

INDEX

A

- Aberdeen Proving Ground, Maryland, 398, 409–410
 - See also Edgewood Arsenal, Maryland
- ABG
 - See Arterial blood gases (ABG)
- Abortion
 - septic, in brucellosis, 516
- Abrin, 610, 632
- Abrus precatorius*, 610, 632
- AC
 - See Hydrogen cyanide (AC)
- Acetaminophen, 627
- Acetylcholine (ACh), 132–134, 136, 159, 647
- Acetylcholinesterase (AChE), 131–132, 134, 182–184
- Acetylene tetrachloride, 34
- Acid hydrolysis, 355
- Action potential, 133
- Activated charcoal, 217, 362–363, 366, 370, 373, 670
- Adamsite
 - See DM (diphenylaminearsine)
- Additives, 122
- Adenine arabinoside (Ara-A), 553
- Adenosine triphosphate (ATP), 275, 383, 431
- S-Adenosylhomocysteine hydrolase inhibitors, 552
- Adenoviridae*, 575, 683
- Adrenaline, 132
- Adrenergic nervous system, 132
- Adsorbent materials, 354, 363–364, 370
- Advanced trauma management (ATM), 326–327
- Aedes albopictus*, 563, 566, 568
- Aedes dorsalis*, 567
- Aeromedical Isolation Team (AIT), 432, 434
- Aeromonas*, 609
- Aerosol
 - definition, 248
 - detection, 383, 448
 - LC₅₀ calculation, 606
 - LD₅₀ calculation, 606
 - particle size, for biological agents, 440
- Aerosolization, 121
 - of biological agents, 440–442
 - of toxins, 605–608, 612
 - See also Inhalational injury; specific agent
- Aerosol vulnerability testing, 429
- AERP system
 - See Aircrew Eye/Respiratory Protection (AERP) system
- Afghanistan, 3, 67–68, 102, 104, 656–658, 665
- Aflatoxins, 656, 662
- African swine fever, 459
- African viral hemorrhagic fever, 434
- Agent Orange, 105, 297, 419
- Agent Purple, 51
- Agent X
 - See Botulinum toxins
- Aging, of organophosphoryl–cholinesterase bond, 162, 182–183, 230
- AHF
 - See Argentine hemorrhagic fever (AHF)
- Airborne toxic material
 - definitions, 248
 - See also Aerosol; Inhalational injury; specific material
- Aircraft masks, 74
- Aircrew Eye/Respiratory Protection (AERP) system, 369–370
- Aircrew personal protective equipment, 368–370
- Aircrew uniform, integrated battlefield (AUIB), 373
- Air delivery
 - history, 28, 31, 34–35, 49–50
 - See also Aerosol; Inhalational injury; specific agent
- Airplane smoke tanks, 31
- AIT
 - See Aeromedical Isolation Team (AIT)
- Alarms, 377–383
 - biological agent, 431
 - history, 23, 53, 60–62, 66–67
 - LOPAIR, E33 Area Scanning, 53
 - M8A1 Automatic Chemical Agent, 380–381
 - M21 Remote Sensing Chemical Agent (RSCAAL), 381
 - Portable Automatic Chemical Agent, 60–62
 - See also Detection
- Alastrim, 543
- Alexander, Stewart, 103
- Algal toxins, 457, 609, 617
- Alimentary toxic aleukia (ATA), 659, 667
- Alkaline hydrolysis, 355
- Allergic contact sensitivity, 238–239, 249, 314, 316–317
 - Naphthylthiourea (ANTU), 638
- Alphaviruses, 562
 - antigenic classification, 564–565
 - structure and replication, 569–570
 - See also Viral encephalitides; specific virus
- Alphavirus virion, 569
- Ambergard XE-555 Resin, 353
- Ambulance exchange points, 331
- AMEDD
 - See U.S. Army Medical Department (AMEDD)
- American Civil War, 11, 13, 88, 416, 540
- American Cyanamid Company, 38
- American Type Culture Collection (ATCC), 463, 646
- American University, 94
- Amherst, Sir Jeffery, 416
- Aminoglycosides, 518
- Aminopyridines, 651
- 2-Amino thiazoline 4-carboxylic acid, 276
- Amphetamines, 292
- Amyl nitrite, 280
- Angola, 69
- Anguidine
 - See 4,15-Diacetoxyscripenol (DAS)
- Animals
 - that harbor disease, 487–488, 514, 524, 527–528
 - transgenic research involving, 683
 - vaccines for, 434, 460, 464, 568, 576, 578
 - weapons directed against, 12, 16, 34–35, 37, 51, 60, 428–429, 459–460
 - See also specific agent or animal
- Animal venom toxins, 610, 650
- Anthrax, 5, 467–475
 - in animals, 468–469
 - clinical manifestations, 471–472
 - cutaneous, 471–473
 - delivery, 442, 446
 - diagnosis, 473
 - epidemiology, 469
 - gastrointestinal, 472–473
 - history, 10, 16, 32, 42–44, 50, 68, 417–418, 420, 427, 431–432, 459, 468, 645
 - inhalational, 469, 471–473
 - lethality, 443–444, 456
 - occupational exposure, 468–469, 474

