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BRITANNICA JUNIOR ENCYCLOPÆDIA

For Boys and Girls

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KEY TO PRONUNCIATION

It is of especial importance that an encyclopaedia for children give the pronunciation where the boy or girl might go astray. In all such instances the pronunciation in BRITANNICA JUNIOR ENCYCLOPÆDIA is clearly marked. The accent is shown by the mark ('). The sounds for the different letters, when not self-evident, are as follows:

ā as in *pale*

ā as in *care*

ā as in *bat*

ā as in *farm*

ā as in *task*

ā as in *ball*

ē as in *be*

ē as in *met*

ē as in *her*

ī as in *mice*

ī as in *tin*

ō as in *cold*

ō as in *not*

ō as in *for*

oi as in *oil*

ōō as in *loot*

ou as in *out*

ū as in *use*

ū as in *run*

ū as in *pull*

ü as in French *début*, German *über*

g (always hard) as in *gay*

j for g as in *gentle*

K for ch as in German *Bach* or Scottish *loch*

ñ (nasal) as in French *bon*

th as in *think*

th as in *thee*

t as in *picture* (Sound varies
from t to ch)

z as in *pleasure* (Sound varies
from z to zh)



THE UNIVERSITY
OF CHICAGO

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

AACHEN (ä'kēn) (French: AIX-LA-CHAPELLE), **GERMANY**, is a small border town with a rich history and important industries. It is a rail junction and a road center in northwest Germany only three miles from the boundaries with Belgium and the Netherlands.

History

The colorful history of Aachen goes back to pre-Roman times. The natural hot springs were enjoyed by the Romans. Charlemagne, the most famous man from Aachen, began the cathedral about A.D. 790. The cathedral was damaged but not destroyed in World War II.

Charlemagne also built a great palace in the years 777 to 786 and made Aachen the capital for most of western Europe. It became an important center of culture and, for a time, the second city of the Holy Roman Empire.

Charlemagne was buried in the cathedral seated in a marble chair. In the year 1000 this chair was taken out and used as a coronation throne. For more than seven centuries (A.D. 813-1531), the German emperors (of the Holy Roman Empire) were crowned in the city. The crowning took place in the town hall, built on the ruins of Charlemagne's palace. After a great fire, which destroyed much of the city in 1656, Aachen declined. It was too close to the French border to be safe and too far from the center of Germany to be a convenient capital.

Because of its location as a border town, Aachen was a German supply base in both world wars. As the main gate into Germany from the west it was the first German city occupied by Allied troops in World War II. Aachen suffered heavily from air raids before United States troops captured the city in October 1944 after bitter fighting. Half of the city lay in rubble, and 85 per cent of the buildings were damaged. Most of the beautiful old churches were destroyed. The city is being rebuilt and some of the famous buildings restored.

Modern Aachen

Today Aachen is an industrial city which produces iron and steel, machinery, railroad cars, electric motors, needles, cloth, and light bulbs. An important coal field lies nearby.

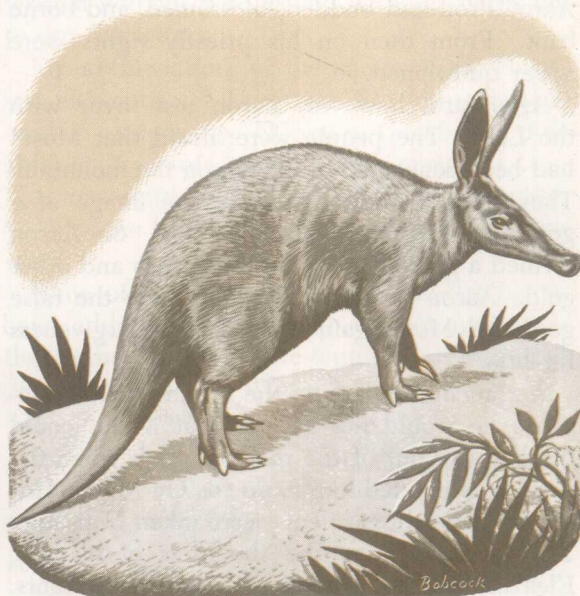
Great walks extend along the lines of the ancient fortifications of the town. Two old gates remain from the former city wall. In the old city, narrow cobbled streets remain but there are also many broad modern boulevards. An engineering school, a technical academy, and a conservatory for church music are located in the city. The population of Aachen was 162,000 in 1939 at the beginning of World War II. It fell to 110,000 in the 1946 census, but has since risen to 239,600 (1973 estimate).

AARDVARK (ärd'värk) is a mammal native to Africa—from Senegal in the west to Somaliland in the east, to the Cape of Good Hope in the south. The name is Dutch and means "earth pig."

It is a large animal, with a long face, heavy body, and long thick tail and has short, grayish-brown hair. It weighs about 140 pounds. The aardvark has peglike teeth like the armadillo. Like the ant-eater it feeds on termites and its forearms are powerful, the forefeet being armed with long claws for digging. One young is born each year.

The aardvark feeds at night and spends the day in its burrows which are large enough for a small man to enter. The bur-

The aardvark, about six feet long, is found in Africa.



rows may have two or three entrances. It is almost impossible to dig the aardvark out as it digs very rapidly and has a keen sense of hearing. If a hole is dug in front of it, it hears the noise and digs in a different direction.

AARON (*ār'ūn*) was an older brother of Moses. Most of the stories about him are told in the book of Exodus in the Old Testament. These stories tell that Aaron was chosen by God to be Moses' spokesman. Together they were to deliver the people of Israel from slavery in Egypt. Ten times they went before the Pharaoh and each time he promised to release the people. But, ten times he changed his mind.

Aaron and Moses were permitted by God to call down ten plagues. The tenth plague brought death to the oldest boy in each Egyptian family. But the angel of death passed over the homes of the Israelites who had marked their doorsteps with the blood of a lamb. Aaron and Moses were 83 and 80 years old when they led the Israelites toward freedom through the Red Sea.

Later the Lord told Moses to anoint Aaron as the first high priest of Israel. When a group plotted against Aaron, the Lord commanded the chief of each tribe to lay his staff in the tabernacle for the night. Aaron's was placed there for the tribe of Levi. In the morning, Aaron's rod had budded, blossomed, and borne fruit. From then on his priestly rights were never questioned.

Afterward, however, Aaron lost favor with the Lord. The people were afraid that Moses had been consumed in the fire on the mountain. They begged Aaron to make the image of a god they might see and worship. So Aaron formed a golden calf from their rings and other gold. Aaron was sorry he had made the false god, and Moses gained the Lord's forgiveness for him.

Aaron could not enter the Promised Land because he would not believe that Moses could bring water out of the rock Meribah when the Lord commanded him to do so. On Mount Hor Aaron's priestly garments were taken from him. They were laid on the shoulders of his son, Eleazar, and passed on to his descendants.

