A Thesis for the Degree of M.D.

by

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on

Goitre :- Its Etiology and Frequency in the Northern Division of the Yorkshire Dales.

Hawes. June 1888.

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I hereby certify that the accompanying Thesis on the "Etiology and Frequency of Goitre in the Northern Division of the Yorkshire Dales" is my own Composition, and that where quotations and Extracts are taken from the writings of others, the source is acknowledged in the course of the text.

As witness my hand this sixteenth day of June, one thousand eight hundred and eighty eight

Thomas Jackson Grime

Indese.

Goitre:- Its Ætiology and Frequency in the Northern Division of the Yorkshire Dales.

Introduction.

The subject of "Goitre," which has been frequently written upon by eminent authorities, both here and abroad, has especial interest for me as I have the misfortune to be a sufferer from the disease, having inherited it from my Mother's side. Consequently, its frequency and the manner in which it is met with within my range of professional work in the Town of Hawes and the surrounding villages, have led me to note various facts with regard to the Geology, Water-supply and Climate of the district, together with the influences of Heredity in the ætiology of the disease.

In the following remarks, the several explanations which I bring forward are given with every reservation, and

rather as being probable than demonstrable; the facts, number and clinical history of cases being given in detail as confirmatory evidence.

*. Heath's Dictionary of Surgery Vol II. Page 613.

Goitre:- from "Guttur" the throat, or Bronchocele from Βρόγχος, the wind-pipe and κήλη, a tumour or swelling.

Definition:- According to Semon in "Heath's Dictionary of Surgery," * "All tumefactions of the thyroid gland not due to inflammatory or malignant diseases, or to the immigration of parasites, are usually comprised under the name of goitre."

Accepting this definition as being correct, I will now endeavour to explain the:-

(1) Geographical situation of the district,
(2) Geological formations, with especial reference to the composition of the rocks as regards lime, magnesian and iron-stone,
(3) Water and water-supply, as bearing on the causation of goitre around here. In addition I must also explain the influences of:-
(a) Heredity and (b) Anaemia.

(1) Geographical Distribution of Work.

Hawes is situated at the head of Wensleydale in North West Yorkshire and is the Market Town for the dale and surrounding district. It has an altitude of about 950 feet above sea level. It is seated on a gentle eminence on the south bank of the river Yore or Ure, and is surrounded by fertile land. The general aspect of the country is mountainous, and the romantic scenery of the neighbourhood attracts numerous visitors during the summer and autumn months.

The population of the district may be estimated at about 2400.

(2) Geological formations.

The rocks around here belong to the "mountain limestone formation", and in this immediate neighbourhood (the upper part of Wensleydale) this formation is found in its fullest development.

It consists of a varying number of deposits in layers of calcareous origin, intersected in each instance by a layer each of grit, flate, shale and hard flagstone. Taking the section of Stags Fell, (a mountain on the North side of Hawes) Prof. Phillips in his "Geology of the Mountain Limestone District", gives the following figures at different points in the geological outline:-

Hardraw Scar

(a) Limestone 30 feet.
Flate, grit &c. 40 feet.

Undersett.

(b) Limestone 50 feet
Grit, flag and flate 40 ft.
Limestone again 45 ft.
Millstone grit 535 feet.

There is a considerable quantity of ironstone, in the form of boulders, between the upper and lower limestone and especially in this neighbourhood of Hawes.

(3) Water and Water-supply.

Now the entire water-supply of the town is derived from springs or wells

and the small brooks flowing from the neighbouring hills, and in either case it mostly comes over or through the limestone formation, which is often worn into chasms or gullies by the solvent action of the water on the rock, owing to the quantity of carbonic acid (CO_2) in solution in the water. In these cases where the water flows over the surface of the grit or shale or flagstone, there are varying amounts of iron salts found dissolved in it. Now under these circumstances, with such a water supply and the disease being prevalent, it is not at all surprising to find the idea popularly entertained that there is some connection between the two, in the nature of cause and effect. Of course the idea that drinking impure, and especially lime impregnated water, is as old as Hippocrates and Aristotle, and is constantly coming forwards.

