

## SPECIAL ARTICLE

# In the Footsteps of Abraham Jacobi, an Early International Medical Graduate: Contributions of a Single South African Medical School to US Pediatrics

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ABBREVIATIONS. IMG, international medical graduate; APS, American Pediatric Society; ABP, American Board of Pediatrics; Wits, University of the Witwatersrand; SPR, Society for Pediatric Research; UCLA, University of California, Los Angeles; NIH, National Institutes of Health; AAP, American Academy of Pediatrics; UCSF, University of California, San Francisco; SUNY, State University of New York.

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Abraham Jacobi is generally recognized as the father of pediatrics in the United States. He was born in Germany and graduated from the University of Bonn in 1851 at a time of political turmoil. He was jailed for 2 years for high treason as a result of his activities as a member of a democratic revolutionary group. He was advised to leave the country to escape additional prosecution. After a brief, unsuccessful attempt to set up a practice in England, he made his way to the United States in 1853 during a period when immigrants from Europe were being welcomed with open arms. He established a practice in the Bowery in New York City, which, at the time, housed a quarter of a million German immigrants and hundreds of thousands of others seeking opportunities in the land of the free. His practice grew by leaps and bounds, and he began translating abstracts of articles from Germany dealing with diseases of children as well as publishing in US journals. In 1859, he co-authored the textbook *Midwifery and Diseases of Women and Children*. His 1860 appointment as Professor in Infantile Pathology and Therapeutics at New York Medical College was one of the first, if not the first, such academic appointment in pediatrics in the United States. In recognition of his clinical skills, his dynamic bedside teaching, and his contributions to the scientific literature, he was offered and accepted a professorial appointment at Columbia in 1870. However, he had to wait 18 years before he was granted faculty voting privileges. Jacobi's *Therapeutics of Infancy and Children* was first published in 1895. He remained at Columbia until his death in 1919, having served as presi-

dent of both the American Pediatric Society (APS) and the American Medical Association.<sup>1-3</sup>

As the first international medical graduate (IMG) to be honored with the Jacobi Award, I began to reflect on IMGs and their contributions to US pediatrics. In 2001, nearly 28% of the 71 675 pediatricians certified by the American Board of Pediatrics (ABP) were IMGs. Although I would have liked to provide a broad picture of all IMG accomplishments, this was an impossible undertaking. I thus followed Sutton's law and looked to where the money was. I settled on the graduates of my medical school and restricted my project to those who pursued careers in the United States in the generally recognized areas of medical pediatrics.

The thread that weaves its way through all successful professional medical careers is the impact of education at all levels, and one of the most important is the foundation provided by medical schools. Considering that the term "doctor" derives from the Greek word, which means teacher, it seems particularly appropriate to comment on aspects of the medical education system that seem to have produced a disproportionate number of pediatric academicians in their adopted country. Interestingly, in the "British" system in which we trained in South Africa, "doctors" graduate with bachelor degrees. The MD degree is a higher degree, more like a PhD, and is awarded to relatively few candidates each year. Another confusing tradition reverts credentialed surgeons to the status of "mister," possibly a reflection of their origins in the barber's chair. Because I am most familiar with the system in which I was educated and with the accomplishments of its graduates, I focus my remarks on the University of the Witwatersrand (Wits) in Johannesburg, South Africa. I highlight what I consider some of the unique aspects of medical education there, which contributed to the success of its graduates in the United States. I am well aware that other schools in various countries can make similar claims.

The medical school at Wits produced its first graduates in 1924.<sup>4</sup> There was and is still no requirement for a premedical degree; the overwhelming majority of matriculants enter directly from high school. The first year was devoted to premedical sciences—zoology, botany, chemistry, and physics—the second to anatomy, physiology, and biochemistry; and the third to pathology, microbiology, and pharmacol-

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Received for publication Apr 25, 2003; accepted Jun 5, 2003.

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ogy. Thereafter, the focus was overwhelmingly on clinical medicine, with particular emphasis on diagnostic skills and differential diagnosis. Final examinations were virtually all oral and involved short and long cases using actual patients who had well-defined and relatively stable physical signs. Failure to feel a palpable spleen or detect a mid-diastolic murmur could lead to an extra 6 months of medical school! Teaching was primarily at the bedside and conducted by relatively senior teachers, an attending or a "registrar," someone with at least the equivalent experience of a fourth- or fifth-year resident.

