

16

COMPTON'S ENCYCLOPEDIA

Migra  
Myth

COMPTON  
ENCYCLOPEDIA

VOLUME

16

**Migra—Myth**  
**pages 307-582**

# Compton's Encyclopedia

**and Fact-Index**

**E.E. Compton Company**

**Division of Encyclopaedia Britannica, Inc.**

**1980 EDITION COMPTON'S ENCYCLOPEDIA**

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BY F. E. COMPTON COMPANY, DIVISION OF ENCYCLOPAEDIA BRITANNICA, INC.

Library of Congress Catalog Card Number: 78-67841  
International Standard Book Number: 0-85229-350-X  
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"*

## HERE AND THERE IN VOLUME 16

AT ODD TIMES when you are just looking for "something interesting to read," without any special plan in mind, this list will help you. With this as a guide, you may visit faraway countries, watch people at their work and play, meet famous persons of ancient and modern times, review history's most brilliant incidents, explore the marvels of nature and science, play games—in short, find whatever suits your fancy of the moment. This list is not intended to serve as a table of contents, an index, or a study guide. For these purposes consult the Fact-Index and the Reference-Outlines.



### Picture Highlights

Part of the Day's Work on a Dairy Farm . . . . .	320
Mineral Crystals of Gemlike Beauty . . . . .	333
An Underground Ore Mine . . . . .	341
The Near Side of the Moon . . . . .	480-1
Diagrams of a Motion Picture Camera and Projector . . . . .	505, 507
A Colorful Collection of Mushrooms . . . . .	553

### Reading for Pleasure

Migrations of People Have Changed History . . . . .	311
Mirages over Land and Water . . . . .	370
Money—How People Use It to Buy, Sell, and Save . . . . .	425b
The Clever Muskrat and Its Winter House . . . . .	570

### School and Home; Work and Play

The Montessori Method of "Progressive" Education . . . . .	474
--	-----

Motorboats—Small Engine-Powered Watercraft . . . . .	531
Multiplication—A Basic Arithmetic Skill . . . . .	542b

### Historical Highlights

The Missouri Compromise on Slavery . . . . .	412
The 'Monitor' and the 'Merrimack' . . . . .	436
The Monroe Doctrine—Keystone of American Foreign Policy . . . . .	457
Sir Thomas More's Defiance of Henry VIII . . . . .	487

### Famous People

A. A. Milne and 'Winnie-the-Pooh' . . . . .	326
John Milton—Great Puritan Poet and Reformer . . . . .	326
The Court-Martial of Billy Mitchell . . . . .	416
The Mohammedan Religion and Its Founder . . . . .	419
James Monroe—5th President of the United States . . . . .	453

Robert Morris, Financier of the American Revolution . . . . .	491
Morse—The Artist Who Invented the Telegraph . . . . .	491
Moses—Prophet, Leader, and Lawgiver of the Jews . . . . .	495
Mussolini—Founder of Fascism, Dictator of Italy . . . . .	571



## The Plant and Animal Kingdoms

Migration—Travels of Birds and Other Animals . . . . .	307
Mink—Aristocratic Fur Bearer . . . . .	345
The Plant That Grows on Other Trees . . . . .	416
The Mollusks and Their Family Tree . . . . .	423
Monkeys—Interesting Animals of Forest and Zoo . . . . .	437
The Mosquito—Always a Pest, Often a Killer . . . . .	496
Exploring the Tiny Forests of Moss . . . . .	500
The Fish That Can Live Out of Water . . . . .	539
Mushrooms—Pale, Flowerless Plants . . . . .	551

## The Wide World of Facts

The United States Military Academy . . . . .	314
Milk—A Basic Food . . . . .	316
Mines—A Source of Minerals . . . . .	338
Mint—Where Metal Is Made into Money . . . . .	366
Monastic Life in Cell and Cloister . . . . .	444
Multiple Births . . . . .	542
Muscles—How They Make the Body Move . . . . .	548

## Marvels of Science and Invention

Minerals—The Raw Materials of Industry . . . . .	331
Monotype—The Machine That Casts Letters Singly . . . . .	451
The Moon—Earth's Nearest Neighbor . . . . .	478
Musical Instruments—Traditional to Electronic . . . . .	568

## The Arts

The Art of Motion Pictures . . . . .	503
Music—A Universal Art . . . . .	554
America's Contribution to the Musical Theater . . . . .	567a
Mythology—Ancient Stories of Gods and Heroes . . . . .	573



## At Home and Abroad

Milwaukee—Key Port and Hub of Industry . . . . .	329
Minnesota—Land of 10,000 Lakes . . . . .	347
Mississippi—Heart of the Deep South . . . . .	372
The Mississippi—"Father of Waters" . . . . .	389
Missouri—Crossroads of the Nation . . . . .	393
The Missouri—America's Mightiest River . . . . .	413
Mongolia—Vast, Dry Pasture of the Mongols . . . . .	431
Montana—Land of Mountains and High Plains . . . . .	458
Montreal—Canada's Largest City . . . . .	476
Moscow—Capital of the U.S.S.R. . . . .	493



## EXPLORING COMPTON'S—VOLUME 16

In what way did the church father the drama? 369.  
Do all birds migrate? 308.

What poet ruined his eyesight writing political pamphlets? 328.

Explain how the mosquito has hampered civilization in many lands. 496.

What animal can "swim" through the soil and disappear in less than a minute? 422.

What important Canadian seaport is nearly 1,000 miles from the Atlantic Ocean? 476a.

Whose picture is engraved on a \$10,000 bill? 429 table.

How does a mountain reveal its age? 535.

What tiny bird makes a 500-mile nonstop flight when it migrates each year? 308.

Why will there always be monkeys on the Rock of Gibraltar as long as it is controlled by Great Britain? 441.

What did the word "monk" originally mean? 444.

Explain how the admission of Missouri to the Union made the slavery problem a national issue. 412.

What advantages helped southern California become the center of motion picture production? 520.

Explain how banding birds has helped clear up some of the mysteries of migration. 308.

Why did the Egyptians mummify their dead? 546.

Why is the Missouri River called the Big Muddy? 413.

Why do the Mohammedans reckon time from the year A.D. 622? 419.

What musician composed at the age of five? 539.

Explain how nature forces man to migrate in modern times. 311.

What doctrine keeps alive the name of the fifth president of the United States? 453.

What is unusual about the mudfish? 539.

Why did the ancients create a mythology? 573.

Do both male and female mosquitoes bite? 496.

