Merit Students Encyclopedia

18

# MERIT STUDENTS ENCYCLOPEDIA

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MACMILLAN EDUCATIONAL CORPORATION NEW YORK

P. F. COLLIER, Inc. LONDON and NEW YORK

Library of Congress catalog number 78-56516

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### ALPHABETICAL ARRANGEMENT OF ENTRIES

The entries in the *Merit Students Encyclopedia* are arranged in a simple alphabetical order. The method of arrangement combines elements of the system used in most dictionaries with that used in telephone directories. Each entry begins with a heading in dark type. Some of these headings contain a comma; others do not. The basic principles of arrangement are listed below, including rules for placement of identical headings.

The alphabetical sequence is letter by letter.

air
air conditioning
aircraft
aircraft carrier
aircraft landing system
airedale terrier
airfoil

When headings contain words out of their usual order, a comma is used to indicate the change of order, as in

> Alaska, University of Alba, Duke of Alger, Horatio

Such entry headings are arranged in alphabetical sequence only up to the comma.

Bryansk Bryant, William Cullen Bryant College

When words preceding a comma are the same in two or more consecutive entries, the order is determined by the arrangement of the letters following the comma.

> Brooks, Phillips Brooks, Van Wyck

When two or more entries have the same heading, the entries are placed in the following order: persons, places, things.

Hannibal	Hercules	Phoenix
(person)	(person)	(place)
Hannibal	Hannibal Hercules	
(place)	(constellation)	(bird)

Rulers with identical names are listed alphabetically by the name of the territory ruled. Rulers with the same name and same realm are listed according to dates of reign.

Frederick IX (of Denmark)
Frederick I (of Holy Roman Empire)
Frederick II (of Holy Roman Empire)
Frederick II (of Prussia)

Popes are listed by dates of reign, and they precede rulers of the same name.

Paul VI (Pope)
Paul I (Emperor of Russia)

Other persons with identical names are listed according to date of birth.

Butler, Samuel (born 1612) Butler, Samuel (born 1835)

Places with identical names are listed according to the importance of the political unit, in descending order.

> New Brunswick (Canadian province) New Brunswick (U.S. city)

When places of the same political unit have identical names, they are arranged alphabetically by location. Cities in the United States and Canada are always located in reference to states or provinces. Cities elsewhere are usually located in reference to countries.

Abilene (Kansas) Abydos (Egypt)
Abilene (Texas) Abydos (Turkey)

Things with identical names are arranged alphabetically according to the subject in which they are classified.

aberration, in astronomy aberration, in optics

## GUIDE TO PRONUNCIATION

Pronunciations in *Merit Students Encyclopedia* appear in parentheses following entry headings. Heavy and light stress marks are used after syllables to indicate primary and secondary accents. A heavy stress mark is used in words that contain one primary accent, such as **comet** (kom'it). Both heavy and light stress marks are used in words that have secondary as well as primary accents, as in **communication** (kə mū' nə ka'shən). When two or more entries have exactly the same pronunciation, as with Paris the mythological hero and Paris the French city, the pronunciation is given only with the entry that appears first. Where possible, letters of the standard alphabet are used as symbols in the pronunciation system in preference to less familiar symbols. The symbols used are shown below with some words in which their sounds appear.

a ā ã a	hat, cap age, face care, air father, far	j k 1 m n	jam, enjoy kind, seek land, coal me, am no, in long, bring	u ü ü	cup, butter full, put rule, move use, music
b ch d e ē ėr	bad, rob child, much did, red let, best equal, see term, learn	o ō ô oi ou	hot, rock open, go order, all oil, voice house, out	w y z zh	very, save will, woman young, yet zero, breeze measure, seizure
f goh	fat, if go, bag he, how it, pin ice, five	prsh	paper, cup run, try say, yes she, rush tell, it thin, both then, smooth	a e i o u	represents: in about in taken in April in lemon in circus

In pronunciations for entries describing foreign persons and places it is sometimes necessary to represent sounds that are not used in English. Such foreign sounds are represented by four special symbols, which are listed below. Each symbol is accompanied by a brief indication of how the sound it represents is produced.

- Y as in French du. Pronounce  $\overline{\mathbf{e}}$  with the lips rounded as for English  $\ddot{\mathbf{u}}$  in rule.
- œ as in French peu. Pronounce ā with the lips rounded as for ō.
- N as in French bon. The N is not pronounced but shows that the vowel before it is nasal.
- H as in German ach. Pronounce k without closing the breath passage.

# TANGIER to UPANISHADS

Tangier (tan jēr'), a city in Morocco; facing Europe across the Strait of Gibraltar. Pop. (1970 est.) 170,000.

Tangier, only 38 miles (61 km) by sea from Europe, is one of the leading tourist centers in northern Africa. A major attraction is the city's Casbah, an ancient walled area built on the side of a hill. The Casbah has many winding, dead-end streets, small cluttered shops, and large open markets. Among the items for sale are handmade rugs, leather hassocks, and pottery. A European-style residential area adjoins the Casbah. Cork, vegetable fiber, and hides and skins are exported. The city's industries manufacture cement, textiles, and clothing. Fishing is carried on in the coastal waters.

History. During its more than 3,000-year history, Tangier has been conquered by the Carthaginians, Romans, Vandals, Byzantines, Arabs, and Portuguese. The city passed to the English in 1662, when Catherine of Braganza, a Portuguese princess, brought it to Charles II upon their marriage. The English abandoned it to its Berber-Arab population, known as Moors, in 1684.

In 1923 the International Zone of Tangier, a 147-square-mile (381-sq-km) area that included the port city, was established by Great Britain, France, and Spain. Under European administration there were no trade or currency restrictions and business flourished. When Morocco achieved independence in 1956, the International Zone became the Tangier province of Morocco. Many of the privileges of Tangier were subsequently withdrawn.

\*George H. T. Kimble

tango (tang'gō), a ballroom dance. It is danced by couples, both partners facing in the same direction and taking long gliding steps in a slow slow quick quick rhythm. The music of the tango is sensuous and melancholy. The tango probably developed from the habanera and other dances of Negroes living in Latin America. It first appeared in the outlying sections and working districts of Buenos Aires, Argentina, late in the 19th century, and it soon became a favorite dance in ballrooms there. The tango became a popular dance in the United States and in Europe after 1915.

\*Genevive M. Oswald

Tanguy, Yves (tän gē, ēv), French-American painter. Born Paris, France, Jan. 5, 1900. Died Woodbury, Conn. Jan. 15, 1955.

A Surrealist, Tanguy depicted sharply detailed but entirely imaginary landscapes. Although precisely defined, his figures only vaguely resemble human forms. Examples of his style include Mama, Papa Is Wounded! and Slowly Toward the North (both in Museum of Modern Art, New York City). Tanguy moved to the United States in 1939 and became an American citizen in 1948.