- oropharyngeal, 472–473
- pathogenesis, 469–471
- prophylaxis, 473–475
- recent use, 4, 420–421, 452–453, 462, 464, 468
- spore stability after production, 441
- treatment, 473
- vaccination, 73, 462, 468, 473–475
- See also *Bacillus anthracis*
- Anthraxin**, 473
- Antianimal weapons**, 459–460
 - history, 12, 16, 34–35, 37, 51, 60, 428–429
 - See also *specific agent or animal*
- Antibiotics**
 - for anthrax, 473
 - for brucellosis, 518
 - cream/ointment, 214
 - for plague, 497–498
 - for Q fever, 531
 - resistance, 681–682
 - for tularemia, 507
 - See also *specific antibiotic*
- Anticholinergics**, 294–302
 - See also *specific agent*
- Anticonvulsants**, 154–155, 165, 187, 191, 279
 - See also *specific drug*
- Antidote kits**, 73
- Antidotes**
 - anticholinergic, 298–302
 - cyanide, 279–282
 - Lewisite, 102, 218, 220
 - nerve agent, 158–159, 329
 - self-administration, 329–331
 - See also *specific antidote*
- Antigens**
 - detection, 383, 517
 - viral, 541–542
- Antihistamines**, 627
 - See also *specific drug*
- Antimaterial agents**, 459, 461
- Anti-O-polysaccharide antibody**, 517
- Antiplant balloon bomb**, 51–52
- Antiplant weapons**, 460–461
 - history, 44, 51–52, 60, 427–429, 431
 - See also *Defoliants; specific agent or plant*
- Antiricin antibody**, 638–639
- Antitoxins**, 434, 632
- Antitussives**, 628
- Antiviral drugs**, 434, 598–599
 - See also *specific drug*
- ANTU**
 - See *-Naphthylthiourea (ANTU)*
- Anxiety reactions**
 - differential diagnosis, 297–298
- Apodemus agrarius*, 594
- Ara-A**
 - See *Adenine arabinoside (Ara-A)*
- Arab–Israeli Six-Day War (1967)**, 57, 65
- Arab–Israeli War of 1973**, 3
- Ara-C**
 - See *Cytosine arabinoside (Ara-C)*
- Arenaviridae*, 575, 592–593
- Argentine hemorrhagic fever (AHF)**, 592–593, 595–596, 599
- Armstrong, George E.**, 428
- Arrhythmias**, 156, 165–166, 239, 253, 277
- Arsenicals**, 42, 198
 - See also *specific agent*
- Artane**
 - See *Trihexyphenidyl*
- Arterial blood gases (ABG)**, 252
- Arthur, Stanley**, 73
- Artificial ventilation**
 - See *Ventilatory support*
- Artillery shells**, 120
- Ascorbic acid**, 671
- ASC Whetlerite charcoal**, 363
- Ash, Charles A.**, 13
- Aspartate aminotransferase (AST)**, 596
- Aspergillus fumigatus*, 429
- Asphyxiation**, 249
- Aspirin**, 597, 627
- Assassinations**
 - using biological weapons, 420–421, 446, 645
- ASZ impregnated charcoal**, 363–364
- ATA**
 - See *Alimentary toxic aleukia (ATA)*
- ATCC**
 - See *American Type Culture Collection (ATCC)*
- Atelectasis**, 252
- Ativan**
 - See *Lorazepam*
- ATM**
 - See *Advanced trauma management (ATM)*
- ATP**
 - See *Adenosine triphosphate (ATP)*
- AtroPen**, 155, 159–160, 169
- Atropine sulfate**, 159–162
 - administered in absence of nerve agent intoxication, 160
 - cardiovascular effects, 156, 160, 165
 - contraindications, 167
 - decrease in sweating caused by, 160
 - for dermal exposure, 161–162
 - dosage and administration, 160–161, 169
 - and endurance time in protective gear, 394
 - history, 47, 54, 60, 131, 291
 - ID₅₀, 295
 - as incapacitating agent, 294–295, 299
 - for inhalational exposure, 161
 - injectors, 54, 73, 155, 159–161, 169
 - LD₅₀, 295
 - for nausea and vomiting, 168
 - and nerve agent cardiovascular effects, 156
 - and nerve agent-induced seizures, 154–155
 - and nerve agent pretreatments, 184–187, 191
 - pulmonary effects, 148–149, 158
 - topical ocular administration, 147, 166–167, 215
- Attack measures**
 - for medical support, 328
- AUIB**
 - See *Aircrew uniform, integrated battlefield (AUIB)*
- Aum Shinrikyo**, 4, 75, 113, 118, 131, 169, 274, 342, 438, 463, 678
- Aura virus**, 566
- Australia**, 460
- Autoclaving**, 358
- Autoinjectors**, 54, 73, 155, 159–161, 163–165, 169, 252, 341
- Autoinoculation**
 - and vaccinia vaccination, 548–549
- Automatic Chemical Agent Alarm**
 - M8A1, 380–381
- Automatic G-Agent Field Alarm**, 53
- Automatic G-Agent Fixed Installation Alarm**, 53
- Autonomic nervous system**
 - effects of cyanides on, 277
- Aviator's masks**, 74
- Avipoxvirus*, 542
- Azidothymidine (AZT)**, 639
- Azithromycin**, 531

B

- Bacillus anthracis*, 383, 439, 468–469, 474
 See also Anthrax
- Bacillus globigii*, 43, 60, 429
- Bacillus subtilis*, 428
- Bacitracin, 214
- Bacteria
 possible biological warfare agents, 439
 See also Biological agents; specific agent
- Bacterial toxins, 609, 647
 See also specific toxin
- Bacterium tularensis*
 See *Francisella tularensis*
- Badoglio, Pietro, 34
- Baker, Newton D., 25
- BAL
 See British anti-Lewisite (BAL)
- Baldwin Report, 427–428
- “8-Ball,” 428
- Bang, B., 514
- Barbiturates, 293, 302
- Bari mustard disaster (Italy), 40, 103–104, 200
- Barmah Forest virus, 565
- Barrier nursing procedures, 432–433, 598
- Barton, Samuel, 13
- Base-ejection devices, 120–121
- Battalion aid station (BAS), 327, 329, 331, 335
- Battledress overgarment (BDO), 371, 373
- Battledress uniform (BDU), 373, 669
- Battlefield health service support, 326–328
- Bedbugs, 487
- Bell, Sir Charles, 105
- Belladonna, 289–290, 294–295, 297–299
- Benactyzine, 159, 187
- Benenson, Abram S., 428
- Benzilate, 295
- Benzodiazepines, 302
- Berlin Blockade, 47
- Berthollet, Claude Louis, 10
 -Propiolactone (BPL), 597
- Bhopal disaster (India), 119
- Bicuculline, 154–155
- BIDS
 See Biological Integrated Detection System (BIDS)
- BIGEYE bomb, 65–66, 71
- Binary weapons programs, 65–66, 70–72, 75, 104
- Biological agents
 aerosolization, 440–442
 availability or ease of production, 438–439, 457, 678
 containment precautions, 430, 432–434
 decontamination, 357–358
 defense against, 1–6, 425–435, 438, 443–446, 677–684
 delivery systems, 121, 420–421, 429, 438–442, 446, 457, 656, 658–659
 detection, 74, 377, 382–384, 431, 447–449
 differential diagnosis, 438, 448–449
 dispersal, 5
 dual use, 679
 ease of dissemination, 440, 457
 enhanced pathogenicity, 680–681
 epidemiological surveillance, 448
 field testing in U.S., 429
 genetic recombination, 681
 ideal, requirements for, 438–441
 incapacitation caused by, 292, 431, 439–440
 incubation periods, 439
 infectivity, 680–681
 inhalational injury, 440
 introduction to, 4–6
 laboratory testing, 448–449
 lethality, 439–440, 444
 nonmilitary sources, 5–6, 10
 nonreplicating, 4–5
 occupational exposure, 398–399, 402–408, 432, 434
 patient isolation procedures, 432–433
 protective equipment against, 431, 447–448
 replicating, 4–5
 risk of transmission to medical staff, 356
 stability after production, 441
 susceptibility and nonsusceptibility, 441
 vaccines, 60–61, 73, 434, 441, 460, 462, 681–683
 virulence, 681
 See also specific agent
- Biological bombs, 32–33, 44, 51–52, 59, 441–442, 444
- Biological defense equipment, 431
- Biological Defense Research Program, 434–435
- Biological Integrated Detection System (BIDS), 74, 377, 382–384, 448
- Biological warfare
 attempts to control, 13, 419–420, 678–679
 Cold War, 50–52, 55, 58–60, 420–422, 426, 430, 656
 definition, 10
 early proposals and usage, 12, 88, 416–417
 history, 9–75, 87–105, 415–422
 indications of possible attack, 448–449
 and military healthcare provider, 6, 445, 447, 683–684
 pre-World War I, 10–13, 88–90
 psychological factors, 445
 1920s, 28–29
 1930s, 31–33
 1960s, 58–60, 104–105
 1970s, 64, 67–68, 104–105, 420–421
 1990s, 74–75, 104–105, 420–422
 strategic and tactical concerns, 445–446, 456–458
 threat, 451–464, 683–684
 unconventional/ clandestine use, 442, 446–447, 458
 World War I, 16, 21–22, 90–97, 417, 446, 459, 540
 World War II, 36–37, 42–44, 103–104, 417–419, 426–427, 446, 483–485, 540, 632, 644–645
- Biological Warfare Convention, 64, 67
- Biological weapons
 advantages and disadvantages, 442–445, 456–459, 684
 demilitarization, 431–432, 525, 564
 nations with capability for use, 679
 nonhuman targets of attack, 434, 459–461
 versus nuclear and chemical weapons, 458–459
 proliferation, 456–459, 678
 use, 437–449
- Biological Weapons Anti-Terrorism Act, 75, 633
- Biological Weapons Convention, 419–420, 422
 compliance, 432, 435, 455, 458, 462–463, 679
 and Soviet biological warfare program, 4, 452–453, 455–456
 Third Review Conference, 453
 and toxin definition, 604, 608
 Trilateral Agreement, 455
 and U.S. biological warfare program, 426
- Biopreparat, 454
- Biosafety levels, 430, 432–434, 597
- Biotechnology, 678–683
 and nerve agent pretreatments, 192–193
- Birds
 viral encephalitides carried by, 567, 573
- Blackburn, Luke, 12
- Black Death, 481–482, 487, 495
- Blackford, William W., 11

