

VOLUME

3

**B—Byzan
pages 1–536**

Compton's Encyclopedia

and Fact-Index

Compton's Learning Company, a division of
Encyclopædia Britannica, Inc.

Chicago • Auckland • Geneva • London • Madrid • Manila
Paris • Rome • Seoul • Sydney • Tokyo • Toronto

1991 EDITION COMPTON'S ENCYCLOPEDIA

COPYRIGHT © 1991 by COMPTON'S LEARNING COMPANY
DIVISION OF ENCYCLOPÆDIA BRITANNICA, INC.

All rights reserved for all countries.

No part of this work may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, recording, or by any information storage and retrieval system, without permission in writing from the publisher.

COPYRIGHT © 1922, 1923, 1924, 1925, 1926, 1927, 1928, 1929, 1930, 1931, 1932, 1933, 1934, 1935, 1936, 1937, 1938, 1939, 1940, 1941, 1942, 1943, 1944, 1945, 1946, 1947, 1948, 1949, 1950, 1951, 1952, 1953, 1954, 1955, 1956, 1957, 1958, 1959, 1960, 1961, 1962, 1963, 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1971, 1972, 1973, 1974, 1975, 1976, 1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1987, 1988, 1989, 1990, 1991
BY COMPTON'S LEARNING COMPANY, DIVISION OF ENCYCLOPÆDIA BRITANNICA, INC.

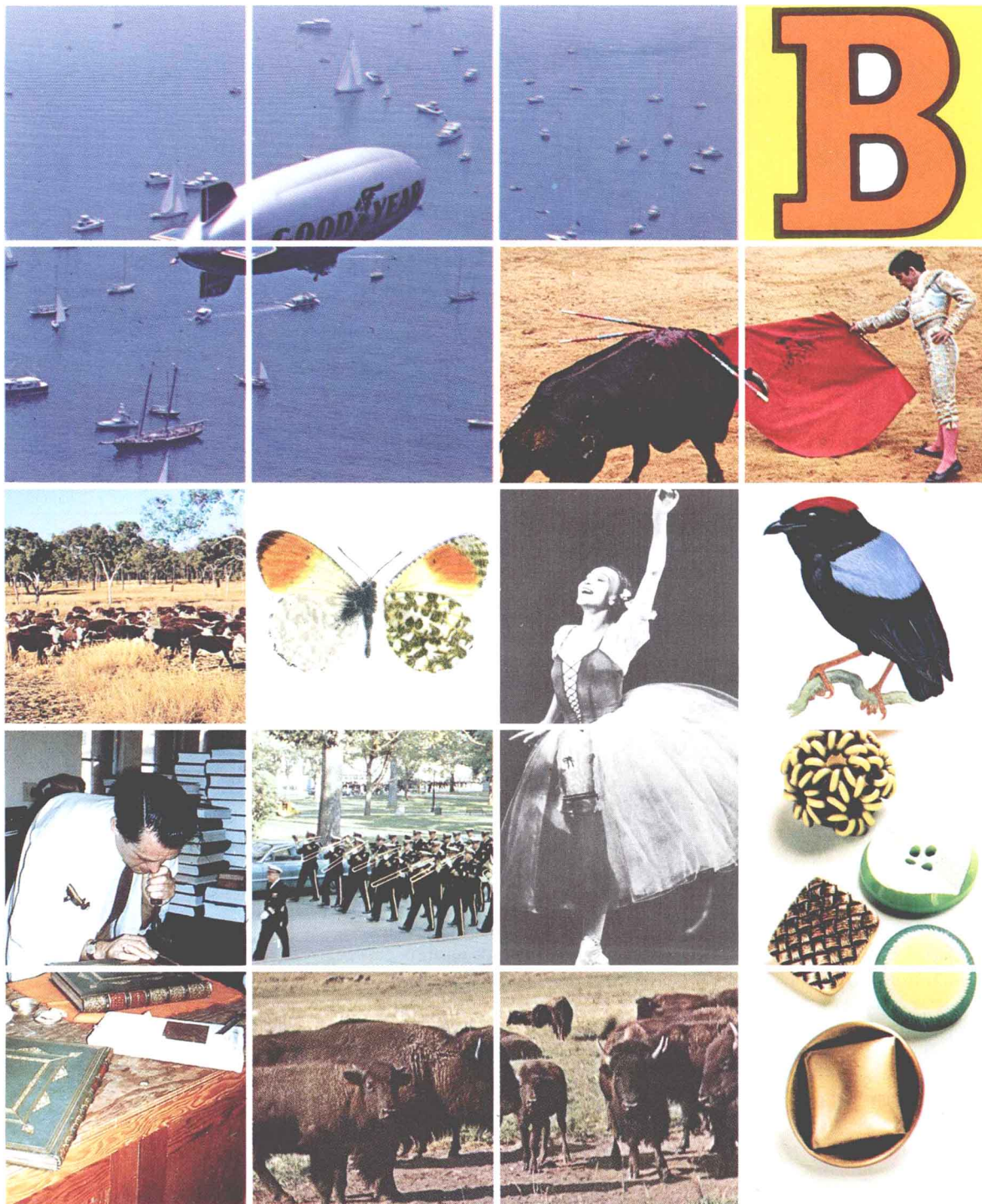
Library of Congress Catalog Card Number: 89-81651
International Standard Book Number: 0-85229-530-8
Printed in U.S.A.



THE UNIVERSITY OF CHICAGO

COMPTON'S ENCYCLOPEDIA IS PUBLISHED WITH THE EDITORIAL ADVICE
OF THE FACULTIES OF THE UNIVERSITY OF CHICAGO

"Let knowledge grow from more to more and thus be human life enriched"



PHOTOS: Row 1: The Goodyear Tire & Rubber Co. Row 2: (right) TWA Ambassador. Row 3: (far left) Australian Information Service; (center left) Marjorie Statham—The American Museum of Natural History, New York/EB Inc.; (center right) Dance Collection, the New York Public Library at Lincoln Center; (far right) R. Keane—EB Inc. Row 4: (left) Chamber of Mines of South Africa; (center left) U.S. Navy; (far right) La Mode buttons created by B. Blumenthal & Co. Inc. Row 5: (center) Hermann Postlethwaite—U.S. Soil Conservation Service.

EXPLORING VOLUME 3

Barnes Engineering Co.



What can a thermogram of a man's head reveal about his health? 209 picture.

E.P.A., Inc./EB Inc.



What city is a seat of government, yet not an official capital? 335.

Anthony Merceica—Root Resources/EB Inc.



How did the Malayan bear get its nickname of "sun bear?" 116.

E.P.A., Inc./EB Inc.



