TREATMENT OF CANCER OF THE CERVIX UTERI BY IRRADIATION.*

BY

MAX CHEVAL, M.D.,
BRUSSELS.

Action of Irradiation on the General Condition.

In their recent works Professor Slosse and Dr. Reding of Brussels have demonstrated the action of the α and gamma rays on the organism.

For that purpose the patient drinks a solution of dextrose (50 grams of pure anhydrous dextrose in 200 c.cm. of distilled water). The authors detect the quantity of sugar in the blood by Hagedorn and Jensen's method. They found that the glycohaemia is more intense and has a longer duration in patients with malignant tumours than in the others.

These authors have shown also that cancer patients have a pH above the normal. When these patients are cured by a surgical operation this state may persist for years. On the other hand, if they are treated and "cured" by irradiation these symptoms disappear.

Having no personal experience of the utilization of α rays I shall not speak of them, but will only indicate the improvements which seem to result from our practice in the treatment of patients by radium. To explain these improvements it seems useful to indicate precisely the technique which we have utilized since 1919.

Technique of Curie Therapy.

In 1919 we utilized the utero-vaginal method of Professor Regaud, which consists in placing a certain number of tubes, suitably filtered, in all the length of the uterine cavity, and more tubes, also suitably filtered, in the vaginal culs-de-sac. Very early (1920) we gave up using needles with a weak filtration (1/2 mm. of platinum), as their action was too caustic, and consequently too local (1 cm. in distance). We have given the preference to tubes filtered by 1½ mm. of platinum, plus aluminium 1/10 mm., plus rubber, plus gauze or cork. The distant action is greater and extends to a zone of 3 cm. around each tube.

Unfortunately the cervical canal is not always reparable, and we have had cases in which recurrence has taken place, the intrauterine cavity being the point of origin.

In the cases in which tubes could not be placed within the uterus we have, a month or two afterwards, made a vaginal application of radium. We have since 1922 performed subtotal hysterectomies by the abdominal route—the cervix is generally difficult to remove—followed by implantation of needles in the cervical stump, our motive being to destroy the malignant cells, which are too distant from the vaginal tubes; here the local action only is aimed at.

Having found that some of our patients presented recurrences in the neighbourhood of the parametrium, in 1922 we adopted the radium drainage method of Professor Daels. By this method tubes of radium may be placed outside the peritoneum in the neighbourhood of the external portion of the broad ligament. We have practised this without any operative accident, and have had a certain number of successes. We employed these methods combined up to 1926. Since then, Professor Regaud having drawn attention to the good results which followed the use of radium placed at a long distance, we have had constructed an apparatus containing 4 grams of radium element or 7½ grams of the bromide. We only use the very hard gamma rays. Our apparatus allows us to irradiate two patients at a time in large fields, as is done by the α rays. The whole of the small pelvis is irradiated with an equal intensity, and, in spite of the enormous doses, the patient is neither rendered anaemic nor shocked. It is premature to speak of the results which this method will give, and to say whether it is useful to combine it with the local applications or with surgery; we have not used it sufficiently long to be able to discuss our results. Therefore we have only given a personal statistic ending in 1924; but we shall appeal to a large

number of authors of different countries to demonstrate that radium effects a cure in more than one-half of the operable cases; that in the cases on the limit of operability at least one-third are cured; and in inoperable cases 10 to 20 per cent. of the cases are cured.

Conclusions.

1. Irradiation seems to effect cures of a better quality than surgery.
2. Of all cases treated by radiation 30 per cent. are definitely cured.
3. An improvement of this percentage should be obtained by the new methods, using large amounts of radium placed at a distance.

An Address

ON

THE CLINICAL STUDY OF PAIN:

WITH SPECIAL REFERENCE TO THE PAINS OF VISCERAL
DISEASE.*

BY

JOHN A. RYLE, M.D., F.R.C.P.,
ASSISTANT PHYSICIAN TO GUY'S HOSPITAL.