- Black Plague, 416
- Black vinyl overboot (BVO), 374
- Bleach
 - See Hypochlorite solution
- Bleaching powder, 22–23, 33–34, 54
- Bleeding
 - in viral hemorrhagic fevers, 597
- Blood–brain barrier permeability
 - and nerve agent pretreatments, 187, 191
- Blood cell counts, 497, 506, 530, 635
- Blood cholinesterases, 132, 136–139
- Blue-X, 3
- BN 52021, 670
- Boer War, 11
- Bolivian hemorrhagic fever, 593, 595–596, 599
- Bombs
 - biological, 32–33, 44, 51–52, 59, 441–442, 444
 - chemical, 28, 40, 49–50, 59, 65–66, 71
 - See also specific type of bomb
- Bone disease, 215–217, 517
- Boots
 - protective, 373–375
- Botulinum toxins, 5, 643–652
 - and assassination of Reinhard Heydrich, 645
 - crystalline, 644
 - decontamination, 616
 - detection, 383
 - dual use, 457
 - genetics, 647
 - history, 32, 43, 417, 421, 427, 644–645
 - lethality, 608
 - mechanism of action, 609–611, 647–649
 - military significance, 644
 - recent use, 462–463
 - relation to other bacterial toxins, 647
 - serology, 646
 - stages of toxicity, 648
 - versus tetanus toxin, 646
 - treatment, 611
 - vaccination, 73, 462, 644, 651
- Botulism, 646
 - clinical manifestations, 649–650
 - diagnosis, 650
 - differential diagnosis, 574, 613–614
 - infant, 644, 646
 - inhalational, 647, 649–650
 - pathogenesis, 647–649
 - treatment, 616, 651–652
 - wound, 644
- Bouquet, Henry, 12
- Boynton, E. C., 11
- BPL
 - See -Propiolactone (BPL)
- Bradley, Tom, 461
- Bradycardia, 156–157
- Brain lesions
 - nerve agent-induced, 154–155, 187
- Brazil
 - hemorrhagic fever outbreak, 593
- Breathing difficulties
 - with mask use, 365, 403
 - nerve agent-induced, 145, 147–149, 158, 167–168, 170
 - and toxic inhalational injury, 255
 - See also Ventilatory support
- The Breeders, 461
- Brefeldin-A, 639
- Brevetoxins, 609
- Bristol-Myers Squibb Oncology Division, 237
- British anti-Lewisite (BAL), 102, 218, 220, 261
- British anti-Lewisite (BAL) Eye Ointment, 42
- British smoke grenade, 262
- Bromine, 273
- Bronchiectasis, 211–212, 215, 238
- Bronchitis, 211, 238, 253, 257
- Bronchoconstriction, 148–149, 158
- Bronchodilators, 253, 257
- Bronchospasm, 250, 253, 257
- Brown, Frederic, 93, 96
- Bruce, David, 10, 514
- Brucella, 383, 514–515
 - See also Brucellosis
- Brucella abortus*, 514, 516, 518
- Brucella canis*, 514–515, 517–518
- Brucella endocarditis*, 517–518
- Brucella melitensis*, 514–518
- Brucella neotomae*, 514
- Brucella ovis*, 514
- Brucella suis*, 51, 429, 514–515, 517
- Brucellosis, 5, 513–519
 - clinical manifestations, 516–517
 - diagnosis, 517–518
 - differential diagnosis, 574
 - epidemiology, 515
 - history, 10, 43–44, 417, 427, 429–430, 514
 - lethality, 444
 - pathogenesis, 515–516
 - prophylaxis, 518
 - treatment, 518
 - See also *Brucella*
- Bubo aspiration, 495
- Bubonic plague, 480, 486, 491–492, 497
- BuChE
 - See Butyrylcholinesterase (BuChE)
- Buddy-aid, 155, 159, 161, 165, 166
 - and chemical workers, 407, 409–410
- Bulk-release munitions, 120–121
- Bullene, Egbert F., 48, 50
- Bunyaviridae*, 575, 592–594
- Burnet, MacFarlane, 525
- Burns
 - CS-induced, 313
 - mustard, 98–100, 202, 205–208, 214, 238, 342–343
 - thermal, 343
- Burroughs Wellcome Co., 214, 552
- Bush, George, 72, 74, 117, 455, 462
- Butyl rubber aprons, 329, 332
- Butyl rubber gloves, 356–357
- Butyl rubber masks, 364–365, 369–370
- Butyl rubber overgarments, 370
- Butyrylcholinesterase (BuChE), 132, 136–139, 192, 301
- Butyrophenones, 293
- Butyrylcholine, 132, 134
- BVO
 - See Black vinyl overboot (BVO)
- BZ (3-Quinuclidinyl benzilate), 5, 119, 159, 294–296
 - anticholinergic delirium produced by, 296
 - chemical structure, 295
 - clinical pharmacology, 295–296
 - delivery systems, 121
 - history, 5, 57–59, 291
 - ID₅₀, 295
 - MED₅₀, 296
 - treatment, 298–302

