specimens of the infecting agents in a variety of diseases—anthrax, diphtheria, tubercle, tetanus, silkworm disease, and fowl cholera; which Dr. Woodhead and Mr. Pringle have ready for inspection, the opening up of a revolution in surgical pathology.

In healthy animals, the protecting cells are victorious unless the microbes are extraordinary in numbers or virulence. In the feeble, the pathogenic organisms, or the soluble poisons they secrete or form, pass into the blood, the spleen, and the liver, and destroy the animal. In the Peyer's patches and tonsils of some animals—of the rabbit, for instance—the struggle, according to Dr. Ruffer, is a physiological process, taking place constantly at every hour of the day.

A new and unexpected support to the phagocyte theory is to be found in Mr. Hankin's recent work on defensive proteids. He has isolated from the spleen and lymphatic glands of various animals a proteid body which has the power of killing bacteria. At the last meeting of the British Association for the Advancement of Science at Leeds, he stated that this defensive proteid, though absent from normal blood, could be obtained from that of febrile animals. If this assertion be accepted as correct, we must believe that, when menaced by a hostile microbe, the organism attempts to protect itself by throwing into the circulation a substance which has bactericidal powers. This view agrees with Mr. Hankin's suggestion that phagocytes can not only kill the microbes they have taken in, but can also (by liberating their contents) exert a bactericidal action.

The question also arises whether animals which are naturally refractory to some special disease may not be so because they have the power of producing some particularly active variety of defensive proteid. If this should prove to be the case, we may hope that (by isolating such substances) remedies, protective or preventive, against various infective diseases, may be discovered and obtained. It seems pretty clear that what Koch and the German pathologists call "toxalbumen" may be the pathogenic albumose of Hankin.

My excuse for alluding to these investigations while they are still in progress, is that, taken into consideration with the power which the serum of healthy blood possesses of killing bacteria—a power connected probably with the presence of a globulin which is only soluble in dilute solution of common salt—they may explain the antiseptic action of common salt and strengthen the belief that we have in dilute saline solutions a safe and useful fluid for surgical irrigation, preferable to water which has been sterilised by boiling, and possibly to solutions of phenol or perchloride of mercury, either of which may irritate the tissues of the patient or injure the instruments of the surgeon.

Some such reflections as these have been leading me to the conclusion that the use of antiseptics in modern abdominal surgery may be summed up as combining the utmost possible cleanliness of the body, the clothing, and the surroundings of the patient, the surgeons, assistants, and nurses; the perfect sterilisation of all instruments by boiling water, as well as of the silk or any material used for ligatures or sutures; and the absolute purity of the sponges or any substitute for them. I long ago asserted that in our daily work we had much grosser causes of danger to guard against than enemies which are invisible without a microscope—that dried clots of blood, or fragments of diseased tissue, imperfectly cleansed from our knives, scissors, forceps, or needles, may act as directly as vaccine matter. Careful assistants or nurses may not perform this duty of cleansing perfectly, and I think what we are learning from the bacteriologists leads to the conclusion that it will be well after all operations, and probably before them also, to boil all our metallic instruments for a few minutes. I have here a simple contrivance for doing this without much trouble. The credit of the contrivance is due to Mr. Cathcart, of Edinburgh. One great advantage of it is that the instruments are taken out quite dry, and remain free from rust.

A very useful series of experiments by Staff-Surgeon Macpherson is now being carried on at the laboratory of the Conjoint Colleges, in order to test different methods of keeping silk or other material for sutures and ligatures aseptic. Some of the tubes on the table here, containing sterilised meat infusion and pieces of silk or catgut prepared in various methods, have been kept for some weeks at a favourable temperature for incubation. In some no putrefactive or germinating changes can be observed. In others these changes are clearly manifest, and the general conclusion so far is that solutions of 10 per cent. of carbolic acid in olive oil are useless, and so is wax impregnated with carbolic acid, while a watery solution of corrosive sublimate, 1 in 2,000, preserves silk

ligatures aseptic. I mention this in passing as one instance of the useful work already begun in our laboratory.