ABBEY (*ăb'ē*). Many people think of Westminster Abbey as a great church where English kings are crowned or as the last resting place of England's famous dead. Originally, however, it was built during the Middle Ages as a home for a group of Benedictine monks.

An abbey is a home for a religious community. All abbeys were built on about the same plan. The buildings were grouped about a court. Along the four sides of the court was a cloister or covered walk, so that the monks could pass from one building to another without being exposed to sun or rain. Each abbey had its chapel, dining room, school, infirmary, garden, outbuildings, and a guesthouse.

The most famous abbeys were built between the 5th and the 12th centuries, so the style of architecture is largely Romanesque. In this style, the round arches of Roman buildings were used in the bell towers. In tall churches sunlight came through high, arched windows in a second story called the *clerestory*, and through the stained glass windows in the front walls.

Among the best-known abbeys that still stand or have been restored are those at Mount Athos in Greece, Monte Cassino in Italy, Clairvaux and Cluny in France, and Tintern in England. In New York City, parts of famous European abbeys have been restored as the Cloisters, a branch of the Metropolitan Museum of Art.

(See also MONASTERY AND CONVENT.)

ABBOTT (*ăb'ūt*), **JACOB** (1803–1879), was the author of more than 200 books. Although he had a long career as a minister and a teacher, he is best remembered for his children's books.

Jacob Abbott was born in Hallowell, Maine. He attended school in Brunswick, Maine, before he entered Bowdoin College. Later he studied at Andover Theological Seminary (Andover, Massachusetts), and became a Congregational clergyman. He continued his work as a teacher, however. After teaching for a while at Amherst College (Amherst, Massachusetts), he married in 1828 and moved to Boston. There he founded the Mount Vernon School, one of the first schools in the United States for the education of young women. He later

founded a school in New York City for boys.

The Young Christian (1832) was Abbott's first book. A collection of lectures, the book became popular both in the United States and in Europe. In 1834 he began his most famous series of books, 28 volumes telling about the adventures of Rollo. *Rollo at Work*, *Rollo at Play*, and *Rollo's Travels* were among the stories enjoyed by many readers. The "Lucy," "Jonas," and "Franconia" books were three other popular series.

Abbott's books were well liked because they were filled with the kind of factual information that children are interested in. In the form of simple stories, he instructed his young readers in proper behavior, religion, natural science, and travel.

ABBREVIATION (*ă brē'vī ā'shŭn*) is a shortened form of a word or a group of words. An abbreviation is used in writing to save time and space. Some abbreviations are also used in speaking.

Abbreviations often are made by taking the first letter of the word, or the first letter of each important word in a group, and writing it as a capital followed by a period. For example, *P.O.* stands for *post office* and *C.O.D.* for *collect on delivery*. Sometimes the first letter is printed as a small letter followed by a period, as in the case of *m.* for *married* and *b.* for *born*. In some cases other letters of the word are also added. Thus *ms.* means *manuscript*, and *ft.* means *foot*. Sometimes an abbreviation made from the initial letters or syllables of a group of words spells out a word, such as *NATO* or *WAVES*. Such abbreviations, called acronyms, are not followed by a period. Letters used in abbreviations are sometimes doubled for the plural form, as in the case of *ll.*, used for *lines*, and *pp.*, used for *pages*.

For certain abbreviations, small capital letters sometimes are used instead of large capitals. The abbreviations *A.D.*, *B.C.*, *A.M.*, and *P.M.* often are printed in small capitals.

Of course, abbreviations are most often used to stand for common words such as the names of days, of months, of states, and of countries. Long words and phrases are often

abbreviated too, such as *Lieut.* for *Lieutenant* and *R.F.D.* for *Rural Free Delivery*. Titles and academic degrees are usually abbreviated; *D.D.* is used instead of the longer *Doctor of Divinity*, and *H.R.H.* instead of *His* (or *Her*) *Royal Highness*. In modern business *Co.* means *Company*; *Ltd.* means *Limited*.

In the case of many Latin phrases still in common use, only the first letter of each word in the phrase is used. For example, *n.b.* stands for *nota bene* (*notice well*) and *i.e.* for *id est* (*that is*). An exception to this rule is *etc.*, used for *et cetera* (*and others*).

An abbreviation may stand for several things. For example, *m.* may mean *married*, *masculine*, or *meter*. The reader usually can tell from the sense of what he is reading which meaning is correct. Almost any book that uses a great many abbreviations will give a list of those used and their meanings.

Abbreviations have long been widely used in the United States. *O.K.* and *C.O.D.*, for example, go back more than 100 years. Beginning in 1933, abbreviations began to be used very widely. Because the names of many of the government agencies set up since that time are too long to say easily, people began to refer to the agencies by their initials. For example, the *Federal Housing Administration* is usually called *FHA*. Many of these abbreviations are written without periods and without spaces between the letters.

For abbreviations of the names of the chemical elements, see **ELEMENT**. For abbreviations used in recipes, see **COOKING**, *Cookbooks*. For abbreviations of weights and measures, see **MEASUREMENT** and **WEIGHTS AND MEASURES**. See also the list of abbreviations in Vol. 1, page xxxvi.

Some of the abbreviations in the list below have additional forms that are not indicated; these other forms may be found in any standard dictionary.

A 1	first-class; excellent.
AA, A.A.	antiaircraft; Alcoholics Anonymous.
A.A.A.	American Automobile Association.
A.A.U.	Amateur Athletic Union.
A.A.U.W.	American Association of University Women.
abbr.,	
abbrev.	abbreviated; abbreviation.

