called "short forms" of *B. diphtheriæ* by the constant absence of polar granules and the intensity and evenness of staining with methylene blue, and from any non-pathogenic, pseudo-diphtheria bacillus before described.¹

The fact that ordinary diphtheria antitoxin protects animals against an otherwise fatal dose of this bacillus would seem to confirm these conclusions. The experiments with the blister serum, taken from cases in which the "atypical" forms were alone present, and by means of which guinea-pigs are protected against lethal doses of both "typical" and "atypical" forms, may add additional proof.

It might here be mentioned that so far as experiments thus far made are concerned, the pathogenic and cultural characteristics of both "atypical" and "typical" forms do not vary with the time in the series of observations at which they were isolated. Thus cultures of both forms have shown bacilli not to be distinguished in morphology or pathogenesis from cultures isolated from the same cases some months either previously or later.

A study of these cases shows, in addition to the long persistence of both "atypical" and "typical" forms of *B. diphtheriæ*, a recurrence of both, either alone or mixed, after a disappearance, evidenced by several successive negative examinations.

A negative break in a long line of positive examinations may be explained by

- (1) Improper technique in taking the smear.
- (2) Improper technique in making cultures from the smear.
- (3) Overlooking bacilli in the culture when few are present amongst a large number of other bacteria.
- (4) Their entire temporary disappearance.

If (4) be the cause the recurrence may be perhaps attributed to the placing of several children in the same room, some of the children being free from the bacilli and becoming reinfected from others in whose throats the bacilli are still present.

GENERAL CONCLUSIONS.

From these examinations, if general conclusions may be permitted from such exceptional conditions as obtain in the school, some such suggestions as the following might be made, if such be deemed desirable, and if desirable practicable:²

1. That the throats of people brought in contact with diphtheria patients be examined, and if *B. diphtheriæ* be found, that they be quarantined until free of the bacilli.
2. That freedom of the throats of diphtheria patients, or those brought in contact with them, from *B. diphtheriæ* or its variants, be determined by at least two successive negative examinations.
3. That diphtheria patients, particularly while convalescent, be quarantined by placing, when possible, one patient in one room.

NOTES.

¹ These "atypical" forms may perhaps be included, so far as can be ascertained from the written descriptions and plates, under the pseudo-diphtheria bacilli of Loeffler (*Berl. klin. Woch.*, 1890, No. 39), von Hoffman (*Wien. med. Woch.*, 1888, No. 3), Koplik (*New York Med. Journal*, 1892, August 27th), Escherich (*Berl. klin. Woch.*, 1893, Nos. 21, 23), Beck (*Zeits. f. Hyg.*, 1890, Bd. viii), Biggs, Park, and Beebe (*Scientific Bulletin*, No. 1, New York Health Department, 1895), Cobbett and Phillips (*Journal of Path. and Bact.*, 1896, vol. iv), Peters (*Journal of Path. and Bact.*, 1896, vol. iv), or the so-designated attenuated forms of Roux and Yersin (*Ann. de l'Inst. Pasteur*, 1890, Martin (*Ann. de l'Inst. Pasteur*, 1890), Biggs, Park and Beebe (*Scientific Bulletin*, No. 1, New York Health Department, 1895), Peters (*Journal of Path. and Bact.*, 1896, vol. iv), and other observers. It will be noted, however, that in the present communication shortness alone does not constitute the diagnostic feature. Uniformity in size and shape, intensity and evenness of staining, entire absence of polar granules, preserved in all stages of development in various media and in various cultures obtained from the same throats, and when passed through animals serve to distinguish this "atypical" form from the long, short, or medium-sized bacilli designated as "typical." The variability in these particulars is the most characteristic feature of the "typical" forms of *B. diphtheriæ* isolated in the same manner. The varying degrees of virulence of this "atypical" form—not greater however than of the "typical" form—serve to differentiate it from similar non-virulent forms of previous observers. In testing the virulence in every case 1 c.cm. per kilo. of body weight (guinea-pig) of a 40-hour broth culture of the micro-organism to be tested was given subcutaneously. ² The results of the investigations of the New York Health Department led them to consider the adoption of rules similar in certain respects to these suggestions. See *Scientific Bulletin*, No. 1, Health Department, City of New York, 1895.

