non-pregnant than in pregnant women, and he thought that it should not be operated on, as life was not thereby prolonged. The discharge from the nipple gave valuable evidence as to the nature of the growth; a dark, sanguineous or granular discharge pointed to carcinoma; pure blood was almost diagnostic of papillary cyst-adenoma, but it must be remembered that the latter tumours had a marked tendency to become malignant. Cutting into a growth was the direct cause of immediate dissemination, so that a piece of the tumour should never be removed for microscopical examination unless it was possible to cut accurate frozen sections at the time, when the tumour could be removed immediately if carcinoma were found. He described in detail his operation for the removal of the breast. The important points of this were the incision, the wide dissection of fascia and muscle both in the direction of the axilla and epigastric angle, the necessity of always working towards the growth from healthy towards unhealthy tissues, and finally, the need for gentle handling of the breast to prevent expression of carcinoma cells, which could easily occur; 72 per cent. of his cases had remained well after operation, and he regarded late recurrences of growth many years after operation not as recurrences but as fresh infections of cancer in persons who had already been proved liable to this disease.

Mr. W. SAMPSON HANDLEY said a tumour supposed to be a fibro-adenoma occurring in a patient over 40 was more often than not a carcinoma, which was sometimes very mobile. Surgery could only advance along the lines mapped out by pathological research. Cancer of the breast spread to a certain extent by the lymphatics to the axillary glands, but the chief spread was by "permeation" in the deep fascia; the growth passed out in a centrifugal manner along the small lymphatic tubules of the deep fascia. When this had spread for a short way a reparative inflammatory process set in, the lymphatic became fibrosed, and the cancer cells destroyed, except for about 5 mm. at the head of the advancing column; the process thus spread out in an ever widening circle, scattered nodules making their appearance where the reparative process had failed. He had been able to demonstrate the advancing edge microscopically. The area to be excised at operation should therefore be approximately circular with the growth at the centre. He showed slides illustrating many of the above points.

(To be continued.)

MOTOR NOTES FOR MEDICAL MEN.

By H. MASSAC BUIST.

OVERHAULING THE CAR.

At the present moment, when many medical men will be reflecting that they may be called upon, in the discharge of duties connected, directly or indirectly, with mobilization, to undertake journeys much longer than those they usually have to make, it may be opportune to consider a few points in connexion with the preparation of the machine for such work. The fact that the machine is doing quite well in its daily runs in connexion with the doctor's work does not mean that it will not require some special attention before undertaking a series of extended runs from one point to another away from the district in which the owner resides.

Cars are curious things, in that, as far as matters of habit go, they seem to be alive. Thus a car may work quite reliably day after day for weeks at a spell, doing a given series of rounds, calling a halt every mile or two, as does the average doctor in the course of exercising his profession. But if the same car be asked to go fifty or seventy miles without a halt it is ten to one that some minor part of the mechanism fails in the most annoying manner, leading to a breakdown involving a loss of hours. This is so even in the hands of manufacturers, as instance the manner in which experience over a period of years is necessary to enable a maker to produce a competition car that will do brilliantly well in hill climbing efforts, speed trials on the sands, or short distance races at Brooklands, and which will also stand the racket of a race of from 300 to 500 miles. If motor manufacturing be con-

sidered along those lines, it will be found that there are in the world to-day only about a dozen firms which know how to combine efficiency with endurance in a manner that can be at all relied on in that way. Since it is so for the manufacturer, how much more is the marked difference likely to occur in the case of the private owner who has no factory behind him. By drawing the attention of doctors to some of the phases of production and of the manufacturing industry, as occasion arises, useful work may be done in the way of putting producer and user in touch with each other's problems.

DIFFERENCE BETWEEN BRIEF AND LENGTHY RUNS.

While, therefore, on the one hand, it should be neither necessary nor desirable to send the car for its annual overhaul before starting, on the other the machine will want looking over in a more special fashion than is done ordinarily in connexion with its daily work in the doctor's service. Under those conditions it does not go long enough at a spell to run any serious risk of damage even should there be insufficient oil in the back axle or gear-box, or lack of grease in the universal joints. In most such cases ample warning would be given by way of gradually-increasing squeaking. Before starting out, however, all those points should be specially checked. It is besides as well to unscrew the valve caps and have a look at the condition of the engine's interior in regard to carbon deposit. If there is at all much of this, the motor ought to be cleaned out by the Cycleclean process. It must be remembered, however, that this is of no use if the under portion of the valves themselves require grinding in, for the motor will only soot up again within 500 miles. When having this process applied by the local licensee, moreover, it is as well either for the owner to stand by his car or for his man to do so. It has been my experience that, had I not been by, on one such occasion all the paint work on the dashboard would have been blistered when it came to doing the last cylinder. The average garage mechanic seldom thinks of what other part of the vehicle is going to be affected by work he is doing on the particular portion of it that occupies his attention.