4 / ABBREVIATION

ABC	American Broadcasting Company; Argentina, Brazil, and Chile.	B.A.	Bachelor of Arts (Latin, <i>Baccalaureus Artium</i>).
AC	alternating current.	bal.	balance.
ac.	acre.	BBC	British Broadcasting Corporation.
a/c, ac.	account.	bbl.	barrel.
acad.	academy.	B.C.	before Christ.
A.C.L.U.	American Civil Liberties Union.	bd.ft.	board foot.
ACTH	adrenocorticotrophic hormone.	B.E.F.	British Expeditionary Force.
A.D.	in the year of our Lord (Latin, <i>Anno Domini</i>).	Benelux	Belgium, the Netherlands, and Luxembourg.
ad., advt.	advertisement.	b.f.	bold-faced (type).
A.D.C.	aide-de-camp.	Bib., bibl.	Bible; biblical.
adj.	adjective.	bibliog.	bibliographer; bibliography.
<i>ad lib.</i>	at one's pleasure (Latin, <i>ad libitum</i>).	biog.	biographical; biography.
Adm.	Admiral; Admiralty.	bk.	bank; book.
admin.	administration.	B.L.	bill of lading.
adv.	adverb.	bldg.	building.
AEC	Atomic Energy Commission.	blk.	black; block.
A.E.F.	American Expeditionary Force.	BLS	Bureau of Labor Statistics.
A.F.L.-C.I.O.	American Federation of Labor-Congress of Industrial Organizations.	blvd., boul.	boulevard.
agr., agric.	agriculture.	Bn., bn.	battalion.
agt.	agent.	bot.	botanical; botany.
AKC	American Kennel Club.	b.p.	boiling point.
A.L.A.	American Library Association.	B.P.O.E.	Benevolent and Protective Order of Elks.
Ald.	Alderman.	Brig. Gen.	Brigadier General.
alg.	algebra.	bros	brothers.
alt.	alternate; altitude.	B.S. B.Sc.	Bachelor of Science.
AM	amplitude modulation.	B.S.A.	Boy Scouts of America.
A.M., A.M., a.m.	before midday (Latin, <i>ante meridiem</i>).	B.T.U.	British thermal unit.
Am., Amer.	America; American.	bu.	bushel.
A.M.A.	American Medical Association.	B.V.M.	Blessed Virgin Mary.
amp.	ampere.	C.	Centigrade.
amt.	amount.	c., c.	cent; century; chapter; about (Latin, <i>circa</i>).
AMVETS	American Veterans of World War II.	CAA	Civil Aeronautics Administration.
anat.	anatomical; anatomist; anatomy.	CAB	Civil Aeronautics Board.
A.N.C.	Army Nurse Corps.	cal.	calorie.
anon.	anonymous.	CAP	Civil Air Patrol.
ans.	answer.	Capt.	Captain.
ant.	antonym.	Card.	Cardinal.
A.P., AP, AP	Associated Press.	CARE	Co-operative for American Remittances to Europe.
APO	Army Post Office.	cat.	catalogue.
approx.	approximately.	Cath.	Catholic.
Apr.	April.	cath.	cathedral.
apt.	apartment.	cav.	cavalry.
A.R.C.	American Red Cross.	CBC	Canadian Broadcasting Corporation.
arch.	archaic; architecture.	CBS	Columbia Broadcasting System.
arith.	arithmetic.	c.c.	cubic centimeter.
art.	article.	CCC	Civilian Conservation Corps.
AS, A.S.	Anglo-Saxon.	C.E.F.	Canadian Expeditionary Force.
ASCAP	American Society of Composers, Authors, and Publishers.	Celt.	Celtic.
assn., assoc.	association.	C.	Celsius; centigrade.
asst.	assistant.	<i>cf.</i>	compare (Latin, <i>confer</i>).
astr., astron.	astronomy.	C.G.	Coast Guard.
Atty.	attorney.	chap.	chaplain; chapter.
Aug.	August.	CIA	Central Intelligence Agency.
A.V.	Authorized Version of the Bible.	CINC-	Commander in Chief of (for example, Commander in Chief of the Pacific Fleet, CINCPAC).
Av., Ave.	Avenue.	cm.	centimeter.
av.	average.	cml.	commercial.
avoir.	avoirduois.	Co.	company; county.
A.W.O.L.	absent without leave.	c/o	care of.
b.	born.		

C.O.	Commanding Officer; conscientious objector.	Emp. ency., encyc.	emperor; empress; empire.
C.O.D.	collect on delivery; cash on delivery.	Ens.	encyclopaedia.
Col.	Colonel.	ESP	Ensign.
col.	colony; column.	esp., espec.	extrasensory perception.
coll.	collector; collection; college.	Esq.	especially.
colloq.	colloquial; colloquialism; colloquially.	E.S.T.	Esquire.
Com. in Ch.	Commander in Chief.	est.	Eastern Standard Time.
comp.	comparative; compare; compound.	<i>et al.</i>	estimated; established.
con., cont.	against (Latin, <i>contra</i>).	etc. or &c.	and others (Latin, <i>et alii</i>).
conj.	conjunction.		and so forth; and others (Latin, <i>et cetera</i>).
cont.	contents; continued.	<i>et seq.</i>	and the following (Latin, <i>et sequens</i>).
co-op.	co-operative.	ex.	example.
Corp.	Corporal; Corporation.	f.	feminine; loud, powerful (Italian, <i>forte</i>).
C.P.A.	Certified Public Accountant.	F.	Fahrenheit.
C.P.O.	chief petty officer.	FAO	Food and Agricultural Organization.
cr.	credit; creditor.	FBI	Federal Bureau of Investigation.
cres.	increasing in loudness (Italian, <i>crescendo</i>).	FCA	Farm Credit Administration.
C.S.A.	Confederate States Army; Confederate States of America.	FCC	Federal Communications Commission.
C.S.T.	Central Standard Time.	FDIC	Federal Deposit Insurance Corporation.
ctr.	center.	Feb	February.
cu.	cubic.	Fed.	Federal.
cu.cm.	cubic centimeter.	fem.	feminine.
cu.ft.	cubic foot.	F.E.P.C.	Fair Employment Practice Committee or Commission.
cu.in.	cubic inch.	ff.	following (pages); very loud (Italian, <i>fortissimo</i>).
cwt.	hundredweight.	FHA	Federal Housing Administration.
C.Y.O.	Catholic Youth Organization.	fig.	figuratively; figure; figures.
d.	penny (Latin, <i>denarius</i>); died, deceased.	fl. oz.	fluid ounce.
D.A.	District Attorney.	FM	frequency modulation.
D.A.R.	Daughters of the American Revolution.	FOA	Foreign Operations Administration.
D.C.	repeat, from the beginning (Italian, <i>da capo</i>).	f.o.b.	free on board.
DC	direct current.	Fr.	French.
D.C.M.	Distinguished Conduct Medal.	Fri.	Friday.
D.D.	Doctor of Divinity.	FSA	Federal Security Agency; Farm Security Administration.
D.D.S.	Doctor of Dental Surgery.	ft.	foot; fort.
DDT	dichloro-diphenyl-trichloroethane.	FTC	Federal Trade Commission.
Dec.	December.	fur.	furlong.
decresc.	decreasing in loudness (Italian, <i>decrescendo</i>).	G.	gravity.
Dem.	Democrat; Democratic.	g.	gram.
dept.	department.	gal.	gallon.
diam.	diameter.	G.A.R.	Grand Army of the Republic.
dict.	dictionary.	G.A.T.T.	General Agreement on Tariffs and Trade.
dim.	decreasing in loudness (Italian, <i>diminuendo</i>).	Gen.	General (title).
D.L.O.	Dead Letter Office.	geog.	geographical; geography.
do.	ditto, the same.	geol.	geological; geology.
doz.	dozen.	geom.	geometrical; geometry.
DP	displaced person.	Ger.	German.
Dr.	doctor.	G.H.Q.	General Headquarters (military).
D.Sc.	Doctor of Science.	C.I.	government issue; a U.S. soldier.
D.S.C.	Distinguished Service Cross.	gi.	gill.
D.S.M.	Distinguished Service Medal.	C.O.P.	Grand Old Party (Republican).
D.S.O.	Distinguished Service Order.	Gov.	governor.
D.S.T.	Daylight Saving Time.	govt.	government.
D.V.	God willing (Latin, <i>Deo volente</i>).	GPO	Government Printing Office.
dwt.	pennyweight.	Gr.	Greek.
E.	east.	gr.	grain; gram; gross.
ECA	Economic Cooperation Administration.	G.S.A.	Girl Scouts of America.
econ.	economics; economy.	hi-fi	high fidelity.
ed.	edition; editor; educated.	H.M.S.	His (Her) Majesty's Ship or Service.
e.g.	for example (Latin, <i>exempli gratia</i>).	Hon.	Honorable; honorary.
		hosp.	hospital.