\*Edward Bryant

tank (tangk), an armored combat vehicle with a selfpropelled chassis on caterpillar tracks. The armament of the typical modern tank consists of one heavy gun, with a caliber of from 75 millimeters to 120 millimeters, and two machine guns for close-in and antiaircraft defense. The gun is mounted in an armored

An M-48 medium tank runs through target practice using a flame thrower instead of the standard 90-mm. gun.



turret that can be rotated in a complete circle. Tanks are usually classified as light, medium, and heavy. U.S. tanks weigh 25.9 tons, 52.5 tons, or 62.5 tons.

Each tank design incorporates a compromise of military advantages. The most important characteristics are firepower, which includes the size and weight of the gun, its fire-control system, and the amount of ammunition that can be carried; mobility, which includes engine power, speed, and the weight of the fuel supply; and protection, which includes the weight, the resistance quality, and the arrangement of the armor and the overall design of the tank itself.

An effective tank must be capable of operating crosscountry as well as on roads and trails. It must also be able to surmount ordinary obstacles. The U.S. Army's standard medium tank, the M-60A1, can move on secondary roads at speeds in excess of 30 miles per hour, climb and descend a 60° slope, cross a 105-inch trench, climb a 36-inch vertical wall, and, with its deep-water fording kit, cross a stream 13 feet deep. Its operating range is more than 300 miles without refueling.

The upper limit on the weight of a tank is fixed by the capacity of the average bridge in the area where it is likely to be used. If a tank is to be used overseas, its weight must be limited to the capacity of the equipment that loads and discharges it from ships. Weight reductions are obtained by using special metals, such as aluminum and titanium, in suitable areas of the tank.

Tanks were first used in World War I, when the stalemate of trench warfare on the Western front demanded a new means of mobility. The first tanks to go into action were British. They were used on Sept 15, 1916, during the Battle of the Somme. However, full and effective use of the new weapon was made only in 1918, the last year of the war. At the beginning of World War II, tanks of greatly improved design were available to all armies. However, Germany had an initial advantage over its opponents because of its development of blitzkrieg tactics, which involved the use of tanks in combination with aircraft.

Tanks are still weapons of mobile land warfare. A new branch of the service, called armor, has replaced the cavalry as the third branch of a modern army.

George Fielding Eliot

tanker. See under SHIP.

Tannhäuser (tän'hoi zər), an opera in three acts with music and text by the German composer Richard Wagner. It was first performed on Oct. 19, 1845, in Dresden, Germany. Its American premiere took place on Apr. 4, 1859, in New York City.

The story is based on a medieval German legend. The knight Tannhäuser has left the earth to live with Venus, the goddess of love, in her home, the Venusberg. Eventually he becomes bored with his life of continual pleasure and leaves the goddess. He goes to the Wartburg in Thuringia, where his former love Elisabeth lives with her uncle, the ruler of the territory. During a singing contest there, Tannhäuser, who is also a troubadour, shocks the court by singing the praises of Venus. The nobles try to kill him, but he is saved by Elisabeth. Deeply repentant, he makes a pilgrimage to Rome. There the Pope tells Tannhäuser that it is as unlikely that Heaven will forgive him as it is that the Pontiff's own staff will bear leaves. Tannhäuser returns to Germany and discovers that Elisabeth has died. Overcome with despair, he dies as a

group of pilgrims enter carrying the papal staff, which has sprouted leaves. One of the most famous passages is the *The Pilgrims' Chorus*. \*Sigmund Spaeth

tannic acid (tan'ik as'id), or tannin, a mixture of complex chemical compounds found in the bark and wood of many trees. It is a yellowish-to-brown amorphous solid and is generally obtained from nutgalls, which are growths on trees caused by parasites.

Tannic acid is widely used in the tanning of leather and as a mordant in dyeing. It is also used in the manufacture of inks, rubber, plastics, and chemicals and as a clarifying agent in the manufacture of wine and beer. It is used medicinally as an astringent and a styptic.

\*Alfred B. Garrett

tanning. See under LEATHER.

tansy (tan'zi), any of a group of strong-smelling plants that bear small flat flower heads. Tansies grow throughout the Northern Hemisphere. Most are considered weeds, but one species, the common tansy (Tanacetum vulgare), is sometimes cultivated as a garden flower. The common tansy ranges from 2 to 3 feet in height. It has yellow flower heads, which are about half an inch in diameter, and feathery leaves, which are sometimes dried and used as a flavoring in cooking. At one time the leaves were used in medicine as a mild stimulant. They were also used to expel worms or other intestinal parasites.

Tansies are classified as the genus *Tanacetum* of the family Compositae (composite). Annual and perennial.

\*Reed C. Rollins

tantalum (tan'ta lam), a chemical element. Symbol Ta. First isolated in 1903 by Wernher von Bolton (German). Melting point 2996° C. (5424° F.). Boiling point 5425° C. (9797° F.). Oxidation numbers +2?, +3, +4?, and +5. Atomic weight 180.948. Atomic number 73.

Tantalum is a very hard metal that is similar in appearance to steel. It is more than twice as heavy as iron, its density being 16.6 grams per cubic centimeter gm/cc.) at 20° C. Tantalum can also exist as a black powder, in which form its density is 14.491 gm/cc. at 20° C. Chemically, tantalum is very inert at normal temperatures and is attacked by a few substances other than sulfur trioxide and hydrofluoric acid. One of the most important uses of tantalum is the production of alloys having high melting points and great strength. Such alloys are particularly important in the construction of certain missile and aircraft parts. Tantalum and tantalum alloys are also used in the manufacture of surgical instruments, electrical and electronic devices, and chemical apparatus. Tantalum oxide is used in optical glass. \*Alfred B. Garrett

Tantalus (tan'tə ləs), in Greek mythology, a son of Zeus and the father of Niobe and Pelops. After being entertained by the gods on Mount Olympus, Tantalus stole their special life-giving foods, ambrosia and nectar. When Tantalus, in turn, invited the gods to a banquet, he served them his own son, Pelops. Outraged, Zeus exiled him to the Underworld to endure eternal thirst and hunger. There, Tantalus stood chin-deep in water that receded when he bent down to drink. Above him were fruits that eluded his grasp whenever he reached for them.

\*Pearl Cleveland Wilson

#### TANZANIA



CAPITAL. Dar es Salaam and Dodoma
AREA. 364,900 square miles
(945,100 sq km)
POPULATION. (1978 est.)
16,950,000; (1983 projected)
19,800,000
PRINCIPAL LANGUAGES. Swahili, other Bantu languages, English
NATIONAL HOLIDAY. Union Day,
April 26

CURRENCY. Shilling

Tanzania (tan'zə nē'ə), an independent republic in east Africa, on the mainland and some nearby islands. The mainland was formerly a separate nation called Tanganyika. The islands of Zanzibar and Pemba, with nearby islets, made up the nation of Zanzibar. On Apr. 26, 1964, Tanganyika and Zanzibar united; the name Tanzania was adopted in October 1964.

