Göthe -

A critical Essay on the subject of non-malignant Bronchocele with special reference to its Anatomy and Treatment.

by


April 1896.
Luis timidum putus miatus in Alpinibus.

"Juvenal."

Who would believe that these were mountainous Jews, lapped like bulls, whose throats had
hanging at them,
wallets of flesh.

"The Tempest." Act III.
History of Goitre

Hypertrophy or non-malignant enlargement of the whole or part of the thyroid gland is a pathological condition which has been observed and recorded in the literature of medicine from the most remote periods; and, bearing in mind the fact that the condition is not infrequently associated with, or accompanied by, a train of secondary symptoms of a grave character, and, the gland affected being one whose functions are but little understood, it is indeed little to be wondered at that the condition should have attracted the attention of all observant writers in medicine, who have each and all in turn attempted to assign some particular factor as the determining cause of the disease. Hippocrates in writing of this malady as early as 400 B.C. attributed it to the use of sea water. Pliny the Roman naturalist observed its prevalence amongst the inhabitants...
of the Italian Alps.
It was also noticed by the Arabian
physician Abiacasis. Paracelsus in
Switzerland at the close of the fifteenth
century attributed it to the presence of
calciophile iron in the drinking water
which theory was upheld by Saint
Lazur as late as 1867.
The disease was extensively noticed
and described in the seventeenth and
eighteenth centuries — vide — "An
account and method of Cure of
Bronchocele or Derby-riek in Country
1769." (Proser).
Amongst the writers of the early part
of the present century may be mention
Albert (Paris). Luigi Porta (Milan).
A. C. Hutchinson (Ind. Chir. Trans. 1855,
pp 235 et). Courdel (Geneva). Francon
(Rotterdam). Mc Clelland (Medical
Topography of Bengal). Dr J. D. Macnamara.
Dr. Saint-Lazy — and — still more
recently we may associate with the
disease the names of Dr. Hilton Fagge.
Sr. Odd, Sir W. Jull, Prof. Koch, Prof. Belis&shy;ski, Samuel Tein (Paris) 1887.
Schoeberle, Reverdieu, Dr. James Bery
and many other writers of this century.

**Footnotes:***

Though *gutta lac.-throat* is the common name by which all non-malignant enlargements of the thyroid gland are known, various other names have been given to this malady. It was known to the Greeks as 
*Bronchocele* (*βρονχοκόλα* = windpipe. *κόλα* = tumour). Other writers have variously termed it *Tracheocele*, *Thyreocele*, etc.
Whilst from the fact that it occurs endemically in certain districts it has been given typical names e.g. *Derbyshire neck* - *Northdale neck* etc.

(The disease known as *exophthalmic goitre* is not dealt with in this paper.)
Clinical Character.

The disease occasions a swelling in front of the neck, in the situation of the Thyroid gland; it may be a slight general enlargement only but often it is great and irregular, one or both lobes or the isthmus being chiefly affected: occasionally the two lobes and isthmus are symmetrically enlarged; the right lobe is generally more affected than the left.

Exceptionally an accessory lobe may be present and may become hypertrophied. The gland in rare instances assumes a gigantic size, weighing as much as seven or eight pounds (Todaro), and reaching to the middle of the chest, but, more commonly the swelling is of more moderate dimensions and is then situated in the normal position of the Thyroid gland.

The skin covering the tumour is, as a rule, smooth and in appearance, with the exception that occasionally through it can be seen dilated and tortuous.
venous trunks.
To the feel, the tumour is usually soft but may be firm (fibrous) or even hard (calcareous or cartilaginous). It is not tender to the touch, and, in the majority of cases, is unaccompanied by pain. When large cysts occur, fluctuation can usually be elicited.

The enlarged thyroid follows the movements of the larynx in swallowing; when very vascular, it pulsates synchronously with the cardiac system. A soft brachial bruit can very frequently be heard over the tumour, which is probably accounted for by the dilated state of the vascular trunks. Apart from the natural hollow in the neck being more or less filled in by the presence of the tumour, the general appearance of the patient remains frequently unaltered, but there is I think in most cases when the enlargement is of long standing a peculiar and characteristic expression.
of apathy" while I have frequently noticed amongst those affected in the portions districts of Cumberland and Derbyshire.

Added to this may be a greater or less degree of exophthalmos which in my experience occurs in a large proportion of cases of simple hyperphtheliomatous goitre at some stage of its growth, frequently at the first onset. I have not observed the presence of Von Graeff's sign in cases of simple goitre.

Progress.
When the disease has begun it may remain stationary at any period of its growth, or it may increase with almost any degree of activity, as a rule it grows slowly.
It often continues during the whole term of life. Though in some cases it shrinks as age advances.
The enlargement may be subject to temporary increases in size as during the course of any intercurrent affection,
P. Macnamara; according to Macnamara, it is subject to an increase in size during the rainy seasons in malarial districts. In the great majority of cases foetid does not tend to shorten the duration of life. In some instances, especially in the young, it may cause death by pressure upon the trachea. In elderly people although foetid is less often the direct cause of death it sometimes does shorten life very considerably by diminishing the calibre of the trachea so much that should Bronchitis or some other similar disease supervene the patient has a much smaller chance of recovery.

**Pressure Effects.**

In the majority of cases, apart from the disfigurement, no unpleasant effects result, the disease being simply a deformity, in others present upon the neighbouring organs as the oesophagus, trachea, carotid arteries, laryngeal nerves.
It may produce definite symptoms, occasionally of a very marked character. The severity of these symptoms has more relation to the rapidity of the growth of the tumour, the age of the patient, the position of the enlarged etc. than to the actual size of the joint.

Let us now take these pressure effects in detail.

1. Pressure on the trachea, in itself, the most frequent and at the same time the most dangerous effect of joint.

It is most commonly observed in the young, which is accounted for by the small amount of resistance offered to the growth by the soft cartilaginous rings of the trachea. I have seen a case of joint in a young adult who was admitted into the Cumberland Infirmary with symptoms of urgent dyspnoea. The lumen of the trachea was reduced to the most crucial, the removal of this joint resulting in a
complete relief of the symptoms; on the other hand another similar case who was admitted into the Cumberland Infirmary in 1872 died from suffocation whilst the point was being exteriorised by Dr Maclean.

