

# ONE HUNDRED AND SEVENTH ANNUAL MEETING

of the

## British Medical Association

HELD IN ABERDEEN, JULY, 1939

### THE SECTIONS

#### SUMMARY OF PROCEEDINGS

*During the next few months there will be published in the BRITISH MEDICAL JOURNAL most of the opening papers communicated to the Scientific Sections of the Annual Meeting at Aberdeen. The reports of the discussions in this and successive issues are intended to give members who were not present a general idea of the proceedings.*

#### JOINT DISCUSSION OF FIVE SECTIONS

Wednesday, July 26

##### Sulphanilamide in Chemotherapy

With Professor DAVID CAMPBELL in the chair, Professor C. H. BROWNING and Dr. G. A. H. BUTTLE opened a discussion on the present position of chemotherapy by means of drugs of the sulphanilamide group. Both papers are published in this issue.

Dr. H. STANLEY BANKS continued the discussion with reference to the treatment of meningococcal meningitis. During the past two years the Park Hospital was the centre of treatment of all acute cases referred to the L.C.C. The first sixty-five cases were treated by intravenous serum as well as sulphanilamide, with a mortality of 12.3 per cent. In twenty-eight subsequent cases sulphanilamide alone was used, and there were no deaths. M & B 693 alone was given to thirty-four patients, of whom only one, gravely ill on admission, died. The speaker considered that dosage should be sufficient to maintain a spinal fluid concentration of 5 mg. per 100 c.cm. of fluid for three days, and a lesser concentration for a further period of five or six days. In infants an appropriate dose would be 3 grammes daily, while 9 grammes daily would be necessary for an adult. Three deaths occurred among twelve patients having lower spinal fluid concentrations than 5 mg. per 100 c.cm. of fluid, and it was inferred from this that low initial dosage was distinctly unsafe. There was no evidence that auxiliary serum treatment was desirable or that it compensated for low dosage, or too rapidly diminished dosage, of sulphanilamide. Similar high dosage was recommended for M & B 693, although lower dosage of this drug might sometimes be successful. While chemotherapy was applicable to persons of all ages, further experience was required for prognosis in the age group over 40. If vomiting prevented the usual oral administration of M & B 693, intramuscular injections of the sodium solution could be employed. Before the introduction of the sulphanilamide preparations intensive antitoxin therapy had been in use from 1933 to 1937, the gross mortality being twenty-one out of fifty-nine cases, or 35.6 per cent.

Dr. F. J. T. BOWIE (Aberdeen), discussing the treatment of gonorrhoea by sulphonamides, said that the preparations chiefly in use were sulphanilamide, uleron, and M & B 693. Of these the first produced cure in about 80 per cent. of cases, and the second in 80 to 90 per cent. By means of M & B 693 an even greater percentage of cures could be effected; this drug had the additional advantage that it did not necessitate delay in its use until the eighth or tenth day of the disease, as was the case with sulphanilamide and uleron. Dr. Bowie grouped together the statistics of nine authorities,

making a total of 810 cases, and showed that the average rate of cure or early cure was 88 per cent. Moreover, less than 1.5 per cent. developed complications, compared with the approximate 30 per cent. complication frequency among patients not treated by chemotherapy. An intensive method of treatment was being tried whereby males received a total of 20 grammes of M & B 693 over a period of four to five days. Although this system was attended by a greater frequency of gastric symptoms in the early stages it appeared to promise a higher rate of cure. The speaker further quoted the results of Dr. A. M. Michie at the City Hospital, Aberdeen, who had treated eight cases of gonococcal ophthalmia neonatorum; all were gonococcus-negative in two or three days, and the stay in hospital averaged seven to ten days.

Dr. WILFRID F. GAISFORD (Birmingham) recounted his experience of chemotherapy in pneumococcal infections of the lungs. Since the introduction of these drugs there had been a conspicuous fall in the mortality rate of lobar pneumonia; of 627 patients treated for this disease at the Dudley Road Hospital only thirty-five died, and three-quarters of these were over 50 years of age. This represented a mortality of 5.4 per cent., compared to the figures of 20.5 per cent. and 20 per cent. for the years 1936 and 1937. Bronchopneumonia was apt to be due to a mixed infection, and this disease was not benefited to the same extent by sulphonamide therapy. There had been eighteen deaths among 196 patients treated, compared to thirty-six deaths among 211 in 1937. The upper respiratory tract infections of children responded well to these remedies. Dr. Gaisford had observed the development of clear effusions in some cases, although the incidence of empyema had not increased; it seemed probable that the effusions corresponded to aborted empyemata. M & B 693 had been given to more than a thousand patients at the Dudley Road Hospital without any serious toxic effects occurring. He attributed this to the fact that intensive treatment was given early, and for short periods, while no ambulatory cases were treated.

Dr. A. MEAVE KENNY (London), referring to the use of sulphonamides in puerperal infections, said that she regarded red prontosil as the most effective preparation in streptococcal infections. At the Queen Charlotte's Hospital Isolation Block the mortality rate for the five-year period up to 1936 was 22.8 per cent. Following the introduction of prontosil the average mortality for 1936-7-8 was 5.7 per cent. The figure was lowest at 5.3 per cent. in 1936, red prontosil being used. The average dose for the sixty-eight patients treated during that year was 18 grammes, as against the very much larger doses of sulphanilamide and M & B 693 required to bring about the same effect. It was possible that patients were being overdosed, especially in view of the risk of agranulocytosis. It appeared that 50 grammes was the danger level. Whereas there were only two published cases of death from agranulocytosis due to prontosil, there were some thirty-five due to sulphanilamide and M & B 693. The latter preparations had to be given in dangerous dosage in order to produce the same effect, as safe doses of red prontosil. Furthermore, Dr. Kenny had found that all the undesirable non-fatal side-effects were more marked with the colourless compounds. She pleaded for a return to the original red prontosil and the original moderate frequently repeated doses suggested by Colebrook and herself in 1936. Large doses were dangerous during pregnancy, and *B. coli* pyelitis in pregnancy was readily cured by small dosage—for example, 1.5 to 3 grammes daily. The prophylactic possibilities of these drugs must not replace rigid asepsis.

