THE PAST AND PRESENT STATE OF ASTRONOMY EDUCATION IN THAILAND

Yupa Vanichai
Srinakharinwirot University, Bangsaen, Thailand

1. Ancient Thai Astronomy

About 300 years ago in Lopburi and Ayudhaya, many astronomical observatories were designed, constructed, and supported by the Roman Catholic missionaries from Europe and by King Narai the Great of Siam (Thailand). The interesting recorded history of Thai astronomy was found in the national museum of France a few years ago. Afterwards, the ruined observatories were searched for and found. A tercentennial commemorative ceremony of Thai astronomy was held on April 30, 1988.

The French emissary and the Roman Catholic missionaries in the reign of King Louis XIV first visited Thailand in 1685. Besides intending to spread the Catholic religion, they carried out research on surveying local and celestial positions. A Thai royal astrologer calculated and predicted a total lunar eclipse on December 11, 1685. King Narai, together with the missionaries, observed the eclipse at Lopburi through a telescope having magnification of 30 to 72. A partial solar eclipse was also observed near the same place on April 30, 1688. Sanpaolo, a Catholic church on the outskirts of Lopburi, was the site of the first astronomical observatory in Thailand, built in 1685. Another observatory in Lopburi, built in the house of a Persian emissary, later became a Thai temple. Other astronomical observatories were supposedly built in Ayudhaya, the capital of Thailand in King Narai's period, and should be worthy of search and restoration. However, the historical events on record have not yet been clearly found out.

About 120 years ago, King Rama IV in the Charkri dynasty, greatly interested in astronomy, precisely calculated and predicted a total solar eclipse on August 18, 1864. The king, together with Thai, French, and English people, were eyewitnesses to the eclipse at Wakor in Prachuabkhirikhan. Until now, no one clearly understands what method he successfully used for this masterpiece. An astronomical observatory was built at Khaowang in Petchaburi in 1860. The king measured the height of the sun and pursued his calculation in astronomy. He set 100° East as the Thai Prime Longitude. A clock tower built at this longitude started Bangkok Mean Time, earlier than Greenwich Mean Time. His palace was furnished with telescopes, microscopes, barometers, and other scientific instruments. He was declared "The Father of Thai Science" not long ago. August 18, the date of his predicted eclipse, was selected to be "the Thai Science Day," in which scientific exhibitions, demonstrations and/or other activities yearly take place in schools and universities throughout the country.

2. Planetarium and Popularization

The Bangkok Planetarium, situated beside the national science museum, was established in 1964. The planetarium, with a dome 20 meters in diameter, has a seating capacity of 500. Within the planetarium precincts, an astronomy exhibition is well planned. It contains various photos, posters, and models, but lacks computers.

The Thai Astronomical Society was formed in 1980, the year in which the Astronomical Amateur Society closed. The society office shares the rooms in the planetarium building. This society has about 1,000 members, mostly amateur astronomers. Their activities are various. Astronomical training, seminars, and colloquia are occasionally held with astronomy lecturers. Competitions in astronomy tests, photos, and drawing pictures are periodically held and/or alternatively held on special occasions such as the Thai Science Day. The society issues books, slides, pictures, constellation maps, and a quarterly journal in astronomy. New aims are to possess bigger telescopes and to restore the ancient observatories in Lopburi and Ayudhaya.

3. Publications

Television, newspapers, and popular journals are rarely helpful in regularly distributing articles on astronomy except for news about launching of spacecraft and well-known celestial objects such as Halley's Comet and Supernova 1987A. At present, there are two important monthly scientific journals, which are great favorites among students. The journals regularly publish articles on astronomy. Popular pocket books on astronomy are usually not beyond amateur comprehension. Textbooks written by university lecturers are published merely to benefit their teaching, and are seldom sold in bookstores. Advanced textbooks from abroad are insufficient.

4. Primary and Secondary Schools

At the primary-school level of education, there are many self-taught books to practice reading and comprehension of the physical environment. Five of these books are on elements of astronomy: the sun, the moon, stars, rockets, and a journey to the moon. At the secondary-school level (grades 7 to 9), no astronomy book is available. Lessons concerning astronomy appear in a few chapters of science textbooks. Only liberal arts students, not science students, in all high schools (grades 10 to 12 can take optional subjects in physical science. One of the books, entitled "The Earth and Stars," largely contains concepts about motion of the Earth, the moon, and planets. However, it is widely said that this book hardly arouses students' interest in astronomy and should be improved. The fault likely lies in the fact that the editor is not an astronomy teacher.