What small animal is noted for its ability to slay the deadly cobra? 436 picture.

What are the "five pillars" of Islam? 420.



**Who were the Mound Builders? 534.**

What bird holds the long-distance migration record? 307.

What great composer is buried in an unmarked pauper's grave? 539.

What Roman emperor is said to have killed his guests by serving poisonous mushrooms? 551.

How did Moscow's Red Square get its name? 493-493a.

What are ruminants? 316.

What is the original name Beethoven gave to his "Eroica" symphony? 558.

What is a bayou? 390.

Who were The Five and Les Six? 560, 561.

Who was the first layman to hold the post of lord chancellor of England? 487.

What are first-year cadets at the United States Military Academy called? 314.

Which of the vitamins is called the "sunshine vitamin"? 317.



**What was the terminal point of the Mormons' 1,000-mile trek to the Far West? 488.**

What breed of dairy cows gives the greatest amount of milk? The richest milk? 319 pictures.

What are the four main groups of musical instruments? 568.

What epic poem is considered to be the finest in the English language? 326.

What did the ancient Greeks call the goddesses who presided over the arts and sciences? 550.

What quality of goat's milk makes it superior to cow's milk as a food for humans? 318.

What are the three kinds of muscles of the body? 549.

May pictures of United States coins be published? United States bills? 425b picture.

The oldest known metal mines are the Egyptian mines of Sinai. What metal was mined there? 344.

What was the "Golden Horde"? 435.

Do mosses bear flowers and seeds? 500.

What city has been dubbed the "Machine Shop" of the United States? 329.

According to the Bible, what prophet saw God face to face? 495.

Name some musical instruments that are mentioned in the Bible. 555.

Can Siamese twins be separated successfully by surgery? 542a.

How did the saying "not worth a Continental" originate? 427.

What is a fairy ring of mushrooms? 551.

What is magma? 337.

What are the two distinct types of twins? 542.

What are the movable homes of Mongolia called? 432 picture.

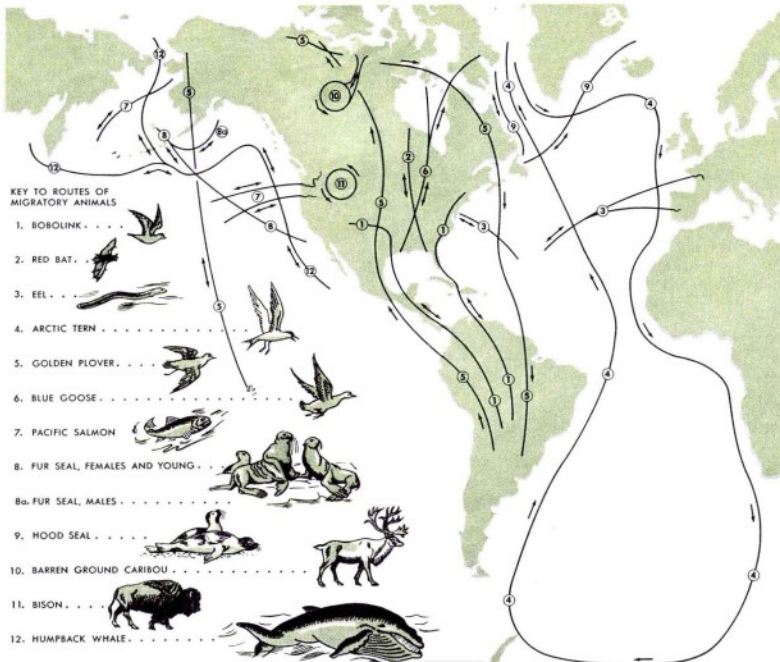
What is the most famous of all mirages? 370-1.

What animal in the Himalayas is thought by many scientists to be the "abominable snowman"? 443.

How do catamarans differ from other boats? 532.

What is the largest money in the world? 427 picture.

What river is known as the "father of waters"? 389.



Many kinds of animals make long migratory journeys between their summer homes, where their young are born, and their winter homes. In most cases the animals make an annual round trip. Salmon and eels make the round trip

only once in their life cycle. They die after returning to the home waters to lay their eggs. This map shows the routes followed by several of the most famous of the bird, fish, and mammal travelers.

## MIGRATION—Travels of Birds and Other Animals

**MIGRATION OF ANIMALS.** Many animals spend their lives in one region or even in one spot. Other animals travel widely. Some make regular trips up and down mountainsides or go from inland streams to the sea. Others make long journeys back and forth across land and ocean. Such animals are *migrants*, and their travels are called *migrations*.

The most famous and beloved migrants are the birds. One of nature's marvels is their great spring flight from their winter homes to their summer nesting grounds. Every year with song and brilliant plumage they pour up from the south—orioles and tanagers from Peru, bobolinks from Argentina, hummingbirds from Mexico. Every year *billions* of birds rush northward from points as far away as Patagonia and the islands of Antarctica. The fall flight to the south is not as exciting as the spring migration.

Most marvelous of all, many birds return to the same place in which they nested the year before. We know that this is so, because banders catch birds in harmless traps and attach an aluminum band to a leg of each bird. The serial number on the band leaves no doubt that a bird recaptured one year is the same one that was banded before (*see* Birds).

### Some Famous Bird Travelers

The long-distance migration record is held by the Arctic terns of eastern North America. They nest in polar regions as far north as there is land. In the fall they fly across the Atlantic and down the coasts of Europe and Africa to the islands of Antarctica. The round trip may total 20,000 miles. Possibly terns lived ages ago in the Eastern Hemisphere. They may have found their way to North America by way of

## MIGRATION

Iceland and Greenland, perhaps over a land bridge that no longer exists. Now instead of taking the easier trip directly south over land, the birds retrace the migration route of their ancestors.

A similar explanation may account for the route of the bobolinks. Originally they nested along the eastern coast of the United States and Canada. Then they spread to the west-central part of North America. They winter in Brazil, as much as 6,000 miles away. In the western part of their range the birds have a safe short cut over land, all the way from Arizona and Texas

across Mexico to South America. Bobolinks still follow the ancestral route. They go first to the Atlantic coast, then south to Cuba and Jamaica, then across hundreds of miles of open sea to the north coast of South America.