C

CA (bromobenzylcyanide), 320

- Caffeine, 292
- CAI
See Chemical (Surety Material) Accident or Incident (CAI)
- CAIRA
See Chemical Accident or Incident Response and Assistance (CAIRA)
- Calabar bean, 130, 298
- Calamine, 670
- Calcium ethylenediaminetetraacetic acid (CaEDTA), 261
- Calcium hypochlorite
See Hypochlorite solution
- Calomys colosus*, 592
- CAM
See Chemical Agent Monitor (CAM)
- Cambodia
See Kampuchea
- Camp Detrick
See Fort Detrick, Maryland
- Camphor, 670
- Camp Terry, Plum Island, New York, 460
- Canada, 32, 427
- Canister mask arrangement, 364, 366–369
- Cannabinoids, 297–298
- Canvas Trench Fan, 22–23
- Capripoxvirus, 542
- Capsaicin, 316
- Carbamates, 130, 132, 134, 183–184
See also specific agent
- Carbamoylation, 184
- Carbaryl
See Sevin
- Carbon tetrachloride, 199, 201, 310
- Carbonyl chloride
See Phosgene (CG)
- Carcinogenesis
and mustard exposure, 217, 237–238
- Cardiovascular effects
of brucellosis, 517–518
of cyanides, 277
of mustard, 217
of nerve agents, 145, 155–157, 165–166, 169
of Q fever, 528
of riot control agents, 315, 321
of staphylococcal enterotoxin B, 626
of toxic inhalational injury, 252–253
of viral hemorrhagic fevers, 596
- Carus, W. Seth, 458
- Cassava, 273–274
- Castor beans, 610, 632–633, 635
- Castor oil, 610, 632, 636
- Casualty arrival point, 331–332
- Casualty decontamination, 329, 331–335, 340–341, 352, 386–387, 408–410
- Casualty Decontamination Center (CDC), 329
- Casualty-receiving area, 331–335
- Cats, 487–488
- Cat scratch disease, 495–496
- Cattle, 417, 459–460, 548
- Cavanaugh, Dan C., 483
- CB Pressurized Pod, 67
- CBPS
See Chemical and Biological Protected Shelter (CBPS)
- C-CHF
See Crimean-Congo hemorrhagic fever (C-CHF)
- CCST
See Chemical Casualty Site Team (CCST)
- CD
See Cluster of differentiation (CD)
- CDAE
See Chemical defense aircrew ensemble (CDAE)
- CDC
See Casualty Decontamination Center (CDC); Centers for Disease Control and Prevention (CDC)
- cDNA
See Complementary DNA (cDNA)
- CDTF
See Chemical Decontamination Training Facility (CDTF)
- Cefazolin, 473
- Ceftriaxone, 497
- Centers for Disease Control and Prevention (CDC), 540, 551–552, 596, 626, 651
- Central Intelligence Agency (CIA), 428, 454, 456–457, 461–462
- Central nervous system effects
of brucellosis, 517
of cyanides, 277
of mustard, 212, 239
of nerve agents, 145, 149–155, 170, 233–234
of Q fever, 529–530
in toxic inhalational injury, 254
of viral encephalitides, 571–574, 576
- Centro Chemico Militaire, 29
- Cephalosporium*, 656
- Cephalothin, 473
- Cerebrospinal fluid (CSF) examination, 576
- CF
See Complement fixation (CF)
- CG
See Phosgene (CG)
- Chad, 69
- CHAMP
See Chemically Hardened Air-Management Plant (CHAMP)
- Chancroid, 495–496
- CHASE (Operation Cut Holes and Sink 'Em), 62–64
- CHATH
See Chemically Hardened Air Transportable Hospital (CHATH)
- ChE
See Cholinesterase (ChE)
- Chemical accident/incident response and assistance, 409–411
- Chemical (Surety Material) Accident of Incident (CAI), 409
- Chemical Accident or Incident Response and Assistance (CAIRA), 409–411
- Chemical agent monitor (CAM), 70, 378–379
decontamination certification with, 355–357
and medical management, 332, 335
- Chemical agents, 4–6, 10, 18–19, 22–24, 27, 29–31, 34–35, 37–39, 41, 52–53, 57, 62–63, 66–69, 72–74, 118–119
defense against, 1–6, 677–684
definition, 398
demilitarization, 115, 117, 411–412
detection, 377–381
deterrents to use, 6
dispersal, 5
incapacitation caused by, 292
lethality, 607
nonmilitary uses, 5–6, 115–116, 679
nonpersistent, 5, 122–123
offensive use, 112–117
persistent, 5, 122–123, 157
physical properties, 122–123
release, See Delivery systems; specific system
review of effects, 341–344
storage, 411–412
volatility, 122–123
See also specific agent

- Chemical and Biological Protected Shelter (CBPS), 385
- Chemical bombs, 28, 40, 49–50, 59, 65–66, 71
- Chemical casualties
 - advising agencies for treatment, 398
 - with combined injuries, 340, 347–348
 - decontamination, 329, 331–335, 340–341, 352
 - diagnosis, 112, 124
 - field management, 325–336
 - first aid for, 329–332
 - medical management, 124–125, 329
 - World War I, 6, 24, 91–92, 100–101, 200, 205
- Chemical Casualty Site Team (CCST), 410
- Chemical Corps
 - biological warfare programs, 430
 - creation of, 45
 - post–World War II programs, 46–47
 - 1950s programs, 47–55
 - 1960s programs, 55, 57–62
 - 1970s programs, 64–68
 - 1980s programs, 68–72
 - See also Chemical Warfare Service (CWS)
- Chemical decontamination methods, 158, 354–355, 357–358, 363
- Chemical Decontamination Training Facility (CDTF), 71
- Chemical defense aircrew ensemble (CDAE), 373
- Chemical defense equipment, 124
 - aircrew, 368–370
 - and chemical warfare capability, 113
 - Cold War, 52–53, 60–62, 67, 69–70
 - developmental, 375
 - early, 12–13
 - ground crew, 365–368
 - individual, 363–377
 - joint service use, 362, 375
 - and medical personnel, 329, 331–332, 334, 338, 340–341
 - post–World War II, 47
 - 1920s, 27–28, 101–102
 - 1930s, 33–34, 101–102
 - 1960s, 60–62
 - 1980s, 69–70
 - 1990s, 74
 - World War I, 15–18, 22, 91–94, 363–364, 393
 - World War II, 37, 40–43, 103, 365, 394
 - See also Collective protection; Masks; Mission-oriented protective posture (MOPP); specific item
- Chemically Hardened Air-Management Plant (CHAMP), 385
- Chemically Hardened Air Transportable Hospital (CHATH), 385
- Chemically protected deployable medical system (CP DEPMEDS), 384
- Chemical Personnel Reliability Program (CPRP), 399–402
 - baseline data for future exposures, 404
 - periodic medical examinations, 404–406
 - preplacement examination, 403–404, 406
 - screening/evaluation, 399–404
 - termination examination, 405
- Chemical protective footwear cover (CPFC), 374
- Chemical protective glove set, 374–375
- Chemical protective overgarment (CPOG), 373
- Chemical rockets, 40, 58–59, 62, 71
- Chemicals in War* (Prentiss), 123
- Chemical Stockpile Emergency Preparedness Program (CSEPP), 409
- Chemical Surety Inspection (CSI)
 - documentation, 400–402
- Chemical surety material
 - definition, 399, 402
- Chemical surety mission
 - civil–military relations and, 408–411
 - definition, 398
 - duty positions, 399–402
 - healthcare and, 397–412
- Chemical threat
 - definition, 112
 - and enemy capability, 113–114
- Chemical warfare
 - attempts to control, 13, 115, 117, 411–412, 678–679
 - capability for, 113–117
 - definition, 10
 - early proposals and usage, 11–12, 88
 - future, 125–126
 - history, 9–75, 87–105
 - and military healthcare provider, 6, 111–126, 328–335, 683–684
 - pre–World War I, 10–13, 88–90
 - 1920s, 25–29, 101–102
 - 1930s, 29–36, 101–102
 - 1950s, 47–55, 104–105
 - 1960s, 55–64, 104–105
 - 1970s, 64–68, 104–105
 - 1980s, 68–72, 104–105
 - 1990s, 72–75, 104–105
 - training, 48, 55–56, 71–72, 94, 124
 - World War I, 13–25, 90–97, 290
 - World War II, 36–47, 103–104, 125, 131, 200, 290
- Chemical Warfare in Southeast Asia and Afghanistan* (Haig), 68
- Chemical Warfare Review Commission, 70
- Chemical Warfare School, 26, 29, 35, 48, 71
- Chemical Warfare Service (CWS)
 - biological warfare programs, 426, 428, 632
 - creation of, 18–19, 95
 - permanent establishment of, 25–27
 - post–World War II demobilization, 45
 - 1920s programs, 27–29
 - 1930s programs, 29–31
 - World War I programs, 19–22
 - World War II programs, 37–44
 - See also Chemical Corps
- “Chemical warfare threshold,” 117
- Chemical weapons
 - nations with capability for use, 114, 116, 679
 - versus nuclear and biological weapons, 458–459
 - proliferation, 114–118
 - reduction or elimination, 115, 117, 411–412
 - tactical and strategic use, 120–125
 - versus toxin weapons, 605, 607
- Chemical Weapons Convention, 75, 115, 117, 679
- Chemical workers
 - health education for, 407–410
 - health surveillance for, 402–405
- Chest radiography
 - and inhalational injury, 252, 259–261, 264
 - and pneumonic plague, 494
 - and Q fever, 530
 - and tularemia, 506
- Chickenpox
 - versus smallpox, 546
- Chikungunya virus, 562, 578
- Chile, 463
- China
 - biological warfare program, 461–462
 - Japanese invasion of, 35–36, 200, 218, 417–418, 485
- Chipmunks, 487–488
- Chlamydia trachomatis*, 496

- Chloramphenicol, 473, 497, 507
- Chloride of lime
 See Hypochlorite solution
- Chlorine (Cl), 118, 255–257
 clinical effects, 256
 history, 5, 11, 14–15, 27, 88–93, 95, 119, 248
 long-term health effects, 257
 physical properties, 255–256
 treatment, 256–257
- 1-Chloroacetophenone
 See CN (1-Chloroacetophenone)
- 2-Chlorobenzaldehyde, 315
- Chlorobenzene, 201
- o*-Chlorobenzylidene malononitrile
 See CS (*o*-Chlorobenzylidene malononitrile)
- Chloroform, 11
- Chloroform–methanol extraction (CMR vaccine), 532
- Chloropicrin (PS), 10, 12, 19, 27, 201
- Chlorosulfonic acid
 See Sulfur trioxide–chlorosulfonic acid (FS smoke)
- Chlorpromazine, 280, 302
- Cholecalciferol, 498
- Cholera, 10, 12, 16, 33, 37, 42, 417–419, 462
- Cholinergic nervous system, 132–134
- Cholinesterase (ChE), 130–139, 159
- Cholinesterase (ChE) inhibitors, 130–142, 164, 236
 See also Nerve agents; Organophosphorus compounds;
 specific agent
- Chromium, hexavalent (CrVI), 363
- Chronic pulmonary disease, 237–238
- Churchill, Winston, 14, 125, 418, 427
- CIA
 See Central Intelligence Agency (CIA)
- Cigarettes
 Teflon-contaminated, 265–266
- Cigarette smoke
 cyanide content, 273
- Cigarette smoking
 and toxic inhalational injury, 250
- Cimex lectularius*, 487
- Ciprofloxacin, 473
- Civil defense program
 and biological warfare, 434–435, 446
 World War II, 41
- Civil disturbances
 riot control agent use during, 309–310, 313
- Civilian resources
 training, 409–410
- Civil–military relations
 and biological defense program, 434–435
 and chemical surety mission, 408–411
- CK
 See Cyanogen chloride (CK)
- Clean Air Act, 412
- Clean treatment area, 331, 333, 335
- Cleghorn, G., 514
- Clethrionomys glareolus*, 594
- Clindamycin, 473
- Clinton, William, 455
- Clostridium botulinum*, 644, 646–647
 See also Botulinum toxins; Botulism
- Clostridium difficile*, 463
- Clostridium perfringens*, 421
- Clostridium tetani*, 644, 646–647
 See also Tetanus toxin
- Clothing decontamination, 358, 408
- Cluster of differentiation (CD), 542, 622
- CMR
 See Chloroform–methanol extraction (CMR vaccine)
- CN (1-Chloroacetophenone), 27, 119, 292, 309–310, 316–321
- Cobalt salts, 281
- Cocaine, 292
- Coccidioides immitis*, 429
- Coccidioidomycosis, 429, 431
- Cochrane, Thomas, 88
- Codeine, 628
- Cold War, 47–64
 binary weapons programs, 65–66, 70–71
 biological warfare programs, 50–52, 55, 58–60, 420–422,
 426, 430, 656
 detection developments, 53–54, 60–62, 66–67, 70
 nerve agent production and development, 49
 offensive chemical agent developments, 49–50, 57–59
 protective device developments, 52–53, 60–62, 67, 69–70
 Soviet threat, 54–55
- Collective protection, 384–386
 developmental, 386
 history, 33, 42, 60, 67, 70
 medical systems, 384–385
 for military vehicles, 67
 preattack measures, 328
- Collective protection equipment (CPE)
 M28, 384
- Colorado beetles, 418
- Combat lifesaver, 327, 339
- Combat medic, 327, 339
- Combat Service Mask, 41
- Combat Support Hospital (CSH), 328
- Combat vehicle filtration protection system, 368
- Combat Vehicle Mask, 70, 74
- Combined injuries, 340, 347–348
 See also Wounds
- ComboPen, 155, 163–165
- Committee on Biological Warfare, 427
- Complementary DNA (cDNA), 569
- Complement fixation (CF), 531, 573
- Compound W
 See Ricin toxin
- Conjunctivitis, 98–99, 208, 210, 214–215, 238, 314
- Contact lenses
 and protective masks, 402–403
- Containment precautions, 430, 432–434
- Contamination
 of medical equipment and facilities, 124–125, 157, 353, 357
 wound, 124, 347–348, 356
- Continental United States (CONUS), 326, 328
- Convention on Prohibition of Bacteriological and Toxin
 Weapons
 See Biological Weapons Convention
- Convulsions, 154–155, 158, 165, 187, 239
- Copper oxide, 363
- Coquilletidia*, 566
- Corneal damage, 210, 238, 317
- Corticosteroids, 598
- Corynebacterium diphtheriae*, 647
- Cotton lung disease, 659
- Cough suppressants, 628
- Counterterrorism, 75
- Cowpox, 548
- Cows, 417, 459–460, 548
- Cox, Herald, 525
- Coxiella burnetii*, 430, 524–526, 528–529
 See also Q fever
- Coyotes, 488

CP DEPMEDS

See Chemically protected deployable medical system (CP DEPMEDS)

CPE

See Collective protection equipment (CPE)

CPFC

See Chemical protective footwear cover (CPFC)

CPOG

See Chemical protective overgarment (CPOG)

C protein, 570

CPRP

See Chemical Personnel Reliability Program (CPRP)

CR (dibenz(*b,f*)-1,4-oxazepine), 319–320

Crackles, 251, 343–344

Crick, Francis, 679

Crimean-Congo hemorrhagic fever (C-CHF), 439, 593–596, 599

Crimean War, 11, 13, 88

Crimes Involving Poisons, 463

CRM-197, 648

Cross-neutralization tests, 573–574

Crotocin, 665

CS (*o*-Chlorobenzylidene malononitrile), 119, 292, 310–316

cardiovascular effects, 315, 321

chemical structure, 310

clinical effects, 310–316

delivery systems, 121

dermatological effects, 312–314, 320–321

future use, 321

gastrointestinal effects, 314–315

history, 5, 310, 313

metabolic effects, 315

mutagenic effects, 315–316

nations with capability for use, 114

ocular effects, 314, 321

physical characteristics, 310

properties, 309

pulmonary effects, 311–312, 321

severe medical complications from, 317–318

tolerance to exposure, 310–311

CSEPP

See Chemical Stockpile Emergency Preparedness Program (CSEPP)

CSF examination

See Cerebrospinal fluid (CSF) examination

CSH

See Combat Support Hospital (CSH)

CSI

See Chemical Surety Inspection (CSI)

Ct

definition, 142, 202, 249–250

Cuba, 657

Cui-xing-ning, 191

Culex taeniopus, 567

Culex tarsalis, 563–564, 566

Culiseta melanura, 563, 566, 573

Cunningham, Roy, 461

Curare, 647

CWS

See Chemical Warfare Service (CWS)

Cyanate, 276

Cyanides, 118–119, 271–282

antidotes, 279–282

biochemical basis for poisoning, 274–276

and combined injuries, 348, 355

and CS-caused deaths, 315

decontamination, 279

detection, 380

food poisoning with, 463

food sources, 273–274

history, 5, 119, 273–274, 447

laboratory findings, 278

military uses, 273

nonmilitary uses, 273–274

pharmacokinetics and pharmacodynamics, 276

poisoning presentation and management, 277–279, 342

properties, 272

prophylactic drugs, 281–282

toxicity, 276

triage considerations, 342, 344–347

and wound decontamination, 355–356

See also specific agent

Cyanogen bromide, 273

Cyanogen chloride (CK), 118, 272–282

detection, 380

history, 10, 16, 38, 40, 273–274

properties, 272

toxicity, 276

Cyanohydrin-forming drugs, 282

Cyanomethemoglobin (CNMetHb), 275, 280

Cyclohexyl alcohol, 185

Cyclopentolate, 146

Cyclophosphamide, 528

Cynomys species, 487

Cyprus, 524

Cystathionase, 275

Cytochrome oxidase, 274, 280

Cytokines, 681

Cytolysins, 609

Cytosine arabinoside (Ara-C), 553

Cytosan, 237

D

DA (diphenylchlorarsine), 319

Dakin's solution

See Hypochlorite solution

Dalden Corp., 374

DANC

See Decontaminating Agent, Non-Corrosive (DANC)

DAS

See 4,15-Diacetoxyscripenol (DAS)

Davaine, Casimir-Joseph, 10

da Vinci, Leonardo, 11–12

Davis, Gordon, 525

Davy, Humphry, 10

DC (diphenylcyanoarsine), 319

DDT

See Dichlorodiphenyltrichloroethane (DDT)

Dead-space ventilation, 364

Decontaminable litter, 389

Decontaminating Agent, Non-Corrosive (DANC), 34, 62

Decontaminating Apparatus, 62, 70

Decontaminating Solution 2 (DS2), 62, 374, 388

Decontamination, 351–358, 362

biological agents, 357–358

casualty, 329, 331–335, 340–341, 352, 386–387, 408–410

certification, 355

chemical methods, 158, 354–355, 357–358, 363

clothing, 358, 408

definition, 352, 357

equipment, 124–125, 353, 357, 387–388

eyes, 352–353

history, 22–24, 33–34, 42, 47, 54, 62, 70, 97–98

importance, 157, 329

and inhalational injury, 252

- methods, 354–355
- nerve agents, 47, 157–158, 168–169, 354–355, 387
- by oxidative chlorination, 354–355
- personal (self-), 157, 329–330, 352
- personnel, 352, 386–387
- personnel requirements for, 335
- physical methods, 354, 358, 363–364, 370
- skin, 157–158, 333, 335, 352–353, 356, 386–387, 408, 669–670
- spot, 333, 341, 353
- surgical instruments, 357
- time required for, 333, 335, 341
- toxins, 616, 660, 669–670
- training, 352, 387, 408
- vapor, 352, 356
- wounds, 352, 355–357, 387
- See also specific agent or method*
- Decontamination apparatus/systems, 62, 70, 97–98, 388
- Decontamination area, 332–333, 335, 409
- Decontamination equipment, 386–389
- Decontamination Kit, Individual Equipment (DKIE) M295, 387–388
- Decontamination kits, 158, 335, 353–354, 387–388
- Deer mice, 487–488
- DEET (diethyltoluamide), 191
- Defense Research Establishment, Ottawa, Canada, 658
- Defoliants, 119
 - history, 44, 51, 56, 60, 62, 104, 419, 428
- Dehydration
 - and protective clothing use, 370–371, 406–407
- Delirants, 294
 - See also specific agent*
- Delirium
 - anticholinergic-induced, 296, 298–301
- Delivery systems, 120–122
 - biological agents, 121, 420–421, 429, 438–442, 446, 457, 656, 658–659
 - and chemical warfare capability, 114, 116
 - and choice of agent, 123
 - history, 27, 31, 36–37, 39–40, 51–52, 58–59
 - vapor, 121–122
 - weather conditions and, 122–123, 125
 - See also specific system*
- de Mussis, Gabriel, 416
- Demustardizing Apparatus, Commercial Type, 33
- Dendrochium toxicum*, 659
- Dengue hemorrhagic fever, 593–596, 598–599
- Deoxynivalenol (DON), 659–661, 668
- Deoxyribonucleic acid (DNA), 515, 660–662, 679
 - alkylation, 203, 239
 - complementary, 569
- Deoxyribonucleic acid (DNA) viruses, 540–541
- Deoxyribonucleoproteids, 541
- Deoxyverrucarol (DOVE)–protein conjugate, 671
- Department of Defense Appropriation Authorization Act, 66–67
- Department of Defense Biological and Chemical Defense Planning Board, 430
- Depressants, 293
 - See also specific agent*
- Dermal effects
 - of anthrax, 471–473
 - of Lewisite, 219
 - of mustard, 201–202, 205–210, 214, 217, 238–239, 342–343
 - of nerve agents, 143–145, 161–162, 167
 - of phosgene oxime, 221
 - of plague, 494–495
 - of riot control agents, 312–314, 316–317, 320–321
 - of smallpox, 543–545, 548–550
 - of trichothecene mycotoxins, 658, 665–666, 670
 - of tularemia, 505
 - of viral hemorrhagic fevers, 595–596
- Derrick, Edward, 525
- Deseret Test Center, Fort Douglas, Utah, 430
- Detection, 124, 362, 377–383, 683
 - aerosol, 383, 448
 - biological agent, 74, 377, 382–384, 431, 447–449
 - chemical agent, 377–381
 - Cold War, 53–54, 60–62, 66–67, 70
 - developmental, 381
 - integrated mobile systems, 381–383
 - and medical management, 329
 - point, 377–380
 - post-World War II, 46
 - preattack measures, 328
 - 1960s, 60–62
 - 1970s, 66–67
 - 1980s, 70
 - 1990s, 74
 - standoff, 53–54, 74, 380–381, 447–448
 - toxins, 613
 - World War I, 23
 - World War II, 42
 - See also specific detector*
- Detection paper
 - M8 Chemical Agent, 335, 355, 357, 377–379
 - M9 Chemical Agent, 378
- Detector crayon, 42
- Detector kits, 42, 46
 - M256A1 Chemical Agent, 379–380
- Detector paint, 42, 46
- Detector paper, 42, 46, 66–67, 70
- Detoxification, 352
- Dexamethasone, 670
- Dextromethorphan, 628
- DFA staining
 - See Direct fluorescent antibody (DFA) staining*
- DFP
 - See Diisopropyl fluorophosphate (DFP)*
- 4,15-Diacetoxyscripenol (DAS), 660–661, 666
- Diamanus montanus*, 487
- Dianisidine chlorosulfate, 14
- Diaphragm masks, 33
- Diarrhea, 212, 216, 314–315
- Diatomaceous earth, 353
- Diazepam, 154–155, 165–169, 191, 279, 347
- Dibucaine numbers, 137
- DIC
 - See Disseminated intravascular coagulation (DIC)*
- Dichlorodiphenyltrichloroethane (DDT), 483
- Dichloroformoxime
 - See Phosgene oxime (CX)*
- 2,4-Dichlorophenoxyacetic acid (VKA), 44
- Dicobalt edetate, 279, 281
- DIDS, 275
- Dihydrocodeinone, 628
- Diisopropyl fluorophosphate (DFP), 132, 152–153, 233, 301
- Dilger, Anton, 16
- Dilger, Carl, 16
- Dimefox, 138
- Dimercaprol
 - See British anti-Lewisite (BAL)*
- Dimethylaminopheno (DMAP), 275
- 4-Dimethylaminophenol (4-DMAP), 279–281
- Dinitrophenol (DNP), 275
- Diphenhydramine, 627, 670
- Diphenylaminearsine

See DM (diphenylaminearsine)
 Diphosgene (DP), 16, 118–119
 Diphtheria toxin, 609, 647–648
 Direct fluorescent antibody (DFA) staining, 495–496
 DISCOM
 See Division Support Command (DISCOM)
 Disinfection
 definition, 357
 Disney, Walt, 41, 103
 Disseminated intravascular coagulation (DIC), 595–597
 Distilled mustard agent (HD), 38–39, 198–200
 Ditrane, 298
 Diuretics, 253, 259–260
 Division Support Command (DISCOM), 327
 DKIE
 See Decontamination Kit, Individual Equipment (DKIE)
 DM (diphenylaminearsine), 27, 119, 292, 309, 319
 4-DMAP
 See 4-Dimethylaminophenol (4-DMAP)
 DNA
 See Deoxyribonucleic acid (DNA)
 DON
 See Deoxynivalenol (DON)
 Dopamine, 132, 598
 Doughty, John W., 11, 14, 88–89
 Doxycycline, 473, 497–498, 518
 DR1 emulsion, 33
 Drinking tubes, 60, 366–370
 Drones
 for agent delivery, 59
 Dry heat decontamination, 358
 Dryvax, 551
 DS2
 See Decontaminating Solution 2 (DS2)
 D-Stoff
 See Phosgene (CG)
 Dugout blanket, 22
 Dugway Proving Ground, Utah, 427, 429, 432, 457
 Dugway sheep-kill incident, 62, 432
 Du Pont Advanced Fiber Systems, 373, 638
 Du Pont Company, 33, 38
 Du Pont Multi-Source Products, 302
 Du Pont Polymers, 264, 617, 638
 Dusts
 definition, 248
 Dutch Powder, 353
 Dyer, Rolla, 525
 Dynamite, 89
 Dysentery, 12, 42, 417–418
 Dyspnea
 nerve agent-induced, 145, 147–149, 158, 167–168, 170
 in toxic inhalational injury, 252, 255–256, 258–261, 265

E

EAC
 See Echelon Above Corps (EAC)
 Eastern equine encephalitis (EEE), 570–574, 576–579
 Eastern equine encephalitis (EEE) virus, 562–564
 PE-6 strain vaccine, 579
 Eastern equine encephalitis (EEE) virus complex, 564–566
 Ebola hemorrhagic fever, 432, 434–435, 439, 593–596
 Ebola viruses, 594
 Ebola-Zaire strain, 594
 ECG
 See Electrocardiography (ECG)
 Echelon Above Corps (EAC), 328
 Echelons of care
 definition, 326
 I: Unit Level, 326–327, 340
 II: Division Level, 327–328
 III: Corps Level, 328
 IV: Echelon Above Corps (EAC), 328
 V: Continental United States (CONUS), 328
 treatment emphasis at, 327
 Ecstasy
 See 3,4-Methylenedioxymethylamphetamine (MDMA)
 Eczema vaccinatum, 549–550
 ED₅₀
 See Effective dose (ED₅₀)
 Edema toxin, 470
 Edgewood Arsenal, Maryland, 19, 26, 30, 38–39, 49, 93, 101, 434, 460, 658
 EEE
 See Eastern equine encephalitis (EEE)
 EEG
 See Electroencephalography (EEG)
 Effective dose (ED₅₀), 622
 Eglin Air Force Base, Florida, 429
 Egypt, 56, 104, 200, 418–419, 657
 Ehrlich, Paul, 632
 Electrocardiography (ECG), 156, 165–166
 Electroencephalography (EEG), 153, 235–236
 Electron transport system (ETS), 275
 ELISAs
 See Enzyme-linked immunosorbent assays (ELISAs)
 Ember, L. R., 657
 Emergency medical treatment (EMT) station, 331–335
 Emetics
 See Nausea-producing agents; specific agent; Vomiting agents
 Emetine, 671
 Encephalitis
 equine, 562–579
 lethality, 444
 postvaccinal, 549–550
 Encephalomyelitis
 nonviral causes, 576
 viral causes, 575
 Encephalomyelitis viruses
 See Viral encephalitides; specific virus
 Endocarditis
 brucella, 517–518
 Q fever, 528, 530
 Endocrine system
 effects of cyanides on, 277
 Endothelial-derived relaxing factor (EDRF), 275
 Enterocolitis, 625–626
 Entry point, 331–332
 Environmental concerns
 with sea dumping, 62–64
 Environmental conditions
 and agent delivery, 122–123
 Environmental samples
 for toxin exposure diagnosis, 614, 617, 627, 668
 Enzootics
 definition, 480
 genetic drift, 567–568
 and plague, 487
 and viral encephalitides, 564, 567–568, 572
 Enzyme-linked immunosorbent assays (ELISAs)
 in biological agent diagnosis, 448–449
 in toxin exposure diagnosis, 617
 See also specific agent diagnosis
 Epileptogenic substances, 292
 Epinephrine

See Adrenaline
 Epiphytotics, 460
 Epizootics
 definition, 480
 genetic drift, 567–568
 and plague, 487, 491
 and viral encephalitides, 564, 567–568, 571–572
 Epoxide group, 656
 Equine encephalitis, 562–579
 Equipment decontamination, 124–125, 353, 357, 387–388
 Erythema multiforme, 549
 Erythrocyte cholinesterase (RBC-ChE), 132, 136–137
 baseline and periodic measurements, 404–405
 inhibition, 138–139
 as nerve agent pretreatment, 192
 Erythromycin, 473, 507, 531
Escherichia coli, 609, 633, 682
 Eserine
 See Physostigmine
 Ethiopia, 34–35, 102, 200
 Ethyl bromoacetate, 12–13, 308
 Ethylenediaminetetraacetic acid (EDTA)
 cobalt salt, 279, 281
 Ethyl iodoacetate, 13
 Evacuation categories, 340
 Evans, A. C., 514
 Executive Order 11850, 308
 Exertion
 and mask use, 365
 and toxic inhalational injury, 254–255
 Explosive-release devices, 120–122
 Export controls
 and chemical manufacturing, 116–117
 Eye decontamination, 352–353
 Eye irrigation
 for mustard injuries, 98
 Eye pain, 147, 166–167, 215
 Eyes
 protection from toxins, 612
 See also under Ocular

F

Faceblank, 364
 Fasciculations, 149, 168–170
 FDA
 See Food and Drug Administration (FDA)
 FDECU
 See Field deployable environmental control unit (FDECU)
 Feather bombs, 51
 Federal Emergency Management Agency (FEMA), 411–412
 Federal Security Agency, 426
 FH
 See Field Hospital (FH)
 Field deployable environmental control unit (FDECU), 385
 Field Hospital (FH), 328
 Field management
 of chemical casualties, 325–336
 Field manuals
 for chemical surety inspection, 400
 Field Masks, 74
 Field medical card (FMC), 333, 335
 Field mouse, 592, 594
 Fildes, Paul, 645
Filoviridae, 592–594
 Filter mask layer, 364–368, 370
 Finlay, Carlos, 10
 First aid

for chemical casualties, 329–332
 Fiske, Norman E., 34–35
 Fitness evaluations
 for Chemical Personnel Reliability Program, 402–403
 Flaccid paralysis, 149
 Flame warfare agents, 90, 119
 Flannel hoods, 91
Flaviviridae, 575, 592–594
 Flavonoids, 671
 Fleas
 as bacterial agent vector, 33, 380, 482–489, 498
 Flechettes, 439–440, 442
 Flettner rotor, 441–442
 FLOT
 See Forward line of troops (FLOT)
 Flour
 decontamination with, 353–354
 Fluoroquinolones, 507, 531
 FM
 See Titanium tetrachloride (FM)
 FMC
 See Field medical card (FMC)
 Food and Drug Administration (FDA), 188, 463
 Food Machinery and Chemical Company, 49
 Food poisoning, 463, 622, 644, 646, 649, 659
 Food supply