sis, however, is at some part of the wall of the ethmoidal cells, here constituting the outer wall of the nasal cavity. To detect this necrosis a suitable probe is necessary, as the ordinary surgical probe is quite unsuitable. In my earlier explorations I used a canaliculus probe, but latterly I have had flat silver probes made for the purpose, as they more readily pass between the tumour and the boundary wall of the nasal cavity into the spaces above or outside this. The presence of necrosis in these regions is indicated by exactly the same signs as elsewhere—namely, a bare, rough, and grating surface, which may often be tapped with the probe so as to elicit a sound as though striking a billiard ball—that is, it is clearly audible to anyone near the patient. Hitherto the diagnosis of ethmoiditis has been considered in connection with gross and manifest changes in that process or wing of the ethmoid known as the middle spongy bone; but an almost equally extensive class of cases exists in which no such external indication of the disease is present. In these the middle spongy bone shows no departure from the normal, except perhaps in looking redder and of less even surface than usual. The necrosis will, in such cases, be found in the walls of the ethmoid cells, which are frequently partly broken away, so that the probe grates against the detritus and enters one of the ethmoidal cells. Here the necrotic process may not extend beyond the nasal wall, though it may not rarely be detected in the depths of the cell structures of the bone.

As with cleavage too evident to be ignored, so with the equally undoubted necrosis, it has been seriously asserted that these changes are merely normal to the region. Surely the force of antagonistic criticism could no further go. My answer, here as ever, is an appeal to pathology. This shows the necrosis to be the final event in a series of morbid changes which, beginning with fibrosis, goes on to obliteration of arteries, absorption of bone, the development of cysts and of polypous and granulation tissue, until finally interstitial death of the bone takes place. The starved bone breaks up into minute areas of dead matter, which, until removed by the art of the surgeon, constitute a source of constant irritation, just in the same way as does a decayed tooth or a carious astragalus.

In conclusion, I believe that the designation "necrosing ethmoiditis" will be found to be amply justified by the judgment of every careful and unprejudiced observer of this disease.

THE INSIDIOUS MARROW LESIONS OF MAMMARY CARCINOMA.¹

By HERBERT SNOW, M.D.LOND.,
Surgeon to the Cancer Hospital.

THE Museum of St. Thomas's Hospital contains a very remarkable specimen (No. 673), the plaster cast of the body of a woman, who died in that institution, after excision of the right breast for scirrhus carcinoma. The skeleton has undergone great distortion. The sternum and ribs have sunk until the former appears almost to touch the vertebral column, the whole thorax being flattened out transversely. The pelvis exhibits a precisely similar modification. The right humerus and both the femora have undergone fracture, the broken ends having subsequently united almost at right angles. A seemingly healthy scar occupies the position of the right breast, and no tumour formation is anywhere apparent. The left femur, one-half the right, a patella, and the right humerus from this case are mounted as dry specimens, and constitute typical examples of "osteoporosis." The other half of the right femur had been preserved in spirit, and Mr. Shattock was kind enough to make a microscopical examination of this for me. He pronounced the bone to be infiltrated by "typical spheroidal-celled carcinoma of the firm kind, a growth similar to an ordinary carcinoma of the breast." Fig. 1 is taken from a photograph of the plaster cast of this case; Fig. 2 represents the bones from the same case, which are mounted as dry specimens.

This specimen affords an extreme example of the pathological condition to which I desire to draw attention—a wide

diffusion of cancer cells throughout the bone marrow. This lesion is not exceptional; in a much less conspicuous form it is a routine occurrence in most average cases of breast scirrhus allowed to proceed to a fatal termination. I say "average

Fig. 1.—Plaster cast, No. 673, St. Thomas's Hospital Museum.

cases," because those "atrophic" scirrhus tumours, which do not prove fatal for twenty or thirty years, constitute an exception to the rule. In these the so-called "rheumatic" pains and the other bone symptoms I shall indicate are conspicuously wanting, so far as my own experience goes. In such I have not

Fig. 2.—No. 672, St. Thomas's Hospital Museum. Right femur, half of left femur, right humerus from case in Fig. 1; mounted as dry specimens.

found malignant cells in the bone marrow, and I am disposed to attribute their protracted duration largely to this circumstance. The "atrophic" condition, I need hardly remark, is restricted to spare women, whose mammae approximate to those of the male, and are therefore not placed in that very intimate connection with the general circulation and with the lymphatic system which obtains in the average female.

