the liver and organs do not alter in shape but only in size. (3) The process is often associated with tubercle, syphilis, etc., and two views may be held: either the process is an infective lymphadenoma similar to an infective granuloma in connective tissue, in which case it may own several causes; or it may be a specific new growth of lymphatic tissue, as sarcoma is of connective tissue or carcinoma of glandular and skin surface epithelium. At present we cannot decide which is the more accurate view. (4) Microscopically the tissue consists of small mononuclear round cells, with very fine fibrous stroma; the cells rarely vary; sometimes hyaline and sometimes lardaceous changes take place. If there is caseation, tubercles will probably be found also to be present. (5) For simplicity of classification the typical case should be one in which the spleen is not involved; when the spleen is infiltrated there will almost always be leucocytosis, and the condition should be classified as lymphadenoma complicated with leukaemia.

Dr. HERBERT SNOW strongly protested against the inclusion of malignant growths of the adenoid tissues under the title lymphadenoma. He recognised three chief forms of lymph gland or adenoid enlargement: (1) Simple lymphoma. (2) The true lymphadenoma or Hodgkin's disease, a general simultaneous enlargement of glands throughout the body, pyrexial. Microscopically there is a cirrhosis of the glands, the cells being crowded out of existence by redundant fibrous tissue. There is no invasion of any other tissue. (3) Lymphosarcoma, or lymphocarcinoma, a true cancer, always primarily local, commonly following injury, steadily progressing to death. There is exuberant cell proliferation; the cells have multiple huge nuclei; they erode all the tissues with which they come in contact, and tally in every respect with the features of malignant lesions elsewhere. The marrow is an important adenoid tissue, which gives rise to round-celled growths indistinguishable from the malignant lesions of lymph glands. Its implication by malignant tumours beginning elsewhere may account in part for the multiple hæmorrhages noticed in some cases of lymphosarcoma.

Dr. CLAUDE WILSON said: I have been much struck by the tendency of many speakers, particularly exemplified by Mr. Spencer's thoughtful paper, to group together the whole series of cases, including typical Hodgkin's disease, leucocythæmia, and the cases between them, rather than to make an attempt to differentiate them. Mr. Jackson Clarke too would seem to link the one end of this chain very closely with sarcoma. My own attention has been specially directed to the subgroup of cases which have been called "splenic anæmia," "splenic cachexia," "splenomegalia primitiva," etc., and which seem to occupy a position midway between typical leucocythæmia and typical lymphadenoma, being characterised by anæmia and enlarged spleen, but without leucocytosis or enlargement of lymph glands. A series of cases which I have described include six cases extending over three generations of the same family, and have shown these characters—in one or two instances for fully thirty years—without showing any tendency to relapse either in the one direction or the other; and my impression is that, however useful it may be in our present state of knowledge to group the whole class of diseases covered by the present discussion, it will be found necessary eventually to differentiate them into at least as many subgroups as has hitherto been customary.

Mr. S. G. SHATTOCK remarked upon Dr. Leslie's observations that, although there were analogies between lymphadenoma and tuberculosis, there were equally analogies between lymphadenoma and new growths. The tissue in question was lymphatic tissue, not granulation tissue, and so differed from that of tubercle. He did not agree with Mr. Jackson Clarke's view that lymphoma was a sarcoma as the word was generally understood. Sarcoma was a tumour of connective tissue origin, and exhibited the metaplasia known between different forms of connective tissue; but leucocytes, it was generally held now, did not produce connective tissue. Mr. Butlin had described the spontaneous diminution of a swelling of the testicle in a boy affected with bilateral disease of the testicles and multiple growths in the skin; this case was at the time regarded as one of round-celled sarcoma, but the speaker thought it more probably one of lymphomatosis. The tissue of lymphomatosis was a normal tissue; so was that of a columnar-celled carcinoma; he considered it safest,

therefore, to relate the disease lymphoma, whether in its local or generalised forms, with new growths in general.

Mr. SPENCER, in reply, said that the President, Dr. Wilks, in his paper in the *Guy's Hospital Reports*, had been the chief person in this country to enlarge our knowledge of this disease. He maintained that histologically there was a sharp distinction from sarcoma, although, as in other disease, a growth of primary lymphadenoma might take on secondarily malignant characters and infiltrate. He denied the necessity of assuming a micro-organism; it might be due to a chemical irritant. He could not agree that gout and osteo-arthritis had any connection with lymphadenoma, which occurred in children and young people. On the other hand, the connection between gout and osteo-arthritis and true sarcoma was frequent. He believed that all the forms of lymphadenoma might be included under one name, as had already been done for tubercle and syphilis.

NOTE ON EHRlich's DIAZO-REACTION.¹

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THE diazo-reaction, or Ehrlich's diagnostic test for typhoid (enteric) fever is now well known. In Ehrlich's original method² two solutions are made use of—(A) a saturated solution of sulphanilic acid in a 5 per cent. aqueous solution of hydrochloric acid, and (B) a 0.5 per cent. aqueous solution of sodium nitrite. For use 40 parts of (A) are mixed with 1 part of (B); this may be termed the test solution. Equal parts of this test solution and of the urine are mixed, and the mixture is rendered alkaline with ammonia. Normal urine gives a yellow or orange colour, while the urine of typhoid fever gives a deep reddish colour, very like that of port wine; on shaking the froth becomes pink, and on standing for twenty-four hours a greenish precipitate forms.

