fortnight, and which, from his description, was similar to that in 1922. The significant fact, however, is that the attacks in 1922 and 1926 were undoubtedly due to severe physical effort.

CASE v.—Auricular Fibrillation Started by Lifting a Heavy Weight.

A man, aged 57, was apparently efficient until the onset of his present disability; he experienced no discomfort on exercise and was not conscious in any degree of the action of his heart. Twenty years ago he was in hospital suffering from rheumatic fever.

On January 30th, 1925, he was lifting a heavy "hip" on to a roof when he felt something give in his chest. His heart seemed to stop beating and then to race, there was acute pain all over the chest and he became very short of breath. He sat down for half an hour, during which time his heart continued to race. He was conscious of respiratory distress. The following day the pain was still present and the dyspnoea marked. He was seen by his doctor and later was admitted to one of the Liverpool infirmaries. While there a diagnosis was made of "strained heart."

He was a fairly well nourished man; he presented no cyanosis nor oedema. The conjunctivae were rather watery. There was marked dyspnoea on any exertion, even on walking slowly. This was accompanied by pain in the mid-line behind the sternum; the pain did not radiate in any direction. Pulse 160, very irregular; blood pressure for the larger beats 150 systolic, 60 diastolic. Cardiac thrust in the fifth and sixth spaces. Deep cardiac dullness 5½ in. to the left. There was a loud blowing systolic murmur over the apex beat—murmur conducted outwards and to some extent inwards; a short rough systolic over the aortic area, and a faint diastolic extending down to the left of the sternum audible during the long pauses.

The liver was enlarged and hard, 2 in. below the costal margin (he admitted taking four pints of beer daily). The urine contained a fair amount of albumin. The electro-cardiogram showed a rapid heart with a right bundle lesion (Fig. 5) and occasional ectopic beats originating in the right ventricle.

He responded well to digitalis, and his cardiac reserve increased, but he has never been able to work since the onset of the trouble.

It is reasonable to infer that fibrillation was the result of the sudden strain.

In Case v there was pre-existing disease both of the valves and of the myocardium, and the patient was more likely to suffer from physical strain than a normal healthy

man. He broke down in consequence of the strain of his employment, and his employers were consequently liable. This has been recognized by them, and he is drawing full compensation for total disability. In reference to one case the law lords laid down that:

"If a man, in lifting a weight or trying to move something not easily moved, were to strain a muscle, or rick his back, or rupture himself, the mishap, in ordinary parlance, would be described as an accident."

"Were to strain a muscle." This man strained the most important muscle in his body—his heart—and its auricles fibrillated.

Summary.

Five cases are recorded in which fibrillation resulted from trauma; in one case the exciting factor was a powerful electric shock; in the remaining four the exciting factor was sudden physical exertion putting an unexpected and undue strain on the heart. In four of these men there was no evidence that the heart was diseased or abnormal, and up to the onset of fibrillation they were living active normal lives.

We hold that the evidence justifies the view that sudden strain may, and frequently does, initiate auricular fibrillation and induce cardiac failure in men and women with diseased hearts. We would go further and say that fibrillation may result from physical strain in hearts that are apparently normal, so far as can be determined by ordinary clinical methods.

The medico-legal significance of this is of considerable practical importance, and it was for this reason that we have put these cases on record.

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ULTRA-VIOLET RAYS: THEIR PLACE IN MEDICINE.*

BY

F. HERNAMAN-JOHNSON, M.D. ABERD.,
D.M.R.E.CAMB.,

RADIOLOGIST TO THE FRENCH HOSPITAL, LONDON; PHYSICIAN IN CHARGE,
X-RAY AND ACTINO-THERAPEUTIC DEPARTMENT, CROYDON
GENERAL HOSPITAL.

In certain quarters a prejudice against light treatment exists because of the multiplicity of disorders for which it is recommended. As definite effects upon the skin can be demonstrated, claims for the value of ultra-violet rays in dermatological cases do not, as a rule, meet with much opposition; but when the same agent is said to be useful in all forms of tuberculosis, in rickets, in various diseases of the blood and lymph glands, rheumatism, neuritis, herpes, organic diseases of the nervous system, syphilis, and even cancer, the orthodox may be pardoned for an inclination to class such a remedy with those advertised in the pages of popular magazines. Yet all the maladies enumerated have really been cured or improved by ultra-violet rays, used either alone or in combination with other forms of radiant energy. Apart from mechanical interference with the function of organs, the greater part of organic disease is directly due to the action of circulating poisons, and of these poisons the majority are of microbial origin.

In disturbances of health caused by microbial invasion the symptoms are not due to the microbes as such (embolism apart), but to the toxins they generate. Nevertheless, provision is made in the body, by phagocytic attack, to deal with the actual germs, as well as with their poisonous products.

