A lowering of the energy expenditure under quinine thus occurred in only a very small proportion of cases, and even in these the effects did not last for quite three hours. To economize materially the energy expenditure would thus involve the repetition of the full pharmacopoeial doses (0.6 gram quinine hydrochloride for the adult) at intervals of about three hours. Even this heroic treatment might well fail to maintain the effect, and the other symptoms from such doses would certainly be undesirable; it is thus not practicable to attain any considerable saving of energy through quinine in a prolonged febrile illness. I have not laid any stress upon the extent of temperature reduction, for it is not so important in itself, and it is well recognized that quinine is not as good an antipyretic in non-malarial as in malarial fevers.

We have already a large mass of evidence to disprove the location of its action in the tissues. It has, according to Feri,¹⁶ no effect, preventive or curative, upon the fever caused by tetrahydro-beta-naphthylamine, which acts centrally. Senta¹⁷ found that while it is capable of reducing the oxygen used by muscular tissue *in vitro*, the concentration required to effect this (1 in 5,000 or higher) is much higher than that attained by a therapeutic dose. Lastly, and most important of all, Barbour and Wing¹⁸ have shown that direct application of quinine to the heat centres causes a certain amount of antipyresis.

CONCLUSIONS.

1. Quinine does not differ in its mode of action from other antipyretic drugs.
2. It has no action on the protein metabolism in health.
3. It does not reduce the gaseous exchange and heat production except in a small proportion of fever cases, and even in these the action lasts for less than three hours with the maximum pharmacopoeial doses.
4. It is not possible in non-malarial fevers to attain a saving of energy and tissue destruction through quinine.

This work was rendered possible only through the kind help of many in the laboratories and clinics. I must content myself here with expressing my deep obligation to them all.

REFERENCES.

- ¹ Ranke: *Ausscheidung der Harnsaure beim Menschen*, Munich, 1858.
² Kumagawa: *Virch. Arch.*, 113, 188-192, 1888. ³ Venediger: *Inaug. Dissert.*, Halle, 1893. ⁴ v. Noorden u. Zuntz: *Du Bois Arch.*, 1894, 203-209. ⁵ Deucker: *Zeit. f. klin. Med.*, 57, 429-465, 1905. ⁶ Hirsch: *Zeit. f. exp. Path. u. Therap.*, 13, 84-131, 1913. ⁷ Schroeder: *Arch. f. exp. Path. u. Pharm.*, 72, 361-373, 1913. ⁸ Lenhart: *Journ. of Exp. Med.*, 23, 739-746, 1915. ⁹ Jürgensen: *Deut. Arch. f. klin. Med.*, 4, 374-375, 1868.
¹⁰ Barbour: *Canadian Med. Assoc. Journ.*, June, 1923, 420-422. ¹¹ Gottlieb: *Arch. f. exp. Path. u. Pharm.*, 28, 167-185, 1891. ¹² Stuhlinger: *Arch. f. exp. Path. u. Pharm.*, 43, 166-192, 1899. ¹³ Buss: *Wesen und Behandlung des Fiebers*, Stuttgart, 1878, 74-75. ¹⁴ Müller: *Inaug. Dissert.*, Erlangen, 1891. ¹⁵ Liepelt: *Arch. f. exp. Path. u. Pharm.*, 43, 161-165, 1899. ¹⁶ Feri: *Arch. internat. de Pharmacodynam.*, 21, 27-40, 1911. ¹⁷ Senta: *Arch. internat. de Pharmacodynam.*, 18, 217-235, 1908. ¹⁸ Barbour and Wing: *Journ. Pharm. and Exper. Therap.*, 5, 105-147, 1913-14.

TUBERCULOMA OF THE PITUITARY BODY.

BY

T. W. LETCHWORTH, M.B., B.Ch.,
F.R.C.S.,

SURGEON, ROYAL EYE HOSPITAL; OPHTHALMIC SURGEON, HAMPSTEAD
GENERAL AND NORTH-WEST LONDON HOSPITAL.

THE following case is remarkable, not only because the condition is uncommon, but because, in spite of the mass surrounding the chiasma, the sight of the right eye was unaffected.