Mainland Tanzania, bounded on the east by the Indian Ocean, lies just south of the equator. The island of Zanzibar is 20 miles (32 km) off the coast. Pemba is 25 miles (40 km) northeast of Zanzibar.

#### Physical Geography

Surface Features. Most of mainland Tanzania consists of the central plateau, which has an average elevation of 4,000 feet (1,200 meters). The Great Rift Valley, a trough that extends from southwest Asia into central Africa, is a dominant feature of the mainland. North of Lake Nyasa, which forms Tanzania's boundary with Malawi, the Great Rift Valley splits into two branches. The eastern branch cuts through the plateau. Lake Tanganyika lies in the western branch along the border with Zaire.

Mountains rise above the plateau in the east and west. Mount Kilimanjaro, Africa's highest point, is located in the northeast, near the border with Kenya. This snow-capped mountain reaches an elevation of 19,340 feet (5,895 meters). The Serengeti Plain, a large level area in the north, is a game reserve. Along the coast is a lowland strip that varies 10 to 40 miles (16–64 km) in width. Zanzibar and Pemba islands are flat or gently sloping and are low-lying.

Lake Victoria, part of which lies in northern Tanzania, is the largest lake in Africa and the second largest fresh-water lake in the world. Tanzania's main rivers are the Pangani, Rufiji, and Ruvuma.

Climate. Tanzania has a rainy-and-dry tropical climate. Most of the rain falls from December through May. Rainfall varies greatly from year to year. Most of the central plateau receives 25 to 35 inches (635–890 mm) of rain annually. Rainfall is somewhat greater in the southern highlands and along the coast. It averages more than 50 inches (1,270 mm) near Lake Nyasa, west of Lake Victoria, and on Mount Kilimanjaro. Zanzibar and Pemba receive 60 to 70 inches (1,520–1,780 mm) of rain yearly.

Vegetation. On the mainland plateau the light vegetation varies from grass and thorny shrubs to open woodland. There are evergreen forests in some mountain areas and rain forests near Lake Victoria. Mangrove forests line the coastal river mouths. The offshore islands are characterized by brush and savanna, with rain forests in the most humid areas.

Animal Life. Tanzania has an abundant and diversified wildlife except on the central plateau, which is infested with the tsetse fly. The tsetse fly carries parasites that cause sleeping sickness in humans and a fatal disease called nagana in animals. Common animals in Tanzania include lions, leopards, deer, elephants, hippopotamuses, monkeys, crocodiles, and tropical birds. The Serengeti Plain is especially rich in wildlife. Small animals, like monkeys and wild pigs, inhabit Zanzibar and Pemba islands.

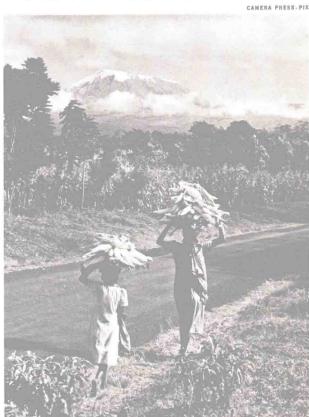
#### **Economic Activities**

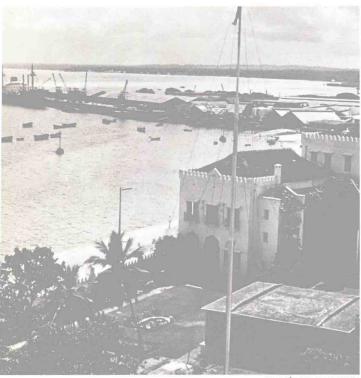
Production and Trade. Farming is Tanzania's major economic activity, even though agriculture is hindered on much of the mainland by low and unreliable rainfall and poor soils. The principal food crops are cassava, millet, corn (maize), sweet potatoes, rice, wheat, and bananas. The main industrial crops are sisal, which is a fiber, and cotton. Wherever the plateau is free from the tsetse fly, herdsmen graze cattle, goats, and sheep. The animals' meat is eaten and the hides are processed.

Most of Tanzania's industry involves the processing of agricultural products like sisal, cotton, coconuts, and wheat. Soap, cigarettes, furniture, and textiles are also manufactured. Valuable diamond deposits are located at Mwadui, which is south of Lake Victoria. Gold, tin, mica, and salt are also mined.

Tanzania's income from exports is usually enough to pay for its imports. The most important mainland crops that are exported are sisal, cotton, and coffee. Zanzibar and Pemba produce most of the world's

Women carrying corn to market in northern Tanzania. Visible in the distance is Kilimanjaro, the highest mountain in Africa.





MILLAR/RAPHO GUILLUMETTE

The harbor of the city of Zanzibar, Tanzania. The building in the foreground was once the palace of the Sultan of Zanzibar.

cloves. The most important imports are manufactured goods like textiles and machinery.

Transportation. Mainland Tanzania's transportation system, following an east-west pattern, links inland population and agricultural centers with the coastal ports. The vast central plateau has only a thin network of all-weather roads and railroads.

The main railroad runs from Dar es Salaam on the coast to Kigoma on Lake Tanganyika. A second railroad runs from Dar es Salaam to Zambia. Tanzania's seaports are Dar es Salaam, Tanga, Mtwara, and Zanzibar town. Mwanza and Bukoba, on Lake Victoria, are linked by steamer with lakeports in Uganda and Kenya. Dar es Salaam has an international airport. Until 1977 the East African Community, made up of Tanzania, Kenya, and Uganda, regulated most transportation and communications facilities.

#### The People of Tanzania

Tanzania's 16,950,000 inhabitants (est. 1978) are almost all black Africans who make their living by farming. They include about 120 ethnic groups, most of which speak a Bantu language. The Sukuma, who live just south of Lake Victoria, form the largest group. There are more than 1,000,000 Sukuma. Other large groups, each with about 400,000 members, are the Chagga, Ha, Haya, Makonde, and Nyamwezi. The Masai are the best known non-Bantu-speaking Africans. Small communities of Arab and Indian immigrants are economically important. They mostly live along the coast and on Zanzibar. In all, about 400,000 people live on Zanzibar and Pemba.

Most Tanzanians speak different Bantu languages, depending on their ethnic group. However, Swahili, a Bantu language taught in the country's schools, is understood throughout Tanzania. English is spoken by most educated Tanzanians.

Religion. More than half of the black Africans practice religions based on ancestor worship. Around 30 percent of the population, including most people living along the coast and on Zanzibar, are Moslem. About one out of four Tanzanians is Christian.

