

**Notes of two cases of malignant pustule : together with a case of seventeen cases treated at Guy's Hospital / by J.N.C. Davies-Colley ; with a report on the microscopical examination of sections of skin affected with malignant pustule, removed during life, by F. Charlewood Turner.**

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### **Publication/Creation**

London : Printed by J.E. Adlard, 1882.

### **Persistent URL**

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NOTES OF TWO CASES  
OF  
MALIGNANT PUSTULE,

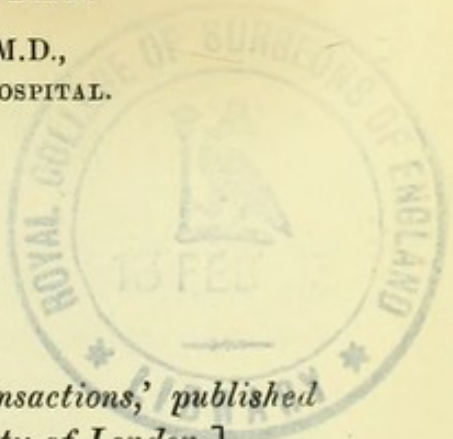
TOGETHER WITH  
A TABLE OF SEVENTEEN CASES TREATED  
AT GUY'S HOSPITAL.

BY  
J. N. C. DAVIES-COLLEY, M.C.,  
SURGEON TO, AND LECTURER ON ANATOMY AT, GUY'S HOSPITAL.

WITH  
A REPORT ON THE MICROSCOPICAL EXAMINATION OF  
SECTIONS OF SKIN AFFECTED WITH MALIGNANT  
PUSTULE, REMOVED DURING LIFE.


By F. CHARLEWOOD TURNER, M.D.,  
ASSISTANT PHYSICIAN TO THE LONDON HOSPITAL.

Read June 13th, 1882.



[From Vol. LXV of the 'Medico-Chirurgical Transactions,' published  
by the Royal Medical and Chirurgical Society of London.]

LONDON:  
PRINTED BY  
J. E. ADLARD, BARTHOLOMEW CLOSE.  
1882.



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(Received May 9th—Read June 13th, 1882.)

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THE affection known as malignant pustule or charbon appears to be rare in this country. The writers of our surgical text-books speak of it as a condition of which they have had little or no personal experience. Since the account of this disease, which was published by Dr. William Budd, of Bristol, nearly twenty years ago, very little had been heard of it on this side of the Channel until the recent outbreak of what was termed "wool-sorters' disease" in Bradford. At Guy's Hospital, however, we have been aware, for the last nine years at least,



of the not infrequent appearance of this dangerous malady in our neighbourhood. This is, no doubt, due to the foreign fleeces and hides which are used in the great leather manufactories of Bermondsey. I find that since the autumn of 1873 at least seventeen cases have been admitted into the hospital. Three of these were recorded by me in the 'British Medical Journal' (vol. i, 1878), and another was published by Mr. Golding Bird in the 'Guy's Hospital Reports' (series 3, vol. xxiii). Last year two well-marked examples were admitted into my wards, as well as three others under the care of my colleagues. I have therefore thought that it would not be unprofitable to bring before the Society the details of my two cases, together with a table containing the chief facts relating to the seventeen cases which have occurred under my colleagues and myself. It appears to me of much importance to call attention to the frequency of the disease in connection with the leather trade, and to the facility with which it may often be cured even when the local and constitutional symptoms have been allowed to attain a considerable development. From occasional notices in our journals and elsewhere I am afraid that medical men sometimes fail to recognise it, and even after the diagnosis has become no longer doubtful that they do not appreciate the necessity of early operative treatment.

CASE 1.—Frederick R—, æt. 31, who works at a hide warehouse, was admitted into Guy's Hospital on April 16th, 1881.

For eight days previous to the appearance of the pustule he had been working among Australian fleeces, and had not handled any of the hides, though he had been through the rooms where they were stowed. On Sunday, April 10th, he noticed a very small red spot on the right lower eyelid at the outer corner. The next morning the lid was puffed, and the spot had increased in size. He went to work feeling quite well, and he was rallied by his



