

PLANTATIONS AND PARASITES. FIFTY YEARS OF INDONESIAN PATHOLOGY

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Summary

Pathology in Indonesia between about 1890 and 1940 developed in the way it did because the colonial government had to cope with the health problems of infectious disease. Pathology was needed as the foundation for rational, scientifically based Tropical Medicine, and the natural laboratory afforded by the prevalence of infectious disease in the topical environment speeded, in return, the growth of Pathology as a discipline. The practice of Pathology in Indonesia prior to independence was nearly exclusively the province of European doctors, many of whom found the opportunity to advance their own academic careers by research into exotic disease. The development of Indonesian pathologists was slow in colonial times, and recognition difficult. With Indonesian assumption of responsibility for medical teaching and for health services during the Japanese occupation of World War II, pathology as a specialty for Indonesians began a period of rapid growth.

The earliest publication of post-mortem findings from Indonesia is in *De Medicina Indorum*, the English translation of which is "An Account of the Diseases, Natural-History and Medicines of the East Indies", by Jacobus Bontius.¹ The author was born in Leiden in 1592, the son of Geeraerd de Bondt, who 17 years earlier had been appointed the first professor of medicine at the University of Leiden. Bontius took the degree of Doctor of Medicine from that University in 1614.² In 1627 he arrived in Indonesia, from where he wrote to his brother that he had emigrated because of "meagre earnings from his practice, partly owing to the scanty remuneration, partly to the numerous quackdoctors and dabblers" in Leiden. In another letter to the same brother he begged him to plead his cause "that upon my homecoming after long and difficult peregrinations, I may get a professorship of medicine, in which undoubtedly I shall excell to some extent by my exotics."¹ In thus seeking to advance his career through his experience abroad he was not so different from the many other Europeans who would follow him in the course of the next three centuries. But Bontius did not return. He died in Indonesia in 1631. In the 4 years before his death he not only performed the duties of medical officer to the East

India Company, but accurately described autopsy findings in meningitis, pulmonary tuberculosis and dysentery (the latter in a patient with a thrombosed vena cava).

The opportunities and challenges offered by exotic diseases continued to attract European physicians, and by the end of the 19th century many of them, while their field of activities was far wider than fits current notions of pathology, were using a rapidly developing array of laboratory methods to understand and to diagnose disease.

In Europe of the mid 19th century pathologic anatomy was coming into its own. Garrison³ has pointed out that the publication of Virchow's *Cellular Pathologie* in 1858 began to revolutionize existing ideas about abnormalities of structure and function, and to establish microscopy as a useful adjunct to clinical medicine. The discovery of aniline dyes by Perkins in 1856, their application to the staining of tissues by Weigert in 1871, and the discovery of their affinity for specific tissues by Paul Erlich in 1878 contributed greatly to pathology's growth. Robert Koch's demonstration of the causative role of microorganisms in anthrax, tuberculosis and cholera between 1876 and 1884 established the basis for subsequent discoveries of the biologic agents of

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disease in a wide variety of diseases. Tropical medicine found its scientific roots in the developing field of medical microbiology. Schools of Tropical Medicine were developed almost simultaneously between 1899 and 1902 in the centers of shipping and commerce of most European countries with tropical colonies. Tropical Medicine and Pathology had much to offer each other. One provided the tools, the other the practical laboratory in which to use them.

Two separate and in many ways unrelated major currents of history stimulated the development of pathology in Indonesia and the rest of South East Asia between 1880 and 1940.

First was the growing realization that more and more human diseases, well recognized as clinical entities for centuries, were in fact caused by one or another form of micro-organism. As ensuing discoveries in microbiology were applied to the diagnosis of disease in individual patients, the practitioner of medicine began more and more to rely on and in reality to need the clinical laboratory to carry out his work. The impact of the new microbiology on the understanding and diagnosis of infectious disease was coupled with the potential for new insights into accurate morphological diagnosis of a wide variety of diseases afforded by the growing use of light microscopy in tissue diagnosis. Pathology, hitherto "morbid anatomy" with a centuries-long tradition of gross autopsy diagnosis now began to develop into what would become anatomic pathology and clinical pathology with its point of focus the use of laboratory methods in the accurate diagnosis of clinical disease states. To light microscopy and microbiology would soon be added the understandings and techniques of chemistry as applied to the investigation of human disease. While these developments were world-wide in scope, the growing application of microbiology was especially noteworthy in tropical countries. Infectious disease was an overwhelming tropical health problem, and the magnitude of the problem provided the stimulus and the raw material for development and application of the new science.

