

Index

A

Abbe condenser, 183

A-B-O bloodgroup system:

antibodies of, 348

table, 350

antigens of, 347–348

table, 348

determination of, 348

distribution of, 350

history of, 6, 346

inheritance of, 365–366

paternity tests, and, 367

Acid phosphatase, 368, 375

Acrylic fibers, 227

Admissibility of evidence, 16–18

AFIS (*see* Automated Fingerprint Identification Systems)

Agglutination, 348

AIDS, 52

Alcohol:

absorption and distribution in body, 281–283

effects of, 259, 281

elimination from body, 283

laws pertaining to, 294–297

measurement in breath, 287–291

physical dependence on, 250

psychological dependence on, 249

Alcohol dehydrogenase, 283, 293

Algor mortis, 21

Alleles, 365

Alpha rays, 172

Alternate light source systems, 448

Alveolar breath (*see* Breath)

Alveoli sacs, 284–285

Amelogenin gene, 401

Amino acids, 385–386

Ammonium nitrate based explosives, 329–330

Amorphous solids, 108, 110

Amphetamines:

administration of, 261

analysis of, 269, 271

dependence on, 249, 261

effects of, 261

illicit manufacture of, 268

legal control of, 266

names of, 260–261

use of, 260–261

Anabolic steroids, 264–265

Anagen growth phase, 211, 217

Analgesic, 252

ANFO, 329–330

Anthrax, 14–15

Anthropology, forensic, 22

Anthropometry, 6, 428

Antimony:

detection of, 194, 301, 475–478

in bullets, 163–164

Antiserum, 348

Arch patterns, 434

Arsenic, 301

Arson:

analysis of evidence recovered from, 323–326

collection of physical evidence from, 55, 321–323

Aspermia, 369

Atom:

arrangement in crystals, 174

definition of, 131

model of, 169

structure of, 170

Atomic absorption spectrophotometry:

applications of, 168–169, 301, 476–477

description of, 167–168

“flameless,” 169, 476–477

theory of, 170–171

Atomic mass number, 171

Atomic number, 169

Automated Fingerprint Identification Systems (AFIS), 79–80, 436–438

Automobile headlights, 119

Automobile paints, 234–235

B

Balances, 104–105

Ballistic Fingerprinting, 470–471

Balthazard, Victor, 73

Barbiturates:

- administration of, 259–260

- analysis of, 137, 269

- legal control of, 266

- physical dependence on, 250, 259–260

- psychological dependence on, 249

- types of, 259

Barium, 194, 475–478

Becke line, 111–112, 189, 227

Beer's law, 147

Benzidine color test, 353

Bertillon, Alphonse, 6, 428

Beta rays, 172

Birefringence:

definition of, 109

of fibers, 227

table, 228

of minerals, 120, 189

Bismuth, 301

Bite marks, 24, 491–492

Black powder:

classification of, 328

composition of, 317, 328

detection of, 334

uses of, 327–328

Blasting cap, 331

Blood:

analysis for alcohol content, 281–282, 292–293

antigens in, 347–348

circulatory system and, 283–287

class characteristics of, 75

collection of, for drug analysis, 298

collection of, for typing, 49, 374, 411–416

composition of, 347–348

DNA typing of, 357

enzymes in, 357–358

table, 358

group systems in, 347–348

preservation of, for alcohol determination, 293–294

proteins in, 357–358

table, 358

stain patterns of, 359–363

typing of, 6, 348–350

table, 350

(*See also* Bloodstains)

Blood alcohol concentration:

effect on carbon monoxide poisoning, 301–302

estimation of, 294

laws pertaining to, 294–297

measurement of, 292–293

relation to breath, 285

significance of, 282

Bloodstains:

collection and preservation of, 49, 411–416

DNA typing of, 390–394

forensic significance of, 346

frequency distribution of, 358

identification of, 353–354

patterns of, 359–363, 412

polymorphic enzyme and proteins in, 357–358

table, 358

species origin of, 354–356

typing of, 6, 13

Bomb investigation (*see* Explosives)

