cerebrally immunises the higher nerve centres before the toxin has been fixed there. The antitoxin given hypodermically renders the blood antitoxic, and the toxin, as it becomes absorbed from the source of supply—wound, bruise, abrasion, or any other source, wherever it may be—is neutralised as soon as it enters the blood stream.

The advantage of giving the antitoxin hypodermically in addition to intracerebrally is evident when we reflect that the tetanus bacilli may still be cultivating themselves, and toxin still being absorbed.

In conclusion, it is my pleasant task to thank Lieutenant-Colonel Martin, R.A.M.C., and Lieutenant Crisp, R.A.M.C., for valuable assistance at the operation. I have also to thank the latter officer for the history of the case and notes.

REFERENCES.

¹ E. Roux et A. Borrel. Tétanos Cérébral et Immunité contre le Tétanos, *Annales de l'Institut Pasteur*, 1898, April. ² *La Presse Médicale*, No. 51, June 18th, 1898.

THYMUS EXTRACT IN EXOPHTHALMIC GOITRE.

By W. RUSHTON PARKER, M.A., M.D. CANTAB.

THERE being still some difference of opinion about the efficacy of thymus extract in exophthalmic goitre, notes of four cases, in which its effects were closely watched, may be of interest.

CASE I.—Mrs. A. aged 28, had been troubled with palpitation for three years, especially during the past twelve months. Her eyeballs protruded conspicuously; the upper lids were retracted so that the sclerotics were visible all around the cornea, and blinking was infrequent, giving her a very staring look, and the upper lids had a lagging, jerky movement when lowered, but she was not aware of any unusual appearance about her eyes. A systolic murmur was audible all over her moderate-sized throbbing goitre, but she had only noticed the enlargement a month previously. Her pulse was 140. She had noticed tremblings for some months. The bowels were inclined to costiveness, and the skin was not unduly apt to perspire. She could walk two or three miles, and do her household work. She was rather anæmic, without any menstrual abnormality either during her twelve months of married life or before.

Fig. 1.

During six months she swallowed 2,000 5-grain thymus tabloids, mostly ten or twelve daily, and ate a large number of lightly-cooked lambs' thymus glands without the slightest perceptible effect upon any symptom, especially upon the rapidity of pulse, a note of which was made thrice daily for eight months, or upon the goitre, which remained as large

and apparently as active at the end as at the beginning. Nor was she apparently in any way benefited by iron, digitalis, bromide, belladonna, arsenic, or blistering, each of which was persisted in for many consecutive weeks; indeed, the best pulse-record was undoubtedly during a three weeks' holiday, when she was freed alike from all medicinal treatment and from household cares. Nevertheless, she somehow professed to feel better at the end of the treatment than at the beginning. The photograph, taken towards the end of the treatment, represents her appearance throughout the course.

CASE II.—Miss B., aged 35, born of a goitrous stock in a goitrous valley, noticed her goitre in her thirteenth year, and palpitation, tremblings, cramps, and weakness in her nineteenth year. There was slight drooping of the upper lids, but no protrusion of eyeballs or other ocular abnormality; her neck measured 16½ inches, and a systolic murmur was audible all over the large throbbing goitre; she complained of frequent faint feelings, had a pulse-rate of 120, and a systolic murmur at the base; she complained of always feeling hot, with a burning sensation in head and eyes, but no great tendency to perspire; her bowels were loosely moved twice daily; there was no menstrual abnormality; she was too weak to be of much use in household work.

During 18 months she swallowed 5,000 5-grain thymus tabloids, usually twelve daily, and ate many scores of lightly-cooked lambs' thymus glands; the neck continued to measure exactly as before, though she thought it was less tense and more flexible; the looseness of the bowels ceased; palpitation lessened; the sensation of heat, and burning in head and eyes ceased, and also the tremblings and cramps; the pulse slowed to 90; she could bear exertion better, bicycling with ease; she perspired less easily, and had faint feelings less often. Her own impression was that the treatment had a very beneficial effect upon all her most troublesome symptoms; but it is important to note that some improvement had already spontaneously set in five years prior to the treatment, leading to a marked diminution of many annoying symptoms, during the two preceding years more especially. Digitalis, strophanthus, and blistering were persisted in for some weeks without any noticeable benefit; no other drugs were used. The photograph, taken on the first day of treatment, equally well represents her appearance at the end.

Fig. 2.

