

*Goitre*  
*With special reference*  
*to its*  
*Causation*

*Allen Thomson Sloan.*



1886

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## Preface

The subject of this Thesis was suggested to me by personal observations made while acting as assistant at Wishaw and Penrith. These observations which were made during the winter 1882-83, and throughout the year 1883-84, convinced me that Goitre existed in both places to quite an unusual extent, and hence this enquiry as to whether its occurrence as an endemic disease in places so different, can throw any light on its causation.

A. J. Sloan

Goitre, with special reference to its  
Causation, and its occurrence as an  
Endemic Disease at Wiskaw, Lanarkshire  
and Penrith, Cumberland.

History of Goitre

History of  
Goitre

Goitre has existed as a disease peculiar to certain countries from the earliest ages. This can be learned from the works of old writers both in medicine and in history. From its resemblance to the swellings occasionally found on the trunks of trees, Hippocrates gave it the name of γογγυρωγ; and in his work on "Epidemic Diseases" he speaks of the painless swellings of the neck that sometimes occur, along with the marsh fevers. Aristotle, in his "History of Animals," mentions that pigs are specially subject to swellings of the neck. Mercurialis (De Fatuitate cap. XIV) refers to the existence of idiocy and goitre among the inhabitants of the mountains which form the northern boundary of Thrace. Vitruvius (De Architect. lib. viii) tells us that those races, which lived in the Apennines, to the east and south-east of Tivoli, had goitre on account of the water which they drank. We have the testimony of Pliny and Juvenal that goitre was common in the Alps and Lombardy in their day. Thus Pliny (Hist. Nat. lib. 37. cap. 11) writing about Amber, says, "At the present day we see the female peasantry in the countries that lie beyond the river Padus wearing necklaces of amber, principally as an ornament, but on account of its remedial virtues as well

well; for amber is generally believed to be good for affections of the tonsillary glands and fauces, the various kinds of water in the vicinity of the Alps being apt to produce disease in the human throat. Again, in speaking of the throat (Libxi cap. 68), he says, that "Man only and the swine are subject to swellings in the throat, which are mostly caused by the noxious quality of the water they drink."

Juvenal refers to goitre as a disease so common in his time that its prevalence no longer excited surprise, when he asks "Luis tumidum guttur miratur in Alpibus" (13th satire). Celsus (De re med. libvii cap 13) has described the appearances of the hypertrophied thyroid on dissection, <sup>stip.</sup> "Est in cervice inter et asperam arteriam tumor increscit quo, modo caro hebes, modo humor aliquis, melli aequaeve similis includitur; interdum etiam minutis ossibus pili immisti!"

Albucasis and some other of the ancients describe the tumour very fully, and many of them share the belief that a certain fulness of the neck occurs naturally in young females the day after marriage.

There then existed a custom of measuring the young bride's neck on that day, in order to ascertain "an integra vel corrupta esset." Catullus, the brilliant poet of the Roman Republic, in his Epithalamium alludes to this circumstance in these words, "Non illam matris orienti luce revisens

Hesternoproterit collum circumdare filo."

Catholic legends tell how in the fifth and seventh centuries

centuries Champagne and Liege were condemned for some sacrilege, to have women with goitres.

The "Life of Saint Cataldus" (6th century) relates "that a man came from transalpine regions attracted to Tarentum by the report of the miraculous cures brought about by his intercession. This man carried at his throat a mass of flesh which hung down at each side like a sack, and which was bigger than the hump of a camel." Fortunately it was cured. The tomb of Saint Eudulus, who lived in the year 664, having been profaned, the following anathema was pronounced by Saint Emibert on the perpetrators; "The authors, and accomplices of this sacrilege, also all their descendants will be punished by lameness; the women will have goitres." In the "Life of Charlemagne" it is stated that in 772 his soldiers caught the goitre on the banks of the Rhine. The gifted Paracelsus, the pioneer of modern chemistry, and the trusted doctor of the poor, considered the relation of goitre to cretinism to be as follows "Quae licet stultis, strumae propria non sint, in stultis tamen frequentissima sunt"; and gave expression to the popular opinion as to their cause, when he wrote "struma oritur ex metallicis et mineralibus aquis." William of Thoco, who died in 1274, narrates many instances of wonderful cures of goitre brought about by pilgrimages taken to the tomb of St. Thomas Aquinas. Agricola (De natul. edum quae effluunt ex terra, 1546) lib ii) notifies the causes which give rise to goitre in Salzburg, the valley of Sonders, and in the

the canton of Zurich. Ambrose Pare in 1561, speaks of the endemic nature of goitre in Savoy; and in an old translation of his works, published in London in 1634, we find the following account of the disease. (Book V cap. 9). "Of the Bronchocele or Rupture of the Throat." "That which the French call Goetra, that the Greeks call Bronchocele, the Latines Gutturis Hernia, that is the Rupture of the Throate. For it is a round tumor of the throate, the matter whereof coming from within outwards, is contained betwene the skin and weagon; it proceeds in women from the same cause as an Aneurisma. But this generall name, of Bronchocele undergoes many differences, for sometimes it retains the nature of Melicencides, other whiles of Steatomas, Atheromas, & Aneurismas, in some there is found a fleshy substance having some small paine; some of these are small, others so great that they seem almost to cover the whole throate; some have a Cyste, or bagge, others have no such thing; all how many so ever they may be, and what end they shall have, may be knowne by their proper signes.

These which shall be cureable, may be opened with an actuall or potentiall cautery, or with an incision knife. Hence if it be possible, let the matter be presently evacuated, but if it cannot be done at once, let it be performed at diverse times, and discussed by fit remedies, and lastly let the ulcer be consolidated and cicatrized."

Reason of the name

The Differences

The Cure

Shakespeare (Tempest, Act. III) makes the trusty old

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old counsellor of Naples reassure his frightened King to partake of the banquet laid out by the strange shapes employed by Prospero, by reminding him,

"When we were boys Who would believe that there were mountaineers, Dew-lapp'd like bulls, whose throats had hanging at their Wallets of flesh?"

Towards the end of the sixteenth and beginning of the seventeenth century references to goitre become more extended and numerous in those countries where it specially occurs; and then it begins to attract the attention of writers in England. Under the name of *struma*, which term was applied by the older writers to all swellings of the neck indiscriminately, many treatises mention it; though most of them consider it as a disease peculiar to Switzerland, and other foreign countries. Its presence in Derbyshire, however, has been long noticed; and it prevails there to such an extent that it has long been called "Derbyshire neck".

Dr. Reeve of Norwich, in *Edin. Medical Journal* (1809), refers to it as a disease rare in Scotland, but common in Norfolk; while Mr Payer, in the same journal (1821), mentions its frequent occurrence in the neighbourhood of Appleby, Westmoreland, a district where to my knowledge goitre is still remarkably common. To Drs. Inglis and Manson we owe most of our information as to its endemic nature in various parts of England; while Dr. Arthur Mitchell found it so common in the southern districts of Scotland, and especially in the valley of the Nith, that he gave it the name of "Nithsdale neck".

Observations have in recent years extended to such a degree that we have several classical works on the subject; and we now know that goitre is so wide in its distribution, that it is no exaggeration to say, that under the most diverse conditions of life, it occurs as an endemic disease amongst nearly every race, and in every clime.

### Goitre in Animals.

Goitre in  
Animals

The question of goitre among animals, appears to have been little studied; and it is difficult to get any literature on the subject. For my present information I am indebted to the works of St. Lager and Baillarger, and also to the kindness of Principals Williams and Walley, whose opinions however, are rather opposed to each other. According to St. Lager the thyroid gland exists in all mammiferous animals, birds, and reptiles. It is wanting among many fish, such as the perch, mackerel, salmon, herring, turbot and sole; but it exists in the carp, sturgeon, eel and shark. In many mammals, as the camel, alpaca, oxylghau, hartbeest, dog, warthog, porcupine, and Kangaroo, the isthmus is wanting, and the two lateral lobes are quite disconnected; whilst in the feline carnivora the isthmus is very small in relation to the size of the lateral lobes (Turner). Naturalists have wrongly applied the term goitre to the enlargement of the throat seen in certain reptiles, such as the chameleon, iguanas, lizards, and some species of toads. Among these the skin of the neck hangs down in projecting folds. The term goitre has also been applied to <sup>the swollen necks of</sup> certain birds, such as the pouter pigeon, the cormorant, the pelican, and

some

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some vultures, all of which have enlargement of the throat quite distinct from the thyroid gland.

Aristotle, Pliny, Galen, and Aetius have remarked that pigs are subject to swellings of the glands of the neck.

Galen expresses himself thus, "Graeci strumas appellant χοιρας α πορισ εν quorum gutture adensi quidam tumores reperiuntur." Paul & Eginus said that these referred to scrofulous tumours, but Pliny in his "Natural History" says positively that pigs are subject to goitre owing to the bad water they drink. Vejece in his "Treatise on the Veterinary Art" speaks of scrofulous tumours of the parotid, and goitres which are seen sometimes in mares. Goitre has been seen in dogs and pigs in many parts of Switzerland by various observers. It has been noticed in sheep and cattle in Switzerland, Wurtemberg, the valley of the Danube, in the Himalayas, in Siberia, Brazil, and the United States. Rudolf and Rupp have seen hyaenas goitrous. Gustave Ruddle has seen in Siberia, near the Chinese frontiers, antelopes with goitre. He thought at first they formed a new species and called it *Antelope gutturosa*; but as he only saw them in districts where goitre also affected man, and not in those where it was absent, he came to the conclusion it was pathological. In Russia, Central America, <sup>the</sup> United States, and in the Canton of Geneva, horses have been seen goitrous. M. Baillarger in a paper read before the French Academy of Sciences (*Sur le goitre des anim.* 1862 - *Compte r. ac. des sc.*) gives the result of his researches undertaken in the departments of Savoy and of the Isère. In many localities in Maurienne, Saint

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Saint Jean, and St. Michael, he found among mules hypertrophy of the thyroid gland in much greater proportion than among man. In a stable of Modane out of 20 mules 19 had goitre. In the department of Isere out of 30 mules employed in the mining works, no less than 23 had goitre. In the normal state, the thyroid gland of mules is about the size of a chestnut, but in these cases it had attained the size of a hen's or turkey's egg. As a rule the goitres were very movable and caused no pain, but in three cases they compressed the trachea, and produced breathlessness during strong muscular effort, causing the animals to kick. The hypertrophy affected both lobes of the gland or one only, and in the latter case more often the left. Dr. Collevard Dr. Niepce confirmed these observations. The existence among mules of a special tendency to hypertrophy of the thyroid seems to be placed beyond doubt, and does not exist to the same degree among other domestic animals. Horses are often attacked with goitre, but the proportion is much less. In certain conditions, however, the frequency is very great. At St. Jean de Maurienne 4 out of 4 horses of the gendarmes were affected with goitre after a residence of less than two years in the place. This case was all the more remarkable for these horses were well-fed, carefully groomed, and kept in a well-lighted, and well-ventilated stable. After horses, dogs are most liable to hypertrophy of the thyroid. Finally, one finds it in cats, cows, sheep, goats, and pigs. It is impossible not to attach goitre in animals to the same endemic causes which produce it

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it in man. Among a great number of these animals in Swiss localities, it was rare to find a thyroid of normal size. Professors of veterinary medicine have considered goitre excessively rare among animals. I believe this rarity only exists in healthy localities, but it is otherwise where goitre and cretinism are endemic. It is difficult to account for its special prevalence among mules, but it is interesting to note its occurrence among sterile animals when sterility is one of the characters of cretinism. In regard to cretinism few observations have been made. Ragnard has seen in goitrous dogs a stupidity comparable to idiocy, and Rougier has observed the same degradation in dogs and horses. St. Leger asked several persons who possessed goitrous animals in Savoy, Switzerland, and Piedmont, and all have assured him that the hair becomes rough and coarse, the voice hoarse, and the memory obliterated. They become lazy, and finally reach a state of torpor which it is quite justifiable to compare to cretinism. Alibert says that sheep and calves not unfrequently die from the effects of goitre.

Observers in India confirm the fact that goitre affects animals in those countries where it is endemic. Thus Mr. Greenhow (*Indian Annals of Med. Science* xii) says, "At Bissaurpore, a village on the Purjo about 12 miles distant from Secroa, dogs and other animals are affected with goitre". Mr. Bramley (*Calcutta Med. Trans.*, 1833) noticed the same curious circumstance in Nepaul, for he mentions "on one occasion, a goat brought forth a kid with a goitre as large as its head." Puppies of a month

old

old, bred from English dogs, are very frequently affected by it, as are also lambs. In 1824 he observed this tumour in camels at Purneah, and crows are likewise said to be affected with it at the same place. Dr. Campbell (Calcutta Med. Trans. 1835) has seen horses and lambs goitreous on the borders of Gunduk, and also many animals in Nepaul, among others buffaloes. Dr. Mac Clelland reports its occurrence among dogs and cats in the Himalayas, while Mr. Brett in his "Surgery of India", says, "Princhocele is congenital in animals in Nepaul; almost the moment the animal is born it expires," a fact noted also by Dr. Campbell.

Principal Walley of the Dick's Veterinary College, Edin., is of opinion that goitre in animals is an extremely rare disease; and that the cases reported have been generally mistaken for struma. In horses especially, it seldom occurs, and these also are very free from struma. The only typical case of goitre he has seen, was in a horse belonging to the late Emperor Napoleon which was brought by Mr. Under M.P. for Wick. Owing to the enlarged thyroid the animal was afflicted with "roaring", so its removal was attempted. During the operation, however, the horse in its struggles broke its back, and had to be killed. Mr. Walley thinks that true cases of goitre do occur among pigs, and these of all domestic animals are most commonly affected with scrofula. He considers it rare in dogs and cattle. I have never seen a case of goitre in an animal, but it is interesting to note that in Cumberland, where it exists as an endemic disease among man, that cattle are notoriously subject to scrofulous enlargements

enlargements of the glands of the worst type.  
Principal Williams of the New Veterinary College, Edinb,  
informs me that goitre is prevalent in horses, sheep, and  
cattle in Derbyshire, and some parts of Wales, where  
magnesian limestone prevails; but that he has seen  
it pretty common in places quite independent of this.  
In his practice round about Edinburgh he finds it  
occasionally occurring in young foals, which fact he  
associates with bad ventilation. It is sometimes con-  
genital; in one case a mare of his own gave birth to  
a foal that was goitrous. It is more rare among dogs,  
though it sometimes affects young ones, disappearing as  
they grow older or under treatment. About twelve years  
ago an epidemic of it affected Lord Polwarth's lambs at  
Mestoun, Berwickshire. In his "Principles and Practice  
of Veterinary Surgery" he writes thus; "Cysts in the thyroid  
body constitute *Benchocele*: they are said to be caused  
by the water which the animals drink, and that if  
the water be changed they will disappear. But I have  
some doubt as to the truth of the statement that  
*Benchocele* is solely caused by the presence of magnesian  
lime in the water, as I have seen well marked cases  
in young foals and in large flocks of lambs, where this  
could not possibly be the cause. Doubtless it is found  
most abundantly on the magnesian limestone formations;  
but it cannot be denied that low situations, or a damp  
atmosphere upon elevated situations, will act as  
causes of *benchocele*." Both professors have several  
times seen the thyroid completely destroyed by  
inflammation

inflammation and suppuration, and the animal remain afterwards perfectly well. Neither of them have had any experience in regard to removal of the gland, as cases necessitating this operation are hardly ever met with.

Artificial Production of Goitre.

"Artificial Production - Various experiments have been made upon Goitre in animals." animals with the view of artificially producing goitre, but without any trustworthy results.

According to St. Lager, both ~~and~~ he and Pailkerger administered preparations containing carbonate of lime and magnesia to dogs for a period of six months, without any enlargement of the thyroid gland ensuing.

The same writer gave dogs and guinea-pigs sulphuret and sulphate of iron and other metallic salts for some months, but with negative results. One day, however, in his own house he caught a mouse, and to his astonishment it had a goitre, which he thought might have been caused by its eating cinders of a certain coal which contained sulphuret of iron. Accordingly he experimented on a dozen mice, giving them sulphuret and sulphate of iron, baryta, fluorine, and natural bitumen. At the end of three months, three only had enlargement of the thyroid perceptible both to sight and touch. These three had added to their food sulphuret and sulphate of iron. Many doctors of Lyons are reported to have seen these animals, but the experiments can hardly be said to be reliable, or at all conclusive. The salts of iron have been long administered

administered in medicine; and for the last few years not only the sulphate but the sulphide of iron have been frequently given in the treatment of Anaemia with none other than a beneficial effect. In Exophthalmic Goitre however, iron is said to be of little or no benefit, and is even held by some to be injurious.

Geographical Distribution.

