leader. What, for instance, has the profession to teach the public on the question of marriages of consanguinity? This matter has been rendered most uncertain by the confusion which has been introduced through the mixing up of two very different states—namely, the marriage of near kin or incest and marriage of consanguinity or of cousins. In the former case there can be no doubt of the evil effects, and every breeder of domestic animals will support this assertion; but the marriage of cousins is a different matter. It has been stated that such marriages result in sterility, abortions, congenital deaf-dumbness, idiocy, retinitis pigmentosa, albinism, and such malformations as polydactyly and ectrodactyly. Now, it does not seem that consanguinity *ipso facto*—that is, without the existence of traces of pre-existing degeneracy in the contracting parties—increases the risk of these diseases and anomalies. Féré goes further, and says that in good families it is to be sought for, not avoided; but the medical man will be well advised if he refrain from proffering such advice unasked.

Another question that the profession must be prepared to answer is, To what extent may marriage into a good stock correct the tendency to degeneration existing in a bad stock? The case of the marriages of the imperial house of Russia has been cited by Dr. Ireland.¹¹ Perhaps the safest view to take of such unions is that the good risk to lose more than the bad risk to gain (Féré).

The consideration of what constitutes a good marriage cannot be concluded without a reference to the spectre of morbid heredity, so obtrusively prominent in modern literature of the Ibsen-Zola present-day novelist type. There are some—they constitute the minority, I think—who treat this matter lightly. For them the question has no terrors; every man has his chance.

Years roll'd on years successive glide,
Since first the world began,
And on the tide of time still floats,
Secure, the bark of man.

But there are others, and their number in these days is great, to whom morbid heredity is a spectre that will not be laid. It looks at them out of their children's eyes, they see it in the flush upon a daughter's cheek, they hear it in the night shriek of their rachitic offspring. All day long it stalks through the house, and in the still hours of darkness the rustle of its garments (cerements are they not?) is to be heard. An unreasonable terror seizes them, and they say like one of old time: "Fear came upon me, and trembling, which made all my bones to shake. Then a spirit passed before my face, the hair of my flesh stood up; it stood still, but I could not discern the form thereof; an image was before mine eyes, there was silence." They are paralysed, are these fearful ones, and a gloomy fatalism overpowers them. They are for ever talking of the relentless anger of outraged Nature; they constantly speak of the visitation of the sins of the fathers upon the children, and they generally mean that the sins of their father are being visited upon them, and rarely that they fear that their own sins will be visited upon their children.

To all such I preach the gospel of hope. I do not require them to take the message on trust, but I simply ask them to look around with eyes that observe. I call upon them to stop focussing their gaze upon the dark places in the picture, and to give a little attention to the bright ones. There is not an all-pervading gloom, there are flashes of light here and there already, and they grow more numerous with the looking. Those who are so fearful of morbid heredity begin to realise that the most hereditary thing in the world is the normal, not the abnormal; that health is transmitted as well as disease; that even where the past history of the family is bad, the clean livers have handed something to their children that is better than what was handed on to them.

NOTE AND REFERENCES.

¹ Shuttleworth in Hack Tuke's *Dictionary of Psychological Medicine*, ii, p. 675, 1892. ² *Loire Méd.*, December 15th, 1898. ³ *Trans. Edin. Obstet. Soc.*, xix, p. 105, 1894. ⁴ *Legal Medicine*, ii, p. 253, 1883. ⁵ *Semaine Méd.*, xviii, p. 481, 1898. ⁶ *Trans. Amer. Gyn. Soc.*, xiii, 1888. ⁷ For example, intracranial hæmorrhage in the fetus in cases of typhoid fever in the mother, as reported by Osler, *Teratologia*, ii, p. 13, 1895. ⁸ Author, *Internat. Clinics*, 6 s., vol. iv, p. 262, 1897. ⁹ A. R. Simpson, *History of Embryulcia*, BRITISH MEDICAL JOURNAL, December 13th, 1884. ¹⁰ B. O. Flower in the *Arena*. ¹¹ *The Blot on the Brain*.

