Observations on Thyroidism
as a Concomitant of Puberty.

[Signature]
Observations on Thyroidism as a Concomitant of Liberty.

When doing the routine inspection of the 13-year-age group of School Children in Ayrshire, one or two cases of Enlarged Thyroid Gland, accompanied with signs of Thyroidism or Hyperthyroidism were made out, and in view of the interrelationship of the Thyroid Gland and the Sexual System, in so far as the influence of the one on the other is concerned, I made an investigation throughout the group for such cases as presented an enlarged Thyroid Gland accompanied or unaccompanied by symptoms of Thyroidism at that age, in view of the connection with the period of Liberty.

The children examined in all numbered 2476, comprising boys and girls. The boys numbered 1276 of these and the girls 1200. The area covered, comprised the districts of North and South Ayrshire.

In North Ayrshire the districts are chiefly manufacturing, colliery, and health resorts, while in South Ayrshire or Carrick district they are chiefly colliery and agricultural. Of the 1200 girls examined, 16 showed enlarged thyroid, which were of recent development, and of these 9 showed symptoms of Thyroidism as evidenced by rapidity of pulse, tension, enlarged thyroid gland, and in nearly all, some oculo signs, although in no case was Exophthalmos very
(very) pronounced.

The cases are as follows.

Case No. 1. Girl, 13 years of age. Height 4 ft. 8 in. Weight 54 lb.

General health good and appeared well nourished, not anaemic, had measles and whooping cough when a child. No history of consumption in the family.

Father. A miner, in good health, family history good.

Recent History. The thyroid gland was enlarged, began about 3 months before so far as aware, but not quite certain as to time.

Pulse rate was 80 per minute and of good volume.

No tremor or any acuities. Was slow in answering questions. This case was only seen once as left district shortly afterwards for Lancashire.

Case No. 2.

Girl, 13 years of age. Height 4 ft. 8 in. Weight 50 lb.

Had measles, whooping cough and chickenpox when young.

In good health, but very emotional and easily made cry which was of recent date. The pulse rate was 10.

Attention paid. No sign of Thyroidism made out.

Not seen again as was in Hospital with scarlet fever when next visit was made. Father miner.

Case No. 3.

Girl, age 13 yrs. Height 4 ft. 7 in. Weight 50 lb.

Had measles when young.

Family History. Father, coal miner, in good health, family history good, no history of Thyroid enlargement in any other.
Recent History. Thyroid enlargement, of recent date, but no signs of Thyroidism present. Pulse rate was 72 per minute, volume good. No nerve tremors made out. In appearance healthy, not anaemic, somewhat stout. Seen for first time in Oct., 1913, and again in April, 1914; condition unchanged. Mammary development was present but no history of menstruation.

Case No.

Girl, age 13 yrs. Height, 5 ft. 10½ in. Weight, 5 ft. 8½ lbs. No illnesses in childhood. Recent History. Thyroid enlargement first noticed at Medical Inspection in Sept., 1913. Appearance was somewhat pale and anaemic, but no signs or symptoms of Thyroidism made out. Pulse rate was 72 per minute and of good quality. When seen later in February, 1914, the condition was practically as before, but not so anaemic looking. Mammary development was showing, but not any menstruation.

Case No. 6.

Girl, age 13 yrs. Height, 5 ft. 7½ in. Weight, 5 ft. 12 lbs. Had whooping cough in infancy and measles 6 years ago. Enlargement of Thyroid recent in origin, seen in Oct., 1913, at which time was emotional and cried readily. The pulse rate was about 80 per minute. Family history was good, no history of Thyroid enlargement.
Case No. 5. Cont'd.

When seen later in April, 1910, there was Thyroid enlargement. Pulse was 80 per minute, tension good.

No signs of Thyroidism, such as tremor or scapula signs were made out. There was some mammary development present though not much, and no sign of menstruation.

The general appearance and physique were good.

Case No. 6.

Girl, age 14 yrs. Height 5 ft. 3 in. Weight 70 1/2 lbs.