*Geographical Distribution of Goitre* Though Switzerland is perhaps the one district in Europe where goitre is most common, yet it is by no means confined to that country. I have already quoted ancient authors to show <sup>that</sup> it occurred in Lombardy, Thrace, and among the Apennines in their day. More modern observers have noted its existence amidst mountain ranges so distant, as the Urals and the Pyrenees, in countries so remote, as Norway and Italy, Belgium and Turkey, Russia and France; while Germany and Austria, and other intervening states are far from being exempt from this widespread disease. It is not to Europe, however, that goitre is limited, for it affects the New World and other parts of the old. In Asia and Africa travellers have described the strange swellings of the throat with which many of the inhabitants are afflicted, and by them also we are told, that the disease which is common in Canada, and endemic in the Rocky Mountains, is still more prevalent in Brazil and Peru among the lofty chains of the Cordilleras and Andes. Occurring alike on the icy steppes of Siberia and the burning plains of India, common at heights thousands of feet above the level of the sea, goitre also attacks the

the inhabitants of ocean-girt islands, and equally affects the mild-tempered Singhalese, and the fierce Ayaks of Borneo, Sumatra, and Java. It is interesting to read the accounts of the travellers themselves, and a few of them I shall narrate here.

As far back as the beginning of the 13<sup>th</sup> century Marco Polo, the famous Venetian voyager, writes in chapter XXXV of his wonderful account of his travels, as follows; "Yarcan is a province five days journey in extent. The people follow the Law of Mahomet, but there are also Nestorian and Jacobite Christians. They are subject to the same Prince that I mentioned, the great Khan's nephew. They have plenty of everything, particularly of cotton. The inhabitants are also great craftsmen, but a large proportion of them have swollen legs and great crops at the throat, which arises from some quality in their drinking water." (Col. Yule's translation) 1841.

Thomas Gage (New Survey of the West Indies, 1648) in his journey from the city of Chiapa to Guatemala describes his sojourn at a place called Sacapula, thus: "The more I hastened to that seeming Paradise, the more did the twinkling and roaring streams invite me down the hill; which I had no sooner descended, but I found in an harbour by the water side the Prior of Sacapula himself, with a good train of Indians waiting for me with a cup of chocolate. At the first sight I was a little daunted to behold the Prior, who looked most fearfully with a bladder from his throat swelled almost round his neck, which hung over his shoulders and breast, and stayed up his chin, and lifted up his head so, that he could scarce look any whither but

but up to heaven. In our discourse he told me that disease had been upon him at least ten years, and that the water of the river had caused it to him, and in many others of that town. This made me now as much out of love with the river, as above the hill I had liked the goodly sight of it, and therefore resolved not to stay so long in that place, as I had thought, lest the waters should make me for all my life as they had done this Prio, whose name was Fryer John de la Cruz, a Biscaine borne, and like some of that nation) a little troubled with the pimples, but a good hearted man, humble, and well-beloved all over the country both by Spaniards and Indians. When I came to the Towne I discovered many men and women with bladders in their throates like the Jewe Prio, which made mee almost unwilling to drink there any chocolate made with that water, or eat anything dressed with it; untill the Prio, did much incourage mee, and told mee that it did not hurt all but onely some, and those who did drink it cold."

Mungo Park (Travels in the interior of Africa, 1799) writing of the diseases of the Mandingoes, who inhabit the territory around the banks of the Gambia, mentions that "Goitres are very common in some parts of Bambarra, and that the Negroes attribute this disease to the water taken from wells."

Mr. Marsden in his "History of Sumatra" (1811) says, "The natives of the hills through the whole extent of the island are subject to those monstrous wens from the throat, which have been observed of the Ballaisans, and the inhabitants of other mountainous districts of Europe. It has been usual to

to attribute this affection to the badness, thawed state, mineral quality, or other peculiarity of the waters; many skilful men having applied themselves to the investigation of the subject. My experience enables me to pronounce without hesitation, that the disorder is immediately connected with the hilliness of the country, and of course if the circumstances of the water they use contribute thereto, it must only be so far as the nature of the water is affected by the inequality or height of the land. But in Sumatra neither snow nor other congelation is ever produced, which militates against the most plausible conjecture that has been admitted concerning the Alpine goitres. From every research I have reason to conclude that the complaint is owing among the Sumatrans to the fogginess of the air in the vallies between the high mountains, where, and not on the summits, the natives of these parts reside. The cold morning mists may also produce tumours in the throat. The Sumatrans do not appear to attempt any remedy for it, the wens being consistent with the highest health in other respects."

In Warden's "Account of the United States" (1820) it is stated that Dr. Barton observed many cases of goitre in the Onondago valley in the neighbourhood of the Mohawk river (New York State). In Pennsylvania goitre is said to prevail to a slight degree in the neighbourhood of Pittsburg. In Ohio Dr. Forsyth observes that this disease is common and endemic at the confluence of the Alleghany, and Monongabela rivers."

Dr. Smith (Edin. Med. Journal 1842) writing on the "Diseases of

of Peru," refers to goitre as follows: "The goitre is a disease principally confined to the central valleys of the Andes. The coto, goitre, or wen, which appears on the fore part of the neck sometimes attains a very large size, and affects individuals of the white race, especially fair-complexioned females. Women of Indian or mestizo race are less liable to it. Indeed I do not recollect ever to have seen an Indian, either male or female affected with it. In Conchucos we are told the disease is not uncommon, though not so frequent perhaps as in the vale of Huancuco; but in either district it shows itself with preference in the more delicate organization of families of European descent. Those affected by this disease are sometimes dumb; but in general the faculty of speech is not affected, and the mind is perfectly sound and unimpaired. Regarding the causes which produce goitre in Peru, I can offer nothing satisfactory; only I may remark that it is certainly not a disease of the snowy range, but rather of the temperate and warm valleys in which the natives are found to refer the origin of the disease to their using turbid water during a considerable part of the year when it snows and rains upon the loftier mountains."

Bennet, in his "Ceylon and its Capabilities," (1843) remarks; "The Swiss complaint goitre is by no means uncommon at Galle, but the cause must be very different from that to which it is attributed in Switzerland, namely the use of snow-water. I have never seen a European or native male afflicted with it, although it is not uncommon with native females, whose guttural protuberance renders

their

their appearance very disgusting. All Europeans who reside in the fort have a prejudice against the water from springs."

Sir George Simpson, in his "Narrative of a journey round the World," (1847) writes, "As we advanced on our voyage through Siberia, that very disagreeable complaint, the goitre became more and more prevalent. Other maladies also of the blood or general system were very common. Noses in particular appeared to have been almost decimated."

Dr. Stratton (Edin. Med. Journ., 1848) says, in his article "On the Diseases of the North American Indians," he has not seen goitre among them in Canada in the neighbourhood of Lake Huron, although it prevailed among other races in the same neighbourhood." I am informed by a gentleman long resident in the country, that at the present day goitre is very prevalent among the French Canadians of Lower Canada, between Quebec and Montreal, on a soil the geological nature of which is blue limestone.

Special Distribution in England and Scotland.

Goitre  
in England

In Derbyshire Goitre prevails to such an extent that it is proverbially known as "Derbyshire neck"; but it is by no means uncommon elsewhere. Dr. Manson has noted its frequency at Nottingham, while Dr. Inglis (Treatise on Ben Chocals) <sup>(1838)</sup> shows how common it is in various parts of Yorkshire. Mr. Bayers refers to its occurrence at Appleby; and in other parts of Westmoreland I can testify to its unusual prevalence. In Keswick and the surrounding country Dr. Black informs me that many families are affected with goitre, while in the neighbourhood of Penrith in one year I have

seen

seen at least 30 cases, of several of which I have full notes. I am told it occurs quite as commonly in the practice of the other medical men of the town. According to Dr Reid (Edin. Med. Journ. 1836) it is very common in Buckinghamshire, and is far more frequent in London and its vicinity than is generally supposed. In Hampshire, Norfolk, Sussex, Surrey, Monmouth, Somerset, in some parts of Northumberland and Cumberland, and <sup>in</sup> the hilly parts of Staffordshire, goitre is reported to exist to such an extent as to be fairly considered an endemic disease. In Wales it is by no means unfrequently seen, and Mr Holbrook says that in that country "it does not appear that those who reside in valleys are more subject to it than those who live in elevated situations."

Goitre in Scotland

Goitre has been usually considered in Scotland to be a very rare disease; but I have no doubt that careful observations would show that it is much more common than is generally supposed. Dr Reeve (Edin. Med. J. 1809) refers to its being seldom met with in Scotland. Dr Marshall (Edin. Med. J. 1832) remarks that it is said to occur in Perthshire. Dr Reid in the same journal (1836) says, "I have never met with the complaint in the hilly tracts of Scotland, though it is said that in a small sheltered village in the Isle of Arran, it, as well as Cretinism, is to be found." St. Lager refers to this fact, mentioning that it occurs on the east side of the island, notably towards Shiskim. Dr Inglis (Treatise of English Prenchocels) 1838, states, on the authority of reports from medical brethren, that in the North and West of Scotland, goitre is almost unknown

unknown; and that personal observation convinces him that in the South of Scotland it is hardly ever met with.

At Penicuik, however, he saw 12 cases, and at Dollar a few more, but he concluded that it was confined to no shire in particular. To Dr. Arthur Mitchell we are indebted for the following information: (Brit. & For. Med. Review, 1862)

"Goitre exists nowhere in Scotland as an endemic disease except in the Southern Counties. The extent of the district which it occupies may be laid down as including the greater part of Roxburgh, the upper parts of Selkirk and Peebles, the eastern parts of Wyrshire, where it touches Lanark and Dumfries, the upper districts of Lanark, the whole of Kirkcudbright and Dumfries, the west of Berwick, and the East Parishes of Wigton. The endemicity reaches a maximum in the Upper Valley of the Nith, and hence the term applied "Nithsdale neck." From personal observation I can testify to its occurrence as an endemic disease at Wishaw, Lanarkshire, where in a period of five months I collected 12 cases, which were published in the Edin. Medical Journal for July, 1883, with some remarks as to their probable causation. In the August following I saw 4 or 5 additional cases; and Dr. Cowan informs me that both he and his assistant still occasionally meet with goitrous patients in their practice. At Peebles also, I have seen many cases of goitre, and Dr. Tod who has several times acted as locum tenens for Dr. Ferguson of that town, tells me it is unusually prevalent in the surrounding country. In Fife I have only seen one case, and I have notes of two cases taken by Dr. Thomson when acting

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as *Locum tenens* for about 10 days at Penicuik. In regard to other Counties I have no knowledge; but I think the above evidence shows that it is perfectly justifiable to maintain that Goitre exists in Scotland as a truly endemic disease.

### Geological Distribution of Goitre.

I think it will not be out of place to treat of this in a general way here, though the geological condition of the soil must be specially considered in relation to the probable cause of the disease. For our special knowledge of the geology of those countries where goitre is endemic, we are indebted to the observations of Dr. McClelland in India, Dr. Inglis and Prof. Lebour of Newcastle in England, and to the carefully compiled statistics of St. Layer, whose work specially details the geology of all affected districts.

The general conclusions of McClelland and Inglis in India and England respectively, show that in primitive districts where limestone does not exist as a principal rock formation goitre is not found, or if found it is in the proportion of 1 to 500 of the population; whilst in transition districts where limestone prevails one seventh of the whole population is affected with goitre. Dr. St. Layer is of opinion that wherever goitre and cretinism are endemic the soil will always be found to contain iron pyrites; Copper pyrites, galena, and barvta are also frequently found. This view is supported by Professor Lebour, of Newcastle, the results of whose observations in England are to be found in the "Medical Times and Gazette" for 1881, vol. I.

"St. Lager's statistics show that goitre has a preference for calcareous strata; but on closer inspection one sees that several of these are free from endemic goitre, while it prevails extensively on geological formations where lime in any form is absent. But the point in which the goitrous and non-goitrous limestones differ, and in which the former agree with the few non-calcareous but goitrous formations, seems to be the presence, in all places where goitre is seen, of "pyrites", and its absence from all those where it is not. In England goitre is absent from the alluvial and tertiary formations generally, and nearly so from the oolites and lias, rare on Chalk, but present on the gault and greensand, as well as the wealden, in all of which much pyrites is found. On the new red sandstone it is endemic in several places as Creditor in Devonshire, where the soil is highly ferruginous. Its headquarters however, may be said to be the vast beds of grits, shales, and limestones forming the Carboniferous rocks in Cumberland, Derbyshire, and Foredale in Yorkshire, but to this there are some remarkable exceptions. At South Shields and Sunderland where the water companies draw their supply from wells sunk deep into the magnesian limestone, goitre is as unknown as in London. The conclusion seems irresistible that it is not in limestones per se, but in certain "combinations of ferruginous and earthy salts", most frequently found in such formations, though not absolutely limited to them, that we must seek for the real cause of goitre."

## Epidemic Goitre

That goitre, usually of such slow and gradual growth, may occasionally become acute and epidemic in those countries where it exists as an endemic disease, seems to be beyond doubt. Curiously it assumes epidemic proportions chiefly among the soldiers of garrisons, but has also been observed to attack the pupils of boarding schools, and communities of all sorts. The most remarkable, as it is the most ancient outbreak of epidemic goitre recorded, is that which affected the sailors of Captain Cook's expedition whilst voyaging in the open seas. In Forster's "Voyage round the World" p. 107 (1777) we find the following account of it. "January 1773 (Saturday 9<sup>th</sup>)  
 "On the 9<sup>th</sup> in the morning, we saw a large island of ice, surrounded with many small broken pieces, and the weather being moderate we brought to, hoisted out the boats, and sent them to take up as much of the small ice as they could. We piled up the lumps on the quarter-deck, packed them into casks, and after dinner melted them in the coppers, and obtained about thirty days water in the course of this day, and in the latitude of  $61^{\circ}36'$  South. Two days afterwards we had another opportunity of supplying our sloops with ice, which our people performed with great alacrity notwithstanding the excoriation of their hands, which the cold and the sharpness of the sea produced. The water we melted out of this ice was perfectly fresh, and had a purer taste than any which we had on board. If any fault could be found with it,

it, it was that the fixed air was expelled from it, by which means almost every one who used it was affected with swellings in the glands of the throat. Water melted from snow or ice is known always to have this effect, and the constant use of it in mountainous countries produce these enormous wens or goitres, which are common among Alpine nations, and are become so habitual that they are looked upon as ornamental." Parry, Ross, Franklin, and other Arctic voyagers have during their long sojourns in the Polar seas, had no other drink than melted ice, and have never seen goitre develop among their companions. St. Lager thinks it possible that the water may have been contaminated by some impurity from the casks, or more likely from the metal of the caldrons in which the ice was melted. The same author records numerous instances of outbreaks of goitre, the most instructive of which are the following.

"Thouvenal wrote in 1799, "I have seen in the space of some days some regiments almost entirely attacked by epidemic goitre. I am assured that the cause was in the quality of the air to the exclusion of the water. I have often seen in the garrisons of the Rhine during stormy springs and autumns, paroxysmal fevers alternate or combine with acute goitre, and these also with a form of periodic ophthalmia. I have reason to believe that these three maladies arise from the same cause." In 1815 Fodéré stated that more than a third of the pupils of the college of Strasbourg had

had goitre. This establishment is situated in the healthiest and most elevated part of the town, but in consequence of the vine-blight wine became scarce and the pupils drank only water. Fodéré adds that it is rare that the soldiers who come to garrison Strasburg do not become goitrous. Coindet records the history of a regiment of young soldiers, who almost all became goitrous a short time after their arrival at Geneva. They were sent to another barracks and soon after the use of a new water the goitres disappeared. Morel reports that the 8<sup>th</sup> regiment of the line in garrison at Rim in well-ventilated barracks, presented from the 27<sup>th</sup> April to the 6<sup>th</sup> of October, 22 cases of goitre. At the same time there were treated in the garrison of Clermont 400 goitres. The soldiers who occupied the barracks at the school, situated in the highest and healthiest part of the town were more affected than those stationed in other parts. The lancers less well lodged, only presented a few cases because they drank wine; the foot-soldiers drank only water. Fleury noted, in 1833, the frequency of swelling of the thyroid gland among young girls, strangers who came to the schools and convents at Clermont; and this occurrence has been observed also at Strasburg, Geneva, and Lausanne." Zillner (*Idiocy, with Especial Reference to Bulbous etc, Brit. & For. M.R. 1861*.) attempts to show a connexion between marsh fever and acute affections of the thyroid. The history of epidemics furnishes him with

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with proofs. Thus in reference to Salzburg, it is recorded that "between August and October, 1847, acute swelling of the thyroid appeared along with intermitting fever; and in October 1849, typhus, intermitting fever, erysipelas, swelling of the thyroid, and scarlatina." It is observed too, that conditions which lead to the manifestation of acute goitre, often also lead to greater enlargements in chronic cases, although, as a rule, chronic goitres increase in winter and attain their maximum in spring. Acute goitre presents itself usually in warm weather or summer." For this reason M. Nivet gave it the name of "summer" goitre. In the "Lancet" for 1873 it is stated that "an epidemic swelling of the thyroid gland occurred at St Etienne where 200 soldiers of the line were suffering, and all means to combat the disease had failed. It had also extended to another regiment and to a battalion of cavalry. What is very singular is that not one individual belonging to the civil population in the neighbourhood had contracted the disease". Certain wells in Savoy have the repute of producing rapid swelling of the neck, and on this account the young men drink of their waters in order to avoid conscription. In Quain's "Dictionary of Medicine" (Article, Goitre) "epidemics in soldiers are said to result from forced marches through goitrous districts combined with scarcity of food. In such districts the practice of carrying loads on the head seem largely to increase the ratio of the disease." Some observers think that acute goitre is caused by drinking iced water when  
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the body is in a state of <sup>free</sup> perspiration; but if this were the sole cause, it would occur in other places than those where the disease is endemic. It also occurs at seasons of the year when iced water is not usually drunk. Others ascribe it to sudden variations of temperature, and to the habit of soldiers wearing tight collars, during the heat of summer. According to Henri Larrey those most liable to become affected were soldiers who had been peasants accustomed to have their necks free, and all at once subjected to the constriction of a stiff and tight collar. None of these theories explain how epidemics of goitre occur only in towns where ordinary goitre is endemic, or in those surrounded by goitrous districts, and not in others. I think with St. Leger that one might call these sorts of epidemics by the name of "accidentally endemic", and that the use of certain waters is the true exciting cause of their production. The outbreak on Captain Cook's vessels seems to be the only true case of epidemic goitre properly so called, occurring wholly apart from endemic influences.