"Every pain has its distinct and pregnant signification, if we will but carefully search for it."—John Hilton.

Of all the symptoms for which we are consulted pain, in one form or another, is the most frequent and frequently the most urgent. Properly assessed it stands pre-eminent among the sensory phenomena of disease as a guide to diagnosis. And yet it must be confessed that our understanding of its nature and mechanisms, and consequently of its full significance in practice, remains peculiarly limited. We are naturally dissatisfied with invisible and imponderable evidence, and it is therefore no matter for surprise that recent years have witnessed the introduction into medicine of a host of objective methods of studying disease, and that the study of subjective symptoms has suffered some contemporary neglect. The opaque meal and enema; pyelography; cholecystography; the electro-cardiograph; methods of blood analysis; the various chemical tests for gastric, hepatic, pancreatic, and renal efficiency; bronchoscopy; lumbar puncture and its developments; and the exploratory operation—all these, following in the trail of the stethoscope and the ophthalmoscope and older routine methods of physical examination, bear witness to our zest for objective information. It is, however, chastening to remind ourselves that, notwithstanding all the help derived from a judicial employment of them, these methods too have their limitations, and none of them is infallible. They are chiefly useful in proving or disproving the existence of established organic disease; in increasing the accuracy of a clinical opinion; and in serving to differentiate one form of organic disease from another. They have greatly helped in decisions for or against operative intervention. They have undoubtedly exerted an instructive and a corrective influence. In some degree—although, to my mind, by no means so much as they might have done—they have even enhanced our appreciation of subjective symptoms. But their contributions to the early diagnosis of organic disease and to the study of functional disorders are necessarily restricted, and it is clear that without the initial indication of certain symptoms they could never be rationally employed. Moreover, their aid can rarely be invoked in urgent problems or in the homes of the people. There is a very real danger that by over-reliance on them, by too great an anxiety to give our patients the benefit of modern investigations, and by a waning confidence in our own clinical ability, we may come to lose the astuteness and wisdom of our forebears.

In medical education the introduction of these methods has not been an unqualified blessing, and the training of ear and eye and hand and the development of the power of inductive reasoning have suffered much. Every year I see a number of mistakes made through inappropriate,

* Abstract of a contribution to a discussion at the Medical Society of London on March 26th.

* Delivered before the Newcastle-upon-Tyne and Northern Counties Medical Society on February 2nd, 1928.

unnecessary, or excessive investigation. Not infrequently I have myself fallen into error for similar reasons; and not infrequently I have extricated myself from error by a return to first principles, by taking the history of the case again, or by making a more careful analysis of the patient's sensations—Nature's earliest signals of morbidity. It will be readily agreed that many of the best diagnoses and judgements are achieved with the unaided senses backed by experience. It will also be agreed that no course of action can train these senses unless it includes experience patiently garnered at the bedside and in the consulting room.

If I were asked how the next considerable advance is to be sought and won in the field of medicine I should say (with grateful acknowledgements to the influence of Sir James Mackenzie) by the intimate study of the physiology of symptoms, and (once more acknowledging our debt to other great pioneers in this field—notably John Hilton and Sir Henry Head) I would submit that our first concern should be a more extended and intimate study of pain.

This brings me to a consideration of method. Now research into subjective phenomena does not commend itself to the laboratory worker, and cannot easily be pursued in the experimental animal. It is presumably for this reason that even the more recent textbooks of physiology are extraordinarily reticent on the subject of all excepting the superficial pains, and that the scanty references which they make to visceral pain are often misleading. (Thus they nearly all declare that visceral pain is very inaccurately located, and devote more discussion to the occasional sympathetic or somatic than to the far more frequent visceral sensations.) Experiments on the healthy human subject, such as those conducted by Hurst and his collaborators in the course of their work on the sensibility of the alimentary canal, are of necessity limited, and no amount of ingenuity can quite reproduce the experiments in disturbed sensation with which Nature herself provides us in our own bodies or those of our patients. The study of pain must therefore continue to devolve mainly upon the clinicians.