This pressure upon the trachea although in itself frequently a cause of, respect, and occasionally fatal, dyspnoe is apt to become rapidly intensified in cases where the patient commences some intercurrent affection which increases the air-hunger - as - Bronchitis, Pneumonia etc, in such cases the limited capacity for the entrance of oxygen may cause the patient to become very rapidly cyanosed, and such case I have had recently in my own practice. When the embarrassment to respiration is in a case of acute bronchitis caused by a large point suggested the advisability of performing a trachestomy below the enlarged thyroid. Besides compressing the trachea another of the effects of point is to displa...
the trachea to one side or other, and extreme cases of distortion have been recorded when the trachea has been reached with considerable difficulty when it was necessary to open it owing to the urgency of the symptoms.

Pressure on the Carotids may seriously interfere with the blood supply to the Cerebrum.

Pressure on the Oesophagus.

Dysphagia is much less commonly observed than dyspnoea as an accompaniment of poisoa, but that it does sometimes occur we may note that Dr. Thomas Watson has recorded a case of chronic starvation from the pressure of a joint on the oesophagus. It is more likely to occur in cases when the lateral lobes extend slightly behind the trachea, how it can readily be understood that any increase in size would at once press upon the oesophagus and so impede the act of deglutition.
Pressure on the Recurrent Laryngeal Nerve
occasionally produces symptoms of
dyspnoea for, although this branch of
the Vagus supplies both the abductors
and adductors of the Vocal cords it is
known experimentally that mechanical
stimulation of the crico-thyroid nerve causes
closure of the glottis from the fact
that the adductors overbalance the
abductors, should the pressure be just
or long continued it may cause par
alysis of the vocal cords, though I do
not know if a case being recorded where
there has been complete paralysis of all
the muscles from a non-malignant
enlargement of the Thyroid.
In the early development of the thyroid it is first noted as a double diverticulum, very similar to the lungs, on the ventral surface of the anterior part of the alimentary canal, but unlike the lungs the passage connecting it with the throat becomes obliterated and it remains a ductless gland on either side of the trachea imbedded in front by a narrow isthmus of gland tissue. In structure the normal thyroid consists of a number of isolated sacs bound together by connective tissue which latter, coming from the capsule of the gland, fuses between, and holds together all these little sacs. Each sac consists of a layer of cubical or low columnar nucleated cells and is filled with the jelly thyroid fluid. The thyroid is richly supplied with blood vessels from the superior and inferior thyroid arteries, the lymphatic system is also well represented in the connective tissue.
Frequently in place of the clear fluid the alveoli contain colloid. When enlargement of either part or whole of the thyroid occurs, putting aside the cases where it is either malignant or the accompaniment of Graves' disease, it may be the result of one or other of the following conditions.

1. Vascular, from the increase in the size and number of the blood vessels.

2. Simple hypertrophic, from a simple increase in size of the normal gland tissue and connective tissue.

3. Cystic, from the distension and confluence of a number of alveoli.

Although the above classification has been used for the sake of convenience it must be clearly understood that in a large proportion of cases of thyroid enlargement we have to deal with a combination of two or more of the above conditions.
Vascular. As has been mentioned above, the thyroid is a remarkably vascular organ, deriving its supply from the superior and inferior thyroid arteries and being drained by large pleurels of veins which empty their contents into the superior, middle and inferior thyroid veins. These venous trunks are subject to occasional or periodic engorgements as during the menses, pregnancy etc., but they may also become permanently enlarged, occasionally almost aneurismal leading to a hyperaemic enlargement of the thyroid. And indeed in most cases of enlargement of the thyroid there is a certain amount of increased vascularity.

Hypertrophy - a simple increase in the normal gland structure and connective tissue. This is frequently spoken of as simple goitre but in a large proportion of cases it is found to be accompanied by the other conditions - increased vascularity and the presence of cysts.
Cystic cysts, generally the result of the distension and coalescence of enlarged vesicles, so that when the cysts are small their walls resemble the walls of the normal vesicles in structure. In cases of older standing however the walls may become more fibrous and so altered as not to show the original structure. The contents of the cyst may resemble the normal mucin-like substance contained in the normal alveoli, but more frequently the contents undergo degenerative changes, blood may be effused, and fat, cholesterol etc may be deposited.

Secondary changes are common in most cysts, as has been stated above, blood is often extravasated, portion or may break down into a softened coiled mass or may become necrosed, whilst centrial cicatisation is very common. (Belchoth.) Cartilaginous and calcareous deposits often occur and occasionally to such an
extent as to form a distinct shell-like cyst-wall. Rarely, a joint may become inflamed and suppurate, and Mr. F. Hutchinson has reported a case in which, after suppuration, a large shell-like cavity was exposed which moved up and down during inspiration.

**Aetiology**

**Sex.** In England joints is far more frequently met with in women than men—roughly in the proportion of 12:1. In France and Switzerland there is not the same disparity in its frequency of occurrence in the two sexes, whilst in some parts of India it is stated that it is more commonly met with in men than in women, though statistics on this point are imperfect from the enforced seclusion of the native women.

**Age.** Joints may begin at any age, it has been found at birth and I have at present a child (7) aged two under
treatment with a well marked en-
largement of the thyroid. As a rule,
however, it commences after puberty
and occasionally in women it is
first noticed during pregnancy.

From the endemicity of goitre in various
localities numerous suggestions have
been thrown out as to the supposed
causation of the disease.

Snow-water. Amongst the earliest
suggestions as to its aetiology is that
of Hippocrates (400 B.C.) who attributed
it to the use of snow-water, which conclusion
was the result of a too
limited experience it may be mentioned
that goitre is not uncommon among
the Malays of Sumatra where snow
is unknown.

Want of air and sunlight have also
been adduced as causes of goitre but if
so, surely we ought to find it prevalent
amongst those whose occupations deprive
Then of such, in my own practice in East Derbyshire, gout is very prevalent amongst the women, but I do not recollect seeing a man in that part affected with it, yet the majority of the men work in the coal pits, where, especially in the winter months, they hardly see the sun from one day to another: the horse, too, that work for years in mines, and never see a ray of sunlight, are not, I am informed, affected with the disease; nevertheless horses, as well as the domestic animals are, like man, subject to gout in districts where it is prevalent.