Borkenstein, R. F., 87

Breath:

alcohol in, 284–287

measurement of, for alcohol, 287–290

Breathalyzer, 287–289

Broach cutter, 461–462

Bulbs, 119

Bullets:

class characteristics of, 462–465

collection and preservation of, 47, 479–481

comparison of, 8, 162–164, 166–167, 186, 460–466

determination of caliber of, 467

trace elements in, 163–164, 166–167

Bureau of Alcohol, Tobacco, Firearms & Explosives 12, 468–470

Burned documents

(*see* Charred documents)

Button rifling process, 461–462

C

C-4, 331, 335

Cabbane, R. A., 500

Caliber, 461

California Assoc. of Criminalists, 9

Camarena, Enrique, 59–67

Cannabis (*see* Marijuana)

Capillary electrophoresis, 399–401

Carbon monoxide, 301–302

Carrier gas in gas chromatography, 135

Cartridge cases:

collection and preservation of, 480–481

examination of, 466–467

Casts:

liquid silicone, 482

Catagen growth phase, 211, 217

Celsius temperature scale, 103

Centre of Forensic Sciences, 13

Chain of custody, 50–51, 273

Charred documents, 508–509

Chemical properties, 100

Chromatography, 132–142

(*See also* Gas chromatography; High-performance liquid chromatography; Thin-layer chromatography)

Chromosomes, 364–365, 382, 390–391, 401

Circulatory system:

alcohol in, 283–287

parts of, 283–287

Clandestine drug laboratories, 258, 268

Class characteristics, 75–78

Clinton, Bill, 394

Club Drugs, 263–264

Cocaine:

administration of, 262

analysis of, 152, 270

classification of, 52

effects of, 262–263

legal control of, 252, 266

physical dependence on, 250

psychological dependence on, 249, 262–263

source of, 262

Codeine, 253, 266

Color tests:

blood, 353–354

drugs, 269–270

explosives, 335

table, 335

semen, 368

Column in gas chromatography, 138

Combined DNA Index System (CODIS), 80, 398, 410

Combustion:

chemistry of, 313–318

glowing, 316

heat of, 314

table, 314

requirements for, 318

spontaneous, 317

Comparison microscope, 8, 184–186, 216, 464–466, 482

Comparison of physical evidence, 72–78

Compound, 131

Compound microscope, 181–184, 209

Computer Forensics, 24–25, 524–543

Computer hardware, 525–529

Computer Image Acquisition, 534–535

Computers, 24–25, 152, 410, 436–438

Computer software, 525

Concentric fractures in glass, 116

Connally, John, 162–164

Continuous spectrum, 164

Controlled Substances Act, 265–268

(table) 266–267

Cookies, 565

Coppolino v. State, 18

Core of fingerprint, 434

Cortex of hair, 210

Cosby, Ennis, 218

Cotton, 220

Counterfeit money, 191–192

Crack Cocaine, 262

Crick, Francis, 383

Crime laboratories:

British, 10, 512

Canadian, 12–13

European, 10

history of, 9–10

organization of, 10–13

services of, 13–14

United States, 9–12

Crime scene:

Internet sites describing the, 563

legal considerations at the, 55–57

photography of, 40–41

reconstruction of the, 83–84, 359–363

safety at, 52–55

searching the, 44–48

securing of, 39

sketching of, 42

Criminal Investigation (Gross), 8

Criminalist (*see* Forensic scientist)

Criminalistics (*see* Forensic science)

Crystalline solids, 108, 110, 174, 227

Cuticle of hair, 209

Cystolithic hairs, 193, 273

D

Darvon (*see* Propoxyphene)

Daubert v. Merrell Dow Pharmaceutical, Inc., 17–18, 430

Delta of fingerprint, 434

Density:

definition of, 105

measurement of, 105–107

of glass, 111–112

table of selected materials, 106

Density-gradient tubes, 121

Deoxyribonucleic acid (*see* DNA)

Depressants, 259–260

Depth of focus, 184, 187, 193

Dermal nitrate test, 475

Dermal papillae, 432

Dermis, 432

Designer drugs, 267

Deuterium, 148, 171–172

DFO (1,8-diazafluoren-9-one), 448

Diffraction pattern, 174

Digital image processing, 41, 452–454, 509–510

Dillie-Koppanyi test, 269

Dispersion of light, 109

Distance determination for firearms, 471–474

DNA:

- application of, 367
- collection of blood for, 374, 411–416
- collection of saliva for, 374
- computerized index system of, 80, 398, 410, 578
- detection of:
 - in blood, 396, 488–491
 - in hair, 214, 217, 403
 - in saliva, 374, 396
 - in semen, 371, 394
 - in skeletal remains, 409–410
- fingerprinting of, 382
- forensic applications of, 11, 13, 75, 347, 578

function of, 385–386

history of, 382

mitochondrial, 217, 403–404, 409–410

replication of, 387–388

structure of, 383–384

typing of, 142–144, 390–394, 448, 488–491

Documents:

alteration, erasures, and obliterations of, 505–510

charred, 508–509

collection of, 501–502

definition of questioned, 498

examination of fax, 504–505

examination of handwritten, 498–501

examination of photocopier, 504–505

examination of printer, 504–505

examination of typescript, 502–503

history of examination of, 8

indented writings on, 510–512

inks on, 190–192, 512–514

Internet site for, 564

laboratory services for examination of, 13

types of questioned, 498

Double refraction, 108–109, 227

Doyle, Sir Arthur Conan, 5–6

Drug dependence, 248–251

 table, 251

Drug Enforcement Administration, 12

Drugfire, 468

Druggist fold, 49

Drug laws, 252, 265–268

Drug Recognition Expert Program, 303–305

Drugs:

 classification of, 251–265, 299

 collection and preservation of, 273–274

 definition of, 249

 dependence on, 248–251

 table, 251

 identification of, 13, 268–273, 300–302, 351

law and, 252, 265–268

synergistic effects of, 302–303

tolerance to, 302–303

trace elements in, 173

(*See also* specific drugs)

Duquenois-Levine test, 269–270

Dyes:

in fibers, 226

in ink, 513–514

Dynamite:

classification of, 329

composition of, 318, 329

history of, 329

military, 331

E

Ecstasy (*see* Methylenedioymethamphetamine)

Electromagnetic radiation:

absorption of, 147

spectrum of, 145

Electron:

charge of, 169–171

excitation of, 170

size of, 169

symbol of, 169

Electrophoresis:

application of, 142–144, 355–357, 369, 392–393, 398–401

description of, 142–144

Elements:

analysis of, 164–167, 172–173, 193–194, 476–478

atomic structure of, 169–170

definition of, 128, 169

periodic table of, 130, 169

table, 122

spectra of, 164–167, 170–171

symbols for, 129–130

table, 129–130

E-mail (electronic mail), 454, 560, 567–568

Emission spectra:

of elements, 164–167, 170–171

origin of, 170–171

of paints, 166, 237

types of, 164–167

Emission spectroscopy:

application of, 237, 164–166, 301

description of, 164–165

EMIT (enzyme-multiplied immunoassay technique), 351

Endothermic reactions, 314

Energy:

definition of, 313

of electrons, 170–171

forms of, 313

of light, 146–147, 170–171

Engineering, forensic, 24

English system, 100–102

Entomology, forensic, 22–23

Enzyme-multiplied immunoassay technique (*see* EMIT)

Enzymes:

alcohol determination by, 293

in blood, 144, 351, 357–358

destruction of, by alcohol, 283

inheritance of, 367

in semen, 368

Epidermis, 432

Epithelial cells, 412

Erasures on documents, 505

Erythroxyton coca, 262

Ethanol (*see* Alcohol)

Ethyl alcohol (*see* Alcohol)

Evidence (*see* Physical evidence)

Evidence collection technicians, 14, 19–20

Exothermic reactions, 314, 317

Expert testimony, 18–19

Explosions, collection of physical evidence from, 332–335

Explosives:

- analysis of, 138, 174, 332–336
- blast effect of, 327

definition of, 317, 327

high, 329–332

low, 317, 328–329

primary, 329

secondary, 329

table, 335

tagging of, 335

(*See also* specific types)

Eyepiece lens, ocular, 181–184

F

Fabric impressions, 484–485

Fahrenheit temperature scale, 103

Fauld, Henry, 428–429

Federal Bureau of Investigation, 9, 12, 115, 214, 394, 403, 429, 435, 466, 468, 516, 577, 579

