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OBITUARY NOTICE

Emmy Klieneberger-Nobel
1892–1985

With the death of Emmy Klieneberger-Nobel on September 11th 1985 at the age of 93, a link with an early period of bacteriology has been severed. Professor Max Neisser, under whom she trained in Bacteriology at the Hygiene Institute in Frankfurt-am-Main, was himself a pupil of Paul Ehrlich and the nephew of Albert Neisser, who discovered the gonococcus.

Emmy Klieneberger initially studied a broad range of scientific subjects at the University of Göttingen, but obtained her doctorate in botany under the direction of Professor Martin Möbius at the University of Frankfurt. She then qualified as a teacher and taught for three years in a private school in Dresden. However, the satisfaction she had experienced when engaged in laboratory work for her doctorate at the Botanical Institute made her long to return to the laboratory, and eventually the lure proved too great. In 1922 she sought and gained an appointment as Bacteriologist at the Hygiene Institute of the University of Frankfurt. There she learned bacteriology in a routine clinical laboratory, handling specimens sent in by medical practitioners and hospitals in the area and, following the practice of the day, preparing autogenous vaccines. But Emmy was a born research worker, and long hours were spent outside those required by the routine examinations investigating a wide variety of bacteriological problems ranging from methods for assessing the efficacy of disinfectants to the activities of phages. Her publication list between 1923 and 1933 indicates that this was a fruitful and varied period, even including a successful campaign to eradicate a plague of Pharoah ants from the Institute and the adjacent hospitals! There were also responsibilities for preparing material for the medical and science courses run at the Institute, and in 1930 she qualified as a Lecturer in the Medical Faculty. In German universities at that time, such an appointment involved the presentation of an

Photograph reprinted from "Memoirs" by Emmy Klieneberger-Nobel (Academic Press, Inc., London, 1980) by kind permission of Harcourt Brace Jovanovich, Publishers.

inaugural lecture which was later published. This appointment should have set the seal on a promising career, but less than three years later Emmy found herself a refugee in London. The working laboratory still attracted her, however. She once recalled her first visit to the Lister Institute of Preventive Medicine in London and how the whirring of the centrifuges created a nostalgia and longing to be back at the bench again. Small wonder that she gratefully accepted the invitation of Professor (later Sir John) Ledingham to work at the Lister Institute, albeit at first in a voluntary capacity. It was here that she was to spend the rest of her fruitful working life.

Emmy was always fascinated by the morphology and structure of living things. One of her most treasured books was Haeckel's "Kunstformen der Natur", and she was never so content as when working at her microscope on some new revelation of bacterial form or structure. So it was with enthusiasm that she followed Professor Ledingham's suggestion that she might profitably study two highly pleomorphic organisms which were then regarded somewhat as curiosities, namely the agents responsible for contagious pleuropneumonia of cattle and agalactia of sheep. Emmy became convinced that these agents could not be unique, so having developed improved methods for cultivating them and for studying their morphology, she began to look for similar 'pleuropneumonia-like organisms" in other hosts. These she found first in laboratory rats and mice. It was during her studies on rats that she isolated "L1", the first L-form or L-phase (L for Lister Institute) of a bacterium. At first there was some controversy as to whether this was another independent pleuropneumonia-like organism similar to those causing bronchiectasis and polyarthritis in rats or a phase of *Streptobacillus moniliformis*, the bacterium responsible for rat-bite or Haverhill fever. Finally, however, Emmy established to her own satisfaction that L1 was indeed derived from the bacterium, as suggested by Dr Louis Dienes.

During the war limited resources forced the work on the more exacting pleuropneumonia-like organisms into abeyance, and Emmy turned her attention to the morphogenesis and cytology of various bacteria, including species of *Myxobacterium*, *Streptomyces*, and *Bacillus*. Her working methods were those of the older school of microbiologists, and an excellent illustration of what can be accomplished with a minimum of equipment, the main component of which was her precious Zeiss microscope purchased, together with a Leica plate camera, during a return visit to Germany in 1934. With these instruments, but without the benefit of an exposure meter or other modern aids to photography, she was able to secure micrographs that were both informative and beautiful; many were included in her book "Focus on Bacteria", published by Academic Press in 1965.