### Causation of Goitre

In seeking to determine the cause or causes of a disease with a distribution so world-wide, and which occurs under conditions so varied and even contradictory, we enter upon an extremely difficult, and well-nigh impossible task.

When we learn that goitre is found alike on mountains and on plains; in moist localities and dry; on soils

containing

containing much lime, and in those in which it does not  
 exist; in places where nothing but snow-water is used, and  
 in places where snow was never seen; in deep, dark, secluded  
 valleys and on mountain heights of 10, to 15,000 feet above the  
 sea; amidst meteorological surroundings so different as are  
 found in tropical Africa and India, insular Ceylon, temper-  
 ate Europe & America, and icy Siberia; amongst native races  
 living in natural freedom and civilized ones deteriorated  
 by vice, poverty, bad hygiene, and intermarriage, we are  
 inclined to say with Fodéré "that there has resulted  
 from the diverse opinions emitted infinitely more obscurity  
 than light, more false theories than true ones likely to  
 benefit the disease which has called them forth." It might  
 be said that since goitre is so universally distributed over  
 the globe, while at the same time it is of such an endemic  
 character, the cause of it might have been expected long  
 ere now to have been discovered. Nevertheless the contrary  
 is the fact, so much so that as recently as December last  
 Mr. Victor Horsley in his "Brown Lectures" said, "whether the  
 endemic disease of the gland is primarily produced by  
 unwholesome water, food, or air, still remains a mystery".  
 To throw light on this mystery I have no new theory to  
 offer, but simply a plain statement of facts and cases  
 to show that, in two places so very different in every res-  
 pect as Nishaw and Penrith, ~~that~~ goitre prevails to an  
 extent hitherto little known; and by applying to these  
 districts in detail the causes said to produce goitre  
 elsewhere, I hope to arrive at a satisfactory explanation  
 as to its occurrence. We are most likely to reach this  
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by first carefully considering the various theories brought forward by different observers, as to the precise nature of the cause, and in doing so I will, as far as possible give their opinions and reasons for them in their own words. This must involve a considerable amount of perhaps wearisome quotation; but the interest and importance of the subject will, I trust, prove sufficient justification. If any proof were needed to show that goitre is truly endemic - prevalent in certain localities and scarcely occurring elsewhere, it would be found in the frequently - noted and well-authenticated fact, that persons previously well, going to live in these localities often become affected with the complaint; and goitrous persons leaving these localities, become perfectly free from the affection by mere change of residence. For the production of an endemic disease certain special and local causes are necessary, and the same cause, or causes, must be supposed to act upon all individuals who are subject to it. It is natural then to think that the physical circumstances of the places selected by the disease, should have something to do with its production; and accordingly in different countries these have been carefully studied. There is hardly one theory, however, that has yet been adduced, though supported by numerous facts, but is met by a corresponding body of evidence to prove that the disease may exist, and that to a great extent, completely independent of the very cause brought forward. To sift this contradictory evidence is the task we now set ourselves.

It is only necessary to mention some of the many causes assigned for the production of goitre, to show how vague and unsatisfactory they are. Valentini supposes the disease to be more common in women than men, simply because women more frequently have the neck uncovered. It has been affirmed that young females who have taken the veil in Catholic countries have lost their goitres in consequence of the change then made in their costume; and a medical man in Guatemala asserts that the same infirmity has sensibly diminished among the men in that part of the world since cravats became fashionable there. (Principles & Practice of Physic, Watson p. 806 vol. I). On the other hand, goitre has been said to result from constriction of the neck by stiff and tight collars, and to disappear entirely when the constriction is withdrawn. A more likely reason for its production is the carrying of heavy weights on the head and shoulders, and in proof of this is cited its greater prevalence in mountainous countries, where the inhabitants are accustomed to carry heavy weights up and down the hills. Violent efforts of any kind such as coughing, vomiting, straining, laborious parturition, and sudden exertion, have been blamed for producing goitrous swellings; as also have been strong local irritations such as blows. These take place in all countries, in those where goitre is never found as well as in those where it is endemic, though in the latter they may predispose to, & aggravate the disease when the tendency exists.

Deficiency of nourishment and the use of certain  
articles

articles of diet are held by some to give rise to Goitre. Dr Good in his "Study of Medicine," (vol. V p. 416) states that on a visit to Derbyshire he found a much larger number of the poor affected with this disease than he had ever seen before while the rich escaped; and he found, also, that by far the greater part of those who were labouring under it were not only exposed to all the ordinary evils of poverty, but derived their chief diet from that indigestible and innutritive substance the Derbyshire "paten cake," which is probably the chief cause of all the glandular and paralytic enlargements which are so common to that quarter." If this theory has any truth in it, it is marvellous how Scotland enjoys such immunity from so troublesome a disease. Milk and vegetable food have been thought by many, including Haller, to aid in the production of goitre, while a few blame pork and fat meat. Alcoholism, opiumism, and sexual excess have likewise been mentioned as causes of goitre; but these are indulged in to great extent where goitre is entirely unknown. With a much greater semblance of truth, and with greater authority, it has been urged, that in poverty and defective hygiene, overcrowding and intermarriage, the true causes of goitre are to be found; still these, though they may add to its intensity, cannot explain its endemic nature. In all large towns are to be found these miseries to the profoundest extent, but, whatever other diseases may spring from them, I am unaware that goitre ever results.

I have as yet purposely refrained from referring to the hereditary nature of goitre, or its connection with menstruation, pregnancy, and faulty uterine functions, a connection which I consider has been too little insisted on, and which is of the greatest importance. On the histories of my Penrith cases were taken with a view to clearly bringing out and enforcing this connection, I prefer to treat of it fully after these have been detailed. Some morbific quality of the "Air" has been long suspected by many observers to be the true cause of goitre; but what that quality is, has given rise to much difference of opinion. Air cold and dry, air hot and moist, air stagnant, air too little oxygenated, air too much oxygenated, air charged with sulphurous vapours, the air of marshes, air containing a special miasma, the action of cold air upon the neck, sudden changes of temperature, and some special thermal or electrical conditions of the atmosphere, have all been suggested as causes likely to produce goitre. A number of observers hold the view that the disease results, not from any one of the above causes, but from a combination of causes, namely a close, hot, moist atmosphere combined with bad nourishment, unhealthy dwellings, absence of sunshine and ventilation, and poverty. This was the opinion of the Sardinian Commission appointed in 1850 to investigate the causes of goitre, and has received support from such observers as Gaultier, Mr. Bramley, Mayer, and Niepce. The two "atmospheric theories," however, which have received the strongest support by writers who themselves have

have specially investigated the subject, <sup>in countries</sup> where goitre is endemic, are those which maintain that the cause is to be found in a hot, moist, stagnating atmosphere, or in malaria.

In support of the first of these we have the evidence of Fodéré, De Saussure, and Drs. Clark, Reeve, Reid, and Crawford.

Fodéré says, "Goitre is a malady peculiar to the inhabitants of the low parts of the valleys, which lie at the foot of the great mountains dividing the countries of Europe, and which are particularly exposed to the south and west winds. It affects equally those who drink good water, and those who drink bad; those who eat good food, and those who eat the worst possible; and since it attacks healthy persons who come to a district there must be some particular circumstances which produce it. "C'est dans cet état permanent de chaleur et d'humidité de l'atmosphère des vallées, que je pense que peut résider la cause éloignée du goitre et du crétinisme." He even goes the length of asserting that "excess of humidity of the atmosphere is in direct proportion to the number of goitrous persons." (Traité du Goitre et du Crétinisme).

M. de Saussure attributes the production of goitre principally to the concentrated heat of the climate and stagnation of the air. He is of opinion that it does not occur at a height greater than 4000 feet, and that the peasants residing in the lower valleys of the Alps always present a greater apathy and deficiency of intel-lect,

"Voyages dans le  
Alpes." chap. 48  
vol. II p. 480.

as well as want of expression in the features, than those who reside on the hills above them" (Edin. Med. Journal, 1836).

Dr. Clark, in his "Medical Notes on Climate and Disease", writes, "In the upper part of the Vallais, which is more elevated, dry, and open, goitres are rare; but in the lower, more confined, and humid situations, half of the population appear goitrous and Cretins are numerous."

Dr. Reeve agrees with Saussure that goitre is due to the bad quality of the air and the food, the neglect of moral education, and other evils attendant upon poverty." (Edin. Medical Journal, 1809).

Dr. Reid considers that "Confined and deleterious air may be, especially when combined with humidity, an active agent in producing endemic goitre." (Ed. Med. J. 1836).

Dr. Crawford thinks it possible that "most frequently goitre is the offspring of a close, stagnant atmosphere, impregnated with moisture and the effluvia of the subjacent soil." (Cyclopaedia of Practical Medicine Vol I p. 327).

In direct opposition to the above opinions are the observations of Raymond, Humboldt, McClelland, Bramley and St. Leger.

Raymond informs us that "goitre and cretinism exist among the Pyrenees even in greater extent and degree than in the Vallais, and under circumstances very different: namely in "open, well-watered, and well ventilated vallies." (Cyclopaed. of Pract. Medicine).

Humboldt states facts which show that the prevalence of goitre does not depend on any particular configuration

of the surface of the earth, nor on any peculiar condition of the atmosphere. In South America goitre is met with both in the Upper and the Lower course of the Magdalen river; and in the high country of Boyota, 6000 feet above the bed of the stream. The first of these regions is a thick forest; while the second and third present a soil destitute of vegetation. The first and third are exceedingly damp; the second peculiarly dry. In the first the air is stagnant; in the second and third the winds are impetuous. In the first two the thermometer keeps up all the year at 22 or 23 degrees of the Centigrade scale; in the third it ranges between 4 degrees and 14." (Holmes's System of Surgery, Art. Prunchocele)

McClelland says, "When engaged in collecting information I was struck with the frequency of goitre in one portion of the district; while the other was almost perfectly exempt from the complaint. The Alpine characters of the province are the same in every part, the inhabitants all belong to the same tribes of Hindoos, and are subject to fewer irregularities in their mode of life than any other people in the world." (Medical Topography of Bengal and N. W. Provinces, 1859).

Bramley has witnessed the prevalence of goitre amongst families who reside on or near the summits of mountains not less than 7000 feet above the level of the sea, and amongst the highest habitable points of the Himalayan range. (Calcutta Medical Transactions vol. VI, 1833).

St. Leger asserts that goitre is not found in many of the worst ventilated Swiss valleys, and is common

in some of the healthiest ("Du Cretinisme" p. 152). Mountain gorges are not the chief seat of the disease, as it occurs on the plains of the St. Lawrence, Danube, Ganges and Po, and in the flat country of Piedmont, Alsace, & Ceylon. (op. cit p. 125). Climate and electric conditions can have no effect on a disease which is found alike in the Sahara, Java, Ceylon, Canada, and Siberia.

I think in the face of such contradictory evidence that no particular atmosphere or climate can be safely assumed to be the main cause of goitre.

### Malarial Theory of Goitre

Among those who assign a Malarious or Miasmatic origin to goitre are Zillner, Virchow, Billroth, Koerberle, Morel, Fayrer, and Macnamara.

These hold that Goitre is due to some aerial miasm, either ordinary malaria or some independent poison.

Zillner has attempted to show a connexion between marsh fever and acute affections of the thyroid, as has also Virchow. In proof of this he points to the history of epidemics, and to the fact that "Acute goitre presents itself usually in warm weather or summer, and so also do marsh fever, erysipelas &c. Malarious influences, according to Zillner and Virchow, are especially active in the production of cretinism. It is possible however, that they are not identical with marsh miasm, which may exist in great force where goitre and cretinism are absent; but it is certain that many of the conditions necessary for originating the one, are required for the other. Salzburg, where goitre is so common, is surrounded with  
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with all the conditions necessary for originating the marsh miasm. Intermittent fever is an endemic disease, as are also enlargements of the spleen, and the other allied ailments" (Brit. & Foreign M.C. Review Vol 2, 1861).

Billroth holds that "goitre is a chronic miasmatic affection endemic in certain places, and its strict confinement to certain places lends colour to this view." (British Medical Journal, 1881).

Morel believes in the existence of a special miasm which he calls "l'intoxication prétineuse". He holds that goitre and cretinism are a degeneration of type due to the action of a "special intoxicant" acting upon the cerebro-spinal system, generated either by the air breathed, or the kind of food and water taken, and which appears to exist chiefly on a soil of magnesian limestone, though it is impossible to affirm that it is not found on soils of a different geological constitution." (Traité Des Dégénérescences" p. 670)

Sir Joseph Fayrer writes, "I have long been under the impression that the malaria which causes fever, anaemia, leucocythaemia, enlarged liver and spleen, and the consequent cachexia so prevalent in those districts, is also concerned in the production of this abnormal condition of the thyroid gland; and considering the analogy of this to the other blood-vascular organs, particularly the spleen, it is not unreasonable, I think, to suppose that what so seriously affects one may in some degree compromise the other, at any rate, this added to the generally recognized cause." (Lancet

Dr. Macnamara has written a book on the "Medical Topography of the Himalayan Districts with special reasons for assigning a malarious origin to Goitre". This book I have been unable to obtain for reference, but in a short review of it in the British Medical Journal for 1880, it is stated that he throws doubt on the conclusions of McClelland and other observers as to goitre being due to the presence of salts of lime or magnesia in the waters drunk, "and connects goitre, not with water, but with malaria".

On the other hand, Dr. Gray found that in Raka, Bhootan, that among 500 Bhootas who inhabited the villages around Raka, it was the exception to see one without a Benchoele. In that district malarial fever was not common. (Lancet 1, 77, p 938)

Again, in many parts of India where malarial fever exists to a great extent, no goitre is to be found. Whilst on a short visit to Calcutta at the various hospitals, I saw many cases of intermittent fever, but don't recollect ever having seen a single case of goitre. Even in the streets, and in the native bazaars, and among the many coolies working at the cargoes, I cannot recall having noticed any goitrous person. It may be that my attention was not specially called to the disease at that time; but it is unlikely that such a prominent tumour as Goitre would escape the eye of any observer, considering the style of dress, or rather the absence of dress of the Hindoos. Whatever may be the case in India,

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the connexion with malaria cannot always be traced in Europe; in the Pyrenees, the Alps, in England, or Scotland. Goitre and malaria may coexist, but that is no reason why they should spring from a common cause; for it is the case, that goitre is most common in mountainous countries where malarial fever is rare, and least prevalent in low marshy districts where the latter reigns endemic. Neither in Wickham or Penwith have I ever seen a single case of ague; and I conclude that more evidence is wanting before we can allow that Goitre springs from a malarious origin.

Goitre due to the Nature of the drinking-water or to the Geological Constitution of the Soil.

The only other obvious sources to which Goitre can with probability be attributed, are the nature of the soil and the quality of the water used for drinking purposes. As the characters of the water depend largely on the nature of the soil from which it springs or over which it flows, and as water is the medium by which the ingredients of the soil are conveyed to the human body, we can best arrive at a satisfactory conclusion by treating these together as "one" cause in the production of goitre.

The opinion that impure drinking-water is the cause of the disease is as old as Hippocrates and Aristotle, and has been held by the majority of observers. It is also the popular belief, and in most places where goitre is

is prevalent, whether in the tropic & arctic regions, it is attributed by the natives to some peculiarity in the drinking-water. According to Sir Thomas Watson its very universality is a presumption in its favour. Certainly the evidence for the causation by water is very strong, and it might even be said to have been borne out by experiments. Dr. Bally of Lemau instances some fountains of his country, the use of whose waters produce or augment goitrous swellings in 8 or 10 days." Dr. Coindet states that the use of hard water, as the pump-water of the lower streets of Geneva brings on goitre very speedily." (Cyclop. of Pract. Med. p. 326.)

We have already seen that most of the recorded cases of epidemic goitre have been traced to the use of certain waters, and on these being changed the disease disappears. St. Lager (op. cit. p. 192 et seq.) cites several strong cases where, in the same village, and under the same conditions of locality and social life, those who drank a particular water suffered, while those who did not do so escaped. Many instances also are given where whole villages, changing their water-supply, became free from the disease; and where families in affected districts were preserved by the precaution of boiling the water or by drinking only rain water. Mr Greenhow informs us that the natives of Cude by partaking of the water of certain wells become affected with goitre, and by deserting these wells they sometimes become quite cured of the complaint. At Galle the Europeans have a great

great prejudice against the water got from springs. So strong is the prejudice against certain waters, in the frontier parts of some of our possessions in India, that at Beneah, near the Nepal hills, where the Ghega or goitre is very common, the British residents there will not drink of the river Coosee, which runs by the place, but have their water brought from the Ganges which is three days journey off. (Reid in Edin. Med. J. 1836)

The drinking of certain waters for the purpose of producing goitre, and thereby avoiding military conscription, has already been alluded to. The invariable answer given me by my patients to the question as to what they thought had caused the swelling in their neck, was, that it was due to the water they drank.