companions on account of his black eye. On Tuesday the manager sent him to Guy's Hospital, where he was recommended to poultice the eye. On Thursday he came again, and the swelling was scarified. This day he felt poorly. He had lost his appetite, and was feverish. That night and the next he could not sleep. On Friday he was trembling very much, but the pain was not great, not as much as would have been caused by an ordinary boil. On Saturday he was admitted. His right eye was then completely closed; the lower eyelid was much swollen, and measured  $2\frac{1}{2}$  by  $1\frac{1}{2}$  inches. A considerable portion of its surface was occupied by an "ugly yellow vesiculopustular mass." The cheek and surrounding parts were greatly inflamed, especially the upper eyelid. The glands below the jaw were much enlarged. He was not in pain, but felt very miserable, and did not care what was done to him. I saw him in the afternoon. Upon his lower eyelid was the characteristic vesicular eschar, of which I shall give a more detailed description in the second of my cases, and there was much surrounding œdema. About 5 p.m. ether was administered, and the lower eyelid was removed by Mr. Jacobson down to the deeper strata of the orbicularis palpebrum. The muscular fibres had lost their natural colour, the superficial layer being green and sloughing, the deeper dark black, except towards the inner canthus. Numerous plugged vessels showed as scattered black points throughout, and there was enormous ecchymosis of the palpebral conjunctiva. The eyeball itself was healthy. Some incisions were made in the upper eyelid, and chloride of zinc applied to the surface left by the removal of the lower lid. Bacilli were found in the blood. There was no enlargement of the veins. Immediate relief followed the operation, and in five weeks the patient went out quite well, with the exception of considerable eversion of the lower eyelid, and a granulating wound which had not quite healed.

I am indebted to my colleague Mr. Jacobson, who



kindly operated on this case during my absence, and subsequently took care of it, for the permission to bring it before you, and for most of the details in the report.

CASE 2.—Thomas W—, æt. 39, a tanner, was admitted July 11th, 1881. His work is to take foreign hides, salted as well as fresh, and after they have been soaked in water to transfer them to lime pits. He had had nothing to do with the hides after July 2nd because work was slack. On July 6th he noticed that there was a red itching swelling on his left cheek. He remembers also that it was moist and that he scratched it. The next day the place was much larger, and a quantity of "watery stuff" ran from it. Up to the 10th he felt well, had a good appetite, and slept as usual. The lump, however, got rapidly larger, and on that day (the fifth from its appearance) he had headache and loss of appetite. The next day he came up to the surgery and was admitted.

He was a healthy-looking, well-nourished man, and had always enjoyed good health. About the centre of the left cheek there was a swelling and eschar, of which the accompanying sketch (see Plate VIII), made at the time by Mr. Hurst, gives an accurate representation. It was a nearly circular area of slightly raised indurated tissue,  $1\frac{1}{4}$  inches from above downward,  $1\frac{1}{8}$  inches from side to side, and probably extending  $\frac{1}{8}$  to  $\frac{1}{4}$  inch down into the soft parts beneath the surface. In the middle it was dry and of a blackish-purple colour. At the sides it was covered with small vesicles, closely packed together, and containing straw-coloured serum. Around this was a red indurated surface from  $\frac{1}{8}$  to  $\frac{1}{4}$  inch across, ending somewhat abruptly in the healthier tissues, which were rather redder than normal. The area was nearly flat, higher by about  $\frac{1}{20}$  inch at the edges than the centre, and raised from  $\frac{1}{10}$  to  $\frac{1}{8}$  inch above the adjacent skin. The submaxillary region and left side of the neck were red and swollen, and the œdema extended as low as the third rib



of that side. The cheek and eyelids were not swollen. I could detect no swelling of the lymphatic glands, but the reporter states that those in the posterior cervical region were enlarged and tender. The temperature was  $101^{\circ}$ , and the pulse quick.

Ether having been given I cut out the whole mass, making my incision a quarter of an inch clear of the margin. A considerable artery, probably the facial, and a corresponding vein bled freely. My dissection must have nearly reached the buccinator, for when I put my finger inside the cheek there appeared to be not more than one eighth to one sixth of an inch of soft parts covering it. I next applied a paste consisting of one part of chloride of zinc to three parts of flour to the cut surfaces at the edges of the wound, and finally I covered the parts with dry carbolic gauze.

In the evening his temperature had fallen to  $100^{\circ}$ , and it was never afterwards observed to rise above this level. The œdema rapidly disappeared, and the general health of the patient was at once restored. A large granulating wound, nearly two inches in diameter, was left, and when the slough caused by the chloride of zinc had separated, it was found that the caustic had opened Steno's duct. The salivary fistula thus formed somewhat retarded his complete recovery, but it was readily cured by the insertion of one end of a wire into the buccal orifice of the duct, while the other end was brought out into the mouth through the inner side of the duct, about a quarter of an inch higher up. The two ends were twisted together so as to form a wire seton in the last part of the duct, while the sides of the wound in the cheek were carefully adjusted with a button suture. I last saw him in December. His cheek was then completely healed, and he was but little disfigured by the scar, which measured one inch from above downwards, and half an inch from side to side.

