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Report on the working of the
Micro-Biological Section of the
King Institute, Guindy

1915



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REPORT

ON THE

WORKING OF THE MICRO-BIOLOGICAL SECTION OF THE KING INSTITUTE, GUINDY,

FOR THE YEAR 1915.

(WITH APPENDIX.)



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 செப்பனிருவதற்காக எடுத்த
 கொள்ளப்பட்ட
 செப்பன் மாதம் 88 வருடம்
 செப்பனிரு முடித்த
 செப்பன் மாதம் 88 வருடம்
 ஆராய்ச்சி உதவியாளர்
 கையொப்பம்.

REPORT ON THE WORK CARRIED OUT IN THE MICRO-BIOLOGICAL
SECTION OF THE KING INSTITUTE OF PREVENTIVE
MEDICINE, GUINDY, FOR THE YEAR 1915.

There were no changes in the staff during the year.

Water Analysis.—As in the immediately preceding years no quarterly or half-yearly routine analyses were carried out, but a very large number of samples were examined in connection with the Experimental filters at Guindy, the Madras Corporation filters at Kilpauk, and proposed or extended water works in the mufassal.

The Guindy Experimental Filters.—A Mather and Platt mechanical filter was added to the installation. It was however completed too late in the year for any experiments to be carried out with it. The work carried out was mainly confined to the comparison between covered and uncovered sand filters. The Clemesha pattern sand filter was provided with a light roof and to make the experiments more comparable, the depth of the water over the sand was increased to three feet. Subsequently side flaps were added to the cover so as to more completely exclude the light. This was found to be an improvement. An investigation of this nature is bound to be a prolonged affair, as accurate data can only be obtained by studying the comparative behaviour of the filters from cleaning to clogging. Three months or more, during which samples have to be taken and examined daily from both filters, are therefore required to carry out a single comparison. During the year such comparisons have been carried out and show conclusively that for Adyar water the covered filter gives a filtering skin which, for endurance, efficiency and probably for proportional yield, is definitely better than that formed in an uncovered filter.

Madras Corporation Filters.—At the instance of the Special Engineer to the Corporation, I paid several visits to Kilpauk and discussed a system of bacteriological control of the filters with him. The control of such a large number of filters was quite beyond the staff available either at Kilpauk or Guindy; so, as a temporary measure, it was decided to control two filters only and to carry out a series of experiments as to how a filtering film of reliable and enduring quality could best be obtained. In addition to being hampered for want of staff, there was, in consequence of the war, a possible want of material to be considered. On this account also it was not possible to launch out into such a large scheme of work as would be involved in controlling all the filters. A farther desideratum was a more rapid test than the usual full analysis. Attention was drawn to this in last year's report, and the difficulty was met by restricting routine analyses to two points, namely, the total count and the quantitative estimation of lactose fermenters. This was found to work well, and, as a good approximation to the final result can be got on these points in two days, a great saving of time was effected. This enabled the staff to make many more analyses. Analyses in connection with new or extended supplies were carried out in the usual full manner. To assist in the Corporation work, Mr. Venkata Rao of the "Filtration Staff" was deputed to the Institute. He was instructed in sample-taking and in the elementary technique of plating out and the quantitative estimation of lactose fermenters. In view of a possible scarcity of material, especially of Witte's peptone, the export of which from Britain was prohibited, experiments were carried out to see if the medium elaborated for the preparation of the Plague prophylactic was suitable for the estimation and classification of lactose fermenters. A quantity of this medium was kindly sent from Parel by Major Glen Liston, C.I.E., I.M.S. It was tested against a large number of lactose fermenters isolated from Madras water supplies and was found to answer well. This will result in a considerable saving especially in connection with large scale routine control analyses.

An examination of a very large number of results of bacteriological examinations conducted during this and previous years leads to the conclusion that in some way or other sand filtration exercises a selective action on water bacteria and that

In general the lactose fermenters are much more completely eliminated than other kinds. In other words and as compared to English results the total counts are relatively high notwithstanding the fact of the lactose fermenters being satisfactorily decreased. As the lactose fermenters are the main indication of potentially dangerous pollution, this state of affairs is a highly satisfactory one. An explanation of this is probably to be found in the interesting discovery made by Assistant Surgeon T. Sitapati Ayyar that a very large percentage, 98 per cent in fact, of the total count in sand filtered water are spore-bearing or coccal forms. It may probably be inferred from this that spore-bearing forms succeed in penetrating the filtering skin while in the comparatively small spore state, and that efficient sand filtration does as a matter of fact completely eliminate all bacillary forms. Should this find be confirmed by farther investigation with Madras and other Indian waters it will be one of first class importance, since the organisms of all water-borne disease are bacilli.

Table I shows the number of samples of water that have been examined chemically and bacteriologically during the last five years:—

TABLE I.

Nature of examination.	Number of samples.				
	1911.	1912.	1913.	1914.	1915.
Chemical analyses ...	429	418	498	277	498
Bacteriological examinations ...	529	820	634	617	1,103

Of the 1,103 samples dealt with, 866 were from the experimental filters at Guindy and 146 from the Madras Corporation Filter Beds at Kilpauk.

Specimens sent for examination.—There was a considerable drop in the number of specimens sent for examination:—

TABLE II.

Number.	Description of specimens.	Number of positive results.	Number of negative results.	Total.	Remarks.
1	Plague, human ...	55	66	121	Peripheral blood ... 19
2	Plague, animal ...	108	132	240	Putrefactive organisms ... 5
3	Blood for enteric reaction ...	453	315	768	(i) 255 positive in (1 in 96). (ii) 193 positive in (1 in 32) but negative in (1 in 96).
4	Do. paratyphoid A ...	8	191	199	Eight positive in (1 in 32) but negative in (1 in 96).
5	Do. paratyphoid B ...	39	158	197	Thirty-nine positive in (1 in 32) but negative in (1 in 96).
6	Do. Micrococcus melitensis reaction (Malta fever).	...	6	6	
7	Do. Wassermann reaction.	288	285	573	
8	Do. Malarial parasites ...	46	310	356	
9	Do. Kala-Azar ...	1	* 7	8	} * Includes two indefinite.
10	Do. Filaria ...	1	* 7	8	
11	Do. Leucocytosis ...	8	40	48	
12	Do. piroplasma ...	...	3	3	
13	Sputum and pus smears for tubercle bacilli.	9	† 35	44	† Includes two indefinite.
14	Specimens for lepra bacilli ...	1	5	6	
15	Discharge for gonococci ...	28	† 23	51	† Includes nine indefinite.
16	Cholera (stools and vomit) ...	...	7	7	
17	Blood for isolation of B. typhosus in tauricholate water medium.	...	10	10	
18	Isolation of typhoid bacillus from stools and urine.	...	20	20	

TABLE II—cont.