¹ Read in the Section of Pathology at the Annual Meeting of the British Medical Association, held in Bournemouth, July, 1891.

A wearing, rheumatic pain in the muscles and bones, often disturbing the sleep at night, has long been recognised as one of the subjective phenomena of mammary carcinoma. I have not myself observed it in connection with any other form of malignant disease. It differs from true rheumatism in not specially affecting the articulations. It resembles that, however, in being greatly alleviated by salicylates internally. The chief localities complained of are the loins, the shoulder and upper arm down to the elbow on the same side as the disease, and the adjoining scapula. With this the patient appears often to suffer from a general sense of debility, and of overwhelming lassitude; is unable to follow ordinary avocations; becomes sallow, and unmistakably deteriorated in health.

Fig. 3.—The "sternal symptom" of marrow infection; the characteristic prominence marked x.

If the breast tumour has not been removed, or if secondary deposits are palpably present, such a condition may be in part ascribed to the malignant growth itself. Very often, however, we find this marked breaking down in physical vigour, combined with pains of a rheumatic character, when, after operative treatment, no tumour formation can be discovered. Eventually reappearance of the morbid cell growth, whether in the lymph glands or viscera, subcutaneous tissue, or opposite breast takes place. Long prior, however, to this "recurrence," while the woman's symptoms are wholly subjective, and *malaise* and "rheumatic" pains form the only matter of complaint, we shall discover, if we duly look for them, one or both of two objective bone conditions. The most conspicuous is one which I designate "the sternal symptom." At the junction of the manubrium with the gladiolus (second costosternal articulations) some exaggeration of the slight natural prominence there situate is found. This physical sign in its earlier stages will probably pass as an accident of normal structure, and I have encountered one or two non-cancerous women whose sterna presented such an appearance. These, however, had perceived the condition themselves, and were ready to inform me that "they had always been so." The cancerous sternal prominence the patient very seldom seems to have observed. The protuberance slowly and progressively becomes more marked, until eventually in a typical case it cannot escape notice. If the woman has a specially broad thorax, the deformity may be so extreme that it cannot possibly be mistaken for a congenital malformation.

Fig. 3 is from a photograph kindly taken for me by Dr. T. Johnston English. To him, to my colleagues who have courteously permitted me to make use of their cases, and to Mr. Cecil F. Beadles, senior house-surgeon at the Cancer Hospital, who has ably assisted me in the preparation of the

microscopical and other specimens, I owe a considerable debt of gratitude.

This characteristic prominence is usually formed "insidiously." The patient feels no pain therein, and rarely or never draws attention to it. Occasionally there is tenderness on firm pressure. I have seen an actual tumour formation at this spot only five times. If a breast tumour be present and be adherent to the parietes, so that infiltration by contiguity of tissue has probably taken place, the deformity is usually accentuated; but in some of the most typical instances no palpable deposit of carcinoma has been anywhere discernible until the "sternal symptom" had existed several months. Eventually the enlargement ceases to be limited to the region above indicated, and an ill-defined thickening of the whole middle portion of the bone succeeds.

In non-cancerous women with prominent sterna the manubrium is commonly implicated, the forward curvature commencing at the interclavicular notch. In cancerous deformity the upper part of the manubrium is not affected until a very late stage. Nothing but carcinoma produces this slowly-progressive painless bulging at the precise spot here pointed out. I cannot say that the symptom is of invariable occurrence. I have never seen it in "atrophic" cases; in others it is certainly a very frequent and ordinary condition, long preceding direct infiltration by contiguity of tissue.

I do not assert that the bone becomes actually thickened. Death in the stage to which I am referring is not frequent; hence necropsies are rare until the thoracic parietes have become directly infiltrated by the carcinoma. We then find the sternum and ribs softened and easily cut with the knife, but not thickened unless a local tumour formation be present. I provisionally attribute the characteristic bulge to the decalcification of the bone by the malignant new growth in the marrow—a condition which induces a gradual yielding to pressure, and hence to curvature at this particular spot. In some measure periosteal hyperæmia probably aids in the production of the symptom. The prominence is often less observable when the woman is in bed than in the erect position, and is less marked towards the termination of the case than in the middle period.

