

## A NOTE ON THE CAUSATION OF BLUE TOES (CYANIDROSIS?) WITH REPORTS OF CASES.

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A CERTAIN number of cases have been recorded or referred to, of a blue discolouration between the toes occurring chiefly in young women. Observers have variously put this down to Chromidrosis, to possible Bacterial products in the sweat, *e.g.*, *B. pyocyaneus*, or to Hysterical artificial colouration. My personal experience is limited to three cases.

CASE 1.—The first was a young girl of about 16 years old, who came to the Sheffield Royal Hospital some three or four years ago saying her toes were going blue. On examination I found that between the toes only there was a peacock-blue discolouration, which did not disappear on washing or rubbing. I accused the girl of having wilfully coloured herself, and as she was much annoyed, she went away and I lost sight of her.

CASE 2.—The next case occurred in a married woman, aged 50, in June, 1902. The blueness of her toes was first noticed six months previously by her doctor when examining her leg after an injury. Ever since then she has observed the same condition, and she thinks her feet are colder than they used to be. Her feet do not sweat much. *She always wears black stockings.* Between all the toes on both feet, at bottom and sides of clefts, there are distinct blue-green (peacock-blue) discolourations—colour of blue mould. It extends up to the middle joint of the toes, where the skin is soft and moist; it seems to be in the epidermis, and a flake of peeling epidermis shows the same colour.

Dr. Robertson, Professor of Bacteriology, University College, Sheffield, kindly made cultures from the blue areas, but after very full investigation not a trace of any blue colouring organism was found in any of them.

The patient remained in hospital some time and gradually the colour disappeared. Some of the blue areas were covered with zinc gelatine, others left uncovered, but both disappeared gradually and equally whilst the patient was in bed. I was a good deal interested in these two cases, especially as to the causation, for they were exactly alike and I had not seen any other similar case. Case No. 2 was no hysterical young girl, but a mother of a large family, so that wilful application of colour was not likely.

Careful bacterial examination had proved negative, so that the question of Chromidrosis had to be faced. Inquiries made as to stockings seemed negative, as she never wore anything but black ones. As we shall see directly, that was where the oversight was made.

Some weeks later whilst examining the chest of a female patient I noticed a similar colouration limited to the axillæ and I found she was wearing a dark purple blouse. The fact that the discolouration, which was evidently due to the dye from this, had not affected the rest of the body or arms in contact with it, but had affected the moist axillæ, made me strongly suspect that the colour I had seen between the toes in the cases reported was due to dye from the stockings, although deep in the webs between the toes was just the part of the foot which was not in immediate contact with the stockings. This I was able to prove definitely in the following case:—

CASE 3.—On August 14th, 1902, a married woman, aged 30, came up to my out-patient department for rheumatism in the legs and arms. She had previously had rheumatic fever. The House Physician, Dr. McFarland, whilst examining the feet, called my attention to an extreme condition of blueness between the toes. I need not repeat a description of it; it was the identical peacock-blue colour of the other two cases, only much more intense, and not only were the webs and clefts between the toes coloured—but also the soft nail-bed just beneath the free ends of the nails and the nail-dirt and the horny parts of the soles. She had not noticed it herself.

The illustration shows the condition well. On looking at the feet, as the patient stands up, there is hardly anything visible of the blue colour, but on separating the toes it is strikingly evident, and also on the soles of the feet. As we shall see later, that is just the parts where the most sweat is produced.

The patient stated she had bought a new pair of *black stockings* one week before and worn them ever since. They cost  $6\frac{1}{2}$ d. a pair!

I examined the stockings in the laboratory and found that on soaking small portions in (1) weak acid (2) weak alkali and (3) distilled water respectively and placing the solutions in an oven at the body heat, within half an hour the weak acid solution was coloured a strong peacock-blue whilst the alkali solution and water solution were not coloured. At the end of twelve hours the difference between them was still more striking.

There seemed no doubt as to the blue being due to the dye in the *black stockings*, and the immediate cause for it the acid decomposition of the sweat and the warm moist surface, the reason of its limitation to certain parts being that there is more moisture there from sweat and more decomposition (more acid) from accumulated sweat.

In order to prove it further, I had portions of one of the stockings applied to the patient's axillæ for twenty-four hours, and on removal both axillæ were stained blue similarly to the feet. She was a free sweater and a litmus paper on her moist palm showed an acid reaction at once.

In the *Polyclinic* for June, 1902, p. 305, Mr. Jonathan Hutchinson refers to a case of blue patches and streaks on the feet of a girl, of which he has an illustration, and comes to the conclusion that it is *not chromidrosis* but due to an aniline dye applied for purposes of hysterical deception. I suspect that "cheap black stockings" should replace the hysterical deception, as the cases are so common, and aniline dyes are not easy materials for poor girls to purchase.

Dr. G. Parker, of Bristol, who reported a case briefly in the *Bristol Medico Chirurgical Journal* for March, 1902, has kindly given me further particulars about his case as follows:—

"My patient is a middle-aged woman, the mother of ten children, and is apparently quite healthy. Her first attack of blue pigmentation on the feet occurred during an attack of rheumatic fever eighteen months ago; it lasted six months and then gradually faded away, returning in December last with a subacute relapse of the rheumatism, and had persisted when I last saw her about April. We tried chloroform, ether, and ammonia to remove the pigment, but in vain, and a culture was made and search for *B. pyocyaneus*, but it was not found. The patient had tried scrubbing with all sorts of domestic

remedies, clean white stockings, etc., but nothing had any effect. The pigment is deposited in the cleft between each of the toes on both feet just where the black marks would be in very dirty feet. The colour is a bright, rather pale blue. No history of coloured stockings, special medicine, etc., can be made out. I scrubbed these patches with chloroform, etc., myself, so that I am sure of the fixity of the dye."