I used the spray at first hopefully, then operated alternately with and without it, and then gave it up altogether. As I have said, I regard drainage as a rare, exceptional practice. The dressing may consist mainly of sterilised absorbent cotton. Whether by any attenuated inoculation, or the injection of any defensive proteid, a patient can be still further protected from septicæmia or tetanus, or the microbes by which they are caused can be destroyed after the battle between the enemy and the defence has begun, is a question which I trust some worker in our rooms upstairs, or on the Embankment, may not leave to our Continental brethren without a close race, handicapped though we may be by mistaken interference and unwise restriction.

That this hope is about to be realised I gather from experiments as yet scarcely completed made in Koch's Institute by his assistant, Dr. Behring, on diphtheria, and on tetanus by Dr. Kitasato, a Japanese. The experiments seem to prove almost certainly that we can prepare one vaccine which confers immunity from tetanus, and another from diphtheria, upon mice, rabbits, and guinea-pigs, but which also, after these diseases have begun, will stop further progress and save the creature, who would otherwise certainly die. The poisons of tetanus and diphtheria are terribly potent, but admit of accurate dilution to an extent which will either kill an unprotected animal in twenty, forty, or sixty hours, or in four to six days; or will, by injection into the peritoneal cavity, cure a poisoned animal after tetanic symptoms have begun, or will confer immunity upon these animals, protecting them against the bacilli and their products.

(To be continued.)

REMARKS ON THE BARKING COUGH OF PUBERTY. (CYNOBEX HEBETIS)

Read before the Medical Society of London.

By SIR ANDREW CLARK, BART., M.D., LL.D., F.R.S.,
Consulting Physician to the London Hospital.

SOME thirty years ago Dr. Brown, of Rochester, sent me for examination a boy, aged 14, the subject for several months of an incoercible convulsive cough. The parents belonged to a nervous family; he was himself nervous, and whilst under examination was odd in movements and restless in manner. Small, thin, pale, and fair, but quick in movement and in response, he exhibited all the characteristics of extreme "delicacy." Careful examination brought to light no sign of special structural disease, and at the end of the examination I found myself no further than at the beginning, and could say of the patient only that he was a very delicate and nervous boy. But when preparing to leave the room the lad, startled by a sudden noise, began to cough, and had a paroxysm of coughing, which lasted for over a minute. The paroxysm consisted of a succession of loud, dry, clanging, convulsive coughs, varying in intensity and duration, broken into irregular bars or phrases, and resembling at one time the barking, and at another the howling, of a dog. During the continuance of the paroxysm the patient appeared to be much distressed; his face was swollen and faintly livid, the eyeballs became prominent and congested, the body (bent forwards) was shaken by the violence of the coughing, and the hands crossed upon the chest convulsively clutched his clothes. At the close of the paroxysm the patient appeared to be a little dazed, and was somewhat giddy. Recovering himself in a few minutes he passed a quantity of limpid urine.

The malady of this patient lasted over thirteen months, and then slowly subsided. No ill effects followed, but I learned some years afterwards that the patient was still nervous, and that a dry convulsive cough was readily provoked by trifling colds.

In 1863 I was consulted by a clergyman residing in the east of

† Suggested by my friend, Dr. Rutherford, Head Master of Westminster.

London about his son, who was supposed to have some grave disease of the lungs. The boy was 13 years of age, well nourished, fair, with all the characteristics of a nervous temperament, and the history of some minor nervous troubles. The parents and their relations were nervous, and the father was subject to involuntary movements of the right arm and hand, and occasionally found difficulty in writing. The boy's malady consisted in daily recurring violent paroxysms of convulsive cough which produced some exhaustion and distress, and had provoked on one occasion an involuntary discharge of urine, and on several occasions vertigo. The affection had begun six months ago, and latterly there had been some loss of flesh, strength, and colour. No school would keep the patient, the members of his family were distracted, and the father was perplexed and despairing. Repeated examinations of the patient by myself and by others failed to elicit evidence of the existence of structural disease in any part of the body; all that I could discover was a somewhat *bizarre* condition of the nervous system, and all that I could say was that the malady was nervous, and that it was devoid of permanent peril to life or to health. In this case the affection lasted nearly three years, but then recovery was complete; and through a careful regimen, strict discipline, and change to the seaside, the *bizarre* condition of the nervous system disappeared.