A specimen was taken of the blood which flowed at the time of the operation, but owing perhaps to an imperfect



method of preparation, the results of the examination were negative. On making a section of the parts removed, I found that the blackened part in the centre extended very little into the true skin, but underneath it there was a congested patch of a dark purplish red colour in the corium and subcutaneous connective tissue. The indurated parts were at once placed in methylated spirit, and sections were subsequently made and stained after Koch's method by Dr. Charlewood Turner (see Plate IX). In these we discovered that the layers of the corium beneath the eschar contained abundance of large rod-like bodies, which were no doubt the *Bacilli anthracis*, as well as some collections of spore-like granules which appeared to have been formed by the breaking up of the bacilli. The accompanying drawings (see Plate IX, figs. 1, 2, 3) show the numbers and form of these bacilli, and Dr. Turner has kindly added a fuller description of their microscopic appearance.

Annexed is a table of the seventeen cases which have been admitted during the last nine years. They were all as well marked examples of malignant pustule as those which I have just related.

During the same period we have had under our care several cases of malignant facial carbuncle, but I have been careful to exclude these from my list. It will be seen that in all these cases the charbon has been observed upon an exposed part of the body. Fourteen out of the seventeen patients had been engaged in handling hides or fleeces, either as tanners or wharf labourers. One of them, however, had not touched hides for five weeks previously to his attack. But it is probable that some infectious particles had adhered to his clothes, from which he afterwards caught the disease. Of the three others in whom no history of infection could be obtained, one was a waterside labourer, and another was the wife of a man following the same employment, and all three lived in the neighbourhood of the wharves where the hides are landed. Possibly also in two of these cases a history of infection might



have been obtained, but they were the first which were observed, and the reports are in this respect imperfect. On the other hand, even if there should have been no direct contact, it is very possible that the poison may have been conveyed to them by flies which came from hides in their vicinity.

Our registrar, Mr. Symonds, has recently made some inquiries as to the source from which Case 1 was infected. The foreman of the warehouse from which the workman came said that the hides were chiefly from Cape Town, Bombay, Morocco, and Australia, and that they consisted of buffalo, ox, goat, and sheep skins. The workmen had no knowledge of the Van mohair, which was not long since the cause of an outbreak at Bradford. The Australian wool which the man had been handling was still in fleece. It was uncleaned, but the hide was dry and without odour. The foreman had been employed twelve years at this business, and had known only three men affected, viz. the present case, one admitted under my colleague, Mr. Lucas, in 1880, and another man who was treated in the London Hospital. There were several warehouses of the same kind in Tooley Street, but he had never heard of a similar disease at any of them. Neither he nor the workmen had any idea that the affection had any connection with the hides or wool. Mr. Symonds was also informed that a gentleman, the partner in a similar business, had died after a short illness from a spot in the back of the neck, like that which the labourers at the warehouses had had, but it had been attributed to the bite of a mosquito at Mortlake.

In the 'Daily News' of March 11th, 1882, there is the report of an inquest upon a similar case, in which a man, who had been working in a Bermondsey tanyard, died from spreading œdema accompanied by symptoms of blood-poisoning, which was attributed to the absorption of arsenic from the hides through an abrasion in the cheek. It will be seen that in several other instances recorded in my table, those affected stated that they had



lost fellow-workmen from the same disease. But I am not aware that it had in any case been attributed to poison derived from the hides.

The virulence of the poison is shown by the fact that some of those attacked had not handled the hides until they had undergone a long process of soakage in quick-lime and water.

It will be seen that, in respect to age, our cases are pretty evenly distributed from that of eleven to forty-seven years. If we can draw any conclusion from so small a number of instances, it would be that old age and childhood are alike exempt, and that it occurs most frequently between puberty and middle age. Probably, however, this is the age of most of the workmen who are exposed to the infection.

According to Nicholai animals are most frequently attacked in August and September. This may account for the fact that the majority of our cases (twelve out of seventeen) were admitted in September and the four succeeding months. If we suppose that the hides were stripped from animals which had died from splenic fever in August and September, we might expect in the earlier part of the winter to meet with the disease in the men who had to handle the recently imported hides. Doubtless, however, many, if not most, of the hides came from countries where the time of prevalence of the disease in animals differs from that observed in Europe, so we should expect to find considerable variety in the seasons of the year in which the infection is likely to spread to men.

