THE
JOURNAL OF
COMPARATIVE PATHOLOGY
AND
THERAPEUTICS.

VOL. VII.—No. 4.

DECEMBER 31, 1894.

PRICE 2s. 6d.

CANKER AND SOME ALLIED DISEASES OF THE
HORSE'S FOOT.¹

BY J. MALCOLM, F.R.C.V.S., Birmingham.

By the term canker we designate a disease of the horse's foot, characterised by an abnormal and radical transformation of the horn formation, there being produced, in place of the normal compact coherent horn, a non-coherent cellular material, which undergoes a decomposing liquefaction of a highly malodorous character.

Up to the present time the real nature and actual cause of this affection have remained, strictly speaking, unsettled questions, and they must necessarily continue more or less in the field of speculation until some more definite and reliable evidence is forthcoming than has yet been produced. I am sanguine, however, we shall not have long to wait, as I have every confidence that, whenever competent authorities will devote the requisite time and means necessary for such an investigation, success will reward their efforts. Until then we must make the best deductions we can from the facts within our reach. These lead me to the very definite conclusion that we have to deal with a specific local infective process, depending upon local contamination for its origin, upon the presence and growth of the infecting agent for its persistence and extension, and upon the annihilation of that agent and its products for a radical cure; I am as convinced of the accuracy of this as anything short of the most conclusive demonstration could make me. Meanwhile, before proceeding to give reasons for the faith that is in me, a brief review of the opinions held by some antecedent and contemporary authorities may serve to clear

¹ A Paper read before the Midland Counties Veterinary Medical Association at Rugby, on Nov. 13, 1894.

up some debatable points, and pave the way for a better appreciation of the morbid processes we are to consider. In doing this I have no intention of attempting a historical record, and shall limit my references strictly to those views which appear to merit special attention.

Early in this century canker was looked upon as a special type of inflammation, and we find Blaine, in his "Veterinary Art," saying that "canker is an inflammation of the internal parts of the foot," which may be caused by a neglected thrush, grease, or nail prick, and which differs from inflammation as seen elsewhere owing to the great vascularity of the parts and their secretory functions. Furthermore, he continues, "the character of this complaint consists in a separation of the horn from the sensible parts by a suppurative process, together with a sprouting of a luxuriant peculiar fungus."

Any refutation of such views at the present day would be quite superfluous, but, however untenable they are, they cannot fail to possess a real interest for the pathological historian.

A few years later Bracy Clark, in an essay published in 1822, described canker as a simple ulceration of the sub-horny tissue, and this view Peuch and Toussaint in the second edition of their *Precis de Chirurgie Veterinaire*, published in 1887, specially commend. They say "Bracy Clark emitted a very remarkable opinion on the nature of canker, which if it had been better comprehended and better appreciated would have exercised a considerable influence on the therapeutics of this affection." Bracy Clark's ulcerative theory marked an undoubted advance on the previous inflammatory one, and although normally there is no ulceration in canker, which is essentially a non-ulcerative process, yet in many cases the two conditions possess unmistakably analogous characteristics, both in origin and extension.

Subsequent to the time of this ulcerative theory several authors adopted a carcinomatous one, conceiving that the morbid process in canker was of a cancerous nature, but, like the preceding, this was found untenable. Peuch and Toussaint, in the article referred to, not only express their own views on the nature of this malady, but also record those of other authorities, and notably of Bouley, Megnin, and Nocard. Bouley appears to have been one of the first to form something like a true conception of the condition of which he treated. His views were published in the *Dictionnaire de Medicine et de Chirurgie Veterinaire*, in 1858, and therein he assimilated the nature of canker to that of tetter—a condition clearly recognised as depending upon specific parasitic infection. His prescience will perhaps be better appreciated when it shall have been definitely established that canker, as well as tetter, owes its origin to a specific local infection. But, of course, a belief in their similarity does not for a moment presuppose a belief in their identity, although both affections have a further resemblance in the metamorphosis of the corneous structures respectively involved. Furthermore, Bouley also very justly recognised that the secretion of the keratogenous surface, instead of being interrupted, was on the contrary augmented, taking care, however, to point out that the products secreted no longer possessed all the properties necessary for undergoing the normal phases of transformation into compact horny tissue.

In 1864 Megnin promulgated the view that canker was caused by

an organised cryptogam, like *Herpes Tonsurans*, and belonging to the oidium family of the order arthrospores, the organised production of which is characterised by a flaky mycelium and some tubes containing spherical spores.

The vegetable cryptogam he proposed to designate by the name keraphyton or *Oidium Batricis*, which, according to the French cognomen of the disease, is to term it the parasite of canker. More recent microscopic investigations have failed to confirm Megnin's view, and the accuracy of his conclusions is still uncorroborated. Meanwhile, it has been suggested that the presence of this cryptogamic structure is purely accidental, like the acari formerly pointed out by Hering.

Nocard's view is that in canker the keratogenous tissue is infiltrated with micro-organisms, whose presence is necessary for the appearance and persistence of the disease, and on this view is based his antiseptic method of treatment by foot baths of corrosive sublimate solution. It is almost unnecessary to say that this view is, so far as I know, like that of Megnin, without corroborative confirmation.

Having summarised the opinions of the chief authorities according to Peuch and Toussaint's records, it is incumbent that some cognisance should be taken of the position these authors themselves assume. I regret to say that, after an impartial consideration, their position appears to me barely intelligible, and a short statement of some of the views they contingently accept will suffice to explain this. They say that "it appears to be connected with a chronic inflammation of the keratogenous tissue, without carcinomatous degeneration, as was formerly thought to be the case," but, "perhaps, as M. Nocard thinks, this tissue is infiltrated with organisms." They further say "it is generally admitted that direct irritative causes, such as long-continued contact with acrid mud and excrementitious material, produce canker," but they are nevertheless of the opinion that "the action of external causes does not alone suffice to originate the malady, because it cannot be developed experimentally by irritating the subungulate tissue; besides this, when one considers that it nearly always affects the two hind or two fore feet of the same animal, and often all four feet, there will be recognised in the malady the local manifestation of a pre-existing general morbid condition." And, disdaining any restriction on the catholicity of their views, they further extend their estimate of the possibilities by deciding "to hold in reserve their opinion upon the cryptogamic theory of Megnin." In the future, whichever view is ultimately proved to be nearest the mark, there will be no difficulty in showing that it received a measure of approval from Peuch and Toussaint.