Fentanyl, 267

Fibers:

birefringence of, 189, 227

table, 228

collection of, 48–49, 231–232

dye composition of, 226, 230

evidential value of, 227–229

examination of, 189, 224–231

infrared spectra of, 228

manufactured, 220–223

table, 221–222

natural, 219–220

thin-layer chromatography of, 226

trace elements in, 161

(*See also* specific type of fiber)

Field of view, 184, 187

Field sobriety tests, 291–292

Filament, 119, 193

Fingerprints:

classification of, 435–436

comparisons of, 430–432

databases, 79–80, 436–438

description of, 432–433

development of, 440–451

digital image processing of, 452–454

history of, 6, 428–430

individuality of, 73, 430–432

laboratory services for examination of, 14

latent, 14, 440–451

preservation of, 451–452

ridge characteristics of, 430–432

Finger Prints (Galton), 6, 429

Firearms:

bullet comparisons of, 460–466

collection and preservation of, 479–481

distance determination involving, 471–474

gunpowder residues from, 471–475, 480–481

Internet site for, 563

laboratory services for examination of, 13

primer residues from, 47, 475–478

rifling of, 460–465

serial number restoration on, 478–479

Fires:

analysis of evidence recovered from, 323–326

chemistry of, 312–318

collection of physical evidence from, 48–49, 321–325

fuel-air mixture and, 316, 328–329

initiation of, 315

Flash point, 316

Flotation, 111

Fluorescence, 445–448

Forensic laboratories (*see* Crime laboratories)

Forensic science:

definition and scope of, 4–5

future of, 574–579

history and development of, 5–10

Forensic scientist:

functions of, 16–20

Frequency of light:

definition, 144–145

energy of photon and, 144–146, 170–171

Freud, Sigmund, 262

Frye v. U.S., 16–17

Fuel cell, 290

G

Galton, Francis, 6, 429

Gamma rays, 172

Gas, definition of, 131

Gas chromatography:

 applications of, 138, 236, 271, 292, 300, 323–326

 description of, 135–136

 use with mass spectroscopy, 150–152, 272, 300–301, 326

 (*See also* Pyrolysis gas chromatography)

Gasoline, analysis of, 323–326

Gauge, 466

Gel diffusion, 355

General Rifling Characteristics File, 466

Genes, 365–367, 382–383

Genetic code, 386–387

Genotype, 366

Geology, forensic aspects of, 13, 119–123

GHB (gamma hydroxybutyrate), 263

Gilbert v. California, 501

Glass:

collection of, 48–49, 118–119

comparison of, 109–115

composition of, 109–110

density, 111–112

fractures of, 116–118

headlight, 109

holes in, 116–118

laminated, 110

refractive index of, 111–115

significance of, 115

tempered, 110

trace elements in, 111, 161, 166–167

Glowing combustion, 316

Glue sniffing, 260

Goddard, Calvin, 8

Greiss test, 473–474

Gross, Hans, 8

Gun Control Act of 1968, 12

Gunpowder residues, 173, 471–474, 480–481

H

Hacking, 569–570

Hair:

age of, 216

collection of, 49, 218–219, 371–374

cross-section of, 216

database of, 211

DNA in, 214, 217, 403

examination of, 212–214

forcible removal of, 216–217

forensic significance of, 51, 217

growth phases of, 211, 217

medullary index, 210

morphology of, 209–211

pigments of, 210

race of, 216

scale patterns, 209

sexing of, 216

species of, 209

Hair follicle, 208–209, 216–217

Hallucinogens:

definition of, 254

types of, 254–259

Handbuch für Untersuchungsrichter (Gross), 8

Handwriting:

collection of exemplars of, 501–502

comparison of, 499–500

individual characteristics of, 498–499

styles of, 498–499

Hashish, 254, 257, 273

Hashish oil, 257, 269–270

Headlight filaments, 119, 193

Heat of combustion, 314

table, 314

Heavy metals, 301

Hemastix® strips, 354

Hemoglobin, 301–302, 354, 385–386

Henry, Edward Richard, 429

Henry, William, 133

Henry's Law, 133, 285

Henry's system of fingerprint classification, 429, 435

Hepatitis B, 52

Heredity, 365–367

Heroin:

- administration of, 252–253

- analysis of, 100, 141, 150, 269

- diluents of, 253

- effect of, 252–253

- legal control of, 266

- metabolism of, 297–298

- physical dependence on, 250

- psychological dependence on, 249

- synthesis of, 252

Herschel, William, 428

High explosive (*see* Explosives)

High performance liquid chromatography, 138, 334

HLA test, 367

Hofmann, Albert, 258

Holmes, Sherlock, 5–6

Hoover, J. Edgar, 9

Horizontal gaze nystagmus, 291–292

Hughes, Howard, 500

Hybridization, 392

Hybridoma cells, 352

Hydrocarbons, analysis of, 323–326

Hydrogen, isotopes of, 171–172

I

Identification of physical evidence, 72

Ignition temperature, 315

table, 315

Immersion method, 111, 189

Immunoassay, 300, 351

“Implied consent” law, 296

Indented writings, 510–512

Individual characteristics, 73

Inductively-Coupled Plasma (ICP), 166–167

Infrared breath testers, 289–290

Infrared luminescence, 505

Infrared photography, 473, 506

Infrared spectrophotometry:

description of, 149–150

of drugs, 270–271

of explosives, 335

of fibers, 190–192, 228

of paints, 190–192, 236

Inks, 190–192, 505, 512–514

Inorganics, definition of, 132

Institute of Legal Medicine and Police Science, 13

Internet:

cache, 564–565

e-mail, 560, 567–568

forensic sites on the, 561–564

table, 562–563

history of the, 552

hypertext on the, 556

mailing lists on the, 560

newsgroups on the, 560–561

protocol, 553–555, 567, 569

search engines on the, 559–560

World Wide Web, 555–556

Intoxilyzer, 14

Iodine fuming, 443–444

Ion, 150, 166, 326, 332

Ion Mobility Spectrometer (IMS), 332–333

Irving, Clifford, 500

Iso-enzymes, 357

Isotopes:

definition of, 171

of hydrogen, 171–172

synthesis of, 172

J

Jeffreys, Alec, 382

K

Kastle-Meyer Test, 354

Kennedy, John F., 162–164

Kersta, Lawrence, 515–516

Ketamine, 264

Kirk, Paul, 9

Koehler, Arthur, 198–204

Kumho Tire Co., Ltd. v. Carmichael, 17

L

Laminated glass, 110

Landsteiner, Karl, 6, 346

Lasers:

 application to fingerprint development, 446

 definition of, 146

Latent fingerprints, 14, 440–451

Lattes, Leone, 6, 8

Lead, 163–164, 194, 474–475

Lee, Henry C., 407–409

Lewinsky, Monica, 394

Librium, 260, 267

Lie-detector (*see* Polygraph)

Light:

absorption of, 132, 147, 287

dispersion of, 109, 148–149

emission of, 170–171

frequency of, 144–146, 170–171

plane polarized, 188

refraction of, 107–109, 174

speed of, 144

theory of, 144–147

wavelength of, 144–145

Lindbergh kidnapping case, 198–204

Line spectrum, 164–166

Liquid, definition of, 131

Liquid hashish, 257

Livor mortis, 21

Locard, Edmond, 8–9

Loop patterns, 433–434

Los Angeles Police Dept., 9, 303

Low copy number, 411

Low explosives (*see* Explosives)

Luminol test, 354, 417

Lysergic acid diethylamide (LSD):

analysis of, 138, 270

effects of, 258

legal control of, 266

physical dependence on, 250

psychological dependence on, 258

synthesis of, 258

M

Magnification, 180, 186

Mandrel rifling process, 462–463

Manufactured fibers, 220–223

tables, 221–222

Marijuana:

analysis of, 141, 193, 273, 300

botanical features of, 256, 273

description of, 256

detection in body, 300, 351

effects of, 257

history of, 254–256

legal control of, 249, 252, 266

physical dependence on, 250

psychological dependence on, 257

THC content of, 256–257

Marquis reagent, 100, 269

Mass, 104–105

Mass spectrometry:

application of, 150–154, 272, 300–301, 326

theory of, 150–152

Matter:

classification, 131

definition of, 128

states of, 131

Mayfield, Brandon, 439–440

McCrone, Walter, C. , 8

MDMA (*see* Methylenedioxyamphetamine)