As yet I have not heard of any instances of internal infection, either by the alimentary or respiratory tracts, like those which have occurred at Bradford or those which have been described by Nicholai. I should expect, however, that now that our attention has been fully aroused to such a possibility, we shall find that some of our cases of severe inflammation of the lungs or intestines with septicæmic symptoms have been set up by this cause. There have also been, as far as I am aware, no cases of



malignant oedema without the formation of a primary central eschar, and I do not know that any have yet been observed in this country, unless those described by Dr. Budd, which seem to me to differ somewhat from typical cases of charbon, should be referred to this category. Out of 300 instances of external inoculation, Dr. Nicholai appears to have seen only two of this form. So it is not strange that in our limited number none should have yet occurred.

As a rule the diagnosis is easy. The raised indurated area with its central blackish depression surrounded by small vesicles can hardly be mistaken for any other affection. Generally, also, the painlessness of the swelling and the occupation of the patient will give some clue to the recognition of the disease. It has sometimes been confounded with malignant carbuncle of the face. But in carbuncle, even though there should be no evidence of central softening, there will usually be yellow spots of commencing suppuration upon the surface of the indurated mass. These spots, the severe pain, the absence of the characteristic eschar, and the evidence of implication of the adjacent veins, are sufficient for the discrimination of this disease.

I do not think that a simple poisoned wound could lead to any difficulty in diagnosis. In such a case there would usually be only one large and painful pustule, instead of numerous vesicles, in the centre of the inflamed area. The affection which I have found to resemble it more closely has been a primary chancre of the face, for here it is not uncommon to find a large scab upon a red indurated base, with considerable swelling of the soft parts and the contiguous glands. Probably, however, the history of the disease, its painfulness, and the slowness of its development, together with a closer inspection of the eschar, would enable us to form a correct diagnosis.

Four of our seventeen cases died, three from dyspnoea and the fourth with septicæmic symptoms. In one we were unable to make a post-mortem examination. In two



cases fibrinous exudations were found in the mucous membrane of the stomach and small intestines. The fourth had œdema glottidis. The veins were implicated in none of the cases. Two of the fatal cases were the first in my series. They were admitted in a moribund condition, and it was not thought necessary to excise the charbon. Of the fifteen cases in which excision was resorted to, twelve showed extension of the disease beyond the limits of the eschar, by inflammation of the soft parts, or swelling of the glands, and eight had well-marked constitutional symptoms. Yet all except two recovered rapidly. The fatal cases had a duration of 8, 9, 19, and 5 days respectively. In the three more rapid cases the charbon was upon the neck, and dyspnœa was a prominent symptom. This was shown to be due to œdema glottidis in the two cases which were examined after death.

With respect to the treatment, it is very important to remember that even after the swelling has extended to a considerable distance, and the adjacent glands have been affected, and after well-marked symptoms of blood poisoning have developed themselves, the patient may be restored to health by the removal of the indurated area of skin which was primarily attacked. As long as this remains, it acts as a focus from which fresh poisonous material is constantly being disseminated over the body; but after it has been removed, I presume that the system is enabled to eliminate that which has already reached the circulation, and so recovery takes place. In his work upon this disease, Bourgeois speaks of the treatment by excision as barbarous and obsolete, and he recommends the destruction of the eschar with caustic potash. In some of his cases, however, the disease appears to have spread notwithstanding the use of this remedy.

In the first case upon which I operated I began by using nitric acid, but I soon found that it ate too slowly through the indurated skin. So I gave up the use of the acid and proceeded to excise the whole of the inflamed



area. I subsequently applied chloride of zinc to the edges of the opening (see Table, p. 248).

This is the treatment which I have adopted on every other occasion, and always with success. But I am doubtful whether so severe a procedure is always necessary. Of course where the disease when unchecked is so fatal, it is better, as in a case of cancer, to err on the side of removing too much rather than too little of the affected tissue. As, however, on carefully examining the parts excised in my last case, I found that the bacilli, though abundant in the fibrous part of the skin and the sheaths of the hair follicles, were entirely absent from the subcutaneous fat in the deeper part of the section, I think that perhaps it was unnecessary to use the chloride of zinc in the subsequent treatment of the wound. On another occasion, if there was danger of the caustic reaching any important structure beneath, I shall be disposed to be content with the excision of the indurated skin, or I should take care to use afterwards some less destructive agent such as iodoform, perchloride of mercury, or a strong solution of carbolic acid.



