circumstances, more commonly found in children, and if the predisposition to any of them exists, the Scarlet<sup>a</sup>inal virus is likely to act as the exciting cause.

In adults, Rheumatism is a more common complication than any other. This is predisposed to by a previous Rheumatic history, and though it usually runs a milder course than does ordinary Rheumatism, there is a greater tendency to suppuration in the joints affected. Secondary tonsillitis when it occurs is also more frequent in adults, a fact rather difficult of explanation, considering how liable children are to tonsillar enlargement, unless it can be regarded as a manifestation of Rheumatism aggravated by the scarlet<sup>a</sup>inal virus.

DIPHTHERIA. in relation to the age incidence stands in much the same position as the infectious diseases already mentioned, though the period of immunity appears to be shorter. Besides general predisposing causes I have no doubt that the greater tendency in children to catarrhal conditions of the naso-pharynx and to tonsillar affections plays an important part in determining the incidence of Diphtheria in them. The Klebs-Loeffler bacillus ( which is sometimes found in the saliva of

those who are not suffering from Diphtheria) finding a weak spot in the inflamed mucous membrane develops rapidly. In children under five years of age this disease is very fatal. I have seen a child aged three succumb on the fifth day of illness with all the symptoms of a profound toxæmia, and in which the throat condition was not particularly acute. On another occasion I was consulted about a child aged ten who was suffering from paralysis of the soft palate. The only history I could get was that just prior to the onset of the paralysis, the child was suffering from a slight "cold" and sore throat, but not severe enough to necessitate her confinement to bed. Although I could get no evidence of exposure to infection I have no doubt but that this patient had had a mild diphtheritic attack and the paralysis was due to that. Within the last three years in private practice I have only seen two cases of diphtheria in adults and at the time of infection one, a male aged 30 was suffering from a septic condition of the leg and the other a woman of 40 was just recovering from a very severe attack of metrorrhagia. Two healthy adults in the same house, escaped. From this it would seem that a lowered vitality from whatever cause, ~~was~~<sup>is</sup> of importance in determining the incidence of diphtheria in adults. In connection with the antitoxine treatment of this disease, I have used the serum in a number of cases and found that the best results were obtained when the antitoxine ~~was~~ injected hypodermically on the first day of illness. I usually gave 2000 units in the first instance and repeat-



ed it if there was no appreciable benefit at the end of 12 hours. In the majority of cases, <sup>given</sup> taken on the first day, one dose proved sufficient to greatly mitigate the symptoms.

MUMPS or Epidemic Parotitis, though it may occur at any age, is most common during childhood and adolescence. I had an opportunity in the spring months <sup>of</sup> for observation during an epidemic of mumps which occurred in Ballachulish. I noted particularly that while the majority of those attacked were between the ages of five and fifteen years, a much greater number of adults than is usual also suffered. The oldest patient was over eighty years of age, and there were many over fifty. The excessive number of adults attacked was due, I believe, partly to the fact that a similar epidemic had not occurred there for many years. The sequelae were few, the disease, with few exceptions, running an uncomplicated course. Six cases of Orchitis followed in boys between the ages of fourteen and eighteen, and one woman aged 37 suffered from ovaritis.

In two patients, a girl aet; ten and a woman aet; eighty, there followed, suppuration of the glands in the lower part of the posterior triangle of the neck. This is probably a rare sequence, as I have not seen it mentioned in any text book. Another somewhat unusual sequela I observed in the case of a female patient aged 45, <sup>who</sup> (who developed) an obscure inflammatory condition in the right hypochondriac region, associated with febrile symptoms. Pain and tenderness were very pronounced in the right lumbar

region, and along the right costal margin. This persisted for about two months, and then gradually subsided without evidence of suppuration. In only one case, that of a boy aged 10, was delirium, a marked feature of the disease.

The whole course of the disease, its infectious nature, and the uniformity of its lesions all point to the existence of a specific micro-organism as the causative agent.

TYPHOID FEVER. This disease is principally one of youth and early adult life, though it has been found at the extremes of life. Its characteristic lesions are seen in the intestinal tract, more especially in the lymph follicles of the ileum. Peyer's patches are the seat of the more important changes, which may vary from simple congestion to ulceration, according to the severity of the disease.

When children under ten are affected, the disease usually runs a milder course, Ulceration of the bowel so frequent in the adult is comparatively rare in children. Epistaxis, another common occurrence in typhoid, is rare in children, and in them, too, the initial febrile symptoms and the later nervous manifestations are less marked than in the adult. Of the sequelae, however, Aphasia, O<sup>t</sup>itis, noma and ~~long~~<sup>bony</sup> lesions are more common in children, and in the severe cases, bronchitis is nearly always present. In the aged, the disease is very fatal owing to the frequency with which pneumonia and heart failure are present as complications. In all cases enlargement of the spleen is a constant symptom.

The most common source of infection is undoubtedly a polluted water supply. In this connection I may cite the following example which came under my own observation. The outbreak occurred in a district whose water supply was derived from two distinct sources, namely, two small mountain streams. Eleven cases in all were affected in rapid succession, and I soon found that these got their water from the same source. On prohibiting the further use of this source and recommending the boiling of all water used for drinking purposes, no further cases occurred.