* Quoted in "Watson's Lectures on the Principles and Practice of Physic" — Lect. XLIII.

According to M. Saint-Lager this opinion has been put to the test of practice, and apparently with success, in some parts of France and Italy, for the purpose of producing goitre in order to gain exemption from military service. Probably, however, the most exhaustive research in this direction has been made by Mc. Clellan on the south of the Himalayan mountains. His facts and statistics not only prove the endemicity of the disease, but also its relation to certain springs or wells in one village as given by Sir Thomas Watson who quotes as follows in his Lectures:-

* "One extremity of the long village Deota, which occupies half a mile of the foot of Durga mountain, is inhabited by Brahmins; the other by Rajpoots and Domes. Of the first caste there are about twenty persons, all of whom are free from goitre. There are forty

of the second, and two-thirds are affected, more or less. Of the third caste, forty-six in number, nearly the whole are goitrous."

"To what cause can we ascribe the immunity of one caste of the inhabitants of this village, and the almost universal affection of the other two castes? They are all alike well-fed, and have little toil; their land producing the requisites of life almost without labour. Difference of caste does not here imply a difference of pecuniary circumstances, and consequently of the comforts of life. In these respects the three castes in this village are on perfect equality. Nor will hereditary predisposition acquired by intermarriages be sufficient to explain the interesting fact: for the affected parties are confined to the Rajpoots and Domes, who cannot intermarry, while the Brahmins and Rajpoots may.

The village is raised about one hundred

feet above the level of the valley; and the mountain, at the foot of which it is situated, rises with a gentle slope, and is not in this vicinity at all rugged. It is chiefly composed of transition limestone, and the village is erected on a conglomerated rock, composed of calcareous tuff, inclosing fragments of other rocks. There is a spring in the valley, about one hundred yards from the village, bearing on its first appearance the character of a mineral spring. The water bursts forth with strong ebullition, in the quantity of at least forty gallons in a minute, and agglutinates the sand and gravel by which it is surrounded, by the deposition of calcareous tuff. The temperature and quantity of the water are the same at all seasons. The former inhabitants of the village, aware perhaps of the noxious effects of this spring, had an aqueduct

formed, by which water is conveyed into the Brahmin portion of the village from a distant source. The aqueduct having been suffered to get out of repair, the quantity of water it transmits is reserved exclusively for the Brahmins; except during the rainy season, when, the water being plentiful, the Rajpoots also use that of the aqueduct; but the Domes have no alternative at any season but to use the water from the spring." '

The above facts led Mc Clellan to the conclusion that the disease was due to Calcareous salts dissolved or held in suspension in the water; but M. Saint-Lager explains Mc. Clellan's cases by the supposition that it was due to some metallic ingredient, this idea being based on an expression in his work, that, in the district where his investigations were carried on the water had traversed the metalliferous strata of the rocks. This explanation

is not supported by any Chemical analysis.

In the Valleys of the Alps, especially the Alps in Northern Italy and the Valais in Switzerland goitre is found very extensively, and when not inherited has been attributed to many different causes, such as drinking snow-water or water containing lime and magnesia. An old writer (Juvenal) writes "Quis tumidum gutter miratur in Alpibus".

Goitre is also found and attributed to the water supply in many other places.

The treatise on "English Bronchocele" by the late Dr Inglis says:- "Take that ridge of magnesian limestone running from North to South through the centre of Yorkshire and marginning the shores of Derby and Nottingham. All along that line we have

goitre to a very great extent; whereas on our diverging to either side the disease is found to diminish.

Here in Hawes, the Northern extremity of the ridge, I find the above quotation applies exactly, but on this point I shall have more to say later on. Adversely, in Norfolk where many of the water supplies are hard and contain excess of Calcareous matter, goitre is rarely seen unless imported.

