



Thai connections to Nobel and Science prizes

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Abstract: This research is a persistent effort to find out the possible reasons why some great Thai citizens as well as scientists missed the Nobel Prize but received major Scientific accreditation. Many great scientists worldwide have made significant contributions pertaining to science but not received any recognition yet. There has always been a thrust in Thailand to inculcate the scientific literacy through local wisdom, with emphasis on HM King Bhumibol Adulyadej's philosophy of sufficiency economy, moral infusion, and the Buddhism way of life.

Keywords: Nobel Prize; Thai Scientists; COVID-19 vaccine; NSTDA; TAST

1 Introduction

In 1895, Sir Alfred Nobel instituted the prizes for outstanding accomplishments in chemistry, physics, medicine or physiology, literature and later on for economics [1, 2]. The first prizes in Chemistry, Literature, Peace, Physics and Physiology or Medicine were given in the year 1901. Apart from general science and technology awards, there are several specific lists of awards that are given in various fields like agriculture, archeology, astronomy, aviation, biochemistry, biology, biomedical science, computer science, earth sciences, economics, engineering, environmental science, geography, geology, geophysics, mathematics, mechanical engineering, meteorology, motor vehicle, oceanography, ornithology, paleontology, psychology, science and technology awards for women, social sciences, space and technology, and so on.

Alfred Nobel was a pacifist with a pessimistic outlook towards mankind (Frängsmyr, 1966) [3]. We should never forget that hard work is a part of every laureate's journey towards the Nobel Prize. Failure is the only constant in every scientist's life. Each experiment has a risk, that is it might fail. Lack of technology might be a possible reason, or the theory wasn't correct, or simply because the experimental protocol was improper. This emotional investment of scientists is incomparable.

2 Thai Nobel connections

Although Thai researchers and writers are yet to be recognized by the Nobel Committee, Thailand has nevertheless participated in the nomination and awards process [4]. On the website of the Nobel Committee in Stockholm, we see that two nominations were made from Thailand for the Nobel Peace Prize. Both were concerned with the rights and welfare of children. The first, in 1928, was made by Prince Thewawongwarorathai (1883–1943), a grandson of HM King Mongkut (Rama

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Fig. 1 Alfred Nobel [1883–1896]



Fig. 2 HH Prince Traidoss Prabandh [1883–1943]

IV). Also known as HH Prince Traidoss Prabandh, he served as Siamese Minister of Foreign Affairs. As such, he was involved in international matters. So in 1928, HH Prince Traidoss nominated for the Nobel Peace Prize Sir Robert Stephenson Smyth Baden-Powell. As all Thais interested in scouting know, Lieutenant General Baden-Powell (1857-1941) was a British Army officer and author of *Scouting for Boys*, an inspiration for the Scout Movement. Baden-Powell was also founder and first Chief Scout of the Boy Scouts Association and founder of the Girl Guides. According to the nomination by HH Prince Traidoss: Baden-Powell founded the Boy Scouts movement in 1907 and he organized the movement internationally. He and his sister Agnes founded the Girl Guides in 1910 (in the US Girls Scouts from 1912). Baden-Powell organized the Wolf Cubs in Great Britain (Cub Scouts in

the US) for boys under the age of 11 in 1916. The nominators emphasized the brotherly mentality and the non-militaristic character of the movement.

NSOT or Khana Luksuea Haeng Chat is The National Scout Organization of Thailand. HM King Rama VI established the scouting organization in Thailand in 1911 and among the charter members of the World Organization of the Scout Movement in 1922. HH Prince Traidos was aware of the importance of Baden-Powells contribution internationally and in the Kingdom. He was not alone, for in 1928, nine other prominent personalities from Switzerland, the UK, Japan, and other nations nominated Baden-Powell for the same award. Even so, he ultimately never received it.



Fig. 3 HRH Prince Vanna Vaidhayakara [1891-1976]

The other nomination from Thailand in the database of the Nobel Prize Committee occurred in 1963. In that year, the United Nations Children 's Fund (UNICEF) was nominated for the Nobel Peace Prize for helping the lives of children all over the world. The nomination was by HRH Prince Vanna Vaidhayakara, Prince of Naradhip Bhongseprabhan, known in the West as Wan Waithayakon (1891-1976), a Thai diplomat. HRH Prince Wan Waithayakon was elected President of the Eleventh Session of the United Nations General Assembly (1956-1957), while serving as Thailand's Permanent Representative to the United Nations. Like HH Prince Traidos Prabandh, he was also a grandson of King Rama IV. In 1963, other nominees from different European countries also suggested that UNICEF was worthy of receiving the Nobel Peace Prize. In 1965, the prize was indeed awarded to UNICEF for its promotion of brotherhood among the nations as a peace-factor of great importance.

