History of Medicine

The Inaugural Sir Aldo Castellani Memorial Lecture

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It is indeed a great honour for me, both as an individual and as the Director of the Medical Research Institute, to be invited to deliver the inaugural Sir Aldo Castellani Memorial Lecture. For this kind invitation I thank the President and the Council of the Ceylon College of Physicians. I must also congratulate the Ceylon College of Physicians for having taken the initiative to organise this lecture on the eve of celebrating its Silver Jubilee. Sri Lanka has had many illustrious physicians but in my opinion no one has excelled Sir Aldo Castellani both as a physician and a medical scientist. The selection of the M.R.I. Auditorium to hold this lecture is most appropriate as he was the first Director of the Bacteriological Institute, the fore-runner of the M.R.I.

This lecture was to have been delivered by Dr. Kasuke Ito, the Director of the Aldo Castellani Institute in Japan, and I was to make a short intervention as the Chief Guest. But owing to his inability to come, which was conveyed to us last week-end, I have had to fill the breech. Preparing this lecture at such short notice was no easy task and I have had to draw heavily on a copy of Aldo Castellani's autobiography, which was sent by him on the occassion of the centenary of the Colombo Medical Faculty and kindly lent to me by Prof. S R Kottegoda, and on the copy of the manuscript sent by Dr. Ito, as well as material written by Dr. C G Uragoda (Sri Lanka's medical historian par excellence). At the outset I must acknowledge the debt I owe to them and the blame for any shortcomings and mistakes rests entirely with me.

As is customary I can do no better than to make the subject of this inaugural lecture the life and achivements of Aldo Castellani himself. It would take several lectures to do justice to the achievements of this great man and in the time available to me I can do no more than highlight some of his achievements, particularly with reference to Sri Lanka.

Aldo Castellani was born in 1874 in Florence, which I consider to be the most beautiful city in Italy. To fulfill his early dertermination to study medicine he had to overcome the opposition of his father, but he eventually completed his medical studies in Florence at the age of 22. His scientific curiosity then took him to Germany to study the relatively new science of Bacteriology under Prof. Kruse at Bonn, who was considered the leading Bacteriologist of that time in Europe. As a young physician he was surprised when Prof. Kruse first consigned him to work in the "kitchen" where the bacteriological media and plates were prepared. Though a little resentful at the time he admits that this initial training stood him in good stead for his future research work.

Castellani soon showed his potential by developig the absorption test which carries his name and became a routine method for distinguishing closely related bacteria[1]. Dr. Ito mentioned that the Bonn University has recently honoured Castellani by giving his name

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to one of the laboratories at its new Institute of Hygiene.

Still intent on developing his medical skills Castellani left Bonn and entered the school of Tropical Medicine which had been established three years perviously in London. Incidentlly I too had the good fortune to complete my postgraduate education at this Institute. Castellani impressed the staff at the school, and one of the leading professors, Sir Patrick Manson, selected him as the Bateriologist for the expedition that the Royal Society was sending to Uganda in 1902. The expendition had been specially commissioned to investigate the devastating diesease of African Sleeping Sickness which was raging in Africa at the time. It is a measure of his genius that within a year he had discovered that the cause of the disease was a trypanasome[2].

I am not going to deal with this tremendous achievement at any length but only mention two aspects that exemplify the character and scientific skill of Castellani. After an arduous journey he and the rest of the team had to build and organise the hospital laboratory at Entebbe, working more than 12 hours a day, before being able to get down to the research itself. This contrasts with the attitude of many present day researchers who wait till they have everything provided to them before performing any research. The other interesting aspect was that though he held Sir Patrick Manson in highest regard for his discovery that mosquitoes transmitted filariasis he refused to accept Manson's theory that sleeping sickness was due to a filarial worm, then known as Filaria perstans. In passing it should be mentioned that when Manson described his original discovery about the role of the mosquito in transmitting filaria before a learned society in London the applause was meagre and the president, besides not praising Manson, winked at the front row of the audience and tapped his forehead significantly!.