That goitre is caused by some impurity in the water is probable; but what that impurity is, has not yet been conclusively proved, though like all other theories it has given rise to much diversity of opinion. Cold water, the water from snow or melted ice; cold water drank when the body is heated, water from glaciers, turbid water holding in suspension mineral particles, waters holding salts of lime in solution, waters containing magnesia, & magnesia and lime combined, sulphurous waters, waters containing silica, fluorine, & baryta, waters arising from coal-beds, waters which have passed over metallic veins, water rich in organic matter, water little oxygenated, water with little or no iodine and bromine, water deprived

of carbonic acid, water containing excess of carbonic acid, and water deprived of phosphates, have all been suggested as causes likely to aid in the production of goitre.

Snow-water not a Cause - It was long supposed from goitre prevailing so commonly in mountainous countries that it arose from the habitual drinking of snow-water. This theory is set at rest for ever by the fact that in Greenland and Lapland, where snow-water is constantly used, goitre is unknown; and that in Sumatra where goitre is common, snow is never seen.

It is not due to the water from glaciers, for Soderé shews that those who live at the foot of the great Alps, and at the foot of glaciers are generally exempt from goitre. Sir Thomas Watson also points out that "the people in almost all the valleys of Switzerland drink the waters that come from the glaciers, while goitre is known in "some" of the valleys only."

The absence of iodine in water, a theory suggested by Prévost, and supported by Chatin, Marchand, & Niepce, is certainly not the cause of goitre; for some of the Alpine springs notorious for producing the disease contain a large proportion of iodine.

There is as little probability of its being caused by fluorine, silica, or by water containing organic matter.

Grange and Bouchardat have considered "magnesian salts" in some form to be the main cause of goitre, and

and their opinion is based on extensive geological inquiries and analyses. Dr. Arthur Mitchell found that all the waters he examined contained considerable quantities of magnesia. The analyses of M. Demortain of waters taken from Lombardy show, on the contrary, a total absence of the salts of magnesia in the water collected where goitre is most prevalent, as also the simultaneous absence of all muriates.

(Medical Times & Gazette 2/59). Magnesia has also been shown to be absent in the goitrous regions of Rheims, according to Maumene; in Auvergne according to Bertrand; while St. Lager enumerates other cases and also states that the analyses of Grange are erroneous. (Op. cit.)

In salts of magnesia alone, therefore, we cannot think the true cause of goitre is to be found.

The evidence that the water of goitrous places is derived from limestone and dolomitic rocks is very strong, and is supported by the investigations of McClelland and Greenhow in India, Cox, Coindet, and Bally, in Switzerland, Dilliet in Piedmont, Richardson at Edmonton, and Manson, Johnston, and Inglis in England.

McClelland's researches show <sup>that</sup> an intimate relation exists between the occurrence of limestone in the sources from which the inhabitants derive their drinking water, and the prevalence of goitre and cretinism. His testimony is so striking that I quote it in full.

"That portion of Kemaon which lies on the south side

side of the Ramessa river is composed of siliceous and argillaceous rocks. The people who lived there were found to be affected with goitre in the proportion of 1 in 500. In 43 villages on the south of the river Ramessa with a population of 3,700 only 17 cases of goitre were met with, and these exclusively in adults. In the district of Shore where "Alpine limestone" prevails an eighth part of the people are affected with goitre. Yet all the inhabitants of the province are of the same religion: they intermarry, have the same customs, and are affected alike by social and political influences. The method I adopted on observing the prevalence of the disorder in one great section of the district, and its absence in another, was to mark the physical characters by which these places were distinguished from each other. The consequence was a perfect agreement in external aspect, altitude, and climate; but a very marked difference in their geological structure; and this distinction was even traced down to the very villages in which the disease is found, with such perfect nicety as to enable me almost to pronounce a priori, on examining the rocks of a neighbourhood, whether the inhabitants of it are affected with goitre or not. In pursuing the inquiry further it is found that every village is not equally affected in the same neighbourhood, but that some are quite exempt, and others affected to the extent of half their population; and this difference is found not to depend on any accidental or transitory cause such as usually influences epidemic complaints, but has always

always affected the inhabitants of a particular village, while those of adjoining hamlets have continued perfectly and permanently free from the complaint. That this does not altogether depend on hereditary predisposition is rendered certain by the numerous cases of persons, who, having changed from a healthy to an unhealthy village, have become the subjects of the disease; and from the tumours of those affected becoming stationary, and even disappearing entirely during a residence in a healthy village. The most convincing of the various examples given is that of a village called Deota, where a certain caste the Domes, who at all times of the year have no alternative but to use the water from a mineral spring, are nearly all affected with goitre; while the Brahmins who use water conveyed by an aqueduct to the village from a distant source, are entirely free from the disease. The goitre-producing qualities of the spring are still further instanced by the fact, that of the Rajpoots who only in the rainy season can use the water from the aqueduct, no less than two thirds are affected with goitre.

McClelland thinks that "the circumstances of this village with respect to goitre might of themselves be sufficient to confirm the doctrine of mineral waters."

The following table compiled from his work is also very striking.

"Goitre in Kemaon" (Gude)

Water derived from	Percentage of population affected with Goitre
Granite & Gneiss	0.2
Mica, Slate, Hornblende	0.
Clay Slate	0.54
Green Sandstone	0.
Limestone Rocks	33.

From the above figured abstract it appears that the proportion of the inhabitants of each rock, affected with goitre, will stand to the healthy in the following order: Granite and Gneiss - goitre  $\frac{1}{300}$ ; mica slate thornblende - goitre none; Clay slate - goitre  $\frac{2}{385}$ ; Green sandstone goitre none; Calcareous rocks goitre  $\frac{1}{3}$ .

Are we to suppose that these results are the effects of chance, or of an accidental association of circumstances confined to a particular spot? When we recollect that a space of upwards of a thousand square miles has been made subject to the enquiry, and that in every portion of this space, the same invariable circumstances attended the presence of the disease, and that its absence was invariably marked by the absence of these circumstances, it is impossible not to view them in the light of cause and effect."

These investigations among the hills of Kemaon were corroborated by what was found on the plains. On the Bhat soil which contained large proportions of carbonate of lime goitre was common; while on the Rangar soil which is very siliceous and contains scarcely any lime the disease is unknown (Medical Topography of Bengal 1837)

Mr. Greenhow, writing on Goitre in Cude, shows by quotations from General Sleeman how rich in limestone is the geology of that province; and states that all the water round Secora where the disease is most common contained lime. The natives avoided those wells which, on testing were found to contain the greatest quantity of lime. "Looking to my own observations, and to the failure of

of other theories to account for the production of the disease, I cannot help concluding that drinking-water containing lime is the main cause of goitre. Soda and possibly potash may also help." (*Indian Annals of Medical Science* xii.)

Mr. Coxe in his "Travels in Switzerland" (1794) letter 35, says, "The springs that supply drink to the natives are impregnated with a calcareous matter called in Switzerland 'tuf', nearly similar to the incrustation of Matlock in Derbyshire, so minutely dissolved as not in the least to affect the transparency of the water. Will it be deemed impossible that the impalpable particles of this substance, thus dissolved, should introduce themselves into the glands of the throat and produce goiters? I ground this opinion on the following observations and facts. During my travels through Europe I never failed to observe that tuf, or this calcareous deposition, abounds in all those districts where goitre is common. I noticed goitrous persons and much tuf in Derbyshire, in various parts of the Vallais, in the Vallée, at Lucerne, Fribourg & Berne, and in the valleys of Savoy & Piedmont. If snow-water occasions goiters, wherever there are goiters there must be snow-water; which is contrary to fact and experience. If the concentrated heat of the climate and stagnation of the air, are necessary to the formation of goiters, those excrescences could never be formed where these causes are wanting; which is not confirmed by fact and experience. If waters impregnated with tuf, or with certain calcareous substances produce goiters, wherever there are goiters the natives must drink waters so impregnated, and this seems agreeable to fact and experience."

Coindet mentions as a curious fact that many of the soldiers in Geneva who drank of the hard pump-water were speedily affected by goitre, but on leaving it off the tumour disappeared in a short time (Reid, Ed. Med. J., 1836). Dr. Bally states that the inhabitants of Lemane who avoid the fountains whose waters are said to produce goitre, are entirely free from the affection. (Eglop of Pract. Med.) M. Billiet, the learned Archbishop of Chambéry, thinks it is necessary to assign to goitre some secondary or accessory causes, and some direct or primitive causes, or causes properly so called. In a letter to Morel he says, "I regard as secondary causes hygienic conditions, the configuration of the soil, lowness of valleys, the absence of currents of fresh air, excessive humidity, ill-constructed and unhealthy dwellings. All these circumstances can influence the affection by favouring its development, but they are not the chief cause, because very often we find the same hygienic conditions in countries where goitre is unknown. It seems to me that we must seek the true cause of the malady, not in the external configuration of the soil but in its mineralogical constitution, not in the meteorological condition but in the nature of the soil itself. It is endemic because the people who are affected remain in the country which produces it. Localities which have it to-day have had it always, and will have it always unless a true preventative is found. Place this people in a healthy country, after one or two generations the infirmity will entirely disappear; but those who return will all become affected in a very short time

time, because the true cause of the evil is not in hygienic conditions, nor in the blood of the people; it is under the surface of the soil and not above it." <sup>Le traité des</sup> <sub>(Dépendances cannes)</sub> <sub>Médec. p. 662</sub>

Dr. Richardson, whose testimony also disproves the snow-water theory, writes; "Bronchocèle, or goitre is a common disorder at Edmonton. I examined several of the inhabitants afflicted with it, and endeavoured to obtain every information on the subject from most authentic sources. The following facts may be depended on:—The disorder attacks those only who drink from the "water of the river." It is indeed, in its worst state, confined almost entirely to the half-bred women and children who reside constantly at the fort, and make use of river water, drawn in winter through a hole made in the ice. The men, from being often from home on their journeys through the plain, where their drink is "melted snow," are less affected; and if any of them exhibit during the winter some incipient symptoms of the complaint, the annual summer voyage to the sea-coast generally effects a cure. The natives who confine themselves to "snow-water" in the winter, and drink of the small rivulets which flow through the plains in summer, are exempt from attacks of this disease." The soil in the neighbourhood of Edmonton is calcareous and contains numerous fragments of magnesian limestone". (Franklin's Narrative of a journey, 1828).

Dr. Manson informs us that goitre is very prevalent in Nottingham and its neighbourhood; and the people there ascribe it to hardness of the water. Generally it appears only with magnesian limestone (Parkes).

Dr. Johnston writing on "the Composition and Physiological action of the Water recently used in the Durham County Jail, states, "that on the 21<sup>st</sup> Jan. 1853, six months before the use of the water was discontinued Mr. Shaw, the surgeon at the jail, had entered in the journal the following statement." Examined every prisoner very minutely. The general health of the prisoners is good, but I am sorry to report that I find several prisoners have glandular enlargements in their necks. This swelling is not confined to men who are on low diet; men in all classes are affected equally, therefore I see no reason to attribute it to the food of the prisoners. I am inclined to think that this affection is from the water, and the gas may also predispose them to it." Six months after this memorandum water was supplied from the river Wear, and the affection on the neck immediately ceased.  
 Owing to this an analysis of the well water was got and was found to contain in one gallon  $94\frac{1}{2}$  grs. solid matter.

Of this	Sulphate of lime	constituted	<sup>grs.</sup> 31.38
	Carbonate of lime	"	15.35
	Sulph. of Magnes.	"	4.49
	Carb. of magnesia	"	1.48
	Chloride of Magnesium	"	14.01
	Chloride of Sodium	"	6.19

showing an extraordinary quantity of salts of lime and magnesia. It is a remarkable coincidence that, in the jail of Durham, the occurrence of glandular swellings in the neck should appear with the use of a water containing an unusual quantity of magnesia, and should disappear

"disappear when the use of this water was abandoned."  
(Edinb. Medical Journal, May, 1855).

Dr. Inglis remarks that "at Studley village and round Ripon, the water from all the wells holds the supercarbonates of lime and magnesia, with a portion of the sulphate of lime in solution, to a great extent. He shows how in all the towns situated on the ridge of magnesian limestone which runs from North to South through the centre of Yorkshire, and margining the shires of Derby & Nottingham, goitre prevails to a great extent; whereas, on diverging to either side, the disease is found to diminish. From his many investigations he comes to the following conclusion "I cannot say that in all lime districts goitre prevails, nevertheless I think that I am correct in supposing, that the presence of the Magnesian limestone always predicts the coexistence of the disease." (Treatise on English Bronchocoele, 1838).

Deluc and many other authors also ascribe this malady to the use of water containing lime, gypsum &c; but doubt is cast on the theory by other observers; in India by Dr. Wilson and Mr Gray, in Switzerland by Foderé and Dr. Reuve, and by the fact that goitre exists as an endemic disease in some places where the geological nature of the soil is not limestone, and where the water is perfectly pure; and is not found in other places where salts of lime are contained in the water to great excess.

Dr. J. B. Wilson, who considers goitre to be entirely a circulatory disease, carried out some inquiries at Bhagsoo,  
Thurmsala,

Dhusmsala, where it prevails extensively. Examination of the water within a radius of 10 miles showed it to be of unusual purity, and to contain only traces in three instances of lime salts, but no magnesia & iron".  
 (Medical Times Gazette 2/74 p. 693).

Mr. H. A. Gray reports that the natives of Parca, where it is the exception to see one without a bronchocele, drink the water from springs, but that there is no limestone in the neighbourhood, though magnesia enters into the composition of the rocks. (Lancet 7/47 p. 938).

Fodere' wonders how any one could maintain "so absurd an opinion" as to the origin of goitre. He analysed the waters commonly used in the lower part of the valley of Maurienne, where almost all the inhabitants are subject to goitre, and found them to contain less gypsum or calcareous matter than those of the higher parts, where no goitre exists. At the same time he points out that on Mount Lenis and other elevated places in Switzerland, where the water runs over a surface chiefly composed of sulphate of lime we scarcely meet with the disease, whilst in the valleys, where little of this substance is found, the complaint is very prevalent. (Traite du Goitre)

Dr. Reeve maintains that calcareous water is not the cause of Goitre in Switzerland, for "there is not a village, nor a valley, but what is enlivened by limpid rivulets or streams gushing from the rocks. At Bern the water is extremely pure, yet, as Haller remarks, swellings of the throat are not uncommon in both sexes".  
 (Edin. Medical Journal, 1809).

Dr. Arthur Mitchell found that in some of the waters analysed, lime salts were present in large quantities, but in the majority the amount was not excessive, while the water taken from a district where there was no goitre contained more lime by 75% than the Withdale waters, as much as 24.33 total lime, calculated as carbonate per gallon (Brit. & For. M.C. Review, 1862)

Dr. J. Dudgeon writes that in China goitre is frequently found in the absence of all the supposed ordinary producing causes."

M. Rivet in Dr. Dobell's "Reports on Diseases of the Chest," says, "Not only that in Puy-de-Dome, bronchocele is rife in certain districts the substratum of which is neither calcic nor magnesian, but also that in some localities the subsoil of which is magnesian-calcareous this disease is almost unknown. (Medical Times & Gazette 2/78 p. 254).

Dr. Falk, in his "Thesis on the Endemic Bronchocele of Nassau & the Electorate of Hesse" (1843), gives as the result of his investigations, that this disease is not confined to any one geological formation, neither to any peculiar altitude, nor to any particular site or situation, and that the only condition which uniformly prevails in the places where it occurs, is the absence of free carbonic acid in the water used for domestic purposes. (Lancet, 1865)

Saint-Lager basing his opinion partly on these negative instances, partly on his own experiments with the soap-test, which show no relation between hardness of water, and goitre, and partly on the negative results of experiments on animals with calcium sulphate and magnesian salts,

denies

denies altogether the connection between goitre and calcium and magnesium sulphates and carbonates. He states also that M. Grange has now himself given up the belief of magnesia being the essential agent of goitre; and argues that the constituent of the water which is the actual cause is either "iron pyrites (ferrum sulphide)" or more infrequently copper or some other metallic sulphide. And he explains M<sup>c</sup>Cllelland's results by the supposition, based on an expression of that writer, that in the limestone districts of Kimaon, the water had traversed the metalliferous strata of the rocks. Saint-Lager does not support his opinion by actual chemical analyses, but he brings forward geological evidence on a large scale to prove that the endemic appearance of goitre coincides with the metalliferous districts. He has also made experiments on animals with iron salts, which do not appear conclusive, although he believes he produced in some cases an effect on the thyroid. His hypothesis seems to fail from his want of chemical analyses. He has made out a case for inquiry rather than for conclusion." (Parkes' Practical Hygiene p. 58).

Sir Joseph Fayrer also thinks "that the presence of Iron pyrites in the soil has something to do with the occurrence of Goitre". (Lancet 2/74).