The exact nature of the impurity of the water of the various districts where the disease prevails is as yet a matter of conjecture. The theory of M. Saint-Lager that it is of a metallic nature, probably some form of iron, is at any rate likely to be correct. It has been shown that metalliferous earths are in every instance to be found in the neighbourhood of the limestone or

magnesian limestone districts where goitre prevails. What may be the injurious form of iron, whether pyrites (FeS_2) or some other salt is not known. In fact this theory of M. Saint-Lager's requires further investigation, and more analyses of the water to be made in goitrous districts before it can be finally accepted or rejected.

What part does the water-supply play in producing or aggravating the numerous cases found in and around Hawes?

As stated when speaking of the water-supply on page seven all the water is derived from springs, wells or small brooks flowing from the neighbouring hills. Now all these sources yield a hard water, slightly acid in reaction, from the presence of CO_2, full of calcareous salts and also containing slight traces of iron from the rocks over or through which the water flows. In noting a

few facts on the geology of the district
on page Six I stated that the limestone rocks were
intersected at varying depths by what-
are known as plate, shale & flags and
these strata contain iron in considerable
quantity. This is dissolved by the water,
to a small extent, but quite sufficiently
to give a perceptible blue coloration when
tested with a solution of red prussiate
of potash and dilute hydrochloric
acid.

In a paper read before the Society
of Medical Officers of Health in 1885
Dr Thursfield of Shrewsbury says that
the injurious ingredient is iron, and
argues that a long-continued ingestion
of this substance might, by throwing
additional work on the thyroid,
which has probably for one of its
functions the depuration of blood,
lead to hypertrophy of the gland.
This appears to me to be correct as
regards the water supply here.

Women suffer from the disease more frequently than men possibly because they are greater water drinkers.

Summing up my remarks on the influence of water, I am inclined to the views enunciated above that the iron is probably the deleterious principle, but that the form in which it is ingested and absorbed and thus rendered capable of developing goitre is not known.

In addition to the influences of endemicity, as thus imperfectly noted, there are other important factors to take into account, and not the least important of these is heredity of which I now proceed to speak.

Heredity.

Science seems every day to be making clearer the indissoluble unity between all life, past, present

*"Empedocles on Etna" by Matthew Arnold.

and to come. The doctrine of heredity teaches us that we are what our forefathers made us, plus our environment or the action of circumstances upon ourselves; and in like manner our children inherit our peculiar individual traits. Is it not true what the late lamented Matthew Arnold writes? —

* "Born into life, man grows
From his parents' stem,
And blends their bloods, as those
Of theirs are blent in them;
So each new man takes root into a far fortune."

In the aetiology of goitre, according to Lemon, and especially sporadic goitre, heredity plays the most important rôle.

Heredity may act in diverse ways; either as direct, reversional (atavism) collateral or premarital.

By <u>direct heredity</u> is meant that the child resembles its parents;

but we must here carefully distinguish two different sets of facts. A child may resemble both parents equally; or it may resemble one of them peculiarly, and here again the likeness may be in the same sex or not; that is, the son may resemble the father and the daughter the mother, or the son the mother and the daughter the father.

Reversional heredity is atavism takes place when a child resembles its grandparents, and is a very important law in explaining individual traits of character or inherited tendencies to disease such as are transmissible to offspring e.g. epilepsy, cancer, goitre, insanity phthisis &c. It may be said to come into force in about thirty per cent of all hereditary cases. As an example the following case well

illustrates the foregoing law.
A Carriers wife at a neighbouring village is as strong and healthy as is possible. Her mother died from consumption when the girl was only six years of age, and this girl in course of time married a carrier, a fine strong healthy fellow with no history of any phthisical taint in his family. Neither himself nor his wife have had a days illness, cough or any other signs of the disease which carried off the wife's mother: but of the fourteen children resulting from the marriage, only one is now alive, the rest having died at ages varying from one to seven years, all from phthisis. The survivor is a delicate young woman with dullness at the apices of both lungs and a pigeon chested breast.