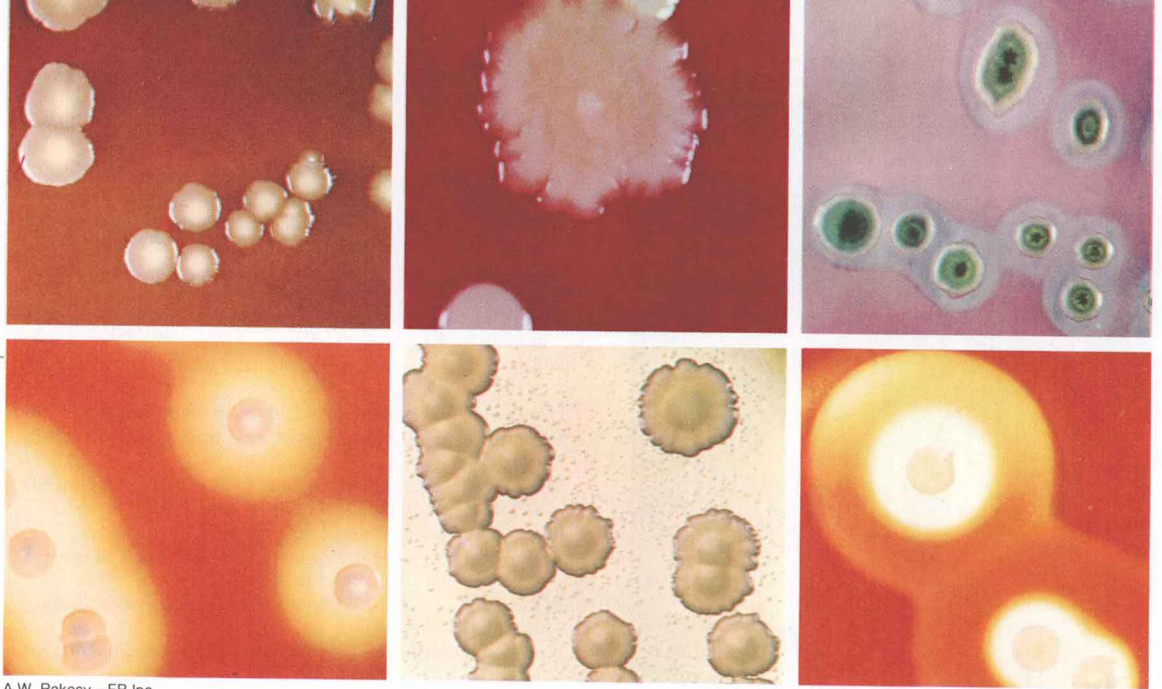
How can a bat avoid obstacles in its path while flying in the dark at bullet speed? 104.

How do the four basic types of motorboat hulls differ? 327 drawings.

Which Byzantine emperor sponsored a code of laws that had a wide influence on legal theory for 13 centuries? 534.



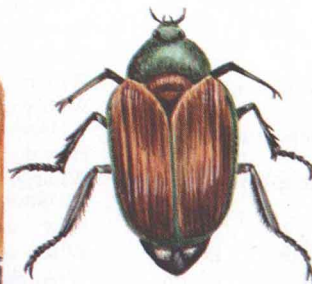
SCALA/E.P.A., Inc.



A.W. Rakosy—EB Inc.

What tiny organisms are found in more places—in virtually all sorts of environments above and below the Earth's surface—than any other living thing? 12.

Who was the polar explorer who made a round-the-world trip alone when he was only 12? 531.



Which order of insects contains the most insect species? 137.

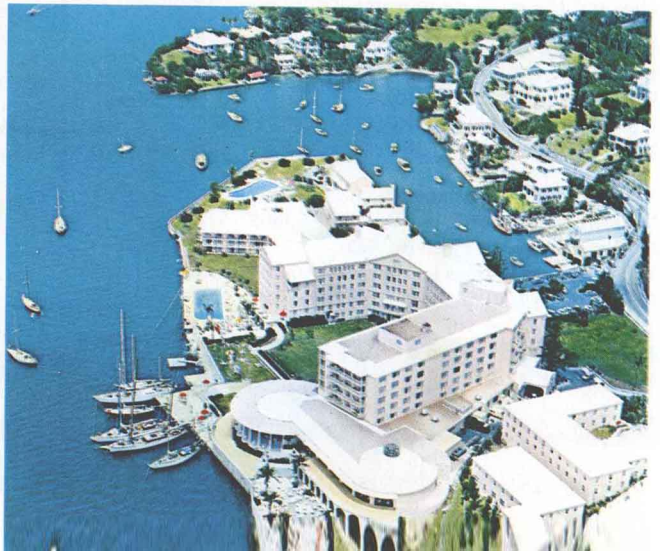
How does an arch bridge differ from a beam bridge? How is it similar to a suspension bridge? 441.



Art Resource/EB Inc.

Where were private cars, buses, taxicabs, and motorcycles banned until 1946? 173.

The Princess Hotel, Bermuda





How many books about the imaginary land of Oz were written by L. Frank Baum? 111.

What city was laid out in the shape of a sweptwing airplane? 408.

Which religion holds that all religious truth is relative? 19.

Who was the first woman to become a prime minister? 58.

How do birds fly? 248.

Next to tea, what is the most popular drink? 132.

What popular game was supposedly invented on a kitchen table by an unemployed salesman? 323.

What struggling young artist earned pocket money by playing sandlot ball? 158.

Why was bubonic plague called the Black Death? 473.

Who wore a coat that was ornamented by 13,600 gold buttons? 528.

What kind of hair is used to make camel's hair brushes? 464.

How did the scouting movement for young people develop from a war hero's military textbook? 16.

What is the world's largest building? 491.

What book was cited as a cause of the Civil War? 131.

Which American vice-president completed his term while indicted for murder in two states? 513.

Why did Sir Richard Burton's widow burn his diaries and journals? 513.

What was the "miracle mile"? 74.

What is the meaning of "Buddha"? 480.

What makes butter yellow? 520.

What tree sometimes has several thousand trunks? 75.

How did the Indians cook food in baskets? 101.

What animal has the highest body temperature? 246.

How is air used to stop a train? 405.

What plant sometimes grows a foot a day? 51.

Why do beavers build dams? 121.

What famous showman became the mayor of Bridgeport, Conn.? 81.

Who was the plant wizard who grew 500 different kinds of cherries on one tree? 505.

Why did a Spanish colonial government behead the explorer who discovered the Pacific? 23.

What organisms are so small that it would take millions of them to cover the head of a pin? 12.

Which has more vertebrae in its neck—a sparrow or a giraffe? 245.

What chemical compound is the power molecule of all life? 200.

How are locust wings and window awnings related? 235.

Why did the ancient Egyptians mix straw in their bricks? 438.

Which author claimed he had a library of nearly 900 volumes, over 700 of which he had written? 361.

How did a spider inspire a king? 466-7.

According to the Babylonian myth, how did mankind lose the gift of immortal life? 7.

What is the only major sport that is completely American in origin? 101.

How do greenhouse plants produce blossoms out of season? 226.

What family occupied five European thrones in the early 19th century? 341-2.

Where did Louis Braille get the idea for an alphabet for the blind? 396.

How does a bird stay on its perch when it falls asleep? 242 illustration.

How did the term cubism originate in painting? 407.

What is a squared circle? 388.

Why is the blood of some invertebrates blue? 317.

Who were the first five players to be elected to the Baseball Hall of Fame? 94.

How does an enzyme work? 203 illustration.

What great European capital lies on both banks of the Danube River? 479.

How does a barometer help to forecast weather? 81.

Where is the largest bell that was ever cast? 154.

What part of the body weight is blood? 313.

What explorer flew over both the North and the South poles? 531.

Who was the first man to go up in a balloon? 41.

How long does it take a hen's egg to hatch? 255.

Why are bobolinks welcomed by farmers in the North and dreaded in the South? 330.

How do bees carry pollen? 125.

How did Bombay become an English possession? 340.

How are book sizes indicated? 352-3.

Where is the oldest university in the United States? The first public school? 374.

What do the "wild men of Borneo" use for "walls" to separate the quarters in their long houses? 368.

How do social bees differ from solitary bees? 126.

Where did Columbus first land in the New World? 20.

What great painter of animals had her own private menagerie? 343.