A youth, aged 16, was referred to me by Dr. Goffe of Kingston. I saw him on March 11th, 1924. He complained that during the last month he had had pain in the head, chiefly over the left brow, sufficiently severe to prevent sleep, and of loss of sight of the left eye, which had come on gradually.

Vision: Right eye, 6/6, fields full; left eye, no perception of light. The right pupil reacted to light and accommodation. The left pupil reacted to accommodation with consensual reaction to light only. The fundi and media and all ocular movements were normal. The left upper lid was a little fuller than the right, with a slight tendency to droop, and there was a suggestion of proptosis in this eye, but not more than might be due to facial asymmetry.

He was admitted to the Hampstead General Hospital for further investigation. The Wassermann reaction was negative and the skiagram showed a normal sella turcica.

On March 27th Mr. Whale examined his nose, and found that a left-sided deviation of the septum precluded examination of deeper parts. The temperature, normal on admission, rose this day to 103°. A swab from the nose gave staphylococci, pneumobacilli, and a few streptococci. Leucocyte count 12,000 per c.mm.

On March 29th Mr. Whale removed the left middle turbinal and punctured the sphenoidal sinus. No pus escaped. The left antrum was also washed out, with negative result. Fluid obtained by lumbar puncture was blood-stained; the cell count was 103 per c.mm., mostly leucocytes. Cultures were sterile. No tubercle bacilli were found.

On April 2nd lumbar puncture was again performed. The fluid contained more cells, mostly small lymphocytes, than could be accounted for by the blood present. On April 4th the patient passed 102 oz. of urine. Temperature still 103°.

During his stay in hospital he had not complained of much headache. Nothing abnormal was found on physical examination. The nervous system was normal. Drs. Sutherland, Scott Pinchin, and Parkes Weber and Mr. Waugh examined him, but could find no physical signs except the loss of vision of the left eye. On April 6th the pain in the head was worse, so that morphine had to be given. He complained of singing in the ears. The left eye was slightly more prominent. He passed 230 oz. of urine.

On April 8th there was deviation of the head and eyes to the right. Extensor plantar reflex on left. The patient was irritable and would not always answer questions.

On April 10th he was only roused with difficulty. Mr. Waugh explored the left frontal lobe but found nothing. The patient died shortly afterwards.

The *post-mortem* examination was made by Dr. Perkins: the only abnormality found was within the cranium. There was a mass surrounding the pituitary body, the optic chiasma, and adjoining portions of both nerves and tracts, which extended right into the left orbit through the optic foramen accompanying the optic nerve. The mass on section proved to be tuberculous. The brain substance was not involved nor were tubercles found elsewhere.

I have to thank Dr. Levi, the house-surgeon, for his assistance with these notes.

The optic nerve appeared to be especially compressed in the foramen. The only localizing symptoms were the loss of sight and the extreme polyuria.

THE TEMPERATURE AND SATURATION OF EXHALED AIR IN RELATION TO CATARRHAL INFECTIONS.

BY

PAUL TOZER, M.B.,

ASSISTANT MEDICAL OFFICER, PEPPARD COMMON SANATORIUM.

With the co-operation of
LEONARD HILL, M.B., F.R.S.,
NATIONAL INSTITUTE OF MEDICAL RESEARCH.

INTRODUCTION.

OBSERVATIONS of various physiologists go to show that, whatever be the temperature of the atmosphere, the expired air issues at a temperature of about 35° C.—that is, closely approximating to body temperature—and almost saturated with moisture at this temperature, the wet bulb temperature of the expired air being in fact about 25° C.¹

The following research was carried out in order to see how closely these figures hold good over wide variations of atmospheric temperature. The matter is one of importance because, as pointed out by Leonard Hill,² the breathing of cool outside air entails a greater blood flow through the respiratory membrane, and a greater evaporation of fluid from it. The greater passage of blood and lymph through the membrane and secretion from it keeps up the health of the membrane and its defence against catarrhal infections. On this depends in part the beneficial effect of open-air treatment, open-air exercise, and sleeping in rooms with open windows or on verandas. Comparing a day and night

spent in cool open air, with abundant exercise, with one spent in the humid moist atmosphere of a cotton mill and shut-up tenement dwelling, Hill calculates in the first case a several times greater flow of blood through, and evaporation of water from, the respiratory membrane, and insists on the importance of the cleansing effect of this flow.