In the city of Paris the water is hard and contains sulphate of magnesia but no goitre exists. (St. Lager)  
Considering the evidence now before us I think we are justified in contending that the arguments in favour of the intimate connection of goitre with limestone

limestone formations, outweigh all those against it. I think, also, that with tolerable certainty we have shewn that in water the goitre-producing agent is to be found; but before concluding that it is the only, or essential cause of the disease, it is right that we should supplement the investigations of others by personal observations, and this I shall now proceed to do.

It will be hardly necessary for me to detail my cases collected at Wishead during the winter 1882-1883, as these have been already published in the Edin. Medical Journal for July, 1883 (p. 30 et seq.). In order that they may be conveniently referred to, however, I will add them as an appendix.

To prove that Goitre exists in Pensith and the surrounding district to such an extent as to be fairly considered an endemic disease, the fact that in one year I saw at least 30 cases is quite sufficient; especially when my observations are confirmed by the experience of <sup>other</sup> medical men who have been long in practice in the neighbourhood. Full notes of all these I was unable to get, but the following 18 well-marked cases will fully illustrate the unusual prevalence of the disease.

### Cases

Case I. J. P. aged 35, unmarried, an idiot woman - idiocy due to infantile apoplexy - suffers from an enormous goitre affecting all the parts of the thyroid, the right lobe being much bigger than the left. It began when she was about ten years of age, and has always been of considerable size,

not

not having increased specially lately. Patient only began to menstruate two years ago, but is now quite regular, and during menstruation the goitre seems to become larger, more swollen, and tense, while afterwards it subsides to its usual size. The goitre at present occupies the whole width of the neck, extending beyond the sterno-mastoids on each side and reaching up to the angles of the jaw. It is unusually soft in consistence; in fact almost fluctuating to the feel. Patient was born in Newcastle, Northumberland, but since she was six years of age has lived in various parts of this district, always within ten miles of Penrith. No relation has ever been affected with this disease. The swelling occasions no special inconvenience, except exceedingly noisy breathing at night. The parents are in no way related to each other, though brought up in the same neighbourhood.

Case II. Mrs. P. aged 47, married, and with 10 children, suffers from a goitre about the size of a cocoa-nut. Both lobes are affected, the left lobe being soft, the right hard; and of fibrous consistence. It used to occasion great breathlessness by pressure on the trachea. It began when she was 22 years of age after the birth of her first living child, and grew progressively larger each successive pregnancy, but diminished to a slight extent after labour. At one time it was so large as to be on a level with the chin and extended up under the ears. Since the climacteric, 5 years ago it gradually got smaller and still continues to grow less. The only inconvenience complained of was great breathlessness, and noisy breathing at night.

so that it could be heard downstairs. Patient has lived in Penrith all her life. No hereditary history whatsoever.

Case III. M. P. aged 25, daughter of the above, a bright complexioned, typically healthy young woman, has a goitre which began about two years ago, and now occupies the front of the neck as a soft diffuse swelling, affecting both lobes and the isthmus as well; the latter being first affected. It distinctly increases during the menstrual period, and in addition to slight breathlessness, gives rise to pain which shoots down to the left shoulder.

Case IV. Mrs. H., aged 63, married, and has had 4 children, has a goitre which began, when she was about 21 years of age, in the centre of the neck, and occasionally gave rise to aching pain relieved by tight pressure of the hand. Menstruation occurred before she was 13, and the swelling increased very slowly from the time of commencement to the time of her marriage at 34, and then it was about the size of a pigeon's egg. During this period it was from time to time painted with iodine, and once or twice it nearly disappeared. Patient thinks there was no perceptible difference during the menstrual period, but whenever she became pregnant the goitre began rapidly to increase in size, until after her first labour it occupied the whole of the front of the neck, extending quite up to the ears. Patient states it was so large that she couldn't turn her head, and she had to lie and be fed. During the puerperal period it was painted with iodine, but at one part began

began to inflame, causing intense pain till it burst, when relief was got. It was also lanced, and from it sanious matter, not pure pus, was discharged, enough to fill a break-fast cup. After this it all disappeared except a small oval tumour, the size of a walnut; and it remained small till patient became a second time pregnant, when it again rapidly increased in size, though it did not attain the dimensions it had after first labour. It was kept reduced by assiduous painting with iodine, but in spite of this, during each succeeding pregnancy it increased rapidly in size. Her last child was born when she was 43 years of age, and she passed the climacteric three years afterwards. Patient states this caused no special diminution in the size of the swelling, which however was kept down by the constant application of iodine. Now, the neck is occupied by an irregularly rounded swelling, the size of a large Cocoa-nut, though at one time it was like three eggs, the lobes being quite distinct. The original distinction is still apparent in the greater softness of the lobes over the isthmus. The latter is very hard and resistant; in fact in some parts quite calcareous, as if a deposit of lime had really occurred. Evidence of old inflammation is found in adherence of the centre of the swelling to the upper border of the sternum, and the sterno-mastoids on each side, which are considerably atrophied by pressure. The goitre produces no interference with swallowing or breathing, but causes an aching pain on the right side which is relieved by firm pressure and the use of iodine. Both pupils are dilated, but there is no prominence of the eyeballs. Patient being thin

thin, and the goitre somewhat pendulous, she supports it by wearing a small flannel bag round the neck, fixed by tapes behind. Patient has been resident here for 18 years, but <sup>the</sup> goitre began when she was in Liverpool. Afterwards she travelled about as ladies-maid, so that local causes can't account for its production. No relation of any kind was ever affected by the disease, and all her children are quite free from any enlargement of the thyroid. The above patient is an exceedingly intelligent woman and along with her own case she gave me an account of one in a great friend of hers. This was a woman of the same age, also living in Liverpool, who developed a goitre of the same size at the same time. This was ascertained by measuring and comparing each other's necks. This patient got married at the same time, but "had no children", and throughout the whole of her married life, the goitre did "not" increase specially in size, but retained its original dimensions till the climacteric, after which it considerably diminished.

Case V. M. C., aged 45, married, and with 4 children, suffers from a very large goitre affecting all the parts of the thyroid. The lobes are equal in size and softer than the isthmus, which is much enlarged and of firm consistency. At present the goitre measures from the external margins of the lobes across the most prominent part of the isthmus  $11\frac{1}{4}$  inches. It began when <sup>she was</sup> about 12 years old, at which time patient also began to menstruate. The right lobe was first affected, and at that time was very soft. Patient is not certain whether it temporarily increased in

in size during the menstrual period, but states that it grew very gradually till she was 30, when after her first pregnancy it increased very rapidly in size. After labour it diminished, but again grew larger each successive pregnancy till within two years ago, when menstruation ceased. Previously it had only occasioned shortness of breath on climbing a hill. In this case there is distinct heredity. Her father had a swollen neck of the same nature, and a sister two years younger, also has a goitre which developed about the same time. Both were treated by the application of some ointment with good effect. This sister has been married 10 years, but has had no children, and the swelling remains the same size as it was before marriage. A daughter of the above is likewise affected.

Case VI A. C. aged 14, daughter of M. C., began to menstruate when she was 12 years old, at which time the thyroid was noticed to enlarge. There is now a soft, almost fluctuating swelling occupying the right side of the neck, due to enlargement of the right lobe. The left lobe is unaffected, the isthmus only slightly. The girl is pale and languid, having lately recovered from a sharp febrile attack, but is not specially anaemic. The goitre has been getting gradually larger, and appears to become more prominent and tense during the menstrual period which is very severe.

Case VII M. A. aged 44, married, and with no children, suffers from a goitre which has existed since she was 12 years of age, at which time she also began to menstruate.

Since then it has gradually increased in size, perhaps more rapidly within the last 3 or 4 years. Patient was married when about 32, but having had no children, at no time noticed any very marked increase in the size of the swelling. Patient thinks there is a greater tightness and fulness of the neck during the menstrual periods, which still regularly continue. There is now a peculiarly prominent goitre of unusual projecting shape due to extraordinary and distinct enlargement of the isthmus, which protrudes forward, and is fully the size of a duck's egg. Both lobes are also affected, the right much more than the left. Patient was born in the Penrith district and has resided there all her life, with the exception of 6 years spent in Lancashire. Patient's father had a goitre, and as already instanced, both her sister and niece suffer from the disease.

Case VIII. F. P. aged 12, a tall, overgrown girl, very thin, but with good colour and no appearance of anaemia, has a large goitre affecting both lobes and the isthmus, the lobes being of the usual pyramidal form, the isthmus more rounded. The latter was first affected, and is of firmer consistence than the lobes which are very soft, the "left" being noticeably larger than the right, a fact carefully observed as it is contrary to the general rule. It began about 2 years ago, and has gradually got larger, especially within the last three months. Menstruation has not yet begun. The pupils are markedly dilated but equal in size, and there is no exophthalmos. Patient was born at Newton, 3 miles from Penrith,

and

62  
and came to her present abode 4 years ago, this being  
Blencow 5 miles from Tenrith. The swelling occasions great  
breathlessness and noisy wheezing respiration on exertion.  
Interesting to note in this case is the fact that patient  
is in an advanced stage of Phthisis. Her mother like-  
wise is goitrous.

Case IX. C. P. mother of the above, had a very large  
swollen neck, when about 15 years of age, and still has  
a small goitre affecting both lobes and the isthmus,  
the right lobe being considerably larger than the left, and  
both of soft consistence. It used to be of such size that  
it occasioned both pain and breathlessness, but all  
inconvenience was removed by painting with iodine, and  
the taking of some drops internally, apparently Tincture  
of steel. Patient has had 6 children, and states that  
the tumour got bigger during pregnancy, though not  
specially so within the last two or three years, her  
last child being now 2 years of age. Her mother was  
afflicted with goitre, and one of her 4 sisters has  
also great enlargement of the thyroid.

Case X. A. G. aged 50, married, and with 9 children  
noticed no difference in the size of her neck till after  
the birth of her first child, at which time she was 20  
years of age. It has gradually grown thicker since, espe-  
cially during pregnancy, until a year ago, when she pas-  
sed the climacteric. Since then it has caused growing  
throughout it never gave rise to any inconvenience.  
Now there is a moderately sized goitre due to enlargement  
of all parts of the gland, the lobes being soft but equal in  
size,

size, the isthmus being most enlarged of all, but firm, as is often the case when it is first affected. Patient was born at Kirbythorpe, 9 miles from Leeds, but has resided at Stainton, a village 3 miles from that town for the last 29 years.

Case XI. M. G., aged 19, daughter of the above, suffers from a soft diffuse swelling, affecting all the parts of the thyroid. The right lobe is distinctly bigger than the left, and the isthmus is also markedly enlarged. She only began to menstruate a few months ago, and her periods are still far from regular. It occasions considerable breathlessness on exertion, but there are no eye symptoms whatsoever. This patient has a particularly florid complexion, and never suffered from anaemia.

Case XII E. G., a younger sister of above, aged 16, also has a goitre, affecting all the parts of the thyroid, the right lobe ~~being~~ being bigger than the left. It began about six months ago, 3 months previous to menstruation, with the onset and progress of which goitre seems to have a distinct connection. Neither of the sisters noticed any special increase in size during the menstrual periods.

Case XIII R. B. a youth aged 20, suffers from a large soft goitre which affects all the parts of the thyroid, the right lobe being much bigger than the left. Over the whole swelling can be heard a double <sup>\*</sup>blowing murmur, and on palpation there is a considerable amount of pulsation. This throbbing is greatly increased on excitement and on exertion. Patient was  
born

born at Morland, a place 8 miles from Penrith, but the goitre only began 4 years ago when the patient came here to business. He has always been very healthy, and has never been off work a day since he came. There is no exophthalmos, but the right pupil is slightly bigger than the left. There is no hereditary history whatsoever. The water supply of Morland is from a limestone district, and patient knows of a good many cases of goitre among the older villagers. In this case the application of iodine had a peculiar effect. A week after the application of equal parts of the tincture and liniment, the patient returned with the goitre fully twice its previous size. Fortunately a short time afterwards it became greatly diminished without treatment.

Case XIV. A. S. aged 46, married, and has had 5 children, noticed her neck begin to swell when she was about 20 years of age, though menstruation began when she was 13. Even when the goitre first appeared it occasioned much breathlessness, and patient had often to stop going up a hill. She was married when 23, and a year after began to bear children. The goitre increased in size each successive pregnancy, though it diminished after labour, till at her last pregnancy it was so large, and occasioned such breathlessness that several times she nearly died from dyspnoea, and her noisy breathing could be heard all over the house. Patient distinctly states that the swelling grew larger during each menstrual period, though as she is now passing the climacteric, lately it has remained

remained of the same size. There is now a general thickness of the neck of a very diffused character, the three lobes of the gland, having all run into each other, and no part being larger than the other. It still occasions great breathlessness on exertion and excitement. All kinds of treatment have been applied but with no effect. Patient has lived at Grestoke all her life, and otherwise has been very healthy. Her mother had a goitre but none of her 4 sisters suffer from the disease, patient being the oldest daughter.

Case XV. M. M.D. aged 60, married, and has had 10 children, noticed her neck begin to swell when she was about 14 years old, and soon after menstruation set in. Even at this time she suffered much from breathlessness. When about 18 she was very hard-worked and had to lift heavy weights, and then the goitre grew to such a size that it was nearly on a level with the chin. The right lobe was then very much enlarged, but after marriage, about 20, it grew less, though the isthmus became much more affected. At this time she commenced rubbing the swelling with an ointment, apparently mercurial, for it caused profuse salivation and the subsequent loss of her teeth. It had the effect, however, of greatly reducing the goitre. Patient did not notice any special increase in size during pregnancy, but at that time was very much more breathless. Since she ceased menstruating it has remained of the same size, and her breathing has been very much easier. Now there is a curiously-shaped goitre formed by enlargement of the right lobe and isthmus, the latter especially

especially being very prominent, and of firm consistence; the left lobe is unaffected. Patient was born at a mining village near Rees in Yorkshire, and has resided in Kendal only about five years. The water-supply of the village was from wells and the water very hard. Patient states that goitre was very prevalent in that district. There is no hereditary history, but a daughter aged 20, suffers from the affection.

Case XVI M. M.D., aged 20, daughter of the above, has a large goitre due to enlargement of the lobes, the left being very much bigger than the right, the isthmus quite unaffected. This swelling the mother states existed from birth, and for the first few weeks occasioned much breathlessness. When the girl was 14 or 15 years old, the period of commencing menstruation, the goitre was even larger than it is now. During the menstrual periods there is no noticeable increase, though, when she is heated and working hard, it seems to grow larger, and occasions much breathlessness. It has a soft diffuse feeling, like most goitres in young girls. In none of these cases is there any tendency to anaemia or any eye symptoms.

Case XVII. Ann P., aged 65, married and with 10 children did not notice any increase in the thickness of the neck till about 16 years after marriage, at which time she was 30 years of age. Then she was in her 4<sup>th</sup> pregnancy, and towards the end of it the goitre was so extensive as to be quite on a level with the chin, while the lobes extended up towards the ears. After labour it diminished to a considerable extent, but

again increased greatly each succeeding pregnancy. Since she passed the climacteric, it has gradually grown less, and now the goitre consists wholly of enlargement of the right lobe which is quite the size of a turkey's egg. The isthmus is only slightly affected, while the left lobe is entirely atrophied. Patient has lived in Penrith all her life, and there is no hereditary history, while her 4 daughters are unaffected. The swelling still occasions breathlessness, and also when she stoops has always caused what she describes as a "dimness of the eyes," perhaps the result of pressure on the sympathetic. There is no exophthalmos.

Case XVIII M. W. aged 49, married, and has had children, noticed her neck begin to swell when about 30 years of age, and while she was carrying her fourth baby, at which time she suffered terribly from neuralgia which she thought was the cause of the goitre. Before labour it was almost on a level with the chin and after it, it did not at once begin to diminish. Much breathlessness was occasioned, and she had to sleep with her head fixed at a certain height with pillows. At the same time she noticed her eyes becoming prominent, and occasionally there was considerable throbbing over the swelling, especially after a hard day's work. Patient being a washerwoman, has always been very hard wrought. During her next and last pregnancy there was not much marked increase in size, but within the past 2 or 3 years it has become somewhat reduced. She is now passing through her climacteric.

Patient at present suffers from a large goitre, extending on both sides quite up to the angle of the jaw. It is formed by enlargement of the lobes of the thyroid, the right being much larger than the left, the isthmus quite unaffected. In each the lobules of the gland are very distinct, the tumour being of firm consistence. It now gives rise to little inconvenience except from the deformity. There is slight exophthalmos, and the right pupil is distinctly smaller than the left. Patient was born about 14 miles from Penrith, where she has only resided for the last 14 months. There is no hereditary history, and her family are free from the disease.

Analysis of Cases - Of these 30 cases of simple goitres 16 have the right lobe larger than the left; in 4 the right and left lobe are equally enlarged, two with, and two without the isthmus being affected; in 2 the three lobes are of equal size; in 2 the isthmus is more enlarged than the lobes; in 1 the isthmus alone is affected; 2 have the left lobe much larger than the right; and in 3 the right lobe alone is affected, the isthmus only slightly, and the left not at all. In those which are of great size, as a rule, the right lobe is larger than the left and the isthmus more or less affected. The consistence of the tumours varies, in cases of recent growth being soft and elastic, in others more firm and resistant; in one instance calcareous or osseous deposit had actually occurred.