The first teaching facility dedicated to pediatrics in Johannesburg was the Transvaal Memorial Hospital for Children, which was established in 1923, but, as far as I can determine, access was restricted to white children until it was closed in 1978 and services were transferred to the newly constructed Johannesburg Hospital. In 1942, Coronation Hospital was built to commemorate the coronation of King George VI and to serve nonwhite patients. The new hospital included a dedicated pediatric unit. After World War II, a pediatric unit was established at Baragwanath Hospital, a sprawling facility that had been built as a military convalescent hospital and was located adjacent to the rapidly growing township now known as Soweto.

Before 1968, there was no academic department of pediatrics at Wits, although well-defined hospital-based teaching departments existed at the 3 affiliated hospitals. The first professor of pediatrics was recruited from the University of Cape Town in 1968. All medical students rotated through 1 or more of these pediatric units. The clinical experiences and commitment of the staff to medical student education were exceptional. After graduation, virtually all of my fellow émigrés were privileged to mold their pediatric skills for varying lengths of time in 1 or more of these facilities.

In August 2001, I was able to identify 65 individuals who had graduated during the 40-year period between 1940 and 1979, had been certified by the ABP and had pursued careers in the United States. My primary source was the American Medical Association directory supplemented by information from the ABP and APS/Society for Pediatric Research (SPR) web sites and from personal contacts with fellow graduates from various eras and geographic regions. I made no attempt to obtain details of those in other pediatric specialties, but I am well aware of graduates who have made major contributions in pediatric surgery, urology, radiology, cardiovascular surgery, dermatology, orthopedic surgery, pathology, and child and adolescent psychiatry. I also made no attempt to track down those based in Canada. I would be remiss in not acknowledging that Sydney Brenner (class of 1951), recipient of the 2002 Nobel Prize in Physiology/Medicine, although not a pediatrician, has played a crucial role in our understanding of how DNA and genes operate, a prerequisite for our ability to address many of the problems posed by pediatric diseases.

Of the 65, 31 are or were full professors and 25

were or had been chairpersons of academic departments and/or specialty divisions. As additional indicators of academic recognition, 21 had been elected to membership in the APS and/or SPR, 5 have served as chairperson of an ABP specialty subboard, and 3 have served as directors of the ABP. More than 40% have subspecialized in cardiology, neonatal-perinatal medicine, or endocrinology (Table 1).

I especially acknowledge the true pioneers who blazed the trail for me and others during a time when visas to enter the United States were difficult to obtain and virtually all South African graduates looked to the United Kingdom for specialty training and credentialing. I also highlight the contributions of others who have made their marks in the academic arena in US pediatrics.

### THE PIONEERS

Solomon Kaplan, class of 1946, was a pediatric resident in Johannesburg in 1949 when his attending invited him to fill in a questionnaire given to him by one of the formula company representatives. The next thing he knew, he was notified that he had been "selected" for a fellowship to work with Sam Rapaport at Children's Hospital in Cincinnati to study renal electrolyte excretion. Unlike Jacobi, Kaplan was considered a law-abiding alien, but his mentor was exposed as a card-carrying communist in conservative Cincinnati in the midst of the McCarthy era. At the time, Rapaport was at a meeting in Vienna, and, despite attempts by Ashley Weech, his department chair, to dissuade him, he chose to remain in Austria, where even the communists distrusted him because of his sojourn in the capitalist West! By his own admission, in his naiveté, Kaplan continued to correspond with and send data to Rapaport until he was advised to cease and desist lest he be deported or worse! Partly because of Rapaport's hasty departure, Kaplan was asked to extend his fellowship, remained on to join the staff of the combined Endocrinology/Nephrology section, and was soon appointed as the first head of the Division of Endocrinology. He subsequently relocated to Los Angeles, where he successively chaired the Divisions of Endocrinology at Los

TABLE 1. Wits Graduates in US Pediatrics, 1940–1979 (N = 65)

	<i>n</i>
Full professors	31
Department/division chairs	25
APS/SPR members	21
ABP sub-board chairs	5
Subspecialties	
Neonatal perinatal medicine	11
Cardiology	10
Endocrinology	8
Genetics	4
Neurology	3
Allergy/immunology	2
Hematology/oncology	2
Critical care	1
Nephrology	1
Gastroenterology	1
Emergency medicine	1

Angeles Children's Hospital/University of Southern California and then at University of California, Los Angeles (UCLA). Among other notable achievements, Kaplan pursued his basic research in insulin receptors; authored a textbook on pediatric endocrinology; chaired the ABP Sub-Board of Pediatric Endocrinology; and served on National Institutes of Health (NIH) Study Sections, a National Science Foundation Advisory Committee, and the Board of Directors of the ABP.

