

# The Early Years of Pathology as a Specialty in Singapore

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## Abstract

During the first 86 years of Singapore's medical history (1819 to 1905), nobody was officially designated a "pathologist" although pathology was practised. All pathological work (purely medical or forensic) was done by non-specialist doctors. Representative cases are quoted so that conclusions can be drawn regarding what pathological practice was like and the problems faced. In 1905, the Governor, concerned about the high death rate in Singapore, consulted the Principal Civil Medical Officer, who advised that the most effective means to reduce the death rate was the establishment of a Department of Pathology with a full-time specialist pathologist in charge. Dr GA Finlayson was appointed the first Government Pathologist, responsible for all the hospitals in Singapore. He was also appointed Lecturer in Pathology in the Medical School. Work in the Pathology Department increased by leaps and bounds, and no research was possible. The first Annual Report of the Department (1907) is quoted in some detail to show the scope of the work done, reflecting the public health conditions of Singapore a hundred years ago. The Department gradually expanded and more staff were recruited. The new position of Government Bacteriologist was created. This officer served under the Government Pathologist in the Pathology Department.

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As in previous articles on the medical history of Singapore by the author, this one has many quotations from primary sources. This makes for more interesting reading than a rehash of the results of his research.

When did Pathology become a specialty in Singapore? It started with three official despatches: two from the Governor of the Straits Settlements to the Secretary of State for the Colonies, and one from the Secretary of State to the Governor in 1905 and 1906. These are quoted verbatim.

The Governor wrote to the Secretary of State on 24 August 1905:<sup>1</sup>

"Sir,

I have the honour to inform you, that in view of the exceedingly high death rate which has prevailed in Singapore for several years, and which shows no signs of decreasing, I have consulted the Principal Civil Medical officer on the measures to be adopted in endeavouring to reduce it, and propose, with your approval, to ask the Legislative Council to provide, in conjunction with the Municipal Commissioners of Singapore, funds for the

establishment and maintenance of a Pathological Department.

Singapore occupies, of course, a rather peculiar position owing to the fact that it is the 'dumping ground' for decrepit persons from the adjoining countries on the Peninsula and in the Malay Archipelago, and it is scarcely to be expected that its public health should be able to compare with that of cities situated more favourably in this respect; but it is believed that much can be done to prevent the enormous mortality shown by the returns of deaths.

No exact information can be obtained as to the causes of the mortality until a system is adopted involving post-mortem examinations of all doubtful uncertified deaths. It is needless to dwell upon the importance and value of such information in deciding on the means by which a reduction can be effected; and I am advised that the cheapest and most efficient way of obtaining it is by the establishment of a Government Pathological Department.

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The initial expenditure has been estimated at \$16,000 to include the necessary laboratories, offices and furniture and the installation of gas and water services. The annually recurrent expenditure is estimated at, roughly, another \$16,000, including salaries of a Pathologist (at £600 to £800 per annum), an Assistant Pathologist at £350 per annum, and 2 Assistants at \$1500 each. \$2000 of the salary of the Assistant Pathologist would be payable by the Medical School, for which it will be necessary in any event to provide an officer of this kind.

It is proposed that the expenditure shall be equally divided between the Government and the Municipal Commissioners, Singapore. The agreement (13.5.1903 to 12.5.1906) of Dr G A Finlayson, the Bacteriologist, who is at present paid by the Government and Municipal Commissioners jointly will expire in 1906. He would be an excellent man for the post of Pathologist, being very well qualified (MA, MBChB, MRCP London) for it and a hardworking officer. He would continue to perform such of the duties of his present post which are of a permanent nature, that for which he was primarily engaged, to examine and report on the purity of the local water supply and to devise improvements therein. These will have been completed by the end of his engagement.

I have, therefore, the honour to ask for sanction to lay the proposal before the Legislative Council when the Estimates for 1906 are under consideration and, if approved, to appoint Dr Finlayson.”