Had measles, whooping cough and scarlet fever when younger.

Family History good, no history of Thyroid enlargement.

Father, coal miner.

Recent History. Thyroid enlargement for about 2 years.

No sign or symptom of Thyroidism was made out.

Pulse ratio was 76 per minute. Seen for first time in September, 1910, and when seen later in April 1910 the condition was unchanged. In appearance was tall, healthy and well nourished, no tremor, not emotional, but somewhat dull mentally.

Mammary development was present, but no history of menstruation.

Case No. 7.

Girl, age 14 yrs. Height 5 ft. 6 in. Weight 52 lbs.

Thyroid enlargement present but no sign of Thyroidism.

Only once examined as left school shortly afterwards.
Case No. 8

Girl, age 13 years. Height 4 ft. 9 in. Weight 50 st.
She had measles at 5 years of age and 2 years ago in 1911 suffered from an attack of chorea which lasted from 8 to 10 weeks, but had been all right since.

Family History. Father, coal miner, alive and at present in good health, but has a Tuberculosis history in his family. Mother deceased 9 years ago, dying at age of 35 years. The cause of death said to have been Tuberculosis of Bowel. Family all well and no sign of any trouble. She has only one sister, the other members being those of the step mother; the older sister suffered from chorea also, but is now quite well.

General History. Nothing noticed until October 1913 when attention drawn to Enlarged Thyroid at school medical inspection. At the same time there were signs of Tachycardia the pulse rate being 130 per minute. There was also tremor present and decided hearing pulsation of Thyroid and neck vessels. The eyes did not show exophthalmos but there was a distinct widening of interpalpebral angle. Graefe's sign was not made out and convergence was good. In addition to the tremor there was decided nervous excitability present and on account of this further examination was deferred.

The report from the teacher was to the effect that she was easily made cry, that she was not as good at class
(case No. Cont.)

(closed) work as formerly, was easily confused. She had only observed this recently.

In December she was again seen and on this occasion appeared to be worse, although she had been having things very much easier. The Thyroid enlargement was much as before, pulsation of Thyroid and neck vessels more pronounced. The pulse rate was increased to 120 per minute and the tremor still showed, being much exaggerated in doing a fine movement, such as buttoning her cloak. The eyes appeared more staring though no decided exophthalmos, convergence still good. The skin was moist, face appeared pale, showing a peculiar yellowish white colouration or pigmentation, somewhat patchy. The mucous membranes were better coloured than formerly.

The heart sounds were good, though action rapid, and does not complain of breathlessness, although respiration seemed slightly faster, but was not counted. Has not suffered from palpitation so far as she is aware, even after some exertion. The general nutrition appears good and much the same as 3 months ago. She is forgetful and does not remember things so well, is very emotional and easily excited, although she said she felt all right when I saw her. The knee jerks are somewhat inactive though present. She is slow at answering questions and teacher reports her as not improving.
Case No. 8.

(5) school work since last visit and thinks even worse, but is certainly not so smart as she had been.

Dorset Mammary development present but no history of menstruation. When seen later in April 1914 the signs were still present, pulse 110 per minute, tremor still active, and a slight degree of exophthalmos present. Trousseau sign was not made out. Pigmentation of skin as before.

Case No. 9.

Sex: 13 years. Height: 58 1/2 in. Weight: 67 lbs.

Had measles while a child.

Family History: Father, coal miner, at present in Asylum. Insanity supposed to follow an spinal injury and developed about 3 weeks after sudden death of a daughter. No history of alcohol or tuberculosis. With above exception, family history good.

Recent History: Thyroid enlargement only recently noticed; pulse rate 110 per minute. Tremor decided and aggravated upon fine movements. No exophthalmos present though one eye appears larger than the other, does not wink much and shows a weakness of convergence in right eye, which is also the one which appears larger than the other. Face appears somewhat pigmented, darkening of skin but no sign of anemia, skin moist. Knee jerk reflexes are normal. Mentally is forgetful, at times confused and does not seem to understand things readily. Patient reports that at least so much about the same, that she does not appear to
Case No. 226

(b) Remember things and so at times stupid.