In 1950, Kaplan convinced his older brother, Sam, a 1945 graduate, to visit Cincinnati after completing a cardiology fellowship in London. He was able to shake loose \$300 to provide financial support for his brother for 3 months! Thirty-two years later, after having built a world-class program, Sam stepped down from his position as Head of Pediatric Cardiology at Cincinnati and started a second career at UCLA, where he focused his research on children with acquired immune deficiency syndrome. His accomplishments include pioneering work in pediatric echocardiography and congenital heart disease in adults. He has trained 87 pediatric cardiologists and has been honored by his peers in the American Academy of Pediatrics (AAP) Section on Cardiology as recipient of the Founder's Award and by the American Heart Association, which established the "Kaplan Visionary Award."

In 1951, Abraham Rudolph, another member of the class of 1946, found his way to the United States to train with Dr Alexander Nadas in Boston. Dr Rudolph is as close to emulating Dr Jacobi as anyone in contemporary US pediatrics.<sup>5</sup> He pioneered neonatal cardiac catheterization and led the original studies of fetal cardiopulmonary physiology. He served as professor and head of Pediatric Cardiology at Albert Einstein before being recruited to University of California, San Francisco (UCSF) in 1966 to lead the Pediatric Cardiology Division and was subsequently chair of the Department of Pediatrics. He has authored >400 publications, has edited the hugely successful *Rudolph's Pediatrics* (now in its 21st edition) and *Fundamentals of Pediatrics*, was elected to membership in the Institute of Medicine of the National Academy of Sciences and to the presidency of the APS. He chaired the ABP Sub-Board of Pediatric Cardiology and has received the AAP's Lifetime Achievement Award, the St Geme Leadership Award from the Federation of Pediatric Societies, the Founders Award from the AAP Section on Cardiology, and numerous other honors.

Rudolph's older brother, Jack (Arnold), a 1940 graduate, came to the United States in 1956 and completed subspecialty training in the emerging field of neonatology under Dr Clement Smith in Boston. After a short return to South Africa, he was recruited to Houston to assist in developing the newborn service at Baylor, where he eventually held the position of chief of neonatology and professor of pediatrics. His research focused on the physiology of fetal transition to extrauterine life, and he trained >100 neonatology fellows. His commitment to teaching and clinical practice is legendary, both nationally

and internationally. His 5-volume *Atlas of the Newborn* was completed and sent to the publisher 2 weeks before his death in 1995 at age 77.

Boris Senior (class of 1945) trained in Boston and London and returned to private practice in Johannesburg before again relocating to Boston in 1960. For 30 years, he was chief of the Pediatric Endocrine and Metabolic service at Tufts. The Senior-Loken syndrome recognizes his description of the association between retinitis pigmentosa and renal medullary cystic disease. Among many other contributions, his research into glucose utilization and glycogen storage diseases has resulted in fundamental changes in our understanding of various disease processes. He has trained many highly successful academic pediatric endocrinologists.

#### THE FOLLOWERS (BY YEAR OF GRADUATION)

##### 1948

Cyril A. Abrams was in private practice in Johannesburg with Jack and Nathan Rudolph before their departures for the United States. In 1963 he, too, emigrated and became a fellow in pediatric endocrinology at Columbia. He subsequently served successively as chief of Pediatric Endocrinology at Roosevelt Hospital in New York City and at Long Island Jewish Medical Center and as associate professor of pediatrics at State University of New York (SUNY) Stonybrook and at Einstein.

##### 1949

Julien I.E. Hoffman joined the team at Einstein in 1961 and then relocated to UCSF, where he held professorships in physiology and pediatrics. He has trained >80 fellows and coedited 3 major texts. His major research interest is in the pathophysiology of myocardial ischemia and the natural history of congenital heart disease. The Julien I.E. Hoffman, MD, Chair in Cardiothoracic Surgery was endowed at UCLA in his honor.

Nathan Rudolph, the youngest of the 3 Rudolph brothers, was a fellow in developmental biology at Einstein and joined the faculty at SUNY Brooklyn in 1967. He is currently professor emeritus at SUNY Brooklyn, having served as chief of Newborn Services both at Maimonides and at the SUNY Health Sciences Center.