Number.	Description of specimens.	Number of positive results.	Number of negative results.	Total.	Remarks.
19	Diphtheria ...	13	21	34	§ Three amoebae were found.
20	Stools for ova and amoebae ...	§ 4	14	18	
21	Urine for chemical and microscopical examination.	...	...	4	
22	Specimens for spirochaetes (fontuses).	3	22	25	
23	Water for cholera-like vibrios ...	13	17	30	
24	Water samples for chemical analysis.	...	...	498	
25	Water samples for bacteriological examination.	...	...	1,103	This includes 866 samples from Experimental Filters at Guindy and 146 samples from the Madras Corporation Filter Beds at Kilpauk, Madras.
26	Miscellaneous ...	...	...	25	
	Total ...	1,078	1,674	4,382	

Plague.—The total drop which amounts to 13.5 per cent is more than accounted for by the diminished number of plague specimens sent. The fall under this head is no less than 65 per cent. In spite of this however there was a marked rise in the number of positive finds.

Under human specimens this rise amounts to 19 per cent and in animal specimens it is 41 per cent. The number of useless specimens of human peripheral blood for plague detection continues high, 15.7 per cent. Some of these purported to be bubo smears but the needle had not gone deep enough and only blood from the tissues superficial to the bubo had been obtained.

Widal's Reaction.—Specimens for this test show a rise of nearly 34 per cent but the percentage showing some positive reaction fell to 58.9. The fall was confined to those showing the reaction in 1-96 dilution and amounted to 4 per cent. There was a slight rise of 1.3 per cent in reactions at 1-32 dilution.

Agglutination test for (a) Paratyphoid A.—The number of specimens sent was exactly the same but positive results were less than half and as usual none gave a positive reaction at 1-96. This type of infection can be stated to be of no importance in Madras.

(b) *Paratyphoid B.*—The number of specimens rose from 174 to 197 and the positive results from 32 to 39 but here again it was only in the lower dilution of 1-32 that positive results were got. In no case was a positive reaction obtained with either A or B unless there was also a positive reaction with typhoid germs. These tests therefore seem of small value in Madras.

Wassermann's Reaction.—The number of specimens submitted rose slightly from 534 to 553, but the positive results fell from 338 to 288. The method used was the same as last year, a combination of the Original and Levaditi's methods and definite results were obtained.

Malarial parasites.—The number of blood films sent shewed a great decline from 644 to 356, and the decline in positive finds from 83 to 46 was a comparable one.

Kala-Azar.—One positive find was made out of eight cases examined, but there was some doubt about two of the others.

Filaria.—Eight bloods were examined for this parasite and it was found in one.

Leucocytosis.—Eight out of 48 proved positive, a proportion nearly twice as great as last year, but the specimens sent were less than half.

Sputum and specimens for Tubercle Bacilli.—The specimens sent fell from 52 to 44 and the positive finds were in much the same proportion.

Specimens for Lepra Bacilli.—These fell from 11 to 6 and the bacteria were only found in one.

Discharges for gonococci.—Two specimens more than in the previous year were sent but positive finds diminished by three and there were three more cases where a definite diagnosis could not be given.

Stools, urine, vomit, blood, etc., for cholera and typhoid bacilli.—All these gave no positive results.

Diphtheria.—There was a sharp fall from 56 to 34 in the number of specimens submitted but the high percentage of 38.2 in positive finds is even higher than that of last year.

Treponema Pallidum.—Many fewer macerated fetuses were sent for the detection of this parasite and the percentage in which it was found fell from 14 to 12.

Water for cholera-like vibrios.—The circulation of sterile bottles and tubes of special medium for the detection of cholera-like vibrios was continued this year. The number of samples fell from 74 to 30, but cholera-like vibrios were found in the high percentage of 43.

Barker's Stovaine Solution.—A new material in the shape of Barker's sterilised glucose stovaine solution for spinal anaesthesia was issued this year. Shortly after the war broke out, some difficulty was experienced by Surgeons in getting this material. A main difficulty was the want of Jena glass capsules. Ordinary glass capsules when sterilised with watery solutions give off alkali and this destroys the stovaine. It was found that if the capsules were filled with dilute hydrochloric acid, sterilised and subsequently washed with distilled water, all the superficial alkali was removed from the glass and the capsules could then be used for sterilising the stovaine solution in.

Torfit urinal tiles and Disinfecting fluid.—A series of experiments was carried out to test the disinfecting efficiency of these proprietary articles and a report was sent to the Secretary of the Sanitary Board on the subject.

Vaccine Therapy.—There was a large fall in the number of autogenous vaccines prepared, which was apparently due to a number of medical officers who were usually supplying material for such vaccines having proceeded to the front. On account of an unusually wide prevalence of enteric in the city a campaign of anti-typhoid inoculation was carried on, which accounts for the large number of doses of typhoid prophylactic having been issued during the year. The demand for gonococcus vaccines and tuberculin continued to be great and an analysis of the results obtained by the use of these vaccines by medical men in the City and mufassal is appended.

Of the 129 autogenous vaccines prepared, the large majority, that is 85, were, as usual, for the use of medical officers and practitioners in Madras City. As during previous years a large number of these vaccines were either not used at all or not reported upon, as many as 23 having been reported 'not used' and the result in another 20 cases being put down as 'not known.'

The 129 autogenous vaccines were supplied to different institutions as follows:—

TABLE III.

The General Hospital, Madras	...	...	...	35
The Royapettah Hospital, Royapettah	...	...	...	1
The Monegar Choultry Hospital, Rayapuram	...	...	...	3
The Madras Lunatic Asylum, Kilpauk	...	...	...	6
The Government Maternity Hospital, Egmore	...	...	...	4
The Government Ophthalmic Hospital, Egmore	...	...	...	1
The Station Hospital, Fort St. George	...	...	...	4
The Penitentiary, Madras	...	...	...	2
Private practitioners and medical officers in Madras City	...	...	...	29
Hospitals and medical men in the mufassal	...	...	...	44
Total	...	...	...	129

The demand for stock vaccines has been increasing. The following table gives an account of the different kinds of stock and autogenous vaccines issued and the number of doses of each:—

TABLE IV.

