

## AREE VALYASEVI

AREE VALYASEVI was born in Bangkok, Thailand on October 20, 1925, during the final year of the reign of King Vajiravudh (Rama VI). His father, Phaya Surindr Sevi (Thoa Valyasevi), who had been educated in a special boarding school, served in the Royal Household. Khunying Surindr Sevi (Ava Sethabutr), his mother, was the daughter of a senior judge in the Ministry of Justice. AREE was the eldest of their six children; he had four half-sisters as well.

With the ascent of a new monarch Surindr Sevi left the Royal Household. He entered business and with other family members invested in land. Choosing to expose his son early to the English language, he sent young AREE to St. Gabriel's, a Catholic boys' school where the religious brothers were rigorous in their academic demands. Among the lessons he expected AREE to learn at St. Gabriel's was: "you have to work hard from early life." Gregarious AREE, who devoted his after-school time to play and occasionally fell exhausted to sleep with his homework unfinished, tasted St. Gabriel's corporal punishments and learned the necessity of self-discipline, as well as hard work.

After seven years AREE was sent to Amnuaysilpa where he pursued English along with Thai, and had the advantage of that school's excellent instruction in mathematics and science, both necessary if he chose to go into medicine. AREE early expressed an interest in becoming a doctor: "As I remember, when anyone of our family got sick, I knew how hectic it was for my father and my mother to get physicians to come and treat us. So I thought of it as a kind of service . . . to relieve the worry of patients, or the parents of patients."

During the Second World War, although Thailand was not officially occupied, schools in Bangkok opened and closed unpredictably. Many people sought refuge in the provinces from the political situation and possible hostilities, including AREE's father and sisters, who returned to their ancestral home in Patum Thani. But AREE, now a teenager, was left behind to guard the family house. Although bombs from an American plane fell a half kilometer away, he survived the war unscathed and lost all-told only a year of schooling. By war's end he had managed to complete his secondary education at Triam Udom, a

prestigious preparatory school. He then entered Chulalongkorn University for pre-medical training; on his university application AREE listed business as his alternative field of study in the event he failed the pre-medical examination. Following two years at Chulalongkorn he moved on to Siriraj Hospital Medical College, where in 1951 he became an MD and for the next two years was a resident in pediatrics.

AREE chose pediatrics in part because of a professor of pediatrics at Siriraj, Arun Netrasiri, who inspired him as a “cool, calm and kind . . . and very gentle” doctor. He also chose it, he says, because children rarely say they are sick when there is nothing organically wrong with them, and because they recover quickly: “They become healthy children again. You can see the result.” Another Siriraj faculty member, Dr. Arun’s wife, Khunying Cherdcharong, introduced AREE to child nutrition. His interest in his branch of pediatrics deepened during his years as a resident—when he was frustrated by the recurrence of infections among his young patients—and led him to the study of how diet affects children’s health.

When he completed his residency AREE decided upon graduate study in the United States. He felt that the quality of medical education in Thailand in the post-war years lagged unavoidably behind the West. A course at the University of Pennsylvania Graduate School of Medicine offered doctors an intensive one-year review of the latest in medicine. Having persuaded his father to underwrite the costs for this course and the three years to obtain a master’s degree (his father did so by selling land), AREE set off in 1953 for Philadelphia.

As he coped with the intensive review course and adjusted to Philadelphia’s strange climate and ways, AREE had a stroke of good fortune. Also at the University, studying public health nursing, was Som Savat Virabutr, a Thai woman student with three years of experience in America. The two found each other good company and Som Savat was soon assuaging AREE’s homesickness with home cooking. They were married in May 1954. Their first child, a son, Sukasith, was born in November 1955.

AREE’s first year at the University of Pennsylvania brought other associations of lifetime importance. One such was with Professor Paul Gyorgy. An emigre from Germany who had discovered three vitamins, Gyorgy was chief of Pediatrics at the Hospital of the University of Pennsylvania (HUP). Another was Lewis A. Barness, an Associate Professor at the School of Medicine. Both Gyorgy and Barness were pediatric nutritionists. They were impressed by the young Thai and encouraged him to “do a residency” at HUP.