THE GRÆCO-TURKISH WAR.—The Greek Minister of War has stated in the Chamber that 32 officers and 662 non-commissioned officers and men were killed in the late war with Turkey. The total number of wounded was 3,365.

DISCOVERY OF THE PARENTAL FORM OF A BRITISH GUIANA BLOOD WORM.

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EARLY in 1897 Dr. Manson¹ demonstrated the presence in the blood of aboriginal Indians of British Guiana of one, or perhaps of two, forms of filarial embryos whose characteristics, as compared with the ordinary filaria of the blood (*filaria nocturna*), were minuteness, absence of sheath, absence of periodicity, power of locomotion, and, in the case of one of them, the possession of a rounded, truncated tail, in the case of the other of a very finely pointed tail. Since their discovery Dr. Ozzard and the writer have shown that these embryos are found all over the colony except in the coast belt, and that they are found in persons of both sexes and of other races who happen to have lived under similar circumstances in the same regions. Almost invariably the blunt-tailed and the sharp-tailed embryos concur in the same subject. Out of 231 aborigines and others from the interior whom we have examined, these embryos have been found in no fewer than 134 individuals, or in 58 per cent.

In December, 1897, I examined *post mortem* two aboriginal Indians. In the blood of the first of these both types of embryo had been found during life, the sharp-tailed preponderating; in the second Indian the blunt-tailed embryos were very numerous, the sharp-tailed, which at first were moderately abundant, having become very scarce for some weeks before death.

In both subjects mature filariæ were found in the upper part of the mesentery, in the fat at the base of this structure, and around the pancreas. In the second subject the worms were found in the same situations, and also in the subpericardial fat. The parasites occurred in small groups, and were chiefly females. No adult filariæ were found in the heart, blood vessels, thoracic duct, lungs, or other organs, although a careful search was made.

The worms were distinguishable from filaria Bancrofti (adult form of *F. nocturna*), and from the filariæ found by Magalhaes in the left ventricle of a Brazilian, both by the details of their structure, as will be evident from the description, and also by their smaller size and proportionately greater tenuity, as is shown in the accompanying photograph

and in the subjoined table of their respective measurements made in millimetres:

	F. Magalhaes.	F. Bancrofti.	British Guiana Filaria.
Length of female ...	mm. 155	m.m. 95	mm. 70 to 8
Thickness of female ...	0.66	0.2	0.12
Length of male ...	8	44	45
Thickness of male ...	0.25	0.10	0.06

Although this is undoubtedly a new species of filaria I do not propose at present to give it a name, seeing that it may turn out to be the parental form of one of the already known and named species of nematode embryos described by Manson. Very probably it may be the parental form of filaria perstans. It seems to me to be a mistake to give the embryonic and parental forms of the same parasite separate designations, and thereby to multiply names unnecessarily, and add to the difficulties of a subject already sufficiently complicated.

The female parasite has a rounded, unarmed head which, in living specimens, is in active movement, altering its shape and rapidly elongating and retracting. As seen under a low power these movements recall the cephalic movements of the embryo in the blood, except that in the adult nothing corresponding to the beak of the embryo is protruded. Compared to F. Bancrofti the neck is longer, the taper of the cephalic end of the worm being more gradual. The mouth is very minute; no differentiation of the alimentary canal into oesophagus and intestine could be made out. In the female the intestine terminates in a small papilla 0.145 mm. from the tip of the tail which, for the last 0.3 or 0.4 mm., is curved in every specimen, the tip being prolonged by two triangular cuticular processes which give it a bifid or mitred appearance. There are two ovarian tubes which contain ova and embryos in various stages of development. The embryos examined were all blunt-tailed, and appeared to be destitute of sheaths, even whilst still in the ovarian tubules. In only one parasite could the arrangement of the vagina be clearly made out. In this instance the ovarian tubules were seen to open into a common vagina which, at first convoluted, became less so, and at the same time narrowed as it was traced towards the vulva, terminating in a straight portion which opened externally about 0.6 mm. from the head.