In connection with the question of age, it is interesting to note that of the eleven cases one was eight years of age, one 46, and the other nine were between the ages of 12 and 20. In one house of two rooms, there were living 8 persons - the parents aged between 40 and 50, three children between the ages of 5 and 10 and three other members of the family aged respectively 16, 18 and 20. These latter suffered from typhoid; the others escaped. In another house occupied by an aged couple and two young adults, the latter alone were attacked. It is not easy to explain why the 3 young children, in the first case cited, should have escaped, unless we presume that they were not so likely to drink the water until after it had been boiled in the process of cooking. This explanation would seem to be a feasible one in the case of children under 2 years of age, but after the age of 5, typhoid is hardly so rare as to necessitate special comment on its occurrence. As in the other infectious diseases, old age seems to bring with

it some protective influence, whether due to the unsuitable pabulum offered by the older tissues, or to a slowly established immunity, is as yet impossible to say. I may mention that the pollution of the stream was traced to the excreta from a visitor convalescing in the neighbourhood after an attack of typhoid, and further, that the cottages in the district are devoid of all sanitary conveniences.

SMALL-POX. In considering this disease from the age point of view, we must take into account the modifying influence of vaccination. At the present day adults are more frequently attacked than children, and this for the obvious reason <sup>that</sup> ~~that~~ an immunity of varying duration, has been conferred on children by vaccination. It is interesting to note in this connection that the liability to the disease increases after puberty in those who have not been re-vaccinated. In countries where small-pox has been prevalent for generations, it was, prior to the introduction of vaccination, a disease mainly of children - the survivors being thereby protected against it for life. Here we have strong evidence in favour of vaccination as a prophylactic measure, and I believe if re-vaccination were made compulsory at stated ages, this disease would, in course of time, be wholly stamped out. In Germany, a step has been taken in this direction with gratifying results, and in that country two-fifths of the few attacked by small-pox are children under two years of age - the age at which primary vaccination is compulsory. I may here mention four cases of small-pox that came

under my notice in a scattered country district. The source of the disease was a boy about 18 who developed a typical variolar rash a few days after his return from a visit to Glasgow. He had been vaccinated as a child but not revaccinated. Two men between forty and fifty years of age were next attacked. They had, prior to my visit, entered the house and freely examined the eruption. They had also been vaccinated, and in all three the attack was a mild one. The last to suffer was a man aged seventy who died three days later from the haemorrhagic form of the disease. Bearing on his death were two important facts - first, he had never been vaccinated and, secondly, he had never before been exposed to the risk of infection.

In children, the death rate is higher than in adults, not because they are liable to the severer forms of the disease, but because their tissues are less able to survive the toxæmia which, as a rule, determines the fatal issue.

#### Nervous Disorders.

CONVULSIONS. Occurring most frequently in the first year of life, are a manifestation of some acute transient disturbance of the nervous system. Some slight dietetic error with consequent digestive derangement is a very common exciting cause. The readiness with which the nervous system at this early age responds to stimuli of an irritating nature is due partly to the instability of the rapidly growing nerve centres, and partly to the fact that the voluntary centres of the cortex are still undevel-

oped functionally. The absence of their controlling influence allows of increased reflex excitability, and this assumes the aggravated form found in convulsions more readily when the vitality of the child is lowered, as it not infrequently is, during dentition.

TETANY. Is a functional nervous disorder often associated in infancy with rickets or some alimentary disturbance. In other children it may follow such diseases as Broncho-pneumonia, Pertussis, Measles, and Rheumatism, and I have met with it several times in a mild form, in which the hands, and, to a lesser degree, the feet were alone implicated.

CHOREA. Most frequently met with between the ages of seven and fourteen, is a nervous disease supposed to be closely related to the Rheumatic diathesis. But then we know that it is predisposed to in some patients by a neurotic constitution, anaemia and general inanition, and so these conditions, associated as they are sometimes with Rheumatism, may be the actual exciting cause, and not the rheumatic virus alone. In view of the fact that the majority of cases of Chorea occur about puberty, it is reasonable to suppose that the great functional activity which is a feature of this age with its numerous nervous manifestations plays no unimportant part in determining its incidence. In its condition at this time of unstable equilibrium, the nervous system is more <sup>susceptible</sup> ~~liable~~ in the presence of those diseases which lower the vitality of the whole organism by their toxic action. Another disease which demonstra-

tes the instability of the nervous mechanism in early life is Epilepsy. While in adult life there may be cited as occasional causes, alcoholism, syphilis, and trauma, the cases resulting from these factors are comparatively rare. In the great majority of those affected, the disease has been present from early youth, the first five years of life supplying the greatest number.

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AGE OF DEGENERATION.

This is the age with its train of retrogressive changes in which the body cells gradually lose their vitality and are less and less able to react to stimuli from without, in which, too, there are found diseases which would seem to (select an age in which they can) join forces with the katabolic processes already in the ascendancy and make more sure the ultimate issue.

CANCER. Cancer, by which I mean malignant new growths of epithelial origin, is by far the most important disease of the later years of life. Although not absolutely limited as to age incidence, the great majority of sufferers from this disease are past middle life. Statistics show that the mortality from cancer is very low in early life but, as age advances, the mortality increases in both sexes very rapidly. (6) In consideration of this fact, the question at once arises as to why older tissues should be more susceptible than those at the stage of active growth. "Cancer" says Paget is a disease of degeneracy the frequency of which increases as age advances." This more than suggests that young epithelial tissues possess an immunity from cancerous disease, an immunity which is evidenced by the strong natural resisting powers which such tissues present to the development and invasions of the cancer cell. Of course there are cases on record where cancer has been met with at a comparatively early age, but these are the exception.

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(6) Dr. Tatham. "Clinical Journal", 14th. May, 1904.



In the lower animals this malady has been observed to follow the same rule as to age. There seems then to be something in the epithelial tissues of the young <sup>which is</sup> inimical to cancer, something which, under conditions apparently favourable to its growth, makes it almost impossible for the cancer cell to live.