Castellani's discovery was not without controversy. Just before Castellani's discovery was published on April 5th 1903[3] Sir David Bruce and Dr. D Nabarro arrived at Entebbe on the 16th of March. Later on Sir David Bruce claimed credit for the discovery and maintained that it was his confirmatory study that led Castellani to publish the conclusion that a trypanosome was the causative agent. The media gave much publicity to Bruce's claim and it was only after Dr. Nabarro and categorically stated that the credit should be given to Dr. Castellani[4,5], that the controversy ended.

Though Castellani left Uganda in 1903 the unanswered questions regarding sleeping sickness still interested him and he published a suggested line of treatment in the British Medical Journal in 1908[6]. In fact he insisted that there was a tissue stage in the life cycle but unfortunately this was not only ignored but even derided by Wenyon in 1938[7]. Actually Dr. Ormerod of the London School of Hygiene and Tropical Medicine confirmed Castellani's theory as recently as 1979 and said this failure to accept Castellani's view had some bearing on the delay in finding a treatment for the disease[8].

Castellani in Ceylon

Though only 29 years old it was as a famous doctor and scientist that Aldo Castellani came to Sri Lanka, then Ceylon. In view of his talents the British government selected him not only to be the Director of National Bacteriological Institute (the forerunner of the MRI), but also the Professor of Tropical Medicine and lecturer on dermatology in the Medical College in Colombo. Further he was made the physician to the Seamen's Ward at the General Hospital, Colombo and Director of the Colombo Clinic for tropical diseases.

Castellani was not only enthusiastic about his work but about Sri Lanka in general. To quote him "Ceylon is the most beautiful place

in the world, far more than any of the islands of Hawaii or the Antilles... glorious Lanka, the pearl of the east, emerging from the foam of the deep blue sea like Aphrodite of Ancient Greece[9].

He not only admired our history and our culture, but the beauty of our women as well. "Sinhalese girls are renowned for their beauty.... the charming oval face is often dotted with the golden beauty spots praised in song by ancient and modern Sinhalese bards as gomera. I may say that my investigating mania led me to take scrapings of these spots and examine them by the microscope, there were colonies of a fungus! My enthusiastic announcement of the fact was received coldly in Sinhalese literary and poetic circles![10]

Yaws (Parangi)

Castellani states that the most common and important disease in the island at the time was yaws and that there were over 50,000 cases per year treated in hospitals. In some districts half the population were affected[11]. It is a horrible disease, the whole body is covered with red fungating excrescences the size of a cherry and with a granular raspberry like surface (hence the term framboesia). The eruption disappears spontaneously after a few months but the infection remains dormant and years later enormous ulcers develop and the bones are affected. Often the nose and the central portion of the face including the palate are destroyed leaving a huge hole through which the lower jaw and all the teeth can be seen. This give the unfortunate victim a gruesome spectre-like appearance known as gangosa. Osteitis is also a feature of the disease.

There was no cure, but Castellani introduced an Iodine mixture which soon became very popular because it made the tumour-like rash disappear rapidly. In 1911 he tried out Salvarsan, which had been newly discovered by Ehrlich and this proved curative[12]. This has been superceded by penicillin and other antibiotics.

But perhaps one of Castellani's greatest achievements was to find the causal agent which he named Spirochaeta pertenuis (now called Treponema pertenui). He categorically stated that it was not hereditary and was spread by flies and direct contract. Several years later Prof. Granham stated "the eradication of Yaws from most of the World stems directly from the work done by Castellani in Ceylon"[13].

Toxoplasmosis

Another significant discovery made by him was from a patient who had a relapsing fever and enlarged spleen who died. At post mortem he made smears from the spleen and detected small oval and elongated bodies which he indetified as toxoplasma (then known to be a rare protozoan parasite of rodents)[14]. I quote Dr. Uragoda "the British Medical Journal wrote that it was between 1912 and 1914 that Sir Aldo Castellani discovered toxoplasma"[15]. It is this discovery that human infections by toxoplasma was possible that has ultimately led to the present work which recognises its important role in causing congenital manifestations.