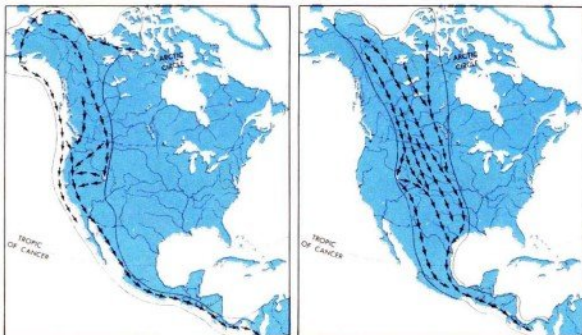
The ruby-throated hummingbird makes a nonstop flight of 500 miles across the Gulf of Mexico to Yucatán. People used to think that this bundle of feathers, weighing no more than a penny, migrated as a "free rider" on the back of an eagle.

The eastern golden plover travels from the Arctic tundras of Canada to the pampas of Argentina. The immature birds migrate through the interior of the continent on the Mississippi flyway. The adult birds journey across northeastern Canada and then make a nonstop flight down the coast and across the sea to South America. In spring they return through the interior over the route used by the immature birds.

Not all birds migrate, nor do all migrants travel long distances. Most tropical birds remain in the same areas throughout the year. In the northern United States and Canada, the woodpeckers, nuthatches, chickadees, grouse, cardinals, juncos, jays, titmice, and others are permanent residents. Robins, bluebirds, and many others, found during the summer months from the Gulf of Mexico to Alaska, merely move to the southern part of their breeding range for the winter.

### Some Explanations of Migration

No one knows with certainty why birds migrate. In ancient times Aristotle and Pliny understood the movements of large birds, such as cranes, storks, geese, and ducks, that fly by day. The disappearance of smaller birds that apparently vanished in the night led to many curious beliefs. People supposed that they spent the winter in hollow trees and caves or that they hibernated in the mud of shallow lakes and swamps. Some birds, it was thought, lived for a part of their lives as different kinds of creatures. The goose



**THE PACIFIC AND THE CENTRAL FLYWAYS**

A migration route is the lane followed by different kinds of birds from breeding grounds to winter homes and back again. A flyway is the broader area where many migration routes come together.

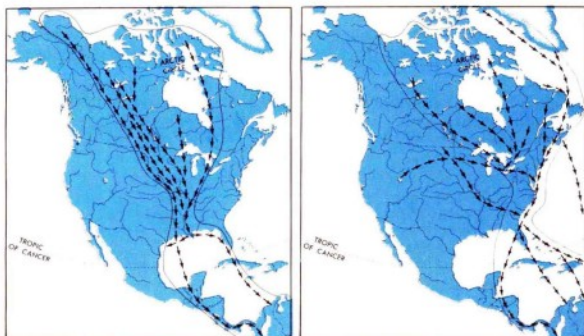
barnacle got its name from the belief that it was the young of a goose which appeared on the coasts of Europe during the spring migration. One 18th-century writer tried to prove that birds flew to the moon for the winter.

Scientists now agree that birds migrate and they know where most birds go. Their knowledge has been obtained through banding. In the United States the bands are issued by the Fish and Wildlife Service. Anyone who catches a bird in a trap or picks up a dead or injured one wearing one of these bands should report the serial number to the Service, which has the record of where it was banded (see *Birds*, sub-head "Bird Banding"). In this way the route of the Arctic tern was discovered. A bird banded on Eastern Egg Rock, Me., was recovered in the Niger River delta, in western Africa. Two birds banded in Labrador were found dead, one on the coast of France, the other near the province of Natal, South Africa. The winter home of the chimney swift was a mystery until 1944, when Indian hunters recovered 13 bands from swifts killed in a Peruvian jungle near the headwaters of the Amazon River.

One theory of migration says that prehistoric birds of the Northern Hemisphere were forced southward during the Ice Age, when glaciers covered large parts of Europe, Asia, and North America. As the glaciers melted, the birds came back to their homelands, spent the summer, and then went south again as the ice advanced with the winter. In time these comings and goings became habits, and birds now migrate though the glaciers have gone.

Another theory proposes that the ancestral home of all modern birds was the tropics. There they lived so well that the region became overpopulated. Many species were crowded northward. During the summer, these birds found plenty of room and food. In winter, however, food became scarce and they had to return to the tropics.





#### THE MISSISSIPPI AND ATLANTIC FLYWAYS

The Mississippi flyway is the most heavily traveled of the four flyways. In the north it spreads out across most of interior Canada. The Atlantic flyway has many migration routes westward.

A newer theory is that increasing daylight stimulates certain glands in the bird's body and prepares it for migration. One scientist is able to make birds migrate in midwinter by exposing them for two months to artificial daylight. Recoveries of marked birds indicate that they fly north as soon as they are set free. The conclusion is that the *urge* to migrate is determined by changes in the bird's body which take place under seasonal changes in the length of daylight.

This theory (called *photoperiodism*) would account for the fact that not all birds migrate at the same time. Each species seems to have its own schedule. The theory would also account for the regularity of migration. Birds arrive at a given place at the same time year after year. Unfavorable weather delays them only a few days. Total hours of daylight, rather than weather, start them on their way.

How birds find their way to the same areas year after year and why they follow their own particular route are still mysteries. They evidently do not follow known landmarks, for many young birds migrate alone without the guidance of experienced adults.

A few things about migration we know. Small land birds and shore birds fly by night and feed by day. Most waterfowl, hawks, chimney swifts, and swallows migrate by day. Normal speed of flight ranges from 20 miles an hour for the small songbirds to 60 miles an hour for ducks, swifts, and hawks.

The airplane has settled the question of how high most birds fly. Collisions between birds and airplanes seldom occur above 2,000 feet. Skyscrapers and lighthouses are among the great dangers of migration. Countless birds are killed by flying into them. Many birds fly so low that their calls may be heard and identified in the night.

We have spoken of the birds that make long non-stop flights, but most journeys are leisurely. After a flight of six or eight hours, the birds pause to feed

and to rest for one or several days. Banding records indicate that a thousand-mile trip may take two to four weeks. Blackpoll warblers, for example, cross the Caribbean Sea in mid-April. They seldom reach the northern United States before May 15. As spring advances over Canada the blackpolls suddenly speed up, and they cover the remaining long trip to their breeding grounds in the Yukon Territory by June 1.

One scientist has enlisted the help of observers all over the country to watch the face of the full moon during the

spring migration through telescopes and binoculars. The silhouettes of birds may be counted and the height at which they are flying estimated. His studies indicate that most night migrants travel until midnight but come to earth soon after.

In some cases the males migrate first. They go ahead to select the nesting site in preparation for the arrival of the females. In other cases males and females travel together and select their mates along the way. Geese, which mate for life, travel as couples in large flocks. In the fall, female shore birds often depart first, leaving the males with the task of caring for the young.