Various modifications of the test have been employed. Ehrlich mixes the urine with five times its volume of absolute alcohol, filters and tests the filtrate as in the original method. Simon³ adds the ammonia by means of a pipette, so that it forms a layer on the surface, and a coloured ring is produced at the junction of the liquids. Rutimeyer⁴ makes his test solution by adding to 200 parts of a saturated aqueous solution of sulphanilic, 10 parts of pure nitric acid, and 6 parts of a 0.5 per cent. aqueous solution of sodium nitrite. Lastly, Greene⁵ claims that the reaction is much more reliable if the test solution be prepared by mixing (A) and (B) in the proportion of 100 to 1 instead of 40 to 1, as originally recommended.

I do not propose to deal at any length with the clinical aspect of this reaction, as my experience of it is not sufficiently large. In the comparatively few cases in which I have tried it, I have been struck by its accuracy, and I gather from a survey of a considerable amount of literature that most authors consider it a very valuable test, and one of considerable diagnostic importance. While the reaction is almost invariably present in typhoid fever during the second and third weeks, it is also met with in some other diseases—frequently in advanced phthisis and other forms of tuberculous disease, and in extensive malignant disease, sometimes in measles, pneumonia, and typhus fever, and occasionally in other specific fevers, acute rheumatism and septicæmia. In typhoid fever the test is, perhaps, most valuable when negative, that is, if in a febrile condition during the second or third weeks the reaction is not obtained the disease is almost certainly not typhoid fever. Greene claims that by using less sodium nitrite (A : B :: 100 : 1 instead of 40 : 1. See above.) phthisis and pneumonia do not give the reaction, while it remains distinct in typhoid and advanced malignant disease.

In employing the test certain precautions must be observed. The solution of sodium nitrite should not be more than a day

¹ Read in the Section of Pathology at the Annual Meeting of the British Medical Association held in London, July-August, 1895.

² *Charité-Annalen*, viii, 1883.

³ *Johns Hopkins H.-sp. Bullett.*, i, 1890, p. 93.

⁴ *Correspondenzblatt f. Schweiz. Aerzte*, No. x, p. 90.

⁵ *Journ. Amer. Med. Assoc.* (Chicago) xxii, 1894, p. 256.

or two old; it is better to prepare it as required. The test solution should be mixed at the time of using. Any excess of sodium nitrite must be avoided, or a pseudo-reaction may be obtained. Neglect of this last precaution has led some observers to deny that the test has any diagnostic importance (Penzoldt, von Jaksch, Munson and Oertel, see below). The colour of the true reaction is a red, not orange or brown, and a pink froth is produced on shaking. It is a curious fact that in some cases, although the colour may be the right one, a white and not a pink froth forms; the reaction then is not a true one. The urine should be freshly passed and acid. It is only by attending to these minutiae that the test can take its proper place as a valuable diagnostic agent. Neglect of them brings failure and undeserved discredit.

The nature of the substance which gives the reaction is still unknown. It might be anticipated that cultures of the bacillus typhosus would give the reaction, but such is not the case. Like Dawson,⁶ who investigated this point, I have failed to get any trace of the reaction in broth cultures of the *Bacillus typhosus*. The bacillus employed for inoculation had been recently isolated, and the cultures were of various ages, from a day to a month. Cultures of a number of other organisms were also tested, namely, *B. coli communis*, *B. anthracis*, *B. tetani*, *B. diphtheriae*, *B. prodigiosus*, pneumococcus of Friedlaender, *S. pyogenes aureus*, streptococcus of erysipelas, Koch's comma bacillus, Finkler's comma bacillus, and *Vibrio Metchnikovi*, but in no instance was the reaction obtained. Penzoldt⁷ and Von Jaksch⁸ have stated that acetone is the substance which gives the reaction. Such is not the case, and these authors seem to have fallen into error by using a 5 per cent. instead of a 0.5 per cent. solution of sodium nitrite, and from the same cause Munson and Oertel⁹ believed that it depends upon aceto-acetic acid, but this is not so.¹⁰ I have tested the following substances to see if they give the reaction: caustic potash, sodium carbonate, ammonium sulphide, formic acid, zinc lactate, picric acid, salicylic acid, glucose, thymol, camphor, carbolic acid, oil of turpentine, asparagin, amygdalin, æsculin, santonin, salicin, brucine (three specimens), strychnine (three specimens), nicotine, caffeine, codeine, eserine, narcotine, piperine, cinchonidine, cinchonine, quinine, quinidine, papaverine, atropine, hyoscyne, and aconitine. All of these give only a yellow or orange, thymol a deep orange. Bagnacci¹¹ has stated that thymol, strychnine, and glucose give the reaction, but they certainly do not. Picro-sulphuric acid (Kleinenberg's) gives a brown colour.

