January 2nd, 1889, that is to say, on the thirty-eighth day after the first abscess was opened, the patient returned to his home in Lincolnshire, a distance of 120 miles, without a single bad symptom."

In a letter from Mr. Heaven dated May 12th, he says: "G. is gaining flesh and strength rapidly, and going about as usual. There is no pain or tenderness about the liver, except a little on pressure over the seat of the abscesses."

Not only do I consider the rapidity of the recovery in this case remarkable, but that any recovery should have taken place at all, in such a weakly constitutional strumous patient, seems to me surprising; all the more so when I mention that so great is the tendency to suppurations in the lad that Mr. Heaven says, in a letter dated August 1st, that he had a few days before drawn "off a large saucerful of thick pus" from his left side—the exact seat of the suppuration not being specified.

When all the foregoing facts are taken into consideration, I scarcely think that anyone who has had much experience in treating abscesses of the liver can fail to be struck with the satisfactory results in the above-cited cases, as two more unfavourable ones for any line of treatment whatever it would be difficult to find. It is, indeed, on this very account they were selected to illustrate the advantage of treating liver suppurations in the manner I have described, and which may be briefly summed up in the three following sentences: First, by the employment of boracic acid we have not only the assistance of a thoroughly safe antiseptic agent, but the great advantage which accrues from the use of one free from the objection of coagulating the albuminoids in the pus, and thereby inducing a fouling of the instruments, such as is unfortunately the case with carbolic acid and most other antiseptic preparations. Secondly, the daily washing out of the abscess with boracic acid solution not only expedites the healing process by keeping it clean, but has the further advantage of rendering it quite unnecessary to take any precautions against the intrusion of air into the cavity, no matter how large it is. Thirdly, the washing out of the abscess with boracic solution, from its enabling us to get rid of all the purulent matter, thick as well as thin, does entirely away with the necessity of making a large opening either in the abdominal walls or liver tissues with a knife or other instrument—a point of no mean moment, seeing that it is a well recognised axiom that the smaller the breach of continuity in any animal tissue, no matter whether it has been made accidentally or intentionally (other things being equal), proportionally quicker is the healing process.

Dr. GEORGE HARLEY, in reply to the question of the danger from hæmorrhages arising after exploring the liver, said that no doubt there did exist danger, but only when the explorations were improperly performed; for, as he had explained at the meeting at Brighton when Professor Boyes Smith related his case of hæmorrhage into the abdominal cavity after exploring the liver for abscess, the danger only arose when the instrument was thrust into the liver at a point of the organ where pressure could not be applied by bandaging the abdominal walls sufficiently tightly to make them close up the opening of the puncture into the liver. He need not repeat his remarks on the subject, as the whole matter had been fully gone into in a paper published in the JOURNAL² in reply to Dr. Boyes Smith's criticisms upon his paper on Hepatic Phlebotomy read at the Brighton meeting.

THROMBOSIS OF VERTEBRAL ARTERY PRESS- ING ON GLOSSO-PHARYNGEAL NERVE: UNILATERAL LOSS OF TASTE AT BACK OF TONGUE.

Read in the Section of Pathology and Physiology at the Annual Meeting of the British Medical Association, held in Leeds, August, 1889.

By FRANK M. POPE, M.B., M.R.C.P.,
Physician to Leicester Infirmary.

THE question whether the glosso-pharyngeal nerve is a nerve of taste is still *sub judice*. Dr. Gowers, in the last edition of *Diseases of the Brain*, p. 209, says: "There is no recorded case in which the roots of the glosso-pharyngeal nerve have been diseased, and

indeed, no case in which there were symptoms of disease limited to the nerve roots of the medulla, and in which there was any loss of taste." The present case seems to me to belong certainly to the more general and probably to the latter of these two categories.

S. K., aged 76, a labourer, who had always enjoyed good health, felt weak on May 17th, 1889. He fell down on getting out of bed on May 18th, but did not lose consciousness; after this he was unable to swallow anything or to stand. There was no affection of speech, no pain in throat, no urinary trouble. He was admitted to the Leicester Infirmary on May 21st. He walked with much difficulty when supported by two persons. He was a large heavy man. The power of the left arm, hand, and leg was much diminished but not abolished. He was quite unable to swallow either liquids or solids. The house-physician considered that there was slightly less expression on the left side of his face than on the right, and that the right side moved more when speaking. This I could not see; at all events, there was far from extensive or general facial paralysis. The left pupil was much smaller than the right, and insensible to light. An œsophageal bougie or tube passed readily into the stomach.