Collateral heredity occurs when a child resembles an uncle or aunt- or some of its relatives out of the direct line of descent. It is of frequent occurence, and it exemplifies our ignorance of the causes of hereditary transmissions and also shows that no one knows how to predict what will happen. As an example of Collateral heredity I cannot give a better one than that of my own case in reference to the transmission of goitre which I append in detail on page thirty-seven.
Premarital heredity is seen when the child of a second marriage resembles the husband of the previous marriage. As I have no cases bearing on this form in connection with my present subject it will not be mentioned again: so that wherever the terms "heredity" or "hereditary influence" occur, they may be understood to include only those forms described as direct,

reversional and collateral heredity. Now given an inherited tendency to goitre in my own person, not by direct but by collateral heredity on my mother's side, what is the actual something in the tissues of the thyroid or the blood which predisposes me to this disease in particular? I do not know; all I know is, that, the human ovum, a tiny molecule of not more than 1/25 inch in diameter, contains within itself a vast number of inherited tendencies, and is charged with the gathered force of countless experiences of previous generations, transmitted to the future child, and that in the case of such a disease as goitre there is required for its development and growth, a suitable environment. This environment is found here, as I have endeavoured to show. Further, although I agree with Lenon as to the important part-

hereditary influences play in sporadic cases of goitre, still I do not think the disease will thrive, become serious, or even be maintained in equilibrium, and in many cases will not even develop at all, outside of a suitable environment. To refer to my own family again, I believe that this tendency, inherited by some of my mother's sister's family, who are resident in the Fylde district of Lancashire, has almost become extinct; and so long as they remain in their present environment, to which they have become adapted, will never be heard of.

In connection with this subject and especially with reference to sporadic cases, the following history is of interest:-

Mary Wilk left this district (Leyburn) in 1831 to become a domestic servant in South West Norfolk. She has a

goitre of considerable size, but states that it has not increased since leaving her home at Leyburn. She married a Norfolk man in 1833, and settled down at Ten Mile Flat, a small village in that County where goitre is almost unknown and I have the assurance of the local medical man, to whom I am indebted for this history, that there is not one case amongst the six hundred inhabitants excepting in connection with the above. As a result of the marriage nine children were born, two sons and seven daughters, and all grew up. Not one of them has ever had any enlargement of the thyroid. Her eldest son married and has had a family of two sons and four daughters. Two of these daughters are twins aged 21 years. One of them came over

to this district for three months to stay with some relatives near Leyburn, two years ago, and she has since developed slight enlargement of the left lobe of the thyroid, in fact it is one inch further from the thyroid isthmus to the seventh cervical prominence on the left side, than it is on the right. None of the others have any enlargement. Now what has caused the goitre in the above case, and would it have occurred if she had never returned to her grandmother's native place? Here we have a clear case of "reversional heredity" giving the necessary predisposition to goitre, and this developing on the subject coming into a goitrous district, even for so short a period as three months; but I feel convinced that this inherited tendency would have failed to produce the disease had she

remained in the environment — to which she was accustomed, and which is unsuited to the development of goitre. From the fore-going it will be gathered that I look upon goitre, as found here, as being due to two sets of factors :-

(1) The influences of endemicity, due to the nature of the geological strata, and the relationship of the same to the water-supply.

(2) The influence of heredity.

It is said the disease is diminishing in districts where it used to be common, at least in England, and this is probably due to several causes e.g. better education leading to an intelligent avoidance of suspicious water, better food, and in fact better hygienic surroundings in its widest sense. Then, too, the travelling facilities and the tendency for the country people to

flock into the larger centres of population, their places often being taken by persons not predisposed to goitre, and not likely to develop such a tendency under the improved conditions of the present day; though this latter scarcely applies to this district as yet.

There is still another interesting topic to discuss, namely the relationship between an anaemic condition in young women and goitre.

Take a typical case of that important variety of goitre known as "Graves Disease" or "Exophthalmic Goitre", which is said to occur most frequently in women between the ages of twenty and thirty years. The symptoms appear in the following order as to time:- anaemia leading to disorders of the uterine functions, followed by breathlessness, palpitation and protrusion of the eyeballs, and gradually enlargement of the thyroid superveres.