Dr. W. R. SNODGRASS (Glasgow) advocated a conservative attitude in the clinical appraisal of new drugs. He considered that there was no controlled work available on which to assess the value of sulphanilamides in tonsillitis, but these drugs might most suitably be employed when the lesion was acute, widespread, and invasive. One gramme of sulphanilamide might be given four-hourly to an adult for three to five days, and thereafter 1/2 to 1 gramme thrice daily for a further five to seven days. With regard to scarlet fever, he had a series of 340 cases, carefully controlled and recently examined in Ruchill Hospital, but had found no benefit from

the use of sulphanilamide or benzyl sulphanilamide. Controlled observations on 824 patients with erysipelas at the same hospital led to the conclusion that prontosil "red" or sulphanilamide should be given in doses of 1.5 grammes or 1 gramme respectively every four hours until the lesion ceased to spread and toxic symptoms and pyrexia had disappeared. Thereafter 1 gramme thrice daily for fourteen days should be given to prevent relapse. Dr. P. MANSON-BAHR referred to the action of sulphanilamide in tropical diseases. It was a peculiar fact that whereas sulphanilamide was extremely effective against *Plasmodium knowlesi* in the monkey, no influence upon malaria in man had been observed. In sufficient concentrations this drug was lethal to *Brucella melitensis* and *Brucella abortus* in the guinea-pig, but the results in human infection were less definite, possibly owing to insufficient dosage. Benefit had been claimed in tetanus and actinomycosis, as in Madura foot. Dr. W. R. THROWER felt that a critical review of failures and setbacks in sulphonamide therapy might bring more progress than a survey of successes. Supposed complications, such as haematuria and neuritis, might be no more frequent during such treatment than in the disease treated by other means. The assessment of the effects of treatment was rendered difficult by the variable individual response and the special clinical features in different epidemics. Dr. T. ANDERSON (Glasgow) considered that it was essential for case reports to indicate the type of organism concerned. While Dr. Gaisford had found effusions more common during treatment of Type I pneumococcal infections, he had found them commoner in Type II. This was due to the preponderance of Type I cases in the former series and the predominance of Type II in his own series. He agreed with Dr. Meave Kenny that there might be some special therapeutic activity in the "red" compounds which had been in use in the early days of sulphonamide therapy. Professor E. FARQUHAR MURRAY (Newcastle-upon-Tyne) saw the efficacy of chemotherapy in puerperal fever reflected in the decreased frequency with which physicians encountered such cases. He deprecated the tendency to give sulphonamide preparations merely because the patient had a raised temperature and before a definite diagnosis had been made. He was doubtful how far these drugs were beneficial when focal was added to general infection. Dr. E. N. MACDERMOTT (Galway) thought that surgeons were operating upon greater numbers of empyemata since the introduction of chemotherapy. He considered that the use of sulphonamides inhibited resolution in pneumonia, and that thick or "laudable" pus did not form so readily in, for example, adenitis. It seemed possible that the leucopenia so often seen was responsible for these effects. Sir BECKWITH WHITEHOUSE (Birmingham) deprecated the irresponsible use of these preparations as the immediate treatment of fever; they should not be used diagnostically. Like Dr. MacDermott, he was inclined to think that slow sclerosing phenomena might follow sulphonamide therapy.

Professor DAVID CAMPBELL (Aberdeen) considered that the variable effects of sulphonamides were due to the operation of three variables: the rate of absorption; the rate of acetylation; and the rate of excretion. He had met one example of haematuria with complete suppression for eight days; during this time the blood concentration remained high, although administration had ceased. He drew attention to the method of rectal administration if the oral route failed. M & B 693 suspended in a small bulk of saline would be readily absorbed provided the solution was alkalized. While methaemoglobinaemia was easily provoked by M & B 693, sulphaemoglobinaemia was more often produced by sulphonamide. Intravenous methylene-blue would clear up methaemoglobinemia rapidly.

## SECTION OF ANATOMY AND ANTHROPOLOGY

Wednesday, July 26

### Physical Training

Professor H. A. HARRIS (Cambridge), opening a discussion on the anatomical and physiological basis of physical training, described the pattern of growth in the spine, upper limb,

and lower limb, with particular reference to the complexity of the articular surfaces of the joints, the epiphyses, and the heterogeneity of materials involved, including articular cartilage, epiphysal growth cartilage, calcified cartilage, and bone. This, in the spine, was complicated still further by the complex structure, pattern of growth, and properties of the intervertebral disks. The spine of man differed from that of quadrupeds in the substitution of thin annular vertebral epiphyses for thick plate-like epiphyses, in overgrowth of the disks, and in overgrowth of the lumbar spine—both vertebrae and disks—in accord with the great growth in length of the lower limb and great development of buttocks, quadriceps, and hamstrings. This was an important aspect of the assumption of the erect attitude in man. Posture was considered as a nervous mechanism, and emphasis was laid on the importance of the righting reflexes, which were physiological, inherent, and developed at an early age. The nervous mechanism of posture was an ancient heritage, modified in particular in man by the acquirement of stereoscopic vision and the dominance of ocular reflexes. Food, play, and free unorganized games in early childhood were the basis of healthy growth and physical training. There was no index of physical fitness or efficiency. The establishment of a false one would produce inferiority complexes.

Mr. E. SOLLY (Harrogate) offered in support of Professor Harris's approval of voluntary exercises, as contrasted with organized "physical jerks," a reminiscence of his boyhood when he heard an elderly Londoner say that he attributed his health to taking daily equestrian exercises, as it "shook his liver up." A medical friend suggested, "It does you good just because sitting your horse maintains the tone of your abdominal muscles, and so prevents your liver from being shaken up." The physiological value of spontaneous exercises, as in games, was infinitely greater than that obtained by organized drill.

Professor DAVID WATERSTON (St. Andrews) remarked on the fact that individuals might not perform movements in the proper way, and that by training it was possible to teach them the correct method of action. He instanced the slovenly gait or attitude of certain individuals, and indicated how it might be improved by training.

Professor R. D. LOCKHART (Aberdeen) agreed in large measure with Professor Harris's concluding remarks, but considered that the physical training teachers and the orthopaedic surgeons were wide awake as to the possible dangers of certain exercises. He stressed the importance of the muscles controlling joint movements, and suggested that Professor Harris in his remarks upon the vertebral column had lost sight of the all-important part played by the hamstring muscles.

Professor HARRIS, in his reply, mentioned the discrepancy between apparent physical build and physical prowess as represented by certain boxers and professional runners. He also asked that slovenliness of dress should not be confused with physical build.

### Growth of Aberdeen Infants

Professor ALEX. LOW (Aberdeen) described how, by permission of the late Professor R. G. McKerron, anthropometric records were made of over 1,000 infants born in the Aberdeen Maternity Hospital, and with the co-operation of the Public Health Department at the Child Welfare Centre fifty males and fifty females of these infants were re-examined at yearly intervals up to 5 years of age. The infants up to the third birthday were weighed and measured unclothed; children of 4 and 5 were weighed with a minimum of clothing, the average weight of which was deducted. The mean weights at birth—boys 7.7 and girls 7.59 lb.—were of interest in that there was little difference between the weights of the sexes; the Aberdeen infants were also from 5 to 6 oz. heavier at birth than the published figures given for other towns. The table of mean weights and gains showed that from the second year the rate of increase was somewhat greater for girls, so that at the fifth year the girls were slightly superior in weight—boys 36.277 and girls 36.333 lb. The

mean heights at birth—boys 19.708 and girls 19.488 inches—were somewhat under the usually accepted figures; at 5 years these children were over an inch taller than Edinburgh and Dundee children, the mean heights being for boys 41.242 and for girls 41.334 inches. The important bearing of the pre-school years on the future of the individual was emphasized. In Aberdeen the average working-class mother was wonderfully efficient and appreciative of the educative value of the child welfare centre. In the absence of reliable British standards, tables and graphs of growth were mostly based on American figures. Reliable observations from a statistical point of view on the growth of individual children were much needed in this country.

