of them was opened, but no maggot was found. Blood count: W.B.C. 20,800 (N. 30%, L. 24%, M. 2%, E. 44%). Erythrocyte sedimentation rate, 12 mm. in 1 hour. During the next five days the papules disappeared.

Feb. 13.—A reddish smooth swelling developed over the medial edge of the right scapula. The patient thought it was one of the papules that had migrated. Next day this swelling had disappeared, but one had come up in the right lumbar region, and the patient thought this also was a migration of the same swelling. *Feb. 15.*—No swellings present.

In the next three weeks, except for a spike to 101.2° on Feb. 16, the patient was afebrile and asymptomatic. Several swellings, similar to that of Feb. 6, developed, and three more specimens were obtained from the left buttock and the right lower leg—one excised and two forced out with ease by squeezing. The small central bleb noted on Feb. 6 was not again seen, but a few swellings showed the dark central spot observed on Feb. 8. Some of them were not touched, and it was noticed that the dark spot would spontaneously disappear in a few hours, though the surrounding swelling generally lasted for one or two days. *Feb. 24.*—Blood count: W.B.C. 20,000 (N. 24%, L. 17%, M. 2%, B. 1%, E. 56%).

No swellings or oedema developed after March 1. On March 7 the patient had a sore throat, which was reddened, and the right anterior cervical glands were swollen. There was no fever and the throat culture contained no pathogens. Symptoms subsided in a few days, and the patient was discharged on March 10. He has had no symptoms or signs since; he was last heard from on Feb. 22, 1945.

Commentary

Cattle are the usual hosts of *Hypoderma* flies, which are usually one of two species—*H. bovis* and *H. lineata*. Great economic loss results, on account of the damage caused to the hides by the emerging larvae. The flies are said (Hermes, 1939) to occur throughout the U.S.A., Europe, and Asia. So far as has been ascertained, the adult fly usually lays her eggs on the legs of the host, and this often terrifies the animal, which may plunge about in a frenzy, or rush into water, in an attempt to dislodge the fly. The egg hatches in about a week, and the larva penetrates the skin directly or via a hair follicle. This process, in those cases observed in man (and presumably in our case), is painless. Once inside the host the larva moves about, usually among the viscera, and especially between the muscular and mucous layers of the oesophagus. In autumn, winter, or spring it migrates through the muscular tissues of the back to lie under the skin, through which it bores a hole for respiration. It then moults, and during this time a local purulent reaction develops, causing the "warble," which finally bursts, to allow the larva to fall out and pupate on the ground. The warbles are sometimes treated locally by farmers with derris or phenol.

Cases of human infestation by the warble-fly *Hypoderma bovis* are very rare, and I have found only five in the literature (Hermes, 1939; Miller, 1910; Smart, 1939). A case involving the allied species, *H. lineata* (Style, 1924), was probably the first British case of infestation of man by a species of *Hypoderma* to be reported. In our case the boy's sore throat may have been caused by wanderings of the larvae in the oesophageal wall, especially as his pharyngeal flora showed no pathogens at the time. It is hard to be sure when the eggs were laid; the emergence of all the maggots during a period confined to about two months suggests that he was infested only once, or, at any rate, during one season only. This most probably was during the summer of 1943, perhaps while he was asleep on Epsom Downs. The manifestations seem to have been due partly to an allergic response (causing oedema and eosinophilia) and partly to the bodies of the larvae themselves. As the case stands it is impossible with certainty to say whether the larvae migrated in the patient or whether they emerged where oviposition occurred, as has been noted in infestation by other species (Hermes, 1939, p. 354); though in view of their widespread distribution over the body, the sensation of "creeping," and the apparent surfacing and sinking of the larvae in the swellings, it seems likely that migration did take place.

I wish to make acknowledgment to the late Sir Thomas Lewis and Prof. P. A. Buxton for their help in preparing this report.

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ABACTERIAL PYURIA

BY

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There exists a condition, provisionally called by the unsatisfactory name of "abacterial pyuria," which is quite well known to urologists, but which is not sufficiently known to medical men as a whole. Of the 15 or so cases which have come under my care in the last six years, one was that of a doctor in full practice who was troubled for months with the condition until the diagnosis was made; another that of a young man who was invalided out of the Army, diagnosed interstitial cystitis; a third was a soldier sent home from the Western Front. It is because of such cases that the following account of the condition is given.