One of the oldest and commonest views as to the reasons for older epithelial tissues being so often affected, is that prolonged irritation leaves the tissues more vulnerable, in that the consequent increased rapidity of cell growth for defensive purposes, so lowers the vitality and normal resisting power of the tissue cells, as to render them more susceptible to the stimulus necessary for their transformation into neoplastic cells. It has been argued that veteran epithelium is more liable to be exposed to prolonged irritation than the epithelium in a young subject, as, for example, in the case of an epithelioma following on the irritation of a carious tooth. But even granting that, the rarity of the disease in the young is out of all proportion to their liability to local predisposing causes.

Again in support of the parasitic theory of cancer, it has been stated that the fact "that the primary tumour of carcinoma is seated most frequently at sites where an infection from without would most readily take place" favours the view of the external origin of cancer. But then we know that young tissues offer just as suitable a nidus for parasitic infection as do the older, and are quite as liable to come in contact with the infecting agent -

if such it be - and yet they escape. The same holds with regard to the many young women suffering from anaemia and gastric ulcer who are not affected with cancer, when one would expect the cancer germ to have everything in its favour - a raw surface in the stomach, and an impoverished condition of the blood. In those comparatively rare cases of cancer in the site of a gastric ulcer, the malignant element in almost every case develops late and is superadded to rather than consequent on the ulceration. Thus we are led to the conclusion that immunity from cancer in the young cannot depend on the absence of the infecting agent. The disposition of epithelium in the body is for the most part intimately associated with the function of secretion, interference with which leads to local and in many cases constitutional disturbances varying in severity according to the position and extent of the lesion. Here then we have cells upon whose ability to discharge their duty successfully, the health and even the life of the whole organism depends. Does not it seem likely that these cells at the same time secrete an internal protective substance capable of resisting the invasion of cells somewhat similarly constituted to themselves, but of an abnormal type - just as the invasion of the organism by a toxin is the signal for the formation of a corresponding anti-toxin? And that the power of this protective substance is lessened as the normal cells begin to degenerate? In this connection it is interesting to note that some years ago an observer suggested the administration of epithelial

extract derived from the tissues of young animals, selecting for preference those more or less immuneto the development of cancer. (7)

(8)  
According to the statistics of Welsh, fully three-fourths of his cases of cancer of the stomach occurred between the fortieth and seventieth year, 24.5% of these were between 40 and 50, 30.4% between 50 and 60. In carcinoma of the oesophagus, the disease is rare before 40 and commonest between 50 and 60. I have had under my care recently 2 patients suffering from oesophageal cancer, one of them being over 80 before the disease manifested itself and the other about 70.

In the Pharynx and Larynx, Carcinoma is sometimes found as a primary new-growth, and here too the age of incidence is 50 to 60 years. We have no proof that chronic indigestion leads to cancer of the stomach, and indeed one sees many cases of carcinoma of that organ in which prior to the onset of the disease no gastric disturbance was present.

Then, again, the commonest age for benign growths of the larynx is between 20 and 40, namely, the period just preceeding the cancer age, and yet the number of simple tumours which tend to malignant degeneration is exceedingly small. In a paper on "Inoperable Mammary Carcinoma" Dr. Beatson (9) expressed the opinion that "the disease consists in the epithelium of the part affected taking on

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(7) Dr. Grant, Lancet, 15th. July, 1899.

(8) Osler System of Medecine, page 402.

(9) Beatson, Lancet, July 11th. and 18th., 1896.

the active proliferation which is the marked characteristic of the germinal epithelium." This conclusion he arrived at from a clinical study of oophorectomy in arresting cancerous activity and even causing in some cases the disappearance of proved cancerous tissue. This he called the germinal cell theory of cancer. Some years later other investigators <sup>(10)</sup> arrived at conclusions strikingly similar in many respects and bearing strongly on the similarity between the cells of malignant growths and those of normal reproductive tissue - the phenomena of Heterotype mitosis being a feature of both.

This was shortly followed by a paper on much the same lines prepared by Drs. Bashford and Murray and read before the Royal Society. These observers shewed, that the same phenomenon of heterotype mitosis occurred in malignant neoplasms affecting the lower animals, and further, that when a portion of tumour from one animal was transplanted into another the resulting tumour was due to proliferation of the tissue introduced, and not to any change in the cells among which it was placed. Whatever etiological significance attaches to these observations is still a difficult problem, but they seem at least to have some bearing on the age question. If we assume more than an apparent similarity between the germinal epithelium and the cancer cell, may it not be possible that the proliferation and distribution of the former are controlled by some body <sup>it</sup> secretion inherent in the germinal epithelial

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(10) Farmer, Walker & Moore, Lancet, 10th. December, 1903.

cells, which persists in the embryo, and continues to exercise its controlling influence during that period of life ~~at~~ which the anabolic processes are in excess of the Katabolic but which gradually loses its vitality as tissue degeneration sets in. This view seems to accord with Cohnheim's theory that "Cancer cells are either those which preserve in the adult organism their embryonic anatomical characters, or which have acquired them again through weakening of their chemical and physiological activity" (11).

Observations have been made illustrating the translation of cancer by contact, "a mode of morbid contact" according to one observer (12) "beyond doubt as affecting adjacent structures belonging to the same individual though not equally evident as between organs belonging to different persons."