Nature of vaccine.	Number of doses supplied.		Total.
	Autogenous.	Stock.	
B. Coli	22	54	76
B. Typhosus	...	1,882	1,882
B. Dysenteriae	...	15	15
Staphylococcus	256	713	974
Streptococcus	242	346	588
Gonococcus	11	1,700	1,711
Pneumococcus	114	144	258
Micrococcus Catarrhalis	26	15	41
Micrococcus Paratetrageus	6	...	6
Acne Bacillus	13	41	54
Antileprosy vaccine	...	14	14
Tuberculin	...	1,269	1,269
Diphtheroid bacilli	48	...	48
B. Influenzae	16	4	20
Pemphigus streptococcus	9	83	92
Other bacilli	10	...	10
Total	773	6,285	7,058

Sera from the Lister Institute of London and the Central Research Institute, Kasauli, were stocked in the Refrigerating chamber and distributed as under:—

TABLE V.

Number.	Name of serum.	Stock on hand on 1st January 1915.	Received during the year.	Sent out during the year.	Balance on hand on 1st January 1916.
1	Anti-streptococcus	75	248	224	99
2	Anti-tetanic	6	364	267	103
3	Anti-diphtheritic	72	61	66	67
4	Anti-dysenteric	60	...	5	55
5	Anti-venomous	81	6	9	78
6	Coley's fluid	37	...	4	33
	Total	331	679	575	435

The amount issued was not much more than half that of last year.

Educational.—Twenty-one students attended the vaccination class in 1915 and all of them obtained qualifying marks in the examination held at the end of the course. A further course of instruction in the manufacture, care and handling of calf vaccine lymph was given to candidates undergoing training for the second-class health officers and the degree of Bachelor of Sanitary Science. Eight candidates appeared for this and all passed creditably in an examination on the work of the course.

Five Civil Assistant Surgeons were instructed in the technique of anti-plague inoculation during the year under report.

Research work.—(1) A paper on "A Bacteriological Analysis of 136 cases of dysentery in the Madras Lunatic Asylum," by Civil Assistant Surgeon M. Kesava Pai, M.D., was published during the year in the Indian Medical Gazette.

(2) Civil Assistant Surgeons M. Kesava Pai, M.D., and S. Ramakrishnan, L.M. & S., were engaged in the further investigation of dysentery and contributed a paper on the "Differentiation of dysentery bacilli by their agglutination reactions" for publication in the Indian Journal of Medical Research.

(3) Under the orders of the Surgeon-General with the Government of Madras, Civil Assistant Surgeons M. Kesava Pai, M.D., and S. Ramakrishnan, L.M. & S., visited the Yerukala settlement at Kavali during November 1915 and were engaged in the investigation of the causes of anæmia at the settlement.

THE KING INSTITUTE OF PREVENTIVE
MEDICINE, GUINDY,
5th February 1916.

F. M. GIBSON, M.B., B.Sc.,
Director.

APPENDIX.

NOTES ON VACCINE THERAPY.

By Civil Assistant Surgeon M. Kesava Pai, M.D.

Furunculosis.—Of the 24 cases under this heading, 18 were typical cases of boils which the staphylococcus aureus was found to be the organism concerned. Six were cases pustular eruption, 5 of them including a case of Whitlow being caused by a staphylococcus aureus and the sixth by a staphylococcus albus. This last was an interesting case of a young man of twenty-four years on whose chest there was a crop of pustules each of which on healing left a raised keloid-like scar disfiguring the chest with a line of keloids. The autogenous staphylococcus albus vaccine suppressed the crop of pustules, but the treatment was unfortunately not followed up and a permanent cure was not reported. Of the 17 cases in which the results were reported 12 were cured, 4 improved and the last got apparently worse presumably as a result of reaction.

Case 40.—A baby of four months developed a rich crop of boils, about 25 to 30 of which had to be opened one after the other each containing about half a drachm of pus. The temperature oscillated between 99°F and 101°F. With each succeeding injection the number and size of the boils decidedly decreased and after the fifth injection the child was practically cured.

Case 98.—A nurse who had successive crops of boils on the breast, face, neck and other parts of the body for several months. Some of the boils used to become large in size and had to be incised. Six doses of the autogenous staphylococcus vaccine completely cured the condition and there was no recurrence of the complaint two months after the final dose.

TABLE I.

Furunculosis.

Serial number.	Case number.	Medical Officer.	Disease.	Vaccine made.	Result.
1	24	The Superintendent, Lunatic Asylum, Madras.	Pustular eruption ...	Staphylococcus aureus.	Cured.
2	25	Dr. P. N. Lakshmanan, Trivandrum ...	Do. ...	Do.	Not given trial.
3	31	.....	Boils ...	Do.	Not used.
4	39	The Second Surgeon, General Hospital, Madras.	Pustules on arm ...	Do.	Not known.
5	40	The District Medical and Sanitary Officer, Geddavari.	Boils ...	Do.	Cured.
6	53	Do. do.	Do. ...	Do.	No effect.
7	61	The Resident Medical Officer, General Hospital, Madras.	Do. ...	Do.	Not known.
8	63	Dr. W. H. Gibson, Chief Medical Officer, M. & S.M. Railway, Madras.	Do. ...	Do.	Improved.
9	64	Do. do.	Do. ...	Do.	Slightly improved.
10	68	The Resident Medical Officer, General Hospital, Madras.	Do. ...	Do.	Cured.
11	70	Major A. C. Ingram, I.M.S., General Hospital, Madras.	Do. ...	Do.	Do.
12	73	Dr. W. H. Gibson, Chief Medical Officer, M. & S.M. Railway, Madras.	Do. ...	Do.	Do.
13	74	Lieut.-Col. C. Donovan, I.M.S., Royapettah.	Recurring boils ...	Do.	Cured, but probably by other treatment.
14	77	Major F. F. Elwes, C.I.E., I.M.S., Egmore.	Whitlow ...	Do.	Cured.
15	78	The Resident Medical Officer, General Hospital, Madras.	Boils ...	Do.	Do.
16	97	.....	Do. ...	Do.	Do.
17	98	Captain A. J. H. Russell, I.M.S., General Hospital, Madras.	Do. ...	Do.	Do.
18	99	The Superintendent, Government Maternity Hospital, Egmore.	Do. ...	Do.	Not known.
19	104	The Medical Officer, Clinical Laboratory, Station Hospital, Madras.	Do. ...	Do.	Improved.
20	105	The Fourth Physician, General Hospital, Madras.	Pustular eruption ...	Staphylococcus albus.	Temporary improvement.