The patient, an adult male, begins to suffer from very frequent and uncomfortable or painful micturition. There may be some associated urethritis sufficient to stain the linen. The urethritis is not constant, and does not precede by much, if at all, the bladder symptoms, which are often the main and only complaint. Fever has not been recognized. At this point the man, if he has a urethral discharge, will be examined for gonorrhoea. The negative bacterial report will probably result in his being given a pot. cit. mixture and a pat on the shoulder—but his frequency will continue. The two-glass test shows an equal amount of pus in the second glass. Heavy treatment with sulphonamides brings no result. The urine is examined bacteriologically, but fails to show organisms in a specimen full of leucocytes. At this point tuberculosis of the urinary tract is suspected because of "pus in a sterile urine." Intravenous urograms show a normal upper urinary tract. Cystoscopy reveals a bladder too irritable for really good examination, but shows a complete cystitis and an angry red mucosa with no portion of the bladder wall uninvolved. A guinea-pig inoculation test for the tubercle bacillus is of course negative.

The above clinical picture warrants a provisional diagnosis of the disease. It is remarkable, and fortunate, that a specific and apparently infallible remedy is to hand. 0.3 g. of neoarsphenamine, given once a week, will improve the condition after two and will apparently cure it after three injections. I do not think I have seen a relapse yet, nor have I observed any systemic complications.

When one has surmounted a natural disinclination to accept a new disease, one begins to recognize peculiarities which make diagnosis easier. A purulent urethritis of non-gonococcal causation is itself rather unusual. When it is associated with marked frequency and a cloudy second glass of urine the disease must be definitely considered. When no organisms, or only a few colonies of an obvious contaminant, are reported in this urine full of leucocytes, there is a strong probability of the condition being present, for tuberculosis of the urinary tract is associated with urethritis with extreme rarity. Moreover, it is not so sudden in its onset, and the urine is as a rule only moderately cloudy. The completely red bladder is not at all like that of tuberculosis, in which there are practically always some areas of bladder almost normal in appearance.

Discussion

Moore (1943) has dealt with the pathology of the condition and with the various views as to its aetiology. My own preference is for the theory that it is caused by a virus—after all, the commonest cause of mucous surface infection in the body. Probably the pathogenic agent will remain unproved until Koch's postulates can be established by human experiment.

There has been recognized of recent years, and especially since the war, a subacute or chronic epididymitis often with little or no evidence of urinary infection. I do not think this can be related to abacterial pyuria, a striking feature of which is the failure of the urinary infection to respond to most forms of treatment.

I have not met with the condition in the female. It is reasonable to ask the question: Is there a vaginitis or cervicitis of similar causation and likely to respond to intravenous neoarsphenamine?

If the cause of abacterial pyuria is a virus, response to organic arsenic is worthy of attention. If one may be permitted to speculate a little—Domagk found protosol to cure certain

streptococcal infections. Subsequent experimental work produced sulphonamides with effect on other organisms. It would seem worth while re-examining some of Ehrlich's 606 original arsenicals and others, and trying some of them on smallpox, typhus, yellow fever, influenza, etc.,

Abstract of Some Typical Case Histories

D. B. G., aged 40.—First seen May 8, 1941, complaining of five months' painful frequency; some discomfort in the left loin. The urine was cloudy, and contained leucocytes and red blood cells; no organisms; guinea-pig inoculation negative for tubercle. Radiograph—no abnormal shadows; intravenous pyelograms normal. Cystoscopy revealed an intolerant bladder. Indigo carmine came equally and well from the ureters. Three injections each of 0.3 g. N.A.B. were given. On Aug. 15 the urine was clear; a cell was present in only three or four low-power fields.

D. A., aged 49.—First seen April, 1939, complaining of five weeks of frequency and scalding, with the passage of blood. The urine was cloudy; it contained a faint haze of albumin, and microscopically showed degenerate leucocytes. Cystoscopy revealed cystitis; indigo carmine came equally and well. The ureters were catheterized, specimens showing no excess of white blood cells. The laboratory report on the urine was: leucocytes; no organisms. Guinea-pig inoculation was negative for the tubercle bacillus. After the usual three injections of N.A.B. the patient improved, and in June his urine contained a doubtful thread. There was an occasional cell in the first glass; the second glass was clear.

Medical Practitioner, aged 52.—First seen March, 1942, complaining of a urethral discharge, with urgency and frequency of three months' duration. A film had been examined for gonococci, with negative results. Intensive sulphonamide treatment had been given without benefit. The urine (glasses 1 and 2) was cloudy. It contained no organisms in the film. No gonococci were obtained after culture with CO₂ enrichment. The gonococcal fixation test was negative. The usual three injections of N.A.B. were given, and the patient wrote on April 15 to say that he had no urinary symptoms; his urine was clear, and contained no albumin.

T. B., aged 51.—First seen on Nov. 22, 1944, complaining of frequency, every 20 minutes by day and five or six times by night, with some terminal haematuria, of two weeks' duration. The urine was cloudy, contained albumin, and microscopically leucocytes and red blood cells. Cystoscopy revealed a haemorrhagic cystitis. Blue came equally and well from the kidneys. The laboratory reported leucocytes but no organisms. After three injections of N.A.B. he lost his discomfort, and on Jan. 26, 1945, his urine, which was clear, contained a very faint haze of albumin and no leucocytes on microscopical examination.