A SYSTEMATIC BACTERIOLOGICAL EXAMINATION OF THE FAUCES IN SCARLET FEVER AS A MEANS OF PREVENTING POST-SCARLATINAL DIPHTHERIA.

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In hospitals for infectious diseases patients convalescing from scarlet fever are not infrequently attacked with diphtheria. The cause of this has been the subject of considerable discussion; but a prevalent theory is to attribute it to the introduction into the scarlet fever wards of unrecognised cases of diphtheria. If this view be correct, it follows that post-scarlatinal diphtheria could be prevented by the early recognition and isolation of such cases. The great difficulty encountered is that the clinical diagnosis of diphtheria is often impossible, especially in patients who are in the acute stage of scarlet fever.

The only other method available for the recognition of the disease is the detection of diphtheria bacilli in the fauces by bacteriological examination. It has, however, been urged that diphtheria bacilli are so frequently present in the throats of scarlet fever patients as to render the isolation of such cases impracticable. F. Ranke¹ found diphtheria bacilli present in the throats of 53.7 per cent. of scarlet fever patients in Munich. Goodall² made a bacteriological examination of 87 cases of scarlet fever admitted into the Eastern Fever Hospital. The examination was made immediately after admission. In 6 diphtheria bacilli of the long variety were found, and in 13 bacilli of the short variety. The cases with bacilli were mild, and would not have been recognised clinically as diphtheria. One of the cases with the long variety of bacillus subsequently developed post-scarlatinal diphtheria, and so did 4 other cases in whom no bacilli were found on admission. Sverensen³ examined 1,547 scarlet fever patients on admission into the fever hospital at Copenhagen, and found diphtheria bacilli in 2.5 per cent. Beggs⁴ found diphtheria bacilli in the throats of 51 out of 140 cases of scarlet fever examined, but the examination was made at various periods after the admission of these patients. Moreover, post-scarlatinal diphtheria was at the time prevalent in the wards, and 14 out of the 51 cases exhibited clinical evidence of the disease. The difference in the results obtained by these observers may, perhaps, be partially explained by the inclusion by some and the exclusion by others of Hoffman's bacillus.

In consequence of an outbreak of post-scarlatinal diphtheria in the London Fever Hospital during the winter of 1895-96, which necessitated the closing and disinfection of some of the wards, it was decided in March, 1896, to examine bacteriologically the throats of all scarlet fever patients then in the hospital, and of all new cases on admission; of the former, those in whose throats diphtheria bacilli were found were isolated.

Our present communication is a record of the examination in this way of all cases of scarlet fever admitted under our care since the above date, our object being to determine, first, the frequency of the occurrence of diphtheria bacilli in the throats of scarlet fever patients; and, secondly, the possibility of preventing post-scarlatinal diphtheria by the isolation of those cases in whose throats these bacilli are found. The cultivations were made upon Loeffler's blood serum, and were examined microscopically on the following day.

Bacilli of the diphtheria family may conveniently be divided into three groups:

1. The Klebs-Loeffler, or true diphtheria bacillus.
2. Bacilli resembling the above in morphological and cultural characters, but non-pathogenic to guinea-pigs.
3. Hoffman's bacillus.

We have discarded the term "pseudo-diphtheria bacillus" because it has been used in different senses by different authors. The distinction between the first and second groups depends mainly on the question of pathogenicity. This test was applied only to the bacilli of cases already in the wards in March, 1896, but it was not found practicable to continue

the method. In the present record we have, therefore, coupled together these two groups under the single heading of "bacilli morphologically resembling the Klebs-Loeffler bacillus."

Hoffman's bacillus from a 24-hours old serum culture appears as a short pyramidal organism arranged in pairs, with the bases in apposition, the pairs being often grouped in parallel rows of two or more. Its protoplasm stains uniformly with methylene blue. This bacillus exhibits no pathogenic effect on the ordinary laboratory animals. It can usually be distinguished from members of the first and second groups by microscopical examination.