As the website of UNICEF Thailand observes, despite economic advances in the Kingdom, huge disparities remain, and the benefits of economic progress have not been equally shared by all children in Thailand. This is particularly true for the children of ethnic minorities, migrants, refugees and the very poor. Several challenges continue to be confronted by UNICEF Thailand, we can appreciate HRH Prince Vanna Vaidhayakaras initiative over a half-century ago to recognize this important organization and its work. Since the Second World War, too, The

Nobel Prize and national politics there has been a steady migration of scientists responding to the pull of better research and economic opportunities afforded primarily in the United States and Western Europe.

It is a delicate question whether the authorities in any country are willing to actively help their scientists receive a Nobel Prize. Lobbying may be done with taste and honest means, though nobody is eager to go on record about what activities may be carried out in this respect. Recently, a noted science historian in Budapest was invited to prepare a report on whether it was feasible to facilitate creating another Nobel laureate in Hungary.

3 Great Thai citizens and scientists



Fig. 4 Sithiporn Kridakara [1883–1971]

Sithiporn Kridakara [5], known as Thailand's Farmer Prince was awarded the 1967 Ramon Magsaysay Award for Public service towards his efforts in the development of Thai agriculture. Born on April 11, 1883, Sithiporn studied in England for most of his early years. At 18, while studying mechanical engineering at City and Guild's Technical College, he returned back to his home country to help manage the family's lime-burning business.

He was the fourth son of His Royal Highness Krida Bhinihan, the Prince Naretraworit, grandson of King Mongkut, and nephew of King Chulalongkorn. Despite the royal blood, he developed a profound interest in agriculture. This interest aroused in him due to his wife's fragile health which necessitated the fresh air and open spaces of the countryside. Sithiporn was successful in propagating the Nicholson Yellow Dent variety of corn which he also encouraged other farmers to plant for animal feed. Starting 1950 corn was planted in place of rice as it was more favorable to land conditions. During 1980s, corn became one of Thailand's major exports. He played a major role in establishing an egg producers' association which made Thailand an exporter of eggs. The United Nations Food and Agriculture Organization (FAO) established the International Rice Commission in 1949, when Sithiporn was elected as chairman. He suggested for a research center for rice production during his meetings with the Rockefeller Foundation. As a result, the

International Rice Research Institute was establishment in Los Baños, Laguna in the Philippines.



Fig. 5 Phya Anuman Rajadhon [1888–1969]

One of modern Thailand's most remarkable scholars was Phya Anuman Rajadhon [6]. Besides being a self-trained linguist he was an anthropologist and ethnographer who became an authority on the culture of Thailand. His actual name was Yong Sathiankoset and Phraya Anuman Rajadhon was his noble title. He is well known by his family name, Sathiankoset, which is also his pen name. His prolific work as well as his interest in a multitude of culture-related fields, from folklore to sociology, set the foundations for an ever lasting cultural awareness among young Thai scholars. Inspired by nocturnal village spirits of Thai folklore, Phraya Anuman Rajadhon conducted a serious study of Thai folkloristics which were revealed in Thai films that have become classics.

At a time when much of the traditional culture was being overwhelmed by modernity, he observed Thai society with intrinsic details. He studied in depth the language, social norms, popular customs, oral tradition as well as the ethical system of the Thai people. He has worked at the Oriental Hotel in Bangkok during his early life. He has worked as a clerk at the Thai Customs Department where his friend Mr. Norman Mackay helped him to polish his broken English. He gathered knowledge for his research and compiled works on his own. Being interested in Thai popular culture, he recorded and described many of the ancient habits of Thais which would have been unnoticed had he not been put them down into his illustrative writings.

He wrote novels under the pen name Sethyankōsēt, better spelled as Sathirakoses. Phraya wrote works on important Thai cultural figures and penned the biography of Phra Saraprasoet (Trī Nākhapraphīp) (1889–1945), a notable author and commentator of Thai literature. He was acquainted with Phra Saraprasoet and both worked together as co-translators of many works. Among them notable was “The Pilgrim Kamanita”, a novel by Karl Adolph Gjellerup, a Danish Nobel laureate. It was about a young Indian merchant's seeking for truth and his encounter with Lord Buddha. The translation found its place in the textbooks

of the Thai secondary school curriculum and admired for its beautiful prose. He was recognized many years later when he received invitation to universities to give lectures. The Siam Society honoured him with the post of President. Social activist Sulak Sivaraksa, founder of the Sathirakoses-Nagapradeepa Foundation rightly described Phya Anuman Rajadhon as a National Hero, at the 100th year of his birth which was staged in 1988 by UNESCO.