Dr. E. H. Edwards Stack, of Bristol, who also reported a case, writes :

"I have seen about twenty cases at Barts and here, and they have nearly all been in young women; I have only seen one in a boy, a water-colour sketch of which I send you, and which gives a very good idea of the appearances. He had only one leg, or no doubt he would have had the same on the opposite foot, as it is nearly always bi-lateral. The condition is by no means always associated with particularly dirty or sweaty feet, but the feet are always of the moist variety. I have not seen or heard of a case amongst the well-to-do, but then it might not be considered worth while bothering about. A few of the patients came on account of the condition. I am inclined to think it is a chromidrosis, although it is quite a different clinical entity to the usual disease described under that heading, which attacks the face of constipated females. I have made many inoculation experiments and cannot find anything; one of course often finds staphylococci, proteus, and moulds of various sorts from the skin, but nothing strange and nothing which yields any colour during incubation or at ordinary temperature. Nor can I transplant it to the feet of other patients. The cases have never had any treatment, as they always clear up after admission in about ten days with the ordinary washing the patients get as routine, and it does not reappear. It has certainly no relation to the kind of stockings worn."

It will be noted that in these cases, so clearly and fully described by Drs. Parker and Stack, there is always the same statement, that scrubbing and washing and rubbing with ether, chloroform, paraffin, etc., has been tried, but without effect; in other words, the epidermis is dyed and stained to some depth, and these things are not solvents of the dye. Also in the course of time with ordinary cleanliness in hospital, they disappear of themselves. That is to say, as the

superficial stained layers of epidermis are shed unstained layers are gradually exposed; as the patient is in hospital, the stockings are not worn much, and no active exercise is taken. When they go out, if the stockings are again put on the condition recurs. Its occurrence in rheumatic fever or rheumatic patients is explained by the increased sweating at that time so that the acidity is even marked to the smell. Dr. Stack refers to these patients as usually having feet of the "moist variety." That is, for me, the solution of the difficulty; if such a person combines imperfect washing with these cheap black stockings the result is that the acid dissolves the blue dye.

Dr. Stack states that it has no relation to the kind of stockings worn, and Dr. Parker refers to his patient as not having worn any coloured stockings, but I venture to think that it is because the pale blue dye comes from the *black stockings* in an acid solution that it has not been hitherto recognised. I may say that from the excellent painting by Dr. Stack of his case in a one-legged boy, which he kindly allowed me to see, there is no doubt whatever of his case and my three cases being identical, and as he has seen many similar cases it is evident that the condition is widely spread.

In conclusion, I have no doubt whatever that the cases of blue toes I have seen are due to the same cause—viz., a blue aniline dye much used in the manufacture of cheap (certainly black, possibly also other coloured) stockings. It is dissolved by the acid sweat. It dyes the epidermis to some depth in those parts which are moist and warm and the chief sweat producers. It has nothing whatever to do with Chromidrosis or Bacteriological decomposition or Hysteria.

As regards the exact nature of the dye I am at present uncertain, but am making inquiries. Treatment resolves itself into giving up the use of cheap black stockings or soaking them in weak warm acid solution till all the blue has come out.

*Postscript.*—Since writing the above, Dr. Young, F.R.S.E., Lecturer on Chemistry, University College, Sheffield, has kindly examined a portion of one of the stockings from the above case, and reports as follows:—

The dye is one of the worst I have seen. It is a mixed dye, of the nature of azo-black. It is probably made by the crude mixing together of a derivative of diazo-benzene chloride with a naphthol or

naphthylamine. When boiled in water it not only dissolves out in a purple colour, but also a solid sediment of dark colour is washed out of the stocking. When treated with dilute acids, various colours of bright blue or peacock blue appear according to the acid used, etc. It is thus a mixed dye.

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## SOCIETY INTELLIGENCE.

### DERMATOLOGICAL SOCIETY OF LONDON.

A MEETING of this Society was held on Wednesday, October 8th, Dr. STEPHEN MACKENZIE in the chair.

The following cases and specimens were demonstrated :—

Dr. DORE showed (1) *a case for diagnosis*. The patient was an anæmic weakly-looking boy, aged 6 years. The greater part of his body was covered with a patchy, finely scaly eruption of a brick-red colour. The general aspect of the eruption resembled psoriasis. On the trunk it was composed of slightly scaly papules and patches, closely aggregated, and leaving only narrow areas of intervening healthy skin, the whole having a mottled if not definitely retiform appearance. The patches had a crinkled surface like that sometimes seen in seborrhoic eczema, were diffusely outlined, only slightly scaly, and did not specially affect the favourite sites of psoriasis. On the forearms and legs the papular element was more marked, the irregular-shaped, flat, shining papules bearing a close resemblance to those of Lichen planus. There were a few scattered papules on the forehead and one or two round the mouth, but with the exception of these the face was unaffected.

The palms and soles and scalp also escaped and the mucous membranes of the mouth were not attacked. On the back of the neck there was some mottled pigmentation, dark patches alternating with light ones. There were no subjective symptoms. The eruption appeared on the backs of the thighs about a month after an attack of scarlet fever two years ago, and gradually spread over the whole body.

The condition had resisted treatment with strong tar, sulphur and resorcin ointment since June of the present year, when the