CASE III.—Mrs. C., aged 45, had suffered about a year from goitre, palpitation, tremblings, nervousness, weakness, looseness of bowels, and easily perspiring skin; she had only lately noticed a peculiarity about the eyes; there was some retraction of the upper lids, so that the entire cornea were ordinarily just in view, and blinking was infrequent, giving her rather a staring look, and the upper lids were lowered in a lagging and jerky fashion, but there was no obvious protrusion of the eyeballs. Her neck

measured $14\frac{1}{2}$ in., and a systolic murmur was audible all over a smallish throbbing goitre. She complained of frequent faint feelings, had very marked palpitation, and an irregular pulse of 144 ; her face was flushed, and her skin beaded with perspiration; she had four to eight loose stools daily; she was much too weak to do any household work, her hands continually trembling; she had ceased menstruating six months previously. During the first three months she improved greatly under digitalis and quinine, the pulse being sometimes under 100 , the skin often dry, there being less trembling and palpitation, and two or three formed stools daily; she could cook and do other household work, and even walk a mile. During the next three months she swallowed 400 5-grain thymus tabloids, and ate numerous lightly-cooked lambs' thymus glands, besides continuing digitalis most of the time; but while the pulse was commonly between 150 and 180 , and occasionally 200 , she kept looking better and feeling stronger, passing two formed stools daily, the neck measuring $13\frac{1}{2}$ in. instead of $14\frac{1}{2}$, and doing all her household work, and occasionally walking two miles easily. During the next three months, while medicinal treatment was almost abandoned, the neck still appeared to lessen, palpitation was much less, nervousness and tremblings stopped, the eyes looked normal, she was on her feet all day, doing all her household work and walking long distances, yet the pulse remained about 150 . During the next three or four months, in only one of which thymus was administered, she continued to look and feel perfectly well, with a pulse of about 140 , rarely having palpitation and never tremblings, there being no ocular signs, but still some thyroid enlargement.

Case III.

This patient, originally severely and dangerously ill, became practically quite well; but the improvement began long before the administration of thymus, and seemed to continue independently of it; moreover, thymus was taken in comparatively small doses of four to six tabloids daily. Digitalis at first seemed beneficial but subsequently did apparently more harm than good. The photograph, taken at the beginning of the treatment, can with difficulty be distinguished from another taken at the end.

CASE IV.—Mrs. D., aged 47, born of a goitrous stock in a goitrous district, had noticed her goitre for three or four years, and had recently observed that, as she sat reading or sewing, she could feel her chin resting upon a throbbing swelling; she had lately been troubled with palpitation, heats, and flushings (which she attributed to the possibly commencing change of life), and occasional tremblings and cramps. Her neck measured about $15\frac{1}{2}$ inches, and by frequent mere blisterings during eighteen months it was reduced to $14\frac{1}{2}$ inches. She was then photographed at the age of 49, the upper eyelids being then slightly retracted so that nearly the entire corneae were ordinarily visible, and blinking was infrequent, so that she had a staring look, but no obvious lagging or jerkiness was noticeable in lowering the upper lids; throbbing was no longer obviously felt in the goitre, though a systolic murmur was audible all over it; the pulse-rate was 100 and regular; and she was occasionally troubled with palpitation; there was no looseness of the bowels or aptitude to perspire except near a fire. For six weeks thyroid 5-grain tabloids were tried very tentatively, usually only one daily, occasionally two; but the pulse-rate ran up to 140 , palpitation became most annoying, and a systolic murmur was heard at the base; she felt more nervous, heated, weak and liable to tremblings and cramps; even slight exoph-

thalmos seemed to develop, and certainly the upper lids seemed more retracted, so that the sclerotic became ordinarily visible above the cornea of the right eye, and the staring look seemed more pronounced; nevertheless the neck seemed to be reduced by another inch during the six weeks. During the next twelve months she swallowed 700 5-grain thymus

tabloids, usually six or eight daily for periods of several weeks at a time, under which treatment the pulse returned to 100 , palpitation and nervousness vanished, ocular signs disappeared, but the neck was no further reduced. During three consecutive months of this period she took no thymus, yet the pulse was found at 110 , palpitation very rare and slight, nervousness a thing of the past, and no ocular signs discernible.

In this case, while thyroid extract produced most unpleasant effects, no certain benefit could be traced to the use of thymus. Nevertheless the patient was found a year and three-quarters subsequently perfectly free from all discoverable symptoms except a pulse of 96 , and a very slightly enlarged thyroid, having throughout that period treasured up her last stock of thymus tabloids, convinced that they cured her of her troublesome symptoms and might therefore be needed at some future time.

EXPERIMENTAL NOTE ON THE FERMENTS OF THE RINGWORM FUNGI.

By LESLIE ROBERTS, M.D.,

Dermatologist to the Liverpool Royal Infirmary.

Among the recent additions to our knowledge of the ringworm fungi is the fact that they are zymogenic or ferment-producing organisms. The steps by which this information has been gained may be briefly recapitulated. In the year 1892 I began the method of feeding artificially-reared trichophyta with human and animal hairs, and then observed, for the first time, that the fungus penetrated and disintegrated the hair when removed from the body, just as it does in the natural process of ringworm.

I can well remember the particular species which impressed my mind for the first time that the process of disintegration was essentially one of digestion. It was a Chinese variety of trichophyton, and the original affected hair had been taken from the head of a Chinese boy in the clinic of my brother, the late Dr. Frederic Roberts, of Tientsin. Never before or since have I seen any variety of trichophyton which could match this Chinese specimen in its remarkable power of diges-