were normal, and there is an absence of lung disease in the family history. Pressure over the right vagus is very painful, aggravates the occipital fulness, induces a feeling of faintness and a weakness in the lower limbs. Injected 5 minims of the silver nitrate solution in the right side of the neck over the vagus, and gave her internally:

R	Strych. sulph.	.	.	.	.	.	.	gr. i
	Quin. sulph.	.	.	.	.	.	.	dr. iss
	Cinch. salicyl.	.	.	.	.	.	.	dr. ss
	Pil. hydrarg.	.	.	.	.	.	.	gr. iv
	Make xxxii capsules.							
	Sig.— One capsule every four hours.							

In five days she wrote me from her home, which was about 50 miles distant, that she feels much better and stronger, and that the occipital pain and fulness had entirely disappeared 24 hours after the injection was given, and there is no return of same up to present date.

The following case, VIII, is of more physiologic than therapeutic interest, inasmuch as it has been seen very recently for the first time and has not yet undergone any treatment.

M., aged 50, with some cough, expectoration and loss of flesh, feels weak and is very easily exhausted. For 2 months before I saw him he complained of fulness and throbbing in the base of the brain on the left side. There are no abnormal physical signs in the chest except an occasional short sibilant râle in the right lung. Very slight pressure with my thumb on his left vagus produced marked faintness, dyspnea, and a feeling of helplessness of the whole body. These effects were so pronounced that he would have fallen on the floor if I had not caught him and placed him in a chair.

In briefly reviewing the histories of these interesting cases it will be seen that the vagus reflex seems to figure as a central, or at least as one of the most obvious lesions which lie at the bottom of their varied manifestations. How to account for all the symptoms which followed vagus compressions on the score of the latter operation is not an easy matter in some of these instances. It is obvious, perhaps, why vagus pressure should produce fulness and pain in the occiput, or a feeling of loss of consciousness, because the vagus is in direct physiological union with the lower and higher nerve centres. But how to connect the cold sweating and tingling in the arms on the same side as that on which the pressure was made, or the sudden helplessness which comes over the lower extremities, as was experienced in three of the above related cases, with vagus compression, is a subject for further study and elucidation. That the vagus lesion is the leading factor in the pathology of the cases is confirmed or at least indicated by the counterirritant influence of the silver injections, which relieved and abated the whole abnormal condition. It is true that most of the patients also received other treatment, but it is hardly probable that this had any marked control on the disease. This is well demonstrated in the history of Case VI, which had received morphin, codein, cocain, strychnin, quinin, etc., for some days without the slightest relief to the paroxysmal cough, but as soon as the silver was administered subcutaneously over the vagus which was most sensitive, the abatement was quick and permanent.

Another feature worthy of consideration in these vagus-reflex cases is, that in not one of

them, except in the first and second, was there any marked lesions of the pulmonary organs, although to anyone who has paid attention to the relations which exist between vagus pain and pulmonary disease, it is quite clear that the former is very frequently a premonitory symptom of the latter, and may therefore be regarded as an important diagnostic sign and a therapeutic indication in disease of the respiratory organs.

AUSCULTATION OF THE KNEE JOINT.¹

BY WILLIAM ERNEST BLODGETT, M.D., NEWTON, MASS.

THE following observations are recognized to be insufficient. They are therefore hesitatingly offered. It is hoped, however, that this preliminary report may stimulate independent investigation which shall supplement the continued work of the present observers, and thus combine to produce a result more extensive and more reliable than any possible by even the elaborate work of an isolated group of investigators. The idea of joint auscultation was suggested to me by Dr. Bradford, and it was by his encouragement that I started last midsummer to assist, as well as I could, in a subject on which Dr. Bradford was then already at work.

Auscultation can be applied to any of the large joints, but thus far I have listened almost only to the knee, as it is most accessible and most liable to disease and difficulty of diagnosis. As an instance of auscultation of joints other than the knee is cited a case of supposed complete ankylosis of the hip, in which detection of the joint sounds, transmitted by the trochanter, ruled out firm bony union and suggested extra-articular causes for the ankylosis.

The instrument used is the full-sized Bowles stethoscope, with a soft rubber cap sprung over the diaphragm. This cap tends to prevent slipping and skin friction sounds. With the patient lying, or sitting on the edge of a chair, the examiner stands or kneels on the side to be examined, grasps the lower leg with the hand that is nearer the foot, and with the other hand grasps the thigh just above the knee, while the index finger holds the receiver of the stethoscope resting on the bare skin over the patella. In children, the limb is small and light enough readily to be controlled in this way; but with adults, I have it convenient to have the patient clasp his hands under the thigh and assist in raising it as the knee is flexed, so that the heel clears the bed or chair. As the knee is extended, the thigh is allowed to sink again. All active motion of the limb I try to exclude, as muscular contraction produces a distant humming sound, which can be reproduced by gently placing the thumb in the ear, and then clinching the fingers into the palm; the joint sounds themselves, moreover, are liable to be altered — increased and multiplied — by muscular contraction, perhaps due to increased intra-

¹ Read before the Boston Society for Medical Improvement Nov. 18, 1901.

articular pressure. If there is much hair over the patella, vaseline prevents the fine, high-pitched, crackling sounds from the hair. The bell of the

necessary to teach the patient to relax the limb and assist rightly with his arms. In examining a knee carefully, I begin with the knee in extreme

stethoscope, with a little practice, can be balanced | flexion, and, with a smooth movement, fully ex-
 on the patella, especially with children, leaving | tend and flex the joint several times. The first
 both hands free. Usually a little practice is | movement up and down gives the most sounds,

and I have repeatedly noticed that the more I examined, the less there was to hear.