Fig. 6 Sood Sangvichien [1907-1995]

Sood Sangvichien [7] was a Thai medical doctor and anatomist, who taught anatomy at the Siriraj Hospital Faculty of Medicine. He was a professor and served as head of the anatomy department and later dean of the faculty. He was particularly known for his pioneering works in archaeology and physical anthropology and made the first detailed studies of prehistoric skeletal remains in the 1960's.



Fig. 7 Rapee Sagarik [1922–2018]

Rapee Sagarik [8], better known as the “father of Thai orchidology”, was a Thai horticulturist, botanist and orchid expert. Rapee Sagarik was born on 4 December 1922 in Worachak Sub-district, Pom Prap Sattru Phai District, Bangkok. Rapee started primary education at Samsen Witthayakhan School and then in 1953, he moved to Satri Chulalak school until 1928. He studied at Saint Gabriel’s College and furthered his studies during 1931–1932 at the Yaowakumarn School under the Royal Patronage. During 1940–1985, he studied at the Kasetsart University Preparatory School (now Maejo University) at Maejo, Chiang Mai Province (which was established as a five-year bachelor’s degree program of Kasetsart University in 1943). In 1947, he graduated in pedology from the Faculty of Agriculture, Kasetsart University. He later received an honorary doctorate degree in Agricultural Innovation from Rangsit University on 23 February 2015.

Rapee became a full-time instructor of Kasetsart University, however, due to his passion for fieldwork, he chose to work at an agricultural experiment station in Mae Jo as a temporary employee. He conducted research on rice, vegetable and tobacco varieties. Meanwhile, he also conducted research on orchids using his own funds, an activity which would later become a fixture in his life. He was devoted to orchid research, and would become internationally recognized in the field of orchidology as one of its foremost experts. Having done research at the station for two years, he returned to government service as a full-time lecturer at Kasetsart University.

His work on research and promotion of orchids, as well as development as an export industry, made Thai orchids an important agricultural export product of Thailand. In recognition, Rapee received the Dushdi Mala Medal from King Bhumibol for agriculture work. He was named a professor in 1970. Rapee worked as the President of Kasetsart University, and as Deputy Minister of Agriculture and Cooperatives during tenure of Prime Minister Kriangsak Chamanan. He held many other positions, even after retiring. During the 2006 political crisis, he jointly signed a royal petition asking for the king’s intervention in naming a prime minister, and was a consultant to the People’s Alliance for Democracy. After 1990, he resigned from the various public and private positions he held, to turn to a peaceful and simple life, though he continued to accept invitations for lectures, especially in rural and youth development, focusing on morality and ethics.



Fig. 8 Rawi Bhavilai [1925–2017]

Rawi Bhavilai [9] was a Thai astronomer, writer and translator. Born in 1925, Professor Dr. Rawee Pawilai, at age 19, joined as faculty of Chulalongkorn University, Thailand, in the Astronomy Department and presided for 42 years. He served as a Professor at the Physics Department of the Faculty of Science, Chulalongkorn University, and was known for his writings on astronomy as well as philosophy and religion.

A member of Thailand's Royal Institute, Dr. Pawilai also served as President of the Thai Astronomical Society. Beyond his interest in studying the stars, Dr. Pawilai expanded into the literary world. He wrote as well as translated a wide range of books from science, astronomy, philosophy and children's literature. His translations included *The Prophet* by Kahlil Gibran as well as *Alice's Adventures in Wonderland* by Lewis Carroll. His efforts made it possible for many Thai readers to enjoy these classics for the first time. Pawilai has created a legacy in translating valuable literature for future generations (along with a nod to his love for the stars and space above).

He was a fellow of the Royal Society of Thailand. In 2007, Dr. Pawilai was honored with the title of National Artist of Thailand, for his written works. In 2018 he was honored with a Google Doodle. His research on solar radiation and the structure of the solar layer helped make him Thailand's most renowned astronomer. At the award ceremony at Chitlada Palace, he received a pin and commemorative plaque from HRH Princess Maha Chakri Sirindhorn. Expressing his gratitude at the honor, he revealed that his greatest satisfaction was in spreading knowledge through yet entertaining prose.



Fig. 9 Sippanondha Ketudat [1931–2006]

Sippanondha Ketudat [10] was a Thai nuclear physicist, educationist and technocrat. He served as a Professor at Chulalongkorn University and also as Secretary-General at Office of the National Education Commission, Minister of Industry and Minister of Education. He held seats on several university councils, including multiple chairmanships, and was an honorary fellow of the Royal Society of Thailand.

