Leucocidin Neutralization Tests.—Mixtures of equal parts of 50 per cent. serum in saline and dilutions of M protein were incubated in a waterbath for thirty minutes at 37° C. At the end of that period cover-slip preparations of leucocytes were exposed for five minutes and then examined as before. The results of these tests, given in Table III, show that the leucocidin activity of M protein is inhibited by the previous admixture of immune serum, although the neutralizing properties of the latter are not so marked as its precipitating power.

TABLE III

Dilution of M protein	Percentage of Leucocytes showing Motility after Exposure to—		
	M only	M and 50 per cent. Immune Serum	M and 50 per cent. Normal Serum
1 in 12,500	0	0	0
„ 25,000	0	4	0
„ 50,000	0	92	0
„ 75,000	18	96	22
„ 100,000	30	91	37
„ 200,000	69	94	73

Conclusions

In this preliminary report it has been shown that the type-specific acid-soluble M protein obtained from matt variants of haemolytic streptococci exerts a marked inhibitory action on the motility of normal leucocytes. This action can be neutralized by the admixture, before exposure of the leucocytes, of immune serum. This immune serum gave a positive precipitin reaction with solutions of the M protein, and also contained bacteriotropins for the strain of haemolytic streptococci from which the M protein was prepared. Attention has been drawn to the close similarity that exists between the resistance to phagocytosis exerted by young virulent cultures of matt variants of haemolytic streptococci and the leucocidin action of the acid-soluble M protein that can be obtained from the organisms of such a culture.

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The following medical promotions in, and appointments to, the Venerable Order of the Hospital of St. John of Jerusalem are announced in the *London Gazette* of June 25th: As Knights of Grace—Lieut.-Colonel Sir Louis Edward Barnett, C.M.G., M.B., F.R.C.S., I. G. Modlin, O.B.E., M.D., Major John Orton, M.D.; as Commanders—W. G. Rogers, M.B., Surgeon Lieut.-Colonel E. J. H. Luxmoore, M.C., M.R.C.S., Lieut.-Colonel G. E. Peacock, M.R.C.P., S. S. Pringle, O.B.E., P.R.C.S.I., I. Fraser, M.D., F.R.C.S.; as Officers—C. H. Perran, M.D., H. L. Garson, O.B.E., M.C., M.B., R. H. Read, M.R.C.S., W. O. Gliddon, M.D., W. C. Winfrey, M.D., J. J. Danby, M.D., D. Samuel, M.R.C.S. (since deceased), Major S. R. Gibbs, M.C., T.D., M.R.C.S., R. V. de A. Redwood, F.R.C.S.Ed., Colonel C. R. White, D.S.O., T.D., M.B., Mrs. Janet W. MacInnes, M.B.; as Serving Brothers—L. H. Wharton, M.R.C.S., Major S. Copley, F.R.C.S., C. H. Upham, M.R.C.S., P. C. Davie, M.B., F.R.C.S., A. E. A. Palmer, M.B., H. Riddell, M.B., Captain R. H. Hadfield, R.A.M.C., Colonel H. H. E. Russell, O.B.E., M.D., F.R.C.P., O. H. Hudson, M.R.C.S., A. J. Hopper, L.M.S.S.A., W. A. Jones, M.D., F.R.C.P., S. C. Betten-court-Gomes, M.B., F. F. A. Ulrich, M.B., J. A. Carman, M.D., J. E. Brereton, L.R.C.P., H. B. Pierce, M.B.

A CONFUSIONAL STATE ASSOCIATED WITH INFECTIVE ENDOCARDITIS

BY

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This case is interesting as showing the development of a confusional state associated with septic endocarditis. In the light of the post-mortem findings, the extensive area of ulcerative endocarditis, the damage to the brain, and the widespread area of infarction, it appears highly probable that the patient's dulled mental state, emotional instability, and incontinence were due to repeated small embolic haemorrhages in the frontal lobes and hemispheres generally and possibly in the thalamus. It suggests, too, that the confusional states which sometimes occur in advanced cases of endocarditis (apart from septic endocarditis) might be explained on this physical basis of repeated embolic haemorrhages in the brain, not large enough or situated in the necessary position to cause the usual sudden marked physical lesions of hemiplegia, etc., but sufficiently destructive to damage the associational paths subserving the higher centres of cerebration.