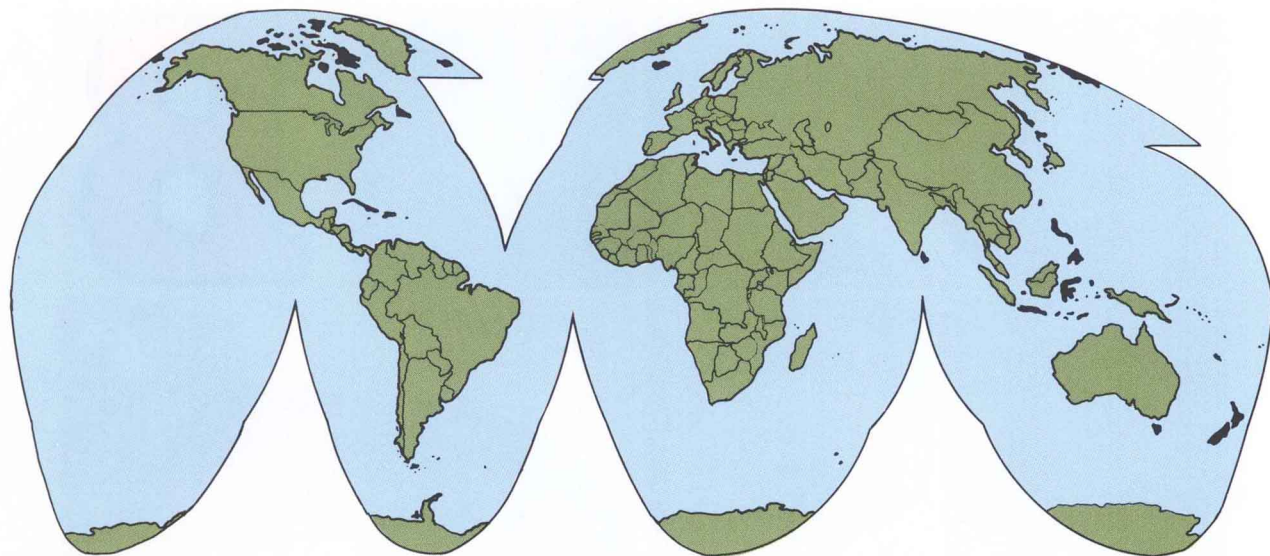
How did Buffalo Bill get his nickname? 490.

Who was the ploughboy poet? 512.

Who are the "three B's" of music? 394.

What sport attracts more paid admissions every year than any other in the United States? 97.

What conditions must exist if brainwashing is to succeed, and how permanent is the technique? 404.



HERE AND THERE IN VOLUME 3

From the A-1 satellite to the zygote cell, thousands of subjects are gathered together in Compton's Encyclopedia and Fact-Index. Organized alphabetically, they are drawn from every field of knowledge. Readers who want to explore their favorite fields in this volume can use this subject-area outline. While it may serve as a study guide, a specialized learning experience, or simply a key for browsing, it is not a complete table of contents.

Arts

Bach Family	10
George Balanchine	22
James Baldwin	23
Ballet	32
Band	54
Imamu Amiri Baraka	78
Barrymore Family	84
Béla Bartók	85
Bead and Beadwork	113
The Beatles	119
Ludwig van Beethoven	136
Bix Beiderbecke	143
Jack Benny	163
Ingmar Bergman	166
Bibliography	186
Biography	222
Book and Bookmaking	345
Constantin Brancusi	406
Marcel Breuer	434
John Bunyan	501

Physical Science

John Bardeen	80
Basalt	86
Beach and Coast	112
Henri Becquerel	123
Bentonite	165
Black Hole	306
Niels Bohr	332

Living Things

Bacteria	12
Banana	51
Bat	104
Bear	116
Beaver	120
Bee	124
Beetle	137
Berry	176
Biochemistry	198
Biogeography	217

Biological Clock	224
Biology	228
Biophysics	237
Birch	239
Birds	240
Botanical Garden and Arboretum	377
Botany	379
Butterfly and Moth	521

Medicine

Claude Bernard	174
Bioengineering	204
Bioethics	214
Biofeedback	216
Birth Control	282
Elizabeth Blackwell	309
Blindness	311
Blood	313
Bone	342
Brain	397
Bubonic Plague	473
Burn and Scald	506

Technology and Business

Ballistics	37
Balloon and Airship	38
Bank and Banking	64
Beer and Brewing	132
Bicycle	187
Bionics	233
Bomb	337
Brass	410
Bread and Baking	428
Brick and Tile	436
Bridge	439
Bronze	463
Budget	485
Building Construction	491
Bus	510
Business Cycle	517

Geography

Bahamas	20
Bahrain	20
Balkans	25
Bangladesh	60
Barbados	78
Belgium	145
Belize	152
Belorussian Soviet Socialist Republic	159
Benin	162
Bermuda	173

Bhutan	180
Bolivia	333
Borneo	368
Botswana	382
Brazil	412
British Columbia	450
Bulgaria	496
Burkina Faso	505
Burundi	509

History

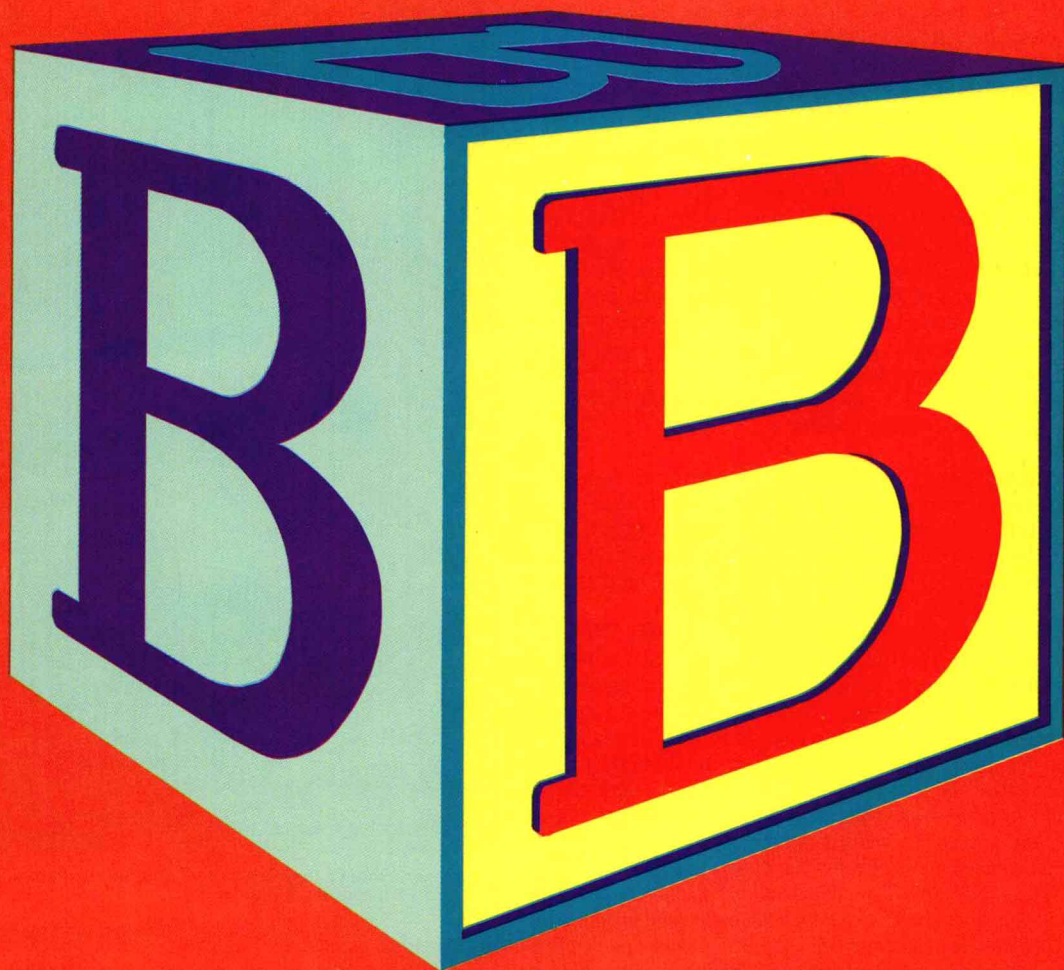
Babylonia and Assyria	3
Balkan Wars	31
Sirimavo Bandaranaike	31
Menachem Begin	142
Boer War	330
Boxer Rebellion	387
Leonid Brezhnev	435
James Buchanan	474
George Bush	512
Byzantine Empire	533