TABLE I—cont.

Serial number.	Case number.	Medical Officer.	Disease.	Vaccine made.	Result.
21	107	.....	Vesicular eruption ...	Staphylococcus aureus.	Not known.
22	110	The Medical Officer, Station Hospital, St. Thomas Mount.	Boils ...	Do.	Cured.
23	113	Major C. A. F. Hingston, I.M.S., Egmore.	Do. ...	Do.	Do.
24	114	The Medical Officer, Station Hospital, St. Thomas Mount.	Do. ...	Do.	Do.

Eczema, Pemphigus and skin eruptions.—There were 11 cases of pemphigoid skin eruptions, every one of which was streptococcal. In two of these a stock pemphigus streptococcus vaccine was used with completely curative results and so the autogenous vaccines were not used. There were 8 cases of staphylococcal eczema in this class, but the results of autogenous vaccine treatment in these cases were not satisfactory. It was either because the organisms were not the causative ones or else the skin eruption was the result of a general constitutional condition.

TABLE II.

Eczema, pemphigus, and skin eruptions.

Serial number.	Case number.	Medical Officer.	Disease.	Vaccine made.	Result.
1	9	.....	Pemphigoid eruption.	Streptococcus ...	Much improved.
2	15	The Second Surgeon, General Hospital, Madras.	Do.	Do.	Cured.
3	29	.....	Pemphigus ...	Do.	Not given a fair trial.
4	36	The Medical Officer, Station Hospital, Madras.	Pemphigoid eruption.	Do.	Not used. Cured by stock vaccine.
5	37	Do. do.	Do.	Do.	Do.
6	38	The Medical Officer, Jubilee Hospital, Berhampore.	Eczema ...	Staphylococcus ...	Temporary improvement.
7	44	The Medical Officer, Municipal Hospital, Kodalkanal.	Pemphigus ...	Streptococcus ...	Much improved.
8	45	The Second Physician, General Hospital, Madras.	Pemphigoid eruption.	Do.	Not known.
9	62	The Resident Medical Officer, General Hospital, Madras.	Eczematous eruption on thigh.	Staphylococcus albus.	Not used.
10	75	The District Medical and Sanitary Officer, Berhampore.	Eczema ...	Staphylococcus aureus.	Doubtful.
11	76	Do. do.	Do. ...	Do.	Do.
12	92	The Superintendent, Lunatic Asylum, Madras.	Pemphigus ...	Streptococcus ...	Cured.
13	94	The Officer Commanding, Station Hospital, St. Thomas Mount.	Ulcers ...	Staphylococcus ...	Cured along with local treatment.
14	101	Major F. F. Elwes, C.I.E., I.M.S., Egmore.	Pemphigoid eruption.	Streptococcus and Staphylococcus aureus.	Cured.
15	103	The Officer Commanding, Station Hospital, St. Thomas Mount.	Chronic pemphigoid eruption.	Streptococcus ...	Considerably improved.
16	109	The Civil Surgeon, Chatrapur ...	Eczema ...	Staphylococcus aureus.	Not known.
17	116	The Medical Officer, Municipal Hospital, Tuticorin.	Do. ...	Do.	Cured.
18	123	Major A. Chalmers, I.M.S., General Hospital, Madras.	Sycosis ...	Staphylococcus albus.	Under treatment.
19	129	.....	Pemphigus ...	Streptococcus ...	Cured.

Abscesses, Carbuncles and Cellulitis.—These were mostly staphylococcal, a streptococcus having been found in combination with the staphylococcus in one case of carbuncle and alone in one of mammary abscess.

TABLE III.

Abscesses, carbuncles and cellulitis.

Serial number.	Case number.	Medical Officer.	Disease.	Vaccine made.	Result.
1	1	The District Medical and Sanitary Officer, Chittoor.	Necrotic abscess ...	Staphylococcus aureus.	No effect.
2	10	.....	Abscess ...	Staphylococcus albus.	Cured.
3	17	The District Medical and Sanitary Officer, Coimbatore.	Carbuncle ...	Streptococcus and staphylococcus.	Not used.
4	49	Miss M. Alexander, M.A., M.D., Tondiarpet.	Mammary abscess ...	Streptococcus ...	Cured.
5	68	Miss M. McNeil, Tondiarpet ...	Carbuncle ...	Staphylococcus aureus.	Do.
6	85	The District Medical and Sanitary Officer, Vizagapatam.	Do. ...	Do.	Not used.
7	102	Dr. Muhammad Hussain, B.A., M.B. & C.M., Gultarga.	Do. ...	Do.	No effect.
8	120	The District Medical and Sanitary Officer, Coimbatore.	Do. ...	Do.	Not used.
9	124	Acting District Medical and Sanitary Officer, Trichinopoly.	Diabetic abscess ...	Do.	Improved.
10	127	Do. do.	Cellulitis leg ...	Streptococcus ...	Not given a fair trial.

Acne.—The acne bacillus was isolated in 3 out of the 5 cases treated, either alone or in association with staphylococcus albus. In the other two in spite of repeated attempts the staphylococcus albus alone could be isolated. The aggregate result of treatment could not be said to be satisfactory. The cases showed decided improvement after a few doses, but in spite of prolonged immunization with comparatively high doses a complete cure could not in any case be effected.

TABLE IV.

Acne.

Serial number.	Case number.	Medical Officer.	Disease.	Vaccine.	Result.
1	8	.....	Acne ...	Staphylococcus albus.	Not used.
2	12	The Resident Medical Officer, General Hospital, Madras.	Do. ...	Staphylococcus albus (and stock acne).	Almost cured.
3	27	.....	Do. ...	Acne bacillus and staphylococcus albus.	Improved.
4	28	Major R. Bryson, I.M.S., Royapuram...	Do. ...	Acne bacillus	Not used.
5	118	Dr. Wheeler, Podanur ...	Do. ...	Acne bacillus and staphylococcus albus.	Improving.