Clinical History

Mrs. X., a widow aged 28, was recently admitted to Graylingwell Hospital as a voluntary patient. The family history, as far as could be made out, was negative. She was described as a cheerful, steady girl, who had married at 21, but had lost her husband some few months after marriage. More recently she appeared to be somewhat unstable emotionally, and, in spite of serious organic disorder, had been energetic and overactive in her pleasures and amusements, and had taken alcohol freely. There was no previous history of "nervous breakdown," fits, or paralysis. Eighteen months ago she had a severe attack of rheumatic fever with endocarditis, and about six weeks before admission had an attack of "influenza."

Present Illness.—Her present illness commenced, according to her parents, some six weeks before admission, and was attributed by them to the attack of influenza and also to domestic worries. She gradually became weak, dull, and drowsy, persistently complained of headaches, and had lost weight considerably. Insomnia and constipation were other marked features during this time. More recently, however, mental symptoms had been more in evidence. She had become more confused and disorientated, and was generally dull, drowsy, and semi-stuporose, although her state of consciousness and alertness seems to have fluctuated very much from time to time. Often she would appear brighter mentally, but she was facile and emotional, and would talk freely about her symptoms, describing peculiar pains which seemed to rush from the head and focus themselves on the root of the nose, "like a ball of fire," which dispersed in flames, giving her instant relief from her pain.

Physical State on Admission.—She was a tall and very thin woman, with poor, flabby musculature and a sallow complexion—in fact, almost café-au-lait. Her temperature was 100.4°, pulse 92, and respirations 22. She looked "toxic" and dehydrated. There were sordes about the gums, and her tongue was dry and red. There was a diffuse purpuric rash on the trunk and limbs, particularly marked on the forearms, which had almost a flea-bitten appearance. In addition, there was a small bruised area on the sacrum and some discoloration over both buttocks. A cough was present: the chest moved fairly well; the note was good, but scattered rhonchi were audible in the left lung. The apex beat was in the sixth intercostal space, about one inch outside the mid-clavicular line, the cardiac impulse diffuse and forcible. There was a loud blowing systolic murmur over the mitral area conducted outwards for a short distance. The pulse was rapid, regular, and raised in tension. The liver and spleen were not palpable. The urine contained a heavy cloud of albumin, but no sugar or blood. The pupils were dilated and sluggish; there was asymmetry of the face; the left side was paretic, and occasional irregular twitchings of the right facial muscles,

particularly the orbicularis palpebrarum, were observed. The arms and legs were poor in tone and power, the tendon reflexes generally were diminished, and flexor plantar responses were obtained. There was analgesia of the distal parts of the limbs.

Mental State.—The patient appeared vacant and dull, and was confused in manner and conversation. She was listless, her reaction to questions was poor, her memory defective, and she was partly disorientated. Her judgement and reasoning powers were impaired, and she showed no insight into her condition. During the course of the illness she was generally euphoric, and would often reply when questioned as to how she felt, "I feel splendid." She was rather facile and emotionally unstable, and appeared to be somewhat retarded mentally.

A diagnosis of septic endocarditis was made, and her further progress was as follows. During the week following admission her general condition was more or less unchanged. She was running a remittent temperature ranging between 99.2° and 103°. She was markedly asthenic and often incontinent of urine, and fresh crops of purpuric rash were noted. She complained of headache at times, but was, for the most part, dull, listless, and confused. However, the degree of confusion varied greatly; at times she appeared semi-stuporose, at other times she was restless, talkative, and emotional.

On the morning of the eleventh day after admission there was an alarming collapse. She had just taken some fluid nourishment when she suddenly became semi-comatose. The pupils were small, reacting freely to light, and the corneal reflex was present. Some twitching of the right facial muscles was observed, the limbs were flaccid and paretic, diminished tendon reflexes were obtained, and a double extensor plantar response was present. There was marked albuminuria, but no other abnormality was observed in the urine.

Later the same day she regained consciousness, and again declared that she felt "splendid." She passed a comfortable night, and the following day appeared slightly improved, although still confused and disorientated. In the evening, however, she complained of severe occipital pain; nausea and retching were present, and she lapsed quickly into a comatose condition and died.

Post-mortem Findings

The lungs both showed marked oedema and congestion.