Exposure of the neck is in many places assigned as a cause of gout, the great prevalence amongst females is by some attributed to this, and Dr. Hall observes that "in Kumaon (India) a covering for the foot, generally of some fur, is used by the natives as a preventive of the disease and for the cure of incipient cases."
Carrying of heavy weights, by altering the circulation in the head and neck, has by several been brought forward as a frequent cause of enlargement of the thyroid, but weight-carrying on the head is of so very infrequent occurrence in many districts where goitre is prevalent that it may be dismissed as being by no means an important factor in the causation of thyrocele; nor do I know that it is specially frequent amongst women who are accustomed to carry specially heavy weights from the head of the Reeshaven fisheries!

In many a Gordon population will certainly tend to perpetuate the prevalence of goitre.

Malaria. Dr. Macnamara assigns a malarious origin to the disease. The reasons for doing so are:

(i) The prevalence of goitre in known malarial districts.

(ii) The frequent temporary enlargement
of the joints and spleen in the rainy
season.

(iii) The supposed analogy between the
thyroid and spleen.

(iv) The occurrence of the two diseases
in the lower animals.

So intimate does he think the relation
between the two diseases to be, that he
even goes on to say: "I have occasionally
met with cases in which rapid en-
largement of the thyroid is associated
with fever in a way which resembles
the more constant association of fever
with enlargement of the spleen.

His theory is somewhat supported by
the reports of many of the Medical
Officers of that district who frequently
have a connection between joints and
malaria. Against this theory must of course be
ranged the prevalence of joint troubles
and countries where malaria is practically
unknown.
Wala. From the most ancient periods, the favourite theory as to the causation of jolith has pointed to the drinking water as the cause of the disease, and, indeed, at present there is, alike in the minds of the profession and laity, a general consensus of opinion that endemic jolith is due to some constituent of the water in the district. As to what the actual constituent, which is the cause of the mischief, may be, we have again a diversity of opinion: the various salts of lime, destruct of iron, iron, organic matter, lack of soda, etc., have all been blamed by different authors.

That looking on potable water as the cause is the correct view is proved by the following facts:

(a) All the epidemic (so-called) of jolith can be explained through the agency of drinking-water. The epidemic which occurred in mid-ocean amongst Capt. Cook's crew only attacked those who drank a certain water, the others being
made use of the original supply was not attacked.

(3) In Italy and in France the drinking of certain waters has been resorted to with success for the purpose of producing poisons and thereby gaining exemption from military conscription. Telles sont, en Pessac, les sources d'Argentini, de Contamafay, de Villard Clement, dans la Biscarrosse, la source de Saint-Chaffrey. S. Laga has investigated the truth of the statement and found one individual who avowed that he himself had proved the efficacy of the potherous water of Villard Clement. Hacquit corroborated the above by experimenting upon himself with the waters of Krielfbrennen (poison spring). Yet de Jamie had a fellow student who avoided military service by this device.

I. Change of water has often, in a potherous district been followed by disappearance of the swellings in the neck. If Johnson's joint disappeared in Durham after change to a pure water.
(5). On the other hand, a development of the people in a previously non-jointed district has been known to follow change of water. Billroth attributed the recent increase of joints in Vienna to the introduction some years ago of the new water supply from Kaisermun in Styria when joints were prevalent.

(6). Many cases have been recorded by Dr. Lauer and Mr. Clelland, when in the same village and under the same conditions of social life and locality those who drank a particular water suffered, while those who did not do so escaped, e.g. in the village of Desta in the province of Kemen, south of the Himalayan mountains.

Let us now inquire into the various mineral ingredients present in potable waters which have at various times been assigned as the determining cause of joints. It will I think be granted that before any one ingredient can be looked upon as
the causes of the disease it should be found to fulfill the following two conditions.

(1) The specific ingredient must be present in the potable water of all goitrous districts.
(2) It should be possible to produce goiter artificially by the internal administration of that specific ingredient.

Amongst the various salts to which has been attributed the prevalence of goiter are:

(a) The various salts of lime as the carbonates, sulphates, etc.

(b) Salts of magnesia - sulphate, bicarbonate.

(c) Iron - especially the protoxide.

A glance at the geographical distribution of bronchocals together with a consideration of the geological formation of the various goitrous districts should be of assistance in clearing up the mystery as to the causation of the disease.

And it will be found that goiter has an exceedingly wide distribution and that in no way does it restrict itself to any one formation.
Amongst the countries where it is most prevalent may be mentioned.

In Europe, England, France especially in the Savoy, Germany in the Black Forest, Austria especially Styria, Italy in the valleys of the Alps, Switzerland in the region of the Valais, Russia in the Altai mountains, Po Plain of Lombardy.

In Asia, western parts of Siberia, western China and Tartary, in Bengal along the line of the Himalayas, in India, and in the island of Sumatra.

In Africa, Barbary, Kamerun by Lake Tanganyika, Lofou and Reuine districts.

In S. America, in Peru, Humpshire and along the Sastalchewan swis.

In S. America, along the Magdalena river at the base of the South American Andes, and down to the North of Patagonia.

All these countries have been worked at with - in some cases - most elaborate detail, and it is quite impossible even to
epitomise the researches of the various authors in different countries, our own country has been studied from a geological standpoint with the greatest care and so it, in a comparatively small area, exhibits a very diverse geological formation, we cannot, I think, do better than glance at the prevalence of fossils in the various formations in a descending order.

The Tertiary rocks of England occur in two areas forming the London and Hampshire basins and in both of these areas the disease is met with but sparingly. The Nesswi or secondary is however more productive of the condition under consideration, over the chalk fossils appear to prevail to a very slight extent but tolerably uniformly. On the upper greensand and fault it is but rarely met with, whilst on the lower greensand it is said to be of fairly frequent occurrence. In the Weald clay area, especially in the hilly regions fossils are tolerably common.

He came next to the region of the oolites...
By the majority of writers described as a district almost barren of fossils with the exception perhaps of Hensley in Yorkshire, but Mr. Berry has not found this to be the case, he says: 'I have found that fossils are tolerably common upon the oolites, and is especially frequent in villages situated just at the junction of the oolites with the lias.'

