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THE SANITATION OF RIO.

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Rio de Janeiro used not to enjoy the reputation of being a healthy city, and this stigma, weighing upon the metropolis of Brazil, was unjustly extended to the whole country. The report, quickly spread among foreign nations, that to stay in the most beautiful city of America was to run into mortal danger, was indeed justified. After 1850 imported yellow fever became endemic in our capital, where annually, almost without cessation, the most precious lives were mown down; the children in whom were fixed our hopes for the future, and the foreigners, associated with the nation's progress, who with their capital contribute to the public wealth. This unceasing daily work of devastation throughout every month of the year assumed the proportions of a veritable carnage in the hot season; and the approach of summer was as the sentence of death hanging over those to whom fortune forbade flight to localities untainted by the evil. Throughout the civilized world echoed the dreadful call of death!

The annual repetition of this terrible state of things, which could not be hidden from the eyes of the strangers within our gates, had launched an interdict against the entrance to our beautiful port; the foreigner *en route* did not dare to land, and was obliged to restrict himself to admiring the enchanting panorama of our city from afar, in obedience to the notice posted by captains when passing the bar of Rio de Janeiro: "Passengers are warned not to go on shore as yellow fever is prevalent in the city." Foreign trade was unnerved, and the port sheltered only a few ships, the crews of which were willing to brave death on shore.

The men-of-war which visited us left a number of their sailors in the cemeteries, and we are even now horror-stricken at the recollection of the Italian cruiser *Lombardia*, which was forced to return home with Brazilian officers and seamen, as the greater part of the crew had succumbed to yellow fever.

REFORM MEASURES.

Things were on this footing, and Rio seemed doomed to become a city of the dead, when President Rodrigues Alves assumed in 1902 the Government of the State, adopting as the basis for his administrative programme the sanitation of Rio de Janeiro. Faithful to this line of policy, he solicited and obtained from the national Congress the laws and supplies needed to commence a campaign against yellow fever, or in other words to secure the sanitation of the city. In deference to the wish of the Government Congress promulgated the law for the reorganization of the sanitary services under the superintendence of the Union. This legislation was directed not only to the fight against yellow fever, but also towards the complete reform of Brazil's archaic sanitary organization. International sanitary regulations were refashioned with the most ample liberality. Vexatious and useless quarantine regulations were suppressed, and in their place disinfection and sanitary inspection of passengers were ordered. An extremely liberal Sanitary Convention was signed with the Republics of the River Plate, which entailed not the smallest annoyance to trade or to passengers. As a consequence of these deliberations the principal ports of Brazil were equipped in a manner permitting rapid and efficient disinfection of ships. Floating disinfecting stations were provided with stoves, formaline chambers, and Clayton apparatus for fumigation and for the extermination of rats, insects, and other vermin which transmit disease.

At the same time as the needs of international hygiene were receiving due attention, rigorous measures were taken to render effective the sanitary inspection of domiciles, compulsory notification of diseases, isolation, and specific prophylaxy against infectious diseases. Finally a special service of yellow fever prophylaxy was created. For the support of all these installations an annual grant of 5,500 contos of reis (£343,750) was voted.

PRECAUTIONS AGAINST YELLOW FEVER.

A campaign without quarter against that national discredit, yellow fever, now commenced. The city was divided into zones, the limits of which were fixed in accordance with the density of population. In these zones the *employés* of the department had sway, divided under two principal heads—first section, isolation and expurgation; second section, inspection of hotbeds. To the first section was entrusted the removal to the isolation hospital, or the isolation in their own homes of the sick, and the purification of the houses with regard to the mosquitoes. The second section, the hotbed police, was charged with a periodical visit to domiciles throughout the city, as also to places such as public and private thoroughfares, especially those known as the hotbeds of yellow fever, there to destroy mosquitoes in the larva stage and to prohibit the increase of these insects by preventing or rendering inaccessible the accumulations of water in which they are able to breed. This section was subdivided into two; one charged with the inspection of dwellings, and the other was entrusted with the work to be carried out in plots of ground, ditches, rivers, &c. As a complement to this service of aggressive prophylaxy, the sanitary inspectors of the Health Department directed the prophylaxy of defence by exercising careful medical supervision over all persons residing near the active hotbeds of fever. It may be well by a rapid examination to consider what was the practice followed, and what were the obstacles met with and overcome by the lessons of experience. The cases of yellow fever are made known to the sanitary authorities by a notification given by physicians attending the patient, the chief of the sick person's family, or by any person having cognisance of the illness, under penalty of prosecution. On receipt of the advice, the staff on duty leave immediately for the spot indicated, accompanied by the doctor. The latter ascertains whether this is a case for isolation, and, if so, whether this shall be effected at home or at the hospital. Removal to the hospital is ordered only when the home is absolutely unfitted for efficient isolation, or when the patient expresses a desire to be removed. In these cases the patient is shifted in a mosquito-proof carriage, and the house is purified as hereinafter shown.