The Secretary of State replied on 21 September 1905:<sup>2</sup>

“Sir,

I have the honour to acknowledge the receipt of your despatch No. 381 of the 24th of August and to inform you that I approve your placing your proposals for the establishment of a Pathological Department before the Legislative Council.

In the event of the Council’s accepting the proposals, I am prepared to agree to the appointment of Dr Finlayson as Pathologist.”

At the Legislative Council meeting of 26 October 1905 to debate the Estimates for 1906, the Governor said:<sup>3</sup>

“... The high death rate continues to be more especially in Singapore, a legitimate cause for anxiety. It is largely in excess of the birth rate, and should the immigration of Indians and Chinese fall away, the prosperity of these Settlements will suffer, in as much as it depends so much on a plentiful supply of cheap labour ... The new Medical School and the Pathological Department,

which it is intended to establish next year, will also be of great assistance in dealing with the health of the Colony ...”

When the 1906 Estimates were passed, the Governor wrote to the Secretary of State on 28 February 1906:<sup>4</sup>

“My Lord,

With reference to Mr Lyttleton’s despatch, No. 270 of the 21st September 1905, I have the honour to inform Your Lordship that the proposals for the establishment of a Pathological Department in this Colony having been approved by the Legislative Council, I have offered the appointment of Pathologist to Dr GA Finlayson from the date of the expiry of his service with the Municipal Commissioners, Singapore, at a salary of £700 per annum rising to £800 per annum after three years service, and that the appointment has been accepted by that gentleman.”

This does not mean that no pathological work was done in Singapore prior to the appointment of Dr Finlayson. We have to go further back into the medical history of Singapore to get a proper perspective.

The Straits Settlements, comprising Singapore, Penang and Malacca, were British possessions for more than 130 years. Penang and Malacca are now constituent states in Malaysia, and Singapore is an independent sovereign republic.

Sir Stamford Raffles arrived in Singapore on 28 January 1819 with a detachment of European and Indian troops in 7 ships. One medical man, Sub-assistant Surgeon Thomas Prendergast, was responsible for the health of the contingent.

In May 1819, the 2nd Battalion of the Regiment garrisoning Singapore arrived to relieve the 1st Battalion. The Medical Officer of the 2nd Battalion was Assistant Surgeon William Montgomerie, and he became responsible for the medical care of the young settlement. Over the years, other regimental medical officers took over the duties whenever they were posted to Singapore.

Thus, the first doctors who practised in Singapore were all Medical Officers in the Army of the East India Company. They came when their regiments were posted from India. In the early years, their duties were both military and civil. Later, there was a separation of duties, depending on the appointment of the post, some doing purely civil duties and some looking after the troops and their families. These doctors were assisted by a few medical subordinates.

Over the years, the Straits Settlements, especially Singapore, prospered and its Medical Service expanded and improved. The doctors in the Medical Service, however, were not “specialists”. They were expected to be “all-rounders” and they performed whatever duty was expected

of them. They worked in hospitals. They dealt with outbreaks of smallpox and cholera. They treated cases of leprosy, tuberculosis, malaria, fractures, wounds, injuries, etc. They performed minor and major operations, post-mortems and did medico-legal work. Public health duties were also within their purview, e.g., quarantine, port health and vaccination. They were also responsible for the care of local prisoners and convicts from India (in the early years, the Straits Settlements were penal settlements for Indian convicts), and had time for private practice.

On 1 April 1867, the Straits Settlements were transferred from the India Office to the Colonial Office, and they became a Crown Colony. From then on, appointments to the Medical Service were made by the Colonial Office in London. But the doctors were not appointed as specialists. All appointments were as “Medical Officers”.

A digression here is necessary to explain the term “Medical Officer”. During colonial times, the term “Medical Officer” did not have the same meaning as used in modern-day Singapore. In the present-day Singapore Medical Service, “Medical Officer” is the designation of a doctor whose rank is one grade higher than that of a “Houseman”.