#### Other Animals That Migrate

Many animals undertake migrations similar to those of the birds; that is, they move at regular intervals from a breeding place to another location where climate and feeding conditions are more favorable. In a true migration the animal always returns to the original area.

The Barren Ground caribou of northwestern Canada move south from the shores of the Arctic Ocean in the fall after the mating season. The does and young animals travel together in small companies, moving slowly, often in single file. The old stags follow later. From December to March the caribou move in a great circular, counterclockwise path, apparently following good pasturage. Early in March, just as mosquitoes are beginning to swarm over the plains of their winter range, the caribou funnel out toward the northeast. The does reach the northern part of the range shortly before giving birth to their young.

Herds of bison, or American buffalo, once moved southward for 200 to 400 miles as winter drew near and started north again with the return of mild weather. They traveled in a roughly circular route. Deer, elk, and bighorn sheep migrate to snow-free valleys in autumn and in the spring return to the mountains where their young are born.

## MIGRATION

Red bats make long flights from the northern limits of their range in Canada to the Southern states. Individuals have been seen hundreds of miles at sea, apparently on their way to tropical islands. They are found in Bermuda in the winter.

Sea-dwelling mammals also migrate. The female fur seals and their young winter in the Pacific Ocean as far south as San Diego, Calif. The old bulls remain mostly in the Gulf of Alaska and south of the Aleutian Islands. In the spring the bulls return to the breeding grounds on the Pribilof Islands. The females and young follow later, making a 3,000-mile journey to these tiny islands in the Bering Sea. They arrive just in time for the females to give birth to their young. They remain near the Pribilofs during the summer until the pups are able to care for themselves, when they again go south.

California gray whales frequent the coast of California from early winter to late spring. At this time their young are born in the bays and lagoons of the lower coast. As summer draws near, the animals work their way north close to the coast to the Arctic Ocean and the Sea of Okhotsk. On the Atlantic Ocean, the humpback whales are found off Bermuda in the winter. As spring approaches they leave for the waters around Greenland.

### Life-Cycle Migrations

A somewhat different type of migration is shown by various fishes, amphibians, and other sea-dwelling creatures. This movement is a part of the life cycle of the individual; in some cases there is no return journey. The most famous examples are the salmon and the eels. Salmon swim 2,000 miles or more from the open ocean up the very river in which they were born several years before in order to lay their eggs in fresh water. The exhausted, battered fish die after spawning, but their young return to the sea (see Salmon).

Equally dramatic is the story of the eels of eastern United States and western Europe. The adults live in rivers that empty into the ocean. When it is time for breeding, they swim several thousand miles to the depths of the Sargasso Sea, south of Bermuda in the Atlantic Ocean. There they lay their eggs and, like the salmon, die soon after. Their young return to the fresh-water home of the parents (see Eel). The sea lampreys, or lamprey eels, do just the opposite. They live in salt water and breed in fresh water.

Land crabs visit the sea to lay their eggs so that the young may pass the early

stages of their lives in salt water. Marine turtles, on the other hand, visit sandy shores to lay their eggs. Toads live as tadpoles in shallow pools or marshes and return to the pools to lay their eggs. They migrate to dry land between the breeding seasons.

### Other Types of Migration

The term "migration" is often used for other types of travel that are not truly seasonal or related to reproduction. Snowy owls, for example, "migrate" southward when their food becomes scarce in the North.

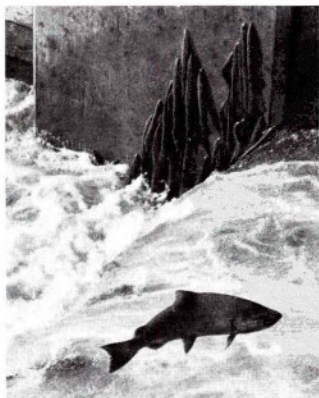
Another type should be called an "emigration" rather than a migration, for there is no return journey. A remarkable example is that of the lemmings, relatives of the field mice. They are small, heavy-bodied rodents, five or six inches long, with very short tails and small ears. They live in Arctic regions around the world. Their food is the vegetation of northern plains and forests. They are themselves one of the chief foods of the snowy owls, foxes, ermines and other meat-eating creatures.

Periodically, the lemmings increase enormously in numbers. They soon exhaust their food supply and begin to leave the area. They pour over mountains and across rivers, eating everything in their path. In Scandinavia they may reach the sea. The pressure of thousands behind them pushes many into the sea and they drown. In Canada they are less likely to come to large bodies of water. They die of exhaustion and starvation. Not all of a colony emigrate; a few remain behind and establish a new generation.

Gray squirrels periodically make the same type of mass emigration when they increase in numbers. Like the lemmings, they move blindly to their death.

The flights of monarchs (butterflies) and dragonflies are believed by some authorities to be "dispersal movements" rather than true migrations; that is, the insects are simply scattering. Many monarchs winter in the areas in which they hatched.

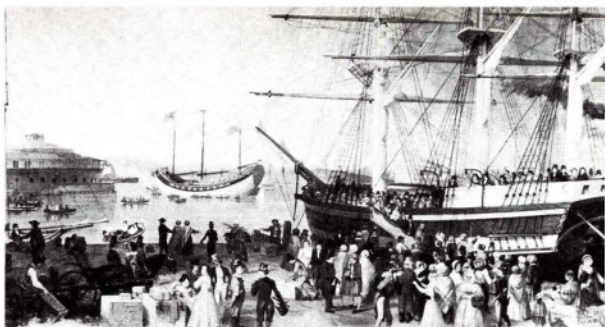
Finally, both plants and animals are said to migrate when they spread from one region to another by land or in the sea. Such migrations have taken place many times during past ages and are taking place today. During the Ice Age, for example, hairy mammoths spread from Asia to North America, crossing an isthmus now covered by the Bering Sea. Ground sloths and armadillos "migrated" northward from South America. Although ground sloths have died out, armadillos are still found in Mexico and Texas.



**MIGRATING SALMON AND LAMPREYS**

The salmon is leaping up a step in the Bonneville Dam fish ladder. On the wall behind it, lamprey eels are climbing by means of suckerlike disks in their heads. Both are traveling upstream to lay their eggs.

## MIGRATIONS OF PEOPLE Have Changed History



In a movement that continues today, immigrants from Europe land at the Battery in New York City in the mid-1800's.