Professor H. A. HARRIS said that present expenditure on the medical examination of school children was largely wasted because there were serious gaps at the two ends—pre-school and post-school. A much more reliable set of data could be obtained if there was more continuity, while accurate observations on dentition and on the special senses were urgently required. He pointed out that more was known about the embryology and growth of chickens, rats, etc., than about human beings.

Professor R. D. LOCKHART (Aberdeen) remarked that this was the first time, so far as he was aware, that measurements of the same individual children had been obtained over the first five years of life. He stressed Professor Low's accuracy as an observer, pointing out the added value of his figures on this account.

Professor Low, in his reply, emphasized that the question of dentition had been studied, and that much variation in the time of eruption and onset of decay had been encountered. Closure of the fontanelles and skull growth were also noted carefully, and he remarked on the precocious development in the first two years of life.

#### Fitness in a Selected Age Group

Dr. JAMES K. SLATER (Edinburgh), in a paper on "The State of Fitness in a Selected Age Group with Reference to Edinburgh University," described first his methods of examination and showed samples of his record cards. Well over 1,000 students attending Edinburgh University had been examined, some only once, but many over a period of nine years. Height, weight, posture, chest measurements, waist measurements, etc., were specially noted, and he drew attention to the difficulties of grading, while giving comparative figures for various years and nationalities. The condition of flat feet was found to be surprisingly common, over 30 per cent. of the students examined, showing this feature. Tables of blood pressure had been prepared, including comparative figures for different nationalities, and several interesting points emerged in connexion with the effects of sport on the blood-pressure readings. Miscellaneous figures were given relating to nutrition, dentition, eyesight, hearing, etc., and the lecturer emphasized the increased adaptability of students for various sports after training under Colonel R. B. Campbell, the University director of physical education.

Professor A. Low (Aberdeen) agreed that physical training had the effects stated, judging from the results obtained in Aberdeen under the directors of physical education, and added that in Aberdeen University a medical officer who examined students periodically had also been appointed.

Professor H. A. HARRIS said that routine x-ray examination would be highly desirable, and would reveal a high incidence of tuberculosis in medical students. He also thought that a follow-up system after the students had left the University was desirable. Dr. G. A. G. MITCHELL (Aberdeen) stated that in Aberdeen, where a large number of first- and second-year medical students had been examined radiologically, no unduly high incidence of pulmonary tuberculosis had been discovered.

Dr. SLATER in his reply said that the most common causes of ill-health among students were undoubtedly tuberculosis and gastric ailments, and on the Continent, where information was more readily obtained, the incidence of venereal disease was

stated to be high. In Edinburgh a Diploma of Physical Education was now granted to those who achieved a certain standard of proficiency under the carefully devised system of Colonel Campbell, in which dexterity and alertness were combined in such a way as to reduce monotony to a minimum.

Professor R. D. LOCKHART showed a cinematograph film of controlled movements of the shoulder girdle taken at the Bergmann-Österberg Physical Training College, Dartford, and also a film made by Professor Bradley M. Patten, Director of the Department of Anatomy, University of Michigan, entitled "Microcinema Studies of Bird Development."

## SECTION OF NEUROLOGY AND PSYCHIATRY

Wednesday, July 26

### Headache as an Early Symptom

With Dr. C. P. SYMONDS, President of the Section, in the chair, Professor HENRY COHEN (Liverpool) and Dr. DESMOND CURRAN opened a discussion on the importance of headache as an early symptom of nervous and mental disorder.

Professor Cohen said that headache as a symptom of intracranial disease occurred (1) in expanding intracranial lesions: (a) in connexion with "tumours" in the wider sense, and (b) in brain swelling due to oedematous or inflammatory changes, vascular lesions, or trauma; (2) in meningeal irritation; (3) in disease of the cerebral arteries; and (4) in a miscellaneous group with no demonstrable gross pathology—for example, post-traumatic headaches, migraine, and epilepsy. From an analysis of the clinical histories two types finally emerged. The first accompanied lesions of the brain which trespassed on the space occupied by normal structures, or which usually, though not invariably, by disturbances of vascular tone interfered with the utilization of oxygen by the brain. On the analogy of cardiac pain Professor Cohen suggested that such headaches might be due to cerebral anoxia. The headaches of migraine, hypertension, and headache occurring after encephalography could be relieved by inhalations of pure oxygen. The second type of headache was associated with meningeal irritation. The commoner pitfalls in diagnosis could be avoided by remembering the following aphorisms. (1) Progressive headache must be regarded as organic until the contrary was proved. (2) Migraine coming on after the age of 40 invariably pointed to gross intracranial disease. (3) Recurring unilateral migraine followed by ocular paresis was almost diagnostic of basal intracranial aneurysm. (4) Recurrent "cyclical" vomiting with severe headaches in children usually meant a posterior fossa tumour. (5) The diagnosis of psychogenic headache must be based on positive evidence, not solely on the absence of any evidence of organic disease. (6) Many intracranial lesions, even tumours, ran their course without headache occurring at any time.

Dr. Curran said that the diagnosis of "functional" headache could not be made merely by exclusion of all possible physical causes. Positive features had to be established to supplement the negative approach of a diagnosis made solely by exclusion. The head was not only physically experienced, but was also psychologically experienced as the place where the ego was localized. It was therefore easy to understand how any threat to the ego or personality was experienced subjectively as head discomfort or a headache, and hence why this should be such a frequent symptom in mental disorder. The characteristics of a "functional" headache were two. (1) It was related to the quality of closeness as opposed to remoteness to the personality. It was not so much typically a sensory perception as an unpleasant experience with a special personal significance. (2) A "functional" headache was a selective disturbance of function and its variability accorded with psychological rather than with physical events.

Mr. D. W. C. NORTHFIELD dealt with headache in expanding intracranial lesions. Frontal headache happened in 95 per cent. of cases of supratentorial tumour and in 75 per cent.

of infratentorial tumour. Pain in the back of the head and in the neck, if an early symptom, might be of localizing value, indicating a herniation of the cerebellum or a tongue of tumour through the foramen magnum. Occipito-cervical pain as a late symptom might be due to herniation of the inner lips of the temporal lobes through the opening in the tentorium. Persistently unilateral headaches were usually on the same side as the intracranial lesion. In 36 per cent. of intracranial tumours headache was the initial symptom. The relation between the headache and the intracranial pressure was of great interest, as severe headache might arise with low intracranial pressure, and, conversely, with high intracranial pressures headache might be absent. He thought that sudden variations in intracranial pressure might cause pain. Headache in expanding intracranial lesions was not due to pressure or tension on the dura mater, as had been taught previously. Headache might rather be regarded as visceral pain, set up by an abnormal state of tension in the walls of the cerebral blood vessels, signifying the perilous position of the brain.