During the colonial era, the Medical Service terminology was similar to that of the Army. There were “officers” and subordinates (“other ranks”). When a British doctor joined the Medical Service, he joined as an officer (not as a subordinate) and was designated a “Medical Officer” (just as lawyers were known as Legal Officers in the Legal Service), and was known as one throughout his career. He could be promoted to Senior Medical Officer or Chief Medical Officer. When a Medical Officer held a special post, he was designated accordingly, e.g., Medical Officer in charge Tan Tock Seng Hospital (MO i/c TTSH) or Chief Medical Officer, General Hospital (CMO, GH).

Doctors appointed as Medical Officers were expected to have only a basic medical degree, e.g. MB, BS, MBChB, MRCS, LRCP, and when it was realised that a knowledge of tropical medicine was essential, the DTM & H (Diploma in Tropical Medicine and Hygiene). They had on the job training and could rise to the higher echelons of the Medical Service without being “specialists”.

We now revert to “pathology”. During the first 86 years of Singapore’s medical history (1819-1905), nobody was officially designated a “pathologist”, although pathology was practised. Pathology was of no interest to officials and the general public, except forensic cases, and even then only those that might have embarrassed the Government or those catering to the morbid interests of the public. Hence, records of pathology are scarce in the official documents and newspapers.

In retracing our steps to 1819, the best way to show the

pathological work done by the non-specialist doctors would be to quote representative cases so that conclusions can be drawn regarding what pathological practice was like, purely medical or forensic – and the problems faced.

In the early days of Singapore, being a “frontier town”, death by violence was common, and so were crimes of passion, as the local population consisted of far more men than women.

On the night of 30 January 1832, a band of Chinese bandits attacked some Malays who were repairing their boats. At the Coroner’s Inquest,<sup>5</sup>

“Dr Oxley, sworn, deposed to having examined the bodies of the two Malays; that on the body of one of them who appeared to have been an elderly man, he found an incised wound in an oblique direction across the back about 12 inches in length and sufficiently deep to divide the spinous processes of the vertebrae, which wound he believes to have been the cause of death.

That upon the body of the younger man there were several bruises and other marks of violence, but nothing sufficiently obvious to discover the immediate cause of death.”

On 27 October 1833, a Coroner’s Inquest was held on the body of a man who had been taken to the Police Station for drunken behaviour and was found dead the next morning in the lock-up cell. A post-mortem examination showed that the deceased had died of a cerebral haemorrhage – a common occurrence when signs of cerebral pathology are mistaken for drunkenness in a person who has had alcoholic beverages.<sup>6</sup>

An Inquest held on 15 March 1834 recorded, for the first time, the use of chemical tests (howbeit very primitive) for the detection of poisons in cadavers. Two Malays had thrown some white powder into the cooking pot of some Chinese, 2 of whom ate the rice from the pot, vomited and died.<sup>7</sup>

“Dr Oxley having examined the bodies ... The contents of the stomach having been carefully preserved, and a portion having been subjected to the two delicate trial tests of the ammoniacal nitrate of silver, and the sulphate of ammonia, with a view of forming the arsenite of silver and the sulphate of arsenic, had precipitates highly indicative of those substances; the latter test, more particularly, threw down its characteristic precipitate of a fine lemon colour.”

Some of the post-mortem findings recorded in 1833, 1834 and 1835 were: “stab wounds”, “throat cut down to the spine”, “ruptured spleen from an external blow with

blood in the peritoneal cavity”, “knife blade in body having penetrated the thorax, diaphragm and stomach”, and “cerebral haemorrhage and GPI”.

A woman died and was buried on 15 November 1843, but was exhumed 3 days later by order of the Superintendent of Police (the highest ranking police officer then) because of reports of her having been poisoned:<sup>8</sup>

“Dr Oxley, the Assistant Residency Surgeon, was called upon to examine the body, but he reported that it was in such an advanced state of decomposition that he could not make an examination or give a professional opinion on the subject; that the extraordinary extrication of gases and the liquefaction of the solids under the heat and moisture of the climate render post-mortem examination dangerous and impracticable, besides obliterating all traces of morbid action, which remain for weeks in a colder climate, but are thus annihilated here in a few days.”