The head and neck of the male are similar to those of the female. As stated, the males were much fewer than the females; in consequence of this I have obtained only two perfect male caudal ends. Both of these are much coiled, and in one of them, examined during life, the terminal portion remained persistently so. From this specimen there protruded a long single spicule, and on each side of the point of its emergence two small papillæ (a pair?) were indistinctly remarked. The coiled-up arrangement of the tail interfered with exact measurements, as well as with the determination of certain important points of structure, especially as to the presence or absence of a second spicule. The long spicule, plainly visible, protruded at a point about 0.09 mm. from the tip of the tail. The protruded portion was nearly 0.16 mm. in length. The portion of the spicule within the body of the worm could be readily traced up the body for about 0.6 mm. It terminated in a trumpet-shaped expansion with which a seminal tubule seemed to be continuous. The basal portion of the spicule is not so distinctly marked off from the posterior or filiform portion as in F. Bancrofti, and is devoid of the markings apparent in that worm. The tip of the tail is sharply incurved, a triangular cuticular prolongation being also apparent. Whether this cuticular appendage is, as in the female, double or not could not be ascertained. During life the spicule was at times partially retracted.

The other male tail was still more closely coiled up, and consequently the details could not be made out; the spicule was not protruded.

No other species of filaria was found at either of the *post-mortem* examinations; but in the posterior mediastinum of the first case a worm, probably an immature, unsegmented bothriocephalus, nearly a foot in length, was found. In the

intestine of both patients lumbrici, ankylostomes and trichocephali were present. In the second case embryo anguillulæ had been discovered in the fæces during life.

REFERENCE.

¹ BRITISH MEDICAL JOURNAL, December 25th, 1897.

THE DISINFECTION OF THE EXCRETA.*

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THE methods used for ascertaining the value of any disinfectant are mainly two—namely, the addition of definite quantities of the substance to an active broth culture, with subsequent inoculation upon various media after the lapse of varying intervals, and the action of solutions of known strength upon test organisms inoculated upon threads.

These methods are valuable in that they determine the absolute working power of the disinfectant in definite conditions, but we have felt that direct experiment is necessary before conclusions derived from them can be adopted. This is more especially to be borne in mind in connection with the subject of our communication.

We have limited our inquiry to the disinfection of the fæces, as naturally they are the most resistant. In our earlier experiments the disinfectant solution was added in excess to the solid faecal mass, but we speedily found that in not a single instance did we get any sterilisation of the central portions. Therefore we would insist upon the necessity for thoroughly mixing up the faecal matter with the disinfectant selected.

We have chosen half an hour as the time during which the mixture must be allowed to stand, as being a convenient one in practice, though we admit that it is a severe test, and no doubt explains some of our results. After exposure for half an hour plate cultivations were made in the usual manner with gelatine and agar-agar.

The accompanying tables give our results at a glance. The second table gives the minimum strength of those disinfectants which seem to act most satisfactorily. The price list is only approximately correct:—

TABLE I.

Disinfectant.	Strength.	Action on Fæces.	
		When Mixed.	When Unmixed.
Perchloride of mercury	1 in 1,000	Spore-bearing forms	Copious growth.
Formol	1 in 20	Sterile	Copious.
Carbolic acid	1 in 20	Sterile	Copious.
Iodic hydrarg.	1 in 4,000	Spore-bearing forms	Copious.
Chlorox	Undiluted	Limited	Limited.
Chinosol	1 in 600	Sterile	Copious.
Izal	1 in 200	Spore-bearing forms	—
Creolin	1 in 10	Sterile	—
Carbolic acid (crude)	Undiluted	Sterile	—
Zinc chloride	1 in 10	Copious growth	—
Copper sulphate	1 in 20	Copious	—
Boiling water	—	Copious	—
Sodium chloride	1 in 10	Copious	—
Chloride of lime, 15% Cl.	1 in 10	Copious	—
" " 35% Cl.	1 in 10	Considerable	—

TABLE II.—Minimum Strength of Six Solutions with Approximate Cost per Gallon.

Carbolic acid	1 in 20	1s.
Crude carbolic	1 in 40	6d.
Formol	1 in 40	1s. 6d.
Chinosol	1 in 600	1s.
Creolin	1 in 40	1s. 6d.
Mercuric chloride	1 in 500	9d.

The above six solutions were tested with a typhoid stool, and all gave complete sterilisation.

The literature on the subject is small, at any rate from our special standpoint. Uffelmann¹ states that the mineral acids are the most active of all disinfectants, then corrosive sub-

* Read at a meeting of the Lancashire and Cheshire Branch.