Professor G. W. PICKERING said that a subject could distinguish only two qualities of pain. The first arose from skin and was usually described as pricking if the stimulus was short, burning if the stimulus was prolonged. It was accurately referred to the point stimulated. The second arose from deep structures and was described as aching or dull. It was often referred to an area remote from the point stimulated, and the subject was unable to distinguish from the nature of the pain alone what structure was stimulated. Both types of pain might be experienced in the region of the cranial vault. The majority of headaches belonged to the second type of pain and arose from deep structures. The chief kind of disturbance in the cranial cavity producing pain seemed to be mechanical. In histamine headache and pyrexial headache the disturbance appeared to be a distension of the walls of the intracranial arteries. This might be shown by the relief of pain which was produced either by digital compression of one carotid artery in the neck or by subarachnoid injection of saline, measures which respectively decreased the pressure inside and increased the pressure outside the intracranial arteries. There were probably other disturbances in the cranial cavity which gave rise to headache, but he was doubtful whether cerebral anoxia was one, first, because cerebral thrombosis, unlike coronary thrombosis, was usually a painless event; and, secondly, because in oxygen lack headache was a delayed event which commonly took place after exposure to low oxygen pressures. Other deep structures sometimes giving rise to pain were the skull in syphilitic osteoperiostitis, and the muscles and tendons overlying the bone, as in so-called "nodular headache" or fibromyositis of the head and neck. Professor Pickering thought that the headaches frequently experienced by otherwise healthy subjects when they were anxious or tired were due to prolonged contraction of muscles such as the frontalis, because in his own case such headaches were relieved at once by conscious relaxation of the muscles.

Dr. T. A. ROSS agreed with Dr. Curran that neurotic patients did not really have headache but suffered from some emotional feeling of discomfort. There were no words which really expressed these feelings, and the word "headache" was used for want of a better. If the doctor saw the patient more than once, he would soon be able to get him interested in other aspects of his case, his history, complexes, and so forth, and he would often cease to talk of his headaches, which seemed to have petered out.

Mr. NORMAN DOTT (Edinburgh) agreed that endocranial pain probably arose from the blood-vessel walls, mainly by dilatation but also by mechanical displacement. This conclusion was based on observations on the intracranial blood vessels during craniotomies and on the extracranial blood vessels during bouts of headache. In intracranial aneurysm headache was localized, and preceded for a long time the rupture of the aneurysm. Arteriosclerotic disease of the cerebral blood vessels was associated with headaches. The fact that in toxic states pain was felt in the head rather than in

other parts of the body might be due to the poor vasoconstrictor control of the endocranial vessels as compared to other parts of the body. He thought that "psychogenic" headache was a clearer and better term than "functional" headache. "Psychogenic" pain was as true a pain as any other. He believed that psychic functions had their basis in neural activity, and disorder of the pain mechanism of the intracranial contents might arise in this way. Dr. RICHARD EAGER (Exeter) said that the fact that many cases of headache were due to eye-strain and refractive errors had not been mentioned. He knew of many cases where the correction of refractive errors by suitable glasses had produced immediate relief of long-standing headache. It was the slighter refractive errors that produced the worst headaches.

Dr. D. R. MACCALMAN (Aberdeen) said that two characteristics of psychogenic pain were, first, its unbearable character, and, secondly, its resistance to drugs, although sleep would relieve it. It was the underlying cause of the pain that was unbearable rather than the pain of the headache itself. He referred to other cephalic dysaesthesias, and he particularly associated the "tight band" and "creeping" vertical headache with fear of insanity. Patients could usually distinguish between psychogenic and organic headaches, but did not see the significance of the distinction, for they regarded both as organic in origin. It was always important to determine how useful the headache was to the patient.

Dr. MACDONALD CRITCHLEY observed that one type of migraine without gross intracranial pathology—menopausal migraine—might start after the age of 40. He would like to add another aphorism to those enunciated by Professor Cohen. When unilateral migraine was accompanied by pulsatile tinnitus, this pointed to cerebral angioma. Blind subjects did not often suffer from migraine. Headache might be an important symptom of toxæmia, as was pain in the small of the back. He thought that the psychogenic pain was "real" pain because an individual with hypnotically induced pain produced the same records on a psycho-galvanometer as did an individual with real pain. Dr. Critchley did not think the pain of fatigue state arose in the muscles. It was an uncommon symptom in myasthenia gravis, disseminated sclerosis, and other asthenic states. Dr. W. S. MACLAY thought that if headache was only one symptom of a psychiatric syndrome such as an anxiety state or depressive state, it was wise not to pay too much attention to the symptom but to treat the syndrome in the confident anticipation that if such treatment was successful the headache would disappear. In those cases in which headache was a prominent symptom and the individual was one of those inadequate or psychopathic persons who are so difficult to treat, treatment by relaxation exercises which could be taught to the patient had proved useful.

Professor HUGH CAIRNS (Oxford) believed that sudden alterations in intracranial pressure were an important factor in causing headaches, but that there was a meningeal factor as well. He had demonstrated that pressure on the under surface of the tentorium could cause pain behind the eye. Patients who went blind from intracranial tumours rarely suffered from headaches, and the ocular factor in the causation of headache was worthy of notice. He thought it unlikely that partial anoxia was a cause of headache. Severe headache might occur as the presenting symptom in cases of early dementia with low intracranial pressure.

The PRESIDENT emphasized the importance of accurate history-taking in the clinical investigation of headache. Even intelligent and introspective patients found it difficult to put their sensations into words. Psychogenic headaches could be recognized by the fact that what the subject felt was rarely pain, but rather a misery in the head expressed as some abnormal sensation other than pain. The continuity of psychogenic headaches was of great value in diagnosis. Any headache continuously present for three or four weeks was likely to be functional. In such cases it was more important to inquire into the history of the patient's sleeping and the possibility of recent anxiety and stress rather than to question the patient directly about symptoms referable to the eyes or nasal sinuses. He regarded the quasi-migrainous attacks in basal aneurysm as

due to intermittent increase in tension in the walls of the sac. The intense pain at the outset of a subarachnoid haemorrhage might be due to actual rupture of the wall of the aneurysm.