Pyorrhoea Alveolaris.—The streptococcus brevis was present in all the cases treated, the Micrococcus Paratetragnus having been found to co-exist with it in one case. Anaerobic cultivations from the pus were made in a few cases both on ordinary and on serum media but no other organism could be isolated, though microscopical preparations from the pus revealed a variety of organisms including bacilli, spirilla, etc. Two cases were reported as cured, 2 as improved and 2 were unsuccessful. In the remaining 8 cases the vaccines were not given a trial or the results were not reported.

Case 91.—Pyorrhoea Alveolaris in a youth of 19 years, with shaky and stunted teeth and spongy gums. The disease was of over 7 years' standing and had resisted all ordinary treatment. Only 5 injections of autogenous streptococcus vaccine, 10 to 50 million, were given in this case with the result that "the patient is all right and is radically cured of the disease. The gums have become healthy."

TABLE V.

Pyorrhoea Alveolaris and Dental Abscesses.

Serial number.	Case number.	Medical Officer.	Disease.	Vaccine.	Result.
1	2	.....	Pyorrhoea alveolaris.	Streptococcus and M. Paratetrigenus.	Improved.
2	26	Dr. P. N. Lakshmanan, Trivandrum	Gum abscess	Streptococcus	Not known.
3	32	Do. do.	Do.	Do.	Do.
4	33	Do. do.	Do.	Do.	Do.
5	35	The Medical Officer, Station Hospital, Madras.	Pyorrhoea alveolaris.	Do.	No effect.
6	48	Dr. T. V. Subba Rao, Triplicane	Do.	Do.	Could not be given a fair trial.
7	56	The Medical Officer, The Penitentiary, Madras.	Pyorrhoea	Do.	Cured.
8	58	The Medical Officer, Pentland Hospital, Vellore.	Do.	Do.	Not known.
9	59	The District Medical and Sanitary Officer, Trichinopoly.	Do.	Do.	Considerably improved.
10	89	Sub-Assistant Surgeon Srinivasagam Nadar, Sankaranayinarkoil.	Do.	Do.	Not known.
11	91	Dr. Narayanaswami Ayyar, Medical Practitioner, Dindigul.	Do.	Do.	Cured.
12	95	.....	Do.	Do.	No effect.
13	119	The District Medical and Sanitary Officer, Nellore.	Do.	Do.	Under treatment.
14	123	The Chief Medical Officer, M. & S.M. Railway, Madras.	Do.	Do.	Do.

Inflammations of the mouth, nose, throat, ear, conjunctiva and antrum.—The streptococcus accounted for a case of pharyngitis and another of stomatitis and the staphylococcus albus for a case of recurring conjunctivitis and corneal ulceration. Diphtheroid bacilli were isolated from the nasal discharge and from the pus of a case of disease of the middle ear and Eustachian tube.

Case 19.—Was one of catarrh of the throat of many years' standing, followed by catarrh of the right Eustachian tube and middle ear and perforation of the tympanum. Three cultivations were made from the discharge in the course of the year, the same diphtheroid organism having been isolated each time. The vaccine had a decided effect in this case, which clinically established the causal relationship of the organism. Each injection was immediately followed by a positive phase in which the discharge considerably lessened and the hearing was partially restored. This immunity effect lasted 10 days or more when the next dose had to be given to keep it up. The patient is still under treatment.

Case 38.—A medical student who for 10 years and more was suffering from recurring attacks of nasal catarrh, the nasal paroxysms being usually followed by symptoms of asthma. A diphtheroid bacillus was isolated from the nasal discharge and a course of vaccine made from it given for a period of 6 months in increasing doses. The catarrhal attacks gradually abated in their frequency and virulence and the patient was able to pass through the cold season without any asthmatic trouble.

TABLE VI.

Inflammations of the mouth, nose, throat, ear, conjunctiva and antrum.

Serial number.	Case number.	Medical Officer.	Disease.	Vaccine.	Result.
1	19	The District Medical and Sanitary Officer, Nellore.	Chronic otitis media.	A diphtheroid bacillus.	Improved.
2	55	Assistant Surgeon B. K. Narayana Rao, Bezwada.	Ulceration of mouth.	Streptococcus	No effect.
3	65	Dr. F. Hall-Wright, Hoogrijan, Asam.	Pharyngitis	Streptococcus brevis.	Not known.
4	84	The District Medical and Sanitary Officer, Nellore.	Chronic otitis media.	Diphtheroid bacillus and staphylococcus aureus.	Improved.
5	88	The Second Physician, General Hospital, Madras.	Rhinitis	Diphtheroid bacillus.	Considerably improved.

TABLE VI—cont.

Inflammations of the mouth, nose, throat, ear, conjunctiva and antrum—cont.

Serial number.	Case number.	Medical Officer.	Disease.	Vaccine.	Result.
6	115	The District Medical and Sanitary Officer, Nellore.	Chronic otitis media.	Diphtheroid bacillus.	Improved.
7	122	The Superintendent, Government Ophthalmic Hospital, Madras.	Recurring conjunctivitis.	Staphylococcus albus.	Cured.
8	126	The Medical Officer, Lawley Hospital, Coonoor.	Suppuration of antrum.	Pneumococcus	Improving.

Asthma, bronchitis and lung affections.—Of the 29 cases of this class treated with autogenous vaccines 24 were cases of asthma and chronic or recurring bronchitis. The following is the analysis of the cultural findings in these 24 cases.

	cases.
Streptococcus only isolated	3
Pneumococcus only isolated	10
Micrococcus Paratetrigenus only isolated	1
Micrococcus Catarrhalis only isolated	1
Bacillus Influenzae only isolated	2
Pneumococcus and streptococcus isolated	3
Pneumococcus and Micrococcus catarrhalis isolated	2
Pneumococcus and Bacillus Influenzae isolated	1
Pneumococcus, streptococcus and B. Influenzae isolated	1

In conformity with the results obtained in previous years, the pneumococcus is found to be the predominant organism in these cases of bronchial catarrh, 17 of the 24 harbouring this diplococcus. The B. Influenzae was isolated in 4 cases either alone or in association with other organisms. Though this organism was not isolated during previous years it is almost certain that the failure to isolate it was not due to its having been absent in the specimens of sputa but to the fact that blood agar media were not systematically used in cultural work until this year. The B. Influenzae does not grow on ordinary agar, grows very scantily or not at all on the hydrocele fluid agar used in the laboratory, but grows abundantly on blood agar, this medium being made by smearing a drop or two of fresh rabbit's blood on each agar agar slope. Even on this medium the organism sometimes shows marked idiosyncrasies as regards growth, fresh sputum demonstrated microscopically to be full of B. Influenzae failing sometimes to yield a growth of the organism. In such cases the attempt has to be repeated and the organism can be cultivated almost to a certainty. The colonies on this blood agar are small, transparent and rounded, unlike colonies of the Pneumococcus which tend to flatten out as they grow.