During the period from March, 1896, to December, 1898, inclusive, 666 cases of scarlet fever were admitted under our care. We have divided them into three classes:

A. Cases in whose throats bacilli morphologically resembling the bacillus diphtheriae were present on admission. These only amounted to 8, or 1.2 per cent.

B. Cases in whose throats Hoffman's bacillus was found on admission. These numbered 21, or 3.2 per cent.

C. Cases in whose throats neither bacillus was found on admission, the organisms present being other bacilli, various cocci, torulae, etc.

Class A.—Cases of Scarlet Fever in whose throats bacilli morphologically resembling the bacillus diphtheriae were found on admission.

No.	Name.	Sex.	Age.		
1	M. S.	F	17	Admission in desquamation period. Throat normal. Transient albuminuria. No sequelae.	Isolated; 9 days later no bacilli.
2	G. C.	F	22	Admission in acute stage. Moderate attack. Thin exudation in front of the right tonsil; this by the next day had the appearance of diphtherial membrane. Treated with antitoxin. Rapid recovery. No albumen. No sequelae.	Isolated; 3 weeks later no bacilli.
	E. G.	F	9	Admission in desquamation period. Throat nearly well. A week later she developed rhinorrhoea and had diphtheria bacilli in the nose. Transient albuminuria. Slight ciliary paralysis followed. Her mother was admitted at the same time with diphtheria, and her sister with scarlet fever. The latter developed rhinorrhoea with diphtheria bacilli in the nose, but not in the throat.	Isolated; 3 weeks later no bacilli.
	E. H.	F	5	Admission in desquamation period. Throat nearly well. Slight rhinorrhoea with diphtheria bacilli in nose. No albumen. No sequelae.	Isolated; 6 weeks later no bacilli.
3	R. F.	M	3	Admission in acute stage. Mild attack. No ulceration or exudation in fauces. No rhinorrhoea. No albumen. No sequelae.	*Kept separate; 5 weeks later no bacilli.
4	H. I.	F	3	Admission in desquamation period. Throat nearly well. No rhinorrhoea. No albumen. Afterwards developed rhinorrhoea.	*Kept separate; 5 weeks later no bacilli.
5	N. H.	M	5	Admission in acute stage. Mild attack. Some follicular exudation in tonsils. No albumen. No sequelae.	*Kept separate; 3 weeks later no bacilli.
	H. C.	F	19	Admission in acute stage. Mild attack. No ulceration or exudation. No rhinorrhoea. No albumen. No sequelae.	*Kept separate; 3 weeks later no bacilli.

* These patients remain in the ward, but are kept in bed until free from bacilli. During this time their drinking vessels, spoons, and forks are marked and washed separately from those of others.

In only one of these cases, No. 2, was there reason to suspect the presence of diphtheria from the clinical appearance of the throat, and even here the exudation was less suggestive of this disease than is often the case in pure scarlet fever. In Case 3, though the only evidence of diphtheria on admission was obtained from the bacteriological examination, slight paralysis ensued, and in this case there was distinct evidence of exposure to the double infection. The other cases exhibited no clinical evidence of diphtheria either on admission or subsequently. Half of these cases were admitted during the acute stage, and half after it had passed; all made a good recovery.

CLASS B.—Cases of Scarlet Fever in whose throats Hoffman's bacillus was found on admission.

There were 21 cases in this class. They exhibited no features of special interest, the attacks being of variable severity, but the majority of a mild type. Except that the follicular tonsillar secretion so frequently present in scarlet fever occurred in about the usual proportion of these cases, none of them showed on admission or subsequently developed clinical evidence of diphtheria. Though they were not isolated in any way they did not appear to convey diphtheria to others. They all made a good recovery.

In considering the above results three points of interest appear:

1. Bacilli resembling the diphtheria bacillus in morphology were found on admission in the throats of only 1.2 per cent. of our cases.