Combination Vaccines

Another important contribution by Castellani was, following experiments with guinea-pigs, his recommendation that a multiple vaccine against typhoid, paratyphoid A and paratyphoid B gave as good or even better protection than the individual vaccine given separately[16]. This was severely criticised by Leishman who stated that "one would interefere with the other and therefore the nett effect would be less than each given individually". Castellani opposed this view and was able to get universal acceptance of his multiple vaccine which even Leishman had ultimately to

accept. It is ironic that this vaccine came to be known as the Leishman vaccine!

Intestinal Diseases

Diarrhoea was common in the country and from cases of acute dysentery Castellani identified an organism which he called Castellaneous sonnei[17]. This was found years later to be Shigella sonnei. He also found a vibrio in some of these cases and called it V. kegallensis. From cases of colitis he identified a bacillus referred to as B. madampensis. From cases of paratyphoid like fever he identified an organism which he named Bacillus colombensis.

Copra Itch

Another common condition was among copra workers referred to as copra itch[18]. In this condition the eruption on the arms was extremely itchy and had been diagnosed as scabies. He found mites swarming in the copra, and reproduced the eruption by placing them on the skin of volunteers. He notes "the copra-itch" mite never burroughs its way into the skin as the acarus of scabies does. Though small its big scientific name is Tyrophus longior gervais var. castellani hirst.

Tea tasters cough

Another disease that interested him was the chronic cough of Tea-tasters which was thought to be due to tuberculosis[19]. He examined the sputum repeatedly and found it to be negative for tubercle bacillus but the culture yielded a growth of fungus which he also found on samples of tea dust. He reproduced the disease by blowing tea dust into the nostrils of the guinea pigs daily for some weeks. When white nodules developed in the lungs containing only the fungus its role was established at autopsy.

Dr. Castellani the physician found time to do private practice and it enabled him to come across some of the cases mentioned above that led to new discoveries. It also enabled him to become influential among the people of Sri Lanka. For instance, he recalls how he had to go to Veyangoda to treat the son of the Maha Mudaliyar of Ceylon who was suffering from diphtheria. This was indeed Mr. S W R D Bandaranayake, whose life he saved by giving "huge doses" of diphtheria serum "which surprised the local doctor". Had he not succeeded the course of Sri Lanka's history may have been different.

One of Castellani's earliest successes in private practice was however with the British Governor's wife, whose cats were dying. He discovered the cause to be the Bacillus felinsepticus and by preparing a vaccine in time he was able to save the remaining cats. So it was as a veterinary surgeon that he first impressed officials in Ceylon.

It is with pride that Castellani remarks that he did private practice only between 6 and 8 in the morning and 8 and 10 at night, so that it would not interfere with his official work, and never charged a fee.

One of his other successes related to the widely prevalent fungal disease Tokelau caused by Tinea imbricata (a fungus discovered earlier by Fox and Manson)[20]. "The entire body is covered by large scales, upto half an inch across, which overlap one another like tiles on a roof. The inching is intense and sleep is impossible, you see these poor wretches, incapable of work, squatting in their compounds and violently and continuously scratching their whole body". It does not kill but lasts for life. Castellani succeeded in cultivating the fungus in the laboratory in 1909 and reproduced the disease "by inoculating volunteers with pure cultures of the fungus, Stopping the experiments before the malady fully developed". He introduced the Fucshin paint that cured the condition, but it often took months to succeed.

Another episode that exemplifies his scientific acumen is illustrated by this story from his autobiography[21]. "One of my bungalow boys in Colombo wore rather short clothes and I noticed what I thought were patches of dirty skin on his legs. I reprimanded him severely, and told him he must wash his clothes and body regularly with soap and water, "Master, this no dirt" he answered. "I use plenty soap patches don't go". I took him immediately to the Bacteriological Institute and then examined scrapings from a patch, finding a fungus which I called Cryptococcus epidermicus".