Another post-mortem examination showed that a man had a depressed fracture of the skull and subdural haemorrhage and the diagnosis was “apoplexy occasioned by intemperance because the cerebro-spinal fluid smelt of liquor!”<sup>8</sup>

Not all the pathological work was of a forensic nature. On 1st January 1846, “*Rules for the better regulation of the Seamen’s Hospital*” (predecessor of the General Hospital, Singapore) were promulgated. The 2 sections on “pathology” are quoted:<sup>9</sup>

“The Medical Officer will further keep a book entitled ‘*Post-mortem Examinations*’ in the Singapore Seamen’s Hospital in which will be recorded the morbid appearances of any fatal cases. Whenever any interesting specimen of morbid anatomy occurs, it will be preserved in spirits, set up in a ground stopped bottle, properly labelled with a detail of the case, to be forwarded to Bengal for the use of the Museum of the Medical College, Calcutta.

Approved, WJ Butterworth, Governor,  
1st January 1846.”

In the first half of the 19th century, forensic medicine in Singapore was rather primitive, and apart from gross morbid changes and a few simple chemical tests, the Coroner and his Jury could not get much help from the non-specialist doctors. In 1846, they could not distinguish between death by hanging and death by strangulation. On New Year’s Day, the Coroner’s Jury recorded a verdict of “*Found dead, supposed by hanging or strangulation against some persons unknown.*”<sup>10</sup>

In the hospitals, the doctors did post-mortem examinations

on all patients they were not sure of the cause of death, and frequently discovered evidence of foul play, as this extract from a letter written on 28 May 1847 from the Senior Surgeon to the Resident Councillor shows:<sup>11</sup>

“I have the honour to report the following circumstances relative to the death of a convict named Hummadaz, which appear sufficiently suspicious to call for some inquiry.

Hummadaz, convict, lately working in Shangei (Changi), admitted at 9 pm on the 24th May, in a state of insensibility. Head shaved, blister applied to the neck. Symptoms those of apoplexy. Died 1 pm on the 25th. Body examined: Viscera of the thorax and abdomen healthy. Severe bruise was observed on the right side of the chest; another severe contusion over the right side of the frontal bone; brain covered with a large coagulum of blood from the rupture of a blood vessel, probably occasioned by a blow, which makes me suppose that the man received some ill-treatment before he was brought into hospital. It is perfectly clear that the rupture of the blood vessel and the subsequent haemorrhage was the cause of death.”

Murder by poisoning was common as poisons were easily obtainable. At an inquest held on 14 October 1848, Mr Traill, the Assistant Surgeon, stated that he found about half a teaspoonful of white powder in the stomach of the deceased, and

“... some of the powder was thrown on heated charcoal. It caused a strong odour like garlic, so far resembling arsenic; more I cannot determine until I have further tested the powder. The rice shown to me by Constable Hill showed parts of a similar-looking powder.”<sup>12</sup>

It was almost a daily occurrence for people to be killed by tigers. In the first 6 months of 1849, 400 Chinese, who lived and/or worked in the interior of Singapore, were carried off by tigers. The remains of those found, provided a unique experience for the doctors performing post-mortem examinations.

In the 1850s, God and the sun were blamed for many sudden deaths, e.g.,

Coroner’s Inquest on 19 July 1855. A Bengali convict died suddenly while at work. “*Cause of death – congestion of the brain caused most probably by exposure of the head to the sun. Verdict – died by the visitation of God.*”<sup>13</sup>

Coroner’s Inquest on 6 September 1855. A Chinese man had been “*struck down by the sun in Circular Road, and who had died almost immediately of congestion of the brain. Verdict – died by the*

visitation of God.”<sup>14</sup>

Coroner’s Inquest on 18 October 1855, on a Chinese domestic of Mr Spottiswoode. “*Went to sleep well on Sunday. At 2 am on Monday morning complained of giddiness. Lay down and remained quiet. By daylight, was insensible and dying. Immediate cause of death – congestion of the brain. Been out in the middle of the previous day for some hours without any protection to his head. Verdict – Died of congestion of the brain caused by a stroke of the sun.*”<sup>15</sup>

There were riots in May 1854 among the Chinese, giving doctors more pathological work.