In this way I have examined about 100 cases, 61 of which I have recorded by the method illustrated in Fig. I.

This is the record of E. R., common laborer, 42 years old, and will serve as a typical record of normal adult knees. The dots and dashes of the upper line in the record of each knee represent the sounds elicited by passive movement of the joint, as described, from extreme flexion, through 135° , 90° , and 45° of flexion, to extreme extension. The lower line represents the reverse movement, and reads from right to left. Record marks in short perpendicular lines at the beginning of extension and the close of flexion, that is, the left end of both upper and lower lines, represent sounds made by lateral movement of the knee. In this way, I have sought to record the joint sounds in the part of the movement in which they were heard.

Of joint sounds proper, excluding, therefore, skin and muscle sounds referred to above, I discriminate three kinds: The first and commonest, heard to greater or less extent in nearly all cases, is a snapping, creaking sound, which can be approximated by listening through the stethoscope with the bell held between the dorsum of the right index finger and the palmar surface of the middle finger and gently rubbing the lower part of the nail of the right index finger on the thumb-nail of the left hand. The second is a grating sound, coarser, rougher, and usually less discrete than the first. The third is a squeak. The first and second sounds are similar; the third is unmistakably different. The first sound I represent by round dots; the second, being a rougher sound, I represent by short, vertical parallel marks; the third, being a more continuous note, by short dashes. Combinations or intermediate sounds are represented by alternation of the corresponding marks. The intensity of the joint sounds is recorded by the size of the marks, and the frequency is roughly indicated by the number of the marks.

This method of recording knee sounds, therefore, gives the location in movement, the kind, and, roughly, the intensity and the frequency of the sound.

To draw any conclusions from auscultation of a joint, it is, of course, necessary first to know the normal type and the range of normal variation: most of my study, therefore, I have devoted to normal joints. One record of a normal adult case has already been given. Another is added (Fig. II).

This is the record of a man 32 years old. It shows the common joint sound scattered through the movements of both knees, chiefly between 90° and straight, a loud snap in the latter part of flexion of the right knee, and a squeak from side play of the left joint in extreme flexion.

The range of normal variation seems to be wide. Compare, for example, the two following records (Fig. III).

The first is from the record of a woman 37 years old, with normal knees. The second is from a boy, 16 years old, also with normal knees. These differ only in frequency of the common snapping sound. The following, however, from a laboring man of about 55, who had had no symptoms from his knees (see Fig. IV), shows a marked tendency to the coarse, grating sound. It can be speculated that this man's cartilages and synovial membranes, like the condition of his arteries, though making no symptoms as yet, were not normal. But whether the grating sound is always pathological, especially in old people, must be decided later. In knees otherwise normal, I have heard it several times. As in old people joint sounds are increased, so in children joint sounds are decreased—fewer and finer. For example, two records from a girl 6 years old (Fig. V).

Besides illustrating the infantile type of joint sounds, these 2 records, taken 5 days apart, show the tendency of the same knee to give the same sounds at different times. Several cases, auscultated 2 to 4 times in a period covering 2 weeks, and recorded without reference to the previous records, support belief in this tendency; but several cases show the similarity to be in the total amount and the quality of sounds, rather than in the localization. The infantile type, above illustrated, was preserved in the knee of a woman about 30 years old, the development of whose leg had been much retarded by infantile paralysis.

The squeak sound from lateral movement of the knee in extreme flexion, already alluded to, can be obtained from half or more of the cases in which it is sought; it seems to have no special meaning. The squeak in extension and flexion I have heard oftenest in the normal knees of children. It was most marked in the case of a girl, 7 years of age, who, I later learned, had had inflammatory rheumatism 4 weeks before (Fig. VI).

Paralysis and general anesthesia apparently do not alter the joint sounds. Three knees with effusion gave no sound at all or sounds faint and distant. Compare with this the diminution of respiratory sounds in pleuritic effusion. It may be noted also that, in the method of imitating the snapping sound, described above, moistening the nails destroys the sound.

Following is an example of rheumatoid arthritis, that is, the form with atrophy of cartilage (Fig. VII).

The sound in these cases is the coarsest and roughest of any I have heard. Immediately after genuclasis, the sounds are still louder and harsher. In course of improvement, the sounds become finer.

In my cases of osteo-arthritis, that is, the form with hypertrophy of cartilage and outgrowth of bone, the sounds are not so harsh, and, in the one forcibly straightened case, I have observed, genuclasis did not much increase the sounds.