The lias formation is with the exception of the upper layers which underlie the oolites — not productive of fossils.

Magnesian limestone is commonly believed to be especially associated with fossils but again Mr. Berry has not found this to be the case, indeed, in some of the magnesian limestone districts of Notts., as Mansfield he describes it as occurring 'with extreme rarity.'

The next series of rocks that engage our attention is the Primary formation, largely consisting of the carboniferous limestones at the top of the series come the coal measures and upon them fossils occur to a considerable extent; it is very
prevailing in the region of the midland coal deposits as also in those of West Cumberland and perhaps with less frequency in South Wales.
It is commonly stated that johren is very common in the coal district of Derbyshire in which the rocks consist chiefly of the Millstone grit and Jorendel works but, as a matter of fact, johren is much less prevalent in the Coal district than on the Carboniferous limestone further south or on the coal measure in the east of Derbyshire.

The Millstone grit formation is the source of water supply to so many of the towns in the North of England that the absence of johren from it becomes a matter of considerable importance.
The Carboniferous limestone deposits of England constitute perhaps the best bed of johren as may be seen in Derbyshire in the neighbourhoods of Wirksworth, Cromford, Matlock, Ashbourne, Bakewell and Middleton.
Johren occurs but sparingly over the region...
of the Devonian or old red sand-stone and the same may be said of the silurian, cambrian and oolitic rocks and indeed in the island of Anglesea it is said to be unknown.

From the foregoing it will be seen that gout is distributed over a very large surface of this country. Its coincidence everywhere with calcareous rocks, which are also very widely distributed in England, is one of the most marked features of its distribution. It will perhaps also be interesting to note that in India there are wells, the water of which is reputed as a cure for gout; one in particular at the Soorjoom factory in the Dipaul Trevi district of Eastern India bears such a reputation amongst the natives who suffer largely from gout, and come from some distance to take water from them. Dr. Coates analysed the water from these and found that they contained an abnormally high proportion of lime and magnesia.
It is not only upon limestone but also upon calcareous sandstones that joint is found. Whether it ever occurs as an endemic disease upon non-calcareous rocks is at least doubtful. The greywacke, metamorphic, Cambrian, silurian, Devonian, and also millstone grit rocks appear to be mainly free from the disease.

Grantid however that joint is specially prevalent in districts which an calcareous in their formation we have yet to discover what is the special ingredient of these calcareous rocks which leads to the disease, and here we must confess our ignorance. The various salts of lime, iron and magnesia have been put forward but they have all failed when put to the crucial test of endeavouring to produce joint artificially by means of each particular ingredient. The lower animals as the horse, dog, sheep, goat, pig, mule, antelope etc. what also suffer from joint, and indeed an subject to the same train of symptoms on being deprived
Of by operation of the thyroid gland have been experiments upon but with only very imperfect results.
Dr James Berry concludes the first of the very admirable lectures with these words: "For my own part, I am inclined to believe that the cause will be found to be in one of the mineral ingredients of drinking water, probably not a salt of iron, but possibly one of the alkaline or alkaline earths, not lime or magnesium. I put forward this belief however with the utmost diffidence and hesitation, feeling that at present such evidence as I have does not warrant me in expressing a strong opinion upon the subject."
This is I believe the standpoint of most clinical observers of the present day.
Diagnosis

As a rule the diagnosis of goitre is a matter of no difficulty; the enlargement in the neck that may most easily be confounded with simple (i.e. non-malignant) enlargement of the thyroid is:

(i) Malignant disease of the thyroid.
(ii) Aneurism of the Carotid or Thyroid vessels.

The history of the case, the implication of the neighbouring lymphatic glands, the presence of pain and the rapid emaciation will soon enable one to clear up any doubt that may have been as to the nature of the case.

While the situation and attachments of an aneurism and the character of its pulsation should to a careful observer be sufficient guides to the true character of the condition.

A point to be noted is the occasional enlargement of so-called accessory thyroids in the neck, one must be on one's guard
against confounding these with tumours of skin nature, even greater difficulties may present themselves when such accessory masses of thyroid tissue are situated near the hyoid bone, behind the sternomastoid muscle, between the hyoideus and omohyoides etc.

It will therefore be advisable to remember in every case of tumour of the neck, the possibility of its being an accessory goitre.
Alveid disease and results of removal of the thyroid in man and the lower animals.

Joint is, as has been mentioned above, often accompanied by a train of accoutant symptoms, nervous and otherwise, which bear such a close resemblance to the symptoms produced by certain other disorders as to lead one to suppose that there must be some intimate relation in the pathology of these conditions.

Cretinism (Chattanee = chagrin) (Pile = chalk). 

Joints have a close relationship to cretinism. These cretins abound, these also we have joints; the converse of this does not so necessarily follow for there are many districts where cretinism is unknown.

It has been estimated that about one half to two thirds of the cases of cretinism are fortunates and it has been supposed by many authorities that joints is the first step to cretinism, or, in other words, that, if the cause which produces joints be intensified it would result in the
It has been noticed that when a family migrates into a place where both diseases are not rare, joint is the first to appear; it is only in the second and third generation that syphilis present themselves. Whilst many syphilis are jointless, others are entirely destitute of a thyroid gland. There is therefore a close relation between the two diseases, but what that relation is, and on what common cause they both depend, is a question which is, in the present state of our knowledge, most difficult to decide.

Hyperodema, which has been called by Sir W. Full a syphilitic condition of adults, has well-defined symptoms which are described in the Third Edition of the Principles and Practice of Medicine by Dr. Smith, as follows:

"It is characterized by a change in the features which become broadly flattened..."
The eyes appear too wide apart, the alae nasi become thick, the lips large, the connective tissue below the eyes loose and baggy and that under the jaws and in the neck loose and thrown into folds. The tongue is so large as to embarrass articulation, and interfere with wearing false teeth. The hands are broad and spade-like. The texture of the skin becomes smooth and the hair thin and scanty while individually they are thick and coarser than before. The general hue is pale, sometimes of a dirty white, resembling the cachexia caused by malaria, by syphilis, or by lead, sometimes of a clear lemon yellow like that of Addison's anaemia but the cheeks are most commonly very, not only from dilated veins, but with a diffused purple which looks like rosy. At the same time the disposition of the patient undergoes an alteration, activity of mind giving place to gentle placid indifference.