We now turn to the opinion expressed by Moeller in his "Text-book of Surgery," and which we may conclude, from its appearance therein, is the one current in Germany. He says, "it is probably a specific infective process, and this is indicated not only by its course but also by observations made in the treatment of the disease; but, at the same time, these observations suggest that the disease is not due to a single cause, but to several causes which do not correspond in their effects. What the nature of these causes is future investigations must show." This clear and intelligible statement stands forth in radical contrast to the destructively divergent opinions which are found in French and English Text-books.

We have already seen what Peuch and Toussaint teach in the former of these, and we will now for a moment notice what is set forth in the latter, and this point cannot be better illustrated than by quoting from Williams' standard "Text-book on Veterinary Surgery." The Professor says, "Canker is a constitutional disease located in the feet, and is due to cachexia or habit of the body, grossness of the constitution, as exhibited by thick round legs, large flat feet and the lymphatic temperament," and he accentuates this constitutional theory in another paragraph, in which he says, "the constitution being the source and origin of the ailment must not be forgotten." But the Professor is not content without a second string to his bow, and in another paragraph we find the statement that "perhaps further research will demonstrate that canker is due to a cryptogam." Is this a significant indication that, notwithstanding the ring of certainty with which the constitutional theory is set forth, its accuracy is nevertheless the subject of a disturbing uncertainty, or why the saving grace of this latter phrase? But whatever be the reason for its intrusion here, it effectually weakens the value of the assertions on the constitutional theory, and we scarcely think the Professor does justice to himself in employing it, since it is obvious that both the theories cannot be true.

From what has thus far been adduced we infer that all current views on the etiology of canker, however much they may vary in detail, are essentially based upon one or other of these two conceptions, viz., (1) that the disease process is the local expression of a general morbid condition of the constitution, or (2) that it is a distinct specific local infection. Now, it is manifest that these two views are in radical contradiction, and, according as the one or the other is held, the therapeutics of the affection must be radically different. It is therefore of moment to try to form a correct conclusion on the matter, and some observations which may assist in this will now be submitted.

In the first place, I desire to draw attention to what I previously wrote on the prevalent idea that canker is specially a disease of coarse-bred horses possessing the so-called lymphatic temperament. In the article referred to I say, "in collieries, it seems, where the waggon ways are quite dry, and kept in good order, canker is exceedingly rare, but where the waggon ways are neglected, and in a habitually wet and dirty condition, canker is exceedingly prevalent, and indiscriminately attacks the well-bred, clean, flat-legged horse, and the coarse-bred, round-legged one."

"In Birmingham we find exactly the same condition of things; no class of horse is exempt, and indeed some of the worst cases I have seen have occurred in well-bred horses. In the ten cases recorded below¹ one of the most inveterate appeared in a grand high-class Clydesdale, bred by the Marquis of Londonderry. This horse possessed irreproachable feet and legs, and, until attacked with canker, was looked upon as the pride of our stud, the stable committee on their visit of inspection invariably stopping to take notice of him. Another case occurred in a fine powerful Shire horse with large bone but clean legs and good feet, bred by the Earl of Warwick, who took first prize with him at Warwick Agricultural Show. These two cases.

¹ Particulars of ten cases were given in the article.

by no means complete the list of well-bred horses I have seen with canker. On the contrary, unlike most writers on this question, I have actually seen as much canker in well-bred, flat-legged, good-footed horses, as in coarse-bred, round-legged, large-footed ones."

Further experience only serves to accentuate what was then recorded. Since the article was written from which this extract is taken, I have had twelve other cases of canker under my personal care, and in addition have seen several others with professional friends. The horses thus seen in consultation have been collectively above the average type, and indeed two of them were valuable thoroughbreds with irreproachable pedigree, and one of them, a two-year-old with a skin like satin, had been purchased as a yearling for 1200 guineas.

The twelve horses under my own care have also been a good lot, and they have lacked the typical feet, legs, or temperament which are supposed to characterise horses with this malady. Moreover, one of the twelve was a well-bred harness horse, and two others were high-class parcel-carters. Thus, in twenty-two horses treated, the large majority have been well-bred horses, and it may furthermore be noted that grease has only been seen in three cases, none of the others showing the least sign of it.

The next point to be considered is the erroneous assumption that any apparent recovery is unreal, inasmuch as the disease, although appearing for a time to be cured, invariably recurs. What the precise evidence is upon which this inaccurate and mischievous conclusion is founded, does not appear, but in all probability the belief has arisen through a misapprehension in confounding a relapse with a recurrence. Now, while a recurrence is rare, a relapse is of frequent occurrence, and this is explainable by the local character of the disease, together with the acknowledged difficulty of completely eradicating every part of it, and by the certainty with which the smallest uneradicated atom of infected material again reproduces the disease. The liability to such a relapse is manifest in the difficulty of eradicating a microscopic agent from an impregnated surface in cracks and fissures at the bottom of the lateral lacunæ, and from under apparently sound horn, the papillæ of which are nevertheless infected.

In only three cases out of the twenty-two referred to have I seen any apparent recurrence, and in these I had no ultimate difficulty in satisfying myself that they were in reality cases of relapse. In them I could demonstrate the uneradicated centres from which the disease again spread, and there is little doubt in my mind that the vast majority of so-called recurrences are simply relapses.

Notwithstanding this, there is no reason why any foot may not be a second time infected when again subjected to the same kind of infection which originated the first, for a first attack confers no immunity from a second, and seems rather to lessen than increase resistance; consequently, an occasional actual recurrence does not necessarily involve any constitutional origin.

Another point which has been advanced with seeming cogency in this connection is the frequent co-existence of the disease in two or more feet. This, no doubt, at first sight presents a greater obstacle to the local theory than the two contentions just dealt with. But the fact must not be lost sight of that the presence of the disease in two or more feet at the same time indicates no more than a contemporary

similarity in origin—a point far short of establishing the dependence of the disease upon constitutional peculiarity. Now, if we clearly recognise this, nearly half our obstacle disappears, and when we remember that canker is usually sequent to an irritation or injury, and that one of the most common of its antecedent irritations is thrush, a condition which usually co-exists in two or more feet, all that we require is the presence of an infecting medium for the whole obstacle to disappear.