The second major historical current that speeded the development of pathology in South East Asia was the result of socio-economic

events stemming from the wave of colonialism that had washed over much of South East Asia prior to receding during and after World War II. Asian health problems held a special interest for the colonial governments and their partners in international capitalism. Two issues dominated the interest of the alliance, the health of Europeans in the tropics and the prevention of economic loss due to incapacitation of contract laborers.

Protection of European health meant in large part the prevention of prevalent or epidemic infectious disease. Smallpox had been attacked earlier in the 19th century with a fair degree of success. Malaria, plague, tuberculosis, cholera, the dysenteries and diphtheria were all diseases requiring laboratory facilities and capabilities for their management. Government medical services built and staffed the laboratories.

The first in Indonesia was the Central Medical Laboratory in Weltevreden, then a suburb of Jakarta. During the Atjeh war there had been hundreds of deaths from beriberi among the colonial army troops between 1880 and 1886. Because of this great destruction the Netherlands government sent Professor G A Pekelharing and Dr C Winkler to Indonesia to conduct research on the nature and the control of this disease. The commission stayed in Indonesia from November 1886 to August 1887 and used a room in the main military hospital for their bacteriological and anatomical pathology research. A military medical officer, Dr. C Eijkman, was assigned to the laboratory. Anticipating the end of the commission's stay, Professor Pekelharing recommended to the Governor General that the laboratory should be continued and cited the necessity "that the opportunity be provided in at least one hospital in the Netherlands Indies to do accurate research into the nature of pathologic products and the presence of living organisms causing disease. . . . It is of much greater importance that the opportunity be created for the performance of strong scientific research into problems in the domain of pathology."⁴

Eijkman, known principally for his Nobel prize-winning elucidation of the cause of beriberi, published in addition a wide variety of reports on subjects such as the pathologic anatomy of cirrhosis (1899), the regeneration of blood after severe loss (1895), dysentery and

liver abscess (1889, 1892, 1893), streptococci in strangles (1891), luminous bacteria (1891), the specific gravity of blood in disease (1892), and vibrios in river water (1894). The commission, including Eijkman, had focussed on finding yet another bacterium as the cause of beriberi, but during the next 6 years Eijkman gradually abandoned the notion of a bacteriological cause. In 1890 he had adopted as an experimental model a type of polyneuritis which had appeared in the chickens maintained in his laboratory.⁵ Attempts to identify an agent which could transfer the polyneuritis from one animal to another were inconclusive because the controls as well as the inoculated animals developed the disease. Then, according to Eijkman, "suddenly the disease cleared up and we were unable to continue our investigations. The affected chickens recovered and there were no new cases. Fortunately, suspicion fell on the food."⁶ The laboratory was housed in the military hospital, and the laboratory keeper had fed the chickens on cooked rice which he had obtained from the hospital kitchen. "Then the cook was replaced and his successor refused to allow military rice to be taken for civilian chickens."⁶ Deliberate feeding experiments then confirmed that the polyneuritis was in fact diet related. This work led to Christian Eijkman receiving the Nobel Prize in Medicine and Physiology in 1929. In the meantime he had left Indonesia in 1896 to become Professor at Utrecht University.

This first laboratory shared a characteristic of many distinguished laboratories to follow. It was overcrowded. "The ice chest stood in the hallway that led to the washroom . . . in this same hallway was a garden bench which Dr. Eijkman used to receive visitors."⁴ Among later distinguished visiting scientists in the laboratory were Robert Koch, who worked there for 3 months in 1899, and Neisser and von Prowazek who both were there in 1905 and 1906. H F Roll, a forensic pathologist, followed Eijkman from 1896 to 1901 as director both of the laboratory and of the medical school for Indonesian doctors. The laboratory was originally an independent institution working directly under the government, but later was incorporated in the Public Health Service. In it there was carried out both scientific investigation and daily routine work of analysis and examination for practical purposes. In 1937 the laboratory

processed 52,000 specimens.⁷ In 1913 a branch laboratory was established in Malang especially for plague. Provincial laboratories were established later in Surabaya, Semarang and Makassar.

Between 1889 and 1915 a total of 225 publications and reports had issued from the laboratory as a result of the investigations of its regular staff.⁴ This laboratory became a prototype for others in Indonesia and throughout South East Asia that were established near the turn of the century. These laboratories became the field-stations for research, and many continue a thriving existence today, under new management.

