one who leans over the railings watching others digging a hole in the road and sees where they are doing it wrong.

**Personal Views**

First I should accept my cases only from a medical colleague. There are many things other than surgery that may cure hypertension. I well remember George Heuer, of Cornell University, relating two such cases at the meeting of the American College of Surgeons in New York in 1938. Both patients had hypertension that had proved refractory to every form of treatment and had been selected for surgery. One had a serious motor accident on the way to hospital; the other collapsed under the anaesthesia after the laminae had been removed but before any nerve roots had been divided. Both were cured. Rather than choose my cases myself, therefore, or rely on any form of test, I would take only those that had been under the care of a wise physician and accept his judgment that no change of occupation and no drug treatment could help them.

Secondly, I should refuse none except those with myocardial changes. The man who needs a high pressure to push blood through his coronary arteries will die the minute it is lowered. The others—those with poor kidneys, with a rising blood urea, who are unable to work because of their headaches, who are going blind—are also poor operative risks. They are no good to the surgeon whose eye is on statistics. On the other hand, they need our help more than any, and we can promise to help them. Their world is falling in ruins round them. We may send them prematurely to the next, but if we do not we give them a joy they had ceased to hope for. And the improvement seems to be largely unrelated to the fall in blood pressure. An operation that, judged by the sphygmomanometer, is a failure may yet relieve the patient of all his distressing symptoms.

Thirdly, I should, as my main line of attack, perform a bilateral subdiaphragmatic operation through an incision resecting the twelfth rib. I should resect the sympathetic chain from the third lumbar to the twelfth nerve dorsal ganglion, following the chain up by splitting the crus. I should pick up the splanchnics where they leave the diaphragm, divide them where they enter the semilunar ganglia, and follow them as high as I could through the diaphragm before cutting them again. I should do this operation on one side, and if the anaesthetist reassured me I should then do it on the other; if the drop in blood pressure was considerable I should do the second side three weeks later.

Fourthly, I should send the patient home after he had recovered from the double operation and reassess him after three months. If it seemed advisable to lower his blood pressure still further I should attack the cardiac sympathetic fibres by removing the second, third, and fourth dorsal ganglia, first on the left side, later, if necessary and after an interval, on the right. I should not divide the diaphragm nor should I open the pleura.

Well, gentlemen, I have talked so long of idleness that I have exhausted you. I have strained your patience so much that your pressures must be near to apoplexy and your duodenal ulcers to perforating. My thesis is the very simple one that the man who works hard and conscientiously does his most important work when he outspans his mind and allows it to wander at its own pace round the paths over which it has been rushing, and that science is advanced further in a shorter time by the informal chatter of a few like-minded friends over cocktails than by the formal exchange of papers or by any number of congresses.

The figure was planned by my former House Surgeon, Mr. Alan Parks.

**THE DISCOMFORTS OF CHILDBIRTH***

BY

GRANTLY DICK READ, M.A., M.D.

When I was a student "on the district" I attended a girl whose reaction to childbirth greatly impressed me. When the head started to crown and the effort syndrome became obvious, with the evidence of suffering, I offered her such anaesthetic as I was allowed to give, and she would not take it, but between the contractions she smiled happily. After her baby was born I inquired why she would not take any anaesthetic freely offered her, and her reply has always remained in my mind. She did not take her anaesthetic because she did not want it. "It didn't hurt, doctor," she said; "it wasn't meant to hurt, was it?"

From the teaching of Cire and Head it became obvious to me that the discomforts of childbirth depended largely on the emotional and not solely on the mechanical factors, which one had been taught were the cause of the pain. The fact that in childbirth there is usually a woman present who is not always remembered even to-day. The performance of the mechanism of parturition is undertaken with a magnificent apparatus, but the fact that the woman has a brain, a mind, an extremely sensitive nervous system from which the impulses act and react upon the mechanism, is not so frequently understood.

I asked myself how a woman could be expected to be successful in the task of bearing a child if she was not equipped with adequate knowledge. Would it be expected that the secretary of a man's routine would be successful if she had never handled pencil and typewriter? Yet women are allowed to enter upon the most important tasks of their lives untutored, untaught, and unassisted. I began, therefore, to educate my patients much earlier in pregnancy. From the time the women came to report that they were pregnant they were tactfully, gradually, and carefully initiated into the job they were about to perform. Their preparation included not only the normal clinical care of the antenatal clinic but they were taught relaxation and respiratory exercises, and during their short periods of rest while they were under instruction they had the art of child- birth explained to them. They were told that they had an uterus in which the baby was growing, that the uterus was made of muscle and grew with the child, and at each visit they were told the relative size of the child. They were told that the child would move and how to expect to feel their baby at about 17 or 19 weeks, as the case might be; they were told the position and were even shown a diagram of it. They were also told that they were already feeding the child and that it was necessary that they themselves should take some care of their own diet. They were told what they should eat and what they should not eat.