I wish that time would permit me to refer to the method and the classical contributions of the pioneers whose names I have mentioned, and to the valuable communications of others, including Ross, Hurst, and Cope in this country, and of Lennander, Rudolf Schmidt, and others abroad. For my present purpose let it suffice to recall that, whatever the individual trend of these investigators may have been—whether anatomical, physiological, surgical, or neurological—the basis of all their researches was clinical observation.

Partly because the immensity of the subject compels selective treatment, partly because visceral pains have especially interested me in my work as a general physician, and partly because they seem to me to have suffered neglect in comparison, for instance, with the pains of nervous disease, I have chosen to confine my attention in this paper to the subject of pain expressing visceral disease. My remarks will fall into three sections. In the first I shall endeavour to summarize the present state of our knowledge of the physiology of pains affecting the hollow organs. In the second I shall outline a simple system for the clinical analysis of such pains—a system which really embodies nothing new, and which is in large measure applicable to the study of other pains. In the third I shall consider, with examples, the practical applications of pain analyses, for, after all, the chief interest to the practising part of our profession of all such studies is their bearing upon the advancement of diagnosis, prognosis, and treatment.

VISCERAL PAIN.

The insensitiveness to ordinary tactile, thermal, and chemical stimuli of the serous and mucous coats of the hollow viscera has been established in various ways. Partly on this account Sir James Mackenzie became protagonist for the view that there is no true visceral pain, but only pain projected to the somatic tissues supplied by the same segment of the cord as that which supplies the injured viscus. This view still finds a few supporters, but common experience and experiment have rendered it untenable for the majority of students. There is reason to believe that

Mackenzie latterly modified his earlier view to that more generally upheld, for in 1922, in response to certain observations of my own, he wrote to me as follows: "It is to answer this question that I have spent a long inquiry and have come to the conclusion that the only known stimulus that produces pain in the tissues which are supplied only by the autonomic nerves is the contraction of muscle." I would prefer, for reasons which will become apparent, that we should state the matter a little differently by saying that "visceral pain is due to an abnormal increase in tension in the muscular element of the wall of the viscus," for a positive contraction is not the only cause of increased tension or of pain.

This conception of the cause of visceral pain can be equally well adduced in explanation of pains as diverse in character and circumstance as those of labour, of gastric ulcer, of renal colic, and angina pectoris. But there are other observations accessory to the main conclusion which may be made in regard to the pains of visceral disease. These I shall summarize as concisely as possible, referring to them as "laws" of visceral pain for brevity and convenience, and implying thereby "present beliefs" rather than "unalterable truths."

"Laws" of Visceral Pain.

(1) Visceral pain has its origin in and is due to an abnormal increase in tension of the muscular element of the wall of the viscus, this increase in tension resulting either (a) from contraction of the muscle, or (b) from its failure to relax in the face of increasing intravisceral pressure. (Examples: (a) tonic spasm of the colon, (b) bladder pain in the early stages of retention before the muscle fibres have become overstretched.)

(2) Relieving factors in visceral pain, other than those which merely deaden consciousness, are invariably factors which reduce intravisceral pressure or encourage muscular relaxation. (Examples: the relief of pain from the sudden perforation of a diseased appendix; the passage of a calculus; the taking of food in duodenal ulcer; the administration of amyl nitrite in angina pectoris.)

(3) As would be anticipated if the truth of (1) and (2) is conceded, the severity of mechanically induced pain is in inverse proportion to the normal distensibility of the viscus. (Thus the most severe pains are found in disease involving tubes of small calibre and small distensibility, such as the ureter, the bile ducts, and the arteries; the more bearable pains in disease involving organs of wide calibre and a wide range of physiological distensibility and postural adaptability, such as the stomach and urinary bladder.)