Smith Dharmasaroja [11] is a Thai government official. In 1998, while serving as a meteorologist, he predicted that an earthquake and tsunami "is going to occur for



Fig. 10 Smith Dharmasaroja [1937–Present]

sure”. He warned about tsunami but was not taken seriously. After the tsunami of December 2004, which killed over 200,000 people, he was recalled from retirement and handed over the charge of developing Thai and regional warning systems. While being chief of the National Disaster Warning Centre in Thailand, Dharmasaroja publicly announced that a solar eclipse could lead to natural disasters such as earthquakes and tsunamis in Thailand, depending on the time when the sun shall unleash its energy.

Shaiwatna Kupratakul [12] is a Thai theoretical physicist. Kupratakul received his early education in Nakhon Ratchasima. He attended Chulalongkorn University at the Faculty of Science for one-and-a-half years, from 1961–1962. In 1962, Kupratakul received a Columbo Plan scholarship, from the Australian Government to study physics in Australia. He graduated with a BSc (Honours) in Physics from Monash University in 1966, and a PhD (Physics), also from Monash University, in 1970. His major research interests included the energy band structures of noble metals, the pressure effects of noble metals on the energy of band structures, and solar energy.

Since returning to Thailand, Kupratakul has worked as a lecturer, university administrator, and educational development project committee member or leader. He has also written both non-fiction and fiction works with the view of educating people in the area of science. He met Isaac Asimov in New York in November 1977, and Arthur C. Clarke at Colombo, Sri Lanka, in February 1980. He was science inspired by the scientific writings of Isaac Asimov, Arthur C. Clarke, Jules Verne, H.C. Wells and Juntri Siriboonrod; the last of whom was proclaimed “Father of Thai Science Fiction”.

Kupratakul worked in the Physics Department, initially at Khon Kaen University from 1970–1982, and later at Srinakharinwirot University (Prasarnmit) from 1982–1999. He retired in 1999, but continues to give talks at universities, schools and for the public. He wrote science fiction (both short science stories and science novels), hosted radio and television programmes, and served as a committee member of several academic and national Councils. Kupratakul wrote and translated a variety of formats including articles, essays, short stories, novels and textbooks. These include both science and non-science subjects for audiences of all ages. More than 100 books, written or translated, have been published. Kupratakul assumed

the pen names of Shaikupt, Tachyon, Watanachai, and Sriwat and was nominated twice for the UNESCO Kalinga Prize in 1981 and 2004.



Fig. 11 Thida Thavornseth [1944–Present]

Thida Thavornseth (Thida Thawonset) [13] was a Thai Assistant Professor, microbiologist, pharmacist, and political activist. Thida was born in Surat Thani in Southern Thailand. She graduated from the Faculty of Pharmaceutical Sciences, Chulalongkorn University. She participated in the pro-democracy uprising of October 1973, that ended the military dictatorship. Thida is the chairperson of the United Front for Democracy Against Dictatorship (UDD), whose supporters are commonly known as the Red Shirts.



Fig. 12 Pichaet Wiriyachitra [1944–Present]

Pichaet Wiriyachitra [14] was a Professor of chemistry at Prince of Songkla University, who obtained his Ph.D, Organic Chemistry from the University of Tasmania. He followed this with a Post-doctoral Fellowships at the University of Connecticut and University of Pennsylvania. Pichaet also became the Vice President and Dean of Graduate School of Songkla University. He was a Guest

Scientist at the Japan Society for the Promotion of Science as well as the German Cancer Research Center.

He has specialized in the development of pharmaceuticals from natural products, particularly Xanthone from Mangosteen. Currently he is the Chairman and CEO of Asian Phytochemicals Public Co., Ltd., and also President of both the Asian Life Co. Ltd. and Green Gold Co., Ltd. He leads a scientific team at the Mangosteen Research and Development Center (Thailand) called Operation BIM. Their research has proven that the beneficial effects of the plant are due to the substance known as *Garcinia mangostana* (GM-1), the scientific name for mangosteen. The GM-1 molecule lowers the elevated level of interleukin 1 and significantly raises the amount of interleukin 2 cytokines. This condition balances the body immune system thereby making it stronger against pain, fever, inflammation, diarrhea, bacterial and viral infection, atherosclerosis, aging, arthritis, mouth ulcer, intestinal ulcer, stomach ulcer and cancer-as tested successfully in laboratory.