The post-war years produced further diverse studies on pleuropneumonia-like organisms (by this time graced with the generic name *Mycoplasma*) and L-forms. In particular mycoplasmas were found in the genital tract and their possible role in various urogenital diseases was explored. Toward the end of her working life Emmy produced the first monograph devoted to mycoplasmas. This was published in 1962 by Academic Press under the title "Pleuropneumonia-like organisms (PPLO) Mycoplasmataceae."

Coincident with Emmy's retirement at the age of 70, there was a burgeoning of interest in mycoplasmas. In that year the agent of primary atypical pneumonia in man was recognised as a mycoplasma, and the value of Emmy's pioneering work became increasingly appreciated. Anyone who has worked with mycoplasmas under the cover of antibiotics can appreciate her skill in isolating and studying these organisms in pure culture during the pre-antibiotic era. Her conviction that the two organisms she orginally studied were only representatives of a much larger group that was wide-spread in nature was finally vindicated when, from the late 1960's onward, many new mycoplasmas associated with plant diseases were identified. The present complex taxonomy of the group (now more correctly referred to as "mollicutes"), which includes orders, families and five genera, bears eloquent testimony to her foresight.

For her outstanding contribution in opening up a new field in microbiology, Emmy Klieneberger-Nobel was honoured in several ways. On her 75th birthday she was made an honorary member of the Robert Koch Institute in Berlin. In 1976 she became the first honorary life member of the newly-constituted International Organization for Mycoplasmology (IOM), and in 1980 the biennial "Emmy Klieneberger-Nobel Award" for outstanding achievement in research in the field of mycoplasmology was instituted, the recipient presenting a lecture at the IOM International Congress in the year of the award. The final and highest accolate was the prestigious Robert Koch Medal, bestowed on her by the President of the Federal German Republic in Bonn in 1980.

In her retirement Emmy made several journeys abroad, not only to Europe but also to the USA, Australia and to Colombia, where one of her nieces

was living. It was typical of her that she learned South American Spanish by Linguaphone before her visits to Colombia. Another retirement activity was tutoring people to whom English was a foreign language. Her own experience made her appreciate the problems that foreigners encounter in trying to master the English language, and it gave her much satisfaction to be able to help the students and wives of foreign diplomats who came to her pleasant Hampstead flat.

In 1977 Emmy Klieneberger-Nobel published her autobiography in German; an English version under the title "Memoirs" appeared in 1980. This is a gentle and philosophical story, written in an easy conversational style that vividly recalls the way she used to speak. It provides an absorbing account of the training of a young woman scientist in Germany before and during the first World War, with intriguing insights both into the pleasures of University life in peacetime and into the hardships of the civilian population during the period of hostilities. Emmy Klieneberger belonged to one of the many Jewish families whose religion took second place to their belief in integration as good Germans; she and her sister were in fact baptised as young girls, but this did not protect her from anti-Semitism in both her social and professional life well before the Nazi epoch. After seeking refuge in England, Emmy made heroic attempts to rescue her mother and sister, including what was, reading between the lines, a hair-raising final visit to Germany in 1938; but she was unsuccessful and they eventually perished, as did her older brother. Despite her own financial position, which must have been difficult, Emmy was able, characteristically, to help her nieces and nephews when they escaped to England. It is also characteristic that despite these dreadful experiences, Emmy's final message is a plea for universal love and tolerance.

In 1944 Emmy Klieneberger married Professor Edmund Nobel, a paediatrician and, like her, a refugee from the Nazis; but tragedy entered her life again when, only two years later, he died of heart disease.

Im Emmy's own words, "We hope that something of us will be left when we retire from the stage". Her considerable scientific legacy is embodied in 83 publications; of these, she was sole author of more than 70. For her relatives, for those of us who worked alongside her, and for her other friends she has also left the memory of a gentle and kindly woman who embodied much of what was good in the pre-war European tradition.

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