Medical treatment must aid and stimulate natural processes. For the most part direct aid is impossible at present; diphtheria antitoxin is about the only example. Vaccines, and even so-called specific drugs, such as neo-salvarsan and quinine, are valuable only so long as the

host-tissues retain a power of response. The modes of reaction of the body to external stimuli are comparatively few, although the stimuli themselves may be almost infinitely varied. A similar result may be brought about by diverse causes, or apparently diverse results by a single cause. If we can discern an agent capable of activating, at least in some degree, all the defence mechanisms of the body, then the list of diseases in which it is of value will be large.

An approach to such an agent we possess in ultra-violet rays. All radiation is due to the vibration of electrons, and travels in the form of waves through the ether. The sole difference between one form of radiation and another lies in their respective frequencies. In the case of visible light the eye and brain interpret the frequency in terms of colour; in the case of invisible light—ultra-violet rays and x rays—the skin shows itself capable of distinguishing between different frequencies or wavelengths by its reaction. For example, an erythema follows an ultra-violet exposure in eight to ten hours, but after x-ray exposure requires as many days to develop. And, in the former case, hair is stimulated, whereas in the latter epilation occurs, and regeneration is not well established for two or three months.

There are three well known types of lamp for the production of ultra-violet rays—the carbon arc, the tungsten arc, and the mercury vapour arc. The former is the most suitable for general treatment; the two latter are capable of producing erythema in a few minutes, and are best suited for local treatment. The production of erythema would appear to be for the most part essential to the successful local treatment of skin disease. Acne, dry eczema, alopecia, impetigo, pruritus, boils, scleroderma, and extensive varicose ulcers are some of the conditions which yield to local applications. A series of erythema doses over the painful area in cases of neuritis, sciatica, and lumbago will often effect a cure; and, applied over the lower abdomen, may relieve the pain of cystitis. These results may be "explained" by saying that the erythema induces a local phagocytosis, and that, in the case of deep-lying trouble, cure is brought about by counter-irritation.

* Abstract of an address to the Croydon Division of the British Medical Association.

The effects of general radiation are clinically no less definite, but many medical men refuse to credit this. Steenbock and Black, of the University of Wisconsin, have shown that ultra-violet rays can reactivate cod-liver oil the antirachitic power of which has been destroyed by heat; and can also confer this power upon other fats, including that present in the human skin. This "explains" their action in rickets in terms of cod-liver oil. Again, Leonard Hill and his co-workers have proved that an erythema dose over about one-quarter of the body surface raises the bactericidal power of the blood. Here is a possible explanation, in bacteriological terms—which, by virtue of thirty years' use, have become familiar and respectable—of the action of ultra-violet rays in tuberculosis. But when it is stated, for example, that great benefit may result from their use in disseminated sclerosis, in pernicious anaemia, and in Hodgkin's disease, there is no obvious link with familiar facts.* Yet it is generally believed that these disorders are the result of toxins, and that these toxins are probably of microbial origin. The bodily resistance to known toxins is raised by ultra-violet rays, and this stimulation is effective against such widely different organisms as the tubercle bacillus and the cocci of suppuration. Surely, then, it is not very difficult to admit that it may be effective against other, and at present unknown, organisms.

It is often said that light treatment is useless, and even dangerous, in phthisis, but by cautious dosage—erythema should be avoided—and a careful selection of cases, much

* Since the delivery of this address good results have been obtained in the treatment of the inco-ordination and depression which follow "sleepy sickness."

good may be done. The patients must not be very ill, nor must they be of the well known type which offers little resistance to the spread of the disease. The kind of patient who would in any case struggle on for some years, doing a certain amount of work, is the one who will derive definite benefit. His working life will be prolonged, and his outlook on life altered for the better.

If we bear in mind steadily that for the most part light acts as a stimulus to natural power of defence, we shall understand its limitations. The moribund patient cannot respond, and the patient with high temperature is in no state to answer further calls. Ill health of any kind due to a concealed septic focus cannot be permanently benefited. "Rheumatic" or "neuritic" pains caused by an abscess at the apex of a tooth are examples in point. When, however, we suspect a toxin, but cannot locate it, the use of light is justified in so far as it places the patient in the best possible condition to resist the hypothetical poison.

Finally, it should be noted that ultra-violet rays form but a small part of the total of wave-lengths in nature; and while their value is great, even if used alone, it is vastly enhanced by a combination with other radiations, notably x rays. Their addition is an essential factor in the cure of some skin troubles; and, on the other hand, x rays may be employed more freely in deep-seated cancer if ultra-violet rays are used to prevent injurious effects on the blood.

The actual carrying out of light treatment may well be delegated to competent lay operators, acting upon definite prescriptions. But the indiscriminate use—or, rather, abuse—by unqualified persons of ultra-violet rays as a cure-all is likely to bring discredit upon the treatment.

SPORADIC BACILLARY DYSENTERY IN ENGLAND.