A. D., aged 35.—First seen Oct. 27, 1944, complaining of frequency and haematuria of sudden onset two weeks before, with pain. The urine contained leucocytes. On cystoscopy the bladder was intolerant and intensely congested. The laboratory reported on the urine on Nov. 2: leucocytes, and on microscopical examination a few Gram-negative bacilli. On Dec. 15 the report on the urine was: leucocytes; no organisms. After three injections of N.A.B. the patient's symptoms were cured, and on Jan. 26, 1945, his urine contained no albumin, and nothing abnormal was seen on microscopical examination.

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At a summer school in social biology which the British Social Hygiene Council is to hold in the Hugh Stewart Hall of University College, Nottingham, from July 28 to Aug. 11, interest will be directed chiefly to problems of education and social life likely to arise through the coming increase in the school-leaving age. The director of the school is Prof. Winifred Cullis, D.Sc. The course is open to all types of teachers, social workers, and members of the general public interested in education and social problems from a biological aspect. The morning lecture programme has been planned to illustrate the aims and content of social biology. Courses of lectures will be given on the place of biology in education, the biological approach to personality, the social aspects of health, the contribution of natural history to social biology, and food production and nutrition. Dr. Mary Collis and Dr. A. C. Tibbits will give an account of the successful scheme of sex-education which they have helped to set going in schools in Nottinghamshire, and this will be followed by a discussion of the technique of sex-instruction in school. At the evening sessions lectures will be given by visiting speakers on the broader application of biological knowledge to human life and culture. A programme of excursions and visits to places of scientific and general interest has been arranged. The inclusive fee for the course is £12 12s. (enrolment fee £1 1s.) and early application should be made to the secretary, British Social Hygiene Council, Tavistock House North, Tavistock Square, London, W.C.1.

NOTES ON ADDER-BITE (ENGLAND AND WALES)

BY

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The following notes are based upon accounts of 50 cases, some of them already recorded, the remainder kindly sent me by doctors in many parts of England and Wales in response to a query published in the *Journal* (July 25, 1942, p. 118). Others have been obtained from patients themselves. The aim of the inquiry was to provide an answer to the question, "How serious is adder-bite?"—a question of some interest in view of our complete lack of a specific *V. berus* antivenene, or indeed, since 1940, of supplies of European viper antivenene of any kind.

The adder (*Vipera berus*) is our only poisonous snake. It is common in many parts of the country, though seldom seen owing to its shyness. It hibernates during the colder months, and is seldom in evidence even in summer, unless the day be warm and sunny. It is commonly believed to be most venomous in spring, but in the present series severe bites occurred throughout the season March to October. The diagram shows the month of occurrence of the dated cases; each lightly shaded square represents a case; the darker squares represent the five fatal cases. It is plain that high summer is the season of maximum danger from adder-bite.

Graph showing seasonal incidence of adder-bites in present series.

Situation of Bites.—The bites were all situated distally on the extremities, three-quarters of them being on the hand, the remainder on foot, ankle, or calf, and one on the brow. The most usual sites were a finger (especially the index) or thumb. There was no apparent connexion between the position of the bite and the course and severity of the reaction, except that in the case of the man bitten on the brow collapse was early and complete and unconsciousness of long duration.

Clinical Features

The effects of the bite are general and local. The general reaction, which takes the form of shock or collapse, varies greatly in degree in different cases, whereas the local reaction is more constant, the bitten limb in nearly every case showing massive oedema up to the trunk and haemorrhagic discoloration, usually most pronounced in the neighbourhood of the main lymphatic trunks. The oedema as a rule spreads up the limb to the axilla or groin within six hours, but continues to progress in intensity generally for two days or so, and in severe cases to advance to some extent over the trunk or head.

The general reaction varies between the very slightest malaise on the one hand and profound collapse on the other. About half of the cases were severe enough to occasion real anxiety for the patient's life. In most cases the critical period was of brief duration, the patient being out of danger within 12 hours, but some remained critically ill for several days. Within 20 minutes of the bite the patient begins to feel faint and giddy, or experiences a sensation of constriction of the head; young children begin to be drowsy, and soon become semiconscious. Nausea occurs, and vomiting is usually a prominent feature and may last for days; there may be haematemesis. Colicky pains may occur, and diarrhoea is present in a quarter of the cases. Swelling of lips, face, and tongue is common, or there may be tightness of the throat, severe thirst, difficulty in breathing, or pain attributed to the heart. With the above symptoms collapse sets in. The patient is pale and cyanosed, cold, sweating, and semiconscious or unconscious. The pulse is rapid and thready, often almost or quite impalpable. The pupils may be widely dilated.

Fear may, as is often claimed, play a part in the causation of the early "shock," but it may be completely absent, as in the case of patients who are unaware they have been bitten and have not seen their assailant. As regards the prolongation