When seen later in April condition much the same.

Mammary development—showing, but did not ascertain

as to menstruation.

Case No. 16.

First age 13 years. Threw up for 10 m. Weight 60.8 lbs.

Head measles in 1907.

Family History. Father, ironworker, alive and healthy no

history of tuberculosis, or times given to alcoholic

cess. Mother, millworker, suffering from Rheu.

skeletal.

Recent History. Nothing noticed until October 1913 when

enlarged thyroid made out at Medical Inspection, but

had been noticed at school as being excitable for

a short period before that.

Appearance. Face grey and anaemic looking, slight

pigmentation in areas. Eyes pale staring, interpupill.

al angle widened, slight" Gracé's sign made out.

Thyroid enlarged and throbbing with pulsation in vessels.

The pulse rate was 130 per minute and the tension low.

There was distinct tremor present, the knee jers were normal.

The general nutrition was fair, but she was easily exhausted

and at such times feels short of breath. She is nervous

and excitable, easily made cry and is quite in a fear

as she describes it. Teacher of school reports that she is

not so smart as before and suffers from a decided lack.
Case No. 61

(lack): of interest, which he notices as recent, and further that
she seems afraid and confined.
She has not menstruated except, though mammary development
is showing. Ten weeks in April the condition is much
similar. The pulse rate was 120, tremor, and slight ex-
ophthalmos still showing. Light Graef's sign still
made out, the convergence was good. The appearance
somewhat improved as not so anaemic looking.
Case No. 11

Girl, age 13 yrs. Had measles and whooping cough in
infancy, and appendicitis one year ago.
Family History: Father, coal miner, healthy. Family history good.
Recent History: Thyroid enlargement not noticed until Medical Inspec-
tion in September 1912. The pulse rate was 125 per minute and there
was distinct throbbing in Thyroid and neck vessels.
In appearance she was thin and rather poorly nourished, though
well covered; had a slight degree of scoliosis of
spine and was somewhat anaemic looking. Here was
slight exophthalmos and Graef's sign was made
out, though not pronounced, and convergence was weak
in the right eye. There was also present some slight fusi-
mation of face. Tremor was very noticeable and was
exaggerated in movement, the knee jerks were normal.
Mentally she was slow; somewhat confused, and teachers
reports that she was not as good as before as formerly
which, so far as I could learn, was of recent developmen.
See No. 11. Cont."

and that she was nervous, excitable and emotional, all of which were growing worse. When seen later in April 1911, the pulse rate was 134 per minute, slight exophthalmos and Graefe's sign present. Light pigmentation of face, but appears better than formerly. Tremor as before.

Mammary development present. But do not had not menstruated

Case No. 12

Girl, 13 years. Had pneumonia as well as measles when a child.

Family History. Father coal pit engineman. Healthy. Other family history good. No history of tuberculosis or enlarged thyroid.

Present History. Enlarged thyroid first noticed at medical inspection in end of September 1913, at that time pulse rate was 110. The girl was very emotional, easily made cry and not a good at school work. There was slight tremor present.

Later February 1914. Thyroid enlargement about the same. The pulse was 100 per minute. Though she had been off school resting and well in September. The tremor had developed. There was pulsation in thyroid gland and in vessels of neck, so much so that body seemed to shake when sitting. In appearance somewhat pale, but not anaemic looking; the mucous membranes were of good colour. Exophthalmos was present but not great, mother says at times more noticeable than others. No weakness of convergence made out.

Interpalpebral angle was widened. But no definite Graefe's sign. The knee jerks were normal, or at most, very
Case No. 10, cont.

(sorry) slightly exaggerated. She is excitable and nervous, irritability of temper present at times. Her mother describes her as having become peculiar in her manner and gives a history which suggests access as having been present on one occasion. No memory development showing, but so far has not menstruated.

Case No. 12

Girl age 15 yrs.

Family History. Father coal miner, healthy; mother and family all well, no enlarged Thyroid in family, but a history of a goitre in a grandmother, who is still living.