(4) Visceral pain when occurring alone or dissociable from attendant pains in the somatic tissues or other viscera can be accurately located by the patient, the localization corresponding, not with any segmental nerve distribution, but with the surface marking of the viscus. (Examples: the loin gesture of renal pain; the sternal gesture of cardio-aortic pain; the accurate indication of the point of obstruction in oesophageal and some colonic strictures.)

(5) Visceral pain, having its origin in muscle, is related to the functional activity of the affected viscus. (Thus it is increased or relieved by food or fasting in gastric ulcer, by effort or rest in cardio-vascular disease, just as pain in skeletal muscle is aggravated by use and relieved by rest.)

(6) Referred somatic pain or soreness in visceral disease may accompany (a) severe visceral crises of mechanical origin, (b) inflammatory or ulcerative disease of the visceral wall, and more particularly if this involves the muscular coat. (Examples: (a) arm pain in angina and testicular pain in ureteric colic; (b) cutaneous soreness in appendicitis and chronic gastric ulcer.)

(7) Sustained somatic pain or soreness in visceral disease persisting apart from recent crises of visceral pain invariably implies inflammatory disease of the viscus in question. (Example: scapular angle pain and interscapular pain and soreness in chronic cholecystitis.)

(8) Conversely, absence of somatic pains and soreness is the rule in cases of visceral pain dependent on functional derangements or due to obstructive lesions in the more distensible viscera. (Examples: chronic colon spasm; pyloric or colonic growths.)

It need hardly be remarked that in actual practice we often encounter confusing effects which result from the extension of disease or multiple lesions or from the "spread" of pain due to temperamental factors or long-continued psychological or physical ill health. Such a qualification need not, however, damage these main conclusions. It would be impossible to detail here the accumu-

lated evidence on the basis of which it has seemed justifiable to formulate the foregoing "laws."

The referred sensory phenomena, requiring for their production special circumstances, such as intensity or prolongation through an inflammatory process of the appropriate stimulus, are infrequent in comparison with the local phenomena, and so are of less constant diagnostic value. It would therefore seem fitting to devote our attention more particularly to the primary visceral pains. It is chiefly with these that I shall concern myself in outlining the scheme for the analysis of a pain which follows.

THE ANALYSIS OF A PAIN.

When a patient comes to us with a complaint of pain it is customary and natural to ask him where the pain is felt and what its character may be. Each of us, no doubt, has his individual method of approach. Often a few direct questions and a little patience will elicit replies so informative as to put us immediately on the track of a reasonably accurate opinion, but there remain a host of "difficult pains" in which our simple routine brings no reward, and we are left "wondering," or are compelled to proceed to the physical examination, which may, in its turn, prove exasperatingly negative. Even the "further investigations," when we can indulge in such luxuries or send the case to hospital, do not necessarily supply the answer to our problem. It is just in these cases that we feel the need for some fuller method of inquiry. A little reflection will show that *there are no less than ten reasonable questions which may be propounded in any given case of visceral pain*, and, indeed, of most other kinds of pain. Each of these questions has some direct bearing on the qualities or circumstances of the symptom, and so renders our investigation less haphazard. It is true that the answers to these questions must be accorded very variable marks for merit. We cannot expect to obtain consecutive or intelligent co-operation from all our patients, but this is no reason for abandoning the attempt. For our failures to "establish contact" or to assess the reliability of replies we must hold ourselves at least in part to blame, and, profiting by them, must aim at an improved technique.

Of these ten questions two have a bearing on quality and quantity, and may be answered under the headings of (1) *character* and (2) *severity*. Three have a bearing on spacial relationships, and are answerable under the headings of (3) *situation* (including depth from the surface), (4) *localization* (or extent of diffusion), and (5) *paths of reference*. Three have a bearing on temporal relationships, and are answerable under the headings of (6) *duration*, (7) *frequency*, and (8) *special times of occurrence*. Two have a bearing on determining causes, and are answerable under the headings of (9) *aggravating* and (10) *relieving factors*. Over and above these questions directly relating to the pain our interrogatory must also include *associated symptoms*. All of these questions are concerned with the spontaneous pain experienced by the patient. At a later stage we proceed to examine for elicited visceral pain (or "tenderness") and elicited somatic pain (or "soreness").