By courtesy of the Museum of the City of New York

**MIGRATION OF PEOPLE.** People enjoy traveling, but they are usually happy to return home. They like to be with their families and friends and do familiar things. There are times, however, when they are forced to leave their homes, migrate to another country, and begin a new way of life.

Most people need deep and compelling reasons to uproot themselves and go elsewhere. To force them to move, there must be both pressure at home and opportunity in another place. Paths to migration must be open; otherwise, many people tend to endure what they have rather than to fight governmental or geographic barriers. The migrants themselves must have the strength to forsake home ties and to venture into a new and often strange environment.

Migration sometimes occurs in great surges, sometimes in a slow, thin stream. It may take place within the boundaries of one country, or it may extend to distant lands. It differs from nomadic wanderings in being more permanent. Nomads drift about constantly and have no fixed home. The Plains Indians of America who followed the herds of bison were nomads. So were the shepherd tribes of the Asian grasslands. Some modern American nomads are the "migratory workers" who move from region to region, harvesting crops. (*See also* Nomads.)

True migrants leave one place to establish themselves in another. If permitted, they usually become citizens (or otherwise pledge themselves to loyalty) and they adopt the customs and habits of their new home. The millions of Europeans who settled in the United States were thus true migrants.

In ancient times migrating peoples generally followed the easiest natural routes. They traveled along coastal plains and river valleys rather than over mountains and through deserts. East to west has been the course of most of the great migrations of mankind. For many centuries the oceans barred mass migrations, and only the most adventurous dared sail out of the sight of land. The Polynesians were among the few ancient peoples who migrated across unknown waters to a new home.

If they can, migrants usually move into areas where the climate and other physical features are somewhat similar to those of their native lands. Many of the Scandinavian immigrants to the United States, for example, settled in Minnesota and Wisconsin.

### Migrating to Earn a Better Living

Within the United States today there is a steady shift of population. People move from farms to towns or cities and from one city to another. One proof of the shift is shown by the fact that communities in the Southwest and in the Pacific states are growing faster than the national average. Some people move there to find a more healthful climate, but most of the westward-moving migrants are seeking better job and business opportunities.

Most of man's migrations throughout history have been for economic reasons. In primitive times he moved to find more plentiful food. Today he seeks the opportunity to earn a better living. His quest has been fundamentally the same.

Nature itself has often forced him to economic migration. In glacial times the advancing ice cap over northern Europe drove man southward (*see* Ice Age). Similar changes have occurred throughout history. They continue to occur today. Drought overtakes the land; groundwater dries up; fields and pastures turn into dust bowls and deserts. Rivers swell into floods, washing away homes and the vital topsoil of croplands. Volcanoes erupt and spread devastating lava over communities and farms. From these natural catastrophes men must flee and find new places to earn livings for themselves and their families.

The migrations which took primitive men from their first homes and scattered them widely were doubtless set in motion by a series of such natural forces. Prehistoric men, who probably arose somewhere in central Asia, wandered westward. Groups of them settled in the fertile valleys of the Nile and of the Tigris and the Euphrates. In time many of their communities were conquered by great migrations of shepherd people from the grasslands of the Caspian Sea. These



conquerors are now called the Indo-European people, because their descendants largely populated both India and Europe. From their Asia Minor home, these people migrated in many directions.

One group of tribes swept southwest to the plateau of Iran, founding the great empire of the Medes and the Persians. Another group advanced into the Greek peninsula and later still another into Italy. Indo-Europeans spread northward over the plains of Russia, around the Baltic, and into the Danube Valley.

Always the ancient migratory people were seeking new hunting grounds, new pastures for their flocks, or new croplands. As the known world filled with people, force became the rule. Men seeking more fertile and prosperous lands could get them only by conquest. The Huns from Asia made inroads into eastern and central Europe, pushing out the Goths, Vandals, Franks, and other tribes. These barbaric people in turn descended upon the weak Roman Empire and virtually destroyed it. For a thousand years there was little or no migration in Europe.

Then came the discovery of America and a whole New World awaited migration and settlement. The land was only thinly populated by Indians who themselves had migrated from Asia centuries before. The first Europeans who came to America were not true migrants. Most of the Spanish and French voyagers of the 1500's came to win a fortune and then go home. Only later, when the population of Europe began to expand rapidly, did migrants come in great numbers to stay. European overpopulation, with its unemployment, scarcities, and even famine, sent huge numbers of immigrants across the sea.

The westward expansion of America itself came partly through this same search for opportunity and partly through an indefinable restlessness and hunger for newness. The West beckoned with a promise of opportunity and freedom unknown in Europe and already diminishing in the crowded cities of the eastern seaboard. In 1849 the prospect of acquiring sudden wealth in California gold spurred the growing number of western migrants in the United States. Less dazzling, but with the promise of greater security, were the grants of free land in the west. Hunters, trappers, and then cattle and sheep ranchers, farmers, and finally oil prospectors led the migration.

The United States has not been the only land of opportunity for overcrowded Europe. The countries of Britain's colonial empire, notably Canada and Australia, have given new homes to Britons and others. In South Africa, Europeans have found a wealth of natural resources. Millions of Chinese and Japanese have migrated from their native lands to other Asian countries and to the Americas. Stricter quotas on both immigration and emigration have slowed these international movements (*see Immigration*).

### Migration to Freedom

Many times throughout history groups of people have been forced to momentous choices by their governments: stay, and give up deeply felt beliefs and

convictions; or leave. Often they have taken the latter choice, rather than disavow their ideals.

The exodus of the Hebrews from Egypt, their land of bondage, is a noted Biblical example of such migration. In the late 1400's Moors and Jews who would not accept Christianity were expelled from Spain. The Pilgrims who landed on Plymouth Rock in 1620 were seeking freedom to worship in their own way (*see 'Mayflower'*). The Quakers who settled in Pennsylvania were also fleeing government control of religious beliefs. The Mormons migrated westward until they could establish their church without persecution from their neighbors (*see Mormons*). In 1848 the failure of a large group of freedom-loving Germans to establish democracy in their land sent many of them as migrants to the United States. Indeed among the millions of immigrants to the United States many have sought not only economic opportunity but the freedom of political and religious belief denied them at home.

The rise of totalitarian states in Europe created new problems in migration. Governments barred passage out of their countries, and only the most resourceful could escape. At the same time, within national boundaries some governments removed people from their homes and sent them to work in state-controlled mines and factories. These same governments annexed weaker neighboring countries and forced their people into similar migrations for state service.