In a hysterical knee, in which long-standing permanent flexion had just been corrected by sug-

gestion and forcible manipulation, the sounds, as far as heard in the limited range of motion, were normal, with the loud humming of strong muscular contraction.

Conclusions are, of course, not yet justified, especially as the nature of joint auscultation prevents the exact findings and records at once obtained in x-ray work, for instance, and allows the imagination of the observer more than the usual chance to color the observation. To arrive at any trustworthy conclusions, the ear must be trained, and cases carefully examined, recorded, and compared with reference to the structural state of the knee, as shown by the history, the symptoms, and the other signs, but best of all, by operation and inspection; for, if, besides the fascination of novelty, auscultation of joints is to have any practical value, the value will depend on the ability to infer the condition of cartilage and synovial membrane, and rightly to interpret this condition.

If a single conclusion is warranted by the observations of the writer, it is that joint auscultation deserves further investigation.

Medical Progress.

REPORT OF PROGRESS IN ORTHOPEDIC SURGERY.

BY E. H. BRADFORD, M.D., AND E. G. BRACKETT, M.D., BOSTON.

THE STRUCTURE OF THE HEAD OF THE FEMUR IN ARTHRITIS DEFORMANS.

P. BADE¹ has examined a number of specimens of arthritis deformans with the Röntgen rays, and found that there was a concentric atrophy in which the normal large trabeculae found in the neck and head are pressed nearer together. There is also a concentric hypertrophy in which also the normal structure is preserved, but the trabeculae seem to be pressed apart. There is irregular atrophy and hypertrophy in which there is unequal diminution and increase of the bone. The diminution of the bone is found more in the periphery of the head in the hollow of the neck between the trochanter and neck. The increase of the bone is found on the shaft between the trochanter, major and minor, as a projection in the neck in the upper half of the trochanter minor and in an angle between the neck and shaft. The bowing on the side of the trochanter remains changed less than on the side of the adductors. The concavity of the former increases where the neck has almost entirely been absorbed, the trochanter taking the place of the neck. Under these circumstances a new system of radiated supports are formed, resembling the diagram of a mechanical crane.

ARTHRITIS DEFORMANS.

Kelley² considers that the affection to which he applies the term "arthritis deformans" is not as

well understood as is desirable, and that the nature of the disease is not recognized partly on account of the various names which have been applied — rheumatoid arthritis, osteo-arthritis, deforming arthritis, etc. He prefers the term "arthritis deformans," which is generally employed in this country and Germany as sufficiently indicative of the distinguishing features of the disorder, and suggesting no relationship to any other disease, such as rheumatism.

He considers the disease as a distinct one, and in no way to be confounded with rheumatism or gout. There are at present two theories which are used to explain the condition, one the neural, or nervous theory, first brought forward by J. K. Mitchell, and the other, bacterial theory. While not accepting either theory he presents arguments in favor of supporting both.

Certain disturbances of metabolism have been found in a diminution of lime salts and earthy phosphates in the urine, diminution in the excretion of uric acid and urates and hydrid without disturbance of the normal relationship between the uric acid and the alloxur bases.

Irwin³ reports a case in which the affections of the joints were worse a few hours after menstruation. All pains and swelling in and about the joints disappeared except Haygarth's nodosities and Heberden's nodes. The joints became supple and the movements were not nearly as painful. The relief to the joints lasted for from two to four days, then the swelling and pain recurred.

The writer concludes that the evidence tends to show that arthritis deformans is primarily of a nervous origin, but as changes of metabolism occur they are preceded by the derangement in the function of the nervous system.

Murdock⁴ reports a careful examination of the contents of the stomach in several cases, and concludes that diet should be prescribed, not with a view of suiting the condition of the joints, but such as may best suit the existing condition of the gastric secretions.

Bain⁵ has made some careful investigations on the subjects and reports a diminution in the uric acid secreted. The phosphates were found to be markedly diminished and the variation in their excretion closely following that of the uric acid.

Parker⁶ is of the opinion that under the heads rheumatoid arthritis, osteo-arthritis and arthritis deformans, are grouped many diseases with but little clinical and almost no pathological resemblance. He agrees with Charcot that the early changes in acute rheumatism are precisely the same as those in rheumatoid arthritis. These views are supported by Lebert and Ranvier as well as Gurlt and Kusmaul.

Painter⁷ urges a clinical distinction between osteo-arthritis and rheumatoid arthritis, based on the difference in the clinical symptoms. He con-

³ American Practitioner and News, vol. xxxi, No. 9, p. 25.

⁴ Medical News, vol. lxxix, No. 5, p. 166.

⁵ Transactions of the Pathological Society of London, xxi, 124.

⁶ St. Bartholomew's Hospital Reports, 1900, xxxvi, 177.

⁷ Boston Medical and Surgical Journal, Nov. 23, 1901, p. 593.

¹ Zeitschr. f. Orthop. Chir., Bd. ix, H. 2, p. 207.

² Journal of American Medical Association, Dec. 22, 1900, p. 1618.