Medulla of hair, 210–211, 213

Medullary index of hair, 210

Mercury, 301

Mescaline, 258

Metals:

as physical evidence, 160

poisonous, 301

serial number restoration on, 478–479

trace elements in, 161, 173

Methadone, 254, 351

Methamphetamine (*see* Amphetamines)

Methaqualone (Quaalude), 260

Methylenedioxyamphetamine (MDMA), 258, 263–264

Metric system, 100–102

Metropolitan Police Laboratory (London), 10, 512

Michigan v. Tyler, 56–57, 318

Microcrystalline tests:

blood, 354

drugs, 270–271

Microscope:

applications for, 111–114, 119–122, 210, 227–228, 270–271, 334, 368, 464–466, 482, 505

comparison, 8, 184–186, 216, 464–466, 482

compound, 181–184, 209

hot-stage, 112

microspectrophotometer, 189–192, 226, 228

polarizing, 188–189, 227

scanning electron (SEM), 77, 192–195, 209, 477

stereoscopic, 186–187, 235, 334

Microspectrophotometer, 189–192, 226, 228

Mincey v. Arizona, 55–56

Minerals, 120, 189

Minutiae (*see* Ridge characteristics)

Mitochondrial DNA, 217, 403–404, 409–410

Mobile crime laboratories, 48

Molecule, definition of, 131

Monochromator, 148, 168

Monoclonal antibodies, 352, 369–370

Monomers, 223

Morphine:

analysis of, 269

in body tissues, 297–298

legal control of, 266

source of, 252

Multiplexing, 398

N

Narcotics:

definition of, 252

types of, 252

National Institute of Standards and Technology, 239, 438

Natural fibers, 219–220

Natural gas, 328

Neutron activation analysis:

applications of, 173, 476–477

theory of, 171–173

Neutrons:

charge of, 169

number in nucleus, 169–170

size of, 169

source of, 172

symbol of, 169

New Jersey State Police laboratory, 12

NIBIN (National Integrated Ballistics Information Network), 81, 468–471

Ninhydrin, 444

Nitrocellulose (*see* Smokeless powder)

Nitroglycerin:

chemical structure of, 318

detection of, 334

in dynamite, 329

in smokeless powder, 329

(*See also* Dynamite)

Nobel, Alfred, 329

Nucleotide, 383

Nucleus:

composition of, 169–170

structure of, 169–170

Numerical aperture, 184

Nylon, 223, 226–227

O

Odds (*see* Probability)

Odontology, forensic, 5, 23–24, 491

O’Hara, Charles, 574

Oligospermia, 369

Opiates, 253

Opium, 249, 252, 266

Orfila, Mathieu, 6

Organics, definition of, 132

Organized Crime Control Act, 12

Osborn, Albert, 8

Osterburg, James, 574

Oswald, Lee Harvey, 162

Oxidation, 312–313

Oxidizing agents, 317, 328, 505

Oxycontin (Oxycodone), 253

P

P-30, 369–370, 376

Paint:

analysis of, 138, 166, 190–192, 235–237

automobile, 234–235

collection and preservation of, 51, 239, 242

composition of, 232, 234–235

database of, 82, 239

evidential value of, 75, 237–238

pyrolysis gas chromatography, 236

trace elements of, 166, 173, 237

Paternity tests, 367

Pathology, forensic, 5, 21–22

PCR (*see* Polymerase chain reaction)

PDQ (Paint Data Query), 82, 239

Periodic table, 128, 130, 169

Peroxidase, 353–354

PETN (pentaerythritol tetranitrate):

classification of, 329

detection of, 334

uses of, 331

PGM (*see* Phosphoglucomutase)

pH, 299

Phases:

in chromatography, 133–135, 138–139

definition of, 131–132

Phencyclidine (PCP), 258–259, 266

Phenolphthalein color test, 354

Phenotypes, 366

Phosphoglucomutase (PGM), 357–358

Photography:

crime scene, 40–41, 532–533

infrared, 473, 506

laboratory services for, 14

uses of, 473–474, 451, 486, 506

Photons, 146

Physical dependence on drugs, 250

table, 250

Physical developer, 444

Physical evidence:

admissibility, 16–18

class characteristics of, 75–78

collection of, 14, 19–20, 48–49

common types of, 70–71

comparison of, 72–78

definition of, 38

identification of, 72

individual characteristics of, 73

laboratory services for examination, 13–14

marking of, 50

metallic, 16

packaging, 48–49

photography of, 38, 40–41

search for, 44–48

sketches of, 42, 532–533

submission to laboratory, 52

(*See also* specific types of evidence)