From Table VII it is seen that in a large number of cases the treatment was reported as ineffective, but a close scrutiny of such cases shows that in a large majority of them the dosage was inadequate or the vaccine treatment was not sufficiently persevered with.

Case 80.—was one of the laboratory staff who for the previous 3 or 4 years was subject to recurring attacks of catarrh of the nose and throat spreading in the course of a day or two into the trachea and bronchi on the one hand and into the frontal sinuses on the other, with the attendant symptoms of persistent headache, lachrymation, and general constitutional disturbance with respiratory symptoms of threatening bronchial asthma. A condition of acute intestinal catarrh and irritability of the stomach was frequently present during these attacks. After repeated attempts the B. Influenzae was at last isolated in pure culture from the fresh expectoration and a course of autogenous B. Influenzae vaccine was given. The result of this treatment was most gratifying. There has been almost no attack of any severity since the treatment was commenced and the general health has been steadily improving.

Two cases which have been included in this class deserve a short description as they indicate the possibility of applying vaccine treatment with benefit to cases of secondary infection in tuberculosis of the lungs.

Case 22.—One of mixed Pneumococcus and streptococcus infection in pulmonary phthisis. The combined autogenous vaccine brought about considerable relief of the cough and reduction of the expectoration with a marked improvement in the general condition of the patient. As a direct effect of the treatment of the secondary infection the nocturnal sweats were relieved, and the hectic fever was greatly reduced. The rapid progress made by the case during the vaccine treatment left no doubt as to its decided value independent of the medicinal, dietetic and hygienic measures.

Case 108.—was one of fibroid phthisis in which Tuberculin B.E. was ill borne on account of hyper-sensitiveness and severe reactions. There was a hectic temperature of 98.4°F—103°F. The sputum showed large numbers of streptococci. A course of autogenous streptococcus injections from 24 to 15 million given during a period of three weeks brought the temperature down to normal, the cough subsided, the night sweats stopped, the appetite got better, and the general condition of the patient had so far improved that Tuberculin P.T.O. was soon commenced and borne without reactions and with benefit.

TABLE VII.

Asthma, Bronchitis and Lung affections.

Serial number.	Case number.	Medical Officer.	Disease.	Vaccine.	Result.
1	4	.....	Pneumonia ...	Pneumococcus and M. Paratetragenus.	Not used.
2	5	The Fourth Physician, General Hospital, Madras.	Bronchitis ...	Streptococcus ...	No effect.
3	6	Do. do.	Do. ...	Pneumococcus ...	Do.
4	7	The Superintendent, Government Maternity Hospital, Madras.	Chronic bronchitis ...	Pneumococcus and streptococcus.	Not used.
5	14	The Fourth Physician, General Hospital, Madras.	Do. ...	Pneumococcus ...	No effect.
6	18	.....	Chronic asthma ...	Pneumococcus, streptococcus and B. Influenzae.	Considerably improved.
7	22	Sub-Assistant Surgeon A. Perumal Nayudu, Vepery.	Pulmonary tuberculosis.	Streptococcus and pneumococcus.	Do.
8	30	The Fourth Physician, General Hospital, Madras.	Chronic bronchitis ...	M. Paratetragenus ...	Not used.
9	34	Do. do.	Chronic asthma ...	B. Influenzae ...	No effect.
10	40	The Third Physician, General Hospital, Madras.	Chronic bronchitis ...	Streptococcus ...	Not known.
11	47	The Second Physician, General Hospital, Madras.	Asthma ...	Pneumococcus and streptococcus.	No effect.
12	53	The Fourth Physician, General Hospital, Madras.	Relapsing bronchitis.	Pneumococcus and M. Catarrhalis.	Not known.
13	57	The Second Physician, General Hospital, Madras.	Asthma ...	Pneumococcus and B. Influenzae.	Do.
14	65	The Superintendent, Royapettah Hospital, Madras.	Do. ...	Pneumococcus ...	Not used.
15	69	Major F. F. Elwes, C.I.E., I.M.S., Egmore.	Chronic bronchitis ...	Pneumococcus and M. Catarrhalis.	Not known.
16	72	The Second Physician, General Hospital, Madras.	Bronchitis ...	Pneumococcus and streptococcus brevis.	Not used.
17	80	.....	Recurring pharyngeal and bronchial catarrh.	B. Influenzae ...	Almost cured.
18	81	The First Physician, General Hospital, Madras.	Chronic asthma ...	Pneumococcus ...	Not known.
19	83	The Fourth Physician, General Hospital, Madras.	Pleurisy ...	Staphylococcus ...	Do.
20	87	Do. do.	Acute bronchitis ...	Pneumococcus ...	No effect.
21	93	The Superintendent, Lunatic Asylum, Madras.	Chronic asthma ...	Do. ...	Improved.
22	100	Do. do.	Do. ...	Do. ...	No effect.
23	106	Dr. K. D. Muganeth, Calicut ...	Bronchitis ...	Do. ...	Cured.
24	108	The Superintendent, Lunatic Asylum, Madras.	Tuberculosis of lungs.	Streptococcus brevis.	Considerably improved.
25	111	The Second Physician, General Hospital, Madras.	Asthma ...	Pneumococcus ...	No effect.
26	112	The Fourth Physician, General Hospital, Madras.	Chronic bronchitis with fibrosis of lung.	Streptococcus brevis.	Not used.
27	117	The Second Physician, General Hospital, Madras.	Asthma ...	Pneumococcus ...	Doubtful.
28	121	The Medical Officer, Municipal Hospital, Tuticorin.	Chronic bronchitis ...	M. Catarrhalis ...	Improving.
29	125	The Surgeon, First District, Madras ...	Acute pneumonia ...	Pneumococcus ...	Not used.