Social and Political Science

Bill of Rights	193
Alfred Binet	197
William Blackstone	309
Blockade	312
Blue Laws	319
Louis D. Brandeis	406
Bureaucracy	503

Potpourri

Badminton	16
Bankruptcy	74
Baptists	76
Baseball	87
Basketball	97
Bell	154
Bible	181
Bilingual Education	191
Billiards	191
Black Americans	288
Black Muslims	307
Board Games	320
Boating	324
Bowling	385
Boxing	388
Braille	396
Brainwashing	404
Buddhism	480
Bullfighting	499
Button	528

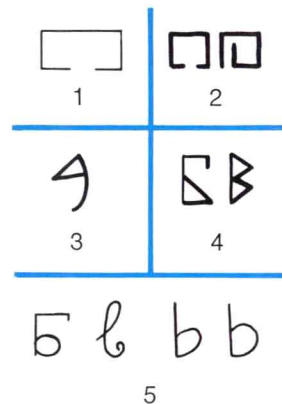


The letter B

probably started as a picture sign of a house, as in Egyptian hieroglyphic writing (1) and in a very early Semitic writing used about 1500 B.C. on the Sinai Peninsula (2). About 1000 B.C., in Byblos and in other Phoenician and Canaanite centers, the sign was given a linear form (3), the source of all later forms. In the Semitic languages the sign was called *beth*, meaning "house."

The Greeks changed the Semitic name *beth* to *beta*. This word is found in the English word *alphabet*. Later, when the Greeks began to write from left to right instead of from right to left, they turned the letter around (4). The Romans took this form almost unchanged into Latin, and from Latin it came down into English.

The present small "b" first took shape in later Roman times, when scribes fell into the practice of omitting the upper loop of the capital and making the sign long and thin (5). By the 9th century the letter had its present form.



BAAL. Centuries ago the Semitic word *baal* meant lord, master, or god. The Semitic peoples had many gods. The god Baal and the goddess Astarte were among the greatest. Both Baal and Astarte were symbols of fertility. Baal was supposed to make crops grow and flocks increase. He was the god of the sun. Astarte was goddess of the moon.

The violent religion of Baal was spread by Phoenician sailors throughout the Mediterranean world (see Phoenicians). Baal cults grew up in Asia Minor, Egypt, Greece, Rome, Carthage, and Spain. Baal and Astarte, under different names, were worshiped in Babylonia and Assyria. People were taught to believe that Baal was responsible for droughts, plagues, and other calamities. The priests would make sacrifices to appease the angry god. Bullocks, goats, sheep, and sometimes human beings were burned alive. In the Bible, Baal is also called Beelzebub (Baalzebub), for one of Satan's fallen angels.

BABBAGE, Charles (1792–1871). Although he was a 19th-century mathematician, Charles Babbage is credited with inventing the modern computer. He also designed the speedometer and the cowcatcher (a sloping frame on the front of a locomotive that tosses obstacles off the railroad tracks).

Charles Babbage was born on Dec. 26, 1792, in Teignmouth, Devon, England. At age 20 he helped found the Analytical Society, whose purpose was to introduce developments from Europe into English mathematics. At the same time Babbage first got his idea for mechanically calculating mathematical tables. Later he made a small calculator that could perform certain mathematical computations to eight decimal places. In 1816 he was elected a fellow of the Royal Society of London, the oldest scientific society in Great Britain. Then, in 1823, he received government support for the design of a projected calculator with a 20-decimal capacity. While he was developing this machine he also served (1828–39) as a professor of mathematics at the University of Cambridge.

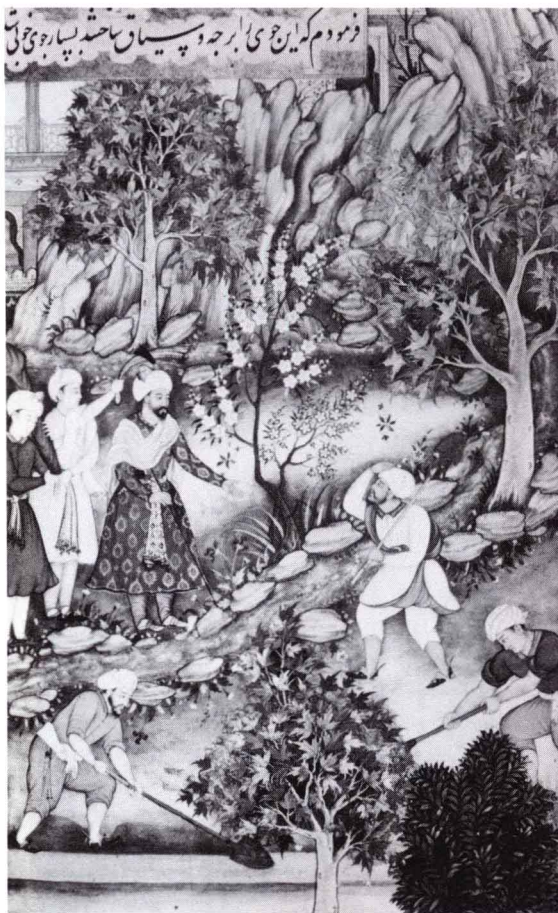
In 1834 Babbage invented the principle of the analytical engine, the forerunner of the modern electronic computer. However, the government refused Babbage further support and the device was never completed. A calculator based on his ideas was made in 1855 by a Swedish firm, but the computer was not developed until the electronic age.

Babbage published papers on mathematics, statistics, physics, and geology. He assisted in establishing England's modern postal system. Babbage died in London on Oct. 18, 1871. (See also Computer.)

BABER, or BABUR (1483–1530). The first Mughal, or Mongol, emperor of India (1526–1530) and founder of the Mughal dynasty there was Baber. He also won distinction as a military commander, a gifted poet and diarist, a statesman, and an adventurer.

As ruler of the principality of Fergana in Turkestan, his birthplace, Baber first tried to recover Samarkand, the former capital of the empire founded by

Courtesy of the trustees of the British Museum



The emperor Baber inspects a garden in an illustration from his 16th-century 'Babur-nameh'.

his Mongol ancestor Tamerlane (Timur Leng). He occupied the city briefly in 1497 and 1501, but could not hold it. He lost his own kingdom in 1503, seized Kabul, Afghanistan, the next year, and made a final unsuccessful attempt to capture Samarkand in 1511–12. Raiding India repeatedly, he defeated the Sultan Ibrahim Lodi of Delhi at the battle of Panipat (1526). He extended his domain in 1527 when, fighting with an outnumbered army, he defeated Rana Sanga, who led an army formed by a confederacy of Indian kingdoms. In 1529 Baber subdued the last major resistance in northern India. His grandson, Akbar, consolidated the empire (see Akbar).