Present History. First complained of shortness of breath in September and was seen by Medical Inspector in October 1913 when enlargement of Thyroid was first noticed. There was some hoarseness present and pulse was about 110 when first seen later in March 1914. The Thyroid enlargement was as before. The pulse rate was 112 per minute and the hoarseness was quite distinct. There was pulsation on Thyroid and vessels of neck. The retropharyngeal angle was widened and the convergence of right eye was weak. There was no other sign of Thyroidism. In appearance looks fairly well nourished and shows no sign of pigmentation or anaemia, but complains still of shortness of breath. Mentally, slow in response to questions, not emotional nor excitable, rather inclined to be dull & slow, but seems to be fairly good at lessons. Knee jers normal
Case No. 13 Cont.

Mammary development present, but no history of menstruation as far.

Case No. 14

Girl, age 13 yrs. Height 5 ft. Weight 75 lbs.

Had measles when young, but no other illness.

Family History. Father, coal miner, deceased. Death said to be due to heart failure. Neither healthy of family of members, 2 of whom, younger members, are said to be mentally defective.

No history of enlarged thyroid in any other member of the family.

Present History. Thyroid enlargement not noticed until inspection in October 1913. In view of the history of mental deficiency in other members of family, enquiry was made as to specific signs, but no trace of syphilis was noticed in case in question.

The pulse rate was 80 per minute, soft but of fair volume. There was a pulsatile thrill in thyroid and pulsation in neck vessels. There was widening of interpupillary angle, more so in left eye than in right, and a weakness in convergence of right eye. The skin was moist. There was tremor present but was slight, the knee jerks were normal. In appearance looked fairly well, not anemic but some pigmentation of skin present of yellowish brown colour. Somewhat dull mentally, musical, excitable and irritable, and teacher reports that not as good as becomes as formerly.

Mammary development present, but had not menstruated.
Case No. 116

Test. age 10 yrs. Height 46 in., weight 24.4 lbs. at 13 yrs.


Family History. Takes coal and miner.

Mother had enlarged thyroid; but not exophthalmic goiter, so far as I could learn. Family history good otherwise.

Present. Enlarged thyroid first noticed at Medical Inspection in December 1912 when tremor was also noted.

Present History. Thyroid gland enlargement still present, pulsating showing on it and also in neck vessels. The pulse was soft and fairly small, the rate being 126 per minute. The tremor is present and easily made out, though the informant said it was worse a year ago, and exaggerated on movement. No exophthalmos noted, but widening of interpupillary angle shows, when asked to look straight into one's face, in the ordinary way, not noticed. Trace's sign was absent. Convergence was good. In appearance looks healthy and bright, not anaemic and no pigmentation. Does not suffer from any mental confusion, intelligent and answers questions rapidly and correctly. The teacher reports her as being a good pupil.

Not vivacious however noticeable, more inclined to keep by herself and does not mix with other girls of her own age, not excitable or irritable. Knee jerk reflex normal.
Case No. 15

Symptoms began, when between 12 and 13 years of age. Had been menstruating for past 4 or 5 months, with amenorrhea of menorr, which she tells me is less than it was. Mammary development was present.

Case No. 16

Girl, age 13 years. Height 5 ft. Weight 160 lbs.
Had measles in 1909, whooping cough in 1910, and mumps in 1910.
Family History. Father, coal miner, healthy.
Mother, alive and healthy, family history good, no history of enlarged thyroid in family.
Present History. Enlarged thyroid first noticed at inspection in March 1914. Pulse rate was 104 per minute, soft but volume soundly good. Tremor was also present but slight.
Thyroid palpable, angle showed slight widening only, but there was weakness of convergence in right eye. The thyroid was enlarged and pulsation was noticeable. The knee jerk reflexes were normal. The mental condition was normal, no emotional excess, nor excitability, and was fairly intelligent. Appearance was healthy looking, not anemic. Mammary development was showing, but to far had not menstruated.
When seen again in April the condition was much the same, no better and no worse.