Combining the extracts of five Thai fruits and grains, a formula has been made that reduces the effects of the cytokine which is the main cause of death by respiratory viruses or airborne viruses. The researchers believe that this formula can help prevent the fatality from all types of respiratory viruses, like H1N1 and the possible mutated strains in the future.



Fig. 13 Yong Poovorawan [1950–Present]

Yong Poovorawan [15] was a medical professor in pediatric hepatology at the Faculty of Medicine of Chulalongkorn University in Bangkok, Thailand. He received his Doctor of Medicine in 1974 from Chulalongkorn University. Yong trained in pediatrics at the Chulalongkorn University Faculty of Medicine and completed board certification by the Medical Council of Thailand in 1978. He was subsequently accepted as a faculty member, and received a research fellowship grant at the hepatology department at King's College Hospital Medical School during 1983-84. He has since worked continuously at Chulalongkorn, mostly focusing on teaching and research, and obtained professorship in 1990. Yong has served as the head of the faculty's Viral Hepatitis Research Unit and Molecular Biology Research Unit since 1992 and 1996, respectively. Since his medical school, he has held a deep interest in research. He first published in national journals during his first year of residency, and began publishing internationally in 1989, with his work on hepatitis

B vaccination. He is author or co-author of over 400 publications in the fields of gastroenterology, hepatology, and virology indexed by the PubMed database, with over 17,000 citations and an h-index of 61 as calculated by Google Scholar.

His works originally has emphasis on the fields of pediatric hepatology and viral hepatitis, and applications to the Thai health-care system in particular. Later on he did research on virology studies. Yong is widely recognized for his work on genetic sequencing as well as detection of the H5N1 avian influenza virus in Thailand, which outbreak in the beginning of 2004. His works received outstanding research awards from the Thailand Research Fund in 2004 and the National Research Council in 2006. Yong served on the editorial board of the Journal of Pediatrics, in addition to other national publications.



Fig. 14 Kanchana Kanchanasut [1951–Present]

Kanchana Kanchanasut [16] is a Thai computer science Professor at the Asian Institute of Technology. Kanchanasut graduated with a Bachelor of Science in math and an additional diploma in computer science, from the University of Queensland in 1974. She complete her a Master of Science from University of Melbourne in 1979 and later returned to Melbourne where she received the Doctor of Philosophy in 1991. The first server in Thailand was hosted and connected to the Internet. Kanchanasut also registered Thailand's country code top-level *domain.th* in 1988. The first Thai person to use email was Kanchanasut. She was included into the Internet Hall of Fame in 2013 and rightly awarded the Jonathan B. Postel Service Award in 2016.

Banchob Sripa is a Thai scientist, Professor and Head of the Tropical Disease Research Laboratory (TDRL) at Khon Kaen University in Khon Kaen, Thailand. He is also the head of the World Health Organization Collaborating Centre for Research and Control of Opisthorchiasis. It is an infectious parasitic disease caused by the Southeast Asian liver fluke. The disease is endemic in northeastern Thailand and other portions of the Mekong River basin. He has worked for the Asian Neglected Tropical Disease Network as it's coordinator. He received a Doctorate in tropical health from the University of Queensland, Australia and in 2013 the Outstanding Scientist Award from the Foundation for the Promotion of Science and Technology. An opisthorchiasis control program [17] known as the "Lawa model"



Fig. 15 Banchob Sripa [1958–Present]

was initiated in 2007 by the Thailand Development Research Institute (TDRI) under Banchob. An EcoHealth approach was used in the program which has been more successful than earlier control programs. The program operates in 12 villages surrounding the Lawa Lake south of Khon Kaen. The liver fluke infection rate has declined to less than 10 percent from an average of 60 percent since the start of the program. Banchob has published more than 200 peer-reviewed scientific articles and eight book chapters in English.



Fig. 16 Chavalit Vidthayanon [1959–Present]

Chavalit Vidthayanon [18] is a Thai ichthyologist and senior researcher of biodiversity of WWF Thailand. He graduated from Bangkok Christian College and graduated in marine biology from Kasetsart University and Chulalongkorn University. Vidthayanon received a Ph.D. in fishery biology from the Tokyo Fisheries University (now's Tokyo University of Marine Science and Technology), Japan. He has been working on aquatic biodiversity studies in Southeast Asia since 1983. He has collaborated with leading ichthyologists both Thais as well as foreigners like Kittipong Jaruthanin, T.R. Roberts, H.H. Ng and Maurice Kottelat etc. He has studied taxonomy and many of the newly discovered freshwater species in the world (many were found in Mekong Basin). These included *Amblypharyngodon*

chulabhornae, *Himantura kittipongi*, *Pangasius conchophilus*, *P. myanmar*, *Pao palustris*, *Pseudeutropius indigens*, *Schistura pridii* etc. He has specialized in Thai freshwater catfishes. In addition, he is also an instructor on ichthyology and zoology at several educational institutions in Thailand such as Mahasarakham University, Chulalongkorn University, Kasetsart University etc.