If domiciliary isolation is decided upon, the doctor chooses a spacious apartment in the house, with windows, and a door opening on

to another fair-sized room, the other doors being closed up entirely. This is the room for isolation purposes.

During the time required for making the necessary preparations the patient remains covered by a mosquito curtain hung over his bed. After the outer doors and windows of the house have been closed to prevent the mosquitoes already inside from escaping from the isolated room, wire-woven netting is fixed over the windows in such a way as not to interfere with their practicability, all other openings communicating with the exterior or with the other parts of the house being covered with strips or sheets of gummed paper. A special contrivance is provided for the entrance door, which is doubled, and the possibility of both doors being opened at the same time is prevented by means of suitable mechanism. This appliance prevents mosquitoes from entering or leaving the room. After the chamber has been prepared in this way, all doors and windows are closed and the cubic measurements are taken. Pyrethrum in the proportion of 10 grammes per cubic metre is then burned for two or three hours. When this operation is concluded the room is thoroughly ventilated, and the patient is brought in.

All the chinks and crevices in the rest of the house are next carefully stopped up, and this is isolated from the part where the patient lies, and is disinfected by means of sulphurous acid gas in the manner shown below. During this operation the patient is under the charge of a sanitary officer, who has the necessary materials with which carefully to close up all chinks or crevices, and so prevent the entrance of any sulphurous acid gas into the isolated room, in the event of there having been any small defect in the protection of the same. While the house is being disinfected members of the hotbed police make a thorough inspection in order to destroy all the larvæ met with, to collect and remove all useless utensils which might contain water for mosquito eggs, and hermetically to close the water cisterns. The patient remains isolated for seven days, at the termination of which time the isolation appliances are withdrawn if the family should desire it. When the centre of infection is thus located, it is subjected to a sanitary treatment, which consists, as already stated, in extinction of insects, inspection of hotbeds, and medical supervision. The expurgation is effected in two directions at the same time—towards the house and away from the house.

When the most extensive range possible for the limits of the hotbed has been marked out, the men are divided into two groups, one to work on the adjoining houses surrounding the infected centre, the other to purify the houses situated within the area of infection,

each advancing to meet the other. The service has thus in view the pursuit of infected mosquitoes, which may have escaped from the more distant houses, to be now driven towards the gang working in an outward direction.

While the disinfecting staff is at work in this way, the hotbed police, under the direction of the doctor and medical students, go through the whole of the suspected area searching for larvæ, not only inside the houses, but also in the gutters, roofs, drain syphons, gratings, watercourses or ducts of any description. The larvæ are killed, either by destroying or removing useless deposits, such as tins, broken bottles, and pots, or by pouring petroleum mixed with creoline, lysol, or similar preparations upon the pools where they live; or when such methods are not feasible, as in the case of tanks, wells, fountains, &c., by stocking these with a small fish called "barrigudo" or "Girardinus caudimaculatus," which devours with incredible voracity all mosquito larvæ which it comes across. The larvæ are destroyed in rain-water drains by means of Clayton gas injected into the pipes previously divided into sections.

INSPECTION OF INFECTED AREAS.

While disinfection is going on the sanitary inspectors visit every house within the suspected zone, and on their first visit make a careful list of persons not considered immune—that is to say, children under 15 years of age and foreigners who have resided less than six years in Rio. These are placed under the strictest supervision, and are immediately isolated the moment that the least rise in their temperature is noted. A record is kept in writing which must be signed every day by the persons under supervision, and is then presented by the doctor to the chief health officer of the district. In this bulletin information is given respecting the health of those absent at work, who are also under the supervision of the medical officer of the district where they are at work. Any person moving from the district under supervision must notify the address of his new residence, where he will be under the supervision of the medical officer of that district. If any person under supervision should deceive the medical officer, and go away without advising him previously, the master of the house in which he lived will be fined, he himself will be sought after by experienced officers of the service, true sanitary detectives, and he will then be subject to fine and imprisonment and renewed supervision.

During periods of good average public health the hotbed police service is continued with the greatest activity throughout the whole city, and more especially round the most recent hotbeds. Whenever, at certain districts,

no further hotbeds of larvæ can be found, the staff leave pools of water uncovered in situations which are most favourable for settlement of the insects. These pools are carefully examined at short intervals; they are sure proofs of the existence of mosquitoes, and serve as snares to entice the insects when about to deposit their ova. In this way they are easily destroyed. There are many districts within the city where larvæ are no longer met with in these traps.

