cytes make up from seventy to ninety-nine per cent—usually over ninety per cent—of all the cells found in the smear (see Fig. 176).

(*b*) In septic cases due to the streptococcus, staphylococcus, or pneumococcus the majority of the cells are *polynuclear* leucocytes (see Fig. 177).

(*c*) In *transudations* (dropsical) the predominating cell is a large mononuclear type, apparently endothelial in origin and often occurring in sheets or "*plaques*" (see Fig. 178).

Exceptions occasionally occur, but in the main these rules are sufficiently exact to be of value in diagnosis when taken in connection with all the facts in the case.

In *peritoneal fluid* the use of cytodiagnosis has not as yet furnished information of any considerable diagnostic value.

In cerebrospinal fluid obtained by lumbar puncture the predominance of lymphocytes has not the same association with tuberculosis as it has in the pleura, and seems to point to nothing more definite than cerebrospinal irritation from any cause.

CHAPTER XVII.

ABSCESS, GANGRENE, AND CANCER OF THE LUNG, PULMONARY ATELECTASIS, ŒDEMA, AND HYPOSTATIC CONGESTION.

Abscess and Gangrene of the Lung.

I consider these two affections together because the physical signs, exclusive of the sputa, do not differ materially in the two affections. In some cases there may be no physical signs at all, and the diagnosis is made from the character of sputa and from a knowledge of the etiology and symptomatology of the case. In other cases we find nothing more than a patch of coarse râles or a small area of solidification, over which distant bronchial breathing, with increased voice sound and fremitus, may be appreciated. Rarely there may be slight dulness on percussion, but as a rule the area is not sufficiently large or sufficiently superficial to produce this. One may find the signs of cavity (amphoric breathing, cracked-pot resonance, and gurgling râles), but this is unusual.

Gangrene of the lung is not a common disease. The diagnosis usually rests altogether upon the smell and appearance of the sputa. In fetid bronchitis one may have sputa of equal foulness, but the odor is different. The finding of elastic tissue in the sputa proves the existence of something more than bronchitis.

Pulmonary abscess, which, like gangrene, is a rare affection, is often simulated by the breaking of an empyema into the lung and the emptying of the pus through a bronchus. Large quantities of pus are expectorated in such a condition, and abscess of the lung is suggested, but the other physical signs are those of empyema and should be easily recognized as such. The finding of *elastic fibres* is the crucial point in the diagnosis of intrapulmonary abscess,

whether due to the tubercle bacillus or to other organisms. Tuberculous abscess (cavity) is usually near the summit of the lung, and other varieties of abscess are near the base, but often there are no physical signs by which we can distinctly localize the process.

Malignant Disease of the Lung, Pleura, or Chest Wall.

In its earlier stages this affection is often mistaken for empyema or serous effusion in the pleural cavity, and indeed the physical signs may be in part due to an accumulation of fluid secondary to the malignant growth within the lung. The rapid emaciation of the patient and the presence of a dark-brown bloody fluid in the pleural cavity, as determined by puncture, make us suspect malignant disease, but in sarcoma there is usually no emaciation until late in the course of the disease. The sputa rarely contain fragments of tissue whose structure can be recognized as characteristic of malignant disease. Secondary deposits in the supraclavicular glands may suggest the diagnosis.

The thorax is usually somewhat asymmetrical. The affected side may be either contracted or distended according to the nature of the malignant growth within; occasionally it is not deformed at all. When the growth attacks only the lung tissue itself, leaving the bronchi and mediastinum free, we get signs like those of pleural effusion (flatness, absent breathing, voice sounds, and tactile fremitus).

If the disease begins in the bronchi, we may have a noisy dyspnœa from stenosis of a bronchus, and a weakening of the respiratory sounds normally to be heard over the trachea in front has several times been noted. Percussion dulness, if present, is usually over the upper portions of the chest, and may disappear and reappear or skip from place to place in a very irregular and confusing way.

Signs and symptoms of pressure in the mediastinum due to secondary involvement of the peribronchial glands may be present and may simulate aneurism, or the growth may press directly upon the brachial plexus, producing pain in the arm.