##### 1953

Aaron Levin was a pediatric cardiology fellow at Duke after completing pediatric training in Johannesburg. He joined the Cornell/New York Hospital faculty in 1966 as director of the Pediatric Cardiology Catheterization Laboratory and subsequently also directed the pediatric intensive care unit. He progressed through the academic ranks to professor of pediatrics. In 1974, he retired from Cornell but continues his professional activities as professor and associate attending pediatrician at New York Medical College. His research includes detailed studies of cardiac function in thalassemia and various congenital cardiac anomalies.

1956

Norman Jaffe (class of 1956) had his pediatric training in Johannesburg but was unsuccessful in his attempts to enter neonatology training in the United States. Happily for US pediatrics, the legendary Dr Sidney Farber sponsored him for training in oncology at the Jimmy Fund in Boston, where he helped pioneer the use of high-dose methotrexate and its application to the treatment of osteosarcoma. His 400-plus publications, editorship of 2 textbooks, appointment to the W.W. Sutow Chair at M.D. Anderson Hospital/University of Texas, and many other honors attest to his accomplishments in the field of pediatric oncology.

Two of his classmates, Edwin Myer and Israel "Kuna" Abrams, have had impressive careers in pediatric neurology. They both achieved professorial status and headed Divisions of Pediatric Neurology at the Medical College of Virginia and the University of Massachusetts, respectively. Both have authored textbooks in pediatric neurology. Interestingly, Myers was also in general practice with the Rudolphs before starting his child neurology training at Johns Hopkins. He has received many teaching awards at the Medical College of Virginia and also served as Chair of the AAP Section of Neurology.

Jack (Jacob) Katz held a chair in hematology in Johannesburg before being recruited to direct the Division of Pediatric Hematology-Oncology at University of California, Irvine, where he was professor of pediatrics and vice chair of the Department of Pediatrics at the time of his untimely death in 1998. His bibliography reflects his interest in a broad array of topics in hematology and oncology.

1957

Gerald S. Gilchrist served for 12 years as Helen C Levitt Professor, and Chair of Pediatric and Adolescent Medicine at Mayo Clinic and Mayo Medical School. From 1981 to 2000, he directed the federally funded Mayo Comprehensive Hemophilia Center. He chaired the National Childhood Cancer Foundation's Medical Advisory Committee, the ABP Sub-Board of Pediatric Hematology-Oncology, the AAP Section on Hematology/Oncology, and AAP Council on Sections. He also played significant roles in the activities of the Children's Cancer Group, was a director of the ABP, and a member of the Accreditation Council for Graduate Medical Education Residency Review Committee for Pediatrics.

1959

Michael Heymann, whose father was a pioneer in pediatric practice in Johannesburg and chief pediatrician at the Children's Hospital there, has made major contributions to our understanding and management of neonatal cardiopulmonary adaptation, including the introduction of nonsurgical treatment of persistent patent ductus arteriosus and the recognition of the role of nitric oxide. His extensive bibliography includes 190 peer-reviewed publications, 100 chapters and review articles, and 3 books. He

served as professor of pediatrics, physiology and obstetrics, gynecology, and reproductive sciences at UCSF; as a member of the SPR Council; and on many NIH Study Sections and Planning Committees.

Jennifer Loggie is professor emerita at the University of Cincinnati, having served for many years as director of Clinical Pharmacology at the Children's Hospital Medical Center. Her clinical research focused on hypertension in children and adolescents and is reflected in her extensive bibliography and editorship of a textbook on the subject. She was a member of various National Heart, Lung and Blood Institute and US Pharmacopoeia committees, task forces, and working groups and chaired the National Heart, Lung and Blood Institute Clinical Trials Committee and a Therapeutics Subcommittee of the US Pharmacopoeia.

Jack Wolfsdorf had been the first chair of pediatrics and dean of the medical school at the University of Rhodesia (now Zimbabwe) before being recruited to professorships at the University of New Jersey College of Medicine/Dentistry and, subsequently, Rutgers, where he established pediatric intensive care units and pulmonary units. Since 1984, he has held similar positions at Miami Children's Hospital.