The only substance I have met with which gives a reaction at all resembling the red typhoid reaction is morphine and its salts. The colour produced by morphine is very like a somewhat pale typhoid reaction, and the resemblance is the greater, as a pink froth is formed on shaking. It differs from the typhoid reaction, however, as no green precipitate forms on standing. The test is a very delicate one; 1 part of morphine acetate in 5,000 parts of water is readily recognised, and even 1 part in 10,000 can be detected. The reaction might perhaps be useful as a test for morphine. In connection with the diazo-reaction, the similar morphine reaction is of importance, because morphine is excreted by the urine, so that the urine of a patient taking this drug or opium might give a pseudo-reaction simulating the true typhoid reaction.

A PRELIMINARY COMMUNICATION ON THE FATE OF MICRO-ORGANISMS IN INSPIRED AIR.¹

BY
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[ABSTRACT.]

IN a communication we recently had the honour of reading before the Royal Medical and Chirurgical Society² on "Micro-

organisms in the Healthy Nose," we estimated that at least 1,500 organisms are inspired every hour, while it must be a common event for this number to rise to 14,000. In spite, however, of the enormous number of organisms inspired, numerous observers have shown that expired air is practically free from microbes (Tyndall, Gunning, Strauss). In the experiments of Strauss,³ of 609 microbes inhaled only a single one was expired. Lister's observations on pneumothorax caused by wound of the lung by a fractured rib seem to show that the organisms are arrested before they reach the air cells; while the experiments of Hildebrandt⁴ indicated that this arrest takes place before the trachea is reached, probably in the nasal cavities. This seems to be the case, for we have examined bacteriologically the tracheal mucus from many recently killed animals, and have always found it sterile. In our paper referred to above, we arrived at the conclusion that the mucous membrane of the normal nose seems to be usually quite free from micro-organisms, while the vestibules, vibrissæ, and crusts are swarming with them. If, then, the bacteria in inspired air are arrested in the nasal cavities, what becomes of them, and how are they got rid of? That the action of the ciliated epithelium is an important factor can hardly be doubted, for any particles deposited on a ciliated epithelial surface are rapidly moved onwards, as can be demonstrated by watching the movement of a particle of wet cork placed on the dorsal wall of a frog's pharynx.

The following experiment shows that bacteria deposited on the Schneiderian membrane are rapidly removed. Cultures were prepared from the vibrissæ and mucous lining of the nose of one of us who acted as the subject. No red growth developed in these, so that the bacillus prodigiosus was absent. A looped needleful of a pure culture of the bacillus prodigiosus was then deposited on a spot on the septum naris, and cultures were made from this spot and its neighbourhood at intervals up to two hours. Cultures made within 5 minutes gave an abundant confluent growth of bacillus prodigiosus; after 15 minutes the amount of growth was distinctly decreased; after 60 minutes the growth was diminished by 75 per cent.; after 80 minutes frequently no growth occurred; while after 2 hours no trace of the bacillus prodigiosus could ever be detected.

Wurtz and Lermoyez have stated that the nasal mucus exerts a bactericidal action, but so far we have been unable to confirm their researches.

We have made a number of experiments to test the bacterial condition of the air before and after passing through the nose. Our first experiments were very conflicting, but having perfected our methods, our later ones show that nearly all the organisms are arrested before reaching the nasopharynx.

We conclude that many of the organisms are arrested by the moist meshwork of the vibrissæ, while those which reach the mucous membrane are eliminated by the action of the ciliated epithelium, and by the trickling of the mucus. The mucus, from our experiments, seems to be an unsuitable nutrient medium, and the multiplication of organisms is thereby prevented. Phagocytosis may occur, but only to a small extent.

THE EXPERIMENTAL EVIDENCE CONCERNING THE PRODUCTION OF A HÆMATOGENOUS JAUNDICE.*

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FOR some time past my attention has been a good deal occupied in an examination of the evidence which in recent years has been advanced in support of the view that a hæmatogenous jaundice is no longer admissible. We may have a non-obstructive jaundice, which is by no means hæmatogenous, except in so far as the hepatic disturbance is initiated by changes in the blood. But a true hæmatogenous jaundice, or that produced exclusively from the blood, is regarded as

⁶ *Dub. Journ. Med. Sc.*, vol. xcv. 1893, p. 490.

⁷ *Berlin klin. Woch.*, 1884, No. 14.

⁸ *Clinical Diagnosis*.

⁹ *Med. Jour. (New York)*, vol. lviii. 1893, p. 127.

¹⁰ A. S. Warthin, *Med. News* (Philadelphia), vol. lxiii, 1893, p. 569.

¹¹ See Warthin (*loc. cit.*, note 10).

¹ Read in the Section of Pathology at the Annual Meeting of the British Medical Association, held in London, July-August, 1895.

² *Trans.*, vol. lxviii, 1895.

³ *An. de l'Inst. Pasteur*, 1888, No. 4.

⁴ *Ziegler's Beitr. z. path. Anat.*, Bd. ii, 1888, p. 421.

* Read in the Section of Pathology at the Annual Meeting of the British Medical Association, held in London, July-August, 1895.