DISINFECTION OF DWELLINGS.

The disinfection of houses by sulphurous acid gas gives the best results. The house to be disinfected is completely closed. Slips or sheets of paper are gummed over all chinks or crevices. Wardrobes and similar articles of furniture are opened and thoroughly cleaned out, and then, too, have all crevices stopped. Metal and gilt articles are protected by a coating of vaseline. Means of access to the roof are opened after this has been covered by a canvas awning fastened by laths to the outside wall of the building. After the cubic measurements of the whole building have been ascertained sulphur is burned in the proportion of 20 grammes per cubic metre, in numerous receptacles spread about the house and raised above the floors by means of special supports. These receptacles should not contain more than one kilogram each of sulphur, to ensure that the whole shall be consumed. Immediately under the tiles these receptacles are placed inside vessels containing water to reduce the risk of fire. When all the sulphur pans are alight the staff departs by the only exit they have left free, and this they seal up from the outside. The air, heated by combustion, and displaced by the sulphurous vapours, escapes through the texture of the canvas and passes out between the tiles. The mosquitoes, however, cannot follow the air as yet uncontaminated by the sulphurous gas, because they are retained by the awning over the roof. The house remains closed for at least two hours.

Disinfection outside the hotbeds is always made in the direction of the prevailing winds, which collect the infected mosquitoes from as far away as possible.

In conclusion a table has been prepared giving the monthly mortality from yellow fever in Rio. It corroborates the assertion that the gigantic fever hotbed which formerly existed at Rio de Janeiro is now extinct.

TABLE OF MORTALITY BY YELLOW FEVER IN RIO DE JANEIRO FROM 1872 TO 1909.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
1872	1	—	—	—	1	3	1	—	1	8	16	71	102
1873	949	1,169	953	281	180	83	29	3	2	5	2	13	3,650
1874	16	51	163	297	165	69	25	5	4	6	10	13	859
1875	23	168	385	301	244	104	37	7	5	4	3	11	1,292
1876	122	319	1,405	1,010	395	14	41	12	6	4	4	2	3,476
1877	3	10	74	35	40	12	4	15	7	8	18	57	282
1878	156	420	331	130	60	23	18	4	8	10	3	13	1,176
1879	102	227	226	160	81	54	43	25	11	8	9	18	974
1880	138	698	471	273	115	58	18	9	5	5	13	24	1,625
1881	50	67	46	26	23	14	13	1	1	2	4	3	257
1882	3	13	23	27	12	8	1	1	1	—	—	—	89
1883	8	91	315	598	390	111	69	34	12	6	15	29	1,604
1884	79	208	253	210	65	15	12	6	2	—	6	4	863
1885	15	28	58	51	65	57	41	20	18	10	21	58	445
1886	201	351	483	364	74	23	9	2	—	1	—	1	1,440
1887	6	18	80	37	18	8	1	3	2	2	1	13	137
1888	30	50	20	128	110	80	50	18	15	16	49	108	747
1889	510	719	559	142	97	61	27	15	8	8	10	20	2,156
1890	57	103	187	169	100	33	22	6	4	5	9	10	719
1891	51	357	1,028	660	699	121	190	106	62	105	105	383	4,456
1892	1,006	1,290	1,404	410	147	55	14	1	1	1	2	1	4,312
1893	4	57	108	135	172	41	73	48	28	9	13	37	825
1894	371	1,351	1,978	655	303	114	14	12	3	2	—	7	4,832
1895	27	41	80	141	104	77	51	29	23	17	56	166	818
1896	524	731	1,002	445	136	57	20	9	4	4	9	8	2,920
1897	23	33	37	20	17	6	3	—	1	—	1	3	159
1898	22	96	255	287	180	78	65	34	10	13	8	21	1,073
1899	99	170	204	91	43	25	11	16	11	14	14	34	731
1900	42	64	78	61	35	28	9	7	5	6	4	4	344
1901	13	41	69	64	37	17	14	9	10	13	8	4	299
1902	32	64	165	173	134	131	79	50	27	10	18	76	984
1903	133	142	151	99	24	10	9	4	4	2	2	4	584
1904	2	7	7	8	16	4	4	1	1	—	3	1	48
1905	3	13	23	50	64	61	26	9	6	5	8	12	280
1906	6	9	6	8	2	1	2	—	1	1	3	1	42
1907	1	1	6	14	6	4	4	1	1	—	1	—	39
1908	—	—	1	—	—	—	—	—	—	—	—	—	4
1909	—	—	—	—	—	—	—	—	—	—	—	—	0