One possible explanation of this suggests itself, viz; that in the same individual the time allowed for the involvement of contiguous parts is much longer. But this, notwithstanding it seems not unlikely that in some individuals the loss of potency in the protective and controlling secretion peculiar to the young cell is more marked than in others and that the effect of the cancer cell in the primary lesion is to further lessen<sup>w</sup> the resistive power of the organism as a whole - paving the way as it were for secondary manifestations of the disease whether these make their appearance in contiguous parts or in remote organs. When Adamic said, "We are as yet unaware of the forces which must

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(11) "Modern Views on Cancer" Medical Press, 23rd. Dec. 1903, p. 700

(12) Dr. Dickinson "The Seed and the Soil"; Lancet, 10 May, 1902 p.1300.

determine and limit orderly growth and which are presumably neutralised in malignant tumours," <sup>(13)</sup> He seems to have considered these forces, whatever their nature, as more than mere abstract entities, and if we could only estimate the proportionate strength of these forces at various ages, some light might be thrown on the cancer problem which would help us to penetrate the obscurity by which it is at present surrounded.

ARTERIO-SCLEROSIS. "A man is as old as his arteries" is a truism which implies that the majority of morbid processes known as degenerations are associated with diseases of the arterial walls, and may even be directly due to them. While all tissues of the body are affected to a greater or lesser extent in the morbid manifestations of physiological senility, the vascular system is the first to suffer in the form of arterio-sclerotic changes in the vessel walls. Heredity plays an important part in determining the early onset of these changes in some individuals, and is often the only etiological factor to be found in such cases. Other predisposing causes are, prolonged increase of arterial tension to whatever cause attributed: The chronic intoxications, alcohol, gout, syphilis, strain and overexertion of the muscles, and renal diseases, though it is still a disputed point as to whether the latter <sup>are</sup> (is) causative of or secondary to vascular changes. These changes, which are in many cases merely an involution process of old age, consist in a fibrosis of the tunica

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(13) Adami; Yale Medical Journal, 1901.

intima consequent on degenerations of the media and adventitia. In fact by some the isolated patches of sclerosis found in the larger arteries are regarded by some as an attempt at repair - in effect a "patch" on the inner wall to protect and strengthen the arterial wall weakened by the degenerative lesions in the outer and middle coats.

A recent observer in discussing arterial degeneration in relation to age suggests that injurious influences causative of degeneration, accumulate as years go on, and that it is they and not the years that cause the lesions. In other words, the age at which senile decay sets in is determined by the condition of the vascular system, early changes of a degenerative type in the arterial walls foreshadowing a premature old age with its increased liability to atheroma and aneurysm of the aorta, miliary aneurysms in the brain, cerebral haemorrhage, and cardiac lesions. The physiological changes which occur<sup>(14)</sup> in the senile brain towards the end of life are coincident with all the other degenerative changes throughout the body, but in the form of senile dementia they assume a pathological significance. Heredity as a predisposing factor is less marked than in any other form of insanity, and here, as in other senile conditions, the most common of all lesions found in the brain itself is that form of combined cerebro-vascular disease, softening of the brain.<sup>(15)</sup>

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(14) Dr. J. M. Cowan, Practitioner, March, 1906.

(15) Clouston. Mental Diseases. 3rd. Edition. Page 627.

Though arterio-sclerosis is the most important disease of the vascular system seen in old age, other vascular affections may also be met with, such are fatty degeneration of the heart and larger vessels, hyaline degenerations and calcification of the arterial wall. All these tend towards malnutrition of the organ supplied by the affected vessels, and when a general involvement of the whole arterial system takes place, we need hardly wonder that the advent of senility is hastened. Some of the eye affections found in those past middle life are dependent more or less on vascular changes. Of these I will here refer to two only.

SENILE CATARACT. This disease is the result, in many ~~cases~~ *cases of* circulatory disturbances in the nutrition fluid of the lens, producing degenerative changes in the lens substance and consequent opacity. In the subject of senile cataract one is almost sure to find arterio-sclerotic changes in other parts of the body.

PRIMARY GLANCOMA. This too is a disease of advanced life which increases in frequency with age, characterised by an increase in the contents of the vitreous chamber with consequent increased intra-ocular tension and bulging forward of the anterior portion of the eyeball. The most likely theory explaining this condition is that of Priestly Smith, who ascribes the primary cause to venous stasis in, and consequent swelling of, the ciliary processes. This blocks up the circumlental space and prevents escape of the



(16)

fluid from the vitreous chamber. Whether the increased pressure is due to the interference with the escape of fluids, or to their active exudation, it is difficult to say, but the etiological and clinical evidence is in favour of circulatory changes being the primary cause, in the majority of cases.

The last disease to which I will refer in connection with this period of life is -

PROSTATIC ENLARGEMENT. There is in this condition, as a rule, an excessive production of fibrous and ill-formed glandular tissue, constituting what is essentially a fibro-adenoma. In some cases the fibrous, in <sup>others</sup> some, the glandular element predominates. The actual cause of the various forms of enlargement is not known. According to Freyer the enlargement occurs to a varying degree in 33% of all men beyond 55 years of age. (17)

Caspar has pointed out that as arterio-sclerosis tends to degeneration and not to hypertrophy, this condition cannot be considered as a cause, and indeed one sees many cases of general arterio-sclerosis without obvious changes, ~~degenerative~~ or hypertrophic in the prostate. May it not be possible that the changes are produced by toxic substances, microbic or chemical, which irritate the organ and set up a low form of inflammation? Remembering the anatomical formation of the prostatic portion of the urethra, we can believe in the possibility of senile relaxation

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(16) Berry. Diseases of the Eye. 2nd. Edition, page 384.

(17) Da Costa "Modern Surgery" 4th. Edition p. 1008

of the sphincter urethrae permitting of the escape into this portion of small quantities of urine, and from there the passage of toxic substances into the tissues of the prostate by means of the prostatic ducts, no longer actively bearing off the products of prostatic secretion.

DISEASES COMMON TO ALL AGES.

The diseases comprised in this class are many, but the limitations which a Thesis, such as I have undertaken, necessarily impose, do not permit of my discussing more than a few of the more important ones.