BY

G. W. N. JOSEPH, M.D., D.P.H.,
MEDICAL OFFICER OF HEALTH FOR WARRINGTON;
AND

J. S. MANSON, M.D., D.P.H.,
MEDICAL OFFICER OF HEALTH FOR THE RURAL DISTRICT OF RUNCORN.

THE following brief account of two recent outbreaks of dysentery or pseudo-dysentery, chiefly affecting children, would seem worthy of record, especially in view of the pathological and bacteriological findings. The sudden and limited outbreak, confined in each case to one household, seemed to point to some kind of food poisoning, and it was with the view of ascertaining the character of the toxic agent that a complete pathological and bacteriological examination was made in the first outbreak described.

The first outbreak involved four children from one household in Warrington. The first child attacked, S. D., aged 1 year and 9 months, became ill on February 27th, 1926, with sickness and drowsiness; then severe diarrhoea set in. Three days afterwards (on March 2nd) A. D., aged 6 years, and G. D., aged 4 years, were taken ill with sickness and diarrhoea. All three were noted to be drowsy at the commencement of the illness. Dr. David Meikle, their medical attendant, stated: "All had symptoms of acute gastro-enteritis, vomiting, diarrhoea, green stools loaded with mucus, no blood or rise of temperature, rapid but regular pulse. The two elder children were semi-conscious, but the youngest was quite conscious. The eldest had had an epileptiform seizure in the night." R. B., aged 2 years and 9 months, was taken ill on March 4th with vomiting and diarrhoea. Drowsiness was not noted in this case.

All the children were removed to Whitecross Hospital, Warrington, on March 4th. S. D. died on March 8th, and R. B. on March 9th, and *post-mortem* examinations were ordered by the coroner. A. D. and G. D. survived.

Post-mortem Examinations.

S. D.—The body was that of a well nourished male child. *Post-mortem* lividity was well marked over the back and buttocks. Rigor mortis was present. The heart and lungs were normal; the left ventricle contained a large amount of dark fluid blood, and there was a large dark clot in the right auricle. The liver, spleen, kidneys, and pancreas were normal. The stomach, which was practically empty, was removed between ligatures for further examination. About the middle of the small intestine signs of congestion appeared, and continued to its junction with the large intestine, which was very congested, showing haemorrhagic patches of inflammation studding the large intestine almost throughout its whole length.

R. B.—The body was that of a well nourished male child. The body was warm, and rigor mortis had not yet set in. *Post-mortem*

lividity was present in slight degree. The heart and lungs were normal. There was a small amount of dark fluid blood in the left ventricle, and a slight amount of *post-mortem* clot in the right ventricle and auricle. The stomach was removed between ligatures unopened for further investigation. The large intestine was also removed between ligatures. The lymph glands in the mesentery of the large intestine presented a remarkable appearance. There was a continuous row of enlarged lymph glands close to the intestine throughout the whole of its length. The other glands in the mesentery were also enlarged. The small intestines contained dark coloured faecal matter, and the ileum was much congested, and contained dark fluid blood. The liver, spleen, and kidneys seemed normal. The brain vessels were congested to a moderate degree with dark fluid blood, but were otherwise normal.

As food poisoning was suspected, the stomachs, intestines, and pieces of the kidneys, liver, and spleen were sent to the pathological laboratory of the Ministry of Health, packed in 30 per cent. glycerin. The pathologist's report, dated March 17th, 1926, was received from Dr. A. W. MacFadden. It was as follows:

"None of the specific food poisoning organisms or dysentery bacilli could be found in the tissues from the two cases. The circumstances point, I think, to an acute infection of the gastro-intestinal tract, and I should suspect an infection of *B. aertrycke*. It would be useful to test the serums of the surviving children against this organism and against the Morgan's bacillus, which I obtained from small intestine and liver of S. D."

Samples of blood from the surviving children were requested in order to test the serums for agglutinating properties. A blood sample from A. D. was sent, and the report was as follows:

"The blood serum from A. D. shows no trace of agglutinin for the *aertrycke* group of bacteria—that is, there is no evidence that the outbreak was one of 'food poisoning.' But the blood serum agglutinates the *B. dysenteriae* 'Y,' which indicates that the condition was almost certainly bacillary dysentery."

A good sample of blood could not be obtained from the other surviving child, G. D., but blister fluid resulting from emplastrum cantharidis was sent. This blister fluid gave no agglutination with *B. dysenteriae*. It may be that the absorption of cantharidin in the blister fluid affected any agglutinating properties that it possessed.

A careful investigation of the food eaten by the affected children was made by Chief Inspector Flood. Their meals consisted of toast and tea for breakfast, chip potatoes and cakes at midday, and eggs boiled and made into sandwiches for tea. The mother stated that the boy A. D. told her that the children were playing in the ash-bins on the morning of February 27th, and that S. D. was seen eating