2. Only a minority of these cases presented clinical evidence of diphtheria.

3. The presence of Hoffman's bacillus in the fauces did not appear to play any part in the causation of diphtheria.

We will now pass to the consideration of the second question which we propounded—namely, how far it is possible to prevent post-scarlatinal diphtheria by the method adopted. For this purpose we will tabulate the annual admissions into the London Fever Hospital of cases of scarlet fever and also of diphtheria during the last six years, showing the incidence of post-scarlatinal diphtheria in each period. A larger number of cases appear in this table than we have hitherto mentioned. This is due to the inclusion in it of Dr. Sidney Phillips's cases, which were in the same wards, and were isolated in the same way as ours when showing suspicious cultivations. We are indebted to the kindness of Dr. Sidney Phillips for permission to refer to and include his cases. We add, for comparison with our figures, similar data abstracted from the reports of the Metropolitan Asylums Board:

The London Fever Hospital.

Year.	Scarlet Fever Admissions.	Diphtheria Admissions.	Post-scarlatinal Diphtheria.
1893	764	5	4 = 0.52 per cent.
1894	294	25	1 = 0.34 "
1895	516	52	14 = 2.71 "
1896	637	65*	3 = 0.47 "
1897	431	45	1 = 0.23 "
1898	325	40	0 = 0 —

* All admitted after the month of March.

The Metropolitan Asylums Board.

Year.	Scarlet Fever Admissions.	Diphtheria Admissions.	Post-scarlatinal Diphtheria.
1893	14,548	2,848	204 = 1.40 per cent.
1894	11,598	3,666	220 = 1.90 "
1895	11,271	3,635	408 = 3.62 "
1896	15,176	4,508	705 = 4.64 "
1897	15,241	5,673	796 = 5.22 "
1898	Statistics not yet published	—	—

It will be observed from these two tables that the percentage of post-scarlatinal diphtheria at the London Fever Hospital has been uniformly lower than that at the hospitals of the Asylums Board. The cause of this, probably dependent upon differences in the average social status and age of the patients, is beyond our present inquiry. In both tables, however, a conspicuous increase in the percentage of post-scarlatinal diphtheria appears in 1895. Whereas, however, in the Asylums Board hospitals this percentage continues to increase in 1896 and 1897, in the London Fever Hospital table it suddenly falls in 1896, and continues to diminish, until in 1898 no case occurs. This difference is rendered more conspicuous

when it is pointed out that of the 3 cases in 1896 2 occurred before the month of March, when our record commences.

Since that date but 2 cases of post-scarlatinal diphtheria have occurred among 1,332 scarlet fever patients admitted, in spite of the admission of 150 cases of diphtheria. Of these 2 cases 1 was isolated on account of rhinorrhoea accompanied by the presence of diphtheria bacilli in the nose. In an adjoining room was a case of diphtheria with scarlet fever. It is possible that the mild attack of faucial diphtheria which supervened six weeks after admission was contracted from this source. On the other hand, the throat may have been infected from the nose. For the second case no cause could be assigned. In neither of them were bacilli found on admission. Both made good recovery.

The first of these two patients was included in a series of 51 cases of post-scarlatinal rhinitis described by Todd,⁵ his observations covering a part of the period included in our report. The leading characteristics of this complaint were as follows: It attacked children only, causing external rhinitis with slight watery discharge. It caused no constitutional disturbances. It was definitely contagious, spreading as rhinitis from child to child, but it did not give rise to faucial or laryngeal diphtheria. A bacillus was isolated by Todd from the noses of these patients, which by all available tests, including that of pathogenicity, was the true diphtheria bacillus, yet he failed in nearly every case to discover any such bacillus in their throats. Were these cases of nasal diphtheria? If so, why did they give rise to rhinitis only and not to faucial diphtheria, and why did not the disease spread beyond the nose? Whatever the explanation, the fact remains that post-scarlatinal faucial diphtheria did not arise. Nevertheless it appears to us that such cases of rhinitis might be the starting-point of faucial diphtheria, and that in future they will require careful supervision.