In this category we have those diseases whose incidence is confined to no particular decade in which the age question is only of importance as determining in what particular form the disease is likely to manifest itself, what organ or organs are likely to be attacked. In these, we may find that the site of election varies with the state of development of the individual, that while no age escapes, the mode of attack differs at the different periods of life.

TUBERCULOSIS. Pre-eminent in this class stands Tuberculosis. Far reaching in its influence, almost world-wide in its distribution and varied in its manifestations, it attacks all ages.

Direct hereditary transmission of the disease itself is exceedingly rare, but that a strong predisposition exists in the offspring of tuberculous parents, is an established fact. The suitable soil is there, all that is wanting to induce the disease is the infecting agent in the form of the Bacillus Tuberculosis of Koch. This germ or its spores <sup>are</sup> ~~are~~ to be found everywhere in the vicinity of infected persons, and may continue to be an active source of danger long after the source of infection has been removed. The spores are especially resistant to external influences

and may be present in the air, or on the walls and floors of an infected room, or <sup>or</sup> the wearing apparel and blankets used by the infected person.

In the earlier years of life, glandular bony and meningeal lesions are those most commonly found. Of the former the bronchial and mesentric glands are those most frequently involved, and this is what we would expect considering how prone children are to catarrhal affections of the throat and tonsils, as well as gastric and alimentary disturbance. In them, too, tuberculosis of the lungs is nearly always secondary to that of the bronchial glands, unless it arises in the course of a general miliary tuberculosis from some more distant source.

The catarrhal affections may be slight in themselves and pass almost unheeded because of their frequency, but they are quite sufficient so to lower the vitality of already predisposed tissues as to allow of the more easy entrance of the tubercle bacillus. Even then a healthy environment and careful feeding might enable the child to successfully resist the invading organism. But the great majority of cases occur in the stuffy ill-ventilated rooms which are a feature of our great cities, or among the poorer classes living in damp, low-lying country districts. Where the best hygienic surroundings are apparently of no avail in arresting the progress of tuberculosis, one is justified in assuming that the hereditary predisposition is very strong. Miliary tuberculosis is more common in the earlier years of life because of its association with primary tuberculosis in the bronchial and other

glands. I have seen one case, however, in which the disease arose from the injudicious attempt on the part of a bonesetter to "put right" a tuberculous knee by forcible movement of the joint.

Trauma accounts for a great many of the <sup>^</sup>arthritic lesions of a tuberculous nature met with in early life. The injury, slight in itself, perhaps, is sufficient to render the part for a time, as Osler says, a "locus minoris resistentiae", and if bacilli are present, they settle on the weakened spot and develop more or less rapidly according to their numbers and the resistance offered them. A simple effusion into a joint may give the bacilli the necessary nidus. We meet with instances of tubercular disease of the hip-joint for example in which no history of injury can be got. It would almost seem as if the mere act of walking were sufficient in debilitated and highly susceptible persons to tire out the tissue resistance.

Meningitis due to tubercle is frequently seen in early life, in most cases associated with a general tuberculosis. Several cases which have come under my own observation, complained in the early stage of the disease (of) vague abdominal pains, pointing to the probable existence of a primary lesion in the mesenteric glands, and that before the meningeal symptoms were at all in evidence.

Acute pneumonic phthisis occurs in early life as a result of such debilitating diseases as whooping cough and measles, or it may be the outcome of an extension of the disease from the bronchial glands.

In adults on the other hand, the glandular involvement is often secondary to the pulmonary. In them the bacilli do not as quickly pass through the mucous membrane of the larger air-passages, but may pass into the lung alveoli and set up irritation and consequent pathological changes there. Chronic phthisis arising primarily in the lung is much commoner in early adult life than in children, and the majority of cases that I have seen were between the ages of 18 and 30.

When we come to the later years of life, pulmonary lesions predominate over the glandular and osteitic, though indeed, after 40, all the tissues of the body are more resistant to the tubercular virus. That this is in part due to the fact that the more highly susceptible have already been eliminated, is to a certain extent true, but it is also reasonable to suppose that it may be due to frequent exposure to infection by ~~members~~ members of the tubercle bacilli, too small to produce an actual lesion, but sufficient in repeated doses to establish immunity.

We often see instances of this in the post mortem room, where the lungs of old persons who have died of some other disease show evidence of healed tuberculous lesions of which there was neither sign nor symptom during life. This immunity is however by no means absolute and may be overcome by the debilitating influence of some other chronic disease, more especially of the respiratory tract.

Next in importance to heredity as a predisposing factor to tubercle, comes environment. Unhealthy surroundings intensify the

risk of infection in those already predisposed, and those in whom no family history of the disease can be traced are rendered less resistant in the presence of the tubercle bacilli. The essential part of treatment of this disease consists in as far as possible removing those predisposed to tubercle from possible sources of infection before the disease has manifested itself. If the children of tuberculous parents be taken beyond the area of infection and placed under the most favourable conditions, climatic and hygienic, they run very little risk of contracting the disease.

Enlargement of the superficial cervical glands is a very common manifestation of tubercle during the age of growth. In the absence of evident lesions elsewhere, it is possible that the local resistance offered to the bacilli, is sufficient to prevent their spread to other parts, or so to deprive them of their virulence, that their advent to fresh foci at some distance from the primary source, is unattended by any lesion. In other words, they may undergo a process of devitalising in their progress from gland to gland through the lymphatic vessels.