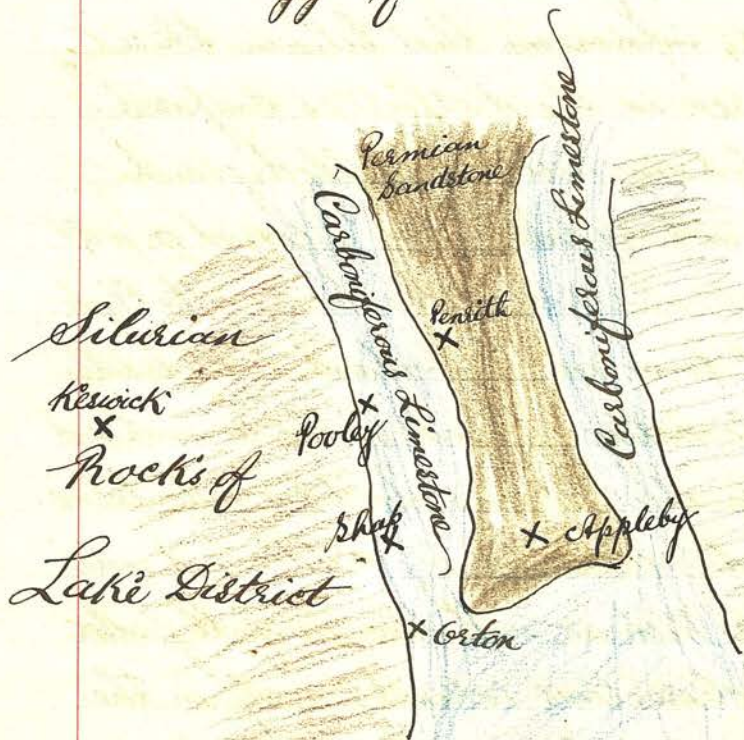
69

To discover if the occurrence of goitre as an endemic disease in Wishaw and Penrith, can throw any light on its causation, is what we must now endeavour to determine. In places so different does a common cause exist? If so, is it to be found in the atmosphere, the water, or the geological nature of the ground? On some physical conditions its endemicity depends, and these with the habits and occupation of the people, we must carefully consider.

Climate and Meteorology

The town of Wishaw, in the middle ward of Lanarkshire, stands at an elevation of from 415 to 460 feet above the sea-level, and is freely exposed to the North and West winds. The atmosphere does not seem to be particularly damp or dry, and is tolerably clear and bracing. There is no meteorological station nearer than Hamilton, so that the exact temperature and rainfall I am unable to state. Mr Buchan, however, informs me that between these towns, a certain area in the district, is, compared with the proverbially rainy West, unusually dry; and hence it is that strawberry cultivation is carried on with such success on particular parts of the banks of the Clyde. Penrith, a market town in Cumberland, is pleasantly situated in a fertile valley watered by the Eamont and Lowther which unite their streams about one mile below the town. The climate is considerably milder and more relaxing than that of Wishaw, and the rainfall greater. \* From meteorological observations taken by myself in the Triarage garden throughout the year, I am able to give the meteorology of the district more accurately.

# Geology of Penrith and District



The mean annual temperature was found to be  $46^{\circ}18'$ ; the extreme highest temperature registered was  $79^{\circ}5'$ , the extreme lowest  $11^{\circ}$ , while the number of nights on which the thermometer stood at or below freezing point was 101. The total rainfall for the year 1883 was 38.40 inches which is less than usual, 40 inches being about the average, and the number of days in which rain fell was 181. The prevailing winds are S.W. and N.W., the former being almost invariably accompanied by rain.

Geological Structure of the Soil

To the officials of the Geological Survey I am indebted for the following account of the geology of the districts. The geological structure of the environs of Wisshaw - "The solid rocks consist of the various members of the "Coal measures." They consist of alternation of sandstones and shales, fireclays with occasional coal seams, and bands of ironstone. The subsoil consists of boulder clay, which as it is made up for the most part of the underlying rocks is stiff and retentive and gives rise to a poor soil.

Penrith is situated on a bed of the new Red Sandstone underneath and completely surrounding which is a layer of the Carboniferous limestone, which appears on the surface at various places.

Keswick, where granite also prevails, stands on the old Silurian rocks of the Lake district, which contain no limestone. The diagram on the opposite page clearly illustrates the geology of the district.

Dr. Robertson, Medical Officer of Health for the County, writes of the villages where goitre prevails most extensively, as follows:—"Every one of the villages you mention are on limestone formation of a very pronounced character. Askham and Helton are on limestone, and a belt of it goes through Tivril and Dockbridge. At Redhills there are limestone quarries, and thence the ridge of limestone continues on from Stainton and Hlusca, through Newbiggin, to Blencow and Johnby. On the Penrith side of Redhills the limestone is lost somewhere between Skirsgill and Penrith, but the limestone belt extends between, near Salate Hill and Troutbeck."

Water-Supply - About thirty-five years ago the chief industry of Wisshaw, like many other towns, was that of weaving, and there was hardly a mine or miner in the neighbourhood. The water-supply at that time was chiefly from springs and wells, but after the mines were worked the water was brought into the town from one or two disused pits. Those inhabitants, who remember the quality of this water, state that it was very hard and very bad; and according to one or two who have been for thirty or forty years resident in the district, goitre was more common than it now is.

That it was prevalent some years ago can easily be learned from the patients when they talk of their former doctors, who, they say, used to call it "Clydesdale" or "Wisshaw neck", and who always ascribed it to the nature of the drinking-water. The present water-supply was introduced about fifteen years ago, and is brought from Gair

Gair in the parish of Carlisle. Dr Bradford states that the usual supply of that district is from springs, wells, and disused pits; and as I have been able to get an analysis of the water made in 1864, before any works were constructed, it should give a fair idea of the nature of the inorganic constituents it contains.

The analysis of 1864 was made by Mr. F Penny, Professor of Chemistry at the Andersonian University, who found an imperial gallon of the water to contain 11.35 grains of dissolved ingredients. Of these 8.95 grains were saline matter, chiefly salts of lime and magnesia; thus of —

Carbonate of lime	there were	5.20	grains	per	gallon
Carbonate of Magnesia	" "	.45	" "	" "	" "
Sulphate of lime	" "	1.62	" "	" "	" "
Chloride of magnesium	" "	.48	" "	" "	" "
Chloride of sodium	" "	1.00	" "	" "	" "
Silica and phosphates	" "	.15	" "	" "	" "
Oxide of Iron	" "	.05	" "	" "	" "

The water analysed at this time was principally surface water, but in 1876 a sample taken from a street well was analyzed by Dr. Stevenson Macadam of Edinburgh, and this was chiefly spring water. He found it to contain

Carbonate of lime	1.50	grs.	per	gallon
" of magnesia	0.48	"	"	"
Sulphate of lime	1.77	"	"	"
" of magnesia	.81	"	"	"
Chloride of magnesium	traces			
" " Sodium	1.32	grs	"	"

The hardness in degrees was 4.6, while in the analysis of 1864 it was 4.5.

The town clerk informs me that the present supply is composed of spring and surface water in about equal proportions, and that near the works are several disused limestone quarries.

From an old Gazetteer of England I learn that the town of Penrith was anciently supplied with water by the Bishops of the Diocese. The water is said to have been purchased by one of the venerable family of Claur who possessed Caterlin, to be drawn from the brook Petherell in no larger stream than would flow through the eye of a millstone. The present supply is on a much larger scale and of excellent quality, being brought from Ullswater by means of the river Eamont from which it is pumped up into the town. The clerk to the Sanitary Authority, though he has not forwarded me a detailed analysis of the water, informs me that the general results are good.

"The character and quality of the supply, however, varies much according to the season of the year. Sometimes the water is hard (as we find on washing) owing to the preponderance of water coming from the limestone. The brooks called Eller-beck and Saere-beck flow into the Eamont and of course affect its quality as well as its quantity. There must, one cannot help thinking, be numerous impurities allowed to go into the lower reach of Ullswater and also into the Eamont. The stream called the Petrel or Petherill is now too much polluted to be available for domestic use." The village supplies are of course  
from

Whitehaven 27<sup>th</sup> Feb. 1882

(1) Analysis of Sample water from Skelton

One imperial gallon contains:-

	One imperial gallon contains:-	One imperial gall. contains
Total solid residue	57.10 grains	26.10 grs.
(a) Chlorine	14.20 "	(b) 2.64
(equal to Chloride of Sodium)	23.40 "	4.35
Hardness	21°	18°
Free Ammonia	1850 parts per million	006 parts per mill.
Albuminoid	480 " " "	.014 " "

Such water is dangerous to health and unfit for domestic use.

(2) Analysis of two samples of "Great Salkeld Water Supply"

One imperial gallon contains

	No 1 Spring	No. 2.
Total solid residue dried @ 220°F.	12.0150 grs	10.884 grs.
Chlorine in Chlorides	1.8420	1.4886
Phosphoric Acid in phosphates	Faint trace	Faint trace
Nitrogen in Nitrates	.0355	.0350
Ammonia	.0020	.0020
Albuminoid Ammonia	.0200	.0158
Oxygen absorbed in 15 mins.	.0220	.0260
" " in 4 hrs.	.0355	.0380
Hardness	6°	6°

(3) The analysis of water from Skirwith showed that the water was loaded with organic impurities and was unfit for human consumption. The hardness equalled 3°.

from local wells and springs, but to get analyses of these was an impossible task, for, as Dr. Robertson truly says, "their name is legion." The popular statement in affected villages is that the water is very hard, and this is borne out by the fact that they are situated on limestone formations. The following analyses however, will illustrate sufficiently the general character of the water as regards contained solids; though it is but fair to state that two of these are taken from villages which I had least opportunities of visiting, and consequently of particularly noting the presence or absence of goitre.

These analyses will be found on the opposite page.

Of the five specimens of water 2 are taken from Skelton, 1 from Skirwith, and 2 from Great Dalkeid. Skelton is a village 7 miles N.W. of Penrith, situated at a considerably higher level and exposed on all sides. Great Dalkeid lies in quite the opposite direction, as does also Skirwith, 6 and 8 miles from Penrith respectively. They are much more sheltered, being nicely situated in the valley of the Eden, but are exposed to the influence of a peculiarly cold and strong wind known as the Helm Wind, which takes its origin on Crossfell in a manner still not satisfactorily explained.

According to Dr. Parkes the permanent hardness of a good water, should not, if possible be greater than  $3^{\circ}$  or  $4^{\circ}$  of Clarke's scale. From the above analyses it will be seen that the "hardness" of the Skelton water is very great indeed, no less than  $21^{\circ}$  and  $18^{\circ}$ ; that of Great Dalkeid  $2^{\circ}$  more than desirable, while that of Skirwith is just what it ought to be.

I am not in a position to state that at Great Balkeld and Skirwith goitre is less prevalent than at Skelton, as our practice did not usually extend in their direction; but this I do know that the villages where in my experience goitre was most prevalent, are those already shown to have been built on limestone. In Skelton itself I cannot remember having seen any case of goitre, though the village doctor who has been there for 40 years, has noted its frequent occurrence. In Newbiggin, Blencow, and Johnby, however, through which the belt of limestone has been traced, goitrous patients are to be found, while these villages lie in the direct route to Skelton, two miles further on.

None of the water analyses taken either at Wisshaw, or Penwith note the presence of "Iron Pyrites," but Professor Leitch informs me that in the soil of Wisshaw it exists in abundance, and is to be found likewise in the new Red Sandstone. Water derived from disused pits is certain to contain it, and probably also that obtained from the new red sandstone. The surface water lying on some of the exposed parts of Wisshaw is tinged with iron salts, doubtless both sulphates and "sulphides."

Habits and Occupation of the People - The chief occupation of the inhabitants of Wisshaw is mining, abundance of excellent coal being wrought there, also ironstone and freestone. A great many are employed at the extensive iron and steel-works in the neighbourhood, while not a few of the men and a considerable number of women are engaged in the industry of brick and tile-making. My patients all belonged to the working class, who were generally  
intelligent

intelligent, and both comfortably clad and fed. As mining populations frequently change their residence when a pit is found unworkable or is wrought out, and as Wislaw as a town is of comparatively recent growth, intermarriage is most unlikely to play any part in explaining the presence of Goitre.

The industries of Lensith are purely agricultural, but the town has also a considerable retail trade and large market. The agricultural peasants in the North of England in temperament are much more phlegmatic than the miners of Wislaw. A "considerable" amount of drunkenness prevails, but as a class the out-door labourers seem to be much better off in every respect than in many other districts. The whole Country is exceedingly free from zymotic disease; in fact is unusually healthy.

We have now established the existence of Goitre as an endemic disease in two places, which differ alike in the habits and occupation of the people, in atmospheric conditions, and even in the geological constitution of the soil. Two things, however, they possess in common, and these are a "water rich in salts of lime", and a "soil containing iron pyrites". The conclusion seems irresistible then, that in these, or a combination of these, the true cause of goitre is to be found. But goitre prevails on the Silurian rocks at Keswick, and these contain no limestone, while the proportion of iron pyrites is small. Can the presence

✓ explained by goitrous families coming to live there from neighbouring affected districts, the disease being perpetuated by heredity, assisted by certain local conditions such as the presence of iron pyrites in the soil? This suggestion leads us on to the consideration of the hereditary nature of goitre, and its connection with menstruation, pregnancy, and faulty uterine function.

ferruginous salts alone account for the occurrence of the disease, or do certain local conditions aid in its production? Dr. Black kindly writes me, as follows:- Keswick stands about 230 feet above the sea level on the Silurian rocks. Its water-supply is one of the best in England, or indeed anywhere else; and the water itself, which is collected from Skiddaw, is very soft and free from organic impurities. The rain-fall is about 40 inches annually; and I believe the prevailing winds are S.W. and N.W. The inhabitants are industrious, and more intelligent than in many places of like or greater population in England. They are engaged for the most part in the pencil works and mines, shop-keeping etc, in the winter, and in summer as boatmen, guides, drivers, and workers about hotels, and the women as lodging-house keepers. There are a great many hotels and public-houses in the place; and although a strong element of temperance is at work in it, there is also a considerable amount of drunkenness. As you already know, my views as to the causation of goitre are to the effect, that menstruation and child-bearing have far more to do with it than water-supply or prevailing winds, or any sort of meteorological condition whatsoever. Otherwise, why should the disease be so much more frequently found in the female sex, and it is quite well known to many females that their necks become more swollen during a menstrual period." Might not the occurrence of goitre at Keswick to a certain extent be (vide opposite page)

Hereditary Nature of Goitre - Whatever may be the primary source of goitre, there is every reason for supposing that once established it is often continued in families by inheritance; or at least in this manner a strong predisposition to the disease is acquired. The question whether the malady is hereditary or not has given rise to much discussion; and not a few writers, including St. Leger, dispute the fact (op. cit. p. 108.) His arguments however are by no means convincing, and simply confirm the typically "endemic" nature of the complaint, without in the least degree proving that a disease which is endemic cannot at the same time be hereditary.

That heredity plays an important part in the production of goitre a study of my cases clearly shows; thus, of the twelve collected at Wisshaw eight show distinct heredity. In 6 the mother and grandmother both suffered from goitre; while of the remaining 2, one had a cousin affected with the disease, while the other's mother died of the exophthalmic variety. It is interesting to note this case, the mother for years subject to exophthalmic goitre, and the daughter, a strong, healthy girl now with the ordinary form of bronchoecle.

Of the 18 Penrith cases 10 are distinctly hereditary; in 8 the mother being affected, in 2 the father suffering from goitre. In case vi, grandfather, mother, and aunt were afflicted with the disease; in case viii it revealed itself in grandmother, mother, and aunt; while case xvi was congenital, the mother also being goitrous. No less than 5 cases instance the occurrence of the affection

in members of the same family, these affected being sisters. Some of these had lived for a long time in different parts of the Country. Dr. Crawford mentions the case of a woman with goitre, whose grandmother, father, paternal aunt, and Cousins also had it; although they did not all live in the same place, and no other person in their neighbourhood was affected with the disease. (Eloq. of Pract. Med. p. 325).

The disease is not only hereditary but may even be sometimes congenital. In one of my own cases the goitre has existed from birth; and only two months ago I had notes sent me from Penzith of another case of Congenital bronchocele, where the mother also was affected. Dr. Keiller records an instance where he delivered a Mrs K, aged 24, of her first baby which, with the exception of a very large goitrous tumour, was a remarkably fine male infant. Mrs K. was brought up in Cumberland, her mother being a native of Keswick. None of her immediate relations had goitre. (Edin. Med. Journal 1855). Dr. James Reid has seen three infants who had the thyroid tumour fully developed; and Fodere thinks he observed a distinct goitre in three cases of newly-born children. (Edin. Med. J. 1836. p. 49). M. Godelle, physician to the hospital at Soissons, had a preparation of the body of an infant, which lived a few hours only, and which came into the world with a goitre; the mother being affected with the same disease. Mr. Bramley affirms, that in India both children and animals are born with it, and cases of congenital goitre have been recorded in Derbyshire. I think the facts just mentioned go to prove that goitre is

is really a hereditary disease.