1960

Avroy Fanaroff is recognized as 1 of the premiere educators and clinical researchers in his chosen field of neonatology. He is professor of pediatrics and reproductive biology at Case Western Reserve and directed the Division of Neonatology at Rainbow Babies and Children's hospital from 1975 to 1998. He received the AAP's Professional Education Award in 1994, and in 2002, the Section of Perinatal Pediatrics awarded him the Virginia Apgar Award. He was a founding member of the National Institute for Child Health and Development Neonatal Research Network and is the coeditor of 2 major texts and the *Yearbook of Neonatal/Perinatal Medicine*. He chaired the AAP Section on Perinatal Pediatrics, the ABP Sub-board of Neonatal/Perinatal Medicine, and the Organization of Neonatal Training Program Directors. He was also a director of the ABP and a member of the Accreditation Council for Graduate Medical Education Residency Review Committee for Pediatrics.

Aubrey Milunsky holds professorships in pediatrics, obstetrics, pathology, and human genetics at Boston University, where he is also director of the Center for Human Genetics and where an endowed chair in human genetics has been established in his name. He has served as president of the American Society of Law and Medicine and on many editorial boards. He was a pioneer in the area of prenatal diagnosis and continues to uncover new gene mutations associated with a variety of diseases. In addition to his 200+ original papers, chapters, and review articles, he has authored or edited 12 books, for both lay and professional audiences.

1961

M. Jeffrey Maisels is one of the world's leading experts on neonatal hyperbilirubinemia, having be-

gun research into the subject during his fellowship in Boston in 1967. After a 3-year stint at Walter Reed Institute of Research, he joined the faculty at the newly established medical school at Hershey, PA, where he advanced to become professor and head of the Division of Newborn Medicine. In 1986, he was appointed Chair of Pediatrics at William Beaumont Hospital with clinical professorships at both Wayne State and Michigan. With Fanaroff, his former high school classmate, he coedits the *Year Book of Neonatal/Perinatal Medicine*. He served as chair of the ABP Sub-Board of Neonatal/Perinatal Medicine

#### 1963

David W. Sapire completed a fellowship in pediatric cardiology with the group at Einstein and joined the faculty at Temple and then at University of Texas, Galveston, before taking up his current appointment as professor of pediatrics at Baylor in Houston. His interests and expertise in pediatric echocardiography have resulted in publication of 2 books and many other contributions to the literature.

#### 1964

Dorothy Becker has been at the Children's Hospital of Pittsburgh since 1974, where she is professor of pediatrics and director of the Endocrinology Division. Her contributions to diabetes research are reflected in her >180 peer-reviewed publications, continuous NIH funding since 1978, election to presidency of the Midwest Society of Pediatric Research, and tenure as chair of the NIH-National Institute of Diabetes and Digestive and Kidney Diseases Metabolism Study Section.

Bernard Kaplan began his studies into the pathogenesis of the hemolytic-uremic syndrome even before entering the nephrology training program at Montreal Children's in 1970, where he subsequently directed the Nephrology Service and the Renal Laboratory. He continued his work after being appointed professor and director of the Division of Nephrology at Children's Hospital of Philadelphia and the University of Pennsylvania, and he is recognized as an international authority on hemolytic-uremic syndrome and related conditions. His extensive bibliography includes 2 books.

Paige Kaplan is professor of pediatrics and chief of the Section of Metabolic Diseases at Children's Hospital of Philadelphia and the University of Pennsylvania. She has written extensively on hereditary renal disorders, on the management of Gaucher disease, and on various aspects of Williams syndrome. In recognition of her commitment to education and before her departure for Philadelphia in 1987, the residents at Montreal Children's Hospital established the Paige and Bernard Kaplan Award for Excellence in Clinical Teaching.

#### 1966

Keith Marks joined Maisels' program as a neonatology fellow in 1975, having completed his pediatric training in South Africa and the United Kingdom. He has continued his career and pursued research inter-

ests in various aspects of neonatal adaptation at Penn State, Hershey, where he is professor and chief of the Division of Newborn Medicine.

Norman Silverman joined the "South African mafia" at UCSF in 1972 as a fellow. He was named director of the Pediatric Echocardiography Laboratory and subsequently professor of pediatrics and radiology at UCSF. He has achieved national and international recognition for his contributions to echocardiography in children and has authored a textbook on the subject and >250 published articles. He was elected president of the Society for Pediatric Echocardiography in 1981.

#### 1967

Ian Gross is professor of pediatrics and obstetrics and director of the Division of Perinatal Medicine at Yale. He has served as editor of *Seminars in Perinatology* and as a member of an NIH Study Section. His research into various aspects of neonatal pulmonary function has generated continuous NIH grant support since 1978, and he has been director of an NIH-funded research training grant since 1982.