My patients were delivered on their backs, propped up in a position equivalent to squatting, but leaning, because the average European is not accustomed to squat. They held their child's hands before the baby was fully born and took it in their arms as soon as the cord was severed. Their happiness and complete freedom from pain were remarkable. Their refusal of anaesthesia was noted, and not infrequently they scorned and rejected the idea that they should be unconscious at such a great moment.

**Nerve Supply of the Uterus**

The neurological explanation of the phenomena I was witnessing was important. Some years previously Beckwith Whitehouse, in Birmingham, had worked very seriously on

*The substance of a lecture delivered before St. Mary's Hospital Medical Society on Oct. 28, 1948, with Dr. G. W. B. James presiding.*
the nerve supply of the uterus. He came to the conclusion that the different muscle fibres of the uterus lying in different directions were supplied one by the autonomic nerves and the other by the sympathetic nervous system, and that these groups worked in harmony in much the same way as opposing muscle groups work in harmony—that is to say, when one group contracts the other relaxes. That is the mechanism whereby the expulsive muscles of the bladder and rectum and the corresponding sphincters work. With the release of the sphincters the expulsive muscles come into play. With the nerve supply of the uterus it was the same story. The circular inhibitory fibres should be relaxed, loose, and acting in harmony with the expulsive longitudinal fibres whose enormous power at full term is sufficient to dilate the cervix for the child to pass through, when the dilating force is augmented by the great effort of expulsion to drive the child through the birth canal.

Thus again the story of Head's thalamic pain loomed very largely into the picture. If in the presence of fear, as Crile and others had pointed out, the sympathetic nervous system throughout the body created a state of tension—a great protective activity to fight or fly from that of which it was afraid—the fear of labour would bring about rigidity by sympathetic nerve-fibre stimulation and the muscles and organs supplied by that nervous system would also be in a state of tension. The outlet of the uterus would be relatively rigid and the cervix resistant to dilatation. Thus there would be tension not only in the person herself but also in the apparatus of reproduction. The presence of fear is therefore a direct cause of somatic manifestation giving rise to the real pains of labour. Sir Charles Sherrington found that the uterus had only two pain-recording nerve endings—those which recorded laceration and those which recorded excess of tension above the normal mean.

Put those simple observations together and see what we have. In the presence of fear the outlet of the uterus is in a state of chronic contraction. The longitudinal fibres of the uterus struggle to release or burst through that resistance of the circular fibres of the uterus, increasing enormously the tension within the organ itself and thereby stimulating the receptors of pain. It is very simple and far more important therefore to remove the fear and the tension, for thus the amount of suffering in labour becomes negligible in comparison with that endured by the woman who is afraid. It is not enough for the woman to say, "I am not afraid." There are subconscious fears, fears formed and based on past associations or ideas. If these can all be removed then the labour of the human female becomes as easy and as enjoyable, in spite of the work and effort involved and the call upon her higher qualities, as it is in the lower animals.

**Emotional Phases**

But that again is not enough, and in order to understand exactly what emotional changes occur in labour we must study a labour which is normal—that is to say, a labour in an unanaesthetized woman, where the natural function is carried out without interference. It became possible to study these labours in large numbers when this series of events was implemented, when the fear was removed, and when the woman herself was in a natural state of relaxation and had no desire for anaesthetics or sedatives, for which, indeed, there was no necessity. Thus the study of the normal emotional phases of labour became possible, and, perhaps more interesting than anything else, in this idea was the discovery that labour is not a purely mechanical affair at all, but is closely associated with varying emotional phases. The chemists will shortly, I hope, be able to prove and demonstrate to us that many of the chemical constituents of the body vary with the emotions during labour. Particularly is that true of the blood sugar, as well as other biochemical factors.

But it is necessary to show how these emotional phases can be recognized, because one cannot conduct a labour to the full satisfaction of oneself and of the mother (and, I am beginning to believe, of the newborn child) unless one understands more than the purely mechanical function of parturition. It is not enough to wait until the head is showing and then put on a mask and gown and get a friend to give some "dope" and stand at the other end of the bed. That is not obstetrics, but it still goes on. Obstetrics is the understanding of the mind as well as the body of a woman in order that she may produce her child in the most natural way with the least injury to both mind and body—certainly the minimum of injury to the mind.