Diseases of bones and joints.—Of the five cases treated, one was evidently a case of gonococcal arthritis, which unfortunately terminated in suppuration and had to be dealt with by operation.

Case 11.—Suppuration of the elbow joint following excision for ankylosis resulting from compound fracture five years previously. The suppuration was followed by symptoms of pyæmia, the right ankle and right knee getting inflamed and threatening to suppurate. An abscess developed in the sacral region and the patient was attacked with acute cystitis with pus in the urine. The ankle joint had to be opened and drained and the sacral abscess incised. With the timely injection of the autogenous streptococcus vaccine, the knee joint was saved from operation, all the abscesses rapidly healed, the urine cleared up and the patient was convalescent within a month from the commencement of vaccine treatment.

TABLE VIII.

Diseases of bones and joints.

Serial number.	Case number.	Medical Officer.	Disease.	Vaccine made.	Result.
1	11	The Third Surgeon, General Hospital, Madras.	Suppurative arthritis of elbow.	Streptococcus and staphylococcus aureus.	Cured.
2	20	Do. do.	Suppurative arthritis and multiple abscesses.	Staphylococcus ...	Not used.
3	23	The Surgeon, First District, Madras ...	Psoas abscess ...	Streptococcus ...	No effect.
4	67	The Third Physician, General Hospital, Madras.	Suppurative arthritis of knee.	Gonococcus ...	Cured but after operation.
5	71	.....	Do.	Streptococcus longus.	Improved.

Gonorrhœa and its complications.—The Gonococcus was isolated from one case of urethritis and the autogenous vaccine greatly benefited the patient. Streptococci and staphylococci and diptheroid bacilli were isolated from cases of chronic urethritis and cystitis following gonococcal infection, but the result of treatment with the autogenous vaccine varied in each case.

TABLE IX.

Gonorrhœa and its complications.

Serial number.	Case number.	Medical Officer.	Disease.	Vaccine made.	Result.
1	13	Senior Sub-Assistant Surgeon A. Perumal Nayudu, Vepery.	Urethral stricture and cystitis.	Streptococcus and staphylococcus.	Considerably improved.
2	21	The District Medical and Sanitary Officer, Coimbatore.	Chronic urethritis ...	Streptococcus and staphylococcus albus.	No effect.
3	41	Officer Commanding, Station Hospital, Poonaasalee.	Do. ...	Staphylococcus albus.	Cured.
4	42	Do. do.	Do. ...	A diptheroid bacillus.	No effect.
5	48	Do. do.	Do. ...	Do. ...	Do.
6	52	The District Medical and Sanitary Officer, Coimbatore.	Do. ...	Staphylococcus albus.	Do.
7	58	The District Medical and Sanitary Officer, Nellore.	Gonorrhœal urethritis.	Gonococcus ...	Much improved.

Cystitis and Bacilluria.—All the five cases were B. Coli infections. In every case a number of colonies from the cultivations from the sample of urine were tested for their sugar reactions and it was ascertained that the infection was with one definite variety of the Coli group, before a vaccine was prepared and sent out for injection. A different individual of the lactose fermenting group was present in each case.

Case 13.—Acute cystitis, the result of gonorrhœal urethritis of one-and-a-half years' standing. Micturition was very painful and the urine was loaded with pus, blood and shreds from the posterior urethra and bladder. The staphylococcus aureus and streptococcus were isolated from the fresh urine and a course of combined autogenous vaccine given. The treatment had to be continued for over three months before the urine completely cleared up and the dysuria was quite relieved.

TABLE X.

Cystitis and Bacilluria.

Serial number.	Case number.	Medical Officer.	Disease.	Vaccine made.	Result.
1	3	The Superintendent, Government Maternity Hospital, Madras.	Chronic cystitis ...	B. Coli ...	Not used.
2	16	Dr. T. V. Subba Rao, Triplicane	Bacilluria ...	Do. ...	Cured.
3	51	Dr. T. S. S. Rajan, Srirangam	Cystitis ...	Do. ...	Not known.
4	79	The District Medical and Sanitary Officer, Cochin.	Bacilluria ...	Do. ...	No effect.
5	96	Miss M. Alexander, M.A., M.D., Tondiarpet.	Do. ...	Do. ...	Not known.

Other infections.—Of the three cases included in this group, the only interesting one (case 54) was of a young lady who for weeks was suffering from irregular fever. Cultures from the blood gave a growth of staphylococcus. The autogenous vaccine administered along with other treatment resulted in a rapid recovery.

TABLE XI.

Other Infections.

Serial number.	Case number.	Medical Officer.	Disease.	Vaccine made.	Result.
1	54	The Second Physician, General Hospital, Madras.	Irregular fever ...	Staphylococcus ...	Cured.
2	82	Miss M. Alexander, M.A., M.D., Tondiarpet.	Acute dysentery ...	B. Dysenteriae ...	Not used.
3	99	The Resident Medical Officer, General Hospital, Madras.	Chronic colitis ...	B. Coli ...	Do.

STOCK VACCINES.

Gonococcus vaccine.—The result of treatment with stock gonococcus vaccine was eminently satisfactory. Autogenous vaccines are rarely needed in gonococcal infections and in the majority of cases where the urethritis has merged into the subacute or chronic stage and in the metastatic complications it is difficult or impossible to isolate the organism for the preparation of the autogenous vaccine. The experiences of the different medical men who have used the vaccine are unanimous as regards its utility in the different gonorrhoeal conditions. Cases of urethritis are not always certain in their amenability to vaccine treatment. A number of cases improve up to a certain point and then merge into a chronic state which yields neither to vaccines nor to local or systemic medication. A certain percentage of the cases recover completely, no trace of the urethral discharge being evident and no complication arising in later life. A small minority of the cases are reported to have got worse by the vaccine treatment, but this is almost certainly due either to insufficient treatment when the disease is normally becoming more acute or to reaction following too high doses. Whether the urethritis is completely cured or not, the vaccine has a decided value in the prevention of complications and for this, if not for any other reason, it is desirable that every case of gonorrhoeal infection, whether in the acute or chronic stage, should be put under a course of gonococcus vaccine treatment.