A finding of his in 1914 was the cause of scepticism but had great epidemiological significance. I quote from his autobiography[22] — "In the summer of 1914, in the Pettah quarter of Colombo, a Moorman, apparently in perfect health, suddenly dropped to the ground unconscious, and a couple of hours later was dead. After two days similar case occurred, also in the Pettah; this time the vicitim was a Sinhalese. A few days later a crop of three or four more cases was reported. "Sunstroke", proclaimed the pettah practitioners, but when I heard of these cases I was not at all satisfied with that diagnosis. Cases of sunstroke are rare in Colombo, and why should they all occur in the same quarter of the city? I had a talk with a Medical Officer of Health, and we decided to hold a post — mortem examination on the next case. This occured about a week later. The body was brought to the post — mortem room in great secrecy, as the vicitim was a Mohammedan and their faith forbids autopsies. All the organs appeared normal except the spleen, which was much enlarged and diffluent. From its pulp and the heart blood I made films and inoculated broth, agar and other media. I had brought with me a microscope and some stains from the Institute: the films were stained and examined at once, and lo! innumerable 'bipolar' bacilli - ends stained, centre clear - were visible. Plague! The microscopical diagnosis was later confirmed by the cultural investigation. It was septicaemic plague, that is to say, an acute general plague infection with no bubos.

When the public heard of our findings, there was much scepticism. Plague had raged in India for many years, but Ceylon, although so near, had always escaped, and the people had come to believe that something existed in the island which kept the scourge away from its shores: perhaps the spicy odours of the cinnamom plantations, which might be repellant to the plague bacillus. Unfortunately, quite a number of further cases occurred: the scepticism in our diagnosis disappeared and was replaced by terror. Energetic phophylactic measures, including plague vaccine, were taken, and the epidemic ceased".

I have endeavoured to touch on some of his main contributions in the field of scientific research while in Sri Lanka. It was perhaps the most fruitful period of his career and the medical profession and the people of Sri Lanka owe him a great debt for his services to the country, irrespective of class, race, creed or caste. Though he had an incisive and analytic scientific mind he succeeded in combining with it a warm love and feeling for humanity. It is no surprise that he achieved eminence both as a scientist and a physician.

He did not confine himself to action and the spoken word, he put his findings down in writing. Besides his many scientific publications abroad he published locally too. Dr. Uragoda has drawn up a list of his 23 local publications in the Journal of the Ceylon Branch of the British Medical Association the forerunner of the Ceylon Medical Journal. (Annex 1). For sometime he was also the editor of this Journal.

Together with the Registrar of the Ceylon Medical College, Dr. Albert Charmers, Castellani wrote the first and second editions of that monumental publication "Manual of Tropical Medicine".

Castellani was as one would expect an internationalist in outlook and was against the isolation of medical science to narrow national boundaries. He made several trips abroad during his sojourn in Sri Lanka. One of the first in 1907 however was under unfortunate circumstances. While experimenting with rabies in the laboratory working with brain material from a rabid dog he accidentally pricked his finger. At that time the Pasteur Institute of the future MRI had not yet been started and Castellani had to make the long and hazardous journey to the Pasteur Institute at Kasauli in the Himalayan foot hills.

The same year he participated in the first World Congress of Dermatological Societies held in USA. Castellani was the leading speaker with five papers in the section devoted to tropical dermatology[23,24]. In fact Dr. Ito, himself a dermatologist, gives credit to Castellani as the founder of this science of Tropical Dermatology.

In 1910 too he was chosen to represent Ceylon at a meeting of the Far Eastern Medical Association in Manila, Philippines[15]. He gives an interesting account of this trip which also took him to China and then to Indochina. It would surprise medical scientists of today to hear how the cause of Beri Beri was decided at the Manila meeting. A vote was taken among the delegates and it was accepted as being nutritional rather than infectious by a majority of two!.