On the next day, after he had been fed by the stomach tube, it was noticed that in addition to the expectoration of a very large quantity of frothy mucus, he regurgitated the greater part of the food that had been given him, also that the left side of the soft palate was higher than the right. The tongue was protruded in a straight line. Suspecting interference with the glosso-pharyngeal nerve I investigated the condition of his sense of taste. Two substances were employed: (1) a weak solution of acetic acid and (2) simple syrup. The tongue was thoroughly dried, and a drop of each solution in turn placed on it with a glass pipette at four different points—namely, at back and front of each side of the tongue, about half to three-quarters of an inch from the median line. Precautions were, of course, taken to thoroughly free the mucous membrane from one solution before applying the other. On the right side he tasted them well, and distinguished for himself between what he called the "sharp" and sweet tastes. He was told to signal with his hand the instant he commenced to taste, and his latent or conductive period was, as far as I could judge, rather short. On testing the left side neither solution could be tasted at the back of the tongue; the acid was tasted at the tip of that side, the sweet solution not being perceived in the latter situation.

From the great contraction of the pupil as well as the other symptoms described, it was thought probable there was a small hæmorrhage into the pons Varolii.

On May 27th, though other symptoms were unchanged, he was weaker, and complained of pain on the left side of the head and face, but said that it was numb to the touch. He could feel the prick of a pin well in the area complained of, but not stroking with a blunt instrument. After this he got rapidly weaker, and died on May 29th.

At the necropsy the left vertebral artery was found distended to about a quarter of an inch in diameter, and occupied by a firm clot for its whole course inside the theca vertebralis to its junction with its fellow of the opposite side. The enlargement was fusiform and regular; there was no sacculation. The brain was carefully examined and appeared normal. There was no valvular disease of the heart. All the other organs were healthy.

Here we have, I think, as clear evidence of the taste function of the glosso-pharyngeal nerve as could have been afforded by a precise laboratory experiment. The dilated artery pressed directly on the roots of the nerve, paralysis of which was shown by the loss of power of swallowing and the raising of the palate on the left side, due to the unopposed action of the levator palati. This is, of course, assuming that the glosso-pharyngeal is really the motor nerve of the palato-glossus and superior constrictor of the pharynx. The only other nerve involved was the pneumogastric, which cannot be supposed to have any influence on taste. The fifth was quite out of the region of pressure, as was the facial. The myosis and weakness of arm and leg on the same side as the tumour were doubtless due to deficient blood supply to the descending pyramidal tract on that side. The hypoglossal nerve, as evidenced by the tongue being protruded in a straight line, escaped pressure doubtless from the position of its roots on the opposite side of the artery to the two nerves already mentioned, namely, glosso-pharyngeal and pneumogastric. I am unable to account satisfactorily for the pain and numb feeling on the left side of the face. There was not complete anæsthesia, and in fact little loss

² JOURNAL, January 15th, 1887.

of sensation. The pain was not very severe, and did not follow the distribution of the cutaneous branches of the fifth nerve. The best suggestion I can make is that it was due to disturbance of the vasomotor nerves. I pass over the question of the cause of the thrombosis, which, though of considerable interest, does not affect the present question.

To conclude, loss of taste limited to the region of the tongue known to be the only part supplied by the glosso-pharyngeal nerve, with unmistakable *post-mortem* evidence of pressure on that nerve, leaves no room for doubt that, as has been usually held, the glosso-pharyngeal nerve takes part with the fifth in the taste function, and I would suggest also that the former is more directly concerned with the appreciation of sweetness, as even in the part supplied by the fifth on the damaged side, syrup could not be tasted.

REPORTS TO THE SCIENTIFIC GRANTS COMMITTEE OF THE BRITISH MEDICAL ASSOCIATION.

REPORT ON UROLEUCIC ACID AND ALCAPTONURIA.

By ROBERT KIRK, M.D., F.F.P.&S. GLASGOW.

I HAVE been honoured with several communications from Professor Huppert, of Prague, Editor of *Neubauer and Vogel on the Urine*, and at present engaged on a ninth edition of that work, on the subject of uroleucic acid, $C_8H_9O_5$, discovered in the urine in cases of alcaptonuria.¹ In my previous report I did not venture to say anything about the rational formula of uroleucic acid or its place in the chemical system, regarding this as involving questions which in many respects were too difficult for me. On this point more especially I have been favoured with Professor Huppert's views, of which I may here give a summary, as expressed in his last letter, dated July 26th, 1889. After thanking me for some specimens of the acid sent, and which he hopes to find time to investigate in the ensuing winter, he proceeds: "In my last letter I have already communicated to you my views on the probable constitution of the acid. It is a homologue of gallic acid ($C_6H_3O_5$), and is probably pyrogallol-propionic acid, or at least a trioxy-phenyl-propionic acid [$(HO)_3C_6H_2CH_2CH_2COOH$]. The grounds for this view are: 1. It does not give the genuine Millon's reaction,² but only something like it, and, therefore, does not contain only one HO in the benzene nucleus, but either none, or more than one. 2. It is optically inactive, and, therefore, contains no asymmetrical carbon; that is, no HO in the CH_2 groups, and, therefore, all three HO in the benzene. 3. This view is further supported by the fact that it is very like gallic acid [$(HO)_3C_6H_2COOH$], in its entire behaviour. In the further investigation of the acid it will be useful to keep a comparison and reference to gallic acid constantly in mind. I have given expression to the above views in the forthcoming edition of the work of Neubauer."