h.p.	horsepower.	m.	married; masculine; meter; mile; minim; minute; month.
H.Q.	headquarters.	M.A.	Master of Arts.
hr.	hour.	Maj.	Major.
H.R.	House of Representatives.	Mar.	March.
H.R.H.	His (Her) Royal Highness.	masc.	masculine.
ht.	height.	math.	mathematics.
<i>ib., ibid.</i>	in the same place (Latin, <i>ibidem</i>).	MATS	Military Air Transport Service.
ICBM	intercontinental ballistic missile.	max.	maximum.
ICC	Interstate Commerce Commission.	MBS	Mutual Broadcasting System.
<i>id.</i>	the same (Latin, <i>idem</i>).	M.C.	Master of Ceremonies; Medical Corps; Member of Congress; Military Cross; Marine Corps.
<i>i.e.</i>	that is (Latin, <i>id est</i>).	mc.	megacycle.
IGY	International Geophysical Year.	M.D.	Doctor of Medicine (Latin, <i>Medicinae Doctor</i>).
IHS	a symbol representing the Greek name of Jesus.	mdse.	merchandise.
ill., illus.	illustrated; illustration.	mech.	mechanical; mechanics.
imp.	imperative; imperfect (tense); imperial; let it be printed (New Latin, <i>imprimatur</i>).	med.	medical; medicine; medieval.
in.	inch.	mem., memo.	memorandum.
Inc.	Incorporated.	Messrs., MM.	Gentlemen (French, <i>Messieurs</i>); Sirs.
incl.	inclosure; inclusive.	met.	metropolitan.
inf.	infinitive; infantry.	mfd.	manufactured.
init.	initial.	mfrs.	manufacturers.
ins.	insurance.	mg.	milligram.
Inst.	Institute; Institution.	Mgr.	Manager; Monsignor.
inst.	instant (the present month).	mi.	mile.
interj.	interjection.	mil.	military.
inv.	invoice.	min.	minimum; minute.
I.O.U.	I owe you.	misc.	miscellaneous.
I.Q.	intelligence quotient.	Mlle.	Miss (French, <i>Mademoiselle</i>).
IRBM	intermediate range ballistic missile.	mm.	millimeter.
Is.	island.	Mme.	Madame (French).
it., ital.	italics.	mo.	month.
I.W.W.	Industrial Workers of the World.	M.O.	Medical Officer; money order.
Jan.	January.	mod.	moderate (Italian, <i>moderato</i>); modern.
Je.	June.	Mon.	Monday.
j.g.	junior grade (U.S. Navy).	M.P.	Member of Parliament; Military Police.
J.P.	justice of the peace.	m.p.h.	miles per hour.
Jr.	Junior.	Mr.	Mister.
Jul.	July.	Mrs.	Mistress.
k.	carat.	M.S., M.Sc.	Master of Science.
K.C.	King's Counsel; Knights of Columbus.	ms., mss.	manuscript; manuscripts.
kc.	kilocycle.	MSA	Mutual Security Agency.
kg.	kilogram.	M.S.T.	Mountain Standard Time.
K.K.K.	Ku Klux Klan.	Mt., mts.	Mount; mountains.
km.	kilometer.	mus.	museum; music; musical.
kw.	kilowatt.	MVD	(<i>Ministerstvo Vnutrennikh Del</i>) Ministry of internal affairs including secret police (U.S.S.R.)
kw.-hr.	kilowatt-hour.	myth.	mythology, mythological.
l., ll.	line; lines.	N.	North.
£, L.	pound (money) (Latin, <i>libra</i>).	n.	noun.
Lat.	Latin.	N.A.A.C.P.	National Association for the Advancement of Colored People.
lat.	latitude.	nat.	national; natural.
l.c.	letter of credit; lower case (typography).	NATO	North Atlantic Treaty Organization.
Lieut., Lt.	Lieutenant.	naut.	nautical.
liq.	liquid.	nav.	naval; navigation.
lit.	literally; literary; literature.	n.b.	note well (Latin, <i>nota bene</i>); take notice.
LL.D.	Doctor of Laws (Latin, <i>Legum Doctor</i>).	NBC	National Broadcasting Company.
<i>loc. cit.</i>	in the place cited (Latin, <i>loco citato</i>).	N.C.O.	noncommissioned officer.
long.	longitude.		
LP	long-playing (phonograph record).		
Ltd.	Limited.		
M.	meridian (noon) (Latin, <i>meridies</i>); mark; thousand (French, <i>mille</i>); Monsieur.		