Anaemia is extremely prevalent here and my own experience tends to the conclusion that it precedes the goitre in most cases. Where a small goitre is already present and anaemia appears the goitre increases at a more rapid rate than it did before: also if by treatment with ferruginous tonics you cure the anaemia, the growth of the goitre is checked at the same time.

Cretinism. Although this disease is stated in some of the text books to obtain in the valleys between Lancashire and Yorkshire, I have not met with a case of it within my sphere of work here, nor have I been able to procure any reliable account of a cretin in this neighbourhood.

The carrying of weights on the head has been brought forward as a cause of goitre by interfering with the cerebral circulation, but as this habit does not obtain here it can have no such effect

in this locality. In the hilly districts of South Wales it is almost the universal custom for girls and women to carry weights on their heads, yet goitre is exceedingly rare.

Before writing out in detail a few of my cases, and before I touch on the frequency of goitre, I will endeavour to summarise my views as above enunciated, and apply them to this district.

Nawes, as previously stated, is supplied with a water which is hard and contains calcareous and ferruginous salts. This water, being the only supply, is used for drinking and all domestic purposes. Goitre has been prevalent for generations, is still found, and so long as this water is used, coupled with the influences of heredity, I believe it will continue to be common.

Which factor plays the more important part it would be rash to even conjecture.

The deleterious principles present in the water might, if the water were freely ingested for a long time by a weakly person, produce the disease. I believe it would, especially if the person was of the lymphatic diathesis. I also think that bad hygienic surroundings would materially help in the process. Any offspring from this person afterwards, still residing here, would probably have the disease in a more aggravated form.

On the whole, however, in order to get the disease typically developed we must have an inherited tendency coupled with endemic influence by residence and use of the water of the district for drinking purposes.

Frequency of Goitre in this District.
The prevalence of this disease throughout the radius of my professional work has led me to collect together, so far as it is possible to do so in private practice, certain statistics as to the number of cases which have come under my notice. There is a peculiar factor here which should not be forgotten by either the statistician or physician in relationship to disease. A great many of the inhabitants seem to be descended from a few common stems as it were: these by intermarriage of cousins of various degrees of consanguinity may have produced offspring more severely tainted with goitrous hereditary tendency than would otherwise have been the case. It is surprising to find the number of families related to each other by blood ties in this way.

In the early part of the year 1884 I took note of one hundred and sixty consecutive persons of both sexes who consulted me, or who required visiting, for various diseases. Of this number twenty five were affected in greater or less degree by goitre. Of the twenty five goitrous patients three were males and twenty two females. Of the males two were old men and the third twenty seven years of age. Of the females eight were over forty years of age, and the remaining fourteen were from fifteen to twenty years of ages. The above figures give a percentage of both sexes of 15·625. The percentage of females is 13·75 and of males 1·875. Of course some of the patients were only affected to a slight degree. Probably the percentage of males is really greater than is shown above for the following reason:- men do not seem to be

affected so severely as women, and rarely come to seek relief on account of goitre. In fact I have not had a male patient under me for this disease since coming to Hawes.

Now from Easter 1884 to Easter 1888 I saw a total of eight hundred and thirty patients, and of this number one hundred and five were goitrous. This gives a smaller percentage viz:- 12·65. Taking the average we get- 14 which will, I think, give as correct an idea of the percentage of cases as can be obtained. Applying these figures to the population of the district, which is 2400, there will probably be about- 336 cases in the neighbourhood.

During the two years preceeding January 1887 I was in practice at Ingleton a small town on the Western slope of the mountain limestone range which contains the town of Hawes between two of its ridges

Here, too, goitre prevailed in about the same proportion.