A descendant of the first Mongol conqueror, Genghis Khan, Baber was born on Feb. 15, 1483. His original name was Zahir-ud-Din Muhammad. His prose memoirs, the 'Bābur-nameh', were translated from Turki into Persian (1589) in Akbar's reign, and later into English (1921–22). His poems and diaries show him to be a man of wit, generosity, and culture. He died at Agra, India, on Dec. 26, 1530.

BABOON see APE AND MONKEY.

BABYLON. On the Euphrates River, in the land that is now Iraq, ruins of the world's first great city stand alone in the desert. The city bore the proud name Bab-Ilu, meaning "gate of the gods." The Hebrews called it Babel. In the Greek and Latin languages the name took the form Babylon, and the plain on which the city stood was called Babylonia.

During the first thousand years of its known history, Babylon was a mere village. It became the capital of the kingdom of Babylon about 1894 B.C. and reached its first peak of glory in the reign of Hammurabi, the lawgiver. This great king beautified the city with palaces, temples, and towers and made it the religious and cultural center of western Asia. In its temples scholarly priests copied and preserved the writings of the Sumerians, from whom the Babylonians derived their civilization. For centuries the city was controlled by various tribes, including the Kassites, the Chaldeans, the Aramaeans, and the Assyrians. Throughout much of that period, Babylon continued to be regarded as a center of learning and culture, even by its conquerors. The last of the Assyrian

ruled of Babylon, Ashurbanipal, died in 627 B.C.

When Assyria declined, Babylon rose once more to wealth and imperial power under Nebuchadnezzar II (604–561 B.C.). This king is remembered in the Old Testament for his destruction of Jerusalem and the Babylonian captivity of the Jewish people. In Babylonia he was celebrated as the builder who made Babylon the most splendid city in the world.

The original city stood on the right (west) bank of the Euphrates. Nebuchadnezzar extended it to the left bank as well and built a stone bridge across the river. The city was in the shape of a square, surrounded by a massive towered wall. Palaces and temples were of vast dimensions.

Nebuchadnezzar's own great palace achieved a touch of fairyland from its famous Hanging Gardens, which the Greeks counted as one of the Seven Wonders of the World (*see* Seven Wonders of the World). The beautiful Gate of Ishtar spanned Procession Street, which led to the Temple of Marduk, chief god of Babylon. Near it stood a great terraced tower (ziggurat), built in seven receding stories with a sloping ramp spiraling around it to the top. This may have been the original Tower of Babel described in the Bible (Gen. xi); but it was only one of many artificial "holy mountains" in and around Babylon.

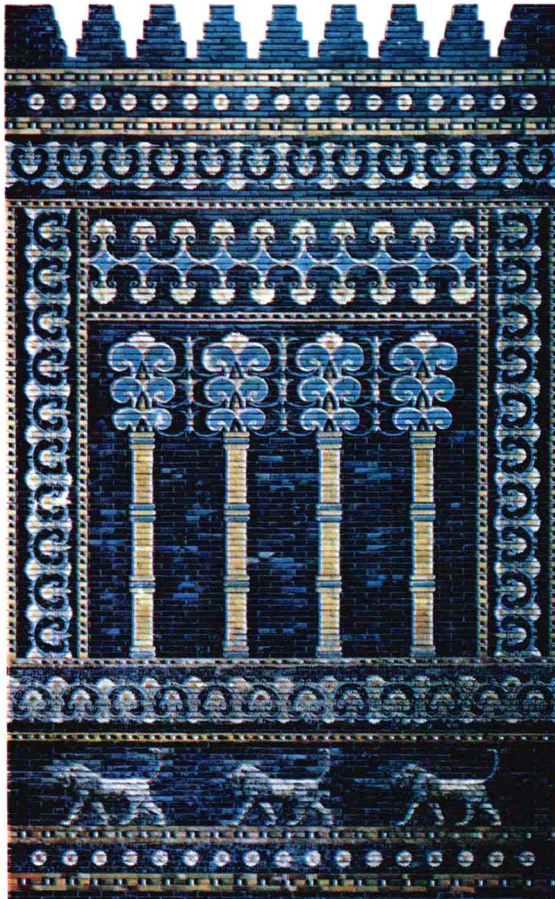
Babylon lost its independence forever when it fell to Cyrus the Great of Persia in 539 B.C., but it continued to be a center of trade and culture. It was still fairly prosperous when Alexander the Great took up his residence in Nebuchadnezzar's palace, where he died in 323 B.C. His successor, Seleucus, built a new city, Seleucia, nearby on the Tigris, because it had a deeper channel for navigation. From this time Babylon rapidly decayed. Its structures, which were faced with glazed brick, were torn down to provide brick for building elsewhere, and the once proud capital was reduced to a vast ruin. The ruins are near the town of al Hillah in Iraq. (*See also* Babylonia and Assyria; Mesopotamia.)

BABYLONIA AND ASSYRIA. The story of Western civilization began on a small plain in southwest Asia. Here 50 centuries ago cities rose, government developed, and great inventions—including writing—were made. The civilization that was born here spread westward to Palestine, Greece, and Rome. From these Mediterranean lands it entered the mainstream of Western civilization.

The Babylonian plain is very fertile. The land was built up of mud and clay deposited by two great rivers, the Tigris and the Euphrates. These twin rivers come down from mountains in the north, cut southeastward through hilly grasslands, and finally cross the plain they created to reach the Persian Gulf. The Greeks named the land between them Mesopotamia, "land between the rivers." Today it is called Iraq. Tradition says the Garden of Eden was here.

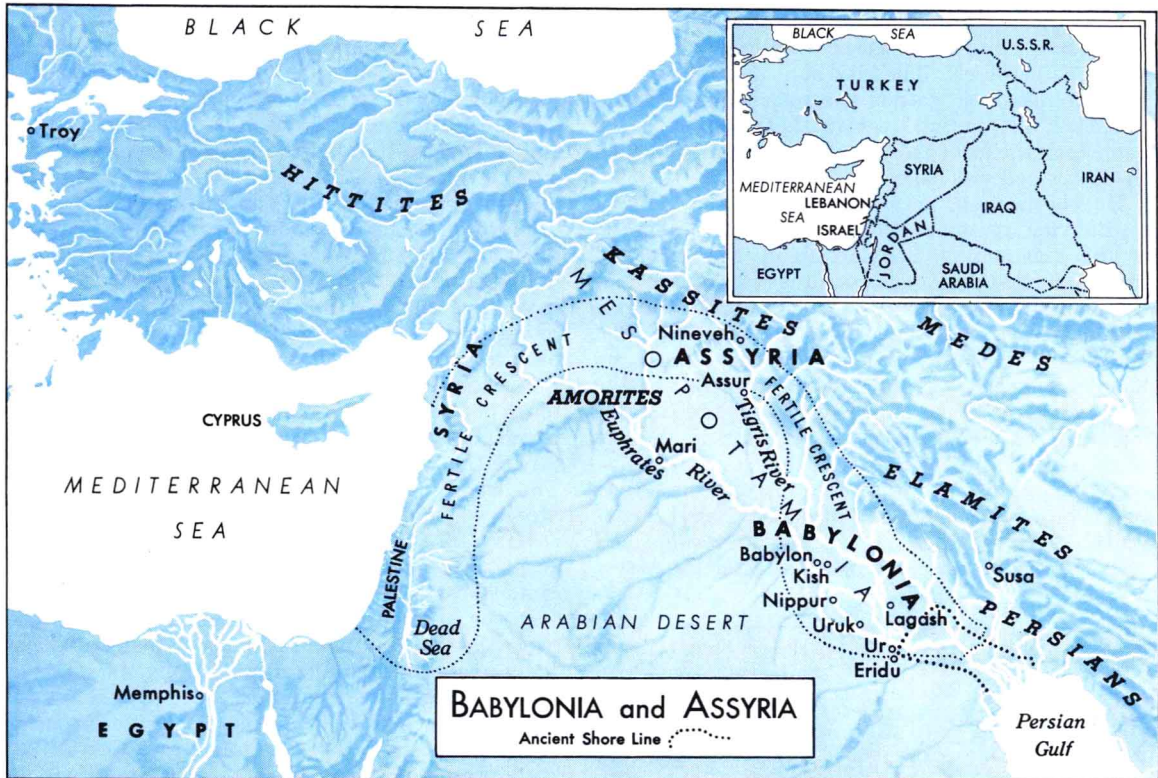
Three main peoples contributed to the civilization of Mesopotamia. The earliest were the Sumerians. They lived in a small county-sized area around

Brightly colored glazed bricks were used to create this decoration in the throne room of the palace of King Nebuchadnezzar II of Babylon.