n.d.	no date.	P.T.O.	please turn over.
N.E.A.	National Education Association.	pub.	public; publication; published.
neut.	neuter.	Pvt.	Private.
NLRB	National Labor Relations Board.	PX	post exchange.
No., no.	number (Latin, <i>numero</i>).	Q.E.D.	which was to be demonstrated (Latin, <i>quod erat demonstrandum</i>).
Nov.	November.	qr.	quarter; quarterly; quire.
N.T.	New Testament.	qt.	quart.
obj.	objection; objective.	q.v.	which see (Latin, <i>quod vide</i>).
obs.	observation; observatory; obsolete.	R.A.F.	Royal Air Force.
OCD	Office of Civilian Defense.	R.C.	Red Cross; Roman Catholic.
O.C.S.	Officer Candidate School.	R.C.A.F.	Royal Canadian Air Force.
Oct.	October.	rd.	road.
O.D.	Officer of the Day; olive drab; overdraft.	REA	Rural Electrification Administration.
O.E.	Old English.	recd.	received.
O.E.E.C.	Organization for European Economic Cooperation.	Rep.	Republic; Republican; representative.
off.	official.	rep.	report.
O.K., OK	approved; correct (O.K. club; after Old Kinderhook).	Rev.	Reverend.
op.	opera; opus.	rev.	revenue; revolution.
OPA	Office of Price Administration.	R.F.D.	Rural Free Delivery.
op. cit.	in the work cited (Latin, <i>opere citato</i>).	R.I.P.	may he (or she) rest in peace (Latin, <i>requiescat in pace</i>).
opp.	opposed; opposite.	riv.	river.
O.T.	Old Testament.	R.N.	Registered Nurse.
O.T.C.	Officers' Training Camp or Corps.	R.O.T.C.	Reserve Officers' Training Corps.
Oxon.	Oxford (Latin, <i>Oxonia</i>); of Oxford (Latin, <i>Oxoniensis</i>).	r.p.m.	revolutions per minute.
oz.	ounce (Italian, <i>onza</i>).	r.p.s.	revolutions per second.
p.	soft (Italian, <i>piano</i>); page.	R.R.	railroad.
par.	paragraph.	R.S.V.P.	please reply (French, <i>repondez s'il vous plait</i>).
pat.	patent.	Rt. Rev.	Right Reverend.
P.D.	Police Department.	R.V.	revised version (of the Bible).
pd.	paid.	S.	Saint; South.
Pfc.	Private first class.	s.	shilling.
pfd.	preferred.	Sat.	Saturday.
Ph.D.	Doctor of Philosophy (Latin, <i>Philosophiae Doctor</i>).	sci.	science.
phil.		SEC	Securities and Exchange Commission.
philos.	philosophy.	sec.	second; section.
phys.	physical; physics.	secy.	secretary.
pk.	peck.	Sen., sen.	senate; senator; senior.
pkg.	package; packages.	Sept.	September.
pl.	place; plate; plural.	seq., sq., seqq.	the following (Latin, <i>sequens, sequentia</i>).
P.M.	Past Master; Postmaster; Provost Marshal; Prime Minister.	Sgt., Sergt.	Sergeant.
P.M., P.M.		sing.	singular.
p.m.	after midday (Latin, <i>post meridiem</i>).	Soc., soc.	society.
P.O.	postal order; post office.	SOS	distress signal.
Port.	Portugal, Portuguese.	sp.	spelling.
POW	prisoner of war.	Sp.	Spain, Spanish.
pp.	pages; very soft (Italian, <i>pianissimo</i>).	S.P.	Shore Patrol.
P.P.S.	an additional postscript (Latin, <i>post postscriptum</i>).	SPAR	Women's Reserve of the United States Coast Guard (contraction of Coast Guard motto, <i>Semper Paratus</i> [Latin], Always Ready).
pr.	pair; price; pronoun.	S.P.C.A.	Society for the Prevention of Cruelty to Animals.
prep.	preposition.	sp. gr.	specific gravity.
Pres.	President.	sq.ft.	square foot.
Prof.	Professor.	sq. mi.	square mile.
pron.	pronoun; pronunciation.	Sr.	Senior; <i>Senor</i> (Spanish).
pro tem.	for the time being (Latin, <i>pro tempore</i>).	S.R.O.	Standing room only.
prov.	province; provisional; provost.	SS.	Saints (Latin, <i>Sancti</i>); steamship.
P.S.	postscript (Latin, <i>postscriptum</i>).	St.	Saint; strait; street.
pseud.	pseudonym.	Sta.	Santa.
P.S.T.	Pacific Standard Time.		
pt.	part; pint; point; port.		
P.T.A.	Parent-Teacher Association.		

stac., stacc.	distinct, separated (Italian, <i>staccato</i>).
subj.	subject; subjunctive.
Sun.	Sunday.
supp., suppl.	supplement.
supt.	superintendent.
syn.	synonym; synonymous.
TASS	U.S.S.R. News Agency (<i>Telegraphnoye Agentstvo Sovyetskovo Soyuza</i>).
t.b.	tuberculosis.
tbs.	tablespoon.
terr.	territory.
3-D	three-dimensional (motion picture).
Thur., Thurs.	Thursday.
T.N.T.	trinitrotoluene.
tr.	translated; translator; transpose.
trans.	transactions; translation; transferred.
treas.	treasurer; treasury.
trig.	trigonometry.
tsp.	teaspoon.
Tu., Tues.	Tuesday.
TV	television.
TVA	Tennessee Valley Authority.
U., univ.	university.
U.A.R.	United Arab Republic.
U.K.	United Kingdom.
ult.	last (Latin, <i>ultimo</i>).
UMT	Universal Military Training.
UN	United Nations.
UNESCO	United Nations Educational, Scientific and Cultural Organization.
UNICEF	United Nations Children's Fund; originally, UN International Children's Emergency Fund.
UNRRA	United Nations Relief and Rehabilitation Administration.
U.P.I.	United Press International.
U.S.	United States.
U.S.A.	United States of America; United States Army.
U.S.A.F.	United States Air Force.
U.S.M.	United States Mail.
U.S.M.C.	United States Marine Corps.
U.S.N.	United States Navy.
U.S.O.	United Service Organizations.
U.S.S.	United States Senate; United States Ship.
V.	against (Latin, <i>versus</i>); volt.
v. or vid.	see (Latin, <i>vide</i>).
VA	Veterans' Administration.
V-E day	Victory in Europe, World War II.
V.F.W.	Veterans of Foreign Wars of the U.S.
V.I.P.	very important person.
viz.	namely (Latin, <i>videlicet</i>).
V-J day	Victory in Japan, World War II.
vocab.	vocabulary.
vol.	volcano; volume; volunteer.
vox pop.	the voice of the people (Latin, <i>vox populi</i>).
V.P.	Vice-President.
vs.	against (Latin, <i>versus</i>).
w.	watt.
W.	West.
WAC	Women's Army Corps.
WASP	Women's Air Force Service Pilots.

WAVES	Women Accepted for Volunteer Emergency Service (United States Naval Reserve).
W.C.T.U.	Woman's Christian Temperance Union.
Wed.	Wednesday.
WHO	World Health Organization.
wk.	week.
WSB	Wage Stabilization Board.
wt.	weight.
yd.	yard.
Y.M.C.A.	Young Men's Christian Association.
Y.M.Cath.A.	Young Men's Catholic Association.
Y.M.H.A.	Young Men's Hebrew Association.
Y.P.S.C.E.	Young People's Society of Christian Endeavor.
yr.	year; younger; your.
Y.W.C.A.	Young Women's Christian Association.
Y.W.H.A.	Young Women's Hebrew Association.
Zool.	zoology.

ABELARD (ăb'ě lărd), **PETER** (1079-1142), was a famous scholar, or thinker. He was also a very popular teacher. He is best known for his book, *The Story of My Misfortunes* (*Historia Calamitatum*). In this book he tells about his love for Heloise.

