intramuscularly about a week apart. The retest to determine the development of antitoxic immunity should be made after two to three months. The local reactions are only slight in positive reactors, but more marked in pseudo and combined reactors.

With the discovery of the toxin producing power of the hemolytic streptococcus a wide field of productive research has been thrown open to the investigator. Many problems will, no doubt, very soon be solved, such as the identity or lack of indentity of toxins produced by different strains of hemolytic streptococci obtained from a variety of sources. The subject of erysipelas and the possibility of producing an effective antitoxic serum will have to be reinvestigated. Eight years ago I used, with striking results, the convalescent whole blood from a case of erysipelas in the treatment of a young child, intensely ill with erysipelas.

The diagnosis of varying forms of sinus disease, such as ethmoid, sphenoid, antrum, ear infections, etc., will be facilitated as regards a doubtful scarlet fever etiology, if the strain of hemolytic streptococcus causing the local condition is obtained, a toxin produced and it is subsequently determined whether the toxin can be neutralized with convalescent scarlet fever serum.

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The influence of thyroid substances on the absorption of pleural effusions.

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A good many patients suffering with pneumonia develop during the course of their disease pleural effusions. Some of these effusions are small and assume no clinical importance since they are usually absorbed at or soon after the crisis. Others are large and manifest themselves by physical and röntgenological signs. They last for a number of weeks, are accompanied by moderate fever prolonged convalescence and sometimes undergo purulent metamorphosis. The gross appearance of the fluid is usually straw-colored, of varying transparency and usually bacteria-free on culture.

The pathogenesis of these effusions is wholly unknown. It is possible that a certain type of pneumonia produces pleural exudation. This, if true, might explain the great frequency of this complication in the so-called influenza pneumonias. It can by no means, however, be said that the parapneumonic pleural effusions are confined to this type of pneumonia. It occurs frequently enough in conjunction with fibrinous lobar pneumonia.

Perhaps certain individuals particularly predisposed develop effusions in the pleural space in the course of their pneumonias. This idea seemed not unlikely in the light of Eppinger's work on edema.

Eppinger[1] found that certain cases of cardiac or kidney disease were frequently typified by an enormous generalized subcutaneous edema, that treatment of the heart by digitalis, restriction of the fluid intake, a salt-free diet or the administration of diuretics had no effect. In such cases the feeding of thyroid gland produced a marked diuresis, the disappearance of edema and distinct clinical improvement sometimes for an extended period.

He subjected these clinical observations to experimental investigation and found that there was a striking difference between the absorption of subcutaneous fluid from a normal and thyroidectomized animals. While normal animals absorbed considerable amounts of saline from the skin, thyroprivic animals could not absorb saline so injected. In such animals a subcutaneous edema collection was produced. Also the effect of the drinking of water on diuresis differed in the normal and thryroidectomized animal. While diuresis was produced in the former, in the animal without a thyroid gland diuresis was insignificant or entirely absent.

These examples illustrate the governing influence of the thyroid secretion on the water transport from the subcutaneous tissues and also on diuresis.

Eppinger then argued, as did Hertoghe[2] before him, that there might be mild or *formes fruste* of hypothyroidism, just as there are of hyperthyroidism, that these forms of hypothyroidism might remain latent until an edema factor—heart or kidney in-

[1] Eppinger, H., *Zur Pathologie u. Therapie des Menschlichen Odems.* Springer, 1917.

[2] Hertoghe, M., *Rolle der Schilddrüse bei Stillstand u. Hemmung des Wachstums,* J. F. Lehman, 1900.

sufficiency—was super-added. Now the edema would be out of all natural proportions and clinical improvement would follow only when thyroid was administered.

It occurred to us that a similar explanation might be given for the parapneumonic effusions just discussed. This seemed plausible in the light of another known clinical fact. A tissue inflammation (furuncle or a cellulitis) in a patient suffering from circulatory failure with edema will be enormously swollen and doughy. Then, by analogy, a pneumonia (an inflammation of the lung) in an individual with a tendency to edema (latent or *formes fruste* hypothyroidism) may produce an extensive pleural edema or effusion. With this theoretical background we applied thyroid substances in four cases of pleural effusion, three of which were associated with pneumonia; the fourth one was primary and probably due to latent pulmonary tuberculosis.

Out of the three cases of parapneumonic pleural effusions thyroxin was used in two cases, dessicated thyroid gland in one, and in the case of tuberculous pleural effusions both of these thyroid substances were used.

Case 1.—A thirty-five year old man with a parapneumonic pleural effusion of one week's standing received 1/6 mg. of thyroxin every four hours for three days and 1/3 mg. every four hours for the next four days. After the three day period there was a striking diminution in the amount of fluid and after seven days the fluid was gone. This was demonstrated both by physical and x-ray examination.

Case 2.—Forty-six year old man with parapneumonic pleural effusion on the right side, of three weeks duration with no apparent tendency to spontaneous absorption, showed a marked diminution in the signs of fluid after three days of thryroxin, 1/6 mg. three times a day, and almost a complete disappearance after the next four days of thyroxin medication given 1/3 mg. every four hours.

Case 3.—Sixty year old woman with a parapneumonic effusion of two and one-half weeks duration, with no demonstrable tendency to spontaneous absorption, was put on dessicated thyroid gland three grains per day for four days. Physical and x-ray examination done on the fourth day of thyroid therapy showed that the fluid had been absorbed.

Case 4.—A thirty-seven year old woman with a primary pleural effusion, probably tubercular, was given dessicated thy-

roid gland eight grains per day for three days, with no evidence of diminution in the amount of fluid in the chest. Thyroxin, 1/6 mg., was given every three hours for the next three days with no change. She was again put on dessicated thyroid gland for four days more and now there was just a slight diminution in the pleural exudate. This difference, however, was probably spontaneous and not due to the thyroid therapy.

SUMMARY

Three cases of pleural effusion were treated with thyroid substances and showed a distinct tendency to rapid absorption. These were the effusions accompanying pneumonia, the so-called parapneumonic effusions. One case of primary pleural effusion, probably tubercular in nature, was not affected by thyroid administration.

Further observations will be necessary to determine which type of effusion in the pleura may be influenced by thyroid administration, also whether it is the individual (hypothyroid?) or particular type of effusion etiologically, that can be affected by thyroid administration.

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On the coagulation of milk by rennin.

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The effects of various salts on the coagulation time of milk by rennin have been studied. It was found that $CaCl_2$, $MgSO_4$, and NaCl in certain dilute solutions favor coagulation (shortening the coagulation time), in other more concentrated solutions counteract it.

The coagulation of milk by rennin is sometimes spoken of as a precipitation of the hypothetical caseinogen by calcium salts. That it is not a true precipitation reaction is shown by the above mentioned action of salts. These to the same extent as they favor the stability of the milk colloids also favor coagulation,