An equally common, but wholly unwarrantable assumption which has to be dissipated is a belief in the incurability of canker. There is not the faintest shadow of actual foundation for this pessimistic assumption. In few serious affections I am conversant with can there be predicted a favourable issue with such unerring certainty as in canker. The usual cause of failure is with the practitioner, and not in any incurability of the disease. Assuming that the patient is worth treatment, and that there is no obstacle to its employment, such as the existence of other diseases, viciousness, etc., any veterinarian who is expert in the treatment of canker, with the requisite facilities and necessary time at command, need never be in doubt. The accuracy of this assertion I have proved over and over again, and I am prepared to back it again by a practical demonstration, providing the case be put under my own personal care.

Meanwhile I may be permitted to claim on this point the evidence of the President and the Treasurer of the Midland Association. I have already referred to the severe case successfully treated under the observation of the former, and I now desire to cite a more severe case, even more successfully treated, under the observation of the latter.

On 9th September Mr Blakeway saw me operate on a five-year-old well-bred grey cart horse for canker in the near hind foot, the disease involving the whole of the sole, the external quarter of the wall, both heels, and part of the internal quarter. The extent of sound hoof was therefore comprised by about 2 or 3 inches across the wall at the toe, and about 2 inches of the wall of the outside quarter below the coronet. He again saw the case on 25th September and acknowledged it was practically cured. He again re-examined it on 8th November and can certify to a complete cure, the whole surface being covered by sound horn, and the foot absolutely free from disease. The history of the case received from Mr Saddington of Measham, from whom I obtained him, was that the horse had been recently purchased by a local dealer for fifty-seven guineas at Shrewsbury auction. He was re-sold to Mr Saddington, who, on subsequently recognising the existence of the disease, turned him out to grass, in the vain hope, which no one with any real experience of the affection could entertain, that it might thereby be benefitted or even cured spontaneously.¹

In the light of such evidence one could wish that authorities whom we all esteem, before publicly promulgating the incurability of a disease, would make themselves conversant with the current literature on the subject—that is, if they desire to retain our respect for their opinions.

But to proceed, it may next be noted that the light which the curability of canker throws on its etiology is much intensified by the means through which a cure is effected.

¹ This horse was exhibited at Rugby to the members of the Midland Association.

One would naturally expect those who contend for a constitutional origin to show their consistency in chiefly depending upon constitutional remedies in their treatment. But what do we find? Not a single one of them has the courage of his opinions, and, instead of seeing principles put into practice, we have the edifying spectacle of practice subverting principle, a sole reliance being placed upon local remedies, to the disregard of constitutional ones, save for an occasional passing reference. Another pertinent point which I will only mention here, but will refer to it again in another connection, is furnished by the fact that, while the disease possesses an undoubted power of self-reproduction, its distinctly local character is manifest in any extension being by direct continuity. On the other hand, if the disease were of constitutional origin, it would no doubt be found disseminated over various parts of the foot, each separate centre having no necessary connection with another. This invariable extension to any unexposed surface by direct continuity from the seat of origin is by itself a fact almost sufficient to base a conclusion upon. But to further labour this question of a local *versus* a constitutional origin, from a clinician's point of view would be supererogatory, and it rests with our pathologists to complete the picture by recognising and demonstrating the presence of the self-reproductive living medium, which will alone explain the origin and progress of the malady.

There have next to be considered the circumstances and conditions under which the disease usually makes its appearance.

The chief predisposing and exciting factors may be comprised under four heads, viz., (1) the character of the constitution, (2) a bad hygienic régime (whether in the stable or outside), (3) the co-existence of other disease, and (4) direct injury.

The constitution, as we have seen, is commonly conceded to play an important part in the production of canker, and many may not feel indisposed to question its deposition from the actual into a predisposing cause. We have already dealt with it from the former point of view, and there remains only a word or two to be said from the latter. Although my personal experience does not bear out the existence of any marked predisposition through the influence of heredity, gross constitution, or the lymphatic temperament, yet I am not unprepared to believe that these may be potent predisposing influences. Indeed, any condition which favours cutaneous or ungual exudation may be so. At the same time, it is open to question whether even in this limited sense the constitution does not receive credit for much more than is due to it, when the existence of canker in all low bred horses is ascribed to its influence. It has to be remembered that the common coarse horses are those which most frequently come under a defective hygienic régime. Their owners are often poor, and many of them pay little regard to sanitation, and, just as we have seen that horses in collieries, when working on dirty roads or waggon ways, were most predisposed, quite irrespective of breed, so we find a similar predisposition through the macerating and irritating influence of excrementitious and other materials to which these horses are subjected. Indeed, wherever the feet of horses are subjected to the prolonged action of humidity, more especially of an acrid character, there we have a predisposing influence at work; it is in this way we account for canker being more prevalent in marshy

districts than on dry highlands, and it is, I take it, in this way likewise that grease and thrush play a predisposing rôle. For in these latter cases it is well known that the presence of the one and the discharge from the other induce destruction of the horn, and irritation of its secreting surface corresponding with the amount of exudation present, and as a consequence there is produced a most favourable soil for the development of the disease. By the action of direct injury we may explain how, while it is usual for canker to originate at the frog, it may and does arise independently of it. In two cases I have had in hand it had no connection with the frog. In the one the disease extended from the solar aspect of the toe right up the front of the foot to the coronet. When I saw the case the external surface of the wall was quite intact, and the only evidence of disease was a dirty offensive discharge from a denuded part about 2 inches wide at the point of the toe. In the other, the disease was confined to the outside quarter and its contiguous solar surface. Both cases I attributed to direct injury by nail or clip, resulting in an abscess, with exposure of the keratogenous tissue and the subsequent development of canker. In this connection it may be worth while to consider whether the not infrequent apparent origin of the disease at the posterior part of one of the lateral lacunæ may not also be connected with an injury, such as a bruise by a stone, or even an over-reach on the bulb. This point, although a small one, deserves further notice, and through it we may derive a possible explanation of why one side of the sole should often be more extensively diseased than the other.