1910 was an auspicious year for Castellani because during his leave in England he married a charming, fair haired young lady from Yorkshire. His only child a girl, was born in 1916 and she subsequently married a distinguished diplomat Lord Killearn. Castellani was very proud of his daughter and her husband and grand children.

It was also in 1910 that the Medical Profession in Ceylon honoured Castellani at the young age of 36 by making him president of the Ceylon branch of the British Medical Association.

In 1914 the British too wished to honour and recognise his services by offering him the post of first Director of the new research institute of science in all its branches, including medicine, that they proposed to set up in Colombo. In fact the British, who value the role of research, had decided to make it a new government department which came directly under the Governor. (In fact I should mention that in Burma at present there is a separate Department of Medical Research with its own Director General, possibly a follow up of this important tradition). But to be made the Head of a Department, Castellani was told, he must take up British citizenship. In Castellani's own word "I answered that I greatly appreciated his offer but could not change my nationality; to do so would be like denying my mother"[26]. The Governor of Ceylon, Sir Robert Chalmers, who had made this offer shook Castellani's hand and said "Castellani I feel more respect for you now than a few minutes ago, when I expected you to say yes". Castellani adds "could there be a better example of British fair-mindedness?". The outcome was that Castellani left Ceylon in January 1915.

After World War I, he lived mainly in England, but he held chairs in Tropical Medicine in Nepal, Rome and New Orleans. He also held a lectureship in Mycology at his beloved London School of Hygiene and Tropical Medicine. This was combined with a flourishing consultant practice in Harley Street. He was an internationalist in an age where internationalism was not yet in vogue.

Dr. Ito states, "though he was a complete Anglophile, he always remained a loyal son of Italy. Because of that, World War II placed him in a very unenviable position. To give you a hint of what this meant in real life I will quote a hostile article written about him at the time.

It was sent to me by Castellani's former secretary, Mrs. Gene Caldwell Moore. The article was written by Lord Donegal[27]. It was headed "Who Let Castellani Go?". It is understandably by hostile when we consider what a valuable acquisition Castellani must have been for the Italian military. However, although the article was hostile in intent, it unwittingly shows with what high esteem Castellani was regarded at that time.. "Sir Aldo Castellani is an Italian. He is a great and famous Italian. He is the leading authority in the world on tropical diseases. He is a brilliant organizer. For many years he has lived in London where he has practiced as a specialist in Harley Street. He is reputed to have made more money than any other Harley Street specialist.

In the Abyssinian War, Castellani perhaps played a bigger part in Italy's victory than anybody else. The army's most dangerous foe was disease, but under Castellani's brilliant direction, the Italian army attained a record of extremely good health unprecedented in such campaigns...

Last week,when Italy entered the war, cafe keepers and other little men of small importance were rounded up and placed in custody. Not so the great Castellani. An hour before war was declared, he took shelter in the Italian Embassy until he left the country last Friday night.

Until he left, I did everything one citizen could do to stop him from going. Surely we are entitled to ask who let Castellani go. For whom was he exchanged? Why was he allowed to go?".

On looking back, Dr. Ito states we can safely assume that, since internment for the duration of the war was his only alternative, Castellani made a natural, not an ignoble decision. In his conscience he would have been at peace, knowing that medicine somehow or other stands on neutral ground even during war.

Father G Quintus Perera recalls that Castellani was among those hiding from the fascists in the seminary where he was studying during the war period[28].

After the war, he was cleared of being a fascist and allowed to remain a member of the Italian Senate. Later, his English Knighthood was also restored.

When Italy, by a narrow majority, elected to become a republic he accompanied the Royal Family, as the King's Physician, into exile in Portugal. There he worked in the Institute of Tropical Medicine in Lisbon until he died in 1970 at the age of 96.