The idea of supervising HUP's bright young interns intimidated AREE, especially because he was not yet confident of his English, but he accepted. More than once the struggle for mutual intelligibility between him and the American staff nearly drove him to give up the residency, for which he received no pay, only his meals. But he worked doggedly in the face of discouragement, and with Som Savat's strong support he persevered for two years.

During his HUP residency AREE also conducted research for his master's thesis on the lung function of premature babies. His thesis received First Place award from the Philadelphia Pediatric Society for research by residents. Once his work was recognized, his self-esteem improved immeasurably.

AREE stayed on at the university for another year as a Research Fellow in Nutrition. His research, in collaboration with doctors Gyorgy, Barness and others, led to joint publication of scientific papers addressing aspects of nutrition-related illnesses of infants and children. During this year, 1957, his second son, Apichart, was born, and AREE received his Master of Science in Medicine.

On the recommendation of his mentors at the university AREE was recruited to start and head a nutrition-metabolic unit at the Driscoll Foundation Children's Hospital in Corpus Christi, Texas; the foundation was an affiliate of Baylor University. There he set up a laboratory to study malnutrition in local children of Mexican descent.

The low protein quality of wheat, the local staple, was an already known contributor to the dietary deficiencies found in the area. From earlier research at Pennsylvania AREE knew that supplementing the diets of laboratory animals with amino acids, particularly lysine, enhanced the protein quality of their wheat diets. At Corpus Christi he designed research to test this possibility for human infants. The research especially interested AREE because it had ramifications for Thailand where the staple food—rice—is also protein poor and low in some essential amino acids.

AREE's conclusions were unexpected. Even more important than supplementing with lysine was supplementing with minerals. By enriching wheat food with lysine and potassium, infants' metabolism was better and the infants grew stronger. AREE presented these conclusions to a meeting of the American Pediatric Association. With the agreement of Gyorgy and Barness, these findings became the basis for his doctoral thesis: "Lysine and Potassium Supplementation of Wheat in the Diets of

Infants.” On the basis of this the University of Pennsylvania awarded him the degree of Doctor of Science in Medicine in 1959.

AREE now pondered his future. By this time he had lived in the United States nearly eight years. He was a success there, and a fine career awaited him if he chose to stay. Moreover AREE and Som Savat had delighted in the warm climate and hospitable atmosphere of Corpus Christi, where a third son, Ruud, was born in October 1958. They seriously considered remaining in the U.S., but bonds of family and culture asserted themselves. What is more, AREE’s mentor Gyorgy had by this time visited Thailand and had spoken a good word for AREE with Arun, now chief of Pediatrics of Siriraj Hospital. Upon his return Gyorgy told AREE he could make a meaningful difference back in Thailand; AREE and his family were soon preparing for home.

Before he left, however, Gyorgy arranged one more learning experience for him—a Rockefeller Foundation Fellowship at the Institute of Nutrition of Central America and Panama (INCAP) in Guatemala City. Here for the first time AREE moved beyond the hospital and laboratory to observe and participate in nutritional research in the community.

Returning to Bangkok in early 1960 AREE joined the faculty of Siriraj Hospital Medical College. He also launched a financially rewarding private practice, joining some of his friends in a clinic for surgery, medicine and pediatrics.

Not long afterwards, however, AREE took temporary leave from his new responsibilities to engage in a national survey conducted by the Interdepartmental Committee on Nutrition for National Development (ICNND). This American-led team, to which AREE had been recommended by Gyorgy, was investigating nutritional problems in children and young adults by surveying diets and attempting to identify nutritional deficiencies specific to Thailand. As a clinical team member, AREE examined subjects, made scientific measurements and held extensive interviews with hospital clinicians throughout Thailand. Seeing much of his country for the first time, he was appalled by the high prevalence of protein-energy malnutrition and vitamin and mineral deficiencies. What struck him most was the prevalence of bladder stones.