The heart was considerably enlarged, weighing 630 grams. The right auricle and ventricle were both dilated, the tricuspid and pulmonary valves thin and atrophic, and the myocardium pale, fatty, and rather friable. The left ventricle was considerably hypertrophied; the mitral valves were shrunken and scarred, and were the seat of crumbling vegetations, extending to the adjacent endocardium of the left auricle, which, over an area of almost two square inches, was ulcerated and eroded by haemorrhagic friable vegetations. There were numerous small haemorrhagic infarcted areas in the walls of the small intestine.

The kidneys were both very much enlarged, and were pitted and lobulated. The capsules were thin and stripped fairly easily, and many small white infarcts were present.

The spleen was rather larger than normal, and was very soft and almost diffuent. A number of small infarcts were present.

The Brain.—There was extensive subdural haemorrhage over the occipital region of the brain, and the pia-arachnoid was very congested. In each occipital lobe there was an area of haemorrhages about the size of a walnut and extending back to the posterior pole of the hemisphere, and, in the case of the left side, the haemorrhage showed some early organization and an attempt at encapsulation. There was, further, a small haemorrhagic area in the right lobe of the cerebellum.

My thanks are due to the medical superintendent and Dr. Sidney Nix for permission to publish this case.

E. De Lauro (*Il Morgagni*, February 10th, 1935, p. 147), as the result of experiments on guinea-pigs, found that quinine injected subcutaneously in the form of the bichloride has an elective affinity for the internal ear, and in a lesser degree for the external ear, whereas the middle ear does not absorb the drug at all. Quinine was also found in more or less abundance in the nervous system, liver, and spleen.

AIDS FOR THE DEAF*

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I propose to consider in this paper what practical advice a general practitioner can give to help those deaf patients who are left with a permanent disability after the best has been done for them on medical and surgical lines. The resources that are available do not seem to be known widely or clearly enough.

Measurement of Deafness

A patient will measure his own deafness as it affects his work or home life. Many do not consult a doctor until they have considerable difficulty in hearing ordinary conversation. Few come in the early stages, when they do not hear when they are tired, or when they are not paying attention, or in general conversation, or in the theatre. Some come when they can only hear speech shouted in their ear, or cannot hear it at all, having already spent much money and energy on so-called remedies and aids. The patient's estimate is almost as valuable as any rough hearing test done quickly on a single occasion on a nervous patient. For deafness nearly always varies from time to time with changing physiological and psychological conditions. It is worth while doing some test, however, as the patient's idea may be influenced by lip-reading, which may be learned and practised unconsciously. I have heard a lady declare that her kind of deafness was such that she could only hear in the light! Tests with voice, watch, or ordinary tuning-fork gave comparative results of value to anyone performing them in a standard manner. If apparatus and facilities are available, a test can be made of the patient's hearing by air and by bone conduction over seven or eight octaves, using calibrated tuning-forks or a pure tone audiometer. In this way a very clear and accurate picture of the disability can be obtained and progress watched. This is a valuable help to the doctor, but not yet an essential one (except in the case of children too deaf to acquire speech naturally), for reasons which will be apparent.

Many of the troubles of the deaf are, strictly speaking, outside the province of the medical adviser. Self-conscious and afraid of admitting that there is anything wrong, they generally tend to blame the faulty diction of the present generation, or the acoustical properties of the theatre. They feel more out of contact with their fellows than the blind, losing the points of all the jokes, and noticing the omission of the words of endearment, which nobody likes shouting. Their families tend to get irritated at their requests for repetition, and say or imply that they always hear when they want to and pay attention. This is probably a true accusation in the early stages, and is indeed an early symptom of deafness. It should also be remembered that the extra mental effort required by the slightly deaf is tiring, and that fatigue increases deafness, so that a vicious circle results. I have read recently an excellent book written by a deaf lady for the deaf and their friends, called *Breaking out of Prison*, by Margaret Munro (Methuen). It is simple, sincere, and full of practical advice worked out from personal experience. It is well worth recommending to any patient whose chief disability resulting from deafness is a thwarted and repressed outlook.

Aids

Any young deaf person should be advised to learn to lip-read, irrespective of whether or not an instrumental aid is advocated. It is an invaluable accomplishment,

* Based on a lecture given to the Paddington Medical Society, May 14th, 1935