The last point to be discussed in the section of our subject devoted to the origin, nature, and character of the disease, is the manner in which the morbid process is effected, and through which it produces its disastrous results. Strictly speaking, this is a question for a pathologist, but in the absence of any authoritative pathological pronouncement, the observations and deductions from a clinician's point of view will have to suffice. In attempting this provisional elucidation, a brief reference to the structures implicated may be of some service in helping to throw more light upon the true nature of the malady. The structures which are involved in the morbid process under all ordinary circumstances are simply the horny hoof and its secreting matrix. The hoof and its keratogenous or horn secreting tissue form, as you will remember, merely a specialised extension of the skin, and they correspond respectively to the epidermis and corium of that tegument. At the upper border of the coronet the cutaneous corium is directly continuous with and becomes merged into the keratogenous corium. This latter in its modified form constitutes the perioplic ring and the coronary cushion, thence it extends posteriorly by direct continuity over the plantar cushion, while inferiorly it is further modified to form the sensitive laminae and finally expands into the sensitive sole. The external surface of this tissue is furnished with vascular papillæ which vary in size and number according to their position. Thus we see that the keratogenous tissue envelopes the whole structures contained in the foot and is itself completely enclosed in its horny covering or hoof. The horn of which the hoof is formed is, in the language of M'Fadyean, "an aggregation of modified epithelial cells, which here represent the horny layers of the epidermis. This cellular horn substance is

arranged in the form of tubes cemented together, the upper end of each tube being occupied by a vascular papillæ. In the growing hoof the bond of connection between the papillated surfaces and the corresponding part of the hoof is a stratum of soft protoplasmic epithelial cells by whose growth and multiplication the hoof horn is formed. This stratum of cells represents the deepest cells of the rete mucosum in the skin, and it is by its ready decomposition that the bond of connection between the sensitive and insensitive structures is destroyed, permitting the extremity of the digit to be extracted from its horny investment." We have in this extract a lucid description of the normal connection between the papillary surface and the compact horn, and the manner by which the former reproduces the latter through the proliferation of the cellular or rete layer, which clothes the one and lines the other. We have also a statement of the destructive and uncementing effect of decomposition on this cellular connection. Now, it seems to me that in these two conditions of reproduction and destruction we have a clue to an intelligible elucidation of the canker process, which appears to consist essentially in increased proliferation of this soft cellular stratum and subsequent decomposition of it into a semi-liquid, greasy, malodorous débris, instead of its normal metamorphosis into compact horn. If we supplement this by conceiving the papillary surface to be impregnated with an infective irritating agent, we are at once provided with an explanation of the papillary irritation, with the resulting increased cellular production and its subsequent offensive decomposition.

The morbid process, although very marked when fully developed, presents in the earliest stages little evidence of its presence, and even the most expert practitioner, when examining a cankered foot, and depending solely upon ocular evidence, without further test, may easily fail to recognise the extent of the morbid ramifications. In this early stage there is no apparent severance of the connection between the horn and its secreting surface. The papillæ still occupy the upper end of the horn tubes, a fact shown by the bleeding surface of newly pared, thinned horn; the horn itself appears unaltered, and the only suspicious sign may be a slight alteration in the colour of the exuded blood. Sometimes the colour may be lighter, sometimes darker than normal, most often the latter, but any alteration, whatever it may be, is a ground for suspicion.

If a hot iron is applied to any suspected secreting surface, all doubt is at once removed. If sound, the surface chars; if unsound, a greyish or whitish reaction is produced, not unlike particles of toasted cheese. By the use of this simple test we can not only clearly and accurately discover the limits of the morbid process, but also prove that its centrifugal extension is always by direct continuity of surface, which is an additional witness to the local character of the process. A little later on there is evidence of commencing decomposition and uncementing of the rete-connecting layer, in the greater facility with which the horn can be stripped from its matrix, as well as in the relatively lessened bleeding produced thereby.

With the further progress of the disease a clear severance of union is marked by the interposition of the newly proliferated cell production in the form of a thin stratum of non-coherent, moist, cheese-like material; by the easy separation of the thinned superimposed horn;

and by the absence of bleeding when this separation is effected. As the process persists the stratum of non-coherent liquefying material gradually increases, and with its continued persistence and the co-existent exfoliation on the ground surface of the horn, a time arrives when complete gaps in the continuity of the latter make their appearance, and through these the dirty semi-liquid collection of cellular débris finds an exit.

Besides these abnormal horn changes there are alterations in the papillæ themselves to be recorded. Continued irritation gives rise first to their active turgescence, then to actual hypertrophy, and finally in some instances to relatively enormous enlargements.

As a general rule, nevertheless, the secreting membrane suffers no radical destruction either in its papillary surface or fibrous basis, and with the elimination of the irritating agent which appears to impregnate it, the papillary surface resumes its normal keratogenous function.

Now, what I have here attempted to describe is the normal progress of the disease on an otherwise unirritated and undenuded surface. Its extension on such a foot is comparatively slow, and particularly so on the solar surface, but when the horn is removed and its secreted surface irritated the spread of the morbid process may appear almost phenomenally rapid. As a marked illustration of this there may be cited its apparently almost instantaneous development over the whole of a denuded cauterised surface upon which an uneradicated centre of infection remains, and to which for a time subsequent to cauterisation no repressive measures have been employed.

A false interpretation of this perfectly explainable occurrence has led inaccurate observers to the unwarrantable assumption that this effect was an evidence of the constitutional origin of the disease, and as a consequence has induced them to abandon the treatment by actual cautery. As an illustration of this effect Peuch and Toussaint cite an example furnished by the clinique of the Lyons Veterinary School, where, it seems, the actual cautery used to be employed but has now been discontinued.

My excuse for dealing so fully with this part of the subject is that a true interpretation of the origin, nature, and progress of the disease is requisite for any real appreciation of what has to be accomplished to effect a cure. In considering the next two sections, viz., symptoms and prognosis, I hope to merit commendation for the brevity with which they are dealt.

From what has been already said it is evident that the disease may be in existence for a considerable period before being perceived, and especially because in the earlier stages there is little or no increased sensibility. As a rule the first observed indication of its existence is the presence of a dirty-looking, semi-liquid, greasy material, with a characteristic offensive odour, coming from gaps in the horn surface.

The gap or gaps in most cases first appear about the cleft of the frog, but they may be on any part of that body or the sole, and in fact usually extend there. Their size and contour vary as the disease progresses, and the extent of their external opening is less than their deep surface, owing to the extension of the diseased process under the adjacent horn. In old-standing cases the whole frog and sole may appear a diseased fungoid mass, with one or two isolated irregular horn projections on the surface. In these cases the size of the foot is

considerably increased both in length and width. The greater length is due partly to increased horn production, partly to the conservative action of the farrier, and its greater width to the effect of weight upon walls unsupported by the bars, which have been destroyed by the disease.