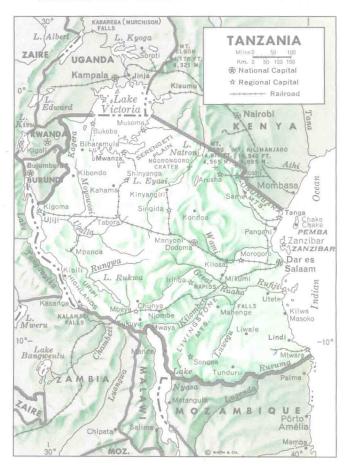
Education. The Tanzanian government emphasizes the development of educational opportunities. In 1972 there were about one million pupils in primary schools, 33,000 in secondary schools, and 5,000 in teacher training schools. More than 2,000 students attend the University of Dar es Salaam.

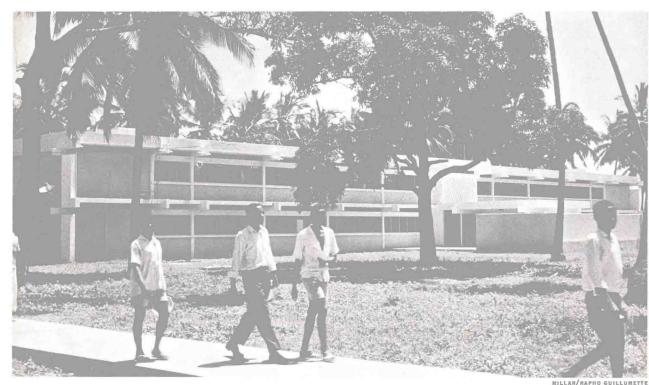
Cities. The largest city and chief port of Tanzania is Dar es Salaam. In 1970 it had an estimated 343,900 inhabitants. It was the country's sole capital until 1970, when the government began moving to Dodoma. The second largest city is Zanzibar, which handles the island's clove trade. In 1967 it had 68,490 inhabitants.

#### History and Government

Early History and Colonization. Human life may have evolved in the Tanzania area. In 1959 a skull of a humanoid (a nearly human being) that lived about 1,750,000 years ago was found in the Olduvai Gorge, in northeastern Tanzania. In Kenya, to the north, the remains of a fully human being who lived more than 2,500,000 years ago have been found. But these peoples did not survive. Until about 1,000 A.D. Tanzania was very sparsely populated. Then, Bantu-speaking people began arriving from the south.

Southwest Asian traders settled on the coast and on





Mbweri Technical College on the island of Zanzibar is one of the most modern institutions of higher education in Tanzania.

Zanzibar beginning around 700 A.D. They traded beads, cloth, and metal to the Africans for ivory. A few black Africans were captured and taken as slaves to Arabia. After an interlude of Portuguese control during the 16th and 17th centuries, Arab power was consolidated by Sayyid Said (1805–1856). Said established an empire centered on Zanzibar that controlled the trade of east Africa. He started the great clove plantations on Zanzibar and Pemba.

Between 1884 and 1890 European powers annexed most of Africa. Great Britain gained control of Zanzibar and Pemba. Germany colonized mainland Tanzania, plus Rwanda and Burundi. During World War I, Britain conquered most of German East Africa, and Belgium took Rwanda and Burundi. Britain governed the mainland, which it named Tanganyika, first as a mandate under the League of Nations and after 1946 as a United Nations trust territory.

Nationalism and Independence. After World War II, African nationalist movements emerged throughout east Africa. In 1954, Julius K. Nyerere founded the first political party in Tanganyika, the Tanganyika African National Union (TANU), which became the dominant party. On Dec. 9, 1961, Tanganyika became independent. In 1962, Nyerere was elected president of the country; TANU won control of the legislature, the National Assembly. Black Africans slowly replaced Asians and Europeans in leading positions.

On Zanzibar two conflicting nationalist movements arose during the 1950's. The landowning Arabs founded the Zanzibar Nationalist Party. Africans and Shirazis, who are people of mixed black African and Persian stock, formed the Afro-Shirazi Party. At times, members of the two groups clashed violently.

The Zanzibar Nationalist Party led the country to independence on Dec. 10, 1963. But only a month

later, John Okello led a faction of the Afro-Shirazi Party in seizing power in a brief but bloody struggle. The new government confiscated most of the land held by Arabs and jailed many Arabs and Asians.

Union. On Apr. 26, 1964, Tanganyika and Zanzibar merged to form the United Republic of Tanzania. Nyerere became president and Abeid Amani Karume, until then president of Zanzibar, became first vice-president. The government included a cabinet, made up mostly of mainland Tanzanians, that was responsible to the National Assembly. The merger was designed to allow the most efficient development of the two countries' economic resources. Thus, although Zanzibar and mainland Tanzania retained some control over internal affairs, the national government was empowered to regulate most economic matters, as well as military and foreign affairs. In 1972, Karume was assassinated, and Aboud Jumbe was named to succeed him.

In 1967, President Nyerere announced a new policy at Arusha. His Arusha Declaration called for hard work and self-reliance. It noted that Tanzania could not rely on aid from richer countries. Agricultural development, rather than industrialization, was emphasized. Nyerere said that all Tanzanians, and not just an elite, should benefit from progress.

In 1977, TANU and the Afro-Shirazi Party merged to form the Chama Cha Mapinduzi, or Revolutionary Party.

Books for Further Study

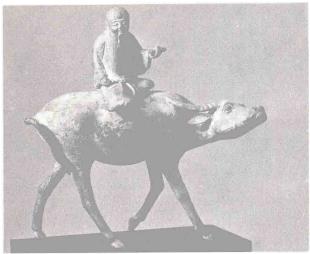
Tanzania: A Profile by John Hatch (Prentice-Hall, 1972).

The Land and People of Tanzania by Edna M. Kaula (Lippincott, 1972).

A History of East Africa by Zoe Marsh and G. W. Kingsnorth (4th ed., Cambridge U.P., 1972).

Society, Schools and Progress in Tanzania by J. Cameron and W. A. Dodd (Pergamon, 1970).

Thomas F. Hirsch



WORCESTER ART MUSEUM

The founder of Taoism, Lao-tze, depicted in a Chinese bronze

Taoism (tou'iz əm), a Chinese philosophy and religion that, with Confucianism and, later, Buddhism, has had a major influence on Chinese civilization. Taoism developed along with Confucianism during the Warring States period, from the 5th to the 3d centuries B.C., one of the many times when China's usually strong central government was weak and civil wars were frequent among the feudal lords of small local states. Taoist philosophy was a reaction against the chaotic violence and the arbitrary laws and hierarchical social structure in the states. It encouraged men to seek harmony with nature and with their fellowmen through a simple individualistic life and calm meditation on the the unity underlying all things in the universe. By the 2d century A.D., Taoism had developed certain deep mystical tendencies and had begun to evolve into a popular religion partly dependent on magic. Taoism has generally supported decentralized government and has appealed to the emotion and imagination of solitary individuals, while Confucianism has supported centralized government and has supplied the intellectual code that has dominated the ethics and etiquette of Chinese society.