Relation of Goitre to Menstruation, Pregnancy, and Faulty Uterine Functions - The mere fact that goitre occurs much more commonly in women than men, would lead us to suspect that an intimate relation exists between the thyroid gland and the female generative organs. In this country it is rarely met with in the male sex. Out of about 50 cases seen by me 14 only occurred in men; one in Penrith, one in Wisbaw, one in Carlisle, and one in London. This proportion is even greater than that noted by other observers in England. In Hampshire County Hospital in a period of ten years of the 49 cases treated, all with one exception, were women. In Chichester Infirmary Dr Forbes informs us that out of 40 patients only two were males. At Bishopston Grange near Ripon, Dr Inglis out of 111 cases found that 6 only occurred in men; while Prosser in Derbyshire saw 50 cases, and none of these in man or boy. In Germany the proportion of males affected is usually given as about 15 per cent; but at Salzburg, Zillner found that of 96 men, and 184 women in adult life in the public charitable institutions, 21 per cent of the men, and 61 per cent of the women were affected with goitre. In Switzerland and some parts of India where the disease is more prevalent, the number of males affected is greater. Mr. Greenhow was of opinion that sex had no great influence on the disease, and Mr. Bramley found it as common in men as in women. These Indian observers also found that goitre occurred at any age, was sometimes congenital or affected children of tender years; but that it was most

Common

Common between 20 and 40, though even in old age goitrous tumours had been known to develop. Dr. McClelland thought that no authentic case of congenital goitre had ever been recorded, but that the disease began at any period of life after the age of three years, and never arrived at its full size sooner than 6 years from the time of its commencement, but generally was much slower, its progressive augmentation seldom becoming perfectly suspended during residence in an affected village. In this country goitre is said to occur chiefly between the ages of 17 and 24, and to be rare before puberty. Though 9 of my cases occur in young girls below 17, and a few of the others describe the disease as commencing a year or two before the onset of menstruation, still the majority assert that simultaneously with the development of that function the thyroid was noticed to increase in size, and all agree that about this time growth seemed more rapid. In 5 of my Penrith cases the patients themselves, or their friends, have observed distinct enlargement of the goitre during the menstrual periods; but the others are doubtful that any change takes place, though most of them complain of an increased sensation of fulness in the neck, and greater breathlessness, which afterwards passes off. Enlargement of the thyroid gland is also common enough at this time without disease. Dr. Dyllis says it is at puberty that goitre generally commences, and accounts for this by supposing that a surplus of blood is thrown into the thyroid in consequence of the diminution of the thymus gland which occurs at this period of life.

From his own observations he found that in by far the greater number the disease had commenced at or about the time when the Catamenia ought to have appeared; and, generally speaking, his patients had been irregular, the menstrual flow not having appeared till between the 16<sup>th</sup> and 19<sup>th</sup> year. (Treatise of English Bronchocele). In my experience enlargement of the thyroid seems more associated with an early rather than a delayed onset of menstruation. According to Dr. Reid, irregularity of the menstrual function has a very marked effect upon the complaint; and the majority of young females he saw with goitre were subject to some such irregularity. (Edin. Med. J. 1836 p. 57.) Dr. Copland has seldom met with an instance in the female unconnected with some kind of irregularity in the catamenial discharge, or disorder of the uterine functions; and he never saw a case in which the disease made its appearance before the period of commencing puberty. (Watson's Practice of Physic p. 498).

Dr. Hunter says, that the Bronchocele frequently appears two or three years before or after the commencement of menstruation, and that it sometimes spontaneously disappears when it goes on in a regular manner. (Cooper's Surg. Dict. p. 238) Suppression of the menses has been thought to act as an exciting cause of goitre, and a case is related by M. Brun where on the restoration of these, the tumour disappeared. Dr. Heath of Solway, records a case where a cystic tumour developed in connection with the thyroid gland. Its first appearance was coincident with a suppressed menstrual period, and it suddenly disappeared on the resumption of that

that function the following month." (Brit. Med. J. 1879, p. 428)  
 Cases also are recorded where goitrous tumours previously of considerable size have grown smaller when the menstrual flow has become fully established and regular. Dr. E. W. Jenks of Chicago, maintains the view that goitre has a close relation with the diseases of the female generative organs for the following reasons:—"Goitre is less frequently met with in men than women, the proportion given being 26 to 474; it first appears generally at the time of puberty; and the thyroid gland, whether diseased or not, often enlarges at the time of menstruation." He believes that goitre is due to some derangement of the female generative system, the derangement being oftener functional than structural." (Brit. Med. Journal, 1881).

Sudden cessation of other discharges, such as leucorrhoea and gonorrhoea, are said to have been followed by swelling of the thyroid. Vicarious menstruation has even been reported to have occurred from the neck. Be this as it may, enlargement of the thyroid gland seems occasionally to be associated with disordered uterine function, and not unfrequently disappears on this organ regaining its healthy action.

Relation to Pregnancy:—In those cases where the goitre does not develop at or near the time of commencing menstruation, it not uncommonly appears during pregnancy and all my married patients observed considerable increase in the size of the tumour at this period.

In countries where goitre is endemic pregnancy is one of the chief causes which favour its formation.

According to Foderé women who are not goitrous before marriage often become so in time of pregnancy. "During this epoch the sex in general is exposed to a swelling of the neck; the volume of the uterus pressing the abdominal and thoracic viscera is necessarily an obstacle to the free expansion of the lungs, from which it results that the air not having sufficient space in the bronchial vessels is introduced by many hidden channels to the larynx, and distends the thyroid gland and all the surrounding cellular tissue." In dry countries after delivery it returns to its normal state, but remains enlarged in goitrous countries." (*Traité du Goitre et du Crétinisme*)

M. Guizot has observed hypertrophy of the thyroid taking place in pregnancy, quite independently of the conditions usually considered to be favourable to the production of goitre. He records two cases which ended fatally, and the post-mortem examination showed great increase of the fibrous framework of the thyroid. Supposing this to be a correct representation of what takes place in other cases of enlargement of the thyroid during pregnancy, the author is disposed to regard it as only one of the manifestations of the excessive production of fibrine during pregnancy. To this is in great part due the progressive development of the uterus and mammary glands, and there is a simultaneity of production between these and the thyroid; and this is why he has been led to state that the hypertrophy of the thyroid body during pregnancy is one of the consequences, as it is one of the proofs, of the energy imparted to the fibrous elements of the system".

(*Archives Générales*, 521)

Dr. Inglis states that the greatest number of his patients noticed considerable increase of the tumour during pregnancy; and considers this to be due to the sympathy existing between the different organs, the uterus, and mammae, and perhaps also the thyroid, which even through the medium of the mammae might be ready to receive morbid impressions." (op. cit.).

The relation of goitre to pregnancy, and the marked effect that activity of the uterine functions seem to have in producing enlargement of the thyroid gland, are strikingly illustrated in the history of many of my cases. The invariable course of the disease might be described as follows:— "A woman has a goitre which has developed at or near the time of puberty. For a few years it continues to increase very gradually in size, or even remains stationary, till after marriage. The patient becomes pregnant, and soon after the thyroid begins rapidly to enlarge, sometimes attaining enormous dimensions, and causing great breathlessness during parturition. After labour it diminishes, sometimes to its previous extent, but oftener remaining a little larger, until the next pregnancy when again it rapidly assumes formidable dimensions, only once more to become reduced in size after labour. And this goes on each successive pregnancy until the age of child-bearing ceases and the climacteric is passed, consequent on which there usually follows a distinct and permanent diminution, the tumour in some instances entirely disappearing. As striking, though not so constant a history, is that

Of goitres in married women who have had no children. In these, two of which I have recorded, "no" special or rapid increase in the size of the tumour was at any time noticed, and if it increased in size at all, it was by gradual, constant, and almost imperceptible growth. It is true that the whole glandular system of the female is much more developed during pregnancy than it ordinarily is; and the probability is, that at this period the function of the thyroid, whether mucin-excreting or haemopoietic, is greatly increased.

When this stimulus of pregnancy is combined with powerful, <sup>or even slight,</sup> endemic influences, might not an enlargement, which in other circumstances would be temporary and physiological, become permanent and pathological, and in this way the ordinary form of goitre most commonly result?

### Influence of the Sympathetic Nervous System in the Production of Goitre.

The influence exerted by the generative organs on the thyroid gland is most probably through the sympathetic nervous system, from the inferior and middle cervical ganglion of which, its main nerve supply is derived.

M. Pincari in "Robin's Journal de l'Anatomie", points out the great richness of the gland in nervous filaments of all sizes. This is the more curious since the gland presents no remarkable indications either of sensibility or motility. No doubt the gland contains a large number of vessels, which require constantly many vaso-motor fibres, but the nervous supply is out of proportion to what may be supposed requisite for this

this purpose. M. Poincaré thinks this peculiarity accounts in some measure for the close relationship known to exist between the thyroid gland and the generative organs, and believes that many of them are of a sensory nature." (Lancet 1/4/61) p. 616.

Dr. Hawkes of Maidstone considers it has never been satisfactorily explained by what means the imbibition of hard water acts on a gland so remote from the centre of assimilation; and thinks it would simplify matters by regarding goitre as the outward sign of a peculiar form of disease, which consists of a tendency to relaxation of the walls of particular vessels under the influence of a morbid condition of the ganglionic system". It is more common in females, (1) because they are more sensible to the causes from their more delicate organization and habits of life; secondly, because they are habitually under the influence of the sympathetic nervous system in a far greater degree than the other sex owing to their uterine functions." (Lancet. 1/61).

Dr. Handfield Jones is of opinion "that goitre may with great probability be ascribed to a paralytic condition of the vaso-motor nerves of the thyroidal vessels" (Times & Gazette 1/64 p. 630)

Dr. Braxton Hicks supposes both exophthalmic and simple goitre to be the results of local congestions. The tendency to local congestions being greater in women, this circumstance accounts for the greater frequency of both these affections in the female.

M. Rivet believes that the "disease may possibly be due to some rheumatic affecting the vaso-motor nerves of the thyroid gland." (Medical Times and Gazette 2/48).

Dr. Noakes says, "The point of departure in the morbid process

process consists in a paresis of the vaso-motor nerves, which mediate the vessel area constituted by the thyroid gland. The source of this paresis is the sympathetic ganglia from which these vessel-nerves issue; and the outcome of such paresis is a chronic state of vessel dilatation as regards the area in question." He considers goitre to be due to a defect in the vaso-motor centres regulating the blood-supply of the thyroid region, which defect has acquired the maximum of intensity by long ages of breeding in, added to hygienic surroundings of the worst conceivable description. In exophthalmic goitre the vaso-motor paresis affects a wider range of ganglia. The immediate cause of goitre is in most cases reflex, the condition of the sub-centres being inherently weak by heredity, and the effects of an over-wrought civilization. A strong correlation exists between the thyroid and the genital organs, there being evidence to show that fibres from the cervical ganglia are in direct continuous communication with the ganglia which preside over the circulation of the genito-urinary organs." (Lancet 1/81 p.448).

Professor Laycock emphasizes this relation very strongly in his clinical lecture on the "Goitrous Diathesis".

After showing that the causes of goitre are purely endemic he states that about 90 per cent of the persons affected are women. "Where goitre and cretinism are endemic you have two classes of cretins, the goitrous and the ungoitrous. This difference depends really upon the difference in the development of the sexual organs. The ungoitrous cretins are the most completely degenerate, for they

they present no marks of sexual development even in adult age, being infants in this particular. Evolution of the body has in these cases been arrested either at the close of the first dentition (3<sup>rd</sup> to 4<sup>th</sup> year) <sup>or at the beginning of the second.</sup> We may therefore conclude that goitre is the result of the morbid actions of the sexual organs on the thyroid body; and that in 90 per cent of ordinary cases it is the ovaria which have this influence. This action, I think, must be through the nervous system upon the vessels which subserve to the nutrition of the thyroid body, these vessels being branches of the carotid arteries, and the nerves from the cervical sympathetic. When endemic causes are absent, those which act on the sympathetic or nerve-centres, are usually sexual excess and depravity. (Medical Times & Gazette 1/62 p.450).

If we suppose the supply of blood to the thyroid to be increased by dilatation of its arteries, and its cell elements to have their nutritive actions increased by the loss of controlling nerve influences, hypertrophy must clearly result.

Conclusion To whatever extent atmospheric, hygienic, or any other conditions may act as predisposing causes of goitre, I think with some reason we have come to the conclusion that the true "endemic" causes are to be found in the presence of salts of lime in the water, associated with iron pyrites in the soil; a theory which the occurrence of the disease as an endemic disorder at Weshaw and Penrith fully bears out. That heredity plays an important part in

in its production we consider to have been clearly proved; as also the fact that pregnancy often acts as an exciting cause. In pointing out the close relationship between enlargement of the thyroid and disturbances of the generative functions, we are more able to account for its greater prevalence in women; and in considering the powerful control which the sympathetic nervous system exercises over the gland, we can better understand how, under the influence of certain special agencies, hypertrophy results, and goitre is produced.

Symptoms of Goitre - By the term goitre we mean a tumour occupying the fore-part of the neck due to "hypertrophy" of the thyroid gland. As a rule this tumour is of slow and very gradual growth, causing little or no pain, and in many cases no inconvenience whatever.

In fact not a few of the patients I have seen with well-marked goitres have been unaware of the circumstance until their attention was specially directed to it; and some were not a little indignant at being told their necks were different from those of other people. The size of the tumour varies greatly; in some instances being of no great magnitude, in others attaining enormous dimensions. I have seen many cases in which the lobes reached right up to the ears. This is nothing, however, compared with cases which have been recorded in other countries, or is common in India. McClelland states that the usual size of a full-grown goitre in Oude is one foot

foot ten inches in circumference, including the neck; and about two feet from one angle of the lower jaw to the other of the opposite side. Dr. Whishaw in the same Presidency saw a remarkable case at the Government Dispensary in a woman, whose goitre measured nearly 5 feet in circumference, hung down some inches below the navel, and was a source of great pain and derangement of the health. (Lancet 1863). Mittelmeyer relates cases in which the goitre hung down as far as the umbilicus, and in one instance descended even to the knees. Gautieri describes some instances where the tumour reached to the pubes; and Alibert mentions one case where it extended to the middle of the thigh. The size of the tumour varies with certain special conditions. It has been observed to become more tense and swollen during the menstrual periods, and in pregnancy it often undergoes rapid increase in bulk; while the act of parturition seems temporarily to add greatly to its volume. External conditions seem also to influence it; for, according to McWhinnie and Foderé, it increases to an inconvenient extent in damp weather, and fluctuates considerably with the seasons, attaining its maximum <sup>size</sup> in winter and spring.

In shape the goitre varies greatly. When recent growth forms a soft elastic tumour with no definite outline, but afterwards the lobes become much more obvious. Generally the different individual parts of the gland can be distinctly made out. In goitres of great size, as a rule, the right lobe is larger than the left.

left, and the isthmus more or less affected.

The consistence of the tumours also varies, in some cases being soft and even fluctuating, in others very hard and resistant; while occasionally a part of the gland <sup>may</sup> become quite bony in hardness.

The goitre in itself is usually quite painless, and causes no discolouration; though not uncommonly large swollen veins course over it. In the majority of my cases, in addition to the deformity produced, there was also considerable breathlessness on exertion, but more particularly on excitement of any kind; while in some the noisiness of the breathing at night was so great as to prevent others from sleeping. This was always worst when the isthmus was affected. In none of my patients was goitre associated with heart affection, or any <sup>marked</sup> eye symptoms, and not even specially with anaemia. As a rule they were of good colour, strong, and able for their work; so that it appears that the disease is not inconsistent with a high degree of health in other respects.

Though not without some reason, goitre has been regarded by some in this country as but a slight disorder, and by none more than the patients themselves, still the serious and even dangerous symptoms it may give rise to, should always be borne in mind. The seriousness of the symptoms in no way depends on the size of the tumour; for in one form, known as suffocative or retro-sternal goitre, even when of small size fatal dyspnoea may be suddenly produced. The thyroid in this form, instead of being placed at the anterior part of the neck

neck, embraces the larynx and trachea, so that when hypertrophy ensues, these are constricted and death results.