A most marked characteristic of this malady is the absence of apparent pain until the disease has made considerable advance, and then what pain appears is due to direct external injury to the exposed surface, or to the dragging effect on the sensitive structures produced by superimposed weight on walls whose solar connection has been severed, rather than to any direct effect of the disease itself upon sensation. In this apparent lack of sensibility the disease differs materially from the ordinary inflammatory affections of the foot, and it is owing to this freedom from pain that horses can be worked with little inconvenience long after the disease has appeared. Other almost equally malignant qualities are recognised in its intractable and destructive nature, and in its inevitable extension when ineffectually treated or left to its own course. The presence of these various distinguishing characteristics never leave the practitioner long in doubt. Nevertheless, on a first inspection in an early stage of the disease located in the cleft of the frog, even an expert may hesitate for a moment between it and thrush. However, the distinctive reaction to the hot iron at once settles the question, and no one who applies this re-agent to a case of each of these affections can ever fail to at once distinguish them.

Having thus indicated how a positive diagnosis may be made, our next point is to consider what are the chief factors upon which a prognosis is based. The factors which guide us in forming an estimate of what the progress and termination of the disease will be are of considerable number and variety, but they can be summed up under two distinct heads, viz. (1) those pertaining to the case, and (2) those connected with the practitioner. In forming their prognosis many practitioners fail to realise the important bearing they themselves have on the matter, but any failure to recognise this influence does not lessen its reality. Personally, I am quite convinced that the degree of the practitioner's capability often plays a greater rôle in forming the prognosis than do the merits of the case itself. At first sight this may scarcely seem tenable, but an illustration will probably make it clear.

The majority of practitioners form an unfavourable prognosis of all canker cases owing to their inability to cure it, and their belief in its incurability—a belief intensified by the frequency with which any apparent recovery is followed by a relapse or seeming recurrence. Now in marked contrast to this habitual unfavourable prognosis stands my own very frequently favourable one—a prognosis based upon the fact that I know that the disease is curable and that I can cure it. Thus we may have two very different prognoses in the same case, in no way depending upon the case itself but upon the veterinarian. This is no more than we must expect, for, though a mild case in capable hands is readily curable, in the hands of a non-expert it at once assumes a very grave aspect; indeed it is by no means rare for neophytes by their treatment rather to accelerate than retard or eradicate the disease, with the result that cases which

presented no inherent difficulty have eventually to be cast aside as hopeless.

But however capable the practitioner may be, no really favourable prognosis can be formed unless he has command of the time, convenience, and assistance requisite for undertaking such a case. Now, however much any one may question my convictions respecting the varying degree of influence due to the capability of the veterinary surgeon upon the prognosis of canker, it will scarcely be disputed, unless by those who are of opinion that all cases are hopeless, that with the variation in the cases there is a consequent variability in the prognosis. The probability of success will be greater, and consequently the prognosis more favourable, in a young well-bred horse with limited disease in one foot, than in an old coarse-bred one with all four feet extensively diseased. Again, the presence of other diseases, viciousness, persistent local irritation, and old-standing unsuccessful treatment, all detract from a favourable prognosis.

As an illustration of a co-existing disease I may mention a case in which canker was developed in three feet of an old mare that was the subject of laminitis. Needless to say, in that case the prognosis was unfavourable. But the accompanying disease need not necessarily be in the feet to prove detrimental. The presence of any malady which renders it undesirable to cast the patient, such as disease of lungs, spine, etc., has a distinct prejudicial influence. In viciousness we have a factor which not only adds to the difficulty of treatment, but in some cases even renders it positively dangerous. Continued exposure to local irritation, such as working on roads covered with acrid mud, is also prejudicial; and, lastly, we have to note the increased intractability exhibited by old-standing unsuccessfully treated cases. Scarcely anything short of practical experience could make one realise the much greater difficulty in surmounting one of these cases than in eradicating a previously untreated one. It is difficult to explain this difference fully, but in long-continued aberration of function, in injury or actual destruction of the keratogenous tissue, either by the morbid process or treatment, and in the incomplete eradication of the disease at a number of separate points subsequently masked by the overgrowing new horn, we have conditions which are no doubt potent contributors to the apparent anomaly.

We have now come to the most important section of our subject, viz., that of treatment. In connection with this it must, of course, be evident that much of what already has been advanced is essentially preparatory to the present section, and those who have read what precedes regarding the nature of the affection will probably anticipate the principle of treatment to be advocated. I have stated that I absolutely disbelieve in the constitutional origin of the disease, and am firmly convinced of its local infective character, and no one will therefore be surprised to hear that I do not employ any general or constitutional medication, but rely solely upon local remedies.

Generally speaking, local remedies in their application may be classed as palliative or curative, and in some cases the general practitioner may find it more advantageous to employ the former than attempt the latter. Personally, however, I discard a palliative procedure altogether, and either employ curative measures or decline treatment. Nevertheless, I am prepared to admit that under certain

circumstances, such as when the patient has a low value, etc., a palliative line of action may in the client's interest be advisable. In using palliatives no real attempt is made to eradicate the disease, and all that is attempted is to prolong the period of the patient's utility by the use of such means as will retard the progress of the disease and delay its inevitable termination. This delay is usually favoured by reducing the liquid discharge and conserving as far as possible the compact horn. The agents generally relied upon to lessen the amount of the discharge are astringents, such as the sulphates of iron, copper, and zinc; deodorisers, as charcoal; and disinfectants, like carbolic acid. It may be here noted that although these and similar agents have a powerful effect on the subungulate healthy tissue, their action on the cankered surface is by no means marked and often of little effect. At the same time I know of few palliative dressings superior to that previously recommended by me in the treatment of canker. This dressing consists of equal parts of the three sulphates mentioned, mixed with carbolic acid, and their cohesion secured by a trace of vaseline. By their combined action better results are obtained than by their separate use, and should a more powerful dressing be wished for it is secured by the addition of corrosive sublimate or iodine, in varying proportions according to the effect desired. Co-existent with the use of this dressing, care is taken to preserve the compact horn as intact as possible. All paring is avoided, and only the ragged edges are removed. By such means a horse may be kept going for a considerable time, but the end is always inevitable—destruction of the hoof, and the horse has ultimately to be killed. No doubt many have practised palliative measures, and have not felt themselves taxed in doing it.