METHOD.

After resting in a semi-recumbent position for at least half an hour, the axillary, cheek, and exhaled air temperatures were taken, together with wet and dry katha-thermometer readings and wet and dry bulb readings of the atmosphere, and the temperature of black fur placed horizontally to indicate radiant heat of sky and sun absorbed by the clothes.

Several experiments were made to determine a suitable form of apparatus for taking the temperature of the ex-

haled air. That finally chosen consists of two glass tubes, each 9 in. long, one of 1/2 in. and the other 3/4 in. bore, the smaller being inside the latter and separated from it by a small air space. The tubes were fastened in position by a wire passing through the inner tube, the two ends of which were twisted together outside so as to keep the inner tube pressed against two small pieces of rubber which were placed in position so as to separate it from the outer tube. Inside the inner tube was inserted a clinical thermometer fastened on a lath of wood, the bulb being 1 in. from the proximal end of the tube. At the farther end of the outer tube was attached a flap-valve, preventing inspiration through the tubes. A small cambric jacket was provided for the bulb of the thermometer, which could be moistened so that "wet" readings could be taken when required. The proximal end of the outer glass tube was held between the lips and inspiration made through the nose and expiration through the mouth and tubes. To secure still better insulation from atmospheric conditions the distal part of the outer glass tube was enclosed in a cardboard tube.

The above precautions to shield the thermometer were found necessary to avoid variation caused by sun and wind out of doors, or the very hot air in the drying room of a laundry which was investigated. The whole apparatus could readily be taken to pieces for cleaning. Readings were also taken while holding the bulb of the thermometer in, but so as not to touch the walls of, the mouth, and with the lips open wide enough to allow expiration.

All the experiments were carried out on Paul Tozer, and, except where it was cold enough to cause shivering, the clothes worn consisted of a shirt, cotton vest, a pair of shorts, and a straw hat to shield the face. Wet and dry katha and wet and dry bulb readings, and cheek temperatures were usually taken every ten or fifteen minutes during the period of recumbency, the final readings put down being an average of these.

The temperature of the exhaled air was taken at the end of each period of observation, first with dry bulb, secondly with wet bulb, and thirdly with the thermometer taken out of the apparatus and held in the mouth. Constant readings were obtained after one minute, but this limit was always exceeded.

RESULTS.

A number of experiments were made to determine the effect of shallow and deep respiration, and of holding the

breath for half a minute before expiration, and as to the effect of exercise. The following is typical of the results obtained.

Table showing results obtained after a brisk walk from 7 to 7.30 a. m. on April 10th, 1924; subsequent recumbent position. (Dry bulb = 5° C.; wet bulb = 3.9° C. in the room.)

	Immediately after.	Half an hour later.		Inspired Air held 1/2 min. before Expiration.
		Shallow.	Deep.	
Frequency of respiration	15	13	5.6	1
Expired air—				
Dry	35.0° C.	35.3° C.	35.3° C.	35.5° C.
Wet	...	34.6° C.	34.9° C.	35.4° C.
Mouth	35.8° C.	36.4° C.	36.3° C.	36.3° C.
Rectum	37.7° C.	36.6° C.	36.6° C.	36.5° C.

The difference between the exercise and resting rectal temperatures is an index of the amount the metabolism is raised by exercise. The mouth temperature is lowered by exercise through the cooling effect of the atmosphere and inspired air.

GRAPH I.

Mouth and rectal temperatures in the recumbent resting position indoors approximated within 0.5° C. Thus:

Mouth	36.2	36.0	36.0	36.8	36.3	...	Mean.
Rectum	36.8	36.8	36.5	36.9	36.5	...	36.3° C.
							36.7° C.

Saturation of the expired air is more nearly approached the deeper the breathing and the longer the breath is held.

GRAPH II.