In the period after he left Sri Lanka he continued his researches and cared for human beings with the same dedication. He did much original work and I think it is appropriate at this time to show a few slides that give a brief summary of his main achievements, based on a list by Dr. Ito with the assistance of Professor F. M. de Cruz Sobral (Annex 2), as time is short[16]. He described more than 70 new diseases and syndromes and frequently elucidated their cause as well. He described new clinical features. He made original contributions in the field of Bacteriology, Parasitology, Mycology and Mycosis and in developing new lines of treatment. Among them is the famous Castellani paint which is still widely used.

He has had a tremendous stimulating effect on the practice of medicine and on medical research throughout the world. As Dr. Ito mentioned Castellani's spirit lives in the memory of those who came under his influence, but it lives on specially in the International Society of Dermatology (Tropical, Geographic and Ecologic) which he jointly founded. Dr. Ito himself has had Castellani's autobiography translated into Japanese, so that he can be a model to be emulated in that country. He also set up the Aldo Castellani Memorial

Institute in Gifu, Japan with "Euphoria et Cacophoria" as its international publication. (Cacophoria, incidently, was a new word coined by Castellani to describe the state of depression and lethargy that was the opposite of euphoria).

Today we are meeting to honour a great medical personality, a physician and a scientist who had a tremendous international impact. He embodied in one person the clinical and laboratory skills that are necessary for the practice and progress of medicine. It was this unity that was the secret of his success.

It is sad that here in Sri Lanka there is still the need for closer cooperation between the clinical and laboratory disciplines. It is my hope that this linkage will be strengthened in the future in the interest of medical science in this country. I would also like to suggest that future Aldo Castellani memorial lectures should be a joint effort by the Ceylon College of Physicians and the Sri Lanka College of Microbiologists. If we achieve this unity that was embodied in the individual named Aldo Castellani we would really be echoing the sentiment that he expressed about our country at the time that he left. "So I left Ceylon in January of the year 1915 — but a part of my soul remained there. The memory of the enchanted island stirs in my heart an emotion which can only be expressed as love; I was a lover of that wondrous country then, I still am, and I shall be to the end of my days"[29].

I wish to thank those who helped me in the preparation of this lecture and the College of Physicians for the honour they have conferred on me today and all of you in the audience for your patient hearing.

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Annex 1

Local Publications

I also enclose here a complete list of Castellani's papers published in the Journal of the Ceylon Branch of the British Medical Association, and which are available at the Sri Lanka Medical Library. (This list was Drawn up by Dr. C G Uragoda M.D.)

1. Some researches on the etiology of dysentery in Ceylon. 1904, 1, 22-35
2. Diphtheria in Ceylon. 1904, 1, 83-84
3. Leukemia in the tropics. 1905, 2, 51-53
4. On the presence of spirochaetes in some cases of parangi (yaws, framboesia tropica) preliminary note. 1905, 2, 54
5. The opsonic treatment of some diseases in the tropics 1907, 4, 42-45
6. Paratyphoid fever in the tropics: cases of mixed infection. 1907, 4, 8-52
7. Glandular fever. 1907, 4, 58-60
8. Note on a palliative treatment of elephantiasis. 1907, 4, 63-65
9. Endemic funiculitis, 1908, 5, 24-25
10. Inaugural address, 1910, 7 ,1-10
11. Observations on the fungi tropical bronchomychosis, 1911, 8, 32-33
12. Cases of fever probably due to Bacillus asiaticus (Cast.1905), 1911, 8, 35-45
13. Preliminary note on an intestinal protozoal parasite producing dysenteric symptom in man, 1913, 10, 17-19
14. Protozoa-like bodies in a case of protracted fever with splenomegaly, 1914, 11, 45-47
15. Typhoid-paratyphoid vaccination with mixed vaccines, 1917, 10, 28-30
16. Note on cases of fever due to bacterium Columbense (Cast 1905), 1913, 10, 47-49
17. Plague in Ceylon, 1914, 1, 1-3
18. Further researches on combined vaccines, 1914, 11, 23-24
19. Notes on the hyphomycetes found in sprue with remarks on the classification of fungi of the genus "Monilia", 1914, 11,35
20. Notes on a case of osteo-periostitis developing after a probable attack of "Febris columbe nsis", 1914, 11, 41-43
21. Further case of entoplasmosis, 1914, 11, 44