At a hospital in Ubon, he recalls, “I went in and saw a museum of stones. Then I went to visit the ward patients. At one time 10-15 of them had come for operations to remove stones.” Half of the patients were under the age of five. “This was unique. I didn’t see it in the south. I didn’t see it in the central area. But I saw it in the northeast. Why,” he

asked himself, "and why in the northeast?" This startling discovery launched AREE on his first extensive research project in Thailand.

Bladder stone disease is a debilitating condition causing painful, cloudy and bloody urine. The pain of advanced bladder stones can be crippling. At the time of the survey some 10,000 Thais went to the hospital every year for stone treatment and many of them were children.

AREE began exploring the problem with Scott Halstead, an American epidemiologist and virologist. The two men soon learned that northeast Thailand is part of a great bladder stone belt extending from the Middle East to Thailand, covering parts of Turkey, Iraq, Iran and southern India. Halstead's search in the literature also revealed that a few hundred years ago the condition was common in Europe and England, where diets and infant feeding practices were similar to those along the modern stone belt. All this confirmed AREE's hypothesis that bladder stones occurred largely in response to diet.

Working with Halstead, AREE defined the geographical distribution of bladder stones in Thailand. He then began investigating the pertinent nutritional and epidemiological variables. He compared, for example, feeding habits for infants inside and outside the belt, and in rural villages and towns. Urban children, he found, rarely got bladder stones, whereas in the rural northeast babies only three months old passed urine containing stone-causing oxalate crystals.

To fund further research AREE went to Gyorgy. He agreed to lend his name as Principal Investigator for two three-year-long projects funded by the U.S. National Institutes of Health; AREE was listed as Co-Principal Investigator.

In a series of meticulously designed sequential experiments AREE and his colleagues learned that in northeast Thailand mothers began feeding rice gruel to their babies only a few days after birth. Filled with this nutrition-poor starch, these infants drew less and less of their mothers' milk. This hastened an early onset of bladder stones in these children because breast milk contains most of the essential nutrients including phosphate that produce pyrophosphates; and it is pyrophosphates that prevent the formation of oxalate gravel in urine. (In central Thailand, where bladder stones are rare, AREE observed that mothers breastfeed their babies for three months before introducing solid foods.) Moreover, AREE discovered, six vegetables eaten constantly in the northeast had oxalate contents (the main component of stones) much higher than the same vegetables grown in central Thailand.

Furthermore the incidence of bladder stone disease was exacerbated in the northeast by the dehydration caused by frequent illnesses, especially diarrhea, and inadequate water supplies.

Focusing on the dietary variables AREE and his colleagues next introduced oral phosphate supplements made from legumes and animal sources into the diets of hundreds of pre-school children. He then monitored their bladder stone symptoms in comparison with those of children who did not receive supplements. After five years he was able to conclude that phosphate supplements led to a significant reduction in stone symptoms.

From a practical standpoint AREE's preventive treatment for bladder stone disease was easy to apply. Eventually Thailand incorporated it into its national health program. As a result the incidence of bladder stones seen in Thailand's rural hospitals has been noticeably declining. AREE's research has also been applied in other countries along the stone belt.

Having begun in 1962 AREE's bladder stone research continued well into the 1970s and yielded more than 40 scientific papers. In 1976 he received the Distinguished Award from the Thai National Research Council for his ground-breaking contribution. AREE's private practice, however, fell victim to the heavy demands of research and teaching. It was too time consuming. "When you are a pediatrician," he explains, "you are not [just] treating children, you are treating mothers. If they feel I should go [to the house] I have to go." He gave up his practice in 1963.

When his grant with Gyorgy expired in 1970 AREE continued his research in nutrition as chief of the Thai component of the Clinical Research Center of the Southeast Asia Treaty Organization (SEATO). The Research Center was an institutional partner to Mahidol University (then University of Medical Sciences), which he now joined.

Coincidentally, Mahidol University was at that time in the throes of establishing a new medical school, an endeavor aided by the Rockefeller Foundation. Mahidol's rector, Chatchawan Osathanond, lost no time in delegating AREE to assist him in setting it up.