*Table of Seventeen Cases of Malignant*

No.	Physician or surgeon.	Name.	Sex.	Age.	Occupation.	Admission.	Seat of charbon.	Days since attack.	Condition of adjacent parts.
1	Dr. Habershon	M. A. C.	F	11	—	Oct. 18, 1873	Under chin	6	Œdema of face glands swollen
*2	Mr. Davies-Colley	E. M.	M	43	Waterside labourer	Nov. 22, 1873	Behind left angle of jaw	7	Hard œdema of neck
*3	„	J. F.	M	33	Tanyard labourer	Dec. 20, 1873	Tip of chin	6	No œdema around
*4	„	G. J.	M	27	Wharf labourer	April 7, 1875	Left cheek	7	Some swelling of glands under jaw
5	Mr. Howse	J. O.	M	47	Tanner	Sept. 4, 1877	Right cheek	15	Great swelling glands enlarged
+6	Mr. Golding-Bird	D. D.	M	20	Dock labourer	Oct. 17, 1877	Right side of neck	3	Whole side of neck and shoulder much swollen
7	Mr. C. Forster	A. P.	M	17	Tanner	Jan. 18, 1878	Anterior surface of forearm	6	Glands enlarged
8	Mr. Howse	F. H.	M	18	Works among hides	Nov. 4, 1878	Under chin	3	Much brawny infiltration
9	Mr. Golding-Bird	J. E.	M	23	Works in tanyard	Nov. 13, 1878	Cheek	4	Swelling around glands under chin enlarged
10	Mr. Bryant	J. R.	M	28	Hide cutter	Nov. 28, 1879	Forearm	5	Blush up to axilla

\* Reported in 'British Medical Journal,' vol. i, 1878, p. 853.



*Pustule treated at Guy's Hospital.*

Constitutional symptoms.	Mode of infection.	Treatment.	Result.	Remarks, post-mortem appearances, &c.
yspnœa	—	Incisions	Died Oct. 20th	She lived in Horseleydown. P.M.—Edema glottidis, and diphtheritic patches in the small intestine and vagina.
yspnœa; fever	—	Laryngotomy	Died Dec. 24th	Two years a total abstainer. P.M.—Edema of larynx. No pus in veins.
one	Handling hides	Excision; chloride of zinc paste	Recovered	Had been six years a total abstainer.
one	Had been landing hides	Excision; chloride of zinc paste	Recovered	Told us that a similar affection had been fatal to some of his fellow workmen.
ery ill; vomiting; temp. 103°	—	Excision; chloride of zinc	Died Sept. 8th	Said it was frequent for tanners to be thus affected. P.M.—He was found to have fibrinous exudations in stomach and small intestines.
temp. 103°; pulse 128	Five weeks ago unloaded dry skins	Excision; nitric acid	Recovered	Had an abscess of neck, and erysipelas during recovery. No bacilli in blood.
ick; faint; no rest; temp. 101.2°	—	Excision	Recovered	—
ooks quite healthy and strong	—	Excision; perchloride of iron and caustic potash applied	Recovered	Nothing abnormal found in the blood.
headache; shivering	—	Excision; carbolic and tannic acid	Recovered	—
one	Sheep and goat skins from Cape	Excision; chloride of zinc lotion	Recovered	No bacilli found in blood or serum. Two years ago a workman died of same disease, caught from similar hides.

† Reported in 'Guy's Hospital Reports, Series 3, vol. xxiii, p. 224.



No.	Physician or surgeon.	Name.	Sex.	Age.	Occupation.	Admission.	Seat of charbon.	Days since attack.	Condition of adjacent parts.
11	Mr. Lucas	D. W.	M	23	Wharf labourer	Oct. 10, 1880	Right cheek	5	Much swelling eye closed; lip inch thick; gland enlarged
12	„	S. C.	F	47	Domestic work	Jan. 4, 1881	Left cheek	11	Eye closed; gland under jaw enlarged
13	Mr. Jacobson	F. R.	M	31	Hide warehouse	April 16, 1881	Right lower eyelid	7	Upper eyelid swollen also glands
14	„	F. F.	M	47	Stevedore	July 2, 1881	Back of forearm	4	—
15	Mr. Davies-Colley	T. W.	M	39	Tanner	July 11, 1881	Left cheek	6	Œdema to the rib
16	Mr. Golding-Bird	J. R.	M	27	Wharf labourer	Sept. 19, 1881	Cheek	3	—
17	Mr. Bryant	M. S.	M	22	Tanner	April 20, 1882	Right side of neck	3	Extensive œdema



Constitutional symptoms.	Mode of infection.	Treatment.	Result.	Remarks, post-mortem appearances, &c.
one on admission; two days before had fainted twice, and had had a sleepless night	Handling hides	Excision; cautery	Recovered	The day before he came in the swelling was still greater, so, perhaps, he was then recovering.
very little	Husband unloads ships, but had not handled hides	Excision; cautery	Recovered	—
sleeplessness; trembling	Australian fleeces	Excision; chloride of zinc	Recovered	Bacilli found in blood; fuller account in paper.
one	Australian wool	Excision	Recovered	—
headache; loss of appetite; temp. 101°	Hides, but has not touched them since July 2nd	Excision; chloride of zinc	Recovered	Fuller account in paper.
no appetite; sick; limbs stiff	Hides, horns, &c.	Excision; galvanic cautery	Recovered	—
dyspnœa; temp. 101.6°	Hides which had been soaked in lime	Excision	Died April 22nd	No P.M. He died from dyspnœa, remaining conscious the whole time. No bacilli in blood or serum.