In previous letters Professor Huppert stated that uroleucic acid was hitherto unknown to chemistry, and that our interest in it was enhanced by its being a homologue of gallic acid, as few such were known.

Uroleucic acid has very considerable antiseptic power, and from its reducing properties it might be expected to have an antipyretic action in the system. Some mincemeat steeped in a strong solution of the acid (2 to 4 per cent.) was allowed to stand in an open beaker alongside of another sample which was simply suspended in water. In a day or two the last was, of course, quite putrid and covered with penicillium, while none of the fungus grew on the acid mixture for nine or ten days, and the latter was still quite fresh when thrown out at the end of three weeks. In the

first hour or two the acid had discharged the red colour of the meat and juice, which became of a dirty grey.

I have previously stated that there is no trace of uroleucic acid to be found in normal urine, or in any urine which I have examined, save that of cases of alcaptonuria, and I have evaporated forty ounces repeatedly with the view of proving this. It seems probable that alcaptonuria is a reversion to a type of metabolism occurring in some of the lower animals, as the horse, in the urine of which Baumann has sometimes found gallic acid; and that it may thus be compared to rumination occurring in the human subject, or to reversions in anatomical type of structure. It would be of much interest if it could be shown that any constitutional idiosyncrasy, especially such a marked one as an insusceptibility to fever or other disease, or even only a greater power of resistance to any such disease, was due to the presence of a certain chemical compound in the system. An observation which has been made on the subject from whom the urine employed in this investigation has been derived may be of interest as bearing on this question. In November last, when about 13 years old, he suffered from what I have no doubt was an attack of typhoid fever, although it was modified in a very striking manner. An outbreak of this fever occurred at that time in the street where he lived, and all the cases, nearly thirty in number, were traced to milk from a single dairy where there was found to have been a case of fever. The alcaptonuric subject, H. K., was not only a large consumer of the milk, but frequented the dairy and spent a good deal of time there daily. None of the cases proved fatal, but three which I attended throughout, in addition to the case of H. K., were tolerably severe. One had almost complete aphonia for a considerable time, with sometimes a temperature of 105° ; all three suffered from delirium for about a fortnight, were extremely prostrate, had a dry and glazed tongue, and all other characteristic symptoms except diarrhoea.

H. K. and another lad who lived on the same inside stair-landing were among the first attacked. While the latter was already delirious, I was called to see H. K., who had been feeling out of sorts for eight days previously. He was sitting up, and I ordered him a tonic; and it was not till two days subsequently that it was ascertained that he had a febrile temperature. He was now ordered to bed, and small doses of carbolic acid, with which the other three cases were treated, were prescribed. Throughout the illness, however, he would not stay in bed; when his mother for any reason went out, she generally found him up on her return, and he could always sit up several hours every day. The highest temperature noted at any time was 102.4° ; pulse generally 120; the patient never manifested the slightest delirium; the tongue was red, but neither furred nor coated, and the patient's aspect was cheerful and lively, very unlike that of one suffering from such a grave disease. The entire illness lasted about three weeks, during which he lived on milk, and could not take solid food, but only for the last two weeks was he ascertained to be febrile, or confined to the house. In the fourth week he was running about out of doors as if nothing had happened, notwithstanding express orders that he should be kept indoors. During his illness the baby (also subject to alcaptonuria) suffered from *malaise* for a few days. Was the typhoid modified as here described, owing to the fact that the antipyretic and antiseptic uroleucic acid was circulating in sufficient quantity in the patient's blood? It is probable that the amount of the acid occurring in the urine is one-fourth per cent. or more, so that the daily excretion in his case is about forty grains, a quantity quite sufficient to exercise a marked effect. Here, however, I should recall the fact, recorded in one of my former papers, that H. K. and two brothers, all subject to alcaptonuria, suffered severely from whooping-cough, one of them even succumbing from convulsions in the sixth week of that disease.

Some statements made in my former reports require considerable modification in the light of further investigation. It has been found, for instance, that when uroleucic acid has been further purified by twice precipitating by lead acetate, it does not darken so much when heated and exposed to the air as was previously stated, and it may be prepared by evaporation of its watery solution over the water bath instead of extracting with ether or evaporating *in vacuo*. Still further qualification and explanation is required for some of the statements made about other ingredients found in the ethereal extract of the acidulated and concentrated urine.

I cannot enter into details for fear of encroaching unduly on space, but would merely refer as briefly as possible to the other

¹ See JOURNAL, August 4th, 1888, and *Journ. of Anat. and Physiol.*, vol. xxiii, p. 69.

² As pointed out to me by Professor Huppert, aromatic bodies with only one HO in the benzene nucleus turn red, or give a red precipitate with Millon's reagent (nitroso-nitrate of mercury). This is seen in a typical form with carbolic acid (C_6H_5O)= $C_6H_5(OH)$. Uroleucic acid does not give quite the same result, although one to a certain extent resembling it.