The close of the second World War left millions of *displaced persons* homeless. Many of these disappeared into "iron curtain" countries, often against their will. Others were absorbed by western European countries and American nations. European Jews presented a special migration problem. More than 6 million had been killed in a relentless program of extermination. Most of the remainder ardently desired to live in a national homeland. The new state of Israel accepted all who wished to come and later similarly admitted Jewish refugees from North Africa and western Asia (*see Israel*).

People with the will to migrate have generally been energetic and enterprising. The ancient migrants from Asia into Europe were vigorous people who fused their new ways with established customs and thus quickened the development of civilization. Each successive wave of migration into a new land has done the same.

Migrants have conquered wildernesses, developed natural resources, and established nations. The history of the United States is largely the history of the migrants who settled it and whose descendants moved steadily westward to expand it.

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#### THESE ARTICLES ARE IN THE FACT-INDEX

Miguel, Dom Maria	Miklas, Wilhelm
Evaristo	Mikoyan, Anastas
Mihailovich, Draja	Ivanovich
'Mikado'	Milam, Ben
Mikan, George (Lawrence)	Milan Obrenovitch IV
Mikita, Stan	

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**MILAN** (*mī-lān'*), **Italy**. Italy's chief industrial, financial, and commercial center. Milan, was 60 per cent destroyed and 30 per cent damaged by bombings during World War II. Within the next ten years the energetic people of Milan had rebuilt the city, making it bigger than ever before.



Milan is in the heart of the fertile Po River basin, on a main route of trade and travel with Western Europe. It has a long history of raids and invasions. The city started life as Mediolanum, a Gallie town, and was taken by the Romans in 222 B.C. It was burned once by the Huns, twice by the Goths, and again by the German Frederick Barbarossa in 1162.

After it was rebuilt, Milan suffered a century of civil strife. Then the house of Visconti gained control of the powerful city-state. The last Visconti duke died in 1447, and three years later the rule of the Sforzas began. It continued until 1535. Most of the ancient beauty of the city was created by the heads of these two great houses. When the Sforza line died out, Spain seized Milan and held it until 1714. It then fell to Austria, which governed it until Napoleon created his short-lived Kingdom of Italy and made Milan its capital. After Napoleon's fall, Milan was restored to Austria. In 1859 it was included in the new united kingdom of Italy.

#### Treasures of Art and Architecture

Milan's Gothic cathedral is one of the largest and most beautiful churches in the world. It rises like a brilliant white crown in the heart of the city. Another great church is that of Sant' Ambrogio, built in the 4th century. Here St. Ambrose baptized St. Augustine, and here many emperors were crowned with the "iron crown" of Lombardy. This iron circlet is said to have been made from a nail used in the Cross. Nearby stands the former convent of Santa Maria delle Grazie, where Leonardo da Vinci's famous "Last Supper" is painted on the refectory wall.

Brera Palace is the home of the Academy of Fine Arts and Science. Its galleries contain works by the great Italian masters and other artists. The city has two famous libraries, two universities, a school of commerce and agriculture, an academy of music, and a celebrated archaeological museum.

La Scala, Milan's opera house, is world-renowned for the talent of its artists and the beauty of the performances. The building, bombed in 1943, was repaired and ready for use in 1946. Also restored was the Galleria Vittorio Emanuele, a huge arcade roofed with glass and lined with shops.

#### Commercial and Industrial Growth

As Italy's greatest railway center, Milan commands lines crossing the Alps via the Simplon Tunnel and St. Gothard passes. Other lines lead east to Venice and south to Genoa and peninsular Italy. It is the largest

of the industrial cities of the north, where most of Italy's manufacturing is done (see Italy). Electricity from Alpine waterfalls furnishes power for industries. The textile, printing and publishing, chemical, and machinery industries are the most important. Among the products of Milan and its suburbs are airplanes, automobiles, locomotives and railway cars, refrigerators, elevators, bicycles and motorcycles, tires, precision instruments, chemicals and drugs, furniture, and food products. Skilled workers create fine jewelry and art wares. The annual Milan Fair attracts buyers from all over the world.

Milan's industry, trade, and population swelled in the period between the two World Wars. The people of Milan modernized their city greatly. They built a huge railroad station and an airport and added wider streets and taller buildings. The gigantic construction boom after World War II included numerous skyscrapers and factories of modern design. Milan is Italy's second city in population. Population of commune (1961 census, preliminary), 1,580,978.

**MILDEWS AND MOLD.** We frequently find small downy or velvety patches called mildew or mold on the surface of leaves, fruit, damp cloth, moist food-stuffs, and the like. Sometimes the growth covers a large area, with a film of soft cottony tissue, very thin. By using a powerful magnifying glass we can see that the growth is composed of a great number of tiny plants, so small that separately they cannot be seen by the naked eye. If we use a compound microscope we can see the structure of these tiny plants, and we discover that their threadlike bodies cover the surface on which they grow with a network of delicate, cobweblike strands or filaments.

Mildews and molds are one of the divisions of the *fungi*, which include toadstools, mushrooms, and many microscopic plants. Like all fungi, they are either parasites, living upon the bodies of other plants larger than themselves, or saprophytes, living upon dead vegetable and animal matter.



#### DELICATE STRUCTURE OF GREEN MOLD

This green mold (*Penicillium glaucum*), shown highly magnified, grows on bread and other foods. Its cousin from the soil (*Penicillium notatum*) secretes penicillin (see Antibiotics).

"Downy mildews" usually grow within the tissues or cells of plants. Thus they do a great deal of harm to the stems and leaves, drying them up and making them curl and twist. One of the best known of these is the grape mildew. The larger part of its thread-like body grows within the grape leaf and sends out upon the surface masses of fibers which appear to the naked eye as small white patches. These patches generate tiny spores, invisible to the naked eye, which are carried by the wind to other leaves where they take root and grow into new mildew plants.

Powdery mildew can be removed from plants by dusting them with sulfur powder or spraying them with a fungicide (see Fungicides). The microscopic spores of green and black mold exist in the air almost

everywhere. That is why damp bread and other food left standing in kitchens will almost always become covered with a furry green coat. To protect food from these molds, it should be kept in dry, airy places.

The scientific name of true mildews is *Ascomycetes*. False, or downy, mildews and black molds belong to the *Phycomycetes*. (See also Fungi; Rusts and Smuts.)