#### Philosophical Taoism

The early Taoist philosophers were a relatively small number of sages, such as Yang Chu; P'eng Meng; Lao-tzu, the legendary founder of Taoism; Chuang-tzu, Lao-tzu's disciple; and Lieh-tzu. Their philosophy is expressed chiefly in the poetic Tao Te Ching, or Book of the Tao and the Te (sometimes called The Way of Life), traditionally attributed to Lao-tzu, and also in Chuang-tzu's essays elaborating the Tao Te Ching.

Taoist philosophy is based on the Tao, an ancient Chinese concept that means "way," "path," or "natural working of the universe." Taoists consider the Tao an original Oneness in things, an eternal underlying foundation of being out of which the many parts of the universe continuously spring and into which they continuously return. The process occurs by means of the Te, or energy, of the Tao. Taoists explain the operation of the Te in terms of two other ancient Chinese principles: the dark, negative, female yin and the bright, positive, male yang. They believe the two

forces combine in different proportions to produce all the endlessly varied things in the universe before these things return once more into the Tao.

According to Taoist thought, man is an integral part of the universe and, by nature, is in harmony with its operations. Unfortunately, men have fallen from this condition into self-assertive, aggressive, competitive actions that lie outside the natural harmony of all things. Thus, the ills of the world are produced. Men perform inconsiderate and harmful acts toward their neighbors. As they organize into societies, through turbulent competition the few grow wealthy and the many are forced into poverty. Oppressive rulers develop, and laws seek to regulate the citizens by defining socially undesirable acts as crimes. Communities and societies located close to one another compete, causing war. Taoists believed that most of the organized efforts to correct the situation-including the codes developed by Confucius and Mo-tzu, such as the social regulation of learning or the regulation of virtuous acts-simply added to the disharmony by their aggressive striving to shape men's actions.

The only true solution, in the Taoist view, must begin with the individual's conscious refusal to participate in the turbulent, aggressive, and assertive ways of life. This refusal is called Wu-wei, or "not doing." The wise man then seeks to fulfill his potential harmony with the Tao by a quiet and sensitive contemplation of the natural tendency in things, making his life like a smooth-flowing river, clear and undisturbed in its movement. He tries always to do only as much as his natural impulse requires, never straining for further achievement. He relates to his fellowmen in a spirit of natural kindness, tolerance, and humility, always seeking his own level and never striving to dominate others. If he is a leader, he leaves his people free to fulfill their individual natures. The highest social organization desired by Taoists was a small state containing isolated and independent villages of free individuals who would not compete with other villages or states for land or trade and who would thus not feel the need for war. The Taoists felt that by being relatively inactive and humble, like the Tao, the individual will be most truly active and in control, as the Tao is. "The Tao is ever inactive, and yet there is nothing it does not do." "The way of Heaven is not to contend and yet to be able to conquer." The calm contemplative life led by believers sometimes included meditation that led to a mystical experience of union with the Tao. Taoist sages often withdrew to lonely mountain retreats for more solitary contemplation. Throughout Chinese history, Taoists inspired gentle, mystically inclined persons, including many of China's greatest painters and poets.

#### Religious Taoism

From about the time of the Han dynasty (202 B.C.-220 A.D.) to about the 14th century, Taoism gradually changed from the philosophy of a small number of sages to a widespread popular religion followed by numerous individual believers and by many groups of monks and laymen. The old established ideas of philosophical Taoism were modified, and new elements were added. At first the changes came from traditional Chinese folklore. From the 4th century A.D., as Buddhism was introduced from India and became prominent, the changes also came from Buddhism. Over the

centuries these developments of religious Taoism were encouraged by Chinese emperors who wanted a strong popular Taoist religion as a check on growing Buddhist influence in the country. During many periods, Taoism enjoyed imperial favor and Buddhists were persecuted. Even in periods when Buddhism was the state religion, Taoism continued to flourish among the common people of China.

Characteristics. One of the new elements was the suggestion that a man in harmony with the Tao was safe from wild beasts, human violence, disease, and even natural death. Another was the idea that a man can become immortal by replacing the destructible elements in his body with indestructible ones. Many Taoists, such as the great 4th-century-A.D. alchemist Ko Hung, tried to find the magic elixir, or drink, of long life by boiling concoctions of gold, cinnabar, and other chemicals. Many persons performed special breathing exercises devised to take in the finer or more durable parts of the universe. A few more eccentric Taoists are reported to have tried to achieve immortality by living on a diet of spring-morning mists or dew; others are said to have thrown themselves into fires, hoping to become flames. Many Taoists during this period used magic charms and amulets to ward off evil spirits.

Another major element of religious Taoism was belief in gods. The abstract concept of the Tao was developed into a trinity of three personal gods. These gods varied in different schools of Taoism but usually included Lao-tzu and also Yu-huang Shang-ti, originally an ancient Chinese god who ruled the universe. Often the Taoist gods were identified with various Buddhist gods. In addition, there were such figures from Chinese folklore as the pair of guardian gods of all house gates and city gates, the god of kitchens, and many other gods of nature. Especially popular were the Eight Immortals, celestial beings who were believed to have been human but to have gained immortality.

Religious Taoism also took over the Buddhist idea of karma, or law of automatic reward or punishment for human acts. Periodic reports to Heaven on the activities of each person were believed to be provided by his kitchen god and other spirits. Lu Tung-pin in the 8th century A.D. set up a system of merits and demerits for specific acts that later developed into the Book of Rewards and Punishments. The reward for a good life was bliss in a physical paradise, such as those described in Chinese folklore: the Isles of the Blessed in the Eastern Sea or the mountains of the West, presided over by the Western Royal Mother, Hsi-wang-mu.

In the T'ang period, from the 7th to the 10th centuries A.D., Taoism borrowed the Buddhist idea of isolated life in a monastery. Monastery monks and nuns, including many of the Chinese nobility, took vows to avoid meat, alcohol, killing, lying, and stealing and to live in celibacy. They sacrificed to Taoist gods in monastery temples. Later some monks in northern China formed the Chuan-chen school of Taoism, which stressed meditation and was closely related to the meditative school of Chan (Zen) Buddhism. In the Sung period, from the 10th to the 13th centuries, Taoism followed Buddhist example by collecting the Tao-tsang, or canon of works believed to be divinely inspired.