GENERAL CONCLUSIONS.

We believe that post-scarlatinal diphtheria is due to the introduction of unrecognised cases of diphtheria into the scarlet fever wards, and that this can only be obviated by systematic bacteriological examinations of all cases on admission, and by separation of those in whose throats diphtheria bacilli are found. If Hoffman's bacillus, which we believe to have no direct causal connection with diphtheria, be excluded, the number of such cases, though probably greater among patients more liable to double infection than ours, should not be beyond the isolation resources of most fever hospitals; moreover, absolute isolation does not appear to be essential. At any rate, we consider that the method deserves trial on a larger scale.

Further, we think that some supervision of cases of rhinitis with diphtheria bacilli in the nose should be practised, such as keeping them in bed while the discharge continues; for though these cases do not appear to have given rise at the London Fever Hospital to faucial or laryngeal diphtheria, yet such an occurrence is quite possible.

REFERENCES.

¹ Münch. med. Woch., Bd. 42, 1896. ² Epidem. Soc. Trans., 1896. ³ Zeit. f. Hyg. und Infectious-Krankheiten, Band xxix, Hft. 2, 1898. ⁴ Met. Asylums Board's Report, 1895. ⁵ Lancet, May 25th, 1898.

A CASE OF ACUTE TETANUS TREATED BY INTRACEREBRAL INJECTIONS OF ANTITOXIN: RECOVERY.

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THE following case of acute tetanus was treated with intracerebral injections of antitetanic serum. The patient made a good recovery.

On February 8th, 1899, M. C., a lad of 13, while employed at a steam machine received an injury to his right hand. The four fingers up to the metacarpo-phalangeal joints were severely crushed and burned by passing between the heated rollers of the mangle. The hand, which was found to be rather dirty, was dressed at the Paisley Infirmary Dispensary on the day of the accident and the two following days with boric acid compresses.

He was admitted on February 11th into the Paisley Infirmary under the care of Dr. H. C. Donald. The fingers had a yellowish-white appear-

ance; they were not painful, and they were devoid of sensibility. He seemed a healthy, well-nourished lad, with no evidence of constitutional disturbance save slight rise of temperature (99.6° F.).

February 11th. The fingers were still painless, and seemed to be quite dead. The line of separation was well marked. There was some superficial purulent discharge. Temperature 99° F. The general condition was good.

February 18th. Amputation of the four fingers at the metacarpo-phalangeal joints was performed, the heads of the metacarpals being also removed. A drainage tube was passed transversely within the flaps. By evening the temperature was 99.6° F., and there was great pain in the hand.

February 19th.—The hand was still painful, swollen, and red. Two stitches were removed, allowing a drachm of pus to escape. The evening temperature was 101.4°. He was sleepless.

February 20th. The remaining stitches were removed. There was much suppuration. The evening temperature was 100.6°.

February 22nd. The back of the hand presented an erysipelatous blush, reaching halfway up to the wrist. There was severe pain shooting up the arm, preventing sleep. The evening temperature was 99.4° F. He was not so strong as when admitted, but was taking food well. On the 24th he came under the writer's care owing to the absence of Dr. Donald.

February 25th (seventeenth day after the accident). There was constant and severe pain in the hand, and frequently acute shooting pains extending to the shoulder. On the previous night he several times started up, and suddenly threw himself back in bed. This morning there was marked stiffness of the lower jaw, and he was unable to separate the teeth more than half an inch. There was no dysphagia. There was slight retraction of the head and opisthotonos, which disappeared during sleep. The whole of the right upper extremity was perfectly rigid, with the forearm semiflexed. This condition was unaltered during sleep, and it may here be added persisted long after the other symptoms. While awake the eyes remained half closed, and the angles of the mouth drawn downwards and outwards. The breathing was rapid (40) and shallow; the pulse was regular, and of good tension, its rate was 100 to 120. He took food well. The evening temperature was 97°. Chloral was given in doses of 10 grains every four hours.