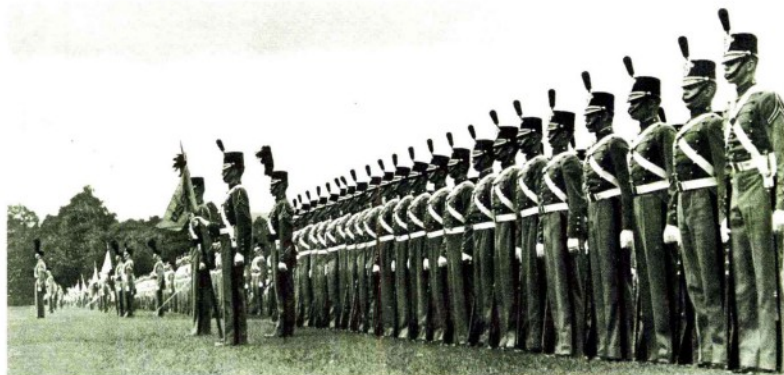
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THESE ARTICLES ARE IN THE FACT-INDEX

Miles, Nelson Appleton  
Miles City, Mont.  
Miletus  
Milfoil  
Milford, Conn.

Milford, Del.  
Milford, Mass.  
Milhaud, Darius  
Milhous, Katherine

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West Point cadets stand at attention for inspection and review.

## THE UNITED STATES MILITARY ACADEMY

**MILITARY ACADEMY, UNITED STATES.** Each June a stirring review is held on the wooded bluffs of the Hudson River at West Point, N. Y. It is graduation day at the United States Military Academy, oldest of the nation's service academies.

Companies of cadets march smartly out to the parade ground. Their spotless gray and white uniforms are studded with shining brass and topped with high "tar-bucket" hats. "Dressed" into precise lines, the men stand rigidly at attention during the ceremony. Then snapping their rifles to "right shoulder arms" the ranks wheel and march past the reviewing stand. The cadets move in perfect step. Every eye looks straight ahead. Every free hand swings in unison.

This amazing precision is not merely for display. These young men are being trained to obey commands exactly so that later they can give commands exactly. They are learning to become officers in the United States Army.

The training at West Point begins the instant a young man reports for duty on July 1. He and a roommate are assigned a bare, pictureless room in the barracks. Promptly he begins two months of drills and exercises. On the morning after Labor Day, he starts his schooling.

First-year cadets, known as fourth classmen or plebes, study mathematics, English, a foreign language, environment, and engineering fundamentals. Second-year men (third classmen) study mathematics, physics, chemistry, a foreign language, English, psychology, and history. Third-year cadets (second classmen) take electrical engineering, mechanics, physics, law, and social sciences. Fourth-year cadets (first classmen) study engineering, leadership, English, social sciences, and history. Physical education and professional military training are parts of each year's curriculum. Each cadet also takes an individualized program of elective courses.

By courtesy of the U. S. Army

The three upper classes receive leaves of four weeks during the summer period (June-August). They devote the rest of the summer to practical military instruction.

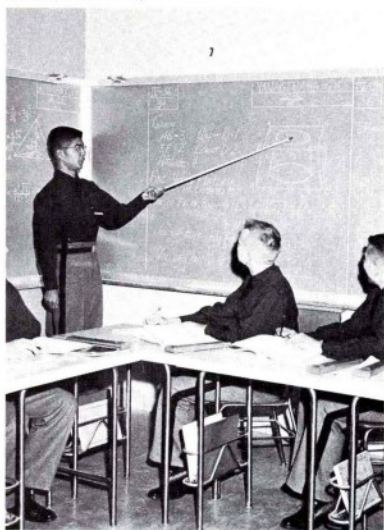
At the end of four years cadets who have met all the high requirements are graduated with the degree of bachelor of science. They are then commissioned as second lieutenants in the Regular Army.

West Point is directed and supervised by the Department of the Army. In 1964 an act of Congress increased the authorized number of cadets from some 2,500 to more than 4,400. Appointments to fill vacancies are made after receipt of nominations from a number of sources.

These sources, and the number of appointments each controls, are: the vice-president of the United States, 5; United States senators and representatives, 5 each; the mayor of the District of Columbia, 5; the governor of the Panama Canal Zone, 1; the resident commissioner/governor of Puerto Rico, 6; the governors of Guam, the Virgin Islands, and American Samoa, 1 each. Additional appointments are allocated to the Department of the Army. Of these, the president of the United States controls 100, reserved for the sons of career military personnel. Other vacancies are reserved for enlisted men of the Regular Army (85), the Army Reserve and National Guard (85), sons of deceased or disabled veterans (about 10), and graduates of honor military and naval schools and ROTC units (20). An unlimited number of sons of Medal of Honor winners may be appointed. Twenty cadets may be accepted from other American republics, and one from the Republic of the Philippines.

West Point seeks cadets of balanced academic, extra-curricular, and athletic achievement. All applicants must meet high standards of physical and mental health and of physical fitness. They must also pass standard tests in scholastic aptitude, mathematics, and English.

Upon entrance, cadets must be between 17 and 22 years of age. They are ordinarily required to be between 5 feet 6 inches and 6 feet 8 inches in height, with weight in proportion. A cadet must never have



Classes at West Point are generally small—12 to 15 students. Each student recites daily. Some 70 percent of graduates attend civilian postgraduate schools during their Army careers.

been married and may not marry before graduation. Cadets must agree to serve in the United States Army for five consecutive years after graduation.

Cadets receive half the basic pay of a second lieutenant during their four years at West Point (for pay table, see Army, United States). Out of this they pay for their uniforms, textbooks, and incidental expenses. Meals, housing, and medical care are provided by the academy.

West Point is located on the Hudson River about 52 miles north of New York City. The Academy was founded by an act of Congress in 1802. The institution owes many of its finest traditions to Col. Sylvanus Thayer, its superintendent from 1817 to 1833. Thayer demanded excellence of character and scholarship. His rule that every cadet had to pass every course still holds.

Academy graduates have served with distinction in every war fought by the United States, beginning with the War of 1812. In the Civil War the opposing commanders, Ulysses S. Grant and Robert E. Lee, were both West Point graduates. About 8,800 West Pointers saw service during World War II.

