dissociation, brown atrophy, and beginning parenchymatous collapse between central veins, and oedema, the appearance of clinical signs of disturbed liver function is to be expected, although, perhaps, not in a very striking degree. The absence of jaundice in such cases is not, as held by some workers, evidence against liver changes; in four of the author's cases yellow discoloration of the sclerae was found some twenty hours after the burn. Cases of early death may fail to show icterus because of the time factor. Clinically and morphologically the effects on the kidney are less impressive than those on the liver, but nephrosis with necrosis and calcification may occur. Urinary findings are often trivial. The loss of chlorine into the tissues, from the burnt area and as a result of vomiting, diminishes the power to excrete toxic degradation products. Where death occurs late there is a picture of "glomerulo-nephrosis," with collapse of the glomerular vessels and abnormal permeability of the capsule; in some cases synechiae are seen between the glomerular loops and capsule. Clinically the kidney condition is reflected in diminished power of excretion and concentration. The occurrence of symptoms of uraemia in some cases after burns is made clear by the pathological findings in the kidney. Haemorrhages into serous membranes and into the duodenum are found in cases showing liver damage, but the latter are not always visible to the naked eye. Haematuria is frequent after severe burns and is not necessarily related to the extent of the burn. Haemolysis has also been described. These haemorrhagic phenomena combined with icterus and sometimes nervous signs (restlessness, tonic-clonic spasms, coma, vomiting) present a "hepato-toxic" picture.

SURGICAL EXPERIENCE IN THE SPANISH WAR

At the present time the treatment of wounds is in the forefront of the minds of a large section of the medical profession, and the principles which guide us in this work are in the main based on the extensive experience gained in the four-years war of 1914–18. This experience was put to a short and sharp test in France early this year and to a less extent on the home front since then. It is true that some fresh impressions have been gathered, but as yet no systematic study is forthcoming of the problems that await solution. In the meanwhile we can still draw on the lessons learnt in the Spanish Civil War, and for that reason welcome the recent account[1] given by Dr. D. W. Jolly of his wide experience as an officer in the Spanish Republican Army Medical Service. He has approached the subject with a mind not unduly trammelled by tradition, and his record may well fill the gap for those seeking guidance till current experience crystallizes out. The first part of his work deals with problems of organization, and is of special interest because it describes the gradual development of a system not handicapped by set ideas and a rigid traditionalism. The importance of the early surgical treatment of certain types of injury was clearly recognized, and the organization directed to satisfy this demand, which ultimately became effective in the Republican Forces, is given the title of the "Three Point System," embodying (1) the Casualty Classification Post; (2) the No. 1 Hospital (where cases requiring immediate surgical operation are dealt with); and (3) the No. 2 Hospital, for the less urgent. It is stated that the time-lag between a man being wounded and his arrival in a No. 1 Hospital was reduced to five hours, and that in the case of a No. 2 Hospital the time-lag was ten hours. No doubt these figures are but approximations. The basic principle underlying this arrangement of forward medical units is, in fact, not very different from that ruling in France in 1918; the function of the classification post was there performed by a main dressing station, and the C.C.S.s allocated for the reception of special groups of cases corresponded to the No. 1 and No. 2 Hospitals. The novelty of the Spanish scheme lay in the composition and equipment of the surgical teams: the surgical team serving the basic hospital units ultimately had a personnel of fourteen, including four medical officers. The team was self-sufficient as to transport and full surgical equipment, and it certainly seems to have been the means whereby first-class surgical assistance was made available in the crucial period. To judge from what Dr. Jolly says, the siting of hospitals seems to have been left largely in the hands of the medical authorities without interference from the general staff. The terrain in Spain appears to have been particularly well furnished with ready-made shelter for hospital units; in contrast it must be recognized that in Flanders and a good many areas in England mined galleries, tunnels, and chalk pits are seldom available. The construction of bomb-proof dressing stations or hospitals in such regions is neither simple nor rapidly effected. Dr. Jolly's account of the Republican system will, no doubt, receive due consideration in any reconstruction of the British Army's medical organization, in which the need for greater elasticity and mobility was very clearly demonstrated during the recent campaign in France.