In a third case—the daughter of a clergyman about whom I was consulted in 1875—the attacks were of the same general character, but occasionally they became so severe as to produce squinting and temporary unconsciousness. This girl was 13 years of age, and her malady had begun with the advent of menstruation a few months before. The offspring of nervous parents, she also was intensely nervous, and exhibited from time to time diverse signs of nervous disorder. The noise made by this patient during her attacks was so loud and so peculiarly distressing to others that, with the exception of the mother, no one would remain in the house during their continuance, and even the mother confessed to me that she felt as if the limits of her own endurance were at hand. After a few months' unsuccessful treatment, this patient was cured quite suddenly through the agency of a fright. One day, whilst in a paroxysm of coughing of exceptional mildness, it was proposed to perform an operation upon her throat, and a box of cutting instruments was laid open before her. Without a word she swiftly fled from the room and managed to keep herself successfully concealed until late at night. When she returned to her mother she had lost her cough, and three years after I was told that it had never returned.

It will have been noticed that in all the cases of which I have spoken, the subjects of this pubertal cough, and also their parents and families, were "nervous." But in a case which I saw in 1880 with Mr. Aikin this was not the case. The parents were healthy, and had come of a healthy stock, and the only signal evidence of nervousness in the patient was the existence of the malady. The boy was between 14 and 15 years of age, had the build and appearance of health, and never suffered in any serious way until the "breaking of his voice," when his malady began. The attacks in this case were not violent, but they were accompanied by irregular action of the heart, and occasionally by bronchial *réles*. The patient recovered within six months, but twice within the ten years that have elapsed since then he has had an attack of bronchitis, accompanied by a little bronchial spasm.

All the cases to which I have adverted are examples of the severest forms of the malady of which I am speaking, and they present the chief varieties of it which have come before me in practice. But the attacks are slight as well as severe, and there are other varieties of it which I thought unnecessary to notice. Except in degree, the cases so closely resemble each other that, from the study of one we may learn the characteristic features of all. I may not therefore occupy your time with further illustrations.

Of the four examples which I have brought before your notice of this convulsive cough of puberty, three have occurred in boys, and you might excusably infer therefrom that this represented the numerical relation of occurrence between the sexes. But it is otherwise. The cases referred to were chosen in illustration of the varieties of the malady and of the whole number which has come within the range of my experience, the greater part were found in girls.

Before proceeding to discuss the nature of this malady, it may be well to point out that the cough, which is its characteristic feature, is not an ordinary nervous cough, that it is not the ordinary cough of local irritation, of related pathological changes, of

reflex action, of pneumogastric trouble, or of mere hysterical disorder, but that possessed of certain distinguishing characteristics, existing always in the same general environment, and occurring almost exclusively within the range of those physical and psychical changes which mark the advent of puberty and accompany the final evolution of sex, it has a well defined individuality of its own, and claims the right of separate consideration and naming.

It is true that little, if any, notice of this malady has been taken by previous observers, for after a search through the chief annals of medical literature, made by Dr. Delépine and myself, there were found, with two exceptions, only distant and obscure allusions to the convulsive or barking cough of puberty. The first notable exception occurs in the sixteenth volume of the *Transactions of the Clinical Society*, where, in the presidential address delivered by me, a brief description of this malady will be found. The second notable exception will be found at page 491 of the first volume of Sir Morell Mackenzie's *Manual of Diseases of the Throat and Nose*. There the disease is plainly recognised, but the author's description of it differs in some important points from mine. It is described as occurring in young girls between 16 and 20, of having been met with in boys between 14 and 16, and of having been seen several times in children between 5 and 14 years of age. Notwithstanding such scant notices as have been found of this malady, I have little doubt that its existence has long been known to practised clinical observers; I can find no just grounds for regarding it as one of our new diseases. In proceeding to notice the convulsive cough of puberty, one must keep in view the extent, variety, and character of the changes which occur in the organism during the final evolution of sex. They are manifold as well as profound, they are central as well as peripheral, they are psychical as well as physical, they are moral as well as mental, and they are accompanied by and penetrated by a fresh awakening of the self-consciousness which carries its organism into a new arena of thought and of life.