Unfortunately, when the internal glandular structures are involved - bronchial, mesenteric, etc. - the tissue-cells do not always overcome the invading micro-organisms, and in not a few cases, in adults as well as in children, the lung is reached before the process can be arrested. Much might be done towards the prevention of tubercle in children, by careful attention to the condition of their mouths and tonsils, more strict regard to the

minor catarrhal affections of childhood, and by a greater appreciation of the value of fresh air, and personal hygiene. If even those affected with phthisis pulmonalis could be brought to realise the infective nature of the sputum and induced to take the necessary steps for its destruction, a great advance would have been made towards stamping out the disease.

PNEUMONIA. Of the various forms of Pneumonia, the two most important are Lobar and Bronchopneumonia. The former is common to all ages, and the latter, though it may be met with at any period of life, is more commonly associated with childhood and old age.

LOBAR PNEUMONIA. Is an infectious disease which runs a definite course and terminates by crisis. Exposure to cold and privation and the debilitating influence of some other disease, influenza for instance, are all predisposing causes. In the majority of cases, the bases of the lungs are the seat of the lesion, though in children the apices are not infrequently involved. In adults, alcoholism is an important predisposing factor, the enfeebled constitution offering slight resistance to the pneumococcus and its toxins. Children and healthy adults stand a good chance of recovery, but where the disease has been preceded by some of the predisposing factors already referred to, the outlook is not hopeful. The Occurrence, too, of complications renders the prognosis more grave. So fatal is it in the aged that it has been termed the  
(18)  
natural end of the old man. The tissues of the old seem easily



to succumb to a pneumococcal toxæmia, even when the lesion in the lung is by no means as extensive as the constitutional disturbance would indicate.

BRONCHO-PNEUMONIA. This disease, so frequently met with at the extremes of life, owes its incidence in children especially to the frequency with which it follows one or other of the infectious diseases. The majority of cases met with in the course of private practice I have found to follow measles and influenza. Occurring in consequence of one of the infectious fevers, the prognosis is far less favourable than when no such cause is discoverable. In adults it may, and not infrequently does, terminate an attack of phthisis pulmonalis. In the presence of the tubercle bacillus, the disease is very fatal.

In the later years of life, bronchopneumonia sometimes occurs in the course of some of the debilitating diseases incident to old age.

ANAEMIA. Under this name are included those diseases of the blood characterised by various changes in its constituent elements, as for instance, diminution of the hæmoglobin, or of the number and size of the red corpuscles.

It is a disease to which persons of all ages are liable in one or other of its various forms. Especially is this true of the secondary anaemia<sup>e</sup>. These may be due to hæmorrhage, or long continued suppuration, or they may be associated with diseases such as nephritis, cancer, and syphilis, or indeed any factor interfering with the general nutrition of the subject. In these

we must regard the age factor as incidental.

There are two forms of anaemia, however, in which the factor of age is one of some etiological importance. These are Chlorosis and Pernicious Anaemia.

CHLOROSIS, almost entirely confined to the female sex, most frequently develops about the age of puberty.

Its chief characteristic is a marked reduction in the amount of haemoglobin in proportion to the number of red blood corpuscles. Indeed, the latter may show a percentage of 80 to 90, while the former may be as low as 30 per cent.

Predisposing causes of this disease are variously ascribed to deficient nourishment, bad ventilation, long confinement in dark, stuffy rooms, etc. and in many instances these are associated with Chlorosis, but I have seen many girls living healthy, out-door lives in the country, the subjects of this disease in a very acute form. The actual causative factor is, as yet, uncertain. Constipation has been suggested by Sir Andrew Clark, as one of the most important. He maintains that the condition is brought about by the absorption of toxic substances from the large bowel. While this may favour the condition it does not explain everything. Why, for example, should a week or a fortnight's absolute rest in bed bring about a marked improvement in many cases, even without the exhibition of laxatives or the iron preparations, where, indeed, with the patient going about, these had failed. Possibly the pressure on the abdominal organs

exercised by the stays may be of some significance in the causation of Chlorosis. Again, the comparatively frequent occurrence of the disease about puberty would seem to indicate some functional disturbance as a cause - a view supported by the nervous and emotional disturbances not infrequently associated with it. On the other hand I have observed two cases of extreme Chlorosis in girls aged 18 and 19 respectively who had never menstruated, in whom, in fact, the organs of generation were quite undeveloped. In both, the administration of iron was attended by temporary improvement.

PERNICIOUS ANAEMIA. We have in this condition a disease insidious in its onset, progressive in its course, and nearly always fatal. It seems difficult to definitely assign to it any recognised cause.

It is a disease of middle life, though occasional cases have been noted in young adults and even in children. In marked contrast to the other forms of anaemia we have here an actual decrease in the number of red blood corpuscles without a corresponding lowering of the percentage of haemoglobin, in fact, that is usually relatively increased. Here too, the iron is in excess, and may be found in great amount in the liver, kidneys, and spleen.

Nucleated red corpuscles are present in almost every case and are found in great abundance in the bone marrow.

No satisfactory explanation of the causation of these

changes is as yet forthcoming. Stockman has endeavoured to demonstrate the relationship between pernicious anaemia and the liability to haemorrhages found in severe anaemia of the simple type. Other observers are inclined to the view that disorders of nutrition and changes in the gastric mucosa, are predisposing if not actual causes. While still another view attributes to the disease a nervous origin. The age, at which pernicious anaemia most frequently occurs, coincident as it is with that at which individuals are most subject to mental strain and the worries of business, would seem to indicate more than a casual relationship with these. Whether any or all of these are actual causative factors or act only in the presence of some undefined specific agent, or whether after all they are only secondary manifestations of the disease is a difficult problem. Nor is it easy to perceive how the factors, mentioned above, could of themselves produce the blood changes which characterise this disease, whether we regard these changes as the result of haemolytic action or due to faulty haemogenesis.