Sects. Religious and magical elements were combined in the many Taoist sects that developed among the peasants in various regions of China. Religious leaders were believed to have magical powers to protect members from harm. Often, members lived on communal property. Because the sects at times rebelled against the central government, they were outlawed and met in secret.

The Cheng-i sect was ruled by a high priest in the West believed to be descended from Chang Tao-ling, who traditionally founded the group in the 2d century A.D. with the sanction of Lao-tzu. The sect was especially concerned with magic. The high priest collected membership dues, conducted rites, and gave diplomas to Taoist practitioners of magic, who lived as laymen in villages and families, chiefly in southern China. The last Cheng-i high priest was driven out of his headquarters by Chinese Communists in about 1930. After the Communists took over mainland China, he fled to Nationalist China on Taiwan.

The T'ai-p'ing sect, also called the Yellow Turbans, is traditionally considered to have been organized by Chang Chio in the 2d century A.D. Members believed that the Tao operated in the world in cycles of prosperity and universal peace (t'ai-p'ing) followed by decline and violence. In periods of decline marked by floods, famine, invasion, bad government, and other ills, believers considered that they were cooperating with the Tao, or the will of Heaven, when they tried to overthrow the government and start a new cycle with a rise of social harmony. The great T'ai-p'ing rebellion that started in 184 A.D. lasted 20 years. Another major T'ai-p'ing rebellion ravaged China from 1850 to 1865, during the European colonial period.

There were many other Taoist secret sects, especially in the period of uncertainty following the collapse of the Manchu dynasty in 1911. Some sects worshipped the gods of all major religions, some allied themselves with the Nationalist government of Chiang Kai-shek against the Communists, and some degenerated into lawless bands.

The Chinese Communist government has suppressed individual Taoist sects. However, it recognizes Taoism as a Chinese religion devoted to universal unity and peace, and it has repaired some Taoist temples and monasteries. Many Western scholars believe that Taoism is still a strong force among the Chinese common people, especially in rural areas.

Books for Further Study

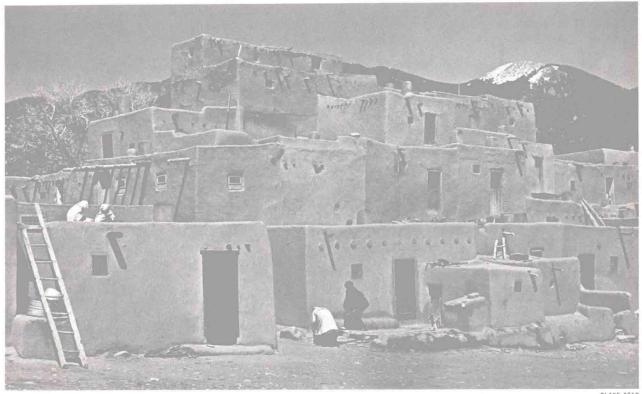
What Is Taoism and Other Studies in Chinese Cultural History by Herriee G. Creel (U. of Chicago, 1970). Chinese Religion: An Introduction by Laurence G. Thompson (Dickinson, 1969).

\*Norvin J. Hein

**Taos** (tous), a town in northern New Mexico; the seat of Taos County; about 70 miles (110 km) northeast of Santa Fe. Pop. (1970) 2,475.

Taos serves as a trade center for the surrounding ranching area and is a popular tourist center. The town is the site of the headquarters of the Carson National Forest and lies near winter sports areas in the Sangre de Cristo Mountains. It is one of the best-known artists' and writers' colonies in the Southwest.

Places to Visit. In Taos are the Harwood Foundation and the Kit Carson Home and Museum. The Harwood Foundation, which is maintained by the University of



One of the two multistoried communal buildings that make up the village of Taos Pueblo, which lies just north of Taos

New Mexico, houses numerous paintings by artists who have lived or worked in Taos, as well as Indian and Spanish artifacts. The house where the famous frontiersman Kit Carson lived in the mid-19th century is now a museum. Also in Taos is Carson's grave, which lies within Kit Carson Memorial State Park.

Two miles north of Taos is the famous Taos Pueblo, which is an Indian pueblo, or village, inhabited by more than 1,400 Pueblo Indians. It has been in existence since before the first white man arrived in the area in 1540. The village consists of two multistoried buildings that face each other across Taos Creek. Traditional Indian ceremonies held at Taos Pueblo are a popular tourist attraction. Adjoining the pueblo are the ruins of a Franciscan mission church. The church, completed in 1726, was destroyed in 1847 by American troops suppressing a rebellion against the U.S. annexation of New Mexico.

Just south of Taos is Ranchos de Taos, a small farming community noted for its 18th-century St. Francis of Assisi Mission Church.

History. Spaniards first settled in the Taos area during the 17th century. However, they were driven out during the great Pueblo Indian revolt that began in 1680. The area was later resettled, and by the 1740's there were four Spanish families living there. In 1779 the Spaniards established a fortified village and church at Ranchos de Taos. The Comanche and other Indians visited Ranchos de Taos periodically for both trade and entertainment. Taos proper developed as the principal community in the Taos area during the 19th century. After 1821 it flourished as a frontier post and a center of the fur trade in New Mexico. In the 20th century, Taos began to attract numerous artists and writers, many of whom settled there. Taos was incorporated as a village in 1934 and as a town in \*Frank D. Reeve the 1950's.

Tao Te Ching (tou tā ching), the earliest and most important book of ancient China's Taoist tradition of thought. The book was formerly believed to have been written in the 6th century B.C. by Lao-tzu, the founder of Taoism, just before he vanished into the wilderness beyond the western frontier of the Chinese state. However, most scholars think the book was actually compiled in the 4th or 3d century B.C. It reflects the Taoists' reaction to the troubled conditions of the Warring States period in China, from the 5th to the 3d centuries B.C. At that time, order was being sought by Confucianists, through a return to rigid ethical codes, and by tyrannical rulers, through severe laws and punishments.

The title of the Tao Te Ching may be translated "The Classic Book of the Way and Its Power." The work is also one of mystical poetry and of advice for harmonious living. It teaches that man should avoid all aggressive and coercive interference with other people and with the natural tendency of things. The way to harmony is not through rules and laws, which only disturb the peace that comes naturally from the free operation of the Tao, or way of the universe, and the Te, or energy of the Tao. The book advises selfeffacing conduct and simple living and suggests ways to attain long life. \*Norvin J. Hein

Tapajós River (tä pä zhôsh'), a principal tributary of the Amazon River, in Brazil, about 500 miles (800 km) long. The river is formed by the junction of the São Manuel and Juruena rivers. It flows generally northeastward, widening to become a lakelike channel for the

last 70 miles (113 km) of its course. The Tapajós joins the Amazon at the city of Santarém. Together with the Juruena River and the Juruena's longest tributary, the Tapajós river system has a total length of about 1,250 miles (2,000 km). The Tapajós is navigable for about 175 miles (280 km) upstream from its mouth. There is regular steamship service on this stretch of the river.