**First Stage of Labour**

The first stage of labour is the stage of initiation and expectancy. The antenatal anticipation of labour is a very boring time. There is no more trying period in a woman's life than the last two weeks during which she is waiting for the baby to be born. She not only wants her baby but she wants to get rid of the pelvic burden and to be again a freely mobile person. Women will go into labour in a condition of considerable exhilaration and animation, and until the cervix is dilated to between one-fifth and two-fifths (I am speaking of the primiparous woman) they will retain that state if there has been an intelligent and proper approach to labour.

When the cervix dilates further there occurs a very marked change. At two-fifths dilatation the large majority of patients will offer two manifestations. They will become quieter, although cheerful between contractions, and they will develop a pronounced malar flush. I would look for the malar flush appearing on the woman's face at two-fifths dilatation, because one knows then that the labour is truly progressive. The woman then begins to realize that she is completely helpless in relation to her uterine contractions. She is in the power of forces over which she has no control. Mere man would be alarmed under those circumstances, but woman fortunately has a better mentality.

When the uterus gets to three-fifths dilatation the woman has become serious in her demeanour—I do not mean distressed—but many of them are uneasy in their minds. What they desire is company. It is not physical pain which gives rise to the distress at three-fifths dilatation. It is the first emotional menace of labour. That can be diagnosed clinically perfectly well, and it is at that time that no woman should be left alone. There is no greater obstetric crime than to leave a woman in a room by herself at three-fifths dilatation and tell her, "You are not going to have your baby for perhaps ten or twelve hours. We have no time to look after you. Do not make a lot of noise, and we will come and see you from time to time." That is the way to ruin a woman's labour—indeed, a way to ruin her whole life, for pain and terror beyond control will give a psychological foundation to future experience that even time will not rectify.

If that phase is well cared for she will carry on with assistance and regain considerable confidence before the cervix is four-fifths dilated. This is the time when a sedative should be given, if it has to be.

**Second Stage**

Then we come to the transition from the first to the second stage. The transition is the great testing period of
labour, for then the cervix is dilated to its fullest. Many women definitely have pain at this stage even in the most normal labours, because of the tension brought about at the ultimate dilatation of the cervix. This is the second emotional menace of labour. Here is a true test of the woman's faith and fortitude. It is a period fraught with anxiety and perhaps pain. This is the time in normal labour when there is backache in about 50% of all cases. It should be recognized as the pain period of labour, and the average normal labour in which there is any pain will exhibit it at this stage.

As that emotional storm abates the woman will pass into the second stage of labour with the establishment of firm contractions, and she will be astonished at the disappearance of the backache and the sense of tremendous relief at being able to help herself. She will also greatly rejoice in the ability to push her baby through the birth canal, but I do not want to allude to mechanical factors now.

The third emotional phase occurs when the head reaches the pelvic floor. Many women will be inclined to give up their labour at this point. They will complain of all sorts of things; they will show a desire to escape. They will use all their female arts and wiles to persuade their attendants to do something for them. I have seen women full of desire to have anal dilatation in the third stage of labour, "although their pulse actually remained at 70, they were not perspiring, and they were breathing freely. The same women have explained to me afterwards that it was not a question of physical discomfort but a terror of anticipation from which they suffered. These women are quite honest with you and tell you exactly what they have felt at this time. One woman obstetrician whom I attended told me after her baby was born that I had not emphasized sufficiently the alarm then felt.

The fourth emotional menace is a real one because it varies with the conformity of the woman. In many women the ultimate outlet of the vulva is elastic, particularly up to the age of 26 or 27. At the crowning of the head, if a woman is in full control of herself, including respiratory control, it is not painful. At ages of from 26 to 34 the indifferent elasticity of the vulva may bring about some difficulty and at about half-crowning there is the onset of a sensation which most women describe "as if they are about to burst." It is not a feeling of actual tension or tearing, but of burning. If you ask them to describe the pain they will say "they are burning or stinging down below."

That sensation has a neurological basis. It is very largely due to the fact that certain nerve receptors go out of action before others (epicritic before propathic), leaving nociceptors to record certain sensations of vulval sensibility. But this disappears quickly in the large majority of women and there is almost complete anaesthesia of the perineum within one-half to three-quarters of an inch of the vulval margin. There is no sensibility whatever to the tear. There is no pain. The woman feels only a sudden release, and afterwards what appears to be a massive laceration, which if it occurred in any other part of the body would cause considerable pain, has been sustained almost without her knowledge, and she is disappointed when she is asked to submit to the insertion of stitches.