In reply, Professor COHEN said that the underlying factors in the production of headache might be twofold. Either in the vessel walls there was a sensory mechanism, the adequate stimulus for which was alteration in tension, or as a result of stimulation of the vessel walls there was an alteration in calibre affecting the blood supply to the area supplied by the vessel. He postulated a local and not a general anoxia, and he thought that cerebral thrombosis was not infrequently accompanied by severe and even localized pain, although it might be painless, just as a coronary thrombosis might be painless.

Dr. CURRAN said he preferred the term "functional" headache to "psychogenic" headache. In the headache of an endogenous depression one might search in vain for a psychogenic cause. The reality of the pain in these cases was not in question. It was rather how much of the sensory component was present, or how much an emotional feeling of a disagreeable kind.

## SECTION OF OTO-RHINO-LARYNGOLOGY

Wednesday, July 26

### Bronchoscopy

A discussion on the role of the bronchoscopist in the treatment of broncho-pulmonary disease was opened by Dr. CHEVALIER L. JACKSON (Philadelphia). Mr. H. BELL TAWSE (Nottingham) was in the chair. Dr. Chevalier Jackson outlined the history of endoscopy during the past fifty years. The continued advances in technique had aroused widespread interest, so that more cases were coming forward, and more surgeons were taking short courses in the speciality. The main indications for diagnostic bronchoscopy in respiratory diseases were productive cough, haemoptysis, wheezing, and bronchial obstruction, in cases with atypical physical signs. Bronchoscopy was indicated in the treatment of pulmonary abscess, massive collapse, bronchial obstruction, so-called unresolved pneumonia, and occasionally in pulmonary tuberculosis. The question who should perform the bronchoscopy—the oto-rhino-laryngologist, the physician, or the thoracic surgeon—depended upon local conditions and upon the personnel available. He showed lantern slides illustrating typical conditions and went on to discuss the condition of post-operative atelectasis. Bronchoscopic aspiration rapidly cleared this condition, which he thought was due to the presence of thick viscid secretion in the bronchioles, cough having been abolished by sedatives or inhibited by pain. He thought cases of "unresolved pneumonia" were often cases of atelectasis, which, if untreated, would develop into bronchiectasis. He then showed a colour film illustrating the technique of passing the laryngeal spatula and the bronchoscope, and the methods of aspiration and removal of tissue for biopsy.

Dr. EWART MARTIN (Edinburgh) said that great advances in thoracic surgery had raised hopes of controlling malignant disease of the lung, but operative measures must fail unless the disease was recognized early. The clinical diagnosis of primary carcinoma of the lung lay in the hands of the bronchoscopist. Of 216 cases of bronchial carcinoma seen at Edinburgh Royal Infirmary during the past five years only thirty-four were referred for bronchoscopy. Not one was operable when diagnosed. Either there was a lack of co-operation or cases were reporting too late. It should be possible to diagnose carcinoma of the lung by endoscopy before it could be demonstrated radiologically. Only in the early case was operation likely to succeed. Was our endoscopic training sufficient to justify this responsibility of early diagnosis? Better training would ensue if combined clinics were formed by the various otological departments of one area; to such clinics all endoscopic cases could be referred. Endoscopy and thoracic surgery might be developed side by side in specialized

clinics. He made a plea for increased facilities for practising on animals, especially dogs, and for the greater centralization of endoscopic cases. There was still a tendency to consider endoscopy a difficult operation, whereas in practised hands it was a simple examination. He thought that the bronchoscopist should decide which cases should be referred to the thoracic surgeon.

Mr. V. E. NEGUS described the mechanical head-rest he had elaborated from Haslinger's model, which enabled the operator to be independent of specially trained assistants. Local anaesthesia was suitable for bronchoscopy in adults, but for children rectal paraldehyde should be preferred. Oesophagoscopy called for combined basal and intratracheal anaesthesia in almost every case. Bronchoscopes had been modified slightly to increase the lumen, and oesophagoscopes were of wide calibre to give a comprehensive view. Twin lamps obliquely set were employed in the oesophagoscopes and laryngoscopes to provide a bright light directed forward. A movable self-contained trolley containing a suction pump and rheostats for lighting was of great assistance. Finally, he showed a film illustrating the instruments and the details of technique.

Mr. E. GILROY GLASS (Nottingham) maintained that bronchography by the injection of radio-opaque oil was an adjuvant to bronchoscopy, and was indicated in those cases in which the lesion was beyond bronchoscopic vision. The value of bronchography was enhanced if the technique adopted permitted of controlled filling of any individual lobe of the lung. The simplest technique meeting this requirement was the passage of a catheter through the larynx and the injection of oil under fluoroscopic control. The exact technique and a new radio-opaque catheter to facilitate orientation were described and illustrated by a film.

The President, Mr. H. BELL TAWSE, expressed the thanks of the meeting to all speakers, and especially to Dr. Chevalier L. Jackson. Among the points for discussion was the question of co-operation between laryngologist, physician, and thoracic surgeon. He thought the voluntary and municipal hospitals should pool their material and resources and that licences for practice on animals should be made available for assistants, so that they could master the technique. Mr. C. A. SCOTT RIDOUT (Portsmouth) emphasized the need for the co-operation of the general practitioner and hoped that an appeal would be made to all practitioners for their aid in the early diagnosis of pulmonary carcinoma. In the smaller clinics the thoracic surgeon would need the help of the laryngo-bronchoscopist, though he might himself perform bronchoscopy if trained. Surely more training on animals should be permitted, as often these animals were brought as patients with foreign bodies in the oesophagus. Cases were quoted showing ultimate good results after repeated bronchial suction and lavage. He advocated local anaesthesia for bronchoscopy. Mr. P. R. ALLISON (Leeds), speaking as a thoracic surgeon, considered that he should perform bronchoscopy himself, unless it were possible to have a bronchoscopist always available. He stated that 95 per cent. of carcinomata of the lung seen bronchoscopically were inoperable, even when the symptoms were recent.

Mr. I. SIMSON HALL (Edinburgh) stressed the importance of bronchial aspiration as a preventive of post-operative pulmonary complications. He emphasized the part played by sinus infection in cases of early lung suppuration or bronchitis. Mr. T. RITCHIE RODGER (Hull) and Mr. DONALD WATSON (Bradford) supported the use of the Negus head-rest, maintaining that team work was impossible in small centres. Mr. J. ADAM (Glasgow) asserted that in cases of bronchiectasis postural drainage was better than bronchoscopic suction. He asked Dr. Martin how often haemoptysis was a symptom in his cases, and Dr. Jackson whether he practised aspiration in cases of asthma. Mr. F. R. EDWARDS (Liverpool) said the question of bronchoscopist versus thoracic surgeon rested on what the surgeon wanted to know. Before operation the surgeon must have had a personal view of the lesion. Haemoptysis in patients over the age of 40 called for early bronchoscopy. A delay of a week or two might render the operable case inoperable. The combination of bronchoscopy

and bronchography was recommended. Dr. H. A. McCoy (Adelaide) asserted that before condemning deep x-ray therapy the size and extent of tumours of the lung should be known and an adequate dosage should have been given. Mr. J. D. MCLAGGAN asked if anyone had had any experience of tomography.