Mahidol's new medical school was in response to a desperate shortage of doctors. At the time the ratio of doctors to people in Thailand was around 1:1100. This was in Bangkok. In rural provinces the ratio varied from 1:10,000 to 1:100,000—an obvious obstacle to improving the health of the population. In planning the new school in

collaboration with key faculty members, AREE energetically assisted in everything from designing the hospital building to formulating a curriculum and recruiting the faculty. He and his colleagues sought to create a medical school that would prepare young doctors for their two years of compulsory service in rural areas following graduation. (The government required this because 85 percent of Thai doctors practiced in urban areas, whereas 85 percent of the population lived in the countryside.) This led to the innovative Rockefeller Foundation-supported Community Health Program at Ramathibodi Hospital Medical School, as the new institution was called when it opened in 1968. AREE was appointed Dean, and Chairman of the Department of Pediatrics.

Ramathibodi introduced medical students to community work early in their course work and instilled in them an awareness of the vital relationship between the environment and health. Its training in community diagnosis (the problems faced by the community as a whole), priority setting in public health, and preventative and promotive aspects of health care distinguished it from orthodox medical schools and attracted the attention of the health community in several countries. AREE hoped that his students would be not only better equipped to work in rural communities than students from traditional medical schools, but also more motivated to do so. His hope was justified. Many of Ramathibodi's graduates are known to emphasize community health; a higher percentage of them remain in rural posts beyond their two years, and four have been named "Rural Doctor of the Year."

AREE's advocacy of community health was not limited to the medical school. As a member of the National Food and Nutrition Committee his was the primary voice calling government and public attention to the detrimental effects of malnutrition on health and the overall quality of life. "We realized that the raw material we were feeding into our schools was not the right quality," AREE says. He also urged new mothers to breastfeed their babies, and joined in the call to regulate marketing of commercial infant formulas in Thailand. With others—such as Dr. Prawase Wasi, 1981 Magsaysay Awardee for his "contribution to medical science while prompting his profession in making modern health care available to the poor"—he urged the government to combine nutrition programs with primary health care nationwide.

AREE's persuasive lobbying succeeded and he was asked to join the committee forming Thailand's Third Five Year Development Plan, to commence in 1972. Earlier plans had emphasized roads and dams and other infrastructural projects. By attacking protein-energy malnutrition

among infants the Third Five Year Plan was the first to address the improvement of human resources as part of comprehensive national development. It set the stage for those that followed: the Fourth and Fifth Plans set specific national targets for child body weights as a measure of healthy growth and strove for the eradication of third degree malnutrition.

AREE's forthright accounts of malnutrition among Thai villagers in the early 1970s, and his advocacy of government action, were not welcome in all quarters. His friends occasionally told him to "tone it down" lest he be viewed as an "oppositionist." But AREE persevered in raising the issue, always supporting his pleas with hard data. "A fact is a fact," he would say, and "the truth is the truth."

Not a political man, AREE was nevertheless caught up in the reformist momentum of the times, as were many of his faculty colleagues. Students were in the vanguard, however. To those who ultimately rallied against Thailand's military government in 1973, Dean AREE was known as a man with a social conscience and a sympathizer with the country's have-nots. When some of the students were wounded in the uprising and others were rounded up and placed in detention centers, AREE visited and assisted them.

The student revolution of 1973 led to a period of more responsive government. In 1975 AREE was appointed senator in the National Assembly. He served as Secretary of the Senate's Committee on Public Health and also involved himself in legislation addressing the environment and illegal drugs. Although he found being a senator interesting, lobbying to secure passage of a bill he thought important was not altogether to his taste. In 1977 he left the Senate and devoted himself to his role as Dean of the Faculty of Medicine, and from 1978, Founding Director of the Institute of Nutrition at Mahidol University (INMU).

INMU was established on the recommendation of the National Economic and Social Development Board to be the technical arm of the food and nutritional component of the National Development Plan. As an advisor to the Ministry of Health, AREE emphasized the comprehensive nature of the problem of malnutrition. It cannot be viewed simply from the standpoint of health, he said, nor will its remedy be found solely within the sphere of medical science. Solving the problem of nutrition requires a broad, interdisciplinary approach.