Abelard was born in Le Pallet, France, in the province of Brittany. He came from a noble family and studied in Paris. When he was only 22 he started a school of his own near Paris. In 1115 he became master of the Cathedral School of Notre Dame in Paris. Many young men came there to study philosophy with him. Abelard spent his life in the search for truth. He taught that all facts that are true, when added together, make truth itself.

While Abelard was teaching in Paris he fell in love with Heloise, the niece of the canon of the cathedral. They kept their marriage a secret, but it was soon discovered and they were forced to part. Abelard became a monk, wandering from monastery to monastery, and Heloise became a nun. After their deaths they were buried together.

ABOLITIONISTS (ăb'ō lish'ün ists) were people who wanted to abolish or end slavery in the United States.

By 1804 all states north of Maryland had decided to abolish slavery either immediately or gradually. There were no slaves remaining in the "free" states by 1846. In the South, however, the invention of the cotton gin made slav-



Abolitionists set up the "Underground Railroad" to help slaves escape to the North.

ery more popular. Slaves were needed to work on the cotton plantations.

At first few northerners were concerned about southern slavery. The American Colonization Society, founded in 1816, planned to send American Negroes back to Africa. It received little support although it did send to Africa some free Negroes who founded the country of Liberia. (See **LIBERIA**.) Then, in 1831, William Garrison began an abolitionist newspaper in Boston called the *Liberator*. In the Midwest Theodore Dwight Weld trained speakers who went from town to town attacking slavery.

The abolitionists were very unpopular in many places. An angry mob in Alton, Illinois, murdered abolitionist Elijah Lovejoy. Another mob dragged Garrison through the streets of Boston. In Georgia the spreading of abolitionist ideas was made a crime punishable by death. But the abolition movement grew.

Soon abolitionists split into several groups. Some wanted to free all slaves right away. Some wanted to free them gradually. A moderate group formed the Liberty party in 1840. Their presidential candidate in 1840 and 1844

was James Gillespie Birney, a southern abolitionist. In 1848 they became part of the Free-Soil party which opposed having slavery in the new western lands. An abolitionist, Salmon Chase, was elected to the United States Senate as a Free-Soiler. Another abolitionist, John Brown, tried to start a slave revolt. (See **FREE-SOIL PARTY**.)

Others worked with the "Underground Railroad." This was not really a railroad; instead it was the routes that escaped slaves followed to the North. They would travel at night and spend their days in the attics and barns of abolitionists. One escaped slave, Harriet Tubman, went back to the South many times to lead others to freedom. Another escaped slave, Frederick Douglass, became a well-known abolitionist.

The best-known attack on slavery was a novel, *Uncle Tom's Cabin*, by Harriet Beecher Stowe. Other well-known writers and orators helped to persuade the people of the North that slavery was wrong. Among them were John Greenleaf Whittier, Charles Sumner, Henry Ward Beecher, and Lucretia Mott.

(See also individual biographies.)

ABRAHAM (*ā'brā hām*) was the founder of the Hebrew nation according to the book of Genesis in the Old Testament. His life is the starting point and source of religion in the Old Testament. He was not afraid to show his belief in the one true God. When Abraham entered the unknown country of Canaan, he believed God would protect him. There, in Canaan, began a long history of the Jews.

About 2,000 years before Christ, Abraham, who was then called Abram, left Mesopotamia and settled in Palestine. Abram prayed to God that he might have children to inherit his land. God listened to his prayer and changed his name to Abraham, which means the father of many nations. One day three angels came to his tent and told him that Sarah, his wife, would have a son. Sarah laughed, for she thought that she was too old to have children; yet she bore a son whom they named Isaac.

Hagar, Sarah's handmaiden, had already given Abraham a son called Ishmael. Abraham

was unhappy because Sarah was jealous for her own son, Isaac. Then God told Abraham to send away Hagar and Ishmael. Isaac's children were to be the nation of the Jews, but Ishmael's children were to be the people of the desert.

Later, God made a test of Abraham's faith and ordered him to sacrifice Isaac. When Abraham took a knife to kill his son, an angel of the Lord stopped him saying: "now I know that thou fearest God, seeing thou hast not withheld thy son, thine only son, from me." Then the Lord promised to bless Abraham and to multiply his descendants "as the stars of the heavens, and as the sand which is upon the sea shore." He died at the age of 175.

ABRASIVE (*ăb rā'siv*) is a material used to cut, grind, or polish other materials. Abrasives are among the simplest and most widely used tools of mankind. Many abrasives are prepared from minerals found in the crust of the earth. Some are man-made.

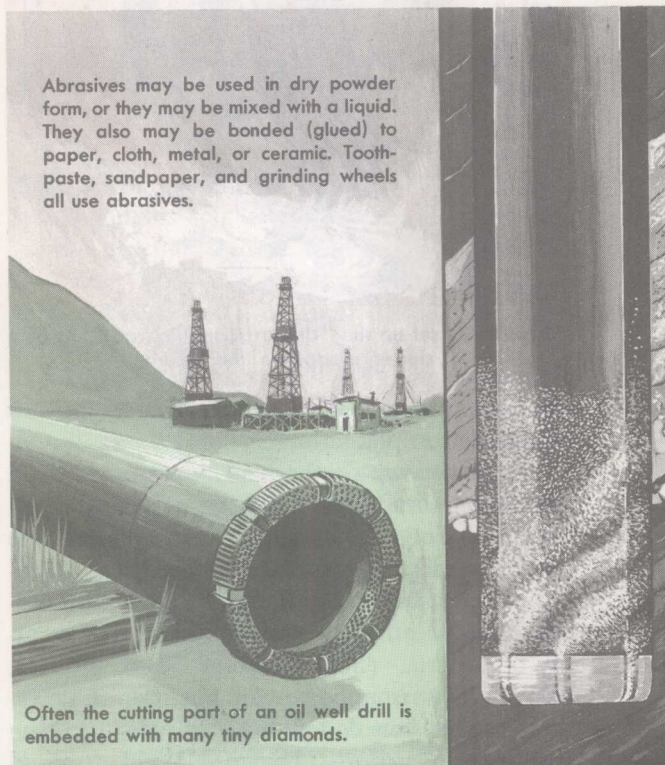
Important natural abrasives may be grouped by their chemical composition. The most plentiful are the silica minerals (silicon combined with oxygen). Examples of these abrasives are quartz, sand, sandstone, tripoli, and diatomite. Combinations of metallic elements with silicon and oxygen form silicate minerals such as pumice and garnet. Corundum is an abrasive mineral made of aluminum and oxygen. A mixture of corundum and magnetite or hematite is called emery. The best of all abrasives, the industrial diamond, is a form of carbon.