The point which is of special interest and
which brings out the intimate relation which exists between this disease and goitre is the fact that before the condition now spoken of as myxoedema was recognised as a distinct disease, an exactly similar train of symptoms had been noticed in cases where the thyroid had been removed artificially. This condition was termed "cachexia strumipriva" and was first noticed by the Swiss surgeon Boecklin of Geneva and by Kocher of Zurich.

Let us now enquire into the use of the thyroid gland in comparative anatomy as judged by the effects observed after removal.

Dr. Victor Horsley has experimented on the thyroids of monkeys and found that usually within a week after the operation subsidiary tumors appear in the lemuo, which, like those in paralytic syphilitic cases on voluntary movement. The monkey became anaemic with an increase in the number of white blood corpuscles and a diminution in the amount
of the red. They wilt, misery and un-
likeness. In eelids and abdomens swell,
the temperature falls below normal, all
tremors disappear and the animal de-
composes in five to seven weeks.
The effects of thyroidectomy have been
studied in a great many different species
of animals and although the results
have been negative in some cases, they
appear to show more and more clearly
the importance of the thyroid gland in
many different animals. In lower
vertebrate experiments indicate that
the gland is not so important as in
the higher vertebrates. Dr. Fisho, O. Kau-
found that no change followed the
removal of the thyroid gland in fifty
dogfish. In lizards however we
already have evidence that the thyroid
gland becomes an important function,
for although Kau did not observe any
change in twelve lizards after thyreo-
dectomy, Christiansen found that lizards
do not survive the removal of the
thyroid gland more than six weeks.
and that they generally die within a month. Christiani has also shown
that in dogs thyroidectomy is followed by loss of appetite, loss of strength and
activity, shedding of the skin and death.
In rabbits the results obtained by different
observers have varied considerably. Schaff,
Colzi, Tizoni, Asperi and Mattui and
Rozowitch all obtained negative results,
and thus a general opinion was
formed that rabbits could live just
well without the thyroid gland and
consequently that it did not exercise
any very important function in that
particular species of rodent.
Stey however has found that when the
accessory thyroid glands which are present
in the rabbit are removed along with
the principal gland, very acute sympotms
are induced which in the great majority
of his experiments - 14 out of 16 - ended
fatally. The chief symptoms of this
acute cachexia are muscular tremors
commencing in the masseter muscles,
clonic and often tursive contractions.
of the voluntary muscles, paralysis, first of the extensors of the fore-foot, then of the hand, limbs, difficult and often rapid respiration, copious flow of saliva, dilatation of the pupils and rise of temperature. Death is rapidly followed by the onset of rigor mortis.

Mr. J. Murray has very similar results in two cases of removal of the thyroid from adult rabbits, he says: "The chief points of interest in these two experiments are, the early development of debility and loss of appetite, the absence of any further change for the long period of eleven months in one case, and twelve months in the other, the similarity between the condition developed and those which develop in man and monkeys after thyroidectomy as shown by the hiccoughs, swelling, loss of hair, dryness of skin, and low temperature. It is also to be noted that warmth diminished and cold increased the severity of the symptoms, and in one case a doe rabbit became pregnant when the symptoms were well marked."
From the above it will be seen that the thyroid plays an important part in the metabolic processes of the body in the majority of the vertebrate animals as in man, and that its removal from the monkey, rabbit and lizard is followed soon or late—according to circumstances—by myxodema, cataract or acutai cachexia tumi-piva.

Enlargement of the Tonsils

A point which has struck me during my residence in a fortress district is the very great prevalence of enlarged tonsils. Whether the two conditions bear any causal relation to each other I cannot say, nor can I find that it has been noticed elsewhere. I merely throw it out as a suggestion that the two may in some way be connected.
Treatment.

In discussing the important subject of treatment we may commence by saying that roughly the lines on which to work may be placed under the following heads:

(ii). The use of various remedies, internal and external.
(iii). The administration of Thyroid extract.
(iv). Surgical interference.

Preventive measures consist in the removal of a patient from a goitrous to a non-goitrous district, and, in cases of early intarment this procedure frequently has the desired effect of checking the growth of the thyroid, if it be impracticable to remove the patient from the district altogether occasional absence from the district or change of the water supply have in some cases been known to produce the desired result.
Local application. Prominent amongst these are the various preparations of Iodine which have been applied both externally and have also been injected into the substance of the gland. Dr. Coriand of Geneva (in 1821) was the first to make this remedy extensively known though Dr. Shaduf of Hofweyl laid claim to priority in its use; before this time burnt sponge was chiefly employed and found efficacious (probably owing to the Iodine contained in it) and the bladder wrack (Fucus vesiculosus) which, with other plants of the same family, yield the iodide compound of Iodine, had also been used successfully.

Iodine is best employed in the liquid form, either the Tincture or a Liniment of the Pharmacopoea being suitable, a combination of the two in equal parts in a very useful strength, it should be painted over the tumour every three days until the skin becomes dry. When its use should be discontinued for a few days,
This treatment should be persisted in for some time, in many cases weeks or even months may elapse before any appreciable difference is noticed. I have at present a case under treatment aged two years in which after a fortnight the thyroid is certainly a trifle smaller.

In India the application of an ointment of the bennioide of mercury has been found very efficacious when applied and rubbed in for ten minutes by means of an ivory spatula one hour after sunrise. The patient sitting with his joint held well up to the rays of the sun as long as he can bear the exposure. In 1857 Dr. Dowlat, then Inspector of jails and Dispensaries in Bengal communicated to the Indian annals of medicine a paper by Major Holmes who had treated 20,000 people in this way. The majority of swellings were cured, in a few cases when the tumour was small and of stony hardness the
ointment had failed, but in none was there any instance of danger arising from the use of it.
At a meeting of the London Medical Society (March 17th 1884), Sir Joseph Fayrer spoke of the efficacy of this treatment, but Dr. Crocker, who has used this ointment and a strong fluid instead of the sun, related that his success was "not marked," here it may possibly be urged that the fire is not so efficacious as direct sunlight.