Fig. 17 Anavaj Sakuntabhai [1962–Present]

Anavaj Sakuntabhai [19] is a researcher specializing in human genetics of infectious diseases, notably malaria and dengue. Anavaj Sakuntabhai graduated in 1987 as a medical doctor and obtained his PhD in human molecular genetics from the University of Oxford in 1999. During 2000 he worked in Institut Pasteur as a senior scientist and in 2007 became the head of the laboratory of Genetics of Human Response to Infections. In 2010 he also became the head of the Functional Genetics of Infectious Diseases Unit.

He worked as a principal investigator in one of the four consortial projects of the MalariaGEN consortium. It represented a global community of researchers working together to integrate epidemiology with genome science and financed by the Bill and Melinda Gates Foundation. He is a partner of a Wellcome Trust financed project on the human genome wide screening for dengue susceptible genes. He is a principal investigator of a French initiative to tackle the disease burden under ever changing environments. He is a coordinator of the European FP7 project on DENFREE (Dengue Framework for Resisting Epidemics in Europe). The project aims to find the causative agents for dengue transmission and dengue epidemics. It also estimates the risk of spreading DENV to uninfected areas, especially in Southern Europe where susceptible vectors exist.

In 1999, Sakuntabhai discovered a gene which was responsible for Darrier disease. In 2005 he found a variant on a promoter of DC-SIGN associated with gene expression and outcome of dengue infection. In 2009, he participated in the finding of positive selection of G6PD (glucose 6 phosphate dehydrogenase) and its effect on *Plasmodium vivax*. The work highlights the significant effect of *P. vivax* on human health, one hitherto neglected. His recent research has shown that both genet

gene and gene to environmental interactions play a vital role in susceptibility to malaria and dengue.



Fig. 18 Kesara Margrét Anamthawat-Jónsson [Unknown–Present]

Kesara Margrét Anamthawat-Jónsson [20] is professor of botany and plant genetics at the Faculty of Life and Environmental Sciences, School of Engineering and Natural Sciences, University of Iceland. Her career began in Iceland in January 1982, at the Agricultural Research Institute in Keldnaholt in Reykjavik (now part of the Agricultural University of Iceland). In 1988 when she went to UK for her PhD studies. She established chromosome techniques to study birch trees and various other Icelandic plant species. Kesara also received training abroad on plant chromosome preparation methods at the University of Helsinki and animal cytogenetics at the School of Veterinary Science, University of Guelph. After completing her PhD in UK, she came back to work as a research scientist at this institute (1992–1996) and focussed on the genetics of birch trees, while initiating her own study of lyme grass in Iceland. For barley, she used molecular cytogenetic techniques to map retro-elements on chromosomes. She has collaborated with and supervised a number of PhD students in the genomic identification of several perennial Triticeae species. Kesara has studied the molecular genetic diversity of Icelandic lyme grass (*Leymus arenarius*), traced the genomic origin and has identified the genome composition of this genus. Since 2014, she has served as president and chairman of the Nordic Microscopy Society (SCANDEM). With the help of her colleagues, she organized the annual SCANDEM conference at the University of Iceland twice, in 2009 and 2017. Kesara has also joined the UK's Royal Microscopical Society and served a 3-year term on the RMS Council. In January 2019, she was elected FRMS fellow of the society. In appreciation of her academic service to the country, she was bestowed with The Highest Order of the White Elephant, Companion.

Yupa Hanboonsong [21] is a Thai entomologist, specializing in entomophagy (the use of insects as food). Hanboonsong received her PhD from Lincoln University, New Zealand. She currently works as an Associate Professor in the entomology department at Khon Kaen University. The effects on Thailand of the 1997 Asian financial crisis moved Hanboonsong great for which she trained rice farmers in



Fig. 19 Yupa Hanboonsong [Unknown–Present]

remote areas of the country to farm crickets as a cheap and plentiful source of nutrition. She has co-authored several reports on insect farming for the United Nations Food and Agriculture Organization (FAO). In 2003, she did research on Edible insects in Lao PDR and worked on building the tradition to enhance food security”.

