and their experience coincides with mine. How can this be accounted for?"

I am not familiar with the literature of syphilis, and do not know if the fact alluded to by Dr. Rush Jones has been observed in other parts of the world. If so, it seems to me to have an important bearing on the practical application of the Contagious Diseases Acts. And so would the complete history of the working of the quarantine and isolation of infected negroes on the several cotton plantations in Montgomery County, Alabama, during the time of slavery and since emancipation, if we could obtain minute and reliable reports on the subject.

I am no authority on the subject of syphilis; and, if any apology were necessary for this communication, it is this:

I was at the meeting of the London Medical Society on November 26th last, and heard the discussion on the papers of Dr. Drysdale and Dr. Routh on syphilis. From this, it appeared that we now differ as widely on the subject of its treatment, as we did fifty years ago. And this gave me the idea of writing to Dr. Rush Jones and Dr. McDade for the facts which I now lay before the profession.

I have known Dr. Rush Jones all my life, and I have known Dr. McDade, and Dr. Freeny, and Mr. Barnett, for more than forty years, and have perfect confidence in any statement they might make, or I would never have said a word on this subject. I think great credit is due to Dr. Freeny and Dr. Banks for giving the coloured man Horace King an opportunity to demonstrate the value of the Indian decoction in the treatment of syphilis on the plantation of Mr. Gipson. For its success there brought it, with their endorsement, prominently before the community, and extended its use to the plantations of Mr. Barnett and his neighbours.

Too much credit cannot be given to Dr. McDade for investigating the subject, and giving us a formula at once scientific and efficient; for it has proven efficient in the hands of Dr. Rush Jones, Dr. McDade, and many other physicians who have been using it for several years past.

I should be pleased to see the name of McDade used by the profession hereafter to designate the formula and the method of treatment herein set forth. The remedy will doubtless be extensively used, at least for a while; and I sincerely hope it may prove as efficient here as it has in the hands of my friends in Montgomery, Alabama.

PRACTICAL PATHOLOGICAL WORK.

By H. A. REEVES, F.R.C.S.E.,

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How to fix Aniline Dyes.—I feel sure that all working histologists will be thankful for the discovery of a simple and effectual mode of setting the various beautiful aniline colours which have been much used of late years, but which do not stand the immersion in spirit and alcohol necessary to prepare them for mounting in Canada Balsam, dammar, or turpentine. It is pretty well known that these dyes are valuable on account of their selective power when properly used. I say properly, because, if employed in the ordinary way, only a general and diffused stain results, and they then are inferior to such a differentiating agent as hæmatoxylin. In all sciences, the discovery of good methods of research has very considerably aided in advancing the progress of discovery, and anything which tends in that direction must be of permanent value. Sections of fresh tissues, or of those hardened in alcohol, Müller's fluid, chromic acid, or chromic and spirit mixture, will answer for several of the methods to be described; but it is better to wash chromic hardened sections in water, and soak them for not less than about half an hour in methylated spirit, before proceeding to dye them. Then it will be found that normal and pathological structures take on distinct double, triple, or multiple staining. I have repeatedly tried the methods described by Heneage Gibbs, Stirling, and some German writers, and have but very rarely indeed succeeded; so that these modes are most uncertain and disheartening, and an easy and efficient substitute will be a great boon. I succeeded in double staining the cord, skin, etc., with the aniline in 1873; and showed some of the preparations to my pupils, among whom was Dr. Nears, the present lecturer on anatomy at Newcastle; also some other preparations of pathological interest which I did not then entirely comprehend; but in 1878 I examined these specimens again with immersion lenses, and found that what I had supposed to be peculiar cells and nuclei, proper to the tumours, and differentiating them

from others, was nothing other than the karyokinesis which Auerbach and Strasburger had not long before described as occurring in growing normal vegetable and animal cells. At least half a dozen times since that date I have found karyokinetic cells in rapidly growing tumours, and shall speak more fully of them in my forthcoming work on Diseases of the Breast.