EB Inc., with permission of the Staatliche Museen zu Berlin—GDR

BABYLONIA AND ASSYRIA



The earliest cities of which we have records appeared around the mouths of the Tigris and Euphrates rivers. Gradually

the mouths of the Two Rivers. Their land was called Sumer (in the Bible, Shinar). The culture they originated spread to the Semitic peoples, who lived side by side with them. About 1800 B.C. political power moved north up the Euphrates to the Semitic city of Babylon in Akkad. The entire plain then became known as Babylonia. Centuries later the center of power moved north once more to warlike Assyria, in the rolling hill country of the upper Tigris Valley.

Just as in ancient Egypt civilization first appeared on the lower Nile, so in Mesopotamia the earliest cities clustered around the mouth of the Euphrates. It

civilization spread northward and around the Fertile Crescent. The small map shows the nations that occupy this area today.

is now generally admitted that Babylonian civilization was somewhat earlier than that of Egypt.

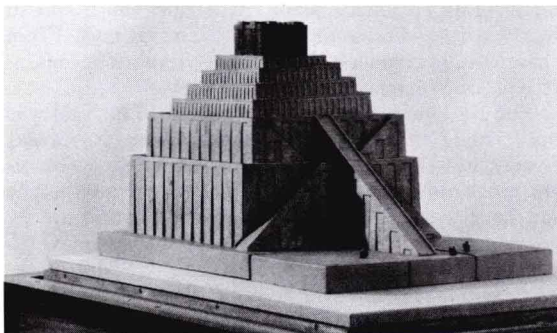
The Sumerians Build the World's First Cities

We do not know who the Sumerians were or when they first appeared in Mesopotamia. Their language has no relation anywhere. We do know they were a highly gifted and creative people.

Mesopotamia is a land of blazing sun and very little rainfall. Farming can be carried on only by irrigation. Centuries before the beginning of history, the Sumerians undertook the stupendous task of building embankments to control the flood waters of the Euphrates River. Gradually they drained the marshes and dug irrigation canals and ditches. Large-scale co-operation was needed to build the irrigation works, keep them in repair, and apportion the water. This need gave rise to government and laws.

The rich soil produced abundant crops of barley, emmer, beans, olives, grapes, and flax. For the first time there was a surplus to feed city workers—artists, craftsmen, and merchants. With this great change in living habits, civilization began. The name “urban revolution” has been given to this new period in history. There were still no nations, only small city-states. The ruler of a city-state was called an *ensi*.

The Sumerians built their villages on artificial mounds to protect them from any normal floods. Very early they learned to make bricks in molds and dry

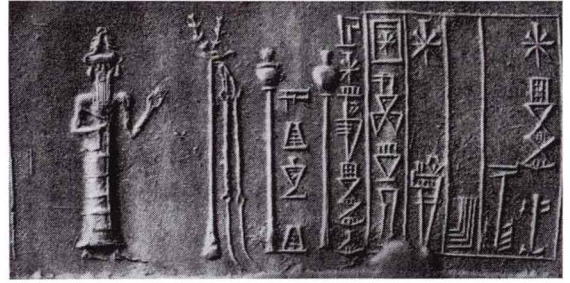


Each city built a lofty artificial mountain, at the top of which stood a temple to the people's chief god. This is a reconstruction of the Tower of Babel, described in the Bible.

them in the sun or burn them in kilns. The houses were small and crowded close together on narrow lanes. Some were two or more stories high. The whole city was surrounded by a wall for protection. Outside the wall were the huts of the poor, built of reeds plastered with clay.

Each city grew up around the shrine of a local god. As a city grew in wealth, its temple became an elaborate structure. The temple buildings stood on a spacious raised platform reached by staircases and ramps. From the platform rose the temple tower, called a ziggurat (holy mountain), with a circular staircase or ramp around the outside. On the temple grounds were quarters for priests, officials, accountants, musicians and singers; treasure chambers; storehouses for grain, tools, and weapons; workshops for bakers, pottery makers, brewers, leatherworkers, women spinners and weavers, and jewelers. There were also pens for keeping the sheep and goats that were destined for sacrifice to the temple god.

Horses and camels were still unknown, but sheep, goats, oxen, donkeys, and dogs had been domesticated. The plow had been invented and the wheel (a solid piece of wood) was used for carts as well as for shaping



This delicate relief was made by rolling a small cylindrical seal over wet clay. A Sumerian physician who lived in Larsa about 2000 B.C. used the seal to put his signature to documents.

pottery. Oxen pulled the carts and plows; donkeys served as pack animals. Bulky goods were moved in boats on the many rivers and canals. The boats were usually hauled from the banks, but sails also were in use. Before 3000 B.C. the Sumerians had learned to make tools and weapons by smelting copper with tin to make bronze, a much harder metal than copper.

Mud, clay, and reeds were the only materials the Sumerians had in abundance. Trade was therefore necessary to supply the city workers with materials. Merchants went out in overland caravans or in ships to exchange the products of Sumerian industry for wood, stone, and metals. There are indications that Sumerian sailing vessels even reached the valley of the Indus River in India. The chief route, however, was around the Fertile Crescent, which lies between the Arabian Desert and the northern mountains. This route led up the valley of the Two Rivers, westward to Syria, and down the Mediterranean coast.

They Learn to Write on Clay

Whether the Sumerians were the first to develop writing we cannot say. At any rate, their writing is the oldest that has come down to us. They wrote on clay. Clay tablets, when baked, are almost indestructible. Archaeologists have dug up many thousands of them. Some may be older than 3000 B.C.

The earliest writing of the Sumerians, as of other people, was picture writing. They began to develop their special style when they found that, on soft wet clay, it was easier to impress a line than to scratch it. To draw the pictures they used a stylus—probably a straight piece of reed with a three-cornered end. An unexpected result came about. The stylus could best produce triangular forms (wedges) and straight lines. Curved lines therefore had to be broken up into a series of straight strokes. Pictures lost their form and became stylized symbols. We call this kind of writing on clay *cuneiform* from the Latin *cuneus*, meaning "wedge."

A tremendous step forward was taken when the symbols came to be associated with the *sound* of the thing shown rather than with the idea of the thing itself. Each sign then represented a syllable. Cuneiform writing never developed an alphabet, although it continued to be written long after the alphabet appeared.



Long ago students sat on these hard benches in a schoolroom in Mari and practiced the difficult art of cuneiform writing. In the top picture, a modern scholar shows how the stylus was used to impress wedges and lines on a clay tablet.