With curative measures it is quite another matter. Few have employed them successfully, and many have wished they had never tried. Yet a cure can be effected with considerable facility in all early stages, and, however extensive the disease may be, if it is confined to one foot, and the keratogenous tissue has not been injured or destroyed in previous treatment, a cure is simply a matter of time. Many methods have been tried at one time or another in attempting to cure this affection, and some with undoubted success, since we hear of various practitioners, such as Mr Robb of Glasgow, who have acquired quite a reputation for their treatment.

My own method of procedure is practically as follows:—

I first have the hoof lowered, and the horn all round the diseased surface pared thin, taking care to avoid injury to the sensitive structures, but seeing that the horn contiguous to the diseased surface is pared until blood exudes. When the frog alone is affected it is often unnecessary to pare the sole or wall, unless the latter be long, when procedure is facilitated by lowering it. The hoof having been effectually pared, the patient is then cast and secured; chloroform is sometimes administered and sometimes not, this depending upon the individual case. Now using a sharp thin drawing knife, every particle of separable horn is carefully removed, and any isolated horny projections on the cankered surface lowered close to the secreting matrix. The removal of all separable horn should commence at the most dependent part of the foot, so that any hæmorrhage accidentally produced may be below the part to be pared, and thereby cause as little incon-

venience as possible; but with care there should be very little hæmorrhage.

The next step in the procedure is to remove all fungoid excrescences, and scrape the whole of the exposed keratogenous surface with a hot iron, but on no account should the surface be severely cauterised,—any severe cauterisation being prejudicial to recovery. By lightly scraping the surface in this manner, the greater part of the infective material and its products are at once removed. A second light scraping will at once show any remaining disease by its characteristic reaction to the hot iron. On the imperfectly eradicated parts this light scraping is continued until no reaction is obtained, but as soon as this desideratum is secured scraping with the hot iron is at once discontinued. The places from which it is most difficult to eradicate all morbid material are the lateral lacunæ, especially at their posterior part, and the point of the frog, the cleft of the frog, and the bars. In the lacunæ and the central cleft it is often necessary to use a lighter, thinner iron, so as to avoid needless and harmful destruction of tissue, and yet permit of the most thorough removal of every particle of disease. Fortunately the reaction so often referred to enables complete eradication to be accomplished without injury, if an appropriate iron and sufficient time and patience be employed.

All disease having been effectually removed from the exposed surface, the surrounding apparently sound intact horn has next to be dealt with. With a sharp, thin, hot iron, the edge of the thinned horn, at its union with the secreting surface, is tested for canker. Whenever the morbid reaction follows the horn must be removed. This is best done by first applying the hot iron to the external surface of the thinned horn, a procedure which facilitates the separation of the horn from its matrix. By thus alternately testing the edge and removing the horn, the extent of the disease can be accurately delimited, but it is always prudent to remove the horn a little beyond this recognisable limit. The surface thus denuded of horn is lightly scraped and thoroughly cleaned in the manner already indicated, and this process of removing the horn and cleaning the contaminated surface is continued until the whole of the surrounding intact horn has been thoroughly tested, and every suspected particle removed; for it is essential to remember that the least remaining microscopic particle of infective material is a centre from which, on the now inflamed surface, the disease spreads most rapidly. In all early cases, however, a painstaking thoroughness will secure eradication of the disease without destroying the keratogenous membrane or its function.

When the disease has extended to the wall, it is necessary to thin and remove the wall horn from below upwards, in the manner already described for the sole, but here it is even more necessary to go beyond the apparent limit of the disease, owing to the difficulty in detecting the extent of the morbid process from the facility with which it passes between the laminæ. Indeed, unless very sure of the definite limit of the process, it is advisable to remove the horn right to the coronet at once. The surface of the coronary cushion must be treated in a precisely similar manner to the surface of the sensitive sole, and it is of moment to remember that in this

position the disease nearly always extends some distance round the surface of the coronary cushion, and that any failure to eradicate it here, as elsewhere, ends in a relapse. The surface of the laminae should be very lightly cauterised, but no excessive cauterisation is either permissible or necessary, for, when the disease is eradicated from the sole and coronary cushion, there is no difficulty in eliminating it from the laminae, and any excessive measures simply retard the curative process. It would be superfluous to contend that such an extensive operation as I have described is a simple matter, and to be rashly undertaken by the non-expert, but in all early stages any non-expert who takes the pains to follow out the lines here laid down will have no difficulty in curing his case. Where the disease is confined to the frog, and no previous treatment has been applied, five out of six may be effectually cured by one such operation, the only subsequent treatment necessary being mild dressings.

Now, I think that is all that need be said upon the operation. If the surface exposed has been a large one, I apply a mild dressing, such as calomel or zinc ointment—the former by preference—over the whole surface.

The foot is then re-dressed daily for several days with this dressing. Subsequently dry calomel is substituted, and should there be excessive cellular proliferation this is checked by the palliative dressing, if I may so call it, already given. Each day the surface is effectually cleaned, scraped, or pared as required, before re-applying the dressing.

When the operation has been a real success little more is necessary except patience. The daily dressings may be replaced by dressing on alternate days, then twice weekly, weekly, and so on. When there is any sign of uneradicated disease the most effective method is a second operation, but where this is unadvisable good results may be obtained by touching lightly the suspected parts with nitric acid, taking care to apply the acid also upon the contiguous thin horn, and afterwards applying the compound ointment.

It will have been clearly perceived that I attach as much importance to the manner of application as to the agent employed. Similar beneficial effects may be obtained by various agents, but in every case much will depend upon the skill and painstaking application of the practitioner.

When the exposed surface is large I often apply several different agents of varying strength at the same time, according as the parts seem to require them. Thus, on the horse exhibited to the members of the Midland Society I applied at one dressing calomel ointment on the solar surface of the toe and on the laminae, the compound ointment round the coronary band and over the sole, and dry calomel in the lateral lacunae and the cleft of the frog. But whatever agent be employed, it is imperative, before its application, to effectually pare or scrape all new cellular horny production day by day until it is evident that sound horn is being formed. It is clear that with such a large cankered surface as was present in this case, it is impossible to put on a shoe, but there is no difficulty in doing without one if small pledgets of tow are placed in the cleft and lacunae, large pledgets on the whole foot, a bandage well tied on over that, and then a suitable-sized bag to cover the whole. When this is effectually done few horses can move the dressing. In all cases, unless you are to do the work

yourself, it is essential to have the assistance of a competent farrier—one who can pare the foot thoroughly without hewing and hacking it. This is a most important matter, as much of the success or failure depends upon the facility with which the removal of every particle of horn necessary for effective treatment is pared away without bleeding or damaging the foot. In this respect I am fortunate beyond most, in possessing the assistance of one of the best men with a drawing knife I have seen.