Practical Applications.

Now let us consider the practical utility of an analysis of this kind. What can we learn of the *character* of a pain? It is common knowledge that certain descriptive adjectives crop up again and again in the language of our patients, and these must be accorded their full due. Thus the pain of ulcer is usually "gnawing" or of a dull "toothache" quality; it is sustained while it lasts—that is to say, it is not markedly fluctuating and never intermittent. In an acute irritative gastritis the pain may be peristaltic and intermittent. The secondary gastric pain of gall-stone dyspepsia is commonly of a "bursting" character. The pain of angina pectoris, sometimes so agonizing as to defy description, is often referred to as bursting, crushing, or vice-like. The pains of biliary and renal colic, devastating in their ultimate throes, are nearly always continuous and crescendo, and in no true sense "colicky"; they start with a dull ache which becomes progressively more intolerable. The pain of enteritis or small intestinal obstruction is truly "colicky"—that is to say, rhythmically intermittent,

sharp, and griping while in action, but quickly giving place to ease between the spasms. "Burning" pains are rarely indicative of gross organic disease. The most familiar example is the homely heartburn, with its unpleasant, but never agonizing, sense of a retrosternal and almost "chemical" heat, although such evidence as we have suggests that it is, in common with strangury and tenesmus, an accompaniment of spasm. Diffuse abdominal burning sensations are chiefly encountered in depressed or emotional patients.

The *severity* of a pain is notoriously hard to measure. It is always well to discover from our patient at an early stage whether "pain" or "discomfort" is the more appropriate description. True pain is more likely to mean organic disease. Pains which are comparable with or worse than those of labour, or which in past episodes have required a hypodermic injection, we accept as genuinely severe. The effect of the pain on the performance of daily duties or mental work or equanimity or sleep allows some estimate of its gravity. Recourse to hot bottles, or bed, or analgesic drugs may help in our assessment, but in this part of our inquiry more than any other our own observational powers in regard to temperament or other factors likely to raise or lower the "threshold" of the individual to pain must be called into play.

The *situation* and *localization* of a pain are best determined by observing the patient's gesture, and, best of all, when the opportunity can be found, or made, to see him in its grip. The more defined and accurately localized the lesion responsible for a visceral pain the more accurate and defined, as a rule, is the gesture of the patient. There are many significant gestures. A famous proprietary pill has caught in its advertisements the typical gesture employed by the victims of a kidney stone. The pain of ulcer is commonly indicated with the tips of the fingers applied to mid-epigastrium; the pain of a functional dyspepsia with the flat of a roving hand. The point of arrest of a ureteric calculus may sometimes be shown with a single finger. In cases of chronic colon spasm I have seen the course of the colon accurately traced by patients wholly ignorant of anatomy. Among the best recognized *paths of reference* are those involving the left arm in angina pectoris, sometimes extending to the right arm, and in either case usually confined to the inner aspect and reaching the elbow, the wrist, or even the ring and little fingers, and sometimes also rising to the neck or jaw; the scapular or interscapular pain (not shoulder pain) of gall-bladder disease; and the testicular pain of ureteric colic. Superficial and more often deep skin soreness may be of very real assistance in the diagnosis of gastric and duodenal ulcer, of some forms of appendicitis, of cholecystitis, and diverticulitis. Referred pain down the front of the thighs may accompany salpingitis and tubal pregnancy. The details of the search for zones of soreness have received full discussion in the literature and need not be considered here. Care is sometimes necessary to avoid confusion of a fibrositic tenderness with a true sympathetic hyperalgesia.