Graph I shows how constant is the temperature of the exhaled air under all conditions. On the whole the only factor which has any decided influence on it is the body temperature. The wet bulb exhaled air temperature is lower than the dry bulb temperature, and the readings taken in the mouth more variable and generally lower than those taken in the apparatus. In the mouth with open lips the thermometer is influenced by wind, which does not affect a cooling of the bulb in the insulated tube.

Graph II shows that high wind velocities, as shown by high dry kata readings, cause a slight lowering of exhaled air temperature, especially when associated with a low dry bulb reading. Low temperatures not associated with wind do not produce a significant fall.

Neither high black fur readings—for example, at 55° C., 60° C., 56.9° C., 44.7° C.—nor even a dry bulb reading of 49.7° C. (in the drying room of a laundry) have any significant effect on the exhaled air temperature. The last reading shows how warm air when inhaled is cooled down and exhaled at approximately body temperature. The inhaling of dry hot air must therefore enhance the flow of blood and evaporation of water from the respiratory membrane, just as does the inhalation of cool air. Inhalation of warm moist air lessens both, and thus lowers the resistance of the membrane to catarrhal infections.

REFERENCES.

¹ W. A. Osborne, *Journ. of Physiol., Proc. Physiol. Soc.*, October 18th, 1913. ² The Science of Ventilation and Open Air Treatment—I. Special Report Series, No. 32, 150, 1919: Medical Research Council. *Sunshine and Open Air*, p. 38: Arnold, London, 1924.

Memoranda :

MEDICAL, SURGICAL, OBSTETRICAL.

MYOCLONIC ENCEPHALITIS TREATED BY PATIENT'S SPINAL FLUID.

DR. ABRAHAMSON reports a most interesting case of encephalitis lethargica of the myoclonic type at a meeting of the Royal Academy of Medicine in Ireland (*BRITISH MEDICAL JOURNAL*, June 7th, p. 1003). I met with a case of a similar nature about six weeks ago. The patient, a woman aged 40, had myoclonic spasms of the abdominal muscles, about seventy to the minute, as described by Dr. Abrahamson. It is a most pitiable and distressing sight to see patients in such a state: they can neither rest nor sleep, and rapidly become exhausted and delirious. Morphine certainly relieves the pain associated with it, but the spasms still prevent rest and sleep. In the case here recorded lumbar puncture was performed every day without relief, until finally she had to be anaesthetized to procure any rest at all. When the spinal fluid was withdrawn on the fifth day 10 c.cm. of it were injected intravenously; this was followed by improvement for about twelve hours, but the patient again relapsed. Twenty-four hours later this was repeated with very gratifying results. The spasms and pain disappeared; they have not recurred since and the patient has made a good recovery.

This line of treatment is advocated by Piticiariu of Rumania (*Medical Annual*, 1924, p. 157), who records similar cases.

I am indebted to Dr. Hebblethwaite for his permission to carry out this procedure and report the case.

R. WOOD POWER, M.B., F.R.C.S.I.

General Hospital, Cheltenham.

RECURRENT INTUSSUSCEPTION.

THE following case is perhaps of sufficient interest to merit publication.

A male child, aged 3 months 27 days, was admitted to the Deaconess Hospital, Edinburgh, on May 31st, 1923, with a history and signs and symptoms of acute intussusception.

First Operation.

The patient was operated upon shortly after admission by Mr. W. J. Stuart. An ileo-caecal intussusception was found, the invaginated bowel extending to midway between the hepatic and splenic flexures. The condition was rectified and the abdominal wound closed.

After the initial shock of the operation had passed, the child was spoon-fed with mother's milk diluted with water. Rectal salines were also given. On the morning of June 1st the patient seemed a little better, the pulse 150, respirations 40, temperature 99°. Feeds were taken well, but the child vomited a little. At 9 p.m. a little dark blood and flatus were passed; pulse 158, respirations 36, temperature 99.4°.

At 5 a.m. on June 2nd the patient took a breast-feed well. During the morning the bowels were open three times. Dark brown faeces and a little mucus were passed; the child seemed

rather better than on the previous day. In the afternoon the bowels were again open with a normal result.