Therefore there are not only the physical factors but four emotional factors which intensify the stimulus. The mind, however, can usually be trusted to take charge of the situation without the necessity for anaesthetics or even sedatives. The more experienced one becomes in these matters the more easily can these emotional factors be controlled. But they are quite definite phases and similar in all primiparae, and can be recognized as discrete entities. In multi-

parae it is a slightly different story, because the whole of a relaxed labour in a multiparous woman is so short that these phenomena run rather on the top of one another. Many women undertake parturition in the spirit which thinks of nothing except having the baby as soon as possible and with the greatest amount of happiness. Labours of two hours are no exception. There is no fear, and therefore only a desire for the child.

Third Stage

The third stage of labour is the only one which presents any anxiety to the normal obstetrician. It is the most difficult to carry out successfully. In a truly physiological labour the mother will be holding the hands of the child before the body is born. The head emerges and with the next contraction the shoulders are freed. The child is then rotated and lies upwards facing the mother. That rotation gives relief and takes the tension from the points where it has been at its greatest on the perineum. It is then we see an astonishing transfiguration of a hard-working woman employing the effort syndrome, which made her appear distressed, to a mother who suddenly becomes happy, smiling, and sits up and waits for the baby to be fully born. Women in these circumstances will complain because the doctor is not yet able to tell them whether it is a boy or a girl. They will ask him to hurry, and I have to say to them, "I will hurry when you give me a contraction to hurry with." The sight of the infant brings on various emotional changes which are by some standards exaggerated. They speak of the child with fascinated wonder and enchantment. The most dull woman can burst out in exaggerated terms of delight at the sight of her child.

These children are all handed to the mother immediately the cord is cut. Every woman takes her child in her arms and holds it to her breast, not necessarily to suckle it. This stimulates a reflex contraction of the uterus which is definitely of physiological value. I think women were meant to take their babies when born. They will say what a funny-looking thing it is. "Is that the right colour, doctor?"

"It really is like my husband."

Expulsion of the Placenta

Meanwhile the uterus contracts down to a firm solid ball. It is my custom to put a Spencer Wells forceps on to the cord close to the vulva, having a little tension on it, and hand the child to the mother. A basin is left underneath to receive the placenta. Not infrequently, as the mother plays with the child you will see the Spencer Wells drop into the receptacle and the cord lengthen five or six inches. It is not always sound practice to judge the position of the placenta by the height of the uterus. The placenta may be extruded and the height of the uterus not alter very much. But if the cord is seen to lengthen five or six inches, with possibly an ounce of haemorrhage, one may be sure that most of the placenta is in the vagina.

The mother is given a hot drink and the baby put in the crib at her side. Twenty minutes is the minimum time to expel the placenta. During that time while the urge to expel the afterbirth is occurring the happy woman is subjected to another wave of anxiety as the uterus contracts, although she cannot feel anything. One might imagine the expression of anticipation on her face to be an expression of pain. But the passage of the placenta is a source of very great satisfaction. It conveys a sensation which the woman will explain as the end of a glorious episode. The contractions of the uterus are needed for the completion of the function of childbirth, and there is nothing which takes place in childbirth without reason or cause.
Conclusion

Childbirth is being conducted in this manner in many parts of the world. There is no evidence yet that any school which has applied the psychosomatic approach to labour has withdrawn. No man who has understood the emotional has returned to the purely physical conduct of childbirth. There is more in this than the production of the child. At present there is a great wave of fear in the United States of America that the psychological state of married women is so altering that a factor is creeping into society which in a few generations may have a deleterious effect upon the whole nation. Two years ago—when I was in America—I found that the “mind of woman” received little or no care either before or during labour. Now, however, the importance to the mother and baby of this approach to childbirth has been accepted and demonstrated by Professor Herbert Thoms, of Yale University; Dr. Blackwell Sawyer, of New Jersey; Drs. Volmer and Marsh, of San Francisco; the Maternity Center Association, of New York; and others who have adopted these procedures. Their recent publications bear out with remarkable accuracy the conclusions drawn from the work in this country. Complete anaesthesia or unconsciousness in normal childbirth is an offence against Nature. Children who have been born according to the laws of Nature will be evidence of its psychological value as they grow to maturity. It will be easy to recognize those who were born with instinctive maternal guidance in the first few moments of their lives. These factors cannot be overlooked.