February 26th. There was no improvement, and he had been excited and noisy during the night. At 2 P.M., 10 c.cm. of antitetanic serum (from the Pasteur Institute) were injected under the skin of the abdomen. At 6 P.M., under chloroform, 8 c.cm. serum were injected into each frontal lobe, 4 c.cm. from the middle line, and 4 c.cm. above the supraorbital ridge, corresponding closely to the frontal eminence; each injection occupied 10 minutes. For the operation a dental drill and an ordinary antitoxin syringe were used; the wound was closed by collodion without suture. In addition 14 c.cm. were given hypodermically. While on his way to the operating table, the patient had a severe spasm, affecting the neck, back, and lower limbs. At 9 P.M. he was noisy, and tried to get out of bed. At 10.30 P.M. 10 c.cm. of the serum were given hypodermically.

February 27th. He had had a restless night. The head was slightly retracted, and the jaw rigid. Respiration was shallow (44), and mainly abdominal. At 7.30 P.M. 10 c.cm. were injected hypodermically.

February 28th. He had had a quiet night, but seemed no better. He could only separate his teeth a quarter of an inch. He was troubled with mucous collecting in the mouth and throat. He swallowed milk well. There was severe spasm of the neck and back. The pulse was feeble (112), and the respirations 48. The stump was healing slowly.

March 1st. He had a good night, but there was no improvement of the tetanic symptoms; the jaw was almost fixed. The thoracic walls were quite rigid, and the respiration was purely abdominal, with a rate of 52 to 60. The pulse was soft and feeble (112). He took liquids freely. At 9.30 P.M. 10 c.cm. serum were injected into each frontal lobe.

March 2nd. He was restless and noisy for half the night, and no better in the morning. At 7 P.M. 20 c.cm. serum were given hypodermically. Temperature 100°.

March 3rd. The spasms were rather less severe, but the boy was drowsy and weak. The pulse was 116 and feeble; respirations 68. There were frequent attacks of choking, from tough mucus accumulating in the pharynx and larynx. There was no difficulty in swallowing milk. He was given 20 c.cm. of serum hypodermically. The midday temperature was 103.2° F.

March 4th. He rested well last night. The jaw was somewhat relaxed but the head continued retracted. He slept almost constantly. The respirations were 68 and the pulse 120; the midday temperature was 103.6°; there was incontinence of urine and faeces. At 7 P.M. a hypodermic injection of 20 c.cm. serum was given.

March 5th. There was severe spasm of the jaw, neck, and back. At 2 P.M. he received 15 c.cm. of serum by intracerebral injection. Shortly after he was extremely weak but rallied towards evening. The administration of chloral was stopped at 2 P.M. At 4 P.M. the temperature was 103.2°, the pulse 123, and the respirations 68.

March 6th. He was restless, excited, and noisy last night; he tried frequently to throw himself out of bed. Chloral was resumed at 1 A.M. in the same doses. At 10 A.M. he was much quieter. The left pupil was widely dilated, and responded sluggishly to light; the right pupil was moderately dilated and responded promptly. He was quite unconscious, and could not be roused by speaking loudly, but by pinching he could be half awakened. While sleeping the lower jaw could be moved passively, but tended to become rigid. Apart from this and the rigidity of the right arm there was no spasm. At 4 A.M. the temperature was 101.8° F., the pulse 124, and the respirations 60.

March 7th. He was still unconscious, and could not be perfectly roused. The pulse was 116, and stronger; the respirations were 52, and the noon temperature 99.8°. By the afternoon he became conscious, and even intelligent.

March 8th. He was obviously improving. The temperature was 100.8° F., the pulse 112, and the respiration (which was entirely abdominal) 48; the pupils were equal. At 6 P.M. a single intracerebral injection was made into the right frontal lobe.

March 11th. He was much distressed by hawking up tough mucus, which he expelled with great difficulty on account of spasm of the masseters. The chest continued rigid, so that breathing was still chiefly abdominal. The respiration-rate was 40, the pulse-rate was 96—it was of good tension;