\*Preston E. James

tape recording, a process by which information is recorded on a tape coated with a magnetically sensitive material. The information may be sound, light patterns, or coded data for an electronic computer. Audio, or sound, tape recorders have became increasingly popular in recent years for use both in the home and in the office. Video tape recorders are used in the television industry for recording television programs and are also used in various other fields.

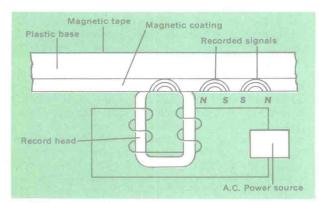
#### Principles of Tape Recording

Magnetic tape recording is based on the effect of a magnet on iron filings. If a magnetized bar is placed near iron filings, the filings will form regular patterns around the poles of the magnet. These patterns correspond to the lines of force of the magnetic field. By using several magnets of different intensity, the iron filings can be arranged in a variety of ways. The coating of a magnetic tape responds to a magnetic field in much the same manner as iron filings. The tape itself has a plastic or paper base, and the coating is usually an iron oxide.

The information to be recorded is first converted to electric impulses. These impulses are then sent to the record head, an electromagnet that sets up tiny magnetic fields in the coating of the tape. The record head consists of a stack of laminations, or strips, of a magnetic material in the form of a horseshoe or a ring. Where the tape passes over the record head, there is a very narrow air gap. A coil of wire carrying the electric impulses is wound around the record head. When electricity flows through the coil, a magnetic field is set up in the head and in the section of the tape passing over the air gap. The characteristics of the magnetic impressions recorded on the tape in this way correspond to the characteristics of the electric impulses carried in the wire coil and therefore to those of the original information.

To convert the information on the tape back to its original form or to another form, the tape is passed over another tape head, called the playback head,

Fundamental components of a magnetic tape-recording system

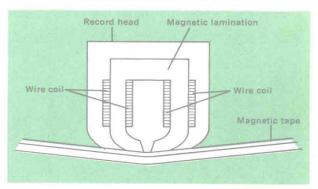




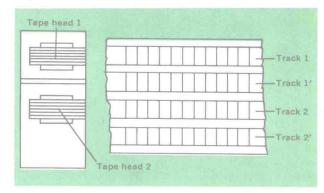
SCHREIBER/RAPHO GUILLUMETTE

Audio tape recorders have made home recording possible because they are compact and relatively inexpensive.

#### Cross-sectional view of a record head



A stereophonic tape-recording system uses two tape heads. If a four-track tape is used with the system, tracks 1 and 2 may be used when the tape moves in one direction, and tracks  $1^\prime$  and  $2^\prime$  may be used when it moves in the other direction.



which is similar to the record head. The magnetic fields in the tape set up tiny currents in the coil of the playback head that are then amplified and converted to the desired form.

A third type of tape head, called an erase head, may be used to destroy all existing patterns on the tape so that it can be used to record other information.

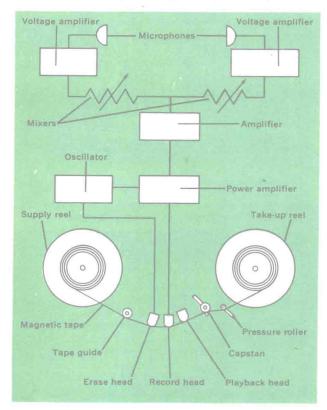
#### Types of Tape Recording

Audio Tape Recording. The standard audio tape recorder has an input connection for a microphone that converts sound vibrations, such as those produced by the human voice, into low-level electric impulses. These impulses are then amplified to produce currents of sufficient strength to magnetize the core in the record head and thus create a pattern on the tape. The current induced in the playback head by the magnetic fields on the tape is amplified and fed to a loudspeaker, where it is converted back to sound waves that reproduce the original sounds.

In an "open-reel" recorder the tape is first fed by a supply reel. It then passes the erase head, the record head, and the playback head, in that order, and is rewound onto the take-up reel. Guides ensure that the tape passes directly by and at the proper distance from the tape heads. Between the tape heads and the take-up reel the tape passes through two rollers, which are called the capstan and the pressure roller. The capstan is driven by a motor and regulates the tape's speed.

Another form of tape recorder and player is the "cassette" system, which makes it unnecessary for the user to handle the tape. The tape is packaged in a flat plastic cartridge, called a cassette, which contains two small hubs that serve in place of the supply and

An open-reel monophonic magnetic tape-recording system





COPLAN/DP

Prerecorded programs on audio tapes can be transmitted by radio stations in accordance with their own scheduling needs.

take-up reels. To use the tape, one simply places the entire cartridge in an opening in the cassette machine. In another type of tape system, also using cartridges, the tape forms an endless loop.

The record head may record impressions on the entire width of the tape, or it may use only part of the width, so that two or more tracks, or bands, may be recorded on a single tape. Multitrack recording makes possible stereophonic sound reproduction, in which different sounds emerge from two or more loudspeakers placed in different positions. Separate record and playback heads and separate amplifiers are required for each track. (See also STEREOPHONIC SOUND.)

Dual-track tapes are also used for monophonic recording. The tape is first played in one direction, using one track of the tape, and is then turned over and played in the opposite direction, using the second track of the tape. Stereophonic tapes of this type have four tracks, instead of two.

Audio tape recorders have many different uses. In addition to providing entertainment, they have many practical applications, such as the businessman's automatic answering service, telephone time and weather reports, and language study aids.

Video Tape Recording. The broadcasting industry uses video tape recorders as a means of recording visual images. Such recorders convert electrical signals corresponding to light impressions to magnetic patterns on tape. From the tape, images can be reproduced on a television screen.

Electronic Data Tape Recording. Electronic computers also use magnetic tape similar to that used for audio and video recordings to record and store information. The material recorded on magnetic tapes consists not of sounds or images but of the symbols of the computer language or code. Such material is referred to as data. The recording process in digital computers is similar to that for audio and video tape recorders. However, there is no concern for the intensity or range of the electric impulse, but only for the impulse itself.



French Gothic tapestry art is exemplified by the famous series The Hunt of the Unicorn. The third tapestry of the series depicts the attempt of the unicorn, a fabled beast, to escape the hunters. The tapestry is noted for its beauty of design and color.