In most discussions on the treatment of canker it is usual to lay great stress upon the advantage of pressure. My own opinion is that the remedial effect of pressure is rather over than under estimated. Its beneficial action appears to lie in its retaining the medicaments employed closely applied to the diseased surface, and perhaps also in assisting to drain the discharge and thereby serving to limit the contamination of surrounding parts, rather than in direct amelioration through pressure.

Among other points which are usually enlarged upon are the kind of shoe to be put on, *i.e.*, whether it should have a sole or not, the exact kind of sole to employ, and the best means of fixing it. Personally I don't care whether the sole be fixed or free, leather or iron, or simply tow supported by cross splints. All I ask for is that whatever shoe is put on it shall be removed at every dressing. Irrespective of the greater facility for paring and dressing the foot, I believe there is an actual economy of time in this procedure. As four nails are all that is necessary to hold the shoe on, and no rasping is done, the time required to unclinch and draw the nails, and, when ready, to drive others in the same holes, is more than counter-balanced by the increased rapidity with which the foot can be pared; besides, no man can thoroughly pare and dress a horse's foot with a shoe on, and failure will almost certainly reward whoever attempts it.

Before concluding this section of our subject a few remarks are called for on some of the methods recommended by different authorities. Naturally the first to merit our notice is that recommended by Professor Williams in his text-book on Surgery. He recommends stripping the whole sole irrespective of the extent of the disease, and subsequent cauterising of the whole surface with nitrate of silver. The only justification for such a rough and ready procedure appears to be the certainty with which the whole diseased surface can be subjected to the direct action of the remedies subsequently employed. This would not apply, however, when the disease has extended to the wall. Whatever this advantage may be worth, the needless destruction of sound structures, and, according to its author, the futility of the procedure far more than counter-balance it. Since the Professor himself proclaims its absolute failure, one is tempted to wonder by what psychological process he feels called upon to advocate it, and how he justifies its adoption. However that may be, if he practices what he teaches and his results are as he describes them, we can appreciate his tutorial wisdom in advising his students to pray for deliverance from canker cases during their first four years' practice, for few clients are so complaisant as to view with equanimity the deliberate suspension of their horses' utility, plus considerable expense, when unrelieved by any hope of ulterior benefit.

In conversation the other day with a Camden Town graduate of

some thirty years ago, he said the method in use there then was to dress the diseased surface with nitric acid, and cover over with tar and tow, but, said he, "I never saw a case cured there." Whatever the results of this treatment have been, the method has become obsolete and is now rarely used.

Blain recommended the removal of all fungoid growths, horny projections, and under-run horn, followed by the application of a mixture of equal parts of red precipitate, verdigris, and calamine, in fine powder to the exposed surface. I tried this remedy at one time, but in my hands it had only a palliative effect, and not a curative action.

Moeller in his *Surgery* very justly says "the treatment of canker requires much patience, not only on the part of the patient, but also on the part of the owner and the veterinary attendant." He recommends the employment of caustic applications, and enumerates corrosive sublimate, chloride of lime, chloride of zinc, creosote, carbolic acid, iodoform, iodine, nitrate of lead, etc., as all being serviceable in certain circumstances. With reference to the last-named agent, he says "nitrate of lead first recommended by Pütz is one of the best. When scattered as a powder on the diseased surface it forms with the destroyed tissue a dry scurf which hinders the progress of the growth. This substance limits the secretion and the proliferation.

My own experience of the nitrate of lead is limited to one case. I removed all horny projections and separable horn, thinned the surrounding horn, and then to the thinned surface applied nitric acid, and to the exposed diseased surface itself nitrate of lead in fine powder. It certainly seemed a most powerful remedy, and on the first available opportunity I intend to give it a further trial.

Some years ago Nocard recommended an antiseptic form of treatment by means of sublimate lotion. In a case which had previously resisted all treatment, he successfully adopted this method. The horn was thinned and the diseased part laid bare and cleaned in the usual way; then a spray of a one per cent. solution of bi-chloride of mercury was projected on to the foot for two and a half hours. After that the hoof was dried and the surface powdered for ten minutes with iodoform ether. Fowler's solution was given daily for eight days in forty grammes doses. This case was a great success, but subsequent reports go to show that the treatment sometimes fails.

According to Peuch and Toussaint, Solleysel achieved considerable success in the treatment of canker. Solleysel, they say, "formulated on the treatment of canker some very just precepts which have been completely lost sight of by our chief veterinary authors." This veterinarian recommended at first to pare the foot, to thin the sole all round, and to apply over it an ointment composed of "Honey, 2 lbs.; brandy, 1 pint; verdigris, in fine powder, 6 oz.; white copperas, 6 oz.; and arsenic 30 grains." The instructions were to "mix the whole in a clean earthen pot, digest on a very slow fire, and stir it frequently until the composition was sufficiently thick." This mixture was to be applied every forty-eight hours, and at each removal the exposed surface was to be carefully cleaned and all pellicles removed. If the case did not improve after three or four dressings, a fresh mixture consisting of half the above composition mixed with three parts nitric

acid was to be applied two or three times ; then the former composition was to be re-applied. The exact measure of success which followed this treatment Peuch and Toussaint do not record, but, as already stated, it appears to have been considerable.

It seems unnecessary to further extend the citation of remedies which have at one time or another been employed. They have been many and various, and much of the success attributed to individual remedies has depended upon the method and manner of their employment. The aim in all cases is to eradicate the disease, and failure to destroy it at any part, whether at the circumference underneath apparently intact horn, or in fissures or cracks at the bottom of the lacunæ, fails as utterly in curing the disease as if no treatment had been adopted. With Moeller I am in full accord when he says, "careful execution of the operative part of the treatment counts for more than the medicine selected, although the latter plays a rôle which must not be under estimated."

Under the head of allied processes I include grease, seedy toe, and a specific superficial chronic coronitis or villitis, as I believe Haycock called it. No doubt some may wonder at the non-inclusion of thrush in this list, and there is unquestionably much to be said for its inclusion. Nevertheless in my opinion, we have in thrush an essentially different character of morbid process from that which characterises the others. Most authors ascribe to thrush an extrinsic and an intrinsic cause, but, however this may be, it appears to me to be a simple catarrhal inflammation of the keratogenous surface of the frog, induced by the irritation of dirt, by malnutrition through want of exercise, pressure, etc. It is marked by a sero-purulent fœtid discharge mixed with horn débris, and it differs from the other conditions named in its non-reproductive and non-infective character, and in its much greater amenability to treatment.