BABYLONIA AND ASSYRIA

Schools for Reading, Writing, and Arithmetic

Cuneiform was difficult to learn. The boy or girl who wanted to master it usually went to a temple school. The textbooks were clay tablets. The teacher wrote on the left-hand side and the pupil copied the model on the right. If he made a mistake, he could smooth it out. He began by making single wedges in three positions, horizontal \neg , vertical ∇ , and oblique \wedge . Then he went to work on wedge groups, such as $\nabla\neg$ (pronounced *lim*). Thousands of groups had to be mastered. Finally he was set to copying a book. Usually he did not get very far. Many first chapters of all important works have come down to us from students' tablets. Of the rest of the books there are only fragments.

The pupils also studied arithmetic. The Sumerians based their number system on 10, as we do, but they multiplied 10 by 6 to get the next unit; multiplied 60 by 10; and then multiplied 600 by 6, and so on. The number 60 has the advantage of being divisible by 2, 3, 4, 5, 6, 10, 12, 15, and 20. We follow the Sumerians in dividing the circle into 360 degrees. From these early people we also get our "dozen" (a fifth of 60) and our division of the clock to measure hours, minutes, and seconds.

The Sumerians had standard measures, with units of length, area, and capacity. The standard weight, the mina, made up of 60 shekels, was about the same as our pound. Sixty minas made one talent. There

was no coined money. Standard weights of silver served as measures of value and as a means of exchange.

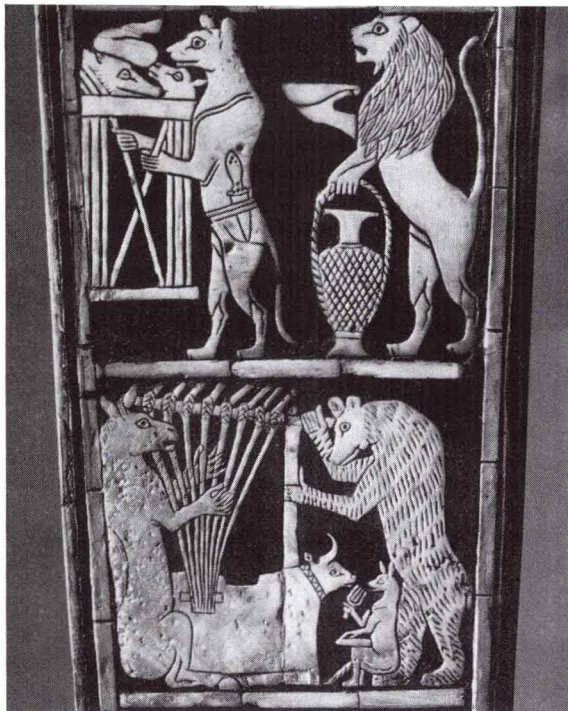
From the earliest times the Sumerians had a strong sense of private property. Having learned to write and figure, they kept documents about every acquired object, including such small things as clothes and shoes. Every business transaction had to be recorded. Near the gate of a city a scribe would sit ready to sell his services. His hands would move fast over a lump of clay, turning the stylus. Then the contracting parties added their signatures by means of seals. The usual seal was an engraved cylinder of stone or metal that could be rolled over wet clay.

In the course of time cuneiform was used for every purpose, just as writing is today—for letters, epics and legends, prayers and incantations, dictionaries, even mathematical and astronomical treatises. The Babylonians and Assyrians adapted cuneiform for their own Semitic languages and spread its use westward into Syria, Anatolia, Armenia, and Iran.

Stories of Gods and Heroes

As people got acquainted with the gods of other cities, they worked out relationships between them, similar to the relationships of people on the earth. Anu, a sky god, originally the city god of Uruk, came to be regarded as the greatest of all the gods. His closest rival was the storm god Enlil of Nippur. The great gods were worshiped in the temples. Each family had little clay figures of its own household gods and small houses or wall niches for them.

The Sumerians knew that their ancestors had created the ground they lived on by separating it from the water. According to their Creation myth, the world was once watery chaos. The mother of Chaos was Tiamat, an immense dragon. Gradually the gods appeared and decided to bring order out of Chaos. Tiamat created an army of dragons. Enlil called the winds to his aid. Tiamat came forward, her mouth wide open. Enlil pushed the winds inside her and she swelled up so that she could not move. Then Enlil



About 2700 B.C. an artist decorated the sounding box of a lyre with these comic pictures (left), which probably illustrate a well-known fable. The pictures are mosaics of shell, gold, and silver on a background of lapis lazuli. The lyre, 49 inches



high, is in the University Museum, Philadelphia. A king probably wore this beautiful helmet of pure gold (right). It is in the form of a wig, with hairs chased, and locks and curls hammered out in relief. The helmet is in the Baghdad Museum.

split her body open. He laid half of it flat to form the earth. The other half he arched over the earth to form the sky. The gods then beheaded Tiamat's husband and created man from his blood, mixed with clay.

The longest story is the Gilgamesh epic. Gilgamesh, a great hero like Hercules, started out from Uruk to search for the plant of life. After many adventures he found the plant and put it in his boat, but a serpent came up out of the water and snatched it away.

Another searcher for eternal life was Adapa, a fisherman. He had gained wisdom from Ea, god of water. The other gods, jealous of his knowledge, called him to heaven. Ea warned him not to drink or eat while there. Anu offered him the water of life and the bread of life because he thought that, since Adapa already knew too much, he might as well be a god. Adapa, however, refused and went back to earth to die, thus losing for himself and for mankind the gift of immortal life. These stories resemble somewhat the Bible story of Adam and Eve (Gen. iii, 22).

Floods were an ever-present danger to the Sumerians. One story tells of a great flood that covered all the land. Utnapishtim, like Noah in the Bible, built a large ship in which he saved his family and "the beasts of the field and the birds of heaven."

The Sumerians Disappear as a People

The cities of Sumer warred with one another from time to time, and strong rulers spread their power

over neighboring cities. Each of the important cities enjoyed its day of glory—Lagash, Uruk (Erech, in the Bible), and Ur. Kings (called lugal) replaced the city rulers (ensis). In general, however, the Sumerians seem not to have been a very warlike people. They had only a citizen army, called to arms in time of danger.

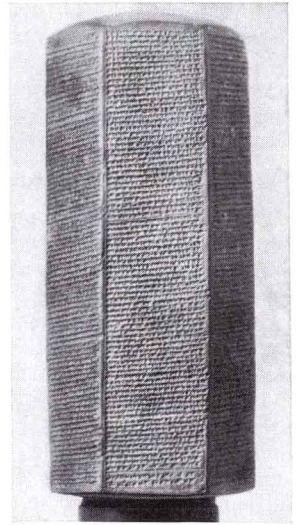
About 2340 B.C. a Semitic king, Sargon of Akkad, conquered the Sumerians and then went on to build an empire that stretched westward to the Mediterranean Sea. The empire was short-lived, but while it lasted art and literature flourished.

Led by Ur (the city from which Abraham is said to have set out on his travels) the Sumerians again spread their rule far westward. During Ur's supremacy (about 2150–2050 B.C.) Sumerian culture reached its highest development. Shortly thereafter the Sumerian cities lost their independence forever, and gradually they completely disappeared as a people. Their language, however, lived on as the language of culture, just as Latin did in the Middle Ages; and their writing, their business organization, their scientific knowledge, and their mythology and law were spread westward by the Babylonians and Assyrians.