*Report on the Microscopical Examination of Sections from a portion of the Skin of the Cheek affected with Charbon, removed during life from a patient of Mr. Davies-Colley. By F. CHARLEWOOD TURNER, M.D., Assistant Physician to the London Hospital. (See Plate IX.)*

THE specimens received for examination were portions of a piece of skin and subcutaneous adipose tissue of circular outline, divided by median crucial incisions.

The specimens were much thicker at their central than at their peripheral parts, the former being capped by a blackish eschar.

Thin sections were made parallel with the planes of crucial incision, thus showing one half of the complete median section of the portion of skin removed. The specimens were hardened in spirit only, in which they had been placed immediately after removal. The sections were made with the freezing microtome, stained in the methyl-aniline violet, and mounted in Canada balsam.

Inspection of the sections shows that the central thickening is due chiefly to swelling of the cutis. An early stage of this swelling of the cutis is seen in one of the sections shown, in a well-defined elevation of the Malpighian layer of the epidermis by serous infiltration into the most superficial part of the cutis.

In the other section there is seen at the border of the eschar a superficial vesicular formation, corresponding with the fringe of vesicles encircling the eschar described by Mr. Davies-Colley.

Immediately below the Malpighian layer at this part there is a defined area occupied by cloudy, granular, fibrino-serous exudation, studded with leucocytes, and containing numerous bacilli. The bacilli are aggregated in masses along the sheaths of the hair follicles, and along a well-defined boundary line between this area and the deeper tissue, which is also swelled and studded



with leucocytes, but presents a more delicate and clearer network, in which but few bacilli are to be seen, excepting along the sheaths of the hair follicles (see Plate IX, figs. 1 and 2).

The appearance is as though at this part there had occurred a separation between the cutis and the Malpighian layer of the epidermis above it, possibly from continued maceration of the tissue in the exuded serum, and that the sero-fibrinous exudation escaping into the space so formed had coagulated and undergone degenerative changes, affording conditions especially favorable to the development of the bacilli.

The bacilli are present in still greater abundance about the border of the eschar. The microscope shows that this eschar consists of the condensed and altered tissues of the Malpighian layer of the epidermis, and of the most superficial part of the cutis with the exudation coagulum in it. Along the deep surface of the eschar is a dense aggregation of leucocytes, and at the inner border of this numerous bacilli are visible. But they are most abundant about the margin of the eschar, and more especially just beneath the Malpighian layer of the epidermis. Dense aggregations of the bacilli are seen at several points; many of which appear to be formed in spaces in the exudation material. With them are many deeply-dyed, coarsely-granular masses (? zooglœa). In places, as shown in fig. 3, the bacilli forming these clusters seem to be studded with sporules; some of the bacilli are broken up into short pieces; and rows of granules, similar to those composing the contiguous granular masses, appear as the relics of other bacilli.

In portions of exudation matter still adherent at the surface of the Malpighian layer at this part, with fragments of the cuticle, clusters of bacilli are here and there to be seen, and also deeply stained granular masses.

In the papular elevations of the cutis just beyond the border of the eschar a few bacilli are to be seen, beyond this there appear to be no important changes in the struc-



ture of the cutis, and no bacilli were observed. In the deeper part of the cutis in the central region but few bacilli could be seen, and in the adipose tissue, which is greatly swelled, especially at the borders of the section, where the fat cells are widely separated from each other, a careful search failed to afford evidence of the presence of bacilli.

Immediately below the eschar several vessels of considerable size are seen in section. In some of them bacilli are seen.

In the subcutaneous adipose tissue many arteries and veins of considerable size are included in the sections. Many of these were examined, but in none was any definite evidence of the presence of bacilli found. This tissue was the seat of much sero-fibrinous and corpuscular infiltration, especially in the centre of the affected area. There the exudation in many parts has a cloudy, opaque, granular appearance, and the fat cells are widely separated from each other. The whole tissue is studded with leucocytes, and they are massed in great number along the vessels, and around many of the hair follicles and of the sebaceous glands connected with them; several of these last are seen to be invaded by the corpuscular infiltration, and the characteristic appearance of their epithelial structure is lost to a greater or less extent. No bacilli were discovered in these glands.