Atelectasis.

(*a*) Areas of atelectasis or collapse of pulmonary tissue are often present in connection with various pathological processes in the lung (such as tuberculosis or lobular pneumonia), but are usually too small to give rise to any characteristic physical signs; nevertheless

(*b*) In most normal individuals a certain degree of atelectasis of the margins of the lungs may be demonstrated in the following way: The position of the margins of the lungs in the axillæ, in the back, or in the precordial region are marked out by percussion at the end of expiration. The patient is then directed to take ten full breaths, and the pulmonary outlines at the end of expiration are then percussed out a second time. The pulmonary resonance will now be found to extend nearly an inch beyond its former limits, owing to the distention of previously collapsed air vesicles.

If one auscults the suspected areas during the deep breaths which are used to dispel the atelectasis, very fine râles are often to be heard at the end of expiration, disappearing after a few breaths in most cases, but sometimes audible as long as we choose to listen to them. These sounds, to which Abrams has given the name of "atelectatic crepitation," are in my experience especially frequent at the base of either axilla. The same writer has noticed an opacity to the *x*-rays over such atelectatic areas.

Forcible percussion may be sufficient to distend small areas of collapsed lung, or at any rate to dispel the dulness previously present (see above, p. 136, the lung reflex).

(*c*) When one of the large bronchi is compressed (as by an aneurism) or occluded by a foreign body, collapse of the corresponding area of lung may be shown by diminished motion of the affected side, dulness on percussion, and absence of breathing, voice sounds, and tactile fremitus.

In new-born babies whose lungs do not fully expand at the time of birth, similar physical signs are present over the non-expanded lobes. The right lung is especially apt to be affected

In the differential diagnosis of extensive pulmonary collapse,

the etiology, the suddenness of their onset, the absence of fever and of displacement of neighboring organs enable us to exclude pneumonia and pleuritic effusion. In distinguishing small areas of solidification from similar areas of atelectasis, Abrams finds the "lung-reflex" (see page 136) of value. Atelectatic areas expand if the skin overlying them is irritated. Solidified areas show no change.

Œdema of the Lungs.

In cardiac or renal disease one can often demonstrate that the lungs have been invaded by transuded serum as a part of the general dropsy. More rarely pulmonary œdema exists without much evidence of œdema in other organs or tissues.

The only physical sign characteristic of this condition is the presence of fine moist râles in the dependent portions of the lungs; that is, throughout their posterior surfaces when the patient has been for some time in a recumbent position; or over the lower portions of the axillæ and the back if the patient has not taken to his bed.

The râles are always bilateral (unless the patient has been lying for a long time on one side), and the individual bubbles appear to be all of the same size, or nearly so, differing in this respect from those to be heard in bronchitis. No squeaking or groaning sounds are to be heard. The respiratory murmur is usually somewhat diminished in intensity.

Dulness on percussion and modification of voice sounds are not present, unless hydrothorax or hypostatic pneumonia complicate the œdema.

Hypostatic Pneumonia.

In long, debilitating illness, such as typhoid fever, the alveoli of the dependent portions of the lungs may become so engorged with blood and alveolar cells as to be practically solidified. Under these conditions examination of the posterior portions of the lungs shows usually:

(*a*) Slight dulness on percussion reaching usually from the base to a point about one-third way up the scapula. At the very base the dulness is less marked, and becomes mixed with a shade of tympany.

(*b*) Feeble or absent tactile fremitus.

(*c*) Diminished or suppressed breathing and voice sounds.

The right lung is apt to be more extensively affected than the left.

Occasionally the breathing is tubular and the voice sounds are increased, making the physical signs identical with those of croupous pneumonia, but as a rule the bronchi are as much engorged as the alveoli to which they lead, and hence no breath sounds are produced.

Râles of œdema or of bronchitis may be present in the adjacent parts of the lungs. The fact that the dulness is less marked at the base of the lung than higher up helps to distinguish the condition from hydrothorax.

The diagnosis is usually easy, owing to the presence of the underlying disease. Fever, pain. and cough such as characterize croupous pneumonia are usually absent.