In a series of cases recently reported by the first great American university to adopt the procedure here outlined it was stated that 80% of all women—including abnormal labours—were fully conscious of all the sensations of the birth of their babies. I have found that in over 90% of uncomplicated births the women refuse analgesic or anaesthetic. The normal healthy woman of to-day, with a normal healthy labour, will tell you that the birth of her child was “a joy she would not have missed for anything.” She sympathizes with those whom circumstances forced into insensitiveness or oblivion at that moment.

NON-SPECIFIC EFFECTS OF IMPURE PENICILLIN

BY J. UNGAR, M.D.
(From the Research Division, Glaxo Laboratories, Ltd., Greenford, Middlesex)

It has occasionally been reported during the last three years that impure penicillin is a more effective chemotherapeutic agent than the purified crystalline material. This view was based on the laboratory study of various penicillin samples, using either the protection of animals (Hobby et al., 1946, 1947; Welch et al., 1947; Miller et al., 1948) injected with streptococci, Bact. typhosum, or salmonella or the action on the motility of Treponema pallidum (Dunham and Rake, 1945). These observations seemed to indicate the presence in crude preparations of penicillin of a factor that increases its antibacterial action; this factor appeared to have so marked an effect on the action of penicillin that the term “enhancement factor” was thought justifiable. This reason probably also explains the suggestion, made in a recent annotation (BMJ., 1948), to take the retrograde step of reverting to the earlier production methods and the use of impure penicillin.

It should be noted, however, that the data available explain neither the nature of the “enhancement factor” nor its action (Welch, 1947; Hobby et al., 1947; Fisbach et al., 1947; Pratt et al., 1948). The individual observations are scanty and occasionally conflicting, but this much is certain, that the “enhancement factor” in the impurities is heat-stable, dialysable, and active in small amounts if added to purified penicillin G, K, or dihydro F (Welch, 1947; Hobby et al., 1947). The issue is of importance to the whole problem of presentation, for penicillin may be distributed either as a pure product with specific pharmacodynamic properties or as a crude one in which largely unknown impurities are left. An investigation was therefore undertaken to determine (1) what part the impurities play in the activity of crude penicillin, and (2) the mechanism of any such activity.

With these objects in mind the main work of Welch et al. (1947) was first repeated, but using, on a units-per-weight basis, smaller doses of penicillin—just sufficient to protect mice against lethal infections with Bact. typhosum or streptococcus, which are those commonly employed in protective trials.

Materials and Animals Used

In this paper we are concerned with a substance or substances that may be present in certain samples of penicillin and are different from the essential therapeutically active constituents. It is therefore important to describe as precisely as possible the penicillin samples used in the experiments. There is some confusion in the penicillin literature owing to the various descriptions of materials used in laboratory and clinical investigations, descriptions that include such terms as “crystalline,” “pure,” “purified,” “crude,” “yellow,” “white.” It has been thought best to follow as closely as circumstances permit the descriptions accepted in this country for the purposes of the Therapeutic Substances Act.

Two preparations were used, differing in “purity.” The first was “penicillin sodium salt,” containing not less than 80% of penicillin G (penicillin II, benzyl penicillin); the other 20% presumably consisted partly of penicillin and partly of material devoid of penicillin activity. It varied in colour from yellow to almost white, according as the impurities contained more or less of pigmented substances derived from the mould. The other material used was “crystalline penicillin G sodium salt”: it contained at least 95% of penicillin G and was a white macro-crystalline product.

For brevity the first type of product is referred to as IP and the second as CPG. The activities in international units were in conformity with accepted standards: the IP batches all had about 1,200 units per mg., the CPG 1,600 or over.

The mice used in the experiments were albino of both sexes from an inbred colony derived from ancestors of the Strong A2 line. They weighed from 18 to 20 g. at the time of test. Rabbits, of no special strain, were used at body weights of 2.5 to 3 kg.; they received intramuscular injections of 10,000 units of penicillin.

Methods of Infection.—The procedure, including the method of infection, was similar to that of Welch et al. (1947), but differed from that of Hobby et al. (1947). Two different pathogens were used. A virulent strain of Bact. typhosum, having for our mice an LD50 of about 40,000,000 organisms, was injected, at ten times the LD50 of a 24-hour culture, by the intraperitoneal route. The other strain used was β-Streptococcus haemolyticus at ten times the LD50 of a 24-hour culture (blood agar), also intraperitoneally. Penicillin injections were given intraperitoneally in the morning, followed two hours later by the bacterial suspension. Treatment was given twice daily for four days and the number of mice surviving after seven days was recorded.