REMEMBER THE TEMPERATURE.

Assuming, therefore, that the motor is clean and that it will be given a reasonable chance of keeping clean by drawing off the oil from the base chamber—if the design is such that it is contained there, as is the general manner—that it has been replenished with new and clean supplies, and is not suffering from loss of compression, and that all water connexions and other points where leaks might occur have been looked over, a start may be made with a fair certainty of having no motor trouble. When motoring in summer weather, especially when running anything from thirty miles upwards at a spell, it should be had in mind that the engine is working under quite different conditions from either winter weather or the ordinary doctor's service. In both those conditions the engine rarely gets heated up sufficiently for the oil to get really thin; whereas when doing a long run the motor is warmed in a manner which of course makes it far more efficient, so that the driver is thoroughly delighted with the power it is giving; but this often has an accompanying penalty, in that the lubricating oil gets very thin and is far more apt to foul the cylinders in that condition. This particularly applies to the manner in which a great number of manufacturers design their oil ways; they are quite satisfactory when the lubricant is thick, but are not so when it becomes thin. It is therefore essential to start in summer time with a clean engine.

GIVE HEED TO PROPELLER SHAFT JOINTS.

In regard to chassis in general, apart from such all the year round attention as the filling of grease caps at regular intervals, it is as well to pay particular heed to the universal joints in connexion with the propeller shaft. Unfortunately, the design of these details in the average car is such that, with the body-work on, the word accessibility is a mere euphemism. Many a time, too, when getting these joints filled up with grease, by putting the car over a pit one has found that in replacing the leather or other forms of covering, the joint made is so indifferently that the grease merely gets spewed out or

to the running boards and under part of the body-work, so that after going a very few miles no more lubricant is left than if no pains had been taken to replenish it. Therefore it is particularly essential to look to it that the grease put into the joints at either end of the propeller shaft is adequately secured in the covering to those connexions. If these parts are run dry, sooner or later a broken propeller shaft joint will be sustained, than which there is scarcely any form of motor accident more dangerous. If the fore end goes it drops like a pole, which the back axle has to jump. I have seen an ugly accident of that sort in connexion with racing, though fortunately the occurrence is very rare with touring cars, because, as a rule, there is considerable squeaking by way of warning. This risk of breakdown can to a certain extent be guarded against by having a strap so set underneath the propeller shaft as to catch it in the event of its dropping. These remarks, in any case, apply only to such cars as have open instead of closed propeller shafts. There are, of course, a large proportion of cars designed on these principles.

TYRE POLICY.

Brakes should be gone over, particularly with a view to ensuring that they are acting in an absolutely compensating fashion, the pull being equal on either back wheel. It is as well to take up any slackness of the steering, and particularly to supply all steering joints with ample lubricant. Next, as the car stands in the garage, the wheels should be checked for alignment. If a wheel be ever so little out of truth tyres wear in extraordinarily quick time.

Runs longer than those usual in the execution of the doctor's daily work demand also attention to the pneumatics. A tyre that is fairly well worn will nevertheless probably run quite satisfactorily for weeks, doing short journeys of anything from a few hundred yards to three or four miles at a spell, because in such circumstances the tyres rarely get hot, and in addition they are not highly stressed. But if run for scores of miles at a spell they are bound to get hot, and on long runs the pace is likely to be greater than when driving about in the ordinary course of professional work. Therefore, the medical man will be in pocket, in place of out of it, by taking off all tyres showing any appreciable wear, and replacing them with new covers before starting out on a run the length of which cannot be foreseen. The old covers can be brought into use again afterwards, and worn to the ordinary limits.

The really economical motorist is the man who uses his tyres, for whatever particular work he may be engaged on, just short of the limits of trouble occurring. It may seem wasteful to discard covers a little early, but in these days, when they can be retreaded practically under guarantee as to mileage to follow, the motorist will be well advised to have such work carried out rather on the early than on the late side. Let a thing go a little beyond the margin, and no amount of repair will ever make a satisfactory job of it. The extent to which tyres should be blown up depends entirely on the speed and on the car. Nobody can give advice that shall be of general application. Happily, however, if he will but inquire, the firm making any tyre used by the individual motorist will give him the best advice their experience dictates.