Travel on horseback and by horse carriage resulting in death of pedestrians was not uncommon: “*Chinese run over by a buggy*”; “*Man knocked down by a horse*”; “*Syce (coachman) kicked by pony in the chest – instant death.*”

By the end of the 19th century, the few records of non-forensic pathological work in the hospitals available still showed the relatively low standard of pathological practice.

In 1885, there was this report on Tan Tock Seng Hospital:<sup>16</sup>

“... An increase in the number of Beri-Beri cases ... 365 cases were treated, of which 156 recovered, 21 absconded, 90 died and 98 remained under treatment ... Several post-mortem examinations have been held, and in all, excess fluid has been found in the pericardium and within the dura mater spinalis, the cord itself being in several cases congested. A number of spinal cords and other pathological structures were sent to Dr Manson of Hong Kong for microscopical examination, but we have not yet received any report from him.”

The hazards of the practice of pathology were highlighted in the pre-sulphonamide and pre-antibiotic eras. One case will be quoted now (and another later) together with the unsympathetic attitude of the administrators towards the professionals:

In October 1896, Dr Hoad contracted “blood poisoning” in the performance of his duties. While performing a post-mortem examination on a Frenchman with a liver abscess, he had inadvertently scratched his finger on the jagged edge of a rib, and later died of infection.

His widow appealed to the Governor for a special pension on compassionate grounds. This was rejected, and the Governor reported to the Legislative Council:

“All post-mortem examinations are a necessary danger to the Medical Officer performing them, and as such, form a part of the legitimate risks of the office.”<sup>17</sup>

Luckily for Mrs Hoad, the Legislative Council overruled

the Governor, and awarded her a pension of \$480 per annum.

On 20 October 1902, the Governor informed the Secretary of State that the Government, concerned about the high incidence of waterborne diseases and the quality of the water supply, together with the Municipal Commissioners, had jointly created a new post of Bacteriologist, whose main duty was to monitor the purity of the water supply and suggest means for its improvement. Dr GA Finlayson (MA, MBChB, MRCP London) was appointed to this post on a 3-year contract from 13 May 1903 to 12 May 1906.<sup>18</sup>

In the meantime, work in pathology continued with occasional cooperation with other bodies:<sup>19</sup>

“... As requested by the Committee of the Cancer Research Fund, two sealed bottles were sent to the Superintendent, Victoria Embankment, London. One contained three small portions of a malignant growth removed from a patient at the General Hospital, Singapore, and the other, the cystic kidney removed from a patient at Tan Tock Seng Hospital. Notes of the cases were sent together with the respective bottles. Copies of the notes were also sent to the Colonial Office.”

Dr Finlayson did not restrict his duties to bacteriology. In 1904, he offered his services and was appointed Honorary Pathologist to Tan Tock Seng Hospital, where he conducted all the autopsies, except those of medical legal interest.<sup>20</sup>

In 1905, the Governor, concerned about the high death rate in Singapore (the increases in the population were due to immigration) (Table 1),<sup>21</sup> consulted the Principal Civil Medical Officer, who advised that the most effective means to reduce the death rate was the establishment of a Department of Pathology with a full-time Pathologist in charge.