The *duration* of a pain has a very special significance, and may frequently throw light on the particular perturbation of function which the pain itself less surely expresses. Thus the intermittent pains of intestinal colic, so clearly due to peristaltic over-activity, last a few seconds only. The pains of an anginal seizure (excluding the sustained agony of coronary occlusion) rarely last more than a few minutes, and depend, we believe (whether their focus be in the heart or its vessels), on an inadequate relaxation—or adaptation of posture—on the part of the coronary plain muscle in response to increased cardiac work and a rising blood pressure. The pains of gastric and duodenal ulcer last an hour or more, until the stomach is empty or replenished. Biliary and renal crises may continue for an hour or hours, and often enough until the blessed relief of morphine has been won. In each instance we can nicely correlate the time character with the mechanical event.

The *frequency* and *special times of occurrence* of a pain are also instructive. Epigastric pain which recurs daily and with some constant time relationship to meals is almost certainly of gastric origin. Epigastric pain arriving at rare intervals, "out of the blue," and independently of

eating or other physiological exercise, should raise a suspicion of gall-stones or tabetic crises. Epigastric pain, absent at times of rest but immediately induced by certain efforts, is almost undoubtedly due to cardio-vascular disease. Of special times of occurrence it is also noteworthy that angina, in concert with other "spasmodic complaints," as observed by Heberden, has a predilection for the early hours of the morning after the first sleep. The hunger pains of duodenal ulcer often wake their victims between the hours of midnight and 2 a.m., and gall-stone pains at a somewhat later hour.

Among *aggravating factors* (taking again the better known types of pain) exertion, cold, annoyance, and particularly exertion after food, may all be provocative of anginal seizures. Jolting is apt to evoke pain in biliary, renal, and vesical calculus, and also in sufferers from chronic colon spasm, a disorder which is highly responsive also to the influence of cold, fatigue, worry, tobacco, and purgatives. Gentle thumping of the loin will more readily evoke the pain of calculous renal disease than simple deep palpation. Of *relieving factors* rest of body and mind and warmth are common to the majority of painful visceral disorders. Amyl nitrite has an almost specific effect in anginal pain, but not so in the status anginosus of coronary occlusion. Alkalis and belladonna (both probably by facilitating pyloric relaxation) have a well-known efficacy in gastric pain. Abdominal pressure, ill tolerated in inflammatory abdominal disease, may alleviate the pain of intestinal colic.

Now I would not for a moment have it supposed that an interrogatory such as I have outlined can be employed by every busy physician in every case of visceral pain with which he is confronted; but I would suggest that some such method is not only appropriate but essential if we are to prosecute a careful inquiry into any single type of pain; and further, that it may be of decided value in practice in elucidating what I have described as "difficult pains," and more particularly in those unhappily plentiful cases of chronic abdominal disease in which physical signs are scanty or altogether lacking. I can think of nothing better calculated to stay the epidemic of injudicious abdominal operations than an extension of interest in pain as a diagnostic symptom.

If I were asked to enunciate a few important principles for the everyday clinical study of pain my choice would fall upon the following:

First, in obscure cases and important decisions to try, whenever possible, to see the patient when his pain is present, for then and then only will his own observations be accurate and reliable, and not dependent upon memory, and physical signs, absent at other times, may be in evidence. We all know how few and far between (especially in consulting and hospital practice) are these opportunities of seeing our patients in pain. This circumstance alone is evidence of the rarity of continuous pain (excepting in advanced inflammatory and malignant disease), and supports the contention that visceral pains come and go in a physiological sequence and in obedience to physical laws.

Secondly, to pay particular attention to the patient's gesture, and, if he makes none spontaneously, to ask for a manual demonstration with the clothes removed. "A pain in the stomach" may mean a pain anywhere between the manubrium sterni and the symphysis pubis, and our endeavour must ever be in the direction of greater precision. I have several times seen the mistake made of supposing a pain to be gastric because it was related to food. Colonic pains may also be influenced for better or worse by food, but they are situated in the lower abdomen, whereas gastric pains are always epigastric.