The Linimentum Ostiæ otis xepone has been vaunted by some as a specific for sores when rubbed over the tumour regularly, but, in the few cases in which I have tried this remedy it has failed to make any appreciable difference in the size of the tumour.

Iodine in the form of Phaësiai Solubl is occasionally exhibited internally with marked benefit. Two such cases which I am enabled to verify personally,
I will give in brief.

(i) J. M. aged 37 was treated as an out-patient by Dr. Lidgard in the Carliell Infirmary, he was suffering from a solid enlargement of both lobes and isthmus of the thyroid gland - $\frac{7}{9}$th of neck 19 inches - duration of growth eight years. For two years he continued taking large doses of Pharmacol. Iodide until the occurrence of an Iodide rash with the symptoms of Iodine surperoxide when the drug was discontinued, the size of the goitre was then considerably diminished, the path of the neck being reduced to fifteen inches, the thyroid being in fact about its normal size. Since then up to the present date there has been no recurrence of the growth and his neck remains fifteen inches in circumference over the thyroid.

(ii) The second case is that of a young woman. She was treated at the same hospital in 1892.

S. H. Both lobes and isthmus were
considerably enlarged, the duration of the growth being two years, the neck was 17 inches in circumference over the larynx and the goitre caused considerable stridor from pressure on the trachea and the patient was markedly anaemic. 

Again, Placcidiun Solide in large doses together with Blaude's pills was administered and after twelve months the neck was reduced in girth to 14 inches. This patient is at present well and shows no recurrence of the growth.

In neither of the above cases was there any history of syphilis, and, what is I think a point of considerable interest is the long history of the first case extending over a period of eight years prior to the commencement of treatment.

Iodoform. Some time ago Dr. Moriarty recommended the injection of the ethereal solution of Iodoform in the treatment of goitres tumours. Dr. Felix Jervis published a note which is a further confirmation of the value of
This treatment was undertaken in a young man of robust health, seventeen years of age, in whom the joints consisted of three tumours. The most voluminous was situated at the right side of the neck and was of the size of at least a hen's egg, the smallest, about the size of a hazel-nut, in front of the trachea, and the third, in volume between these two, was situated on the left side. The tumours were very hard but were not adherent to the skin and were fully movable during deflection. Treatment was commenced by the injection of a five per cent solution of iodiform ether by means of a hypodermic syringe, one injection being made each day. At the end of three weeks the neck had diminished about an inch in circumference. The subsequent treatment consisted in one hundred injections, extending over eight months, and at the time of writing, Dr. Valentine stated that the joints were not quite completely cured, but that there only remained a
small hard lump, about the size of a small nut in the place of the large tumour which had been originally there. The other tumours had entirely disappeared, not even the slightest particle remaining. Kappa employed these injections in fifteen cases and in every one of them a reduction of from 3 to 4 inches in the circumference of the neck took place.

**Iodine injections.**

Another method of applying Iodine is to inject it, in the fluid form, into the parenchyma of the enlarged gland and in the hands of some surgeons this treatment has been followed by very marked improvement; it is also useful as an adjunct to some of the other methods.

Certain risks attendant on the operation must however be borne in mind.

(a) The Iodine must be injected into the substance of the gland and not into the loose cellular tissue surrounding it or one may have a very troublesome suppurating wound.
(3) Care must be taken not to inject air into any of the distended venous trunks of the stumps, or a suddenly fatal termination of the case may ensue. The best preparation to use is the Jutisine, and it must be injected in increasing doses commencing with \( \frac{1}{5} \) and gradually increasing the dose up to \( \frac{1}{3} \).

If this treatment I have personally had the supervision of two cases in both of which marked improvement resulted.

I. W. L., age 15 from Newport was admitted into the Carlisle Infirmary under Dr. Macarini's care in May 1892. At the time of admission he complained of a swelling in the neck which he had first noticed ten months previous, this occasion dyspnoea on exertion. On examination he was found to have a general enlargement of the thyroid which was firm in consistence. The circumference round the neck was fifteen inches. On May 13th, 1892, \( \frac{1}{5} \) of the Jutisine \& Sodium
been injected into the gland and subsequently \textit{mpo} were injected twice a week for the period of four weeks. When the circumference round the neck was reduced to 14 inches. He was then discharged and the treatment was continued in the out-patient department, the injection being made once a week, at the end of six months

the thyroid was reduced to its normal size and, I am informed, there has been no recurrence of the enlargement up to the present time.

\textit{II. The second case presented very similar features.}

P.P., aged 13 years, from Timothy near Huy, was admitted into the Out-patient Department under the care of Dr. Madox, in May 1892, with a small solid goiter situated in the isthmus of the gland which caused him to have considerable dysphonia on exertion.

The injection of iodine was injected into the gland in doses of 0.0022

\textit{mpo} twice
a week for two months when he was discharged and the treatment continued weekly for a further period of two months when the cure was complete. I am informed that there has been no return of the palsy.

A point of considerable importance in the above cases is the fact that for only one month in the first case and two months in the latter were they treated as in-patients and that the enlargement continued to decrease in size under treatment just as much when they had returned to their original surroundings, thus negating the suggestion that change from a portentous to a non-portentous district might possibly have brought about the result.

Against this method of treatment, in addition to the possibility of dangerous sequelae as mentioned above, is to be arrayed the pain and discomfort, occasionally lasting for some time after the injection, which it causes.
Electrotyphus. Weinbaum reports two cases of soft goitre permanently cured by Electrotyphus. The treatment consisted in galvanic electricity applied for from ten to fifteen minutes at a sitting, and supplied by a battery of twenty cells connected with two golden needles, which were thrust several millimeters deep into the tumour at two diametrically opposite spots. Only moderately strong currents were used. In all, one hundred and fifty sittings were made in the course of eight months. The tumour gradually dwindled away. When seen lately, about a year after the end of the treatment, the patient was in flourishing health, not a trace of the swelling could be detected.