Dr. CHEVALIER JACKSON, in reply, said that postural drainage in cases of lung abscesses was extremely valuable, but it was much more effective when combined with occasional bronchoscopic aspiration. He never advocated aspiration during the height of an asthmatic attack. He agreed that the thoracic surgeon should view the lesion either by himself or with the bronchoscopist. He favoured lipiodol injection through the bronchoscope. In his experience he had never seen prolonged arrest of any malignant growth of the lung follow deep x-ray therapy. He had not yet had sufficient experience of tomography. Dr. EWART MARTIN visualized the establishment of clinics for non-tuberculous diseases of the chest. If the thoracic surgeon was to replace the bronchoscopist he must be prepared to undertake all bronchoscopies. Mr. NEGUS agreed that postural drainage was of value, especially in young children, but in many cases of bronchiectasis granulation tissue and the swelling of the mucosa prevented such drainage until the condition was relieved by bronchoscopy and suction. A point in the diagnosis of carcinoma of the bronchus was that the opacity seen radiologically might be due to some extent to collapse and excessive secretion from obstruction; a further radiograph after the removal of such obstruction by bronchoscopy gave a much more reliable estimate of the extent of the growth.

## SECTION OF ORTHOPAEDICS

Wednesday, July 26

### Painful Shoulder

With Dr. ALEXANDER MITCHELL (Aberdeen) in the chair, Dr. PHILIP DUNCAN WILSON (New York) gave an analysis of 168 cases of painful shoulder. In the largest group the pain was due to lesions of the subacromial bursa. Discussing the anatomy and function of the subacromial bursa, he laid particular stress on the fibro-tendinous cuff formed by the combined tendons of the external rotators, which cuff was particularly liable to stress and strain. The more common lesions of the subacromial bursa were (1) calcareous deposits and (2) periarticular adhesions. He pointed out the difficulty of determining the part played by calcareous deposits in causing shoulder pain. He had had the opportunity of observing the actual conditions present at operation in several acute cases; when the deposit lay deep in the tendinous structure it caused no symptoms, but when it enlarged sufficiently to approach the nervous and vascular layer beneath the bursal wall the acute stage with pain was reached. Formerly treatment for such conditions was by rest and physiotherapy or by surgical excision. He had achieved good results with aspiration and irrigation by means of a needle. It might be necessary to guide the needle under x rays, since relief of the pain depended on reaching the deposit with the needle. Relief in cases of acute pain was immediate and generally permanent. Cases in which the deposit was dense and almost bone-like, however, did not respond to this treatment, and operation had to be undertaken.

Dr. Wilson then described the common symptoms of periarticular adhesions, and stated that, in his opinion, the adhesions lay in the substance of the tendino-capsular structure. As to whether this tendinitis was a true inflammatory process due to some low-grade infection or to degenerative changes was not clear, but in his experience most of these patients recovered without any particular attention being paid to septic foci. In treating such cases of primary tendinitis heat, massage, and pendulum exercises were advocated. If the pain was severe at night the arm was immobilized, and if no improvement had been noted in two weeks some other procedure, such as manipulation under anaesthesia or treatment by traction and a suspension apparatus, should be

adopted. Dr. Wilson finally pointed out that there was a group of cases in which periarticular adhesions were secondary to injury of the soft structures. Such cases responded well to local physiotherapy—in contrast to the primary group.

Mr. V. H. ELLIS confined his remarks to injury to the supraspinatus tendon. He discussed the symptomatology, and expressed the opinion that the pain in these cases had its origin in the muscle or its tendon. The muscle might be contused, or completely or incompletely ruptured. It was difficult to differentiate clinically between complete and incomplete rupture. In cases of incomplete rupture recovery was spontaneous, but could be expedited by early passive movements; in cases of complete rupture early operation was imperative, and even then the results might be disappointing. Mr. B. L. MCFARLAND (Liverpool) gave a very useful clinical classification of painful shoulders, dividing them broadly into two groups—those with no limitation and those with limitation of movement. Under the second heading the most common cause was probably adhesions. When the adhesions were of the type that snapped the patients did well with active treatment. If the adhesions were of the type that tore, the patient should be treated in an abduction splint.

Mr. H. O. CLARKE (Manchester) confirmed Dr. Wilson's opinion as to the success of aspiration and irrigation in cases of calcifying tendinitis, and referred to the association of periarticular adhesions with acute illnesses. Saying that he never had been able to diagnose a case of rupture of the supraspinatus tendon, he asked for advice on arthrography. Dr. G. SLOT stressed the importance of the sympathetic factor; he had achieved success with the Leriche method of injection of large quantities of novocain followed by physiotherapy. Dr. J. A. MCVICKER (Belfast) said that in chronic cases the diet should be regulated before any specific treatment to the joint was begun. He advocated progressive manipulation, and he also endorsed the importance of the sympathetic factor. Dr. H. POSTON (Manchester) mentioned the association of painful shoulders with septic foci. He thought that the adhesions which snapped were probably intra-articular, while the adhesions which tore were extra-articular.

In replying, Dr. WILSON attributed the poor results of operation in ruptures of the supraspinatus to too long an interval elapsing between the tear and the operation. He himself would not undertake suture after three months. He mentioned the danger of manipulation because of the risk of tearing live structures. Mr. ELLIS said that another factor affecting the results of operation in cases of rupture of the supraspinatus tendon was the condition of the tendon. He thought that in cases of calcareous deposit needling without aspiration gave relief if the deposit was under tension.

## COMBINED SECTIONS OF DISEASES OF CHILDREN AND MEDICAL SOCIOLOGY

Wednesday, July 26

### Nutrition of Mother and Child

With Professor G. B. FLEMING, President of the Section of Diseases of Children, in the chair, Sir JOHN BOYD ORR (Aberdeen) opened a discussion on problems of the nutrition of mother and child.