In the above stories of cases I have confined the histories chiefly to these cardinal signs, which
(which) establish the diagnosis of Hyperidism, and when using the term Hyperidism, I mean those signs and symptoms which are due to an excess of Thyroid secretion and which are practically similar to those of Exophthalmic Ophthalmia, which disease is now held to be due to excess of Thyroid secretion. The chief or cardinal signs of this condition are rapid action of heart, usually associated with low tension pulse; tremor which is rhythmic in character and is increased on movement; some degree of enlargement of Thyroid gland and in a pronounced case exophthalmos. The last sign is frequently modified and shows just as a widening of interpupillary angle, and is sometimes not present, particularly in the early stage. Von Graefe's sign of Exophthalmos are not usually demonstrated unless exophthalmos is present. Weakness of convergence is a sign that is frequently present, usually unilateral, and may be demonstrated at an early stage. Mental symptoms are often present, such as pronounced emotionalism, some degree of mental confusion, forgetfulness; often an instability or a dullness may be present, in others excitement. At least most cases show some degree of instability of loss of equilibrium of nerve tone and this shows itself in one or other of the various ways mentioned above. In the literature it mentions the enlargement of the Thyroid in girls at puberty, but does not
(not) suggest that there are signs of thyroidism, in fact the literature on this point is sparse, mentioning it merely as a physiological enlargement or hyperplasia without further comment. In the number examined by 1219 girls at this age, namely 13 years in those cases given, only 16 showed presence of enlarged thyroid, which makes a relatively small percentage affected, being 1.31 per cent, so that evidently the enlargement of thyroid gland is not a very frequent occurrence at that developmental period.

Of these 16 cases of enlargement, 9 or about 56.25 per cent of the total enlargements showed distinct signs of thyroidism, which condition may be of temporary duration, but at same time suggest themselves as being cases of early myxoedematous goitre, which apparently have their genesis in a fundamentally necessary developmental process, namely that of the development of sexual function at puberty. It is interesting in this connection that at the same time the boys of same routine group, namely those of 13 years of age, were also examined for presence of thyroid enlargement, but no case of such was discovered. This would lead one to presume that in males the part played by the thyroid gland in sexual development was not so great as in females and also that if such enlargement does occur, it must be in a relatively much smaller percentage.

Again it may be due to the fact that sexual develop.
(development). in males is not so decided, nor such a great economic strain on the organism as in the female, and being more gradual in its process, may not call for the same activity on the part of the thyroid gland, as it does in the female sex.

That thyroid secretion is necessary to the development of the sexual function is well seen in the case of the ocellus, which condition is due to insufficiency of the thyroid gland.