As regards the dosage, in the acute stage the smaller doses, i.e., 2, 5, 10 and 20 million give the best results, the higher doses causing severe reactions with exacerbation of discharge and delay in recovery. In the metastatic troubles and in subacute and chronic urethritis the larger doses, 10, 20, 50, 100 and 200 million give the best results. How far the dosage can, or should, be pushed is not easy to judge but the majority of the cases seem to bear a 200 million dose well, whilst others cannot be taken beyond 100 million and still others can, be run up to 500 million or even more. Each case has to be studied on its own merits, the main point to be kept in view being the avoidance of severe reactions, which, as in the gonorrhoeal infection of a delicate organ like the eye, may lead to the most disastrous consequences.

As is seen in the tabular statement, stock gonococcus vaccine was found to be beneficial in a variety of conditions including urethritis, arthritis, synovitis, fascial inflammations, orchitis, epididymitis, endometritis, salpingitis, peritonitis, cystitis and a number of gonococcal eye affections including conjunctivitis, keratitis, corneal ulceration, iritis, iridocyclitis, uveitis,

etc. The remarkably rapid effect which this vaccine often produces on some of these conditions, especially on the joint affections, which have resisted all other kinds of treatment gives this vaccine a specific diagnostic value similar to that of salvarsan in the treatment of syphilis and its complications.

TABLE XII.

Giving the results of treatment with stock gonococcus vaccine during 1915.

Nature of infection.	Number of cases cured.	Number of cases relieved.	Number of cases unaffected.	Total.
Gonorrhoeal urethritis ...	13	11	2	26
Gonorrhoeal arthritis and tenosynovitis ...	72	39	8	119
Gonorrhoeal epididymitis ...	2	...	...	2
Gonorrhoeal endometritis and peritonitis ...	3	5	...	8
Gonorrhoeal cystitis ...	2	...	...	2
Gonorrhoeal affections of the eye ...	7	4	7	18
Total ...	99	59	17	175

Streptococcus vaccines.—Polyvalent streptococcus vaccine issued from the Institute has been used both curatively and prophylactically for a number of different conditions including puerperal sepsis and actual or threatened sepsis after accidents and operations. A large number of Pyorrhoea alveolaris cases with their attendant symptoms of dyspepsia, neurasthenia, debility, sprue, etc., were also reported to have been greatly benefited and even cured but in all these cases other treatment was also given such as cleaning of the teeth, emetin injections, etc.

In this connection may be mentioned certain interesting observations made during an epidemic of Pemphigus which broke out among the Territorials in Fort St. George. Soon after their arrival from England, a number of them broke out with a virulent eruption on the fore-arms and legs. The eruption was presumably the result of mosquito bites, the covered parts being remarkably free. The eruption started as clear vesicles and blebs the contents of which when inoculated on culture media mostly proved sterile. The irritation resulting from them was so great that the men freely scratched themselves so that many of the foci suppurated and cultivations in this stage gave pure growths of the Pemphigus streptococcus. Scabbing followed with the production of ulcers below the scabs which took a long time to heal in spite of local and internal medication. All the affected men were put under stock Pemphigus streptococcus vaccine treatment. The results obtained were highly gratifying. Of thirty-one men who developed the complaint, eight were cured after one injection, seven after two injections, five after three injections, seven after four to eight injections and the remaining four men were under treatment at the time the report was received. The noteworthy feature in this set of cases is the apparent absence of organisms in the contents of the eruption in its primary stage which lends support to the view that it started as a direct effect of the mosquito bite on the highly irritable skins of persons unaccustomed to the climate, the vesicles later getting infected during scratching or otherwise with the streptococcus of pemphigus.

Pneumococcus vaccine.—This was used in a number of cases of asthma and bronchitis. Many of these were reported as 'cured' or 'relieved' but, as the after history of these cases, which are well known to be of an intermittent and paroxysmal nature, could not be closely followed, it is difficult to say what is the real extent of the benefit that resulted from the stock vaccine.

B. Coli vaccine.—Cases of cystitis and perineal suppuration are reported to have been benefited by this vaccine.

Tuberculin.—As usual there was a diversity of opinions regarding the efficacy of tuberculin in the treatment of tubercular infections. It was not used on any large scale in the General Hospital as its employment there during previous years does not seem to have given trustworthy results. The Superintendent of the Madras Lunatic Asylum used it in a series of cases including tuberculosis of the lungs and glands with very successful results. Of the thirty-four pulmonary cases fifteen were reported as cured, four were relieved, eight died, two were died aged before completion of treatment and five were still under treatment at the end of the year. This series included cases of different degrees of severity, both tubercle and a tubercle. Bacillary emulsion consisting of a mixture of equal parts of the human and bovine strains was used, many of the cases having been run up to a dose of 4 mgr. A few of the cases were diagnosed clinically as pulmonary tuberculosis whilst, in the majority, the diagnosis was confirmed by microscopic examination of the sputum as well. Of the six cases of glandular tuberculosis treated in the same Institution, five have been reported as cured and one as

relieved. Side by side with the tuberculin treated series, one of eleven pulmonary cases was treated without tuberculin, of which one was relieved, nine died and one was discharged otherwise, none having been cured. Though from the records of these cases one could not with fairness say that the two sets of cases, namely those treated with and those without tuberculin, were strictly comparable with each other, the latter class including some advanced cases where recovery was out of question, it was quite apparent that tuberculin was of decided value as a curative, aiding in a considerable degree the action of drugs, and of dietetic and hygienic measures. It must be stated however that under the term 'cured' are included cases where the patients had recovered from the clinical symptoms of the disease and were discharged as fit for ordinary avocations. All these cases could not possibly be pathologically free from tubercular foci but there was no active trouble in the affected organs and no local or constitutional symptoms which could be directly attributed to the disease. The following table gives a synopsis of the results of tuberculin treatment in a number of tubercular conditions dealt with by different medical officers with the material supplied from the Institute.

TABLE XIII

Showing the results of tuberculin treatment during the year 1915.

Seat of infection.	Number of cases cured.	Number of cases relieved.	Number of cases unaffected.	Total.
Tuberculosis of the lungs	15	12	11	38
Tuberculosis of lymphatic glands	14	6	...	20
Tuberculosis of bones and joints	1	1	1	3
Tubercular sinuses and fistulae	2	...	...	2
Tubercular cystitis	...	1	...	1
Tubercular keratitis	...	2	...	2
Tubercular ulcers	...	...	2	2
Total	32	25	...	41

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W. J. Harrison
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