As the idea for a national institute of nutrition began to take shape, AREE insisted upon two criteria. First, if the primary functions of such an



institute were to be research and training, it should be part of a university, not directly subordinate to a government ministry. Second, if its mandate was the *interdisciplinary* study of nutrition, it should stand independent of any existing school, including Mahidol's Faculty of Medicine at Ramathibodi.

The Institute of Nutrition at Mahidol is very much AREE's creation. Under his direction since its creation, the INMU conducts primary research in Thailand, and acts as a coordinating agency for nutritional research in Thai and foreign institutions. It engages in short and long term education in clinical, experimental and community nutrition, and disseminates information to the public through the mass media and through its own field workers and government officers. At the same time the institute is training new researchers and systematically integrating nutrition into the curricula of the medical, nursing, public health and tropical medicine faculties of Mahidol University.

Today INMU's modern four-story headquarters on the Salaya campus of the university houses administrative offices, a library, food and nutrition laboratories, statistics and communications research facilities as well as class and conference rooms. In its sophisticated laboratories, institute technicians assist scientists and doctors with advanced research in biochemistry, metabolics and nutrition, and perform specialized laboratory services for others: contamination analysis, for example, and nutrition evaluation of foods and food products. Other institute staff provide consulting services on nutrition management for individuals, families and communities, and on diet therapy for hospitals.

The institute will have its own metabolic kitchen and wards for infants, children and adults. Aside from its own staff and students from various faculties at Mahidol, its Institute Fellows from Asia and elsewhere join in the ongoing research and in the process of sharing knowledge through conferences, seminars and workshops. AREE presides from the director's office. Here tidily arranged research materials proliferate alongside charts and photographs—including one of Paul Gyorgy, now dead, who looks sternly over AREE's shoulder as he works.

Through the institute AREE—along with his longtime colleague Dr. Sakorn Dhanamitta, other fellow scientists and a staff numbering more than two dozen—has placed nutrition education and research in the mainstream of Thailand's development efforts. Since 1980 the INMU has been an Associated Institution of the United Nations University, Tokyo. It directs some of its work to complement the UN's World

Hunger Program, which seeks, among other goals, to fulfill human nutritional needs by means of readily available local foodstuffs. It is in this area that AREE's work has had the greatest recent impact, especially in addressing the most pervasive form of malnutrition among Thailand's children, protein-energy malnutrition (PEM).

Among Thai children and youth PEM arises from a too heavy dependence upon rice as a staple food. When infants are weaned too early from the breast to rice, and when the diets of young children are insufficiently supplemented with protein rich foods, both the physical and mental development of the children is retarded. This has permanent consequences for the quality of their lives. As recently as 1980 more than half of all pre-school children surveyed nationally suffered PEM to one degree or another. The problem was worst in the northeast.

AREE observed the near ubiquity of protein-energy malnutrition among rural Thai children during the nutritional survey of 1960, and published his first scientific paper on it in 1964. As his research in bladder stone disease reached a mature and conclusive stage in the early 1970s, AREE shifted his attention back to his broader problem, all the more so as the government of Thailand enlisted his help in fighting PEM.

The same methodical approach that AREE brought to studying bladder stone disease he now applied to PEM. He began by targeting pregnant and lactating women, infants and pre-school children as the focus for research, and by deciding to stage the research in the northeast. AREE then selected Nong Hai, a village of over 1,000 households in Ubon Ratchatani Province, for a series of multi-disciplinary operational research projects, integrating new experiment-based knowledge about PEM with remedial strategies. In the Nong Hai Pilot Project (1976-1980) AREE's research staff in Bangkok worked with its field workers in Ubon and with collaborating government agencies.

In Nong Hai AREE, Sakorn and his co-workers concentrated first on finding protein energy-rich foods that were locally available and that could be used to supplement a rice-based diet. They found several, including red and black beans, soybeans, mung beans, fishmeal, groundnuts (peanuts) and sesame seeds. (The latter two are also useful providers of fats.) The next step was to find a way to introduce these supplemental foods into the diets of infants and small children.