At 12.15 a.m. on June 3rd the patient became somewhat collapsed. The foot of the bed was raised and rectal salines were continued during the early morning. During the morning the bowels were open several times with only some mucus evacuated. At 8 a.m. the appearance of the patient was improved; pulse 160, respirations 38, temperature 98.4°. During the forenoon all feeds were vomited. In the afternoon, however, a feed was retained, and the child slept from 5 to 8 p.m., when another feed was given, which was vomited immediately afterwards. The patient seemed in great pain, screaming aloud, and being almost convulsed; pulse 130, respirations 40, temperature 100.4°. At 9 p.m. the abdomen was tense and distended, the child screaming on palpation. Mr. Stuart saw the case immediately afterwards, the patient having now become somewhat collapsed; pulse 200, respirations 34, temperature 103°.

Second Operation.

Immediate operation was considered necessary. On opening the abdomen an enteric intussusception was found about the lower end of the jejunum. The bowel was invaginated to the extent of about seven inches. This intussusception was reduced fairly easily. The bowel was slightly congested and movement passed on well after reduction.

After the shock of this second operation had passed the patient made fairly good progress. His breathing, however, became laboured on June 7th, and bronchopneumonia set in. The condition of the patient unfortunately gradually became worse, and he died on June 21st.

I wish to express my indebtedness to Mr. Stuart for permission to publish this report.

J. H. CLARKE, M.D.,

Late Resident Medical Officer, Deaconess
Hospital, Edinburgh.

X RAYS IN LUPUS OF THE NASAL MUCOUS MEMBRANE.

IN your issue of March 8th, 1924 (p. 423), Dr. Harrison describes the successful treatment by diathermy of a patient suffering from lupus of the soft palate and fauces. Such, of course, involves a certain amount of destruction of the surrounding healthy, or at least unaffected, tissues as well as the patches of lupus. That better results are obtainable by x-ray treatment, which must of course be sufficiently penetrating to reach the lesions affected, is illustrated by the following:

V. E., aged 15 (in 1922), had been treated for lupus at an out-patient department of a large hospital in 1919. The Wassermann reaction was negative on two occasions. As the condition was progressing she was transferred to the Austin Hospital for Incurables. When I first saw her in 1922 she had considerable deformity of the cartilages of the nose resulting from lupus, also numerous small ulcers of the mucous membrane of the palate, extending almost as far as the uvula, causing much distress, especially during mastication, etc.

Only one exposure of deep x rays (voltage 200,000) was given—namely, on September 14th, 1922—with the mouth closed. Improvement was very rapid, so that nothing remained of the ulceration except some scarring. Owing to pyorrhoea, all her teeth have since been extracted, and she has been wearing a full set of artificial teeth without any discomfort. Since her discharge she has been regularly employed for the past twelve months, has gained at least a stone in weight, and has not had a day's illness.

Melbourne, Victoria.

H. FLECKER, F.R.C.S.

TREATMENT OF ANGINA PECTORIS.

Two days before I read Professor Wenckebach's lecture (*BRITISH MEDICAL JOURNAL*, May 10th, p. 809) a patient of mine died from a form of angina pectoris that was new to me.

He was a farmer, aged 71, who for some years had been treated for arterio-sclerosis. Occasionally he suffered from slight attacks of syncope, but he never had marked precordial pain. On the morning of the day he died I was called to see him as he was feeling out of sorts. Beyond the usual signs of his complaint I could find nothing abnormal. I told him to stay in bed for a few days and carry out the usual treatment. The same evening I had an urgent summons to go and see him. Apparently he had been seized with an agonizing pain over the heart on trying to get out of bed. I found him completely pulseless, and only a few faint sounds could be heard over the heart, the auricle apparently being in a state of fibrillation. The pain was obviously still intense. I immediately gave him injections of digitalin, camphor, ether, and olive oil, and inhalations of amyl nitrite, wrapped him in a heated blanket, and cupped the precordial region. He revived slightly for a few minutes, but after about a quarter of an hour he was seized with an intense exacerbation of the pain and became completely