22. Further notes on certain protozoa-like bodies in a case of protracted fever with splenomegaly, 1914, 11, 45-47
23. Note on dermatits cupoliformis, a peculiar ulcerative affection of the skin, 1914, 11, 48-49
24. Vibrio kegallensis, 1914, 11, 49
25. Brief notes on a case of dermatomycosis, 1914, 11, 50
26. Note on the internal treatment of yaws, 1914, 11, 72-73
27. Brief note on a case of triple infection, typhoid, paratyphoid, I.A. and paratyphoid B, 1914, 11, 78-79
28. Note on a vibrio (V.kegallensis Cast 1913) isolated from cases of paracholera, 1914, 11, 80-82

Annex 2

Castellani - Major discoveries

1. Sleeping sickness - cause - trypanosome
2. Yaws - cause - Treponema pertenua Castellani
3. Toxoplasmosis - Toxoplasma pyrogenes Castellani
4. Polyvalent vaccines
5. Tropicaloid ulcer (Mycetoid desert sore) 1940-2. Differentiated from tropical ulcer and veldt sore.

New diseases and syndromes by Castellani

Frequent discovery of their cause

List of over 74 including

Tea taster's cough, Bronchospirochaetosis,
Epidemic cryptococcosis, Tropicaloid ulcer

Tinea nigra, hepatosplenomegaly with arthritis,
Bacterial pseudomycosis

Description of clinical features by Castellani

1. Chronic amoebiasis - three signs - Tender subensiform spot, increased liver dullness in the mid-axillary line, and a triangular zone of dullness at the right base
2. Persistent facial erythema in Pappataci fever
3. Generalised microadenitis in dengue

Castellani - Contribution to Bacteriology

A. Serological and cultural methods

1. Absorption test
2. Dilution method for finding typhoid bacillus in the blood
3. Selective culture medium for the differentiation of B pestis

B. Isolation and description of new bacteria

eg. B Ceylonsis A (Cast 1907) with B Sonnei Levine (1921)

B Ceylonesis B (Cast 1907) causing colitis and dysentery

B madampensis (Cast 1911) causing colitis

B columbensis (Cast 1905) causing a fever resembling paratyphoid

Micrococcus metamyceticus (1933) causing attacks of fever with erysipeloid

Micrococcus (Coccobacillus) mycetoides (Cast 1942), the cause of tropicaloid ulcer

Staphylococcus violagabriellae (Cast 1954)

Cloaca cloacae var. marocanus (Cast 1955)

Bacillus cascainensis (Cast 1954)

Castellani - Contribution to Parasitology

1. Copra Itch - Tyroglyphus longior var. Castellani Hirst
2. Amoeba (Hartmanella) Castellani Basis for "amoeba test" differentiate bacteria
3. Toxoplasma pyrogenes castellani - in a chronic case of high intermitant fever

Castellani - Contribution to Mycology and Mycosis

1. Grew fungus Tokelau (Tinea imbricata) and reproduced disease in volunteers
2. Described new mycoses
3. Discovered and described new fungi eg. Trichophyton rubrum and over ten others
4. Developed sterile distilled water method to culture fungi
5. Mycological methods to identify sugars etc.

Castellani - Contribution to Therapy

1. Introduced organical arsenicals for yaws
2. Tarter emetic for Indian Kala-azar
3. Iodoform for amoebiosis
4. Castellani's yaws mixture (based on Iodine)
5. Castellani's Fuchsin paint for Tokelau (Tinea imbricata)

Castellani - Paint

Magenta paint	0.4
Phenol	4.0
Boric acid	0.8
Resorcinol	8.0
Acetone	4.0
Methanol	8.0
Aqua ad to	100.0