Benny Kerzner was chief of the Division of Pediatric Gastroenterology at Columbus Children's Hospital from 1981 to 1985. He was then recruited to the position of professor of pediatrics at George Washington University and chair of the Department of Gastroenterology and Nutrition at National Children's Hospital in Washington, DC. He has broad research interests with particular emphasis on inflammatory bowel disease and studies of carbohydrate absorption and assimilation.

Garth Orsmond is professor of pediatrics and director of the Division of Pediatric Cardiology at the University of Utah and Primary Children's Hospital. After basic pediatric training in South Africa, he completed a fellowship in pediatric cardiology at the University of Minnesota. His bibliography reflects his interests in a broad range of pediatric cardiology topics.

#### 1968

Since 1987, Raoul Wolf has been director of the Section of Pediatric Allergy and Immunology at the University of Chicago and was recently promoted to professor of pediatrics. He had been a fellow in immunology at Boston Children's before relocating to Chicago. His research interests have focused on various aspects of asthma management with particular emphasis on social and environmental factors.

#### 1969

Joseph Wolfsdorf is associate professor of pediatrics at Harvard and has served as chief of pediatrics at the Joslin Diabetes Center and as clinical director of the Division of Endocrinology at Children's Hospital, Boston. His major research activity has been in disorders of glucose metabolism, an interest dating back to his fellowship under Boris Senior at Tufts.

Steven Block's research has been directed at NIH-funded studies of cerebrovascular integrity in newborns. At Wake Forest University, he is associate professor of pediatrics and vice-chair of the medical school admissions committee.

Karen Hofman was founder and director of the Down Syndrome Clinic at the Kennedy Institute, Baltimore, and on the Johns Hopkins Center for Medical Genetics Faculty from 1988 to 1996. In April 2002, she was appointed director of the Division of Advanced Studies and Policy Analysis at the Fogarty International Center at NIH. The division is responsible for analyzing social, economic, and public health policies related to international biomedical research with an emphasis on disparities in global health, provides strategic guidance for new initiatives, and evaluates ongoing programs that complement the research activities of the NIH categorical institutes.

Desmond Schatz is professor of pediatrics and medical director of the Diabetes Center and associate director of the Clinical Research Center at the University of Florida. He has been principal investigator on a number of NIH-funded studies directed at the pathogenesis and therapy of type 1 diabetes.

#### COMMENTS

It is not possible to separate the roles of seed and the soil in contributing to this impressive list of achievements. However, in my opinion, these unique accomplishments reflect in large part the superb clinical training and the commitment to education of the teaching staff at Wits Medical School's affiliated pediatric units. This suggests that the key ingredients for realizing the potential of talented students is not necessarily high-technology laboratories or fancy facilities; where there are dedicated and serious teachers dedicated to hands-on medical education, the seeds of greatness will grow. As is the case with so many of the talented immigrants who seek better opportunities in the United States, what this country gains is another country's loss. In the case of South Africa, one is deeply saddened by the loss of talent from a country in great need of individuals of this caliber. Their departure from South Africa was in no small part influenced by the apartheid policies of the South African government beginning in 1948 but also by the phenomenal professional opportunities available in the United States. It is a testament to the self-defeating nature of apartheid that the same system that squandered the potential of millions of South Africa's citizens also drove away many of those whose privileges it so desperately sought to protect.

Through their contributions to pediatric knowledge and their compassionate concern for the welfare of children, the spirit and legacy of Abraham Jacobi is well preserved by these latter-day IMGs!

#### ACKNOWLEDGMENTS

This article is based on a lecture given at the Abraham Jacobi Award, American Academy of Pediatrics, San Francisco, CA, October 21, 2001.

I am indebted to Drs Sam Wayburne and Michael Heymann in the United States and to Professors John Pettifor, Keith Bolton, and Harvey Cohen in Johannesburg for providing me with some key historical material for this article.

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## IMPACT OF NURTURE

“There is a lesson from our study that bears remembering: the impact of perinatal complications tends to diminish with time, and the developmental outcomes of virtually every biological risk condition become more and more dependent on the quality of the rearing environment. Pre- and perinatal complications in our longitudinal study were consistently related to serious impairment of physical and psychological development in childhood, adolescence, and adulthood *only* when they were combined with chronic poverty, parental psychopathology, or *persistently* poor rearing conditions—*unless* there was serious central nervous system damage.”

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Submitted by Student