RHEUMATOID ARTHRITIS. This disease is met with at all ages, unless as some observers suggest, we regard the acute and chronic form as two distinct diseases. Both forms occur in children and young adults, while the chronic form alone is more common in those at and beyond middle life. It is predisposed to by debilitating diseases, such, for instance, as influenza, gonorrhoea, and rheumatism, and by prolonged toxæmia from septic foci, suppurative or ulcerative lesions. In women it may be associated

(19)

with chronic endometritis. The older theory, attributing to the disease a nervous origin was based on the symmetrical nature of the lesions, and on the fact that violent emotion had been known to precede it. A more modern and more likely theory suggests the possibility of an acute infective origin - a view supported by the sudden onset of the acute form of the disease and by the splenic and general glandular enlargement by which its course in children is marked.

The relationship between malnutrition and Rheumatoid Arthritis is very close, and in its earlier stage, improved hygiene and a generous diet may arrest the progress of the disease, preventing the occurrence of those morbid structural changes in the joints which no treatment can afterwards influence.

It seems quite a possible explanation of the occurrence of the chronic form of this disease in old people, that an enfeebled digestive system, may permit of the formation and absorption of toxins in the alimentary tract, and that the slowly produced lesions are the result of chemical rather than of microbic influence. The liberal diet and healthy surroundings, by improving the general condition of the patient, would necessarily have a beneficial effect on the organs of digestion.

RHEUMATISM. There are some features of this disease not unlike those of Rheumatoid Arthritis, though both affections are quite distinct from each other. Here too we have an acute and a

chronic form of the disease. The former is principally found during adolescent and early adult life in its usual recognised form, an acute onset, high fever, arthritic swellings and profuse perspiration. In children, however, the disease may manifest itself in quite a different way. The arthritic lesions being mild in relation to the endocardial. In fact, the occurrence of an acute endocarditis may be the first obvious manifestation of acute rheumatism. But a history is usually obtainable of "growing pains" or of a previous febrile attack with vague pains referred to one or more joints; or again the swelling of a joint may have been so slight as to have been overlooked.

The frequent occurrence of tonsillitis should always be regarded with suspicion and the heart carefully watched. Where tonsillitis is associated with the rheumatic virus, the connective tissue rather than the glandular structure is more often affected, and the tendinous origin of the palatal muscles are probably involved in most cases.

On the other hand the tonsillar lesion may be primary, the inflamed area giving more easy access to the rheumatic virus. (20)

In rheumatic fever, as it affects adults, the articular swelling is the most characteristic lesion. This enlargement is due to peri-articular infiltration with serum, all the joints may be involved at once, more frequently however the progressive involvement of one joint after another is the rule, the inflamma-

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(20) Hutchison "Diseases of Children", page 161.

tion in *those* first affected subsiding while in others it is becoming more intense.

Sub-acute rheumatism is a milder form of the disease in which the febrile symptoms and arthritic lesions are not so marked. It is more apt to become chronic than the acute form. Simple endo-carditis is the most important complication, and in children, as I have already mentioned, in whom the mild ab-articular form of rheumatism is most common, may be the most prominent manifestation of the disease.

Pericarditis and myocarditis are less frequent complications.

In the acute phase of the disease the valvular lesions are not as a rule a serious menace to life. It is the later sclerotic changes in the valves leading to retraction and consequent mitral stenosis - more rarely aortic insufficiency - that constitutes the grave danger of this complication.

I have seen several cases of chronic valvular disease end fatally, at varying ages from early adolescence to beyond middle life, in most of whom, if not in all, there was traced a previous history of rheumatism. In a great many more instances, the patient was rendered unfit for any occupation requiring the least exertion.

CHRONIC RHEUMATISM. Occasionally follows an acute or sub-acute attack but in the great majority of cases is chronic from the outset. It may attack any age but is oftenest met with in those past middle life. Exposure to cold and damp and residence

in a climate where the rainfall is high, are the commonest predisposing causes. The disease is characterised by thickening of the capsule and ligaments of the joints, and of the tendon sheaths in the vicinity of joints, with gradual limitation of movement and atrophy of the muscles. The joints may ultimately become ankylosed and even greatly distorted.

The fibrous thickenings, which are a very usual manifestation of rheumatism, vary somewhat in character and site according to age. In children and young adults, these rheumatic nodules, as they are termed, are subcutaneous fibrous bodies most frequently found over the bony prominences (elbow, malleoli, etc.) and on the tendinous insertions of various muscles, notably the erector spinae. They may disappear in a few weeks. In elderly people, on the other hand, these nodules usually occur after a protracted attack of chronic rheumatism, and their commonest situation is in the fascia, on or in the substance of the muscles. They are apt to persist for a long time, (and) are tender on pressure, and painful on movement of the muscles in relation to them.

Valvular lesions accompanying chronic rheumatism which is not secondary to the acute or sub-acute forms, are rarely dependent on this disease for their incidence, the relationship being in most cases accidental.

SYPHILIS. This is a disease from which no age is immune. It seems probable that it owes its incidence to the spirochaeta *Pallida*, a micro-organism most easily obtained in the scrapings from a primary sore.



The disease is more severe, when the person infected is very young and undeveloped. As Mracek says, the tender growing organism falls an easy prey to the ravages of the disease. In these, the later tertiary symptoms are not unlikely to appear in spite of all remedies.

The prognosis is more hopeful when the patient is a strong healthy adult, whose vitality has not been lowered by previous disease. In such, under careful treatment, the disease may terminate with the secondary symptoms.