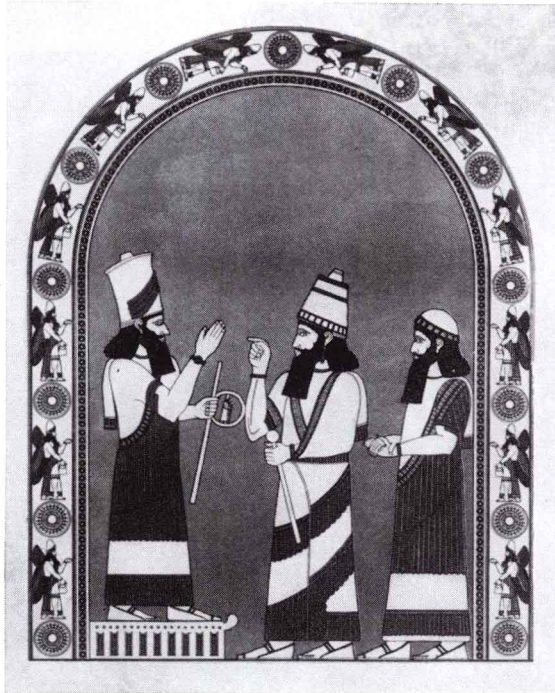
The First Kingdom of Babylon

The city of Babylon now rose to power (*see* Babylon). Its brilliant First Dynasty lasted 300 years and reached its greatest glory about 1800 B.C. under the great King Hammurabi. Hammurabi spread the rule of Babylon south into Sumer and westward around the Fertile Crescent into Syria, on the Mediterranean. He was most famous, however, for the code he published to unify the legal practices in his empire. He had the law code inscribed on a huge pillar, or *stele*, set up in a public place, and sent copies of it to all his governors and judges. At the top of the stele, Hammurabi was pictured as receiving the laws from a god, although most of the laws were already old and had long been in writing.

The code supplies a wonderful insight into the habits and customs of the time. Women were free and respected. There was a system of police and a postal service. Trade with distant lands flourished. The people were divided into three classes—nobles, with hereditary estates; freemen, who could own land but not leave it to their children; and slaves, who were sold in the open market. Enslavement for debt



This six-sided clay book contains an account of the Assyrian king Sennacherib's siege of Jerusalem.



Sargon, accompanied by an attendant, stands facing a god, probably Assur. The god holds a staff and a ring and seems to be investing the king with these symbols of royalty. The picture is a restoration of a painted plaster decoration found in the ruins of Sargon's palace at Dur Sharrukin (now Khorsabad, Iraq).

BABYLONIA AND ASSYRIA

was legal, but most of the slaves were captives taken in war. Maximum prices and maximum (not minimum) wages were fixed by decree. Punishments were very severe, usually based on the principle of "an eye for an eye and a tooth for a tooth." For example, if a man destroyed another man's eye, his own eye was put out.

Babylonian Gods—Marduk, Ishtar, and Tammuz

Hammurabi made his own Semitic language official throughout his kingdom and raised the god of Babylon, Marduk, to first place among the deities. Scholars rewrote old Sumerian myths and gave Marduk credit for creating the universe instead of Enlil. The Babylonians' chief female deity was the ancient mother goddess Innini of Uruk, renamed Ishtar.

Ishtar, as goddess of fertility, could grant her worshippers crops, lambs, or children. Her son Tammuz was associated with vegetation. In the hot mid-summer month—called Tammuz—vegetation dried up, and people fasted until Tammuz rose from the dead and made the earth green again. The worship of Ishtar (also called Astarte) and Tammuz spread over southwest Asia and reached Egypt in the myth of Isis and Osiris. Later the deities appeared in Greece as Demeter and Persephone. In Palestine, as late as 600 B.C., the prophet Ezekiel was horrified to see women in Jerusalem "weeping for Tammuz" (Ezek. viii, 14).

The Kingdom of Assyria

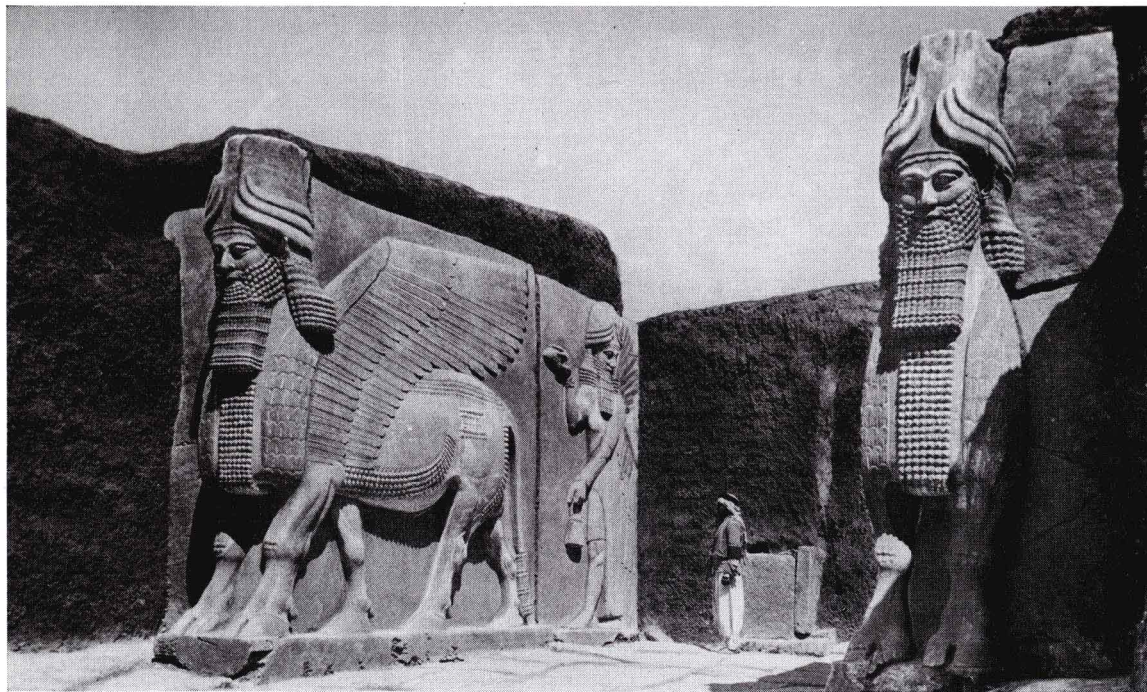
After Hammurabi's death, wave after wave of barbaric Indo-European tribes swept down from the

northern mountains. For centuries the entire civilized world was plunged into darkness. The Hyksos invaded Egypt. The Kassites overran Babylonia. The Hurrians occupied the rest of the Fertile Crescent, from Assyria into Palestine. This period has been called the Middle Ages of antiquity. About 1400 B.C. the Assyrians freed themselves from the invaders' rule. Then they extended their kingdom northward.

Assyria took its name from its chief city, Assur, on the upper Tigris. Lying north of Babylonia, on the great trade route of the Fertile Crescent, the country was frequently invaded from the north as well as from the south. Constant warfare made the Assyrians fierce fighters, and traders who passed their way were forced to pay them tribute for protection.

The Assyrians had long been under the control of Babylon and had absorbed Babylonian culture. Like the Babylonians they were Semites, and their language was almost identical with the Babylonian. From the Hittites they learned the use of iron and developed powerful weapons. From them they also acquired horses and were the first to use them in war as cavalry instead of for drawing chariots. They built up a military state, organized for war; and they boasted of their cruelties in order to strike terror into the hearts of their enemies.

Assyria's greatest period of expansion took place as the power of the Hittites and Egyptians gradually weakened in Syria and Palestine. The Assyrian king Tiglath-Pileser III (745–727 B.C.) took Damascus, in Syria. Sargon II (722–705 B.C.), most famous of



These Assyrian bulls, carved in alabaster, stand 16 feet high and weigh 40 tons. Behind each bull stands a winged human

figure carrying a bucket and cone. The gateway was the outer portal of the fortresslike palace of Sargon II at Dur Sharrukin.