I have frequently found, in attempting double staining with the anilines, that one colour either extracts the other, or blends with it, without differentiation, and that the sections must be mounted in glycerine, or acetate of potash, or a mixture of the two; that even then they are apt to fade, or soak out in the mounting medium. How long the colours will last by the methods to be described I cannot yet say, but see no reason to doubt a vitality enough for all practical and scientific purposes. For teaching, such preparations are of the greatest value, as some stains pick out one structure and some another, with great clearness and beauty.

For the last eighteen months I have been again experimenting, with a view of finding some mordant for these dyes, and have tried a legion of chemicals, in varying strength, singly and combined. I did not undertake this work hap-hazard, but after studying several modern works on chemistry, and on the art of dyeing. The latter did not help me much, as spirit or alcohol is not used in the ordinary dyeing processes, and, moreover, most of these dyers' becks are worked while the dye is hot. As the modes of fixing in calico, wool, leather, or silk dyeing would destroy, or seriously damage animal tissues, it was necessary to find a mordant which would not in any way deteriorate the structures, but this was no easy matter; and it was only by plodding systematically through the selected series, and making numerous variations in the modes of application, that the proper articles were found out. As, in the first instance, these were generally combinations, I had to find out the ingredients, and work with each separately, in varying strengths, before I could be sure which was the real and the best mordant. The purchase of oil immersion objectives, Abbé's achromatic condenser, and numerous chemicals and apparatus being necessary, and as my colleagues and the committee, and our excellent secretary, Mr. Cannon, at the Hospital for Women, all liberally fell in with my views, and fitted up and furnished the laboratory according to my desire, I have very much pleasure in rendering them my sincere thanks. I am also much obliged to Dr. Oliver, the house physician, for having cut sections for me when I have not been able to spare the time.

Before describing the process, I will draw attention to two or three new and beautiful dyes, and also to others which have not been used before, and to others but little known. The new dyes are Phloxine, and Erythrosine. I do not yet know their exact composition, but feel almost sure they are obtained from resorcin, as in many physical and chemical respects they resemble rosine. They stain rapidly and deeply, in weak aqueous solutions, and stand spirit well. Connective substances and the protoplasm of cells are, in rapid staining, preferred by them to nuclei, which, however, stand out on the stained ground-work very clearly. Phloxine is the more beautiful and pleasant colour to work with. Both are soluble in water or spirit, and weak solutions stain quickly. If sections be placed in weak solutions for several hours, the nuclei often take on the stain. Phloxine, and Erythrosine, as supplied to me, are darkish red powders by reflected light, the former having a faint purplish-crimson colour, and the colour of the solutions in a test tube, i.e. in transmitted light, will vary according to the strength. Any of the dyes herein mentioned may be obtained direct from the agent of the Badesche Anilin Fabrik, 22, Bush Lane, E.C., or from Messrs. Wright, Layman, and Umney, or in small quantities from Mr. Cooper, chemist, Oxford street, W. Messrs. Brooks, Simpson and Spiller, Broad street, E.C., also keep several of them.

Murexide, has—so far as I have been able to find—not yet been used in microscopy. It is given up by the dyers in favour of rosanilin, and is consequently not in demand, and therefore not easily procured. It is a brownish red powder, and very slightly soluble in cold water, not soluble in spirit, but readily soluble in boiling water. On cooling and filtering, the sections are immersed for five or ten minutes, when it will be found to furnish a good ground stain for double dyeing. With acetate of zinc, murexide gives a yellow stain.

Maroon, phosphine, cerise, and mauve, are all useful and unused colours; phosphine yielding a good ground stain of a rich golden yellow, and may be used with advantage in double staining. The rest resemble most of the other anilines in picking out the nuclei, but they also stain the other structures. Dilute aqueous or alcoholic solutions, stain rapidly, and may be fixed by one of the processes presently to be described, though phosphine holds very well of itself.

Induline is also a new aniline colour, and may be used as above. It is a dark powder, and gives an agreeable pale bluish-purple stain; and, if used after carmine or picrocarmine, the cell body and intercellular substance will be preferred by the induline, and the nuclei and connective fibres by the others. It dissolves in warm water or dilute alcohol. Maroon, phosphine, and cerise are new to histology.