The bacilli seen in these specimens exceed the dimensions mentioned by Bollinger in vol. iii of Ziemssen's 'Encyclopædia of Medicine.' When measured with the camera the full-sized bacilli were found to be from  $\frac{1}{1400}$ th to  $\frac{1}{1600}$ th of an inch in length, some were seen larger. According to Bollinger's observations their length varies from .007 to .012 of a millimètre, or from about  $\frac{1}{3700}$ th to  $\frac{1}{2600}$ th of an inch. The bacilli are straight or slightly curved; several are to be seen dividing into two parts by transverse fissure.

The variety of forms presented by the leucocytes and their nuclei in these specimens is remarkable. Many



of the nuclei present an irregular hour-glass form, as though arrested in the process of active amœboid movements, others have a horse-shoe shape with moniliform character, as if about to divide into several parts. The greater number of the corpuscles have two, three, or more nuclei.

The nuclei are surrounded by a cloudy mass of protoplasm, which was quite distinct by its fuller staining, when the specimens were first examined soon after being mounted, but which has since become indistinct from a partial diffusion of the pigment. No cell-wall could be distinguished around the protoplasmic masses forming the corpuscles.



## DESCRIPTION OF PLATES VIII AND IX.

Case of Malignant Pustule (J. N. C. DAVIES-COLLEY, M.C.).

### PLATE VIII.

CASE 2.—Thomas W—. Malignant pustule on the left cheek; the facial outline has been added to show its position.

### PLATE IX.

CASE 2.—Microscopic sections of a portion of the skin of the cheek affected with charbon.

FIG. 1.—Part of a transverse median section at the margin of the eschar—( $\times 60$ ).

- a.* Malpighian layer of epidermis.
- b.* Sheath of hair follicle.
- c.* Boundary between space immediately below the Malpighian layer in which the bacilli are abundant, and clearer space in which there are few.
- d.* Margin of eschar.
- e.* Dense aggregations of bacilli.
- f.* Deeply stained granular masses.

FIG. 2.—A part of the same section at *b*, highly magnified, showing clustering of bacilli along the sheath of the hair follicle (*b*), and along the boundary line (*c*) shown above—( $\times 700$ ).

In this drawing many bacilli are represented with one extremity tailing off. They are all of uniform thickness throughout.

FIG. 3.—A cluster of bacilli studded with granules and breaking up into granular bodies resembling those forming the adjacent masses—( $\times 700$ ).