Manufactured abrasives include synthetic diamonds, carborundum, artificial corundum, steel shot, steel grit, and glass. Carborundum was discovered accidentally by Edward G. Acheson in 1891. He was trying to make artificial diamonds. Coke, sand, salt and sawdust were mixed together and heated in a furnace. An electric current was passed through the mixture, and crystallized silicon carbide was formed. Within ten years after Acheson's discovery, a process was found for changing bauxite into artificial corundum.

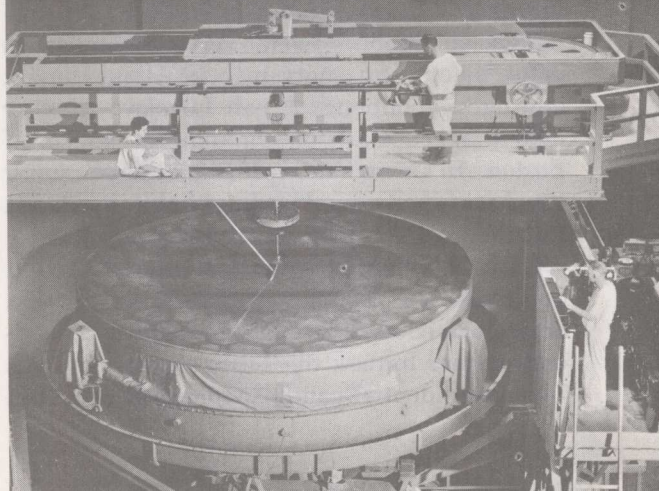
Abrasives may be used as loose particles for grinding, scouring, or polishing, or they may be bonded (glued) to paper or cloth. Examples

are sandpaper and emery cloth. The abrasives may be bonded together to form grinding wheels or oil stones. Large blocks of abrasive may be cut into grindstones, millstones, whetstones, and pumice blocks. The size of the abrasive particles largely determines for what an abrasive will be used. Coarse particles cut or grind. Fine particles scour or polish.

How good an abrasive is and its use depends upon hardness, resistance to crumbling, and the



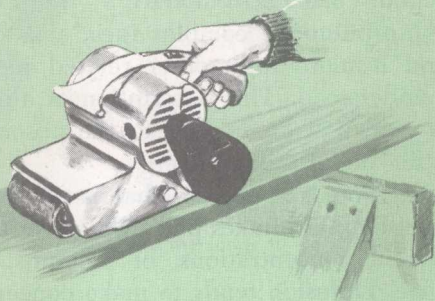
Courtesy Mount Wilson and Palomar Observatories



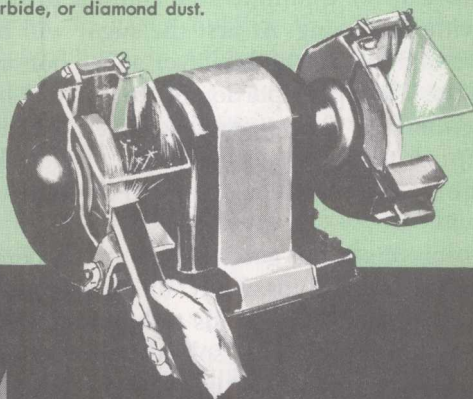
size of the particles. In 1812, Friedrich Mohs, a German mineralogist, set up a scale of hardness for minerals. He selected ten minerals to serve as the standards, and numbered them from 1, the softest, to 10, the hardest.

The diamond is the hardest abrasive, but it is very expensive. Abrasive wheels that can cut very hard materials contain diamond dust. Steel bits, studded with diamonds, are used for drilling in bed rock.

Sandpaper is frequently made up of small bits of quartz bonded to paper. Sometimes cloth is used instead of paper. The larger pieces of quartz make sandpaper rough; the finest pieces make it fine.



Grinding wheels may be made of aluminum oxide, silicon carbide, or diamond dust.



The great telescope on Palomar Mountain, California, has a mirror that is 200 inches (16 feet, 8 inches) in diameter. It was cast as a flat disk. Then it was made dish-shaped by grinding with several abrasives. Nearly five tons of glass were removed. Carbides, aluminum oxide, and pitch were the abrasives used.

Mohs' Scale	Natural Abrasives	Artificial Abrasives
10 Diamond	Diamond	Diamond
9½		Carborundum
9 Corundum	Corundum	Corundum
8 Topaz		
7½	Garnet	
7 Quartz	Quartz	
6½	Rouge (Hematite)	Steel
6 Feldspar	Feldspar	
5½	Pumice	Glass
5 Apatite	Opal	
4 Fluorite		
3 Calcite	Chalk	
2 Gypsum		
1 Talc		

Artificial corundum and carborundum are important for cutting machine parts and grinding lenses for microscopes and other instruments. Garnet is used in garnet paper, or cloth, and in grinding stones. Quartz is used in sandpaper, in scouring and polishing soaps, and in sandblasting. In sandblasting small particles of sand and steel are blown by compressed air against a surface to be cleaned. This is a common method for cleaning soot-covered stone or brick buildings. Jewelers' rouge helps in the polishing of metals. Feldspar is in adhesive for many abrasive wheels. Synthetic abrasives are also widely used.

ABSALOM (*ăb'sä lôm*) was the third and favorite son of David, King of Israel. His story is told in the Bible in the book of Samuel.

Absalom was famous for his beautiful, long, thick hair that weighed more than ten ounces. In those days a man's strength and endurance were judged by the amount of his hair.

Two things directed Absalom's life: one was a strong desire to replace David as ruler of the Jews; the other was revenge against Ammon. Absalom's sister, Tamar, was wronged by Ammon, her stepbrother. As the eldest son, Ammon was first in line to succeed David. For these reasons Absalom had Ammon murdered.

Several years later, with the help of David's faithless adviser, Achitophel, Absalom raised a rebel army. He thought he could take the throne from David by force. While riding in a battle, Absalom's long hair caught in the branches of an oak. He was killed by David's general, Joab, against the King's command. David was filled with grief at his son's death.

ABSCESS (*ăb' sēs*) is pus surrounded by irritated tissue in the body. Certain organisms may enter the body and be carried to some weakened spot by the blood. There they feed upon (destroy) the tissues and multiply rapidly. The body, however, has its defenses. Blood brings the white cells which attack the germs. (See BLOOD.) During the "battle" pus is formed. This is the abscess. It contains dead germs and blood cells, destroyed tissue of the body, and liquid from the blood.

Not all bacteria cause abscesses. Some germs spread through the tissues causing inflammation but little destruction. The staphylococcus is the most common bacteria forming abscesses.

Small abscesses in the skin are called pimples. Larger skin abscesses often are called boils. Abscesses also form deep in organs. A lung abscess may develop after breathing in infected material. Brain abscesses may follow infection of the ears, or sinuses, or blood stream.