The problem of surgery in the forward area, which is dealt with comprehensively in what is much the best part of the book, shows the author to be possessed of extensive knowledge and sound surgical judgment. It is interesting to note the conclusions arrived at by the Spanish surgeons in regard to some contentious points. For example, the primary suture of nerve injuries was frowned on and the results of secondary suture were found to be satisfactory. In the treatment of fractures there is a strong bias in favour of the use of plaster-of-Paris for all cases. It is interesting to note that in the forward area plaster casings made from shaped flannel wrung out in emulsion were favoured; this was the method introduced by Mr. John Croft at the end of the last century. The Thomas splint, even for first-aid work, receives surprisingly little notice; so little, indeed, that one wonders whether the provision of this useful piece of field apparatus was mismanaged. The recommendations in regard to the treatment of fractures, except in case of those of the femur, conform to what was the general practice in the B.E.F. in 1939–40. Dr. Jolly's clear directions on the surgery of wounds of the chest and abdomen, based on extensive experience, cannot but be helpful to the Army surgeon.

[1] *Field Surgery in Total War.* By Douglas W. Jolly, M.B., Ch.B. N.Z., late Major, Spanish Republican Army Medical Service. With a foreword by Surgeon Rear-Admiral G. Gordon-Taylor, F.R.C.S. Hamish Hamilton Medical Books. 1940. (10s. 6d.)

We notice that thoracotomy and not aspiration is recommended in the treatment of pressure or valvular pneumothorax. No mention is made of the use of a colostomy in the treatment of wounds of the large bowel. Drugs of the sulphonamide group were not systematically investigated in the Spanish War, and consequently Dr. Jolly expresses no opinion on their value. Full and, if possible, controlled observations on the prophylactic and therapeutic efficacy of these drugs in the treatment of wounds will be a major contribution to the surgery of both war and peace. A notable omission is any reference to burns and their treatment, and yet they form a not unimportant group of casualties in modern warfare.

PREGNANDIOL

The need for a reliable test of corpus luteum function has stimulated workers in this field ever since the discovery of progesterone, the active principle of the corpus luteum. Attempts to identify progesterone in the tissues and fluids of the human female have, however, failed. In 1929 a substance—pregnandiol—was isolated by Marrian[1] from the urine of pregnant women; this finding was confirmed by Dingemanse and co-workers[2] and also by Butenandt.[3] The latter and his co-workers[4 5] established a structural formula and succeeded in 1934 in converting pregnandiol back to progesterone. In 1936 Venning and Browne[6] demonstrated that pregnandiol was excreted in the urine as a complex with glucuronic acid, and sodium pregnandiol glucuronide could be extracted quantitatively from the urine of pregnant women; later, they showed that it is also excreted during the progestational phase of the menstrual cycle. Venning and Browne[6 7] after further work concluded that this compound was an altered product of progesterone, and their observation has since been confirmed and elaborated. It has been shown that from 3 to 60 mg. of pregnandiol are excreted in the urine during the progestational phase of the menstrual cycle, and the excretion usually disappears a few days before the onset of menstruation. There does not appear to be any correlation between the degree of change in endometrium and the amount of pregnandiol excreted; if pregnancy happens the excretion of pregnandiol, which began in the progestational phase, continues and rises steadily throughout pregnancy to reach a maximum in the eighth and ninth months, and ceases a few days after delivery. During pregnancy there is also a considerable range in the total amount excreted a day; Venning[9] gives a mean figure in the last few weeks of pregnancy of 75 mg., but there appears to be a range of normality from 30 to 120 mg. Apart from these physiological conditions no other is known in which this substance is excreted. By the administration of progesterone, however, an artificial excretion can be produced. As this will occur in both males and females it is apparent that, contrary to earlier ideas, the endometrium is not essential for the conversion of this substance into pregnandiol.[10] It is now generally assumed that the liver is the site of this alteration. It is known that when the kidney is damaged sodium pregnandiol glucuronide is not excreted; hepatic or renal disease must therefore be excluded before any trustworthy estimation of the excretion of pregnandiol can be obtained. Although it is generally accepted that the pregnandiol is a specific excretion product of progesterone Cuyler, Ashley, and Hamblem[11 12] record that it is also excreted after the administration of desoxycorticosterone to the male.