4 Modern Thai scientists

There are at least eight Thai Scientists who have made considerable impact with their research. Pimchai Chaiyen [22] has won the 2003 L’Oréal Thailand For Women in Science Award. In 2017 she received the L’Oréal Woman Scientist Crystal Award for her research into a cleaner way to produce chemicals. For her research on environmentally friendly nanocatalysts, Pussana Hirunsit has won the 2017 L’Oréal-UNESCO For Women in Science National Award. For her work on powder metallurgy, Anchalee Manonukul received the 2017 L’Oréal Woman Scientist Crystal Award. It is a special award that commemorates the 15th anniversary of the L’Oréal-UNESCO for Women in Science Awards in Thailand. The 2017 Young Scientist Award for the Foundation for the Promotion of Science and Technology under the Patronage of His Majesty the King, went to Varodom Charoensawan for his bioinformatics research. Marisa Ponpuak received the 2017 L’Oréal-UNESCO For Women in Science Fellowship for her research on autophagy. It was aimed at finding new drugs for malaria and tuberculosis. Napida Hinchiranan was awarded the 2017 L’Oréal-UNESCO For Women in Science Fellowship. Her studies on using natural rubber were useful to create value-added products. David Ruffolo received the 2017 Outstanding Scientist Award from the Foundation for the Promotion of Science and Technology under Royal Patronage for his research on global radiation and cosmic rays and prediction of the effects of solar storms on Earth.

We should also make special reference of Ngamta “Natalie” Thamwattana who is a Thai mathematician and works in Australia as a Professor of Applied Mathematics at the University of Newcastle (Australia). In 2014 she won the J. H. Michell Medal of ANZIAM for her “pioneering contributions in the areas of granular materials and nanotechnology”. In her early career due to high test scores in science and mathematics, she earned a government scholarship with full tuition and, later,

support for doctoral studies abroad. She received her Ph.D. at Wollongong in 2004 under the guidance of James Murray Hill. After completing her studies, she returned the money received from her Thai scholarship. She went to Australia to join as a Wollongong faculty and founded the Nanomechanics Group there. In 2018 she moved to University of Newcastle (Australia) to take up a position as Professor of Applied Mathematics.

5 Thai scientists begin COVID-19 vaccine trials on monkeys

Thai scientists [23] have begun testing a vaccine against the corona virus on monkeys after positive trials in mice. Researchers have moved testing of the vaccine to monkeys and hoped to have a “clearer outcome” of its effectiveness by September’2020. COVID-19 vaccine testing is being done at Chula Vaccine Research Center. Thailand wants to be one of the countries to have a vaccine ready for use by the human race. COVID-19 is the disease caused by the novel corona virus and more than 100 potential vaccines are being developed, but vaccine would take at least 12 months to effect. The Thai vaccine is being developed by the National Vaccine Institute. The Department of Medical Science and Chulalongkorn University’s vaccine research centre is working towards it’s success.



Fig. 20 The Thai vaccine using M-RNA, prompting body cells to produce antigens. Molecules on the surface of viruses bring the immune system into action. A laboratory baby monkey being examined by employees at the National Primate Research Center of Thailand at Chulalongkorn University in Saraburi.

6 Final Remarks

Known for its resorts and Buddhist temples, Thailand is also a regional centre of research and development and high-tech manufacturing [24]. It’s the world’s second-largest exporter of hard disk drives and a major centre for car production.

Thailand has contributed to basic science which has grown in recent years, with its researchers doubling their output in physical sciences journals within the index between 2012 and 2015. A major player is that the state-backed National Science

and Technology Development Agency (NSTDA). Established in 1991, it supports centres of excellence in gene-splicing, biotechnology, electronics and nanotechnology.

Thai scientists like a chemist at Chulalongkorn University, Patchanita Thamyongkit, have been raising the profile of home-grown research. Her work on the chemistry behind solar cells use organic compounds, referred to as porphyrins, for which she received the Theoretical Physics prize in 2013 from Abdus Salam International Centre. She also received the LOreal-UNESCO accolade in 2014 for ladies in science. However, the country suffers from a paucity of researchers and funding. “Thailand is focused on cultivating a new generation of young scientists by promoting a number of fields which include biotechnology, biomedical devices, robotics and the Internet of Things”.

The Thai Academy of Science and Technology (TAST) was established in 1997 [25]. It was organized by a group of scientists and technologists whose works have been continuously recognized and whose experiences and interests are vital to the development of the nation as a whole. TAST is a “non-governmental agency”. This is to ensure that there is no bias in giving recommendations to national organizations, government and the public as a whole. TAST realizes that matters concerning science and technology have a profound impact on the nation. Therefore, it has made this its duty and priority to select issues or matters that are currently within the eyes of the general public, and perform careful analyses, doing research, and formalize plans for the longer term development of the nation. The academy was established and registered with the Bangkok registrar office and was endorsed by the Permanent Secretary, Ministry of Interior on November 5, 1997.