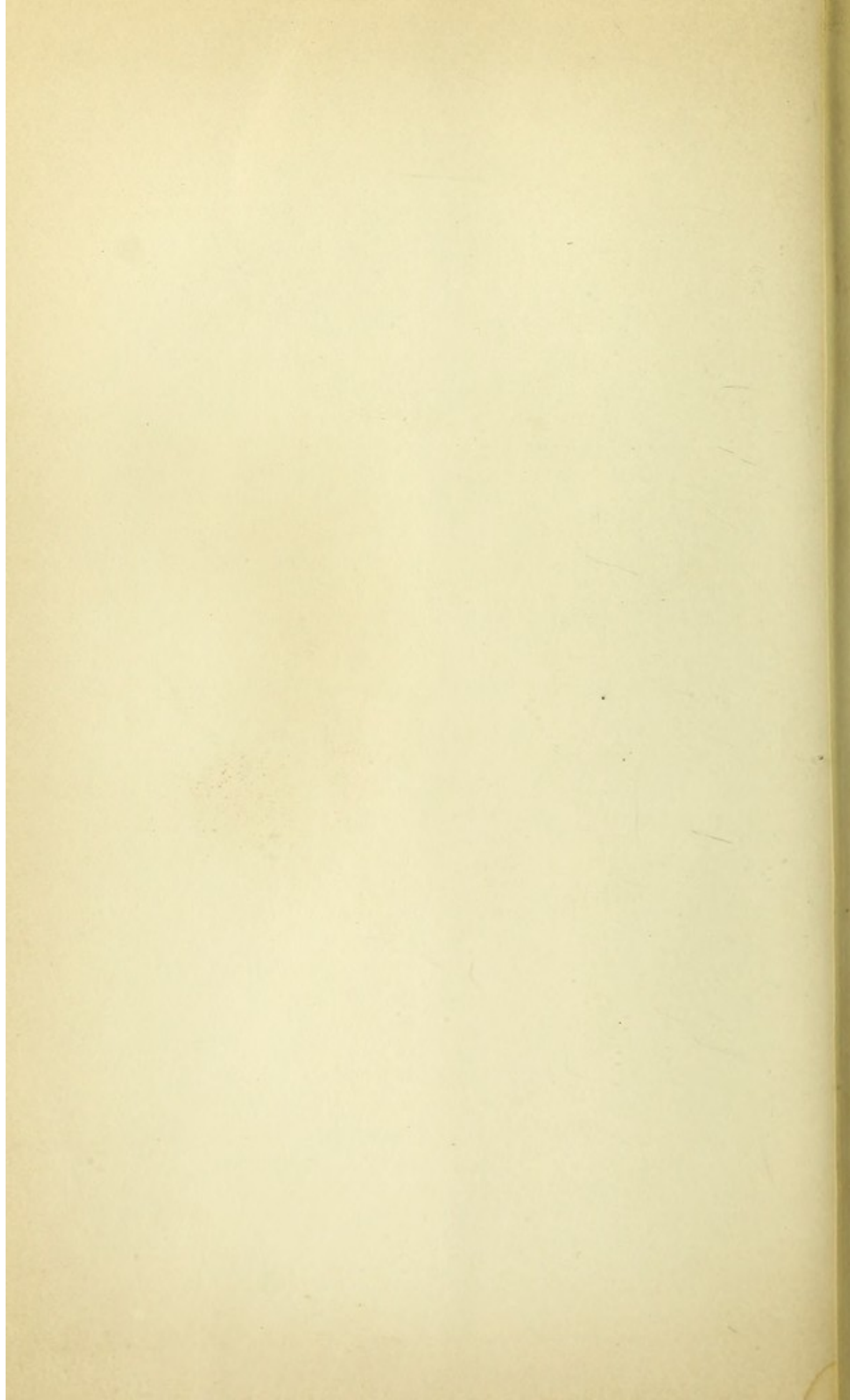




Fig. 1.

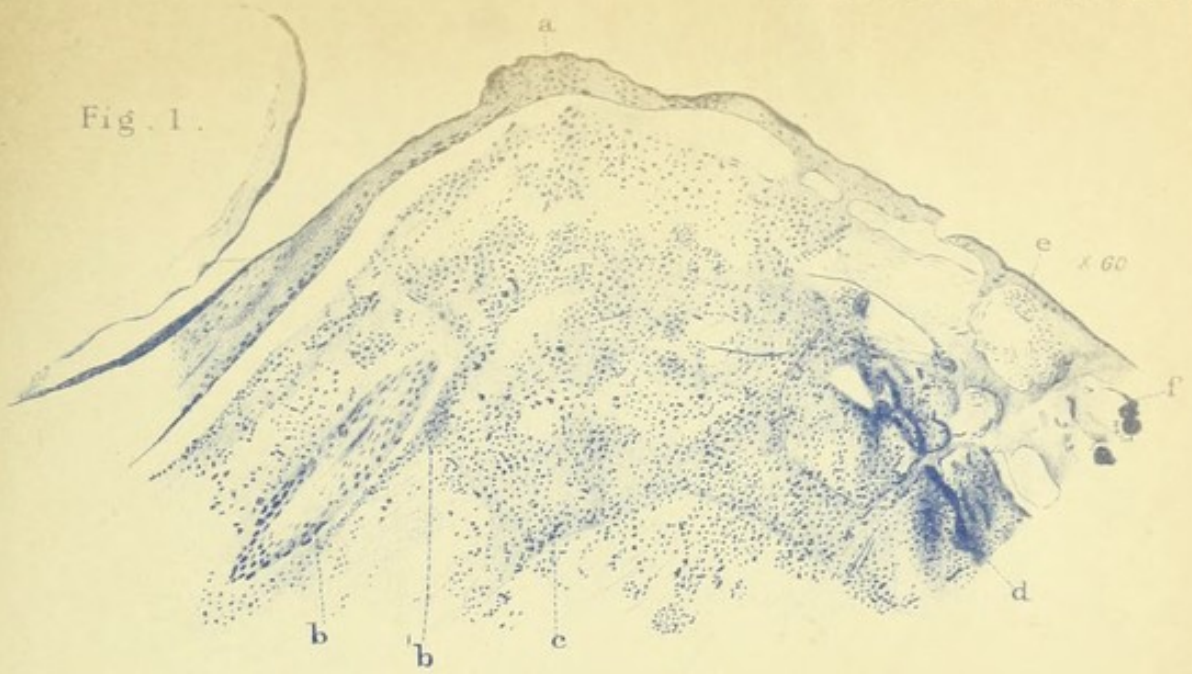


Fig. 2.



Fig. 3.