At first it was thought that a quantitative estimation of excretion of pregnandiol during the menstrual cycle might constitute a test of corpus luteum function. Attempts to establish normality have, however, revealed such a wide range in total excretion that quantitative differences do not appear to have any pathological significance. In the absence of complicating factors such as renal disease, a complete absence of pregnandiol would suggest the absence of ovulation and production of progesterone. Some authors disagree with this, and Hamblem, Ashley, and Baptist[13] believe that a failure of excretion is not conclusive evidence of inadequate ovarian function. This point needs elucidating. As the presence of an ovum in the interstices of a corpus luteum has been observed in monkeys it is possible that this might happen in the human being; also, a secretory endometrium might arise and pregnandiol be excreted although ovulation might not have taken place. Clearly, then, it is possible that even if pregnandiol is present there may have been no ovulation, but it would be highly probable, and in most cases the absence of pregnandiol would point to a failure of ovulation. Buxton[14] showed that in most patients who were excreting this substance the endometrium was of secretory type. In a few, however, the correlation is not complete, as has been pointed out by Wilson, Randall, and Osterberg.[15] Bartelmez many years ago observed that different parts of the uterine mucosa respond differently, and portions of endometrium from the same uterus may often differ in their character considerably. We can, therefore, only assume at the moment that as a rule the excretion of pregnandiol is correlated with a secretory endometrium. During pregnancy quantitative variations in the excretion of pregnandiol are impossible to interpret in terms of pathology. Cope in our present issue (p. 545) states that its complete absence is always evidence of serious abnormality, and in early pregnancy it suggests that abortion will occur, and in late pregnancy the death of the foetus. But it is not a reliable test—at all events in late pregnancy, as in only a small percentage of cases of foetal death can the absence of pregnandiol be demonstrated, and in others excretion is normal. Such a test can only be used as an adjuvant to other methods of investigation. The significance of a low pregnandiol excretion, if indeed there be any significance, is still undetermined. Unfortunately, too, a normal excretion of pregnandiol is no proof that the pregnancy is normal. And artificial disturbances of the excretion during pregnancy may arise in connexion with either toxaemia or chronic nephritis, which would render any estimations valueless. It has been suggested that the estimation of pregnandiol might be used as a test for pregnancy, and it is assumed that the associa-

[1] *Biochem. J.*, 1929, **23**, 1090.
[2] *Dtsch. med. Wschr.*, 1930, **56**, 301.
[3] *Ber. dtsch. chem. Ges.*, 1930, **63**, 659.
[4] Ibid., 1931, **64**, 2529.
[5] Ibid., 1934, **67**, 1901.
[6] *Proc. Soc. exp. Biol.*, N.Y., 1936, **34**, 792.
[7] *Endocrinology*, 1937, **21**, 711.
[8] *Amer. J. Physiol.*, 1938, **123**, 209.
[9] *J. biol. Chem.*, 1938, **126**, 595.
[10] *Proc. Soc. exp. Biol.*, N.Y., 1939, **41**, 284.
[11] *Endocrinology*, 1940, **27**, 172.
[12] Ibid., 177.
[13] Ibid., 1939, **24**, 1.
[14] *Amer. J. Obstet. Gynec.*, 1940, **40**, 202.
[15] Ibid., 1939, **37**, 59.