AREE's solution was a porridge-like mixture of rice and supplements that mothers could cook at home and feed their babies as they

gradually weaned them from the breast. The team experimented with seven such mixtures, testing for safety, digestibility, texture and taste. Infants showed a clear preference for the groundnut, sesame and bean-based mixes, spurning those with fishmeal. Toddlers tired quickly of the soft mixtures made for infants and preferred chewier ones.

For the new mixes to be adopted on a routine basis, they had to be made from local ingredients using locally available technology. They were therefore designed with an eye to expense and simplicity, and villagers were involved in every step of the process. INMU field workers taught villagers how to grow the beans, seeds and legumes and how to roast, grind and package them. They introduced simple hand-operated grinders to process the ingredients into meal.

Once perfected the mixes were distributed to second and third degree PEM children. The field workers taught mothers how to use the mixes and trained them to weigh their children and interpret the results using simple growth charts. Later the INMU helped villagers form nutrition cooperatives to manufacture and distribute the mixes, and introduced electric grinders. At the same time new income-generating projects were promoted.

The institute's work in Nong Hai yielded encouraging results: after two years the proportion of normal, healthy children had increased from 45 to 79 percent, second degree PEM was significantly reduced, and third degree PEM had disappeared altogether.

AREE next inaugurated a second pilot program in three villages in nearby Trakarn. The Trakarn Project (from 1978) built on the Nong Hai framework, but with greatest emphasis on income generation.

Although the initial introduction of the new food supplements and intensive care brought a rapid and significant improvement in malnourished children, over the longer period villagers shifted their attention away from nutrition to the money-making projects. After 14 months the basic nutritional state of the villages' children was little improved. The Trakarn experience pointed up the necessity for intensive nutritional and health education. Increased income alone, AREE realized, does not necessarily improve the nutritional status of the rural poor.

From the Nong Hai and Trakarn pilot projects AREE and his co-workers hypothesized that successful intervention in villages to improve the health and nutrition of children must consist of four components: 1) curative, promotive and preventive health care; 2) modification of people's diets through nutrition education; 3) new agricultural produc-

tion leading to the processing and distribution of supplemental foods, and 4) generating income through new occupations and technologies. These components, though overlapping, are best executed sequentially, they found. The first step might best be initiated by a health worker who can win the confidence of villagers with first aid and simple medical treatments before attempting to change their behavior. In the Non-Klang Project, begun in 1980, AREE adapted these hypotheses with an eye to developing a model capable of being applied nationwide.

The Non-Klang Project covers 10 villages, comprising an average-sized subdistrict. Here, in place of INMU staffers, district level officials of the Health, Agriculture, Education and Rural Development ministries implemented the program. AREE's team provided technical assistance, support and motivation. The program was ambitious. Aside from introducing the INMU-developed food supplements, the project sought to produce an improvement in 1) health (by means of inoculations, drug cooperatives and a clean water supply), 2) agriculture (high-yield rice, home gardens), 3) income generation (silkworms, pigs and crafts) and 4) education (literacy and job training).

The Non-Klang Project was not a success. Already overworked government employees had little time to give to it and implementation was erratic and slow. Moreover, villagers responded selectively to the new initiatives, as they had done in Trakarn. The project achieved few behavioral changes, and after two years AREE and Sakorn concluded, "the improvement in the nutritional status of infants and pre-school children was insignificant." However, he and his colleagues learned much from the Non-Klang Project.

Despite some disappointments, the efficacy of AREE's food supplements had been established. The Nong Hai Project was well-known to Thai government ministries and to non-governmental organizations interested in nutrition and development. They in turn began spreading news of its innovations and approach among local health workers, agricultural extension agents and community development officers through workshops and training sessions. Then, beginning in 1983 with a huge project supported by the World Bank, the government introduced programs based on AREE's concept to 1,200 villages throughout Thailand.

Meanwhile workers at INMU, in collaboration with government ministries, searched for ways to make the integrated approach more successful. It was obvious, for example, that greater support and encouragement was needed from provincial and local government. AREE

relates how they carried their charts to the governors and district officers to get their cooperation. As he well knew, without a “green light” from the top, lower echelon officials will do little.