ANTIDYSENTERIC VACCINATION.

By W. BROUGHTON-ALCOCK, B.A., M.B.Cantab., M.R.C.S.,
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At this critical period of international conditions haste compels me to omit all matter not of immediate practical interest, and I trust those authors who have devoted some time to this study and have made known their interesting observations will comprehend the omission of reference to their work. I hope at some future date to write a more complete article.

After recognizing from practical experience on man the impracticability of the employment of heated Shiga bacilli in subcutaneous injections in single or multiple doses, I tried several other methods, and at length arrived at a most simple and practical one, which I trust may render service should the occasion for its use arise during the

present war. Any race of *B. dysentericus* may, when treated, be so employed. The strains of Shiga alone, of all varieties of dysentery bacilli at the Institute, show in man an extreme reaction, this being due to their endotoxicity, which is present in both recent and old laboratory strains, living and dead.

This is the method: Take then a twenty-two to twenty-four hours' culture of *B. dysentericus* on a test tube of peptone agar, wash in saline 0.9 per cent. and centrifugalize, dilute the deposit in 2 c.cm. fresh saline; heat to 56° C. for one hour, count or otherwise numerate the bacilli per c.cm., and place the 2 c.cm. in 20 c.cm. normal, heated, pooled (two or more) human serums or 10 c.cm. normal heated horse serum. Let them remain together overnight. If I use the former, I place the mixture in the ice house, so that any possible spirochaete may be destroyed. After well centrifuging twice (the second time after adding saline to wash the bacilli), the deposit is mixed with 0.9 per cent. saline, so that 1 c.cm. contains 350 million bacilli to the c.cm. Preventive injections are to be made four at a time, and when possible in the afternoons; first dose, 1 c.cm., that is four injections of $\frac{1}{4}$ c.cm. each made in the left side of the back over muscular tissue, and where the braces or kit to be carried do not press (not in the arms). The skin is well raised, and injection made into the loose subcutaneous tissue. The second dose of 2 c.cm. follows about eight or nine days later in similar fashion, $\frac{1}{2}$ c.cm. quantities, on the right side. A third similar dose may be made.

I have been similarly preparing very endotoxic strains of Paratyphoid B, also A, typhoid, cholera, and *B. proteus*, etc., some for treatment, and have seen during the last year some most satisfactory results from therapeutic inoculations of typhoid and *proteus* bacilli.

The reactions most carefully followed have never in over 200 subjects been marked or inconveniencing. This reduction in both local and general reactions to the untreated micro-organism is really striking. In the last series of 75 preventive injections in a dysentery-infected service of a lunatic asylum there was but one subject who showed high fever the night of the injection; he, however, slept well, and the temperature was just over normal in the morning. My object in giving only 1 c.cm. for the first injection is to avoid too great a general reaction in the rare hypersensitive patient.

Results.—All subjects I have vaccinated live in endemic areas; so far there have been no cases among them.

Serological Examinations.—By contrast with the patients of earlier series who to the same dose of untreated Shiga bacilli showed determinable specific amboceptor and agglutinin properties in their serums, the serums of the subjects who had even three doses of bacilli treated by normal serums showed no fixation of complement nor increased agglutination. I have previously (*Académie des Sciences*, May 7th, 1912) made known such observations when applying specifically sensitized typhoid vaccines to man (Besredka principle).

These comparative findings in the serums of subjects after vaccination by bacilli treated with prepared specific horse serums, and in those after bacilli treated with normal human or horse serums are interesting.

Dopter (*Annales de l'Institut Pasteur*, 1910), after reviewing the literature of vaccine work with dysentery bacilli, has shown that the Shiga bacilli treated with specific antiserum give early and prolonged immunity in mice and avoid the negative phase that follows injections of untreated bacilli.

In the method I have above described will be noted the marked simplicity and rapidity with which a vaccine may be made—and used prophylactically and therapeutically—from the first pure culture of the particular micro-organism that is causing an epidemic, despite the numerous varieties in any group. On the valued suggestion of Dr. Roux, the eminent director of the Pasteur Institute, I have been trying the utility of a vaccine made by the addition of heated human serum and later adding saline without centrifuging after the micro organisms have been acted on by serum. This procedure simplifies technique, but my work is too recent to draw conclusions.

PROFESSOR ABDERHALDEN has accepted an invitation to become director of a research institute which is to be erected in Berlin.