This was approved by the Legislative Council, and Dr GA Finlayson, when his contract as Bacteriologist ended on 12 May 1906, was appointed the first Government Pathologist, responsible for all the hospitals in Singapore. The new Department of Pathology had 2 main sections – Pathology and Bacteriology. Dr Finlayson was also appointed Lecturer in Pathology in the Medical School. Dr

Table 1. Data Compiled from the Relevant Annual Reports

	Estimated population	Births	Deaths	Birth rate	Death rate
1900	239,776	4280	9785	17.85	40.84
1901	228,555	4462	10,696	19.52	46.80
1902	235,301	4852	12,485	20.62	53.06
1903	240,833	5089	11,505	21.13	47.77
1904	246,495	5435	10,937	22.05	44.37

RD Keith was appointed Physiologist and Assistant Pathologist to the Medical School in 1906.<sup>22</sup>

Although the Medical School was founded in 1905, there were no “clinical students” until 1907, when those who had cleared the preclinical hurdles were introduced to hospital practice. Introductory courses in Clinical Medicine and Clinical Surgery were held at the General Hospital, but as there was more “clinical material” at Tan Tock Seng Hospital, its wards were thrown open to the medical students, who were not slow in availing themselves of the opportunities offered to improve their professional knowledge and skills. Thus, Tan Tock Seng Hospital became the teaching hospital of the Medical School.<sup>23</sup>

As there were no full-time medical specialists, Dr GA Finlayson and Dr D Galloway, a private practitioner, taught Medicine to the medical students at Tan Tock Seng Hospital.<sup>23</sup>

There was such a shortage of permanent staff at the Medical School that when Dr GD Freer, the Principal, went on leave from March to December 1907, his duties were performed by Dr Finlayson and Dr Keith.<sup>24</sup> This entailed so much extra work that it was almost impossible to undertake any research in pathology, the routine work of the Medical School and the Pathology Department occupying so much time.

As a result, when asked by the Secretary of State in November 1907 about the research conducted by the newly appointed Pathologist and his department, the Governor replied:

“No research has been done in the Government Laboratory during the past six months because Dr GA Finlayson, Government Pathologist, has been acting Principal, Medical School, and carrying on his routine duties.”<sup>25</sup>

Dr Keith, however, found time to set up a Pathological Museum in the Medical School. In 1907, “... *A number of new pathological specimens have been put up by Dr Keith, and added to the former collection which now numbers over 160.*” Dr Finlayson had an assistant, Assistant Surgeon SN Bardham (non-British doctors were designated “Assistant Surgeons”) to help him in his post-mortem and laboratory work.

The 1907 Annual Report of the Pathology Department will be quoted in some detail to show the scope of work done, reflecting the public health conditions in Singapore 100 years ago:<sup>23</sup>

#### **I. Laboratory**

During the year, 2,573 specimens were sent in for examinations, of these 262 were forwarded by private practitioners, while 2,311 were submitted by medical men attached to the public services, the

majority being composed of blood films from Tan Tock Seng Hospital. The examination of such a number naturally occupies some considerable time so that little opportunity is offered for the carrying on of any research work.

#### **a) Malaria.**

In all, 1,455 slides were examined ...

#### **b) Widal Reaction**

686 were examined, 597 being forwarded from hospitals, while 89 were sent by private practitioners. Of the former, 240 gave a positive reaction (40%), of the latter, 35 (40%) ... It should be remembered that it is of advantage to send in both a film and some blood serum in cases where the diagnosis rested between Malaria and Enteric Fever. In several instances, the Widal was positive while no parasite was observed in the blood; in other instances, the Widal was negative but malarial parasite could be demonstrated in the film. In some three or four instances the patient suffered from Enteric Fever with an intercurrent Malarial infection ...

#### **c) Tuberculosis**

206 specimens of sputum in suspected Phthisis were examined, the tubercle bacillus was found in 67 or 32.5%.

#### **d) Leprosy**

The bacillus leprae was observed in 7 instances with a negative result in 36 cases.

#### **e) Miscellaneous**

Urine ... Blood films ... Faeces ... Rats. 1,035 examined, a monthly average of 86. ... no plague (epizootic) amongst rats in Singapore.. Rabies ... in a suspected case in a dog, a rabbit was inoculated subdurally and it died about three weeks later from paralytic rabies. Water samples from taps and public stand-pipes showed no sewage pollution, but in samples from 6 wells, 3 showed sewage contamination.