Thirdly, to remember the close association which exists between visceral pain and the functional activity of the viscus in question. I once had a case referred to me by a cardiologist on a suspicion of stomach trouble with a request for a gastric analysis. The patient was an elderly man complaining of high epigastric pain after food. Before examining him I ascertained that the same pain was also evoked by walking, and that the case was undoubtedly one of angina pectoris.

It remains for me to cite from my personal store a few case histories which serve to show the value of a full

analysis of pain, and how such an analysis may lead to a more correct opinion or may modify judgement or treatment in important ways. I have been careful to include mistakes of my own as well as those of others. How often these mistakes give us insight into matters previously debatable or obscure.

[Case histories illustrating the following conditions were here recounted, the detailed descriptions being omitted owing to lack of space.]

(1) A case in which examination of the patient during an attack of pain altered a diagnosis, based on careful investigations, from duodenal ulcer to gall-stones.

(2) A case in which the severity of the pain led to a diagnosis of gall-stones and a fruitless operation; in which a radiologist later found a lesser curvature ulcer; but in which the clinical analysis led to a diagnosis (proved at a second operation) of "chronic posterior duodenal ulcer adherent to the pancreas."

(3) A case of chronic colon spasm previously diagnosed as (a) gastric ulcer, (b) renal colic, and leading to laparotomy.

(4) A case of chronic right-sided colon spasm for which appendicectomy was performed.

(5) A case of aortic disease with abdominal angina subjected to investigations of the alimentary tract.

(6) A case in which opinions as diverse as coronary arterial thrombosis and gall-stones were entertained by different observers.]

CONCLUSION.

It is a criticism sometimes levelled at the clinician that his work is regrettably unscientific. In general the criticism may seem justified, and we know well enough that we cannot make of medicine an exact sort of science. But in particular it is indisputable that a careful clinical examination or inquiry is just as much a scientific procedure as any other measure of research. According to Huxley's definition, "Science is nothing but trained and organized common sense"—a definition which we should be very ready to accept, and which applies particularly well to clinical work.

We hear much talk at the present day of research in general practice. I marvel at the temerity of anyone who can suggest that the busy practitioner should add another burden to his arduous life; but if there is one way of research not involving too great a consumption of time, and open alike to the general practitioner or to any other branch of the profession, it is that of keeping very full clinical notes on selected cases with a view to the solution of a selected problem in symptomatology. No symptoms better lend themselves to such a process of inquiry than some of the common pains of daily practice. A series of cases of headache, backache, or abdominal pain, as fully investigated as circumstances will permit, and carefully followed through the years, will certainly provide individual rewards for their investigator, and may ultimately furnish the material for a reasoned contribution to morbid physiology. System and patience are necessary, together with an inquiring mind. The only essential apparatus for the research is a good card index.

GANGRENE FOLLOWING THE USE OF ERGOTIZED RYE BREAD.

BY

WALTER J. DILLING, M.B., Ch.B.,

ASSOCIATE PROFESSOR OF PHARMACOLOGY, UNIVERSITY OF LIVERPOOL,
AND

R. E. KELLY, C.B., M.D., B.Sc., F.R.C.S.,

PROFESSOR OF SURGERY, UNIVERSITY OF LIVERPOOL.

EARLY in 1923 we reported at the Liverpool Medical Institution a case of gangrene in symmetrical toes, a condition which followed upon a diet of ergotized rye bread.¹ In view of the recent article in this *Journal* describing symptoms, resembling those of ergotism, among foreign Jews in the Manchester area,² a synopsis of the essential features of epidemic ergotism and of this case of gangrene will now have greater interest.

Although the ergot fungus (*Claviceps purpurea*) occurs most commonly in rye, it occasionally infects wheat, oats, and barley, and, failing its usual host, it can exist on the following grasses: Poa, Phleum, Anthroxanthum, Agrostis,