The second physical sign to which I have alluded is far less conspicuous than the preceding; and it is not always easy to satisfy anyone, who for the first time examines such a case, of its presence. The upper epiphysal end of the humerus on the same side as the affected breast feels thicker than its fellow, on a careful comparison of the two. There is also usually tenderness on firm pressure. Deeply-seated gnawing pain referred to the bone and muscles is always present, though of a remittent character. The upper third alone presents the feature in question; just below the shoulder-joint, in a well-marked instance, the bone feels broader and flatter. As both humeri may ultimately receive cancer deposits in the marrow, we lose towards the end the advantage of being able to contrast one with the other. I do not consider that any real hypertrophy of the bone takes place, but attribute the apparent increase in bulk to irritative hyperæmia of the periosteum, excited by the presence of malignant cells in the marrow. The frequent tenderness of the part on firm pressure countenances this view. Carcinomatous deposit in any tissue promptly induces hyperæmia and other inflammatory phenomena. The "humerus symptom" was first described in the *Lancet* of June 12th, 1880, although I hardly then appreciated its full significance. It is far inferior in practical value to the preceding.

The malignant infection is by no means limited to the bones in question, but eventually becomes more or less general throughout the osseous system. The backache of scirrhus carcinoma is due to malignant cells in the lumbar vertebrae. I have been able to examine the latter in four instances; in all, typical scirrhus acini were present. Where the infection took place first, and where, consequently, the cancerous deposit at the necropsy is most abundant, decalcification of the bone is found to have taken place, and the latter can be divided by the knife as readily as the soft parts. Withal, tumour formation or fracture are only rare and exceptional occurrences. The specimens in museums of "osteoporosis," or of "fragilitas ossium," in connection with carcinoma have always been derived from cases in which special attention has been directed to the part by one or other of

these two events. They are nearly always dried; should these have been kept in spirit, actual deposit of cancer will be proved by microscopic examination.

As a rule, this marrow infection slowly and insidiously saps the springs of life in two ways: (a) by the facilities which it affords to the passage of cancer cells into the general circulation and their deposit in the viscera; (b) by its interference with the process of red corpuscle manufacture, which is the most important function of the marrow.

Fig. 4.—Scirrhus deposit in lumbar vertebra (case "Hill"). Under low power (A eyepiece, A Zeiss objective), showing fibrotic induration of the marrow; at a bone matrix.

Occasionally marrow infection occurs with other varieties of malignant disease, especially when primarily attacking bone. Recently Mr. Bernard Pitts showed a growth in the humerus, secondary to rectal cancer, at the Pathological Society. As

Fig. 5.—Part of section shown in Fig. 4. Under medium power (A eyepiece, DD Zeiss objective). The nuclei of the scirrhus cells alone represented.

an ordinary routine phenomenon, however, I believe it to occur only with mammary carcinoma in women; I have not noticed "rheumatic pains" of the peculiar character described under any other circumstances. I have examined the lumbar vertebrae in four cases of uterine carcinoma, where lumbar pains are a prominent symptom, with entirely negative results.

Fig. 6.—Scirrhus deposit (insidious) in sternum; under low power (A eyepiece, A Zeiss objective), case "Daw." The shaded parts are bone matrix, which is here and there seen to be continuous with the fibres of the malignant stroma.

The marrow, when extensively infiltrated, becomes opaque white, its ordinarily delicate adipose reticulum is replaced by tough, fibrous-looking tissue, which shows the characteristic acini of scirrhus carcinoma. The presence of abundant myeloplaxes in one or two of the sections indicates the absorption of bone tissue which is going on. The fibrotic change is, however, found only when the deposit has reached an advanced stage. In Case II, where multiple bone tumours were developed and very wide dissemination took place, it is not present in the section exhibited. All that can be seen is a small group of malignant cells amid normal marrow corpuscles and reticulum. When this "cancer cirrhosis" has taken place the thin sections are comparatively tenacious; in its absence the marrow tissue is apt to be broken down, and all its corpuscles destroyed by the acids used for decalcification. Hence a negative result on microscopic examination may be arrived at in an early stage of the marrow infection.

Torok speaks of having found the humerus diseased in 5, the femur in 3, out of 336 cases of breast cancer. Sprengel noted deposit in the femur in 4 of 131 similar. All that such assertions, however, mean is that in the small percentage of positive instances their attention was directed to the bone in question by the presence of a tumour or the occurrence of a fracture. The negative majority do not appear to have been examined at all. Hence we may take the above figures, making allowance for the "atrophic" cases doubtless included, to indicate approximately the proportion in which this latent marrow infection ceases to be "insidious;" but they count for nothing more.