### **II. Mortuaries**

1,083 autopsies were performed at Tan Tock Seng Hospital and the General Hospital, the majority at the former institution. Malaria, Dysentery, PTB, Enteric Fever, Pneumonia formed a large majority of the total. From this one can get a more definitive idea as to the diseases more prevalent in Singapore.

### **III. Quarantine Camp Mortuary**

A total of 237 autopsies, including Cholera (161), Gastro-enteritis and Entero-colitis (18), Dysentery (15), Malaria (14), Plague (9) ...”

In 1908, a most tragic incident occurred at the beginning of May, in which the lives of 2 doctors were lost. Dr CT Raikes (a young Medical Officer who had just joined the Medical Service a few months previously) and Assistant Surgeon NA Wray (a veteran of more than 20 years' service) contracted Plague whilst holding a post-mortem examination on a plague case at the Quarantine Station. Both succumbed within a few days of each other.<sup>26</sup>

In 1908, Dr Keith continued building up the Medical School Pathology Museum. He "*mounted and catalogued a large number of specimens illustrating various pathological conditions for the Medical School.*"<sup>26</sup>

But Dr Finlayson again had to explain why no research was possible even with Dr SN Bardham's assistance, and expressed the hope that when the first batch of students graduated from the Medical School in 1910, a few might be posted to the Pathology Department:

"Dr Bardham examined more than a thousand specimens from the wards including 620 samples of sputa for TB and 300 specimens of faeces for ova ... Naturally, the time occupied in the personal examination of so many specimens, in the demonstration of autopsies and in the preparation of lectures, etc. is so great that I humbly beg to reiterate that it is impossible to perform any research without some further qualified assistance. I trust that the Government will place the services of two Assistant Surgeons who will obtain the local qualification in 1910 at my disposal for their training as Assistants in the Department."

In February 1909, Dr Freer was promoted to Senior Medical Officer, Selangor. Dr Keith succeeded him as Principal of the Medical School, and Dr SM Livesey was appointed Physiologist and Assistant Pathologist at the Medical School.<sup>27</sup>

In early 1909, the new Bacteriology Laboratory and Morgue, Sepoy Lines, and the Mortuary, Tan Tock Seng Hospital, were completed, and work in the Pathology Department was carried out more efficiently. Once again, the large amount of routine work, such as post-mortem examinations, blood and water examinations, bacteriological examinations, and classes in connection with the Medical School, left the Pathologist no time for research projects in 1909. It was again hoped that with the training of a local graduate the next year as an Assistant Pathologist, the time needed for original research would be available.<sup>27</sup>

Dr Keith, although Principal, continued to mount specimens for the museum and to prepare a descriptive catalogue. This made the collection fuller and more valuable. 1910 was an important year in the history of the Medical School and the medical history of Singapore. It was marked

by the graduation of the first batch of students.<sup>28</sup>

No new graduate was posted to the Pathology Department and once again, no research was undertaken. Over 100 specimens were added to the museum in the course of the year, and the typed catalogue brought up to date. The Pathology Department prepared a very useful series of bone specimens which were of great value in the teaching of Surgical Pathology. The Museum was now housed in the new Tan Teck Guan Building, donated by Mr Tan Chay Yan, in memory of his father, in 1910. More specimens were added in 1911.<sup>28</sup>

There was little change in the situation in 1911 and 1912, and the Pathologist found it impossible to devote his attention to special research work. He was supported by the Principal Civil Medical Officer, who stated that the routine work of the department had so grown that with the present staff, no special work in the nature of research could be expected. Dr Finlayson, however, continued to teach Clinical Medicine to medical students.

There was, however, one highlight in 1911. At the end of the year, Wasserman Reactions were performed by the Pathology Department and were of great assistance in the diagnosis of Venereal Disease.<sup>29</sup> From February 1912 to June 1913, Dr WM Scott acted for Dr Finlayson, when he was seconded for service with the Anti-Malaria Committee. Dr Scott had been recruited from England as a temporary Pathologist.<sup>30</sup> There was an unusually large number of cases of Bubonic Plague in 1911, and a systematic examination of rats, which had been halted, was again instituted in December.