Sir John said that since the beginning of the present century there had been a remarkable improvement in the national dietary, with a corresponding improvement in national health and physique. There was still, however, a great amount of preventable ill-health and poor physique, especially among the poorer classes, in which the infant mortality rate and the incidence of disease due to faulty diet were higher than among the well-to-do. The results obtained in an experiment with recruits rejected on medical grounds showed that they could be reconditioned. In one of the first experiments done in 1937 64 per cent. were fit for service after six weeks' treatment, and 18 per cent. were almost fit for service. These recruits were put on a first-class diet, and, although other hygienic factors would favour reconditioning, the results of feeding experiments in

which other factors remained constant, such as those carried out in Scotland on school children, suggested that the improvement of the diet was the most important item. The public health measures, especially the providing of milk and other health foods free or at reduced rates at child welfare clinics and maternity centres, which had increased so largely since the war, had been an important factor in reducing the infant mortality rate in England and Wales from 138 in 1901-5 to 58 in 1937. Recent work emphasized the importance of proper nutrition in the early years of life, including the pre-natal period. If a healthy race was to be built up they must intensify the work done to improve the nutrition of the expectant and nursing mother and the infant and pre-school child. The report of the Nutrition Committee of the British Medical Association, which set up a minimum standard of diet, was an important advance. A further advance was made by the League of Nations Committee, which concentrated its attention upon the mother and child. Unfortunately the kind of diet recommended, which included one litre of milk, one egg, green vegetables, and fresh fruit daily, was beyond the purchasing power of many working-class families. The time was ripe for a large-scale test of improving the diet of expectant mothers. A test with two or three thousand women in a district or a city where the infant mortality rate was high would give an indication of the extent to which maternal and infant mortality rates could be reduced, disease of children decreased, and the physique of the next generation improved by application of the results of research on nutrition.

Professor J. C. DRUMMOND, referring to the large-scale test on expectant mothers, explained that this was already in progress, and a group of mothers were receiving extra minerals and vitamins during pregnancy. In one respect, he continued, the modern tendency to push up the optimum amounts of vitamins required by healthy people presented an exception—namely, as regards vitamin D, for which the experts now actually recommended less than a few years ago. Historically considered, it appeared impossible that the huge doses of vitamin D which had been advocated—for example, during pregnancy—could have been obtained in the past from natural foods, and hence it appeared necessary to consider if the presentation in the diet of calcium and phosphorus in correct amounts and proportions affected the amount of vitamin D required. This led to a consideration of the anti-rachitic value of human milk. It was found that the vitamin D content of human milk varied, not with season but definitely with the amount of vitamin D in the maternal diet. On the other hand, the calcium content of human milk appeared to be largely uninfluenced by the maternal diet. It was disturbing to note that the calcium intake of the infant fed with human milk was often insufficient to provide the amount calculated as requisite. There were still unexplained factors in the whole question of the utilization of calcium from human milk, and there was need for metabolic studies on infants fed by mothers whose diet conformed to optimum standards such as those advocated by the League of Nations Committee on Nutrition.

Professor NOAH MORRIS (Glasgow) dealt particularly with problems of calcium metabolism, mentioning first the general functions of calcium and the factors which regulated the retention of this substance in the body. He thought that one of the great dangers of artificial feeding of infants was over-dilution of milk, since there was a modern tendency to give concentrates of vitamins and at the same time to starve the infant. The speaker pointed out in this connexion that boiling milk, necessary on grounds of safety, actually promoted a better retention of calcium and phosphorus. As regards the intake of calcium during pregnancy, it was easy to calculate this as being in the neighbourhood of 1.6 grammes daily. There was possibly some danger of over-emphasizing the disappearance of florid rickets, for he had found that among 500 admissions to a children's ward combined clinical, radiological, and biochemical studies revealed rickets in nearly 50 per cent. Further, there was evidence that a large number of the convulsions met with among children in the first year of life were due to hypocalcaemia. At the same time it was wise not to attribute all the defects of growth to lack of calcium, since there were other factors which played a part in the ossification of the skeleton.

Dr. H. E. MAGEE described experiments concerned with the phosphatase content of the blood in connexion with pre-symptomatic indications of defects in calcium and phosphorus metabolism. A series of experiments with sheep on a deficient diet showed that a rise in blood phosphatase occurred at least one month before experts could detect that there was anything wrong with the sheep. It could be taken that a rise of the blood phosphatase above normal was a warning that something was about to go wrong unless conditions of diet were altered. These observations had been applied to examination of pregnant women, and in one investigation at Blackburn it appeared that there was statistical proof of a correlation between the level of the phosphatase of the blood and disturbances of health during pregnancy, labour, or the puerperium.

Dr. J. C. SPENCE (Newcastle-upon-Tyne) emphasized the great improvement in the nutrition of children viewed over the past twenty years, stressing the disappearance of florid rickets and certain skin lesions associated with vitamin deficiency, as well as the decrease in the infant mortality rate and absence of xerophthalmia. Despite these facts, however, economic and sociological studies suggested that all was not well, and there was need for the collection of detailed information of the dietetic faults still present in the community. Dr. Spence suggested that rickets, for example, might be made a notifiable disease so that investigation of the factors leading to its occurrence in individual cases might be carefully studied. The main problems at the present day could be grouped under the headings of economic, ignorance, and incompetence. Dealing with the question of ignorance, he quoted a "case" shown to a medical society of a mother of seventeen children, fourteen of whom were living, brought up on an average wage of £1 to 30s. per week, and all healthy specimens with good teeth. The results had been achieved by excellent mothercraft and homecraft, and Dr. Spence urged that such examples needed far more publicity. [Later in the discussion, as the result of questions, Dr. Spence explained that careful buying in the markets of "waste" being sold cheap and the use of the stockpot to provide soup daily were among the methods used by his "case."]

Dr. GRACE CUTHBERT (New South Wales) said that recent visits to Holland led her to contrast the state of affairs in Scotland with those in Holland and in New South Wales. She thought that there was insufficient application of the available services in Scotland, and that in general medical officers of the welfare centres were not sufficiently keen on breast-feeding. Better instruction in mothercraft was essential, and could be done through nurses trained in this science. Dr. ELENORA SIMPSON (St. Andrews) pointed out that every woman who had a baby was inundated with advertisements of artificial foods for infants, and she was thus tempted to abandon breast-feeding at the first sign of difficulty. Owing to these commercial interests breast-feeding suffered, and yet, as continuous observations of children at the James Mackenzie Institute in St. Andrews showed, there was great superiority of the breast-fed infant as compared with the artificially fed. Dr. W. G. WICKREMESINGHE (Ceylon) pointed out that in Ceylon the soil was deficient in calcium, and hence the diet was very likely to be deficient in this mineral. About two-thirds of all infant deaths in Ceylon were due to convulsions, and presumably this meant a serious degree of calcium deficiency. Dr. W. G. BOOTH (Boston) expressed his satisfaction that the discussion was concerned with the nutrition of normal people, and he pointed out how eager public health authorities were to co-operate in the matter of improving nutrition. He thought that the notification of rickets, as had been suggested, was not without its dangers. Mr. GRIFFITH EVANS (Carnarvon) spoke of the great need for propaganda, and insisted that every possible opportunity should be taken to instruct mothers about correct diet. Dr. H. V. P. CONRICK (New South Wales) thought that the selection of food and how to cook it should be made a compulsory subject in the schools so that every girl received expert instruction. Dr. I. LEITCH (Aberdeen) dealt with some of the difficulties relating to calcium supplies in human milk. Cow's milk certainly contained more calcium than human milk, but there was a danger in so-called "humanized" milk mixtures in diluting this calcium to low levels. In the breast-fed infant the total intake

of calcium might be low despite an adequate concentration of calcium in the milk, merely because the total milk supply was inadequate. Medical practitioners, stated Dr. Leitch, took far less trouble over preparing women for lactation than the laboratory worker took over preparing rats, for example, for lactation. If the calcium drain of lactation was to be dealt with properly it meant adequate diet during pregnancy so that stores might be laid down.