In the second case only a slight tympanization about the right lobe remained after fifty sittings. Dr. Weinbaum tried the same plan also in a case of dense fibrous goitre, but failed to obtain anything beyond a trifling diminution of the cervical circumference, though more than two hundred sittings had been made.
Dr. John Duncan has treated many cases by electrotherapy, in enumerating fourteen he says, six were cured and all the others were improving under the treatment with one exception. Chrostek, Buno and Zawadowski cured about 15 per cent of their cases. The method being to pass a current of 10 to 20 milliamperes, the electrodes should be frequently moved to avoid destroying the skin by electricity in action.

Surgical treatment.

For a proper description of the various surgical methods of treatment for goiter it will be more convenient to adhere to the pathological classification which divides goiter into

(i) Solid.
(ii) Cystic.

Division or removal of the cystic of the gland.

In 1875, Sir Duncan first proposed division of the enlarged cystic, or, better still.
excision of a part or whole of it. When this is done, the lateral lobes made from the trachea and become less prominent and so relief from the dyspnoea is frequently obtained: moreover, shrinking of the hypertriphid lateral lobes sometimes follows.

The chief advantage of this operation are, great ease in operating and less risk both from the immediate and remote consequences of the operation. The operation is specially indicated for the relief of urgent dyspnoea.

In my own experience I can recall several cases of this operation, two of which I shall give in brief:

1) A.B. Female, aged 25, in service at Brampton near Carlisle was admitted in Feb. 1892 into Carlisle Infirmary under the care of Dr. Hadrian suffering from a general enlargement of the thyroid in which the rheumatism also took part. The girth of the neck before operation was 18 inches, the growth caused a certain
amount of dyspnœa which was very much increased on exertion. A few days after admission the cathartic was removed with a very marked influence on the dyspnœa, the wound healed rapidly and she was discharged. Unfortunately it has been impossible to trace the further history of the case.

(iii) J. B. Female, aged 25, from Pinwells, Cumberland, was admitted into the Carlisle Infirmary in Jan 1893 under the diagnosis suffering from a solid joint which caused a certain amount of dyspnœa. The constipation was excised, the case healed by first intention and the patient was discharged very much relieved.

Unfortunately in this, as in the preceding case, inability to trace the patient's further history prevents one from reporting on the influence exerted on the rest of the growth by the removal of the central portion.
Thyroidectomy partial or complete.

Removal of the whole thyroid by operation is now rarely or never performed for unless the contingency is provided against by the existence of "accessory thyroids" the operation results in the condition which has been termed cachexia strumipriva - the seriousness of which renders total extirpation unjustifiable.

Partial thyroidectomy, on the other hand, with the results obtained from the improvements of modern surgery promises to be the operation of the future. It is perhaps specially indicated when either one or other lobe is specially implicated and while, by its size, causes dysphonia or any other symptom of discomfort, and while medicinal and other methods of alleviating the condition have failed. It must, however, be here mentioned that cachexia strumipriva has been reported as a sequel to cases of partial extirpation. The steps of the operation are briefly as follow.
A straight incision over the prominence of the enlarged lobe and of sufficient length to allow of its removal is made down to the superficial muscles. Then are the divided, all bleeding points secured and the sheath of the growth is exposed to view.

The knife should now be laid aside and the tumour carefully separated with the fingers or handle of the scalpel, taking care in doing so to secure all vessels running into the tumour with a double ligature before dividing them. Special care should be taken in searching for the superior thyroid artery and its vein, and the inferior thyroid, these should severally be secured by means of stout double ligatures and then divided, the tumour can now be raised from its position and gently removed.

Special care must be taken by means of ligature, to avoid it, not to have any bleeding points discharging into the cavity now left. For drainage being provided for, the wound should then be closed.
with a row of fishing gut sutures and pressure applied externally to close the cavity so left by bringing the various surfaces into apposition.

Throughout the operation the strictest antiseptic precautions should be taken to avoid any risk of suppuration, which, when it does occur, frequently sets up a troublesome and occasionally fatal supplicative cellulitis running into the mediastinum.

It should also be borne in mind that, in its removal, the joint ought not to be handled roughly owing to its proximity to the various important structures of the neck. Particular care should be taken in ligaturing the inferior thyroid artery not to injure the recurrent laryngeal nerve.

It is also desirable if possible to avoid a tracheotomy which if once made enormously increases the risk of the wound becoming septic.

During my term of office as House Surgeon
at the Carlisle Infirmary I assisted in operating upon seven cases of void point in which the steps of the operation were as described above.

In five cases the right side being the one mainly implicated was removed.

In two cases the enlargement being general the isthmus was divided and partially removed.

Six cases were female and one male.

In all cases the operation was successful.
Cystic Foci.

(a) Tapping by means of the aspirator can only be looked upon as a temporary expedient as the fluid will almost certainly accumulate in a short space of time, but it may occasionally be resorted to for the relief of urgent dyspnoea caused by an over-distended cyst.

(b) Incision of the cyst and subsequent drainage was formerly more frequently performed than at present. The cyst was laid open and the contents being expelled the cyst walls were attached to the edges of the incision and the cavity was allowed to fill up from the bottom with granulations.

(c) Puncture and injection of the cyst has been recommended by several surgeons. Dr. Trotter in an interesting paper recommended the injection of perchloride of iron in water (3:1 to 3:1) after tapping a cyst with force and cannula. Bichat at Tournon recommends the injection of iodin suspended in ether.
(3) Extirpation of the cystic portion of the gland, the steps of the operation being similar to those described under the treatment of solid goitre is the most suitable operation, when there are a number of cysts scattered throughout the gland.

(2) Enucleation of the cyst and its contents is certainly the operation to be preferred in the majority of cases when the greater bulk of the tumour is composed of a simple cyst - whatever be the nature of the cyst, contents or wall. The steps of the operation are given by Arnaiz of Very as follows.

The incision should be made over that part of the tumour which seems most superficial and when the capsule of the gland tissue is thinnest. The proper wall of the cyst will generally be recognised by its bluish-grey colour, contrasting with the reddish brown of the gland. The haemorrhage produced by incising this glandular tissue is seldom.
alarminy, and, with intelligent assistance, can readily be controlled. As soon as the incision has reached the tumour, the latter has to be extricated from its parenchymatous bed. In the majority of cases the tumour has only slight connection with its glandular covering, so that it can be dislodged and removed in the space of a few minutes, or even seconds, by the fingers alone without the help of any cutting instrument and without serious haemorrhage. If the tumour has been previously punctured or injected then adhesions are apt to be formed between the tumour and its covering. When there are several distinct tumours they may sometimes be removed through an incision in the gland or it may be necessary to make two.