In 1912, Assistant Surgeon Kozo Ando, a recent local graduate, joined the department as an Assistant. He and his senior colleague, Dr SN Bardham, helped the Pathologist in his routine work and teaching of pathology to the medical students.<sup>30</sup> In the meantime, Dr Keith reported:<sup>30</sup>

"A considerable number of specimens has been added to the Pathological Museum during the past year, some of great interest. For a number of these we are indebted to Dr Fletcher, Institute of Medical Research, Kuala Lumpur ... A catalogue of the specimens illustrating the diseases of the circulation has been printed and has been distributed to students. Owing to my other duties, I have been unable to get further parts ready for the printers ..."

In 1913, Dr Finlayson continued to be the Visiting Pathologist to Tan Tock Seng Hospital, and Dr Bardham, the Visiting Assistant Pathologist.

The Municipality of Singapore appointed its own Bacteriologist, Dr PS Hunter, in May 1913. The Department of Pathology from then was no longer maintained at the joint cost of the Government and the Municipality.<sup>31</sup>

In the laboratory at Sepoy Lines, in 1914, the number of specimens examined was less than the previous year, 970 compared with 1247. This was due to the fact that many of the specimens formerly sent by general practitioners were now examined by the Municipal Bacteriologist. This decrease in routine work allowed the Government Pathologist to devote a portion of his time to research.<sup>32</sup>

There was, however, no decrease in the number of post-mortem examinations. In Tan Tock Seng Hospital, 1050 were performed, of which 89 were for the Coroner; at the General Hospital, 275, of which 132 were Coroner's cases.<sup>32</sup>

A new appointment of Government Bacteriologist was created in October 1924, and Captain JA Cowan, RAMC, then in Singapore, was appointed in 1925. (Prior to this, the Government Pathologist did both pathology and bacteriology). The Bacteriologist, however, served under the Pathologist in the Pathology Department.<sup>33</sup>

On 11 August 1926, Dr GA Finlayson retired from Government Service and as Lecturer in Pathology in the King Edward VII College of Medicine after 20 years' service. Dr JC Tull, Pathologist, Penang, was promoted on the same day to be Government Pathologist, Singapore, and appointed Lecturer in Pathology, and Dr JA Cowan, the Government Bacteriologist, promoted to take his place in Penang.<sup>34</sup>

There was no full-time bacteriologist for 2 years, and the Governor requested the Secretary of State on 23 January 1929 to recruit

“... a specialist with at least 2 years' whole-time experience of Bacteriology and Pathology, to fill the post of Bacteriologist, Singapore, on a salary of \$500 - \$25 - \$800 per month. Initial pay may be raised if necessary, according to qualifications and experience. Duties – bacteriological and pathological work under the Government Pathologist and the Professor of Bacteriology, College of Medicine.”<sup>35</sup>

Before the Secretary of State could make a selection, the Governor informed him in May 1929 that he would like to appoint a suitable officer in the Malayan Medical Service. This was agreed to, and Dr HO Hopkins, Malaria Research Officer, Federated Malay States, was appointed Government Bacteriologist.<sup>36</sup>

The Government Bacteriologist assumed duty in July 1930. From that time, the Pathology Department was divided into a Pathological and a Bacteriological Section, with the Government Pathologist in charge. For the first 5 months of 1930, Dr JR Jacob was the chief Assistant Pathologist, and thereafter his place was taken by Dr C Subrahmanyam.<sup>37</sup>

Routine work (laboratory, forensic and general pathology)

continued uninterrupted until war with Japan broke out in 1941. Other work included the mounting and describing of pathological specimens with preparation of microscopical sections; the teaching of general, special and clinical pathology and medical jurisprudence to students of the King Edward VII College of Medicine; and special investigations into certain diseases.<sup>38</sup>

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