It cannot be doubted that through the procession of changes, so many and so varied, all the ascending nervous hierarchies are actively at work, creating new activities, establishing new relations, adjusting new environments, establishing new control. One obvious result of those excited activities is that the whole central nervous system is carried into a condition of unstable equilibrium and is ready in an irritable organism to explode on small provocations into convulsive action, and when one remembers that peripheral changes are also undergoing concurrent evolution, that one of the principal seats of them is the laryngeal region, and that the nervous hierarchy under which they exist is now perhaps the most active of all, it is not difficult to understand why troubles should occur in this region at this time, and why, when they do occur, we should expect them to be of a nervous character. In these central and peripheral activities we have conditions ripe for disorder and either autogenetically or deuterogenetically, from inborn disturbances, or from extrinsic irritations, we can see without stretch of vision, how this malady may arise. When, furthermore, we remember that for the most part the family and personal history of the patient is nervous, that no local adequate changes are to be found in the pharynx, in the larynx, or in the lungs, that the cough and other disturbances of the respiratory movements are rhythmic and paroxysmal, that no structural degenerations follow in the wake of the malady, and that it disappears with, or shortly after, the complete evolution of sex—we cannot doubt, at least I think, we cannot justly doubt—that this convulsion or barking cough of puberty (*cynobex hebetis*, *pubertatis tussis canalis*) is a malady of nervous origin, character, course, and issues. But in how far the inborn changes which engender it are central, or in how far peripheral, and to what extent they are modified or controlled by extrinsic influences, I am at present unable to determine.

Concerning the prognosis of the malady, it will be sufficient to say that in all the cases in which I have had any direct knowledge—and they number over twenty—the course, although usually tedious and always somewhat prolonged, has ended eventually in complete recovery.

I proceed now to speak of the treatment of this malady. Unfortunately I am compelled to confess to you my belief that I have not succeeded by any treatment which I have hitherto employed in shortening to any great extent the duration of the disorder. Nevertheless, I am as sure as I can well be about anything of this kind, that by an appropriate regimen, by sedative applications to the interior of the throat, and by the administration of

certain internal remedies, I have, without disturbance of the patient's health, succeeded in restraining the cough within harmless limits, in averting secondary evils, in improving the general health, and in guiding the course of the malady to a somewhat speedier issue than otherwise it would have reached.

With respect to regimen I have to observe that in all the cases brought before me the patients were plainly overfed; that, in addition to ordinary meals, there were frequent "interludes" of different kinds of food, mostly preserved, and that alcoholic beverages of some sort or another were freely administered. For my own part, I am unable to believe that the laws of digestion are suspended because an organism is troubled with a malady of this kind, that there is no physiological limit to the administration of food in disease, and that you are not certain to make a bad fire when you keep putting too many coals upon it.

Improvement has almost invariably followed the enforcement of a simple, but liberal, dietary arranged into three, or at most four, meals a day, abstinence from alcohol, cold or tepid sponging, warm, but not too warm, clothing, active outdoor exercise, early hours, and general discipline. Poor platitudes these, it may be said. Yes; plainly so on paper, but not so in practice where they can effect so much and are yet overlooked so often.

Of local applications to the interior of the throat, only two have done good service; the first is glycerine of borax with oxychloride of bismuth and morphine, and the second is the same combination with the substitution of cocaine (10 per cent.) for morphine. These applications should be brushed over the whole interior of the throat after each meal, and also at bedtime. In using cocaine, care must be taken in its application to the larynx, which is sometimes provoked by it into dangerous spasm.

Among the internal remedies which I believe to be of use in this malady there are also two; the one is a syrup of the bromide of quinine and iron, with small doses of arsenic, and the other is a pill of reduced iron, valerianate of zinc, belladonna, and *nux vomica*.

This latter combination, often successful in controlling the cough, must be given in doses, slowly increased until the physiological effects of the belladonna become apparent, and then, slightly diminished; the amount administered should be maintained at that level.