Grease.

The majority of practitioners recognise a similarity in nature between canker and grease ; indeed, some go so far as to say they are identical in origin and nature, the one being capable of originating the other, and that whatever difference they manifest depends upon the difference of the structures involved. My own experience does not bear out this contention, for although I have seen canker and grease co-exist, and the former to appear subsequent to the latter, I have never seen canker show the least indication of extending into grease, even when the coronary substance was markedly involved. Clinically, although similar in behaviour they are not identical ; they are not interchangeable, and they involve different structures, the one being essentially an ungular affection, the other a cutaneous one. Furthermore, heredity seems to play a more distinct rôle as a predisposing factor in the production of grease than of canker. The coarse hair of common, low-bred cart horses, in favouring the aggregation of cutaneous secretion, dirt, etc., induces an irritation, and thus contributes a favourable condition for grease. In grease, as in canker, the unfavourable hygienic circumstances to which low-bred horses are liable contribute a further predisposing influence. If I were asked to define grease I think I should call it a specific chronic infective dermatitis, involving the whole cutaneous structures, but more par-

ticularly the papillary layer and subaceous glands, and which when persistent involves the subcutaneous tissues.

The first noticeable indication of its presence is the liquid foetid discharge in the neighbourhood of the heels, especially marked at the bottom of the folds of skin in the pit of the heel. Soon in the neighbourhood there are seen enlarged vascular-looking papillæ, which are devoid of their cuticular covering in consequence either of its destruction by maceration in the discharge, or of its never having undergone the normal cuticular metamorphosis. The hairs are harsh, erect and agglutinated in small tufts. As the process persists the papillæ continue to increase through the combined effect of aggregation and hypertrophy, the liquid discharge increases in amount and offensiveness, the hair is mostly shed, and what few hairs remain stand erect between the enlarged fungoid papillæ. As the case continues the disease extends to contiguous parts, and ultimately the entire surface of the lower portion of the leg may be involved, and the skin and subcutaneous tissue enormously thickened. In the early stages thorough cleanliness and astringent applications are generally sufficient to eradicate it. In the later stages the most effective remedy is that recommended by Professor Williams, viz., to cut off the exuberant grapes with a thin, sharp, hot iron, and thoroughly scrape the surface, using the requisite care to avoid destruction of the corium. Many cases so operated on remain sound for years after.

Seedy Toe.

Seedy toe is included here, because we have in it an abnormal condition of the hoof horn which seems to depend upon an infective property, as indicated by its persistent propagation and extension. In this sense it may be said to be allied to canker, although differing in many of its most essential conditions from it. In seedy toe there is an uncementing of the union between the wall horn and the horny laminæ. The bulk of the latter undergoes a friable, mealy, or cheesy-looking change. At one time it was thought this change was due to an interference with nutrition at the coronary band. Others again believe it to be hereditary, and no doubt it is seen more frequently in horses of high action than in others; there may be an inherited condition of horn which favours the change, but the disease itself is of local origin and perfectly curable. Professor Axe, I understand, described some organism or organisms to whose influence he ascribed this condition. I am not aware whether his conclusions have been verified. Although seedy toe is a curable affection, no cure is effected without employing radical measures. Some cases are cured by scraping out all the crumbly, mealy horn, antisepticing the parts with carbolic acid, dilute nitric or hydrochloric acid, and filling up the space by hot tar and tow, pitch and resin, or gutta-percha. If any particle, however, of the mealy horn be left, the process continues and gradually extends, and the only radical cure is to remove the wall horn, and thoroughly clear out all mealy material, a proceeding which may be rendered all the more effectual by subsequently slightly touching the affected surface with a hot iron. Naturally, when this radical remedy is required recovery is slow, and must wait upon the growth of horn, but it is sure, and I have never known it fail.

Specific Coronitis.

We now come to a condition which, for want of a better term, we may provisionally call specific coronitis. This name by no means conveys the exact morbid condition to be described, since the deep part of the coronary band does not seem to participate in any marked degree in the process. In this condition there is an undoubted infective process involving the keratogenous surface of the coronary band, especially its perioplic surface, the keratogenous surface of the ergots, and the corresponding surface of the chestnuts. In two or three cases which have come under my notice the disease has extended posteriorly, and passed on to the secreting tissue of the frog, and in one case it extended thence to the sole. This case was considered one of canker, but it differed materially from canker in the greater tendency to hypertrophy of the fibrous base of the keratogenous tissue, and in the manner of its extension over the papillary surface. In this affection there does not seem to be such a marked liquefying decomposition of the horn product, but in its nature it is practically as inveterate as canker, although, from its more exposed condition on the coronet, it can usually be more readily cured. It is this condition, I take it, which Bouley describes under the term *crampaudine* or *mal-d'ane*, the former term from the view that the malady is akin to *crapaud* or canker, and the latter from the frequency with which asses are affected by it. This is essentially a corneous, in contradistinction to a cutaneous, malady, the skin participating in no real sense in the process. On the ergots and chestnuts the horn at first becomes dry, brittle, and splits readily up into small bundles of fibres, which are easily separated from their matrix. The surface thus exposed is more or less moist, and may even exhibit a slight oozing of blood. A somewhat similar condition exists on the coronet, the horn being rough, rugous, and fissured to a varying depth, producing a condition which Bouley likened to the rough bark of an old tree.

According to Peuch and Toussaint, Bouley in describing this condition said, "there is produced at the origin of the hoof a phenomenon identical to that which is manifested at the plantar region when affected by the morbid alteration which constitutes canker, saving that in the case of *crampaudine* the parts of the cuticle which remain sound secrete some flakes of horn which, being unable to unite in the normal manner, remain isolated in such a way that the wall is divided in two or three superimposed layers." Most practitioners must have met cases which this description of Bouley's vividly recalls, but they may not have seen it extend to the frog, and, indeed, when it does so it is usually included under the term canker. This is therefore a condition which, although apparently not absolutely identical, is nevertheless very closely allied to canker. Furthermore, in this condition the exposed papillary surface gives the characteristic canker reaction to the hot iron. The treatment is precisely similar to that for canker.