METROPOLITAN MUSEUM OF ART/THE CLOISTERS/GIFT OF JOHN D. ROCKEFELLER, JR., 1937

Computers use codes based on different combinations of two symbols, "ones" and "zeros," representing letters of the alphabet, numbers, and other symbols. The two symbols can be recorded by "current on" for "one" and "current off" for "zero." The playback head converts the magnetic impulses on the tape back to electric impulses, which in turn must be converted first to computer language and then to ordinary language, if the result is desired in that form. Depending on the number of digits needed to symbolize a letter or number in the computer's code, there may be several record heads arranged in a row across the tape to record a single symbol. For example, a six-bit, or six-digit, code requires six tape heads for recording and six for playback. The playback output may be sent to a printing device that automatically converts the code into letters and numbers as it prints them. The tapes with recorded information are stored in the computer's memory area, from which the information can be recalled at a later date by replaying the tape.

#### History of Tape Recording

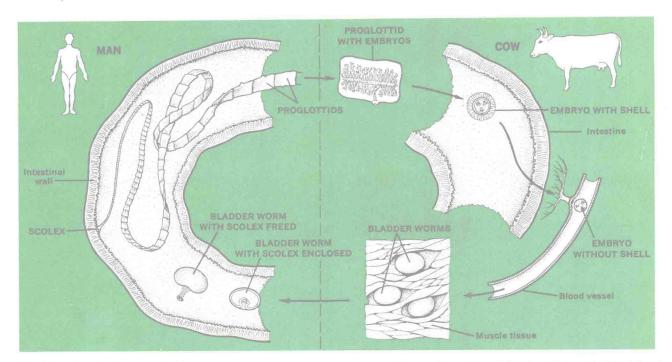
The idea of converting sound impressions into magnetic patterns seems first to have been set forth toward the end of the 19th century. An article published in the technical journal The Electrical World in 1888 discussed the possibility of storing electrical information by means of magnetized particles. The first workable magnetic recording device was patented in 1898 by Valdemar Poulsen, a Danish electrical engineer. His invention, called the telegraphone, employed a process for magnetizing steel wire. In 1913 the American inventor Lee De Forest experimented with using wire-recorded sound with motion pictures. A metal tape-recording system was developed during World War II because of the need for a less-cumbersome device than that used in disc recording. The use of tape coated with iron particles was developed in Germany shortly before World War II. \*Lyman Mower

tapestry (tap'is tri), a heavy handwoven fabric colorfully patterned and usually hung as a wall decoration. It can also be used as a carpet or drapery. The craft of tapestry weaving flourished particularly during the late Middle Ages, when tapestries served both as decoration and insulation for the stone walls of castles. One of the most famous examples of French Gothic tapestry is The Hunt of the Unicorn series (The Cloisters, New York City).

An ancient technique, tapestry weaving has changed little over the centuries. The basic warp is made by stretching undyed linen yarn lengthwise across a loom. The decorative pattern is woven through the warp with bobbins of colored silk or wool thread. These threads form the weft, or woof, of the fabric. As portions of the tapestry are completed, they are rolled around one end of the loom so that fresh warp is exposed.

Areas of different color are woven separately. Each color is provided by a different thread. Depending on the intricacy of the color design, the number of weft strands may range from about 50 to many thousands. Later, areas of color are stitched together to close up gaps of unwoven warp. Elaborate tapestries often require many weavers and may take years to complete.

Tapestries can be woven on two types of looms. Some weavers use a high-warp loom, or haute-lisse, in which the warp threads are arranged vertically, and others employ a low-warp loom, or basse-lisse, in which the warp is stretched horizontally. The weav-



The life cycle of a tapeworm. Adult tapeworms live in man's intestine, where they produce new individuals called proglottids. When mature, proglottids containing embryos break off and pass out in man's feces. If the proglottids are swallowed by a cow, their embryos pass into the cow's intestine. The embryos travel through blood vessels to muscle tissue, where they transform into bladder worms. If a man eats raw infected meat, the bladder worms enter his intestine, mature, and produce new proglottids.

ing itself is always done from the back, and the weaver must attach a mirror to one side of the loom so that he can see the front of the fabric. As a rule, the design is copied from a drawing, known as a cartoon.

History of Tapestries. Tapestry weaving was practiced in Egypt as early as the 3d millennium B.C. Other ancient peoples who produced fine tapestries include the Syrians, the Greeks, the Persians, the Chinese, and the pre-Columbian tribes of Peru. In Europe, tapestry weaving began to develop after the 5th century A.D. The first important tapestry centers were monasteries and convents, which produced handwoven fabrics for a variety of religious purposes. Early medieval tapestries were frequently made of wool, and their designs were usually flat and stylized representations of Biblical subjects.

The manufacture of tapestries reached a height of development during the late Middle Ages. Leading centers arose in the 14th century at Arras and Paris in France. Later, the industry spread to Brussels, Antwerp, Bruges, and other cities of western Europe. Religious themes continued to be popular subjects of tapestry design. However, there was a growing emphasis on background detail and on secular costume, and there were lush displays of colored and metallic threads. Famous Gothic tapestries include the 14thcentury Apocalypse series (Angers Cathedral, France) and the 15th-century Seven Sacraments (Metropolitan Museum of Art, New York City).

During the Renaissance, tapestry design became increasingly like oil painting in its use of perspective and other illusionistic devices. Mythological subjects as well as scenes of daily life were incorporated in the tapestries, which were frequently conceived on a huge scale. A famous set of tapestries made by Flemish weavers is the series Acts of the Apostles (Vatican),

based on designs by the painter Raphael. Fine cartoons were also produced by William Sheldon, who opened the first English tapestry works in about 1560.

Tapestry weaving continued to thrive in Europe throughout the 17th and 18th centuries. Particularly outstanding were the products of the Gobelins tapestry works, which became King Louis XIV's private factory in 1662. The weavers of Aubusson and Beauvais were also famous for their designs. Tapestries of this period were realistic and had a wide array of delicate colors. Examples are the Constantine tapestries, designed by the Flemish artist Peter Paul Rubens, and the Cupid and Psyche series, based on cartoons by the French painter François Boucher (both sets in Philadelphia Museum of Art).

With the production of factory-made cloth in the 19th century, handweaving declined. Simulated tapestry carpets, draperies, and upholstery fabrics were woven on mechanical Jacquard looms. Such limitations, however, were generally inferior in design and texture to handmade tapestries. Late in the 19th century the traditional craft of tapestry weaving was revived in England by the artists William Morris and Sir Edward Burne-Jones.

Among the leading contemporary tapestry designers is the Frenchman Jean Lurçat. Modern tapestries have also been adapted from the paintings of many famous 20th-century artists, including Stuart Davis, Henri Matisse, and Joan Miró. \*Edward Bryant

tapeworm (tap'werm'), any of a large group of long ribbon-like, flatworms that live as parasites in vertebrates, or backboned animals. Adult tapeworms live in the host's small intestine, feeding on the host's food material. Because tapeworms lack both a mouth and a digestive system, their food materials are absorbed