Physical properties, 100, 102–109

Physical states, 131

Pigments:

hair, 210

paint, 232

Pixels, 452

Planck's constant, 146

Plastic fingerprints, 440

Plastics, analysis of, 138

Poisons:

carbon monoxide, 301

metallic, 301

Polarizing microscope, 188–189

Polyclonal antibodies, 352

Polyester fibers, 220, 223

Polygraph, 14

Polymerase chain reaction (PCR), 388, 394–398, 401, 463

Polymers, 223–224, 383

Polymorphic enzymes and proteins, 357–358

Portrait parlé, 428

Postal Inspection Service (United States), 12, 500

Potassium chlorate, 174, 328, 335

Potassium nitrate, 174, 335

Precipitin test, 354

Primary explosives, 329

Primer residues on the hand, 47, 194–195, 475–478

Primers (*see* Primary explosives)

Probability:

 application and significance, 73, 115, 122, 237–238, 357–358, 398–399, 430–431, 518–519

 definition of, 73

Product Rule, 75

Prostrate Specific Antigen (*see* P-30)

Proteins:

 in blood, 357–358

 inheritance of, 367

 structure of, 385–386

Proton, 169

Psilocybin, 258

Psychiatry, forensic, 23

Psychological dependence on drugs, 249–250

table, 251

Psychology, 5

Psychophysical tests for alcohol intoxication, 291–292

Punnet square, 366

Pyrex (borosilicate), 110

Pyrolysis, 316

Pyrolysis gas chromatography:

of paints, 138, 236

Q

Qualitative analysis, 132

Quantitative analysis, 132

Questioned Documents (Osborn), 8

Quinine, 253, 268

R

Radial fractures, 116

Radioactivity, 171–172

Radioimmunoassay (RIA), 351

RAM (Random Access Memory) 527, 529–530, 537–538, 540–541, 543, 568–569

Rape evidence (*see* Sexual offenses)

Rayon, 220

RDX (cyclotrimethylenetrinitramine):

analysis of, 335

classification of, 329

uses for, 331

Real image, 180

Recombinant DNA, 388–390

Reconstruction, 83–84, 359–363

Refraction, 107

Refractive index:

definition of, 107, 109

determination of, 107–108

of fibers, 189, 227

table, 228

of glass, 111–117

Regenerated fibers, 220

Reinsh test, 301

Respiratory system:

alcohol in, 284

parts and function of, 284

Restriction enzymes, 390–394

Restriction fragment length polymorphism (RFLP), 390–394, 396

Retention time, 136, 271

Rf value, 141–142, 271, 334

RFLP (*see* Restriction fragment length polymorphism)

Rh bloodgroup system, 348

Rh factor, 348

Ridge characteristics, 430–432, 435–436

Rifling, 460

Rigor mortis, 21

Rohypnol, 263–264

Royal Canadian Mounted Police, 13, 239

S

Safe insulation, 121

Safety, crime scene, 52–55

Saliva, DNA typing of, 374, 396

Scanning electron microscope (SEM), 77, 192–195, 209, 477

Schmerber v. California, 296–297

Scott test, 270

Search of crime scene, 44–48

Secondary explosives, 329

Semen:

- collection and preservation of, 371–377

- DNA typing of, 371, 374, 394, 396

- identification of, 367–371

- significance of, 375–376

Seminal fluid (*see* Semen)

Serial number restoration, 478–479

Serology, definition of, 348

Sexual offenses:

- collection and preservation of evidence from, 47, 371–377

- forensics aspects of, 371–377

Shoe impressions, 82, 484–491

Short Tandem Repeats (STRs), 397–401, 411–412, 414

Shotguns:

cartridges for, 466–467

choke of, 474

description, 466

distance determinations involving, 474

examination of cartridge cases, 466–467

gauge of, 466–467

SICAR (Shoeprint Image Capture and Retrieval), 82, 491

Silver nitrate, 288

Simpson, O.J., 75, 405–409

Sinsemilla, 254

Sketches, 42, 532–533

Slack space, 539–541

Smokeless powder:

around bullet holes, 471–474

classification, 328

composition, 328

detection, 334

Soil:

collection, 122–123

comparison, 119–122

forensic definition, 119–120

trace elements in, 161

variability, 122

Solids:

amorphous, 108

crystalline, 108, 110, 174, 188

definition, 131

Sound spectrograph, 14, 518–519

Southern, Edward, 392

Southern blotting, 392

Spectrophotometer, description of, 147–149, 287–289

Spectrophotometry:

application of, 271–272, 293

definition of, 132

theory, 147

(*See also* Atomic absorption spectrophotometry; Infrared spectrophotometry; Ultraviolet spectrophotometry; Visible spectrophotometry)

Spermatozoa, 368–369, 375

Spontaneous combustion, 317

State of Tennessee v. Paul Ware, 404

State v. Jasclevich, 29–35, 352

Stereoscopic microscope, 186–187, 235, 334

Stimulants, 260–263

STR (Short Tandem Repeats), 397–401, 411–412, 414

Study in Scarlet, A (Doyle), 5

Sublimation, 131, 443

Substrate control, 321, 371, 413

Succinylcholine chloride, 18

Super Glue® fuming, 444–445, 448

Swap file, 537–538, 543

Synthetic fibers, 223

T

Taggants, 335

Tandem repeats, 390–391

Takayama test, 354

Teichmann test, 354

Telogen growth phase, 211, 217

Temperature, 103–104

Tempered glass, 110, 115

Tetrahydrocannabinol (THC), 256–257, 351

Tetryl (2,4,6–trinitrophenylmethylnitramine), 329

Textiles (*see* Fibers)

Thallium, 301

Thin-layer chromatography:

- application of, 226, 271, 334, 513–514
- description of, 138–140

Tire impressions, 484–491

TNT (trinitrotoluene), 329

Toner Examination, 504

Toolmarks:

- collection of paint from, 483
- collection and preservation, 481–482
- comparison, 481–483
- definition, 481
- individual and class characteristics of, 481–483

Toxicology:

analytical techniques used, 300–301

classification of drugs for, 299

collection of specimens for, 298

forensic aspects of, 297–298

laboratory services for, 14

poison detection, by, 6, 301

significance of, 302–303

Trace elements:

in brass, 161

table, 162

in bullets, 162–164

in copper wires, 173

table, 173

in drugs, 173

in fibers, 161

in glass, 111, 161

in hair, 173

in metals, 161, 173

in paint, 166, 173, 237

significance of, 161

in soil, 161

Tranquilizers, 260

Triacetone triperoxide (TATP), 330

Tritium, 171–172

Turin, Italy, 8

Type lines, 433

Typewriters:

collection of exemplars from, 502–503

identification of make and model, 502–503

individual characteristics, 502–503

typefaces of, 502

U

Ultraviolet spectrophotometry, applications of, 149–150, 271–272

Unallocated space, 542–543

United States v. Byron C. Mitchell, 430

United States v. Mara, 501

Urine testing for drugs, 303

V

Vacuum sweeper, 47

Valium, 260, 267

Van Urk test, 270

Virtual image, 180

Visible spectrophotometry, 149–150

(See also Breathalyzer)

Voice examination, 14, 515–519

Vollmer, August, 9

Von Bayer, Adolf, 259

Vucetich, Juan, 429

W

Warren Commission, 162

Watson, James, 383

Wavelength, 144–145

Weight, 104–105

Whorl patterns, 434

Wi-Fi, 553

Williams, Wayne, 76, 87–97, 225

Wood, 13

Working distance, 187

World Trade Center, 337, 414, 421–425

X–Y–Z

X-ray diffraction:

application of, 174, 301, 335

theory of, 174

X-rays:

emission by elements, 193–194, 237, 477

nature of, 145–147

Y-STR, 401

Zygote, 364