The government was not the only institution interested in the infectious and epidemic diseases. An example of other interest is found in the cooperative action taken by the tobacco planters of Sumatra's east coast. As in many other plantation operations begun on sparsely populated and hence cheaply available land, the planters found it convenient to import labor chiefly from crowded and economically depressed Central Java and South China. It was expensive to import these laborers, and loss of productivity because of sickness or death was a serious matter. Into this situation in 1897 came Dr WAP Schuffner, a German-born graduate of the University of Leipzig. Schuffner, prepared by five years of postgraduate training under Curschmann, Tiersch and Trendelenburg, exemplified the tradition of young and ambitious men leaving the mother country for the opportunities of rapid advancement offered in the tropical colonies.⁸ His major contribution stemmed from his research in prevalent endemic tropical diseases. He was the innovator of many principles of occupational hygiene and he applied them in the plantations. His later work, carried out in the Netherlands, mainly concerned leptospirosis, but his name is probably best remembered as a result of his description of erythrocyte stippling in *Plasmodium vivax* malaria, Schuffner's dots. His employer, P W Janssen, also German by birth, recognized the economic value of a healthy labor force, and the two men collaborated in using scientific means to establish a system of estate hygiene. Most aspects of this system were totally new at that time. Application of laboratory methods to diagnosis was achieved by establishing a central laboratory to serve a large

number of plantations in the area, the costs shared by all. Kuenen, who arrived in Sumatra in 1903 and worked out in detail the histopathology of amoebiasis, became the director of this laboratory.

Beginning in 1907 in a number of larger cities in Indonesia, postmortem examination was compulsory in all deaths among Europeans. Malaria, pulmonary tuberculosis, cholera, dysentery and typhoid were the major causes of death.⁹ After 1925 four centers of Pathologic Anatomy developed: Jakarta, Medan, Bandung and Surabaya. In reality these were the only cities where pathologists were functioning in 1936.

Some of the European pathologists in Indonesia who published their findings in the early part of the 20th century were Sitsen,¹¹ the first director of the medical school in Surabaya, who reported autopsy findings and Bonne¹² who reported on breast cancer.

The teaching of pathology always played an important part in instruction of Indonesian doctors. The curriculum of the newly-opened school for the *Dokter Djawa* in 1851 had included "the rudiments of general pathology".¹³ In 1897 forensic medicine was added to the required subjects to be tested in the final examination of the medical school in Jakarta. This was in view of the role that graduates in practice could fill in assisting the courts. From that time, instruction in autopsy technique was given to all students. A textbook was written especially for Indonesian doctors. By 1908 students took a more and more active role in autopsies. The yearly total was about 40 post-mortem examinations per year, half of them forensic. This was at a time when there were 8 to 10 graduates per year.

By 1923 the medical school curriculum at STOVIA in Jakarta included 600 hours of lecture and laboratory work in pathological anatomy,¹⁴ and the Surabaya school ten years later scheduled the same amount of time.¹⁵ All this was in addition to a large amount of time for instruction in parasitology and bacteriology, plus 120 to 200 hours of forensic medicine. The latter was considered necessary because the Indonesian graduate was customarily assigned for the early part of his career as a government medical officer to a remote area where he was the only person available to perform coroner's autopsies.¹⁶

Some Indonesian graduates undertook further training in Pathology. One who did so in the early 1920's spent a year as an assistant in forensic pathology with Dr A E Sitsen. He chose this field because it was the only assistantship available at the time, and he preferred it to being sent to a remote post as a district health officer. He left after one year, though, because he was not satisfied with the prospect in pathology. "If you were an assistant in a preclinical field, you could not expect to go further in that field. You could become a specialist in Medicine, Surgery or eye disease, but not in Histology, Pathology, Forensic Medicine or Physiology. Then you would be just an aid of the *dosen*. Specialist ratings did not exist then in those fields."¹⁷ The progress of Indonesians toward any kind of specialty training was slow. Although the school to educate Indonesian doctors was opened in 1851, fifty years later there was still little possibility of their achieving parity with their European colleagues. In 1903 the *Deli Kring*, a rather vocal and powerful group of European doctors in eastern Sumatra, cabled the Netherlands parliament opposing a proposal to allow the *Dokter Djawa*, graduated from the school for Indonesians, to be equalized with Europeans even after passing the Dutch examination "because it was neither in the interest of the profession nor the nation".¹⁸ The *Kring* also turned down a proposal for *Dokters Djawa* to work as students in the hospitals of Sumatra's east coast.

In the early 1920's Dr M Sardjito, after graduating from the medical school in Jakarta, enrolled in the University of Amsterdam and did receive a Netherlands medical degree. With the support of the Rockefeller Foundation he then completed a course in Public Health at Johns Hopkins University and returned to work in the Medical Laboratory in Jakarta. He was one of the first Indonesians to be given the rank in the Health Service of Government Doctor as opposed to Indonesian Government Doctor, a position with less pay and less authority.¹⁸ His long career resulted in many publications in the fields of bacteriology and public health. He was a principal founder and Rector from its inception of the first new University established under Indonesian nationalist sponsorship in Yogyakarta following World War II.