Antibiotic medicines cannot easily reach the bacteria in an abscess. It is often necessary for a doctor to open the abscess to let the pus out.

ABSORPTION (*ŭb sôrp' shŭn*) **AND OSMOSIS** (*ă smô' sŭs* or *ăz mō' sŭs*). Absorption is a process by which one kind of matter becomes intermixed with another. Osmosis is a process by which matter moves from a solution of one concentration through a special kind of membrane to a solution of lower concentration. (See LIQUID.)

Dry sand can absorb water, glass can absorb radiant energy from the sun, an alkaline solution can absorb carbon dioxide, and a photographic film can absorb light. In each of these examples, the absorption is slightly different. The first two are physical processes; the last two are chemical processes.

Sand is not altered chemically when a water film spreads along the surfaces of its individual grains and fills the voids between them. Absorption in this sense is a purely physical process, and the water and sand may be easily separated from one another. In glass, radiant energy from the sun is transformed into vibrational motion of the atoms of the glass, which can be sensed as heat. This is also a physical process because

the chemical composition of the glass is not altered. (See RADIATION.)

Carbon dioxide absorbed by an alkaline solution, however, is changed chemically into a salt. The carbon dioxide cannot be recovered except by means of a chemical reaction. Acid must be added to the solution. (See CHEMISTRY). The absorption of light by the silver bromide coating on photographic film is a complex process, which is both physical and chemical. The light causes electrons from the bromide ions to move from one place to another in the film. The new positions of the electrons help in the chemical change that takes place when the film is developed. (See PHOTOGRAPHY.)

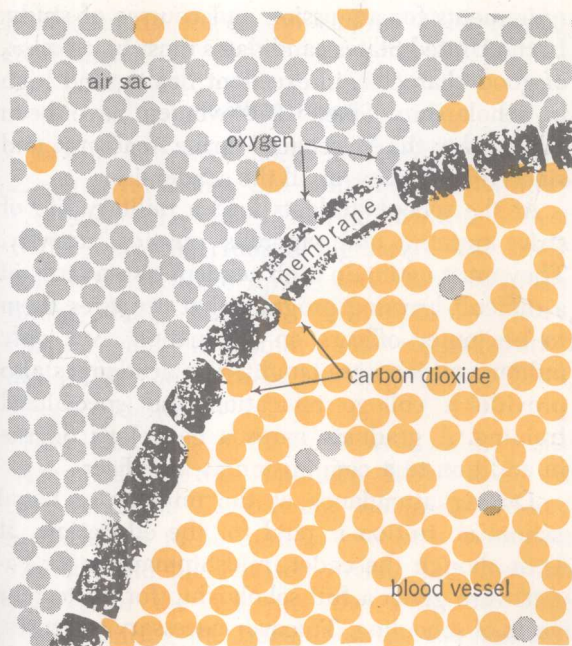
Absorption is a complex idea, and to understand it more fully other related ideas must be understood. This description of absorption, however, will be limited to the absorption of matter, not of radiant energy.

Diffusion is a process that is related to osmosis. Diffusion takes place whenever there are different concentrations, or amounts, of substance. Diffusion tends to make concentrations uniform. Suppose a sugar cube is dropped into a cup of tea, for example, and allowed to dissolve without stirring. At first the sugar will be concentrated in a fairly thin layer at the bottom of the cup. The upper portion of the tea will be unsweetened. As time passes, however, the entire cup of tea will become more uniformly sweet as the sugar molecules spread throughout the liquid.

Diffusion mixes the gases in the atmosphere, helps make the oceans fairly uniform in salt concentration, and even tends to help make the chemical composition of solids uniform. Its action in solids, however, is a slower process than it is in liquids and gases.

Diffusion takes place in all living organisms. Life could not be sustained, in fact, if it were not for processes of diffusion that assist in bringing nutrients to, and removing toxic wastes from, cells. (See CELL AND CELL THEORY, *Cell Structure*.)

Diffusion is the "leveling" process that causes molecules to migrate from regions in which they are numerous to regions in which they are few. Molecules migrate because at all tempera-



In breathing, oxygen passes by osmosis from air sacs in the lungs into the blood stream. Carbon dioxide passes out of the blood into the lungs to be exhaled.

tures above absolute zero they possess energy. This energy exists in the form of motion in all matter. In gases and liquids, the motion is in straight lines. In solids, the motion is vibrational, or back and forth. These motions increase in velocity with increasing temperature. (See MOLECULE.)

Air escapes from an inflated tire when its valve is opened, because the air in the tire is more dense than the air outside the tire. The air in the tire is more dense because it was compressed, or squeezed down in volume, when it was forced into the tire. There are, therefore, more collisions between the molecules inside the tire than there are in the same volume outside. Some of these collisions inside the tire cause the molecules to pass through the open valve. Nothing "forces" these molecules out of the tire except the natural diffusional process. The air molecules simply move from a region of higher concentration to one of lower concentration. (See AIR; GAS.)

Diffusion is the process by which the roots of a plant absorb water and salts from the soil. The same process is used by the capillaries

of all animals to absorb water and molecules of nutrients from intestinal fluids. Animals also use diffusion to exchange oxygen and carbon dioxide between the bloodstream and the cells of the lungs.

Substances move in the direction that tends to make concentrations move uniform by means of diffusion. The transfer of such substances occurs between cells of the tissues of plants or animals across membranes that have a special property. These membranes have structures that allow small molecules to pass freely through them. The direction in which the molecules move depends on the differences in concentration on the two sides of the membrane. This membrane, however, prevents the passage of large molecules. Such membranes are semipermeable, or partially permeable, that is, they allow only certain things to pass through them.

Both the root cells of a plant and the bloodstream of an animal contain a fluid made up of water and dissolved substances. The large molecules of this fluid—proteins and carbohydrates—cannot pass through the cell wall. In all such cells, the concentration of water molecules in the cell fluid is lower than it is in the surrounding soil water or intestinal juices. Water molecules, therefore, diffuse into the vascular system of the plant or animal—from high concentration to low. Osmotic pressure is that pressure within the cell that would reduce the net transfer of water across the membrane to zero. The overall process of fluid flow through semipermeable membranes is osmosis.

It is possible either to measure the osmotic pressure of solutions quite accurately or to predict its value from the laws of physical chemistry. For dilute, or weak, solutions the osmotic pressure is proportional to the concentration of dissolved salts.

There are some aspects of osmosis, however, that are not fully understood. Sometimes the transfer of salt is in the direction opposite to that expected by simple theory. Salmon, for example, transfer salt from their blood through their gills to the saltier ocean. Electrical charges on the salmon's gill membrane may cause this. The salt transfer, therefore, may not be completely caused by osmosis.