In this condition there is no development of the sexual function, which fact presumes that ovarian development in the female does not take place, if the case remain untreated by administration of thyroid gland substance in some form or other. However if such material be given to supply the natural deficiency of thyroid in question, then not only does the general condition improve, but the sexual function develops and it is presumed therefore that thyroid gland secretion activates the ovary by its secretion. This is more evident if the treatment is started early in life, but even if begun late it may produce results. Murray, records a case of a female ocellus, who at the age of 29 years was only 34 1/2 inches high, in which scanty menstruation had only occurred a few times, and the mammary glands were quite undeveloped. Under thyroid treatment, she grew 4 inches in 3 1/2 years, menstruation became regular and abundant, and breasts and nipples became remarkably well developed. The connection is still further seen or observed in the condition of
of) myxœdema, another condition developing usually in later life, which is due to insufficiency of Thyroid gland. In this condition there is usually failure of the sexual function, and when such cases were examined post mortem it was noticed in the case of females, that the ovaries were atrophied. This was held as clearly demonstrating the co-relationship and interdependence of one on the other. In contrast to this above is the condition of Exophthalmic Goitre, which is held to be due to over activity of the Thyroid gland, but the actual cause of which has not so far been satisfactorily agreed upon. The above mentioned cases in number 16, all showing Thyroid enlargement at the period of puberty, would suggest that the developing ovaries and adrenæ make some demand on the Thyroid gland for secretion required in their development, and while this demand is usually met without any enlargement of the Thyroid, in a certain percentage this demand can only be met by an increased activity of the gland. This increased activity results in an enlargement of the gland, but the secretion in a number of these merely meets physiological requirements, but without giving rise to any signs or symptoms of excess of Thyroid secretion, while in another per centage of cases, the secretion is produced, apparently in excess, and gives rise to signs of Thyroidism.
It is possible that this excess may owe to the function of stimulating the ovaries, stimulating fresh demand, which further stimulating the thyroid, gives rise to more excess, and thus action of the producing action and reaction, the increase goes on until the classic symptoms of exophthalmic Goiter develop. A least ovarian activity seems to bring about exacerbations of exophthalmic Goiter, as Oppenheim mentions a case which always had an exacerbation of the symptoms during menstruation, when it is presumed that the ovary is in a more active condition than usual. This would suggest that the ovary demands more of the thyroid secretion at such times than under ordinary circumstances. In fact, it is well known that there are cases in which the thyroid undergoes physiological enlargement at such times, and surely it can only be because of increased demand due to ovarian activity. Further in certain cases of pregnancy such enlargements are also found, which are presumed to be on the same footing as those of puberty and menstruation. In this connection Thompson records the history of a patient in which partial thyroidectomy was performed during the early months of pregnancy. The patient had a hypertrophied thyroid but exhibited no sign of Hyperthyroidism. Half of the
(Ko) organ was excited and subsequently the uterus decreased in size until it was almost normal and of the same consistency as a non-pregnant organ. No history of bleeding was given and later when enucleated, only some atrophied decidua and villi were removed. Six months later the patient again became pregnant. The remaining portion of thyroid was much enlarged until the fourth month. Induration continued to form and was followed by a normal labour. The thyroid then subsided. It is noted that the gland has a direct connection with the sexual system of man and higher mammals through its secretions. Thus a lack of thyroid secretion influences sexual activity adversely. On the other hand sexual activity, whether physiological or pathological, causes a hyperactivity of the thyroid. Reviewing this it appears that the thyroid though enlarged did not give rise to symptoms of thyroidism, but was merely meeting physiological demands or requirements no excess of secretion being evidently present. The partial removal upset the equilibrium, with result that it became a case of thyroid insufficiency with consequent diminution in the activity of the sexual process and a retrogression until it returned to a condition of comparative inactivity. In the subsequent pregnancy the demand for thyroid secretion could only be met by a further hypertrophy, which in fact took place, increasing until the fourth month, when apparently a balance or equilibrium was reached.
(reached) and the pregnancy went on an uninterrupted course
to a finish, after which as the demand did not continue
existent, the thyroid subsided, evidently without giving rise
to any symptoms of hyperplasia. This would presume that
the original stimulus arose from the sexual function
and the thyroid enlarged as a result.

The undetermined record for which I am indebted to my friend
Dr. Clark is of interest as showing a connection between
the ovary and thyroid gland. A gest patient aged
15 years, menstruated for first time about 6 months
before being seen and at the time it was noticed that
she was unduly excited, not only during the period, but
also for a few days preceding and also following it.
No tremor of hands or staring of eyes was noted so
far as could be learned. Menstruation continued re-
gularly until she came under observation 6 months
after that period. Each succeeding menstruation period
seemed to make her more excitable and nervous than
those preceding and in January 1977, her hands were
noticed as being very "shaky" and she complained of short-
ness of breath. When seen in February a few days before
her period was due, as she felt so weak she had to take
her bed. Had scarlet fever and whooping cough when
young, otherwise had always been healthy. There was
no history of ectopic format in family.
On examination pulse was found to be rapid,
(rapid), averaging 120 per minute, heart was normal otherwise. 
Lungs were clear and respiratory murmur was good.
The urine showed a slight trace of albumin.