Of 12 cases of breast carcinoma, examined by myself without any selection, 9 displayed "fibrotic induration" in the marrow of various bones; and, on microscopic examination, the typical characteristics of scirrhus cancer were revealed. All these 9 were "insidious;" no tumour of bone or fracture had been witnessed during life. Of the remaining 3, 1 was an "atrophic" case of more than eight years' duration in a peculiarly spare woman; the other two showed (in the humeri) fatty degeneration of the marrow in an extreme degree, and, after preservation for some months in spirit, were found too altered for satisfactory examination.

In conclusion, I may briefly hint at the practical bearing of these observations, their significance in explaining the fatal tendency of mammary carcinoma to reappear after apparent

extirpation, and in doing away with any yet lingering views of "constitutional origin," whatever that equivocal phrase may really mean. Lastly, at their import from an ethical point of view, inasmuch as when any of these obscure marrow symptoms are present no operation can be undertaken or advised, except as a measure of palliation only.

Appendix of Specimens Exhibited.

1. Photograph of No. 673 in the Museum of St. Thomas's Hospital (taken by the kind permission of Mr. Shattock)—reproduced in Fig. 1—exhibits in an extreme degree the phenomena of marrow infection without any tumour formation. Also photograph of certain bones taken from the same case.
2. Photographs displaying the "sternal symptom" in as many patients, the subjects of breast carcinoma. Five of these cases were described in the *Lancet* of March 14th, 1891.
3. Case: "Trindles." Scirrhus of right breast in woman aged 51, who died in the Cancer Hospital with acute mania and with coexisting phthisis. Thin sections exhibited showing scirrhus acini in cancellous tissue of head and shaft of right humerus; in ditto of left in marrow taken from both bones; in cancellous tissue of a lumbar vertebra. No bone symptoms during life. Thin sections and bones exhibited.
4. Case: "Hill." Scirrhus of the right breast in woman aged 58. Scirrhus acini in right and left humeri; also in cancellous tissue of lumbar vertebra. Bones and microscopic sections therefrom exhibited.
5. Case: "Hewett." Scirrhus of both breasts, the right primarily, in a woman aged 43. Typical scirrhus acini in marrow and in cancellous tissue of upper epiphyses of both humeri. These bones, with the sections, exhibited.
6. Case: "Phillips." Scirrhus of left breast in woman aged 42. Scirrhus acini in left humerus; large cells, not arranged in acini, scattered through the marrow; the sternum infiltrated, but possibly by contiguity of tissue; a mass adherent to thoracic parietes.
7. Case: "Anson." Scirrhus of both breasts, the left primarily, in woman aged 78. Scirrhus acini and large cancer cells, mingled with abundant myeloplaxes in both humeri.
8. Case: "Carlisle." Scirrhus of left breast in woman aged 50. Typical acini in right humerus; the sternum infiltrated (but possibly by contiguity). At the necropsy several of the ribs, not included in the diseased area, found to contain small nodular tumours, which, on microscopic examination, proved to be scirrhus deposit.
9. Case: "Emma B." Cancellous tissue in head of left humerus, with scirrhus acini; secondary to disease of left breast; brawny cedema of arm; bone cut easily with knife.
10. Case: "Martha S." Scirrhus deposit in seventh cervical vertebra, secondary to disease of left breast; not insidious; paraplegia and local tenderness, but no tumour.
11. Case: "Mildred W." Also not insidious, but important as showing wide diffusion; primary encephaloid carcinoma of left breast; two bony growths on sternum; large tumours on left parietal bone, left scapula, and right femur; the femur fractured shortly before death.
12. Case: "Foot." Scirrhus of both breasts, primarily of the left, in a woman aged 38; duration about three years; the left breast excised eighteen months previously at the London Hospital; typical scirrhus acini in the left humerus and in a lumbar vertebra.
13. Case: "Daw." Two large cancerous masses in left cerebral hemisphere, consecutive to scirrhus of the right breast, in a woman aged 41; profound coma for seven weeks before death; disorganisation of articular cartilage at head of right humerus; sternal prominence noted during life; sternum found filled with scirrhus deposit; no direct infiltration in the humeri, some fatty degeneration of the marrow, but no malignant deposit found—the only instance among the nine positive cases in which these bones were examined with a negative result.