## SECTION OF PHYSIOLOGY AND BIOCHEMISTRY

Wednesday, July 26

### Control of Respiration

With Professor G. SPENCER MELVIN, Vice-President, in the chair, the session began with a discussion devoted to the control of respiration, the opening paper being given by Sir JOSEPH BARCROFT (Cambridge). He took for his special subject the intra-uterine development of respiratory effort. In his own experiments upon the sheep's foetus he had been able to follow this development stage by stage, starting from a simple response to stimulation of the trigeminal nerve, which in the next stage became a rhythm. The rhythmic responses were of two types—one a movement like "an effort to get up," and the other an after-rhythm simulating respiration. Later these movements were subjected to an inhibition, which transections of the central nervous system had shown to be established in a centre in the thalamic region. Until this stage was reached respiratory movement could not be initiated by asphyxia. One effect of asphyxia, therefore, was to release respiratory movement from the thalamic inhibition. At birth a battle was waged between inhibition and sensory stimulation, the former being depressed by asphyxia. Professor Barcroft then went on to show a film which fully illustrated all his main points.

The President, Professor E. D. ADRIAN (Cambridge), pointed out that Sir Joseph had devised a new and illuminating approach to the problem of respiration which was particularly interesting to the neurologist, since it showed some of the fundamental properties of the central nervous system. Work on the electrical reactions of the brain had shown the importance of afferent impulses in raising the general level of activity, and had given some insight into the first important factor in the control and development of respiration—namely, the general facilitating effect of afferent impulses. The rhythmic movements of respiration had to be integrated with the other needs of the body for speech, movement, etc., and this integration was brought about by the second nervous factor—the sense organs in the lung which sent fibres up the vagus. The third nervous factor was that of the glomus caroticum endings, recently investigated by Professor Heymans; these signalled the state of the blood to the respiratory centre. All three factors might conceivably come into operation in certain pathological states. In particular the vagal endings, if exposed to irritants, might be the cause of rapid breathing. So far disturbances of the carotid sinus endings had not been reported, but we were still far from knowing fully their normal effect.

A further contribution to the discussion was made in the course of a paper by Professor W. H. WILSON (Cairo), who described the control of respiration as a visceral function, and the control of breathing as somatic function. The first was governed by centres in the midbrain and medulla, the second by influences from the cortex and from the thalamic region passing through the hypothalamus to the centres governing respiration. The second formed the occasional control of breathing by posture, body movements, and sensory stimuli. Apart from central chemical stimuli, the control of respiration was affected by three reflex influences: (1) chemical, through the carotid sinus and aortic areas; (2) reflex periodic inhibitory influences from the lungs; and (3) tonic accelerator influences from the lungs. Anrep had given two new proofs of the latter. If one lung was ventilated with the vagus cut, and the

other was collapsed with the vagus intact after section of the branches to the aorta, "vagotomy breathing" only occurred after section of the vagus from the collapsed lung. The intravenous injection of ethyl aceto-acetate inhibited breathing by exciting the vagal endings in the lungs, but if the cervical vagus was cooled below 8° C., thus blocking the inhibitory fibres, the injection was followed by rapid breathing due to the excitation of respiratory accelerator vagal endings in the lungs.

### Cardiac Muscle Metabolism

With the President in the chair, Professor E. W. H. CRUICKSHANK (Aberdeen) described experimental work which demonstrated a linear relation between the glycogen content of the heart and the level of the blood sugar in the male rat. The relation of lactic acid to blood sugar utilization was represented by a rectangular hyperbola. The sum of blood-sugar-lactic-acid utilizations was greater with higher concentrations of either. Lactic acid was probably not used by the rat's heart for glycogen synthesis. Further investigation of the functional relation between glucose and lactic acid would necessitate the use of a heart-lung preparation. Fat utilization in the mammalian heart could not be decided gravimetrically or by the respiratory quotient method. The question of the "reducibility" of the fatty acids in muscle and blood had to be investigated. It had been shown that neutral fats and fatty acids were reduced in aglycaemic conditions. The relative call upon carbohydrate and lipid reserves during the reduction of the blood sugar to levels approaching 5 mg. per 100 c.cm. of blood could be approximately stated as: blood sugar 80 per cent., heart glycogen 65 per cent., blood and heart muscle fatty acids, each 20 per cent.

Dr. A. LYALL (Aberdeen) then raised a point about the form in which the fatty acids were used, and Dr. D. P. CUTHBERTSON (Glasgow) inquired whether protein was also utilized. In reply, Professor CRUICKSHANK said that he regarded the evidence upon both these matters as unsatisfactory.

### Substitute Carbohydrates in Diabetes

The final paper by Dr. H. W. KOSTERLITZ (Aberdeen) was concerned with the metabolism of substitute carbohydrates, which substances he defined as compounds which were better tolerated by diabetic patients than was glucose; they reduced ketonaemia and ketonuria, and had a sparing effect on nitrogen metabolism. The best known of these substances were laevulose, dihydroxyacetone, sorbitol, and galactose. In the depancreatized dog, laevulose and sorbitol could lead to the deposition of appreciable quantities of glycogen, which was not the case with glucose. This phenomenon might be due to the intermediary formation of some substance readily built up into glycogen. In the case of galactose an intermediary product—galactose-1-phosphoric acid—accumulated in the liver during assimilation, and it was probable that this was only slowly transformed into glucose. Since initial phosphorylation appeared to be essential for galactose metabolism, the rate of this reaction would determine the tolerance for this sugar. It was of interest that galactose-1-phosphoric acid was also an intermediary product in galactose fermentation by galactose-adapted yeast. In this process, however, there was no accumulation of the ester, since dried yeast fermented glucose and galactose-1-phosphoric acid at approximately equal rates.

Arising out of Dr. Kosterlitz's paper questions were put by Dr. J. N. DAVIDSON (Dundee) as to the site of conversion of galactose, and Dr. D. P. CUTHBERTSON (Glasgow) asked what would be the effect of galactose on an animal rendered diabetic by anterior pituitary hormone.

On July 26 the new fracture clinic at the Hull Royal Infirmary, which has cost £10,000, was opened by Mrs. Arnold Reckitt. In commemoration of Mr. Joseph Rank's continued benevolence a ward at the Sutton branch hospital has been named after him. A gift of £60,000 was recently made by Mr. Rank to the general endowment fund of the Royal Infirmary.