The eyes showed marked exophthalmos. Con Saccades, Sattwago and 
Alfroy's signs were all present, and there was also a slight internal 
squint of right eye. The hands were 
very tremulous. The skin was moist and warm to touch, but 
temperature was only 98°F. The thyroid gland was definitely 
enlarged and pulsating. Patient was very excitable and 
flushed on the slightest 
provocation.

Progress. She was treated by application of ice bag to the heart 
region and Rodagen was given in 5 grain doses 3 times 
daily, in addition to general treatment by light diet etc.
Under this treatment the symptoms abated somewhat, the 
pulse falling to 106, tension and excitement became milder, 
until crest of menstrual period, when she was considerably 
easier within 24 hours. After the menstrual she made 
speedy progress and within a week was able to be up and 
go. Rodagen was continued and Thyroid gland was noted 
to be somewhat diminished in size and the pulsation almost gone.
In one month under Rodagen the symptoms showed amelioration 
but in July it was stopped and the symptoms were again 
great deal worse in August. In the month of 
November she was operated upon for a supposed Appendicitis 
when the right ovary was found to be enlarged and 
removed. The appendix was normal. Since the enlarged
(enlarged) ovary was removed, the symptoms and signs of exophthalmic goiter have disappeared, although patient has had no treatment of any kind since her operation. It is interesting in connection with above case that when under treatment with Radagen while the symptoms of the exophthalmic goiter were ameliorated, menstruation almost ceased as a function, but that when the Radagen administration was stopped, the menstrual returned in full force as also did the symptoms of the exophthalmos. It would appear from the above that it was impossible for this patient to function sexually, at least so far as menstruation is concerned, without the exophthalmos and would support the view of the condition being in many cases, due either directly or indirectly to the demand or stimulus made upon the thyroid, by the developing sexual function and at the same time that the function is unable to go on without it.

Regarding the cases given above it is perhaps a coincidence that three cases, with exception of two, all belong to coal miners' families. The housing conditions in these varied, although most of them lived in miners' rows, where the houses are of the one room brick order, and ventilated only on one side, with no inside water supply, this being obtained from a common outside Kennedy well, which supplies several houses. This might suggest a
(2) toxæmic as being a cause, but under the varying circumstances found, it would be difficult to suggest what such toxæmic element might be. It is not the water supply as these are varied, and not of the same character and most of them are from excellent gravitational supplies. The only common feature was the employment of the fathers, with 2 exceptions, and the fact that all are at the developmental period of puberty and showing signs of development sexually. One can hardly ascribe blame to the father's employment for a condition commencing at such a time, it is therefore reasonable to suppose that the other common feature has its bearing on the situation. Particularly is this so, when in cases of sexual activity, such as pregnancy, an allied enlargement of thyroid is frequently found. Why however the secretion should exceed the physiological requirements is more difficult to say.

One of the cases mentioned suffered from Cieæa previously and another from appendicitis. In these cases it is easy to suppose that the nervous system as a result of these conditions may be out of tone and therefore unable efficiently to regulate the nervous tissue governing such co-related reactions as that of Ovary and Thyroid gland, and on account of this an increased activity may result. This excess of secretion produced may help to further
(further) disarrange, the balance and the condition grows worse until the symptoms of hypothyroidism are fully developed.

I conclude therefore that puberty may frequently be the initial cause of a condition of hypothyroidism, which is the result primarily of the demand of the developing sexual organs, and presumably the ovary, for their harmonious secretion from the thyroid gland. But that owing to certain instabilities of the nervous system, this is produced irregularly and in excess, giving rise to the condition of hypothyroidism as a result of the secretion of the ovaries not being able to fully combine therewith, and that at least is a frequent concomitant of puberty.

Dr. Blair Bell gave results of experimental removal of ovaries in the thyroid of rabbits, which showed increased activity. The note that the character of the secretion is altered however was premises from that, that the enlargement at puberty is due to insufficiency of the ovarian secretion. If that were always so then it is reasonable to suppose that all developing ovaries would at some stage show insufficiency, as while not developed they are in a state of immaturity and hence reasonably insufficient. But it is only the very small numbers that such enlargement is found and it would to my mind appear to be more the result of an over activity of the ovary than an insufficiency.