Treble Staining.—Methylanilin violet, and iodine, malachite or methyl green, combined, give beautiful results. I first worked with aqueous solutions, which yielded good preparations, but now use an alcoholic mixture in the following way. Make a saturated solution of violet in strong alcohol, and filter. Do the same with the green, leaving some granules in excess at the bottom of the vessel; this solution is a greenish-blue. Filter and add the violet solution to it, drop by drop, till the mixture is the colour of Prussian blue, which soon occurs. If a large quantity be made for future use, add a little strong carbolic acid solution, about three drops per ounce of the solution, to prevent decomposition, and to retard the acetic change in the alcohol, which would soon spoil the dye. Filter about twenty drops into a watch glass, and dilute with spirit, and immerse sections for five to ten minutes; wash off excess in ordinary water, or better, drain off on filter paper, and set in saturated solution of acetate of potash, and mount in a mixture of equal parts of pure glycerine and acetate of potash. This gives good preparations for several weeks; but the dyes may be fixed by placing the sections, for three to five minutes, in a mixture of equal parts of a saturated aqueous solution of tannin, to which a little carbolic acid has been added, and distilled water. Then wash in water, and transfer, for the same time, to a mixture of rather more than one part of tartar emetic, (potassio-tartrate of antimony), and rest distilled water; wash, and put in strong pure methylated spirit for five to ten minutes; draw off excess of spirit on filter paper, and put for five minutes in oil of cajuput, cloves, juniper, aniseed, or turpentine, and mount—after drawing off excess of oil—in Canada balsam or dammar. The tannin and antimony solutions should be filtered into a watch glass before using, as also should be the dyes. Preparations hardened in spirit, or Müller's fluid, answer best; but chromic hardened sections will do, if previously soaked for twenty to thirty minutes in methylated spirit. One part of a saturated aqueous solution of xanthate of soda, and one of distilled water, will partly fix violet for passing through spirit and clarifying oil, if this be done quickly; but I have not found it to answer so well as the tannin and antimony. The xanthate solution is yellow, and has an odour of decomposing cheese. If this process be successfully carried out, and I have not found it to fail if the steps be carefully executed, very striking results are obtained. Connective and elastic tissues and cell protoplasm are stained violet; nuclei, nucleoli, young cells, and leucocytes are greenish-blue. The nuclei of unstripped muscle-fibres, and the nuclei of the sarcolemma of striped fibres, are blue; blood is rusty brown. The young cells of tumours, especially cancer and sarcoma, are greenish-blue, thus producing a treble stain—violet, blue, and greenish-blue. Sections of lymphatic glands are very pretty, the leucocytes being blue, and the rest violet; and, if tumour cells be present, they are greenish-blue, and readily made out. I have observed that some cells have an intermediate tint, due probably to their protoplasm having commenced to undergo the cancerous change.

Double Staining.—Roseine and green, fixed as above, have given me very satisfactory preparations in sections of tumours, the former selecting the stroma, and the latter the nuclei, but especially the young cells, some of which are also stained with the roseine. The tannin and carbolic solution, if used rather stronger, will often fix these colours without the antimony; and, in sections of tongue and skin, good results and multiple staining may be obtained by first staining in Itanvier's picrocarmine, and putting sections at once in the tannin fluid, then in roseine, and in the tannin again before and after the green; then draw off excess of green on filter-paper, and pass through the antimony, and wash before placing in methylated spirit. Staining in picrocarmine, and passing the sections at once into a mixture of iodine and malachite green, gives multiple staining in several tissues, if the dyes be fixed as above.

To prevent disappointment, I must point out that often sections which look pale by daylight (especially the violet and green preparations) are very clear by artificial light if the illumination be good. I think this is due to the combination of the red and yellow rays of the light with the stained elements of the tissue, and also to the fewness of the violet rays in ordinary oil lamplight, and in gaslight.