On the other hand, syphilis acquired late in life is as a rule more severe than when acquired at an early age. Here again the physical fitness of the host must play an important part, and the increased severity of the disease at a late period is due to the loss of vitality of the tissues, when the process of tissue degeneration has commenced, and the body cells are less able to overcome the syphilitic virus.

This disease differs from Tuberculosis in that direct hereditary transmission is one of its marked characteristics. In congenital syphilis we may find all the recognised lesions peculiar to the acquired form, with, of course, the exception of the primary sore. Children showing acute syphilitic lesions at birth are usually ill developed and much emaciated. They may have a bullous eruption on the skin round the wrists and ankles and on the hands and feet, ulceration of the lips, and fissures at the angles of the

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(21) Mracek "Atlas of Syphilis and Venereal Diseases", page 3.

mouth. Deformities at the epiphyses of the long bones are not uncommon. I have seen one such case in which the picture presented was that of a small, deformed bony framework over which was tightly stretched a sallow parchment-like skin; large protruding forehead, cheeks sunken, face drawn and wizened, nose-breathing entirely obstructed. There was marked distention of the abdomen due to enlargement of the liver and (to a much less extent) of the spleen. There was one peculiarity, in that there were present two upper incisor teeth in which the dentive was exposed for some distance from the tips but without actual notching. The skin eruption was principally papular and appeared on the forearms and legs with a few scattered bullae on the feet. The child died on the sixth day from birth. The father had acquired syphilis two years previously, but the mother bore no trace of the disease nor had she had any symptoms of it. The child affected was the first-born.

The more common form of congenital syphilis makes its appearance from four to eight weeks after birth. Baumgarten<sup>(22)</sup> explains this on the theory that the actively growing embryonic cells inhibit the development of the syphilitic germs. A remarkable feature of congenital syphilis is the frequency with which the mother of the affected child escapes. (Colles' Law.)

Explanation of this anomaly is difficult, but it seems possible

that, in a certain number of these cases, the syphilitic element is introduced in the semen alone, and this, according to several authorities, is innocuous. In that case, we can understand the gradual immunising of the mother against infection from the developing embryo - the latter bearing the full brunt of a toxin intimately associated with it from the beginning. There are a few noteworthy differences between the manifestations of congenital and acquired syphilis. They are chiefly, however, differences of degree. For instance, in the adult, the lung is very rarely the seat of syphilitic disease, in the congenital form, on the other hand, the "white pneumonia" of the foetus is a recognised syphilitic lesion, by no means rare. Syphilitic lesions of the brain and cord are rare in the congenital disease and of comparatively frequent occurrence in the acquired. Destruction of the nasal bones and cartilages, due to extension from the nasal mucous membrane, is often seen in the subjects of congenital syphilis, but the rhinitis as evidenced by "snuffling" is one of the most constant of the early manifestations of this form of the disease.

Iritis is more common as a secondary lesion in acquired syphilis, though it may occasionally be met with in syphilitic children. Otitis, on the other hand, is a more frequent accompaniment of early syphilitic pharyngitis in the latter. I will now deal shortly with two diseases of the nervous system whose frequent incidence in association with the Syphilitic virus justifies my mentioning them now. They are Locomotor Ataxia

and General Paralysis of the Insane.

While Locomotor Ataxia has been known to follow prolonged exposure to cold and wet and great over-exertion, by far the most important cause is syphilis. The age at which this disease is most frequent is the decade between thirty and forty, no less than half the cases occurring at that age. (23) It is comparatively rare after fifty, but I have seen one case of Locomotor Ataxia in a man aged 60<sub>x</sub> who had contracted syphilis thirty years before. One fact, suggesting cause and effect, was that the secondary symptoms had been so slight that the patient did not undergo any specific treatment. Locomotor Ataxia rarely makes its appearance within three years of the primary sore, and is most common from six to twelve years after the initial lesion. (24)

It seems probable that the nervous system for a longer time resists the syphilitic toxin, and this explanation is the more feasible in that the spinal lesions in this disease differ altogether from those occurring in the earlier stages of syphilis (due to gummata, etc.). Here we have a degeneration-produced by a toxin, - the histological appearance of which is similar to that predisposed to by such other agencies as injury, exposure to cold, privation, etc. Further, the effect of such factors super-added to a syphilitic history is likely to be a shortening of the period between the primary lesion and the onset of Locomotor

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(23) Gower's "Diseases of the Nervous System" Vol. I, page 346.

(24) Ibid.

Ataxia, by overcoming more quickly the natural resistive powers of the nervous mechanism. When a long interval of time has elapsed since the primary infection and the individual has passed middle life without any manifest sign of tabes dorsalis, the chances are that the toxin has gradually been eliminated or at least lost its virulence. Even then however, as in the case cited above, one cannot definitely assert that all risk is gone. The intercurrent of some of the predisposing causes already mentioned may so lower the systemic resistance as to enable a latent attenuated toxin to reassert itself.

GENERAL PARALYSIS OF THE INSANE. As Locomotor Ataxia is a disease of the spinal cord so Dementia Paralytica attacks the cerebral cortex. The disease may occur at any period of adult life, but is most frequent between the ages of 30 and 45. Although a life of mental activity and anxiety is a predisposing factor, as are also alcoholism and sexual excesses, syphilis accounts for a very large percentage of all cases.

The higher nerve centres, the controlling centres, are those first attacked. The age at which the disease sets in is that at which the mental faculties are at their zenith, at which too they are, under ordinary circumstances, liable to the greatest strain and taxed to the uttermost. It is when this physiological activity is exercised beyond reasonable limits, when health is sacrificed on the altar of ambition, that other predisposing influences are liable to step in, and provoke the onset of those degenerative changes which terminate in paralytic insanity.