Further in Dr. Clark's case quoted above, the
that ovary on one side was removed on account of interstitial and inflammation. Now surely this would be an active ovary, presumably overactive, as we often find in inflamed organs. However if we conclude it to be insufficient and that this caused the thyroid activity, then surely its removal would make the insufficiency more so, and according to that theory, in this case the exophthalmic goitre ought to have increased, instead of which the condition emaciated and completely disappeared. This would support the contention that the activity of the thyroid is secondary to increased stimulation from the ovary or ovaries. If in those cases mentioned it were due to a parathyroid, we would presume that in the boys, who are liable to the same local influences as the girls, we should find it present in the male sex more frequently almost if not just as frequently, as in the females. All the literature on the subject suggests the condition as being much more frequent in females and it is only in relation to the female that temporary physiological enlargement seems to be found and the question naturally arises, why? As it to be presumed that the thyroid, as a gland, is not to necessary for a similar development in the male, or is it only slightly related in that respect, the chief one being placed upon some other member of the duellis-
(ductless) glands, with only a subsidiary function of the thyroid, while in the female the reverse holds. That there is correlation of the ductless glands is reasonable, and J. Blair Bell gives many reasons in favour thereof, showing that one is dependent on the other and vice versa. As a suggestion it is not unreasonable to presume that as the sexes differ in conformation and are complementary to each other in function, that the gland structure governing the development of each sexually, should differ, although these might be complementary to each other. As an example, that the thyroid is the chief agent governing in the female with the pituitary or other as complementary, while in the male the pituitary or other is the governing gland with the thyroid as complementary, in the development of the ovaries and testicles respectively, which are complementary to each other. The pituitary suggests itself as the chief agent governing in the male as removal of the Pituitary in adult dogs, according to Swett, &c.

(3) Often caused or rather resulted in atrophy of the testicles.

With regard to the enlargement of thyroid, which is sometimes seen in pregnancy, and which is frequently referred to in the literature, is presumably of the same character as that of puberty and presumably brought about in the same way.
Thompson's case which is quoted above would show that it is directly brought about by the physiological demands of the enlarging or growing foetal organ in the uterus, and presumably due to the ovary or ovaries of the mother, as it is difficult to suppose that the ovary, being an internal secreting gland, ceases functioning in that respect, when the uterus, its co-related organ, is in a condition of physiological activity. It may be a state from ovulation, but even that is doubtful as there have been cases recorded of spurts of secretion, which could only occur if ovulation continued after pregnancy is established, and if such occur, surely it is reasonable to suppose that ovarian activity goes on even in pregnancy. Hence it is reasonable to presume that this physiological enlargement of the thyroid, at such times is in response to ovarian stimulus or demand, but whether the demand is caused by ovarian secretion in the blood acting on the thyroid direct or reflexly through the nervous system is difficult to suggest. Either way is quite reasonable and physiological. That the one is dependent on the other there seems no doubt, and the condition at puberty would suggest
suggest) to my mind that the primary demand, if such we may describe it, arises from the ovarian end of the chain, and according to the record of cases given at the beginning that Thyroidism is a frequent concomitant of such demand and response.

In extenso, since we have the hyperactivity of the thyroid at puberty, at the beginning of sexual activity, due to stimulation from the ovary, may we not as readily in later life have an opposite condition brought about due to a lack of this stimulation, and in this way explaining some cases of myxoedema. We know that a great many cases of Exophthalmic Goitre become cases of myxoedema later on, and according to D. Jarrett there is a definite cycle from thyroid excess to thyroid insufficiency. May these not be brought about by the atrophy of the ovary cutting off the activating secretion, leading thereby to lesenced activity of the thyroid and later to atrophy, and may this not suggest an explanation also, why as a rule women tend to become fat, due to lesenced metabolism after the menopause, as it is well known that Thyroid secretion encourages metabolism.
References

1. A. F. Murray. Lancet July 26th 1913 page 274.
   Dec. 27th 1913 page 1810.

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