A careful perusal of the foregoing pages will lead to the Conclusion that the Darwinian theory of natural selection embraces one or two propositions capable of application here. For instance:- "Individuals whose peculiarities bring them into closest adaptation with their environment are those which survive and transmit their peculiar organisations."
Our environment is the circumstances in which we are placed. Here the influence of the water-supply and other endemic factors act upon us and we react upon them; this forms our environment. The result is a disease - goitre, which is not an advantage in the struggle for existence. Yet the disease will remain so long as the present

environment remains unchanged. For I believe, the strongest amongst us, with perhaps only a very slight enlargement of the thyroid, will transmit his peculiar organisation to future generations, and that in them it will develop so long as the environment is suitable.

But should the deleterious principle or principles be discovered, and means adopted for avoiding them, then I think the peculiar organic change in the thyroid will become "degraded" and finally perish, owing to the altered environment.

Thus, I hope, will die out the last of the diseases endemic in England.

The strong predisposition which heredity gives to every one born of goitrous stock will, I believe, be powerless to harm, if the endemic district are avoided,

or, if the environment of these districts becomes altered in the way I have spoken of.

As a personal sufferer from goitre I have endeavoured to show, however imperfectly, that the disease is endemic in certain places, from causes strictly local, the worst of these causes being contained in the drinking water; also, that heredity is an important factor in the aetiology of the disease, and that it is seen at its best in certain localities, of which Hawes and its vicinity is a typical example.

Family history of a few cases in illustration of the foregoing Thesis on the Etiology of Goitre.

Case I. The writers own case. J.J. Grime aged 34 yrs. My maternal grandparents, from whom I inherit the goitrous predisposition, were farmers residing on the Western slope of Ingleborough, a decidedly goitrous district, with the magnesian limestone and metalliferous strata all around the house.

My grandmother had a goitre of small size. They had one son and four daughters. The eldest daughter developed a large goitre, which was first noticed when she was about 15 years of age. The next two daughters were also affected, but to a slight extent only, the elder of the two having slightly the larger goitre; the youngest daughter — my mother — and the son were not affected at all. Now when the

eldest daughter was 25 years and the youngest 15 years of age, the whole family removed to Formby, a village in the County of Lancashire, about eight miles west of Ingleton. Here the disease is a rare one, the water supply is a soft one and the nearest mountain limestone about seven miles from the village. The change to this district had the effect of checking the growth of the goitre in the two younger daughters, but that of the elder continued to increase. The two youngest daughters married, and the elder of the two went to reside at Pilling, in the Fylde District of Lancashire, a district where goitre is not found excepting in imported cases. The water-supply is soft, but contains much vegetable matter derived from the peat moss over which it flows. She had two sons and three daughters and none of them have ever shown any traces of the disease.

The youngest daughter – my mother – after her marriage went to reside at a village called Wray, a mile distant from Hornby and situated on a gravelly soil. The water-supply was chiefly derived from springs & wells and is of a soft nature. I have one sister, a year older than myself, but have no brothers. My sister has never had any enlargement of the thyroid. Previous to commencing my Medical studies at the age of 23 years, my avocation frequently took me into the mountain limestone district about Clapham & Ingleton, and I naturally used the water of the district for drinking purposes. When I was about 20 years of age a slight enlargement of the left lobe of the thyroid made its appearance and slowly increased up to the time of my student life in Glasgow. During the four years spent in Medical study the

goitre made no progress. After I qualified in 1882 I went to reside in the Hyde District of Lancashire, near Pilling, previously mentioned. During the two years I was in this district, the swelling did not increase, and as it gave me no trouble I did not try to remove it by treatment.

My next residence was at Dugleby where I was in practice for two years. During this time the goitre slowly grew, and this growth has steadily gone on since coming to reside at Hawes. The isthmus of the thyroid - not previously affected - has also begun to increase during the past twelve months.

This history brings out a few points very markedly viz:- The heredity of the disease and the influence of endemicity in developing it. Also the powerlessness of heredity unless assisted by a suitable environment, is well shown in the case of my Cousins.

Case II. John and Elizabeth A——.

They have been residents of Hawes or the near neighbourhood all their lives. Mrs. A. has suffered from goitre since girlhood. It grew to a large size, and always seemed to get bigger during pregnancy, and to become smaller again after confinement. She had two sons and six daughters. The two sons are both married and reside near Hawes. One of them has three sons and the other two; neither of them have any daughters. None of the sons have any enlargement of the thyroid.