NOTE.—Since the above was written I have become able to give what appears to me a satisfactory explanation of the mechanism whereby the two physical signs referred to take origin; in both the lymphatic system is the agency concerned. In a case with well-marked sternal prominence and healthy thoracic parietes, I found the degenerate thymus full of scirrhus acini, adherent to the bone, and thus producing direct infiltration; the greater part of the sternum was decalcified. The thymus, it is to be remembered, is practically a lymph gland, intimately associated with the glands and vessels in its vicinity. There can be little doubt, again, that the humerus becomes implicated by the regurgitation of lymph currents, secondary to the block following carcinoma deposit in the subclavian and deep axillary lymph glands. For a typical instance of this lymph regurgitation, see *St. Bartholomew's Hospital Reports*, viii, art. 5.

A PUBLIC meeting in support of the Royal British Nurses Association will be held at the Mansion House on March 18th, at 4 P.M. H.R.H. Princess Christian will be present, and Sir William Savory, Sir J. Crichton Browne, Sir Dyce Duckworth, and others, have promised to speak.

A SOCIETY for the Care of Children suffering from incurable disease, without regard to social position, sex, or religious denomination, has been formed at St. Petersburg. One anonymous benefactor has given 40,000 roubles (£4,000) to the Society, and another has presented a site for building purposes.

MEMORANDA: MEDICAL, SURGICAL, OBSTETRICAL, THERAPEUTICAL, PATHOLOGICAL, Etc.

OXYGEN IN PNEUMONIA.

ON January 22nd I was asked to see a lady, 45 years of age, who was just recovering from an attack of influenza. The medical man under whose care she was had succeeded very satisfactorily in his treatment of her case. On the morning of the 22nd, however, she was seized with great difficulty of breathing. When I saw her there was marked orthopnea, her face was livid, bloated, and covered with cold perspiration. All the extraordinary muscles of inspiration were called into play, and yet the lips remained cyanosed and the pulse very small and frequent. She begged to be left alone to die. Her history was that for thirty years she had suffered from winter coughs and wheezing on lying down. There was marked dullness over the right base, and on auscultation tubular breathing. On the left side subcrepitant râles abounded. Her temperature was 103°, pulse 130, respirations 65. She was given concentrated nutrient at short intervals, her stimulants were increased, but towards midnight she got rapidly worse. Through the kindness of Mr. Henri Weiss I secured a bottle of oxygen, and administered the gas direct into the nostril by means of a piece of india-rubber tubing. The hope was a forlorn one, the patient being apparently moribund. Within two minutes the aspect changed from a dusky purple to a rosy hue. The pulse, which was previously imperceptible at the wrist, reappeared and was of fairly good volume and strength. The inhalation was continued for about four minutes, and then she awoke, and said: "Where have I been to? I feel quite well now." The next morning the cyanosis had returned and the dyspnoea as severe as before. Again the oxygen was administered, and again with the happiest results. From that moment she began to improve, the urgent symptoms did not return, resolution took place in the lung, and to-day she suffers only from slight swelling of the feet when she is about on them too long.

Albany Street, N.W.

JAMES T. MAUGHAN.

OXYGEN IN DIPHTHERIA.

THE value of the inhalation of oxygen in restoring life seriously endangered by pulmonary trouble was strikingly shown in the following case.

A. W., aged 4½ years, was admitted into St. George's Hospital on June 29th, 1888, suffering from marked pharyngeal and laryngeal diphtheria, with much dyspnoea and cyanosis. It was necessary to at once perform tracheotomy, and the operation greatly relieved the urgency of the symptoms. The child did well for some time, but the dyspnoea gradually increased again owing to the extension of the membrane downwards and the development of broncho-pneumonia.

On July 1st and 2nd oxygen was several times administered through the tracheotomy tube by means of a neck piece connected with an india-rubber bag (similar to those employed in the use of nitrous oxide) in communication with the reservoir of gas. The inhalations were consistently attended with good results as far as the dyspnoea and cyanosis were concerned, the improvement on each occasion lasting for about an hour and a-half.

About 5 P.M., on July 2nd, she had a sudden attack of dyspnoea, and fell back in bed. When seen about five minutes afterwards the respiration had entirely ceased, no pulse could be felt at the wrist, nor could the heart be heard to beat; the face was of an ashen stone colour, and the child apparently dead. Artificial respiration was vigorously employed, and oxygen administered under pressure, that is, during the inspiratory movements; the bag was firmly compressed between the hands of an assistant, thus forcing the gas into the lungs. In from two to three minutes the child began to show faint signs of life, and finally completely came round, and the same evening sat up in bed and played with her doll. The improvement was maintained throughout the night, but in the morning prostration set in, and the child died gradually from asthenia twelve hours after the last administration.