There is still another remedy to which, in laryngeal nervous affections, specialists on throat disease attach great importance, and that is a long sea voyage. Undoubtedly it is sometimes successful; but undoubtedly also in my experience it is oftener the reverse. Furthermore, it is costly, it is difficult to carry out, it interrupts the work of education, and occasionally in boys it begets habits of a kind which permanently interfere with a right conduct of the business of life. For my own part, when I now review the experience of the effects of sea voyages upon young invalids, I am more strongly impressed than ever I was before with the necessity of extreme caution in prescribing them.

But although in all these ways the benefits which we shall be able to confer upon our patients may not appear to be great, there is one way in which, perhaps, we may be enabled to make them great beyond expectation or expression. We have seen that almost all the subjects of this malady are "nervous," and from this we know that they tend to become self-conscious, to dwell upon their disorders, to give way to self-distrust, to take interest only in themselves, and at last to fail in all that is useful as well as in all that is high in life. Coming at this early time of youth under our instruction and influence, we may help them to strive after self-effacement, to aim at some higher ideal than themselves, to find in labour strength, and through suffering tranquillity; and so, transfiguring their lives, to discover therein sacrifice instead of selfishness, and gladness instead of gloom.

SUCCESSFUL VACCINATION.—Dr. Samuel Hamill, B.A., Public Vaccinator of Burnham District Docking Union, Norfolk, has been awarded the grant for successful vaccination under the provisions of Section 5 of the Vaccination Act, 1867.

GUY'S HOSPITAL LONDON UNIVERSITY CLUB.—Dr. Pavy presided at the annual general meeting of this club. The officers for the coming year were elected: Mr. Howse and Dr. F. Taylor being chosen vice-presidents, and Dr. Horrocks, hon. secretary. Subsequently, the annual dinner took place, at which Dr. S. Wilks, F.R.S., was in the chair. In spite of foggy weather there was a good attendance, and a most enjoyable evening was spent. The club consists of nearly one hundred members—Guy's men and graduates or undergraduates of the University of London.

EXTRACTS FROM THREE LECTURES ON TUBERCULAR DISEASES OF BONES AND JOINTS.

Delivered at the Royal College of Surgeons of England.

By W. WATSON CHEYNE, M.B., F.R.C.S.,

Hunterian Professor; Surgeon to King's College Hospital; and to the Paddington Green Children's Hospital, etc.

LECTURE III.—CARIES OF BONE.

FOLLOWING the destruction of the cartilage, and in some cases beginning to a slight extent before the cartilage had disappeared, we have the carious changes in bone. Roughly speaking, we may say that clinically the articular ends of bones are carious when the cartilages are destroyed, but examination of a number of specimens where the articular cartilages have disappeared shows that the resulting state of matters varies much, and if we were to limit the term caries to tubercular disease of the surface of the bone itself, we should exclude many cases which are clinically reckoned as caries. It will be best, therefore, to study in one group the various conditions which we find when the articular cartilage has disappeared.

In some cases we find that the cartilages are absent, and that their place has been taken by fibrous tissue, but it is seldom that the whole surface is covered simply with fibrous tissue; usually there are tubercles or tubercular tissue at some part, either at the free surface, or in patches in the tissue. This is, however, usually an early stage, found only shortly after the disappearance of the cartilage, for it is seldom that the process ceases at this stage, or that the new tissue does not become the seat of development of tubercles, if, indeed, it has not been tubercular from the first.

[A number of specimens were shown to illustrate the various appearances met with where the cartilages have been more or less completely destroyed, but where the tubercular material has not yet penetrated into the superficial cancelli of the bone.]

The following are the most common appearances met with in true tubercular caries:

By far the most common type of caries, in my experience, is that seen in the section of the head of the tibia which I previously exhibited, as showing a soft caseating deposit in the substance of

Fig. 6.

the bone. (Fig. 6.) On the upper part of the surface of the bone we see that the superficial cancelli are infiltrated to a depth of about one-eighth of an inch with dense tissue, which, on examination under a higher power, is seen to be composed of tubercles and tissue infiltrated with epithelioid and giant cells, this tissue undergoing caseation at the edge. Lying among this tubercular tissue we see the trabeculae of the bone, which are con-