Five of the six daughters had goitre. One of them has resided in Liverpool for many years, and the goitre in her case disappeared under treatment and has not returned. She is married and has two sons, neither of whom have any signs of the disease.

Of the other four goitrous daughters

one died, one has remained single and is a sufferer from Exophthalmic Goitre: she resides in Hawes.

The other two are married, and one, the elder, residing near Hawes has two sons but no daughters, and neither of the sons have any enlargement of the thyroid.

The younger of these two married sisters resides at a farm about five miles north west of Hawes. The water-supply to the farm and two or three cottages adjoining it, is derived from a small stream flowing off the peaty moorland on the south side of the house. The water is soft but contains a little vegetable matter but no calcareous salts. The magnesian limestone range is about a mile to the north of the house.

Her goitre does not seem to be increasing at all now. She has

three daughters and one son. The eldest daughter, aged 19 years, has no goitre nor has she ever suffered from any glandular enlargement; she has always lived at home with her parents.

The second daughter came to Hawes two years ago to live with her maiden aunt. She was then 13 years of age. About a year ago menstruation commenced, and about the same time she noticed her neck becoming thicker, and at the present time she is under treatment for a goitre of considerable size, both lobes as well as the isthmus being involved. Now, would this case have developed had she remained at her original home, and continued to use the soft water there? Judging from her elder sister, who remains quite clear of the disease, I do not think it would have troubled her

at all, had she remained away from the endemic influences of Hawes. Both girls are equally strong and healthy in other respects.

The two younger children have not, as yet, shown any signs of the disease.

Case III. Thomas and Mary S———.

This couple resided at a small village called Thoralby to the South of Wensleydale. Mrs S. was brought up at Wood Hall, situated on the mountain limestone range on the North side of Wensleydale. Whilst living at this place she first noticed a goitre, but does not remember what age she was when it appeared.

After her marriage she went to live at Thoralby. The water-supply here was derived from a shallow well in the yard attached to the dwelling house. (The water from

this well is quite soft and contains no calcareous matter (J.S.G.).

The goitre never attained a large size, and was principly an enlargement of the thyroid isthmus.

She had five daughters, and of these, two died in girlhood, the other three are alive and married. One resides near Skipton - Yorkshire, another resides at Liverpool, and neither of them nor any of their children have goitre.

The youngest sister married and left home to come to Hawes, where she has resided ever since. She married at 27 years of age and up to that time had no signs of goitre; but about three years after coming to live here "her neck began to enlarge", and it has gone on gradually increasing, but especially so during the past few years. She is now 46 years of age

She has a large goitre, both lobes being about equally enlarged, but the isthmus scarcely at all. She has three children, two girls and one boy. The elder girl is 18 years & the younger 11 years of age the boy being still younger. None of the three have developed goitre yet, but it is commencing in the second girl.

Case IV. Alice H— aged 57 years. She was born and brought up at a small village called Whittington on the border of Lancashire. She was the eldest of a family of seven, and the only daughter. Neither the Father, Mother nor any of the brothers suffered from goitre: but she says her grandfather (on her mother's side) had a Derbyshire neck. She married at the age of 24 years and lived near Kirkby-Lonsdale; after being there about eight years they removed

to Barbon a village on the border of Westmoreland, where after ten years residence her husband died, and she removed to Ingleton where she is still living. About two years after coming to Ingleton a goitre developed. It is mainly confined to the left lobe and the isthmus, and is still slowly increasing.

She has two daughters, & both are married. The elder is living at Ingleton & the younger at Blackburn. Neither of them have goitre, though the elder has twice had a slight swelling of the right lobe of the thyroid, but it has quickly disappeared, on each occasion, after a little treatment with Iodine ointment.

She has only lived at Ingleton during the last four years, having, from the age of 15 years up to the time of her marriage at 26 years lived at Lancaster and Barrowdswick in Yorkshire.