The advantages that keep claims for this operation are:

1. The operation is not followed by cachexia tumefacita.
2. Paralysis of the vocal cords from injury to the recurrent nerves cannot occur, since the nerves are in no way interfered with.

3. No large vessels are cut and hemorrhage therefore is never serious.

4. The operation can be performed rapidly.

5. The results from the aesthetic point of view are excellent as there is not the unsightly hollow in the neck that is seen after extirpation.

My personal experience of the above operation is confined to four cases — as below.

<table>
<thead>
<tr>
<th>Case</th>
<th>Sex</th>
<th>Age</th>
<th>Operation</th>
<th>Side</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Male</td>
<td>62</td>
<td>Enucleation</td>
<td>Right</td>
<td>Cured</td>
</tr>
<tr>
<td>2</td>
<td>Male</td>
<td>22</td>
<td>Enucleation</td>
<td>Right</td>
<td>Cured</td>
</tr>
<tr>
<td>3</td>
<td>Male</td>
<td>21</td>
<td>Enucleation</td>
<td>Left</td>
<td>Cured</td>
</tr>
<tr>
<td>4</td>
<td>Female</td>
<td>16</td>
<td>Enucleation</td>
<td>Right</td>
<td>Cured</td>
</tr>
</tbody>
</table>

Died last from pneumonia.

From the above it will be seen that the cysts occur at all ages, in the case of the first patient — at 62, the cyst had a growth of upwards of 20 years.
Thyroid Extract

Of late years an entirely new method of treatment has been advocated and exten-
sively tried for the cure of thyroid hyper-
thyroidism - for with our indifinite know-
ledge as to the true pathology of the
condition, and on the supposition that
the gland might possibly have undergone
a process of enlargement, which, not being
in the nature of a degenerative hypertrophy,
might have become necessary from some
cause of an unknown nature throwing
an increased strain upon the organ and
necessitating an increase in its functional
output.

With this idea in view, it was recommended
that the thyroid gland in its natural
form or in the shape of an extract from
the contents of the gland should be ad-
ministered to supplement the action
of the hyperplastic gland.

This remedy had already been very ex-
tensively used and with marked success in
the treatment of Myxedema and Sporadic
Osteitis; it has also been employed with
Apparent benefits result in certain
diseases of the skin e.g. Psoriasis, Scleroderma,
Eczema, Ichthyosis, and Lepus, and also,
but with less marked results in certain
nervous and mental conditions as
Frenzy, Chronic mania and Melancholia.

Mikulicz in referring to thyroid feeding
for goitre recalls the observation of Rein.
holz, that when insane people having
goitre were fed with the thyroid gland
of sheep, their goitre mostly became smaller
although their mental condition remained
unaffected. Out of sixty cases of goitre
treated by thyroid feeding Von Braun
observed a decided improvement in their
form. The goitre in a great many of
these cases may be regarded as a true
hypertrophy of the gland substance demanded
by unusual necessities of the organism.
Part of the function of the thyroid may
be to destroy some “poison” circulating in
the blood, and the excess of this poison
in the blood may act as an irritant on
the thyroid and induce its hyperplasia.
The thyroid feeding may in such cases diminish the work thrown by the thyroid gland and by thus removing the cause may get rid of the joint. This theory would indeed not be at variance with the explanation of the beneficial action of thyroid feeding in myxœdema, but it does not explain why and when the thyroid feeding is discontinued the hyperplasia does not make its reappearance for a considerable time. Another explanation is therefore suggested. Two different substances may be contained in the thyroid, one which prevents myxœdema, and which can only be supplied by the thyroid gland, the other which is useful in cases of goitre and which can also be obtained from the thymus gland. Pekulieff has himself employed thymus feeding in ten cases of goitre and, as far as he can see, the result is similar to that obtained by thyroid feeding. Of the 10 cases, I was rapidly cured, 6 decidedly improved, 2 slightly improved, and 1 remained unaffected by the treatment.
Dr. Bums has tried thyroid feeding in cases of goitre, especially in young people. Goitri goitre of course is not amenable to this treatment. Of 12 cases the goitre disappeared either entirely or in great measure in 9. In 4 cases completely cured the thyroid was enlarged in all its parts, the one half being about the size of a hen's egg. In one case there was stridor with difficulty in breathing, which also disappeared. In a boy aged 14 a goitre as big as the fist diminished in four weeks, so that the circumference of the neck became less by 7 cm. In a man aged 40 a right sided goitre of about the same size and present for six years, caused displacement of the biceps and increasing difficulty of breathing; it disappeared after four weeks' treatment. In three patients aged 23 to 57 years the results were negative; the treatment lasted six weeks in one case and fourteen days in the other two. Strumectomy showed in one case a hyperplastic goitre with small cysts, and in
another abundant colloid material, in only one case did the treatment give rise to unpleasant symptoms - viz., headache, anorexia, frequency of pulse and loss of weight. This occurred after 46 g was taken, distributed over 14 days. The author concludes that thyroid feeding causes a specific in many goitres causing their rapid diminution or disappearace.

With the above results it must I think be conceded that although at present it has only been possible to give the treatment a limited trial, it seems that certainly in some cases of goitre very marked beneficial results ensue upon its administration, and, under proper supervision it is worthy of a more extensive trial. It is probably true the increase in size takes the form of a simple hypertrophy that the best results must be looked for after from this treatment; but it will only be after a more thorough trial that one will be in a position to generalize.
To sum up the various methods of treatment at our disposal it seems to me that we may recommend the following lines.

I. Where possible removal from a goitrous to a non-goitrous district may be recommended with advantage.

II. When the goitre does not produce urgent symptoms, and especially in the young, the various palliative measures as the use of the different preparations of Iodine, Thyroid feeding, etc., may be tried either alone or in conjunction with each other.

III. When the pressure causes severe dyspnoea, operative interference should be recommended, and, if the various forms I think partial extirpation is the operation that presents most advantage.

III. In nearly all cases of cystic goitre, I certainly prefer the operation of Emicletion.