In all instances goitre constitutes a deformity; and apart from this, its mechanical effects are often grave and even dangerous. When of considerable bulk its mere weight causes much inconvenience; and the movements of the neck are often greatly interfered with; the muscles, as we have seen in one case, being occasionally atrophied by pressure. Great distress and suffering may be produced by its interference with the circulation in the large blood vessels; and by the pressure exerted on the larynx, trachea, pharynx and oesophagus, even death itself may ensue. Sometimes the goitrous have head symptoms; headache, giddiness, noises in the ears, and congestion of the head and face; or they cough, cannot articulate, are unable to swallow, and above all complain of dyspnoea. Well might McClelland say "A mistaken notion appears to be entertained by some authors, who speak of the comparative innocence of the disease, and consider its unsightly appearance as its worst effects. Those who express themselves so, cannot have had sufficient opportunities of witnessing the misery entailed on the inhabitants of tracts of country in which the goitre prevails. There is no disease of which the people have greater dread, or from which they are more anxious to be relieved. It is true there may be little acute pain at first; the ultimate effects of the disorder are, however, scarcely less fatal than those of any other complaint to which we are subject; to say nothing of its complication with

with cretinism, the greatest of all afflictions." Even in England it has been looked upon as a serious disorder, for Dr. Inglis was of opinion that "at all events the probabilities of life are diminished by goitre inasmuch as it predisposes to diseases of the heart, phthisis and other affections of the lungs, with a tendency to apoplexy." I have seen one case in a boy at Carlisle, who was in imminent danger of his life from attacks of dyspnoea, caused by a small goitre affecting the isthmus; and I have attended several goitrous women in their confinements, when during the pains, their congested appearance and laboured, noisy respiration, were exceedingly alarming. In no instance have I seen that peculiar form of goitre known as "Cervical Goitre", which is said to result sometimes from the straining of parturition; and which, as it consists really of a sac containing air communicating with the trachea by an orifice more or less extensive, may very properly be called "Gutturis hernia." In regard to the state of the blood in goitre, Dr. Richard Keale found that in <sup>the</sup> all cases he examined the pale corpuscles were increased decidedly in numbers and also in size, showing the analogy between the state of the blood in this disease and leucocythaemia. The red corpuscles, however, did not appear to be diminished (*Medical Times & Gazette* 1854); and this has been corroborated by Dr. Henri Renne. A tendency to the haemorrhagic diathesis has also been noted, while flooding during childbirth is said to be not uncommon. (*Quain's Dictionary of Medicine*, Article Goitre).

### Treatment of Goitre.

In the treatment of goitre I have had little personal experience. It was with great difficulty patients could be persuaded to persevere in any course of treatment; but those who did so were evidently benefited by the external application of iodine (equal parts of the tincture & liniment), combined with iodide of potassium, or the syrup of the iodide of iron internally. The use of the red mercury ointment was in some cases followed by diminution in the size of the tumour to an appreciable extent. My results in regard to treatment are negative, however, as in no instance were my directions followed for any length of time. It is unnecessary to discuss in detail the many methods of treatment, both medical and surgical, which have been suggested. These vary greatly, from the charms worn round the neck by the simple Indians, and the ancient belief in the efficacy of burnt toads or of sea-water applied externally, to the more scientific means employed in the use of the electric needle, recommended by Dr. Althaus, and the hypodermic injection of various remedies. Of the many drugs given internally, perhaps those followed by most benefit have been iodine in the form of a tincture, iodide of potassium, alone or combined with the bromide, iodide of ammonium, chloride of ammonium, bromide of potassium combined with liquor potassae, fluoric acid, and various preparations of the salts of iron. Phosphorus, digitalis, ergot, and belladonna have also been employed.

The application of friction or pressure, and the use of various

various stimulating ointments, leeching, and blistering, have all been recommended in the treatment of goitre. The best results have followed the external use of tincture or liniment of iodine, or an ointment containing iodine and iodide of potassium; but above all in India by the employment of the Binoiodide of Mercury ointment & exposure to the sun's rays. Major Holmes and Captain Cunningham treated over 60,000 cases, and in only one case failed to make a complete cure (Indian Annals 1854). Mr. Greenhow used it in hot weather with like success; and Dr. Macnamara (Lancet 1866) gave it the following strong testimony "I have seen tumours of this kind extending from the chin to a line drawn from between the mammae, disappear after two applications of the Binoiodide of Mercury ointment". Major Holmes thought that the rays of the sun, either by some chemical action on the ointment or by causing its more rapid absorption, had much to do with the cures effected.

Injection into the tumour of solutions of perchloride of iron, sodium ethylate, ergotin, and iodine have all been suggested as most likely to produce rapid and permanent cure of the disease. Of these by far the most extensively used, and with the most successful results is the Tincture of iodine. So recently as March 28<sup>th</sup> Mr. J. J. in the British Medical Journal p. 653, gives his experience of this method in 33 cases. In all of these he succeeded in reducing the goitres considerably, the majority being perfectly cured in from three to six months; and in no case did he fail to reduce the circumference of the neck.

neck around the goitre by less than two inches. The one great danger of simple injection, as pointed out by Mr. Victor Horsley, is an extremely serious one; namely, sudden death, the real cause being the injection of the iodine & ferric chloride solution into one of the large veins, with instant thrombosis of the right side of the heart as a consequence. To avoid this would seem easy by attention to the following rule; namely, to test the possibility of having wounded a vein by waiting after the puncture for a flow of blood to indicate the same before injecting the fluid." (Brit. Med. J. 1885 p. 216)

In Mr. Jiv's hands injection has been "a most safe, successful, and comparatively painless operation."

The application of caustic seems to be a dangerous and painful method of effecting removal of the tumour; but successful cases have been recorded by Dr. Figg, of Williamstown, Australia, who used liq. Ferri. Perchloridi; Bennet who used Vienna paste; and Prof. Ollier who modified and improved the plan of the latter by dissecting down and exposing the wall of the cyst before applying the caustic, having previously separated the sternomastoid and fixed it to the skin. Of the many surgical means employed perhaps the most successful has been the introduction of setons into the tumour, first largely performed by Dr. Quadri of Naples, but carried out by many operators since. Simple tapping or incision of the gland has in some instances been followed by cure, but death likewise has also resulted. The tying of the thyroidal arteries with a view to

to cutting off the blood supply, has also been attempted, but with little satisfactory results. Short of removal of the gland, in urgent cases relief has been got by division of the cervical fascia, & of the muscles over the tumour, by excision of portions of the gland itself, and by division and removal of the isthmus. (Lancet 1875, Sir Duncan Gibb, 2 cases). Mr Sydney Jones states that this simple operation is performed by removing the isthmus between silk-ligatures; and that it is followed invariably by shrinking of the goitre, and no inoperable symptoms. (Brit. Med. J. Jan. p. 213).

"Complete extirpation" of the gland has been successfully performed in many cases, but the unanimous conclusion of the most experienced operators, without the knowledge of the after-results we now possess, was "that in rare cases is such interference warrantable; never for relief of deformity or discomfort merely; only to save life." Since the dire results following total removal of the gland have been pointed out by Köcher, and have been corroborated by experiments on animals by Mr Victor Horsley, we can fully agree with the latter when he says, that "under no circumstances is it justifiable to excise the whole gland for the ordinary adenomatous or firm cystic goitre." Apart from any special treatment complete removal of the disease has been seen to follow "change of residence" from an affected district; and M. Guyon (De la disparition du goitre par le changement de climat) records two cases where a voyage to Belgium from Santiago resulted

resulted in complete cure of the goitre."

A paper on Goitre would hardly be complete without some reference to its relations with Idiocy, and the kindred subject of Cretinism.

Relation to Idiocy - In regard to the former it appears that idiots are not more liable to this disease, than others living under similar health conditions.

Dr. Arthur Mitchell's statistics show that a lunatic - be he imbecile, idiotic, demented, melancholic, or maniacal - appears to have no predisposition to this affection in virtue directly of his lunacy, in so far at least as Scotland is concerned. ("Goitre in Scotland"; Br. Med. Chir. Review 1862.)

Relation to Cretinism - In regard to cretinism, had any doubt existed in my mind as to its close connection with goitre from the study of the various opinions of different authors, it would have been wholly dispelled by the very careful experiments of Mr. Victor Horsley, who shows that this pitiful condition most probably results from destruction of the function of the thyroid gland, a loss which the constant influence of certain special causes, intensified by hygienic conditions of the worst possible description, seems capable of producing.

In conclusion, may I express the hope that by reporting the occurrence of goitre as an endemic disease in a district of Scotland, where its presence previously has not been particularly noted; by recording cases to show its unusual prevalence in a district in Cumberland which is eminently healthy in every other respect; and

and by comparing carefully the physical characteristics peculiar to each, I have been able to throw some additional light on the causation of a disease at once so important and so interesting.

Allen Thomson, Sloan.

12 "Cases of Goitre" collected at "Wishaw" during the winter 1882-1883. (Edin. Med. Journal, July 1883 p. 30 et seq.)

Case I. C. D., a nervous, intelligent little girl, aged 9, whose parents have resided in this neighbourhood for eighteen years. About a year ago the goitre commenced in the centre of the neck as a small swelling the size of a marble, and it has gradually increased in size till now a large three-lobed tumour occupies the thyroid region. Each lobe is equally enlarged, about the size of a hen's egg, that formed by the isthmus being very distinct. The swelling is hard, elastic, and non-pulsating, while over it the heart sounds are heard very distinctly, especially over the central lobe. A marked feature in this case is the embarrassment of breathing, worst on exertion and when she is excited or speaking rapidly. Throughout the night the breathing is so noisy as to keep her parents from sleeping, and when she has a slight cold they have to sit up with her. There is no exophthalmos, but both pupils are dilated, the right more than the left. Pulse 100.

Case II. J. C., 12 years of age, noticed a swelling in the thyroid region about a year ago. The right lobe is larger than the left, and very soft, the isthmus not at all enlarged. The heart-sounds can be heard over the left lobe, and are quite normal, as is also the pulse-rate. The tumour has diminished by painting with iodine.

Case III. S. C., sister of the above, aged 14, is very anaemic, and with an elder sister is being treated for chlorosis. In her case there is a soft, indefinite swelling in front of the neck; the right lobe is slightly larger than the left, and the isthmus also is affected. There is no exophthalmos in either of these cases. Their parents have been life-residents in this district, and both their mother and grandmother had enlargement of the thyroid. In the former it came on after the birth of her fourth child, but never attained any great size, and occasioned only slight breathlessness. In the latter it was much larger, and caused great inconvenience till her death from heart disease at the age of 53.

Case IV. J. S., age 15, a strong, healthy, rosy-cheeked girl, first noticed her neck begin to swell about three years ago. Since then it has gradually increased in size till within the last three months, when she came under treatment. The swelling is large and very soft; the lobes are of equal size, but there is no enlargement of the isthmus. There is no pulsation, but on auscultation marked bronchial breathing can be heard. The breathing often becomes so noisy during the night as to prevent those in an adjoining room from sleeping.

There is great breathlessness on exertion, but no exophthalmos while the pulse and heart sounds are normal. This case is interesting from the great size of the goitre, and also from the fact that consanguinity may have something to do with its causation. The mother is said to be imbecile, and the girl is a natural child by a cousin.

Case V. - B. J., age 16, a pale, rather anaemic girl, noticed about two years ago. The enlargement of the lobes is very distinct, the right being about the size of a hen's egg, and larger than the left. The isthmus is not affected. She complains of breathlessness on exertion. In this case there is distinct heredity.

Case VI. - E. H., aged 17, a strong, healthy girl, complains of a soft, indefinite swelling on the neck which began about four months ago. The isthmus is more enlarged than the lobes. No inconvenience is caused, except when she wears a tight-fitting dress. The girl's mother died of exophthalmic goitre a few days ago.

Case VII. - J. S., age 17, an engineer, complained of great breathlessness. The thyroid gland is enormously enlarged, the right lobe, if anything, a little more than the left, the isthmus not much affected. The swelling began about two years ago, and has gradually increased in size since. Now it is very soft, but no pulsation can be felt over it, though the heart sounds are heard very distinctly. The patient lives at Cleland, a village three miles away, but was born in Mishaw, and lived here till seven years ago. There is no family history of goitre.

Case VIII. J. C., age 24, married, and with two children, states that the swelling was first noticed when she was 12 years of age, and has gradually increased in size since, but much more rapidly after her marriage four years ago. Till lately it caused her no inconvenience, except from the curiosity of her neighbours, but now there is breathlessness on exertion, and still more on excitement. The swelling is of great size, the right lobe much larger than the left, while the isthmus is also much enlarged. There is no exophthalmos; the heart sounds are normal; pulse 86; and when at rest she breathes quietly. She is one of a large family, but no other member is affected with goitre, though a cousin of her own age has one which developed at the same time.

Case IX. B. M. P., age 29, married, first noticed it about four years ago, after her second confinement. Now the thyroid gland is greatly enlarged, the right lobe considerably more so than the left, the isthmus only to a slight extent. She complains of palpitation and breathlessness on exertion. Most marked is the noisy, rapid, bronchial breathing, which can be heard at some distance from the patient, and is greatly increased by excitement. So well is her case known from this fact, that many have asked me if I had seen Mrs. McPherson. There is no exophthalmos, and she is a strong, bright-complexioned young woman. Her mother had a goitre, also of great size; while her brother, aged 30, suffers from distinct enlargement of the thyroid, which causes considerable breathlessness on exertion.

Case X Mrs. A., aged 30, noticed the thyroid gland begin to enlarge when she was 15, said to be due to a fright after the loss of a pound-note. The swelling is soft, situated exactly between the sterno-mastoids, and is due to enlargement of the isthmus, the lobes not at all affected. She states it becomes considerably larger during pregnancy, and that she suffers much from breathlessness on exertion & when she catches a slight cold. A sister of hers, aged 18, also suffers from goitre, which began when she was 15, while their mother has also enlargement of the thyroid, now much less than it was formerly. There is no exophthalmos in either of these cases, and the heart-sounds are quite normal.

Case XI Mrs. Y., age 45, married, has four sons, and one daughter who suffers from goitre. She noticed her neck begin to swell when she was 10 years of age, and it grew to a considerable size till she was 26, when she came under treatment. Now there is a soft, ill defined swelling, formed by both lobes of the thyroid, which are equally enlarged; the isthmus is not affected. There is slight exophthalmos, and the pulse is 106. There is distinct heredity in this case, her mother and sister both being affected with this disease. All the above have been life-residents in the district.

Case XII B. J. age 72, has lived here for forty years, and before that resided for seven years in Carlisle. The goitre began forty-two years ago as a slight swelling on the right side of the neck, and gradually increased in size till now it is fully as big as her head.

It has never caused the slightest inconvenience except from the deformity it occasions. Now a large tumour occupies the whole of the front and right side of the neck, extending from the chin to the sternum. At its broadest part it measures 15 inches, while from above downwards it measures 10 inches, the whole circumference of the neck being 22 inches. The distinction between the right and left lobe can be easily made out, and the isthmus does not seem to be specially affected. The tumour hangs over to the right side, and the right lobe is much larger than the left. Over its most projecting part are a few dilated capillaries. It is of firmer consistence than in any of the other cases, and no sounds whatever can be heard over it on auscultation. Patient has had three sons and three daughters, none of whom have goitre. She is a thin but very healthy old woman, having been, as she herself expresses it, throughout life "as strong as a horse". It is wonderful how little inconvenience such a large growth has produced.

Interesting to note in the above cases is the various ages at which they occur.

R. Sloan.

## Authorities Consulted

History of  
Goitre.

- Hippocrates "Aphorisms," "On Epidemic Diseases" "On Air & Water"  
(Eydenham Society Translation)
- Pliny "Natural History" Book 37; chap 11. Book XI chap. 68.
- Aristotle's "History of Animals" Book 8, chap 21.
- Paracelsus "Encyclopaedia Britannica" vol VI art. "Cretinism".
- Ambrose Pare' English Translation (Johnson) 1634.
- "Du Cretinisme" Saint Leger; & the various authorities following.

Geographical  
Distribution

- Marco Polo "Account of his Voyages" (1298.)
- Thomas Gage "A new Survey of the West Indies (1699)
- Mungo Park "Travels in the Interior of Africa" (1799)
- Forster George "Capt. Cook's Voyages round the World" (1779)
- Humboldt's "Travels in South America"
- Marsden's "History of Sumatra" (1784)
- Coxe William "Travels in Switzerland (1794)
- Warden "Description of the United States" (1820)
- Goldon Laing "Travels in Sumatra &c" (1825)
- Richardson "Franklin's Narrative of a Journey" (1828)
- Hall "Travels to Chili and Peru" (1824)
- Bennet "Ceylon and its Capabilities (1843)
- Bakewell "Travels in the Tarentaise" (1821)

and the various Indian authorities.

- Greenhow "Indian Annals of Medical Science vol XII
- Mouat " " (1857)
- McClelland "Medical Topography of Bengal & N.W. Provinces (1859)
- Blamley & Campbell "Calcutta <sup>Extracts from</sup> Medical Transactions (1833, 1835).

The French Authorities consulted have been chiefly from  
 the "Comptes rendus acad. des sciences" namely,  
 "Sur le goître chez animaux domestiques", Baillarget, 1862  
 "Sur le goître" Maignien, 1842  
 "Note sur le goître" Gujon 1845-1862  
 " " " " Casaseca 1853  
 "Recherches sur l'icte" Chatin 1850-1851  
 " " " " Marchand 1850

also

"Traité du Goître et du Crétinisme" (Fodéré)  
 Du Crétinisme Saint-Lager  
 Traité des Dégénérescences Morel.

### English Authorities

The various Medical and Surgical Journals mentioned in  
 Neale's "Medical Digest" but continued up to the present date,  
 these including the

"British and Foreign Medico-Chirurgical Review"  
 The Lancet from 1837;  
 The Medical Times & Gazette from 1850;  
 "Rankin's Abstract and Braithwaite's Retrospect"  
 British Medical Journal

I have also consulted several numbers of the "American  
 Journal of Medical Science" and the following papers in  
 the Edinburgh Medical Journal.

Bayer's "Topographical Sketch of Appleby" 1821, vol 22.  
 Marshall "Sketch of the geograph. dist. of Diseases" 1832, vol 38  
 Reid "On the History and Causes of Bronchocoele" 1836, vol 46  
 Reue "Some Remarks on Crétinism" 1809.