5. University Level

In each education college, students majoring in general science are required to take an astronomy course. For example, the course in astronomy and space is compulsory in Surin Education College. The contents of this course are mainly electromagnetic waves, astronomical instruments, celestial objects, and space exploration. This course in general astronomy is neither profound nor complex; it is appropriate for students who are going to be teachers in secondary schools.

In some universities, an elementary course on astronomy or partially on astronomy is open to most undergraduates. The contents of the *Earth and Space Science* course in Srinakarinwirot University mainly includes elementary climatology, geology, and astronomy.

An Introduction to Astronomy is a compulsory course for general science students in Srinakharinwirot University. This follows a textbook written by Baker, *Astronomy.* A similar course is elective for all science students in Khonkaen University but elective for physics students in Chiangmai University. The other elective course for physics students in Chiangmai University is *Astrophysics*, largely concerning the foundation of astrodynamics. Physics students in Chulalongkorn and Khonkaen Universities are offered *Astrophysics* and *Spherical Astronomy* as elective courses. If the astronomy section of the physics department has only one astronomer, only one astronomy course can be offered[1]. A seminar and/or a project in astronomy can also be supplementally selected by physics students. A few laboratory exercises in astronomy are usually included in physics laboratories for physics students.

6. Research Programs and M.Sc. Level

Only Chulalongkorn and Chiangmai Universities offer the M.Sc. in astrophysics. Astrophysics students mostly take the same compulsory physics courses as other physics students; they also take 3 to 4 selective astrophysics courses, seminars, and a thesis on astrophysical research. In Chulalongkorn University, theoretical stellar research, or observational solar or comet research can be chosen as a thesis topic for a master's degree in science. Variable and binary stars can be selected as a research project in Chiangmai University, which has equipment for photoelectric photometry and a 40-cm (16-inch) telescope. An analysis of eclipses is carried out by an astronomer in Khonkaen University. Silpakorn University is likely to begin solar observation with a filter passing the K-line of ionized calcium. Without technicians or advanced technology, some of these research projects are managed successfully but with difficulties; sometimes they are not much too different from work in laboratories or by amateurs.

7. Problems and How to Solve Them

Astronomy in Thailand is improving at a slow pace, and sometimes, oscillates

[1]In some universities, astronomy is taught by a physicist with no training in astronomy, so only a basic astronomy course can be taught.

https://doi.org/10.1017/S0252921100087388 Published online by Cambridge University Press

up and down. Difficult conditions exist more in advanced levels than in primary and secondary-school levels. For example, the best observatory admits the public but hardly allows cooperation in research with other universities. The government ordinarily pays little attention to astronomical support since such support is not in the country's development plans. Many astronomers, lacking sufficient equipment and encouragement, often find it so difficult to carry out their research that they turn their attention to other fields. Moreover, advanced journals and textbooks are insufficient. All these cause gaps in astronomy education.

These problems may be eradicated by cooperation with astronomers from well-developed countries in astronomy. It would be good to establish well-planned observatories in Thailand, managed by an efficient staff of foreign astronomers who could make justified allowances to enable enthusiastic Thai astronomers to participate in research. Starting from such a step, Thai astronomy would be likely to be on the threshold of prosperity.

THE TEACHING OF ASTRONOMY AND SOCIAL AND ECONOMIC DEVELOPMENT

Gonzalo Vicino
A.N.E.P., Consejo de Educación Secundaria, Uruguay

Sometimes we may ask ourselves how can astronomy, a science with apparently few points of contact with technology or industrial production, help the economic development of people?

My paper is an account of an experiment undertaken in Uruguay on the teaching of astronomy in secondary schools. We seek to show how astronomy may contribute to the development of nations that, like Uruguay, need to create their own technologies to overcome their economic backwardness.

Though the introduction of astronomy in the secondary education curriculum in Uruguay dates back to 1889, in 1986 the Educational Supervisory Office made a radically different proposal for the methodological and programmatic orientation of astronomy teaching. The proposed goal is clear: the teaching of astronomy in secondary education should be geared not to train technicians but to create a scientific-minded youth. It is not important if later, in their university studies, these young people go into medicine, engineering, or economics; the important thing is a reevaluation of sciences in the eyes of adolescents, who often slide along the comfortable slope of certain humanistic areas, in which they wind up by the process of elimination. (One often hears the argument, "I'm studying law because it doesn't have mathematics.") Further, above all those considerations, the most important thing is to create thinking minds, the minds of free people.