But still there were few Indonesian patho-

logists. In 1935 Dr Bambang Soetarso, a graduate of Surabaya who later became Professor of Pathology in Yogyakarta, filled in temporarily for 6 months as a pathologist at Juliana Hospital in Bandung in the interim between two Dutch pathologists, Vos and ten Selden. Even so, tissues for microscopy were sent to either Professor Bonne or Muller at one of the two medical schools during Dr Bambang's tenure.¹⁹

The first scientific article by Sutomo Tjokronegoro, later to become the first Indonesian professor of Pathology, appeared in the *Geneeskundig Tijdschrift voor Nederlandsch-Indie* in 1936. Professor Sutomo played a large part in maintaining continuity of medical teaching in Jakarta during the Japanese occupation of World War II. He worked tirelessly to promote the precise and accurate use of the Indonesian language in medical teaching and writing. He studied and described the pathology of hydatidiform mole and its relation to choriocarcinoma. From his department there later came a stream of bright and well trained young men and women who became the nucleus of academic, research and service pathologists in Indonesia today.

If there is a father of Indonesian Pathology, it is Sutomo Tjokronegoro, for he, unlike any of his predecessors, left a strong and viable family of Pathologists as his legacy to the nation.

REFERENCES

- 1 Bontius J: An Account of the Diseases, Natural History and Medicines of the East-Indies, T Noteman, London, 1769. (Reprinted in *Opuscula Selecta Neerlandicorum de Arte Medica*, Nederlandsch Tijdschrift voor Geneeskunde, Ed, Amsterdam, 1931, Fascicle 10).
- 2 Scot HH: A History of Tropical Medicine, Williams and Wilkins, Baltimore, 1939, p. 1012.
- 3 Garrison, FH: An Introduction to the History of Medicine, 4th ed, WB Saunders, Philadelphia and London, 1929, pp 569–581.
- 4 Grijns G: Het Geneeskundig Laboratorium te Weltevreden. *In* Feestbundel 1917, Mededeelingen uit het Geneeskundig Laboratorium, Javasche Boekhandel, Batavia, 1917, pp 16–40.
- 5 Donath WF and van Veen AG: A short history of beri beri investigations in the Netherlands Indies. *In* Science and Scientists in the Netherlands Indies, edited by P Honig and F Verdoorn, Riverside Press, New York, 1945, pp 75–78.
- 6 Eijkman C: Antineuritic vitamin and beri-beri. *In* Nobel Lectures In Physiology or Medicine, 1922–1941, Elsevier, Amsterdam, 1965, pp 199–207.
- 7 Esseveld H and van Veen AG: The Medical Laboratory at Batavia re-named "Eijkman Institute" on its fiftieth birthday. *Bull Col Inst Amsterdam*, 1: 290–306, 1938.
- 8 Olpp G: Hervorragende Tropenartze in Wort und Bild, O Gmelin, Munchen, 1932, pp 368–371.
- 9 van Gorkom WJ: Ongezond Batavia, Vroeger en Nu. *Geneeskundig Tijdschrift voor Nederlandsch-Indie (GTNI)* 53: 228–241, 1913.
- 10 Bonne C: De Ontwikkeling der Geneeskundige Wetenschappen in Nederlandsch-Indie, in de Periode 1911–1935. *In* Feestbundel 1936, *Geneeskundig Tijdschrift voor Nederlandsch-Indie*, G Kolff, Batavia, 1936, pp 16–44.
- 11 Sitsen AE: Verslag over 173 lijkopeningen, verricht aan de STOVIA te Weltevreden. *GTNI* 54: 191–203, 1914.
- 12 Bonne C: Diagnostiek van het mamma carcinoom. *GTNI* 77: 1472, 1937.
- 13 de Waart A: Vijf en Zeventig Jaren Medisch Onderwijs ter Weltevreden, 1851–1926. *In* Ontwikkeling van het Geneeskundig Onderwijs te Weltevreden 1851–1926, G Kolff, Weltevreden, 1926.
- 14 STOVIA Almanak, 1923, Kolff, Weltevreden, nd.
- 15 NIAS Almanak, Lustrum Nummer, 1933–34. (no publisher, nd)
- 16 Tehupeiori, WK: Iets over de Inlandsche Geneeskundigen, Handelingen van het Indisch Genootschap, 1908, pp 101–121.
- 17 Personal communication. Interview with STOVIA graduate, Jakarta, 10 January, 1976.
- 18 van Driel, BM: De Sociale Geneeskunde in den Delischen Kring. *In* Feestbundel 1936, *Geneeskundig Tijdschrift voor Nederlandsch Indie*, G Kolff, Batavia, 1936, pp 303–319.