Undoubtedly the cases discussed above concern Thai scientists who carried out outstanding work deserving Nobel Prize. One may suspect that Nobel prizes which epitomize the achievement of excellence as per the vision and norms of western civilization are hard to win by scientists from other nations, particularly from third world countries, in spite of the fact according to Nobel’s will in awarding the prizes no consideration be given to the nationality of the candidate. There would have been numerous deserving Nobel Laureates if the entire history of Thailand is taken into consideration. It is generally believed that to be worthy of the prize scientists from Thailand have to stand out distinctly much above his western counterpart. But such a view is perhaps too simplistic. Even in the western world there have been a number of cases where Nobel prizes were not awarded to very deserving cases. Confining only to physics, some of the glaring omissions (not in any particular order) are: Thomas Alva Edison (Inventor of many gadgets including telegraph, movies, electric bulb etc), Thomas Tesla (Electromagnetism), Lise Meitner (nuclear fission), Chien-Shiung Wu (Parity non-conservation), Yuval Neeman (Particle physics), George Zweig (quark composition of particles), Fred Hoyle (Astrophysics), Jocelyn Bell Burnell (Radio pulsars), George Gamow (Theory of Cosmic Microwave Background radiation), Freeman Dyson (quantum field theory), Robert Oppenheimer (Theoretical physics), Sidney R. Coleman (Particle physics).

The debate as to why most Thai citizens as well as Scientists missed the Nobel is left open to all audiences and Thais at large. Let’s hope for a better world where scientist’s shall be properly judged as they spent most of their times for the welfare of people and always try for a better improvement and quality of life.

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References

1. Google and Science Magazines.
2. https://en.wikipedia.org/wiki/Alfred_Nobel.
3. T. Frängsmyr, *The Royal Swedish Academy of Sciences, Alfred Nobel-Life and Philosophy* (1996). [http://www.nobelprize.org/alfred_nobel/biographical/articles/frangsmysr/].
4. <http://203.131.219.167/km2559/2017/10/29/thailand-and-the-nobel-prize/> Thailand and the Nobel Prize.
5. C.C.A. Balgos, "Nilawan Pintong", *Great Men and Women of Asia: Ramon Magsaysay Awardees from Southeast Asia 1958-1973* (2007).
6. F.K. Charles, K. William and S. Sulak, *Phya Anuman Rajadhon: A Reminiscence, Sathiankoset-Nakhapraphip Foundation* (1973).
7. V. Subhava, S. Pramankij and W.G. Solheim, "SOOD SANGVICHIE, 1907-1995". *Asian Perspectives*, **36** (2), 260-264 (1997).
8. https://en.wikipedia.org/wiki/Rapee_Sagarik
9. https://en.wikipedia.org/wiki/Rawi_Bhavilai
10. Fry G. W., Nieminen G. S. and Smith H. E., *Historical Dictionary of Thailand* (3, revised ed.). Scarecrow Press p. 281 (2013).
11. https://en.wikipedia.org/wiki/Smith_Dharmasaroja
12. https://en.wikipedia.org/wiki/Shaiwatna_Kupratakul#cite_note-1
13. https://en.wikipedia.org/wiki/Thida_Thavornseth
14. https://en.wikipedia.org/wiki/Pichaet_Wiriyachitra
15. https://en.wikipedia.org/wiki/Yong_Poovorawan
16. https://en.wikipedia.org/wiki/Kanchana_Kanchanasut
17. B. Sripa, S. Tangkawattana and T. Sangnikul, "The Lawa model: A sustainable, integrated opisthorchiasis control program using the EcoHealth approach in the Lawa Lake region of Thailand". *Parasitology international*, **66** (4): 346-354 (2017).
18. https://en.wikipedia.org/wiki/Chavalit_Vidthayanon#cite_ref-1
19. https://en.wikipedia.org/wiki/Anavaj_Sakuntabhai
20. https://en.wikipedia.org/wiki/Kesara_Margrét_Anamthawat-Jónsson
21. https://en.wikipedia.org/wiki/Yupa_Hanboonsong
22. <https://www.asianscientist.com/2018/12/features/as-100-thailand-science-technology-researchers/>
23. <https://www.ndtv.com/world-news/covid-19-thailand-begins-coronavirus-vaccine-trials-on-monkeys-2234135>
24. T. Hornyak, *Thailand's basic science grows despite limited resources*, nature index, 24 Jan (2017).
25. <https://www.interacademies.org/13602/Thai-Academy-of-Science-and-Technology-TAST>.