At the same time field workers conducted experiments aimed at making nutrition education more effective. They coached young teachers in home visit and group study presentations, using flip-charts, slides and puppet shows, and conducted food demonstrations for new mothers followed by group feedings. They introduced audio cassettes with standardized lessons given in local dialects, often in the form of mini-drama. And they exploited the pervasive presence of transistor radios among rural Thais to plant short, repetitive messages amidst popular programs. In keeping with AREE’s scientific approach, all these devices were tested for their effectiveness and modified accordingly.

Further experiments designed to test the relative significance of each component revealed that two essential components for improving nutrition were *effective education* and *food availability*. A third was *local leadership*. Identifying and motivating the natural leaders among village elders, monks and teachers was critical if nutrition intervention was to bring permanent change. Yet this was among the greatest challenges. Once identified, the village leaders then needed “to have their consciousnesses raised with regard to what problems exist . . . and what their role in effecting a solution might be.”

As AREE and his colleagues carried on, experimenting and perfecting their approach, they were supported by the Thai government and, at various phases, by the Ford Foundation, the European Economic Community, UNICEF and the Stiftung Volkswagenwerk.

By 1984 the program of nutritional intervention had been expanded to cover 30 of Thailand’s poorest provinces. Today it is applied virtually nationwide under the auspices of the ministries of Health and Agriculture. Babies and children in some 12,500 villages across Thailand benefit from AREE’s food mixes. And all over Thailand the incidence of protein-energy malnutrition has been markedly declining. By 1986 first degree PEM had declined to 24 percent; second degree PEM to 4 percent; and third degree PEM, the severest, to .04 percent.

AREE’s personal contribution to a new generation of healthier and brighter children has been recognized by King Bhumipol Adulyadej who in 1983 conferred upon him the Dushdi Mala Medal of Royal Appreciation “for performing public service through medical science.” In 1985 AREE was singled out for his achievements in nutrition by the

University of Giessen, West Germany. Perhaps even more meaningful is recognition of the importance of his work by a broad segment of the international scientific community. Today among observers at the INMU and the Nong Hai research station are students and scientists from around the world; a recent visitor found himself in the company of delegations from Australia, Malaysia, various parts of Africa and North America.

AREE has long been a member of numerous international organizations devoted to nutrition, among them the Expert Committee on Nutrition of WHO, the American Society for Clinical Nutrition and the American Institute of Nutrition. He has served as consultant to USAID in Thailand and to UNICEF in China, Saudi Arabia and Pakistan; as Vice President of the International Union of Nutritional Science, and President of the Federation of the Asian Nutrition Societies. He has also been Institutional Coordinator of the United Nations University.

His first love, however, remains research in pediatrics and nutrition. In this connection he has authored or co-authored 75 to 80 scientific papers, and has written the sections on beri-beri, nutrition disorders, pellagra and bladder stone disease for four internationally used textbooks.

As the worst manifestations of PEM have been gradually eliminated AREE is now turning his attention to Thailand's other well known nutritional deficiencies: the lack of iron among pregnant women, and Vitamin A deficiency. More and more, however, he seeks to study the more subtle variables in the national diet. Through the INMU he hopes to establish guidelines for daily nutritional requirements on a national scale, based on research on the composition of Thai foods. Furthermore the prosperity of Thailand's urbanites and upper classes poses a new and growing nutritional danger which requires research and education. This is "over nutrition" which results in problems such as coronary heart disease, diabetes, arteriosclerosis and hypertension.

AREE and Som Savat's three American-born children are now adults. Sukasith is studying and working in the U.S.; Apichart is a resident in internal medicine at Upstate Medical Center, Syracuse, New York; and Ruud is a graduate student in genetic engineering at Oregon State University.

AREE sometimes broods over the pattern of his country's development. Why, for example, as the economy boomed in recent years, have rural people not shared equally (or sometimes not at all) in the growing

prosperity? And why, when they do, do they often neglect their young in their search for better cash incomes?

But AREE is not one to brood for long. As a scientist he believes most solutions will be found by “getting back to reality.” As one of his colleagues has said of him, AREE is the sort of visionary who “works, works, works.”

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*Arue Vafaseni*