## A TYPICAL DAY AT WEST POINT

### Morning

6:15	Reveille
6:15-7:00	Breakfast
7:45-11:50	Class or study
12:10-12:50	Dinner

### Afternoon and Evening

1:05-2:05	Class or study
2:15-3:15	Class or study
3:40-6:00	Intramural and intercollegiate athletics; study time; parades; extracurricular activities
6:15-7:00	Supper
7:20-10:50	Study time
11:00	Taps (late lights authorized for study)

THIS ARTICLE IS IN THE FACT-INDEX

Militia



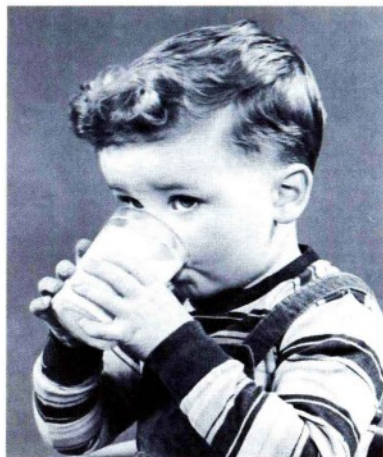
# MILK— A Basic Food

**MILK.** The babies of all mammals—warm-blooded animals—start life by drinking their mother's milk. Human babies, calves, kittens, puppies, and all other young mammals take their first nourishment from the milk in their mothers' breasts. Not only babies, but older people as well, need milk or foods made from milk to keep strong and healthy. Milk is nearly a perfect food.

Man learned long ago that he could drink the milk of other animals. By feeding certain animals well and by milking, or taking their milk at frequent intervals, he found that the animals produced more milk than their own young needed. This surplus he could use for himself.

People use the milk of animals that thrive in their homelands. The Laplanders live on the milk of reindeer. Dwellers in the desert drink the milk of camels. The roving Tatars of central Asia drink horse's milk. Water buffaloes, sheep, and goats also provide milk for human beings. The best producers are cattle, and it is cow's milk that most of the people in temperate parts of the world drink.

Milk sours easily. So people learned to make it into cheese, butter, and other foods which stay fresh longer. Such foods are known as *dairy products*. The cattle raised for milk are called dairy cattle. The farms on which they are raised are dairy farms.



Three or four glasses of milk every day will give this boy strong bones and teeth, bright eyes, and general good health.

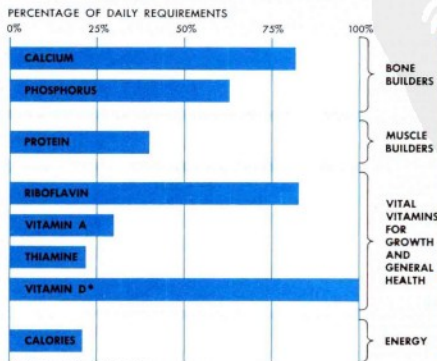
## How Cows Make Milk from Plants

Cows are very efficient "milk factories." They eat coarse plants, such as grass, clover, and chopped corn-stalks, which human beings cannot digest. After digesting such foods, they use part of it as nourishment for themselves and turn part of it into milk.

The cow has a special kind of stomach with four parts. Animals that have such a stomach are called ruminants (see Ruminants). The cow chews her food just enough so that she can swallow it. It goes into the first stomach, called the rumen, or paunch. It is a sort of reservoir lined with a thick membrane. Many small, hard projections secrete a fluid in which the food is soaked and softened.

When the cow has finished eating, she begins to ruminate, or chew her cud. She brings softened food up from the first stomach in small quantities and chews it thoroughly. The well-chewed food then passes through the other three stomachs for further churning, softening, and finally digesting. The long process

## FOOD VALUE IN 1 QUART OF MILK FOR TEEN-AGERS





turns coarse, tough, fibrous plants into a solution which the blood can absorb and carry to other parts of the body.

### The Milk Glands

Shortly before a cow is ready to give birth to a calf her blood carries dissolved food to her udder. This is a milk gland that hangs below the rear of her body. Inside the udder there are millions of tiny milk-making bodies, called *alveoli*. The milk passes from the alveoli into small tubes, then into the larger ones, and finally into four compartments in the udder. Each compartment has its own outlet, called the teat, or nipple.

The cow cannot let her own milk run out. If she could, much of it would be wasted. It is removed from the teat by the sucking action of the nursing calf. The farmer removes the milk by hand or by a special machine. Cows must be milked at least twice a day. If they are not, the udder becomes swollen and painful.

### Milk for the Newborn Calf

Nature intended the cow to produce enough milk to feed her calf for several months. The calf would then eat solid food and the mother's milk would dry up. Today farmers take calves from their mothers one to five days after birth and teach them to drink from a pail with a rubber nipple. Calves may be able to get along without milk (weaned) in two months. Meanwhile the mothers are being milked regularly, and their milk is used by the family or sold.

Six or eight weeks before they are ready to give birth to another calf, the cows "dry off." When they give milk again, after the new calf is born, they are said to "freshen." The first fluid produced by the cow after the birth of the calf is *colostrum*. It differs from ordinary milk in appearance and in composition. It is nature's own specially prepared formula. Colostrum contains nourishment in the proper balance for the newborn calf's needs. It also is rich in antibodies, which protect the calf from disease. The fluid gradually assumes the properties of normal milk in a few days.

### Milk Is a Nearly Perfect Food

Cow's milk contains some of all the basic food materials that give people energy and help them grow strong and healthy. Milk averages about 87 per cent



**A DAIRY FARM**

This picture shows the four buildings which are essential on a dairy farm. They are a house for the farmer and his family, a barn for the cows, a silo, and a milkhouse.

water. The remaining 13 per cent, called *milk solids*, contains all the nourishment. The solids consist of protein (3.5 per cent), fat (3.8 per cent), carbohydrate (4.8 per cent), and ash (0.9 per cent).

Proteins are the muscle builders. The chief protein of milk is *casein*. It forms the curd that becomes cheese. Cottage cheese is mostly casein.

The carbohydrate in milk is an easily digested sugar called *lactose*. It is an energy maker. Cheese does not contain lactose. It drains off in the *whey*, the watery part left when milk thickens into a curd. The calories in milk (168 calories to an 8-ounce glass of milk) come chiefly from the fats. Butter is about 80 per cent fat.

A large part of the calcium and phosphorus in the food eaten by people in the United States is in milk. Growing boys and girls must have these minerals to build strong bones and teeth.

### The Vitamins in Milk

Vitamins are needed for clear skin, good eyesight, and general health. They are the chemicals the body needs in order to make use of foods. Milk contains four particularly valuable vitamins. Riboflavin helps the cells use oxygen and is needed for growth. Vitamin A builds resistance to infection. Thiamine enables the body to release energy from food. Normal cow's milk has only a small amount of vitamin D, but nowadays milk is fortified with the addition of 400 International Units of vitamin D per quart. This is enough to provide all one's daily requirements of the "sunshine vitamin" (see Vitamins).