Other agents will partially or completely fix some of the anilines, such as arsenious, acetic, hydrochloric, and carbolic acids; hypophosphite of soda, stannate of soda, and silicate of soda, to which a

little hydrochloric acid has been added, and should these be tried in special cases. Acids extract aniline blues, and acetic acid has the same effect on violet, but gives good temporary preparations. Saturated aqueous solution of acetate of potash fixes roseine, saffranine, soluble blue, and partly fixes fuchsin, when these colours are used alone, so that they can be passed through spirit and clove-oil. I have found that dilute aqueous solutions of induline, methyl green, and rosins, stand spirit and absolute alcohol without fixing, if used alone.

Dahlia, which is monophenylosanilin, and some of the other violets, are very serviceable in dyeing the connective substances, as they distinguish the plasma cells from the ordinary connective tissue-cells, rather more clearly than the other anilines; the bodies of the cells are stained a pale violet, and nuclei darkly, while the plasma-cell body is dark violet, and nucleus remains clear. As the violets do not, in weak solutions, stain the intercellular substance, they may usefully be combined with some dyo that does, such as French archil, murexide, phosphine, picrocarmine, rosine, etc.

Erythrosin, or rosin and green, give a very effective double stain. The following proportions make a good staining fluid. Erythrosin or red eosin, one part (there are a yellow and blue shades of eosin as well); iodine, methyl, or malachite green, sixty parts, dissolved in thirty per cent. solution of warm alcohol. The epithelial nuclei are a bluish violet, the connective nuclei greenish blue, and cell-body and stroma of tumours red.

If sections of skin be stained in methyl green and induline, or *vice versa*, it will be found that the Malpighian layer is stained a greenish blue, the corium cells and nuclei violet red, nuclei of subcutaneous tissue-cells and the nuclei of vessels and nerve-sheaths are rose-colour. Calberla introduced these dyes (*Morph. Jahrbuch*).

By using ordinary water for washing, and strong methylated spirit for dehydrating and passing into the clarifying oil, without putting in absolute alcohol, time, expense, and trouble are saved, and the curling up of large thin sections avoided; further, if in mounting in Canada balsam or dammar, a drop of spirits of turpentine be put on the cover-glass, and this gently lowered on to the sections, no air-bubbles will form. This practical hint is well worth recollecting. In a further communication, I will draw attention to some other methods of dyeing and fixing the dyo in tissues, and in the meantime hope that the above directions will prove of service.

AN EXPERIMENTAL INVESTIGATION OF THE ACTION OF CHLORAL, OPIUM, AND BROMIDE OF POTASSIUM.

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AND

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FOR the purpose of lessening nervous and nervo-muscular action, the above three drugs are perhaps the most frequently employed in medicine. From the physiological evidence forthcoming, it would appear that the action of chloral, in therapeutic doses at any rate, is more especially on the cerebrum; that that of opium similarly employed, is likewise more especially on the cerebrum, but to a more marked degree than obtains for chloral, for whilst chloral, in doses sufficient to produce sleep, is of very little value as an analgesic, opium is, of all other drugs, perhaps the most powerful analgesic. Other differences are to be found. Thus, both drugs threaten by their depressant action on the centres at the base of the brain; but the dangerous paralytic stage is, with opium, preceded by a well-marked stage of stimulation of those centres, as indicated by the slow and full action of the heart and respiration, and the strongly contracted pupils, during the second stage of opium poisoning. A similar stage of stimulation is held to occur with chloral, but it is much less marked. Opium, again, has a marked effect on the centres of the spinal cord, at least in the lower animals, as is seen best in the frog, in which convulsions precede paralysis; these convulsions having been shown by Kölliker to be of spinal origin. With regard to the peripheral structures, both opium and chloral are stated to be without effect on motor nerve or muscular tissue; though with reference to opium the evidence is somewhat conflicting.

Passing to the bromide of potassium, the physiological evidence would show that this salt acts powerfully on all parts of the nervous system, both central and peripheral nervous structures; but that the central nervous system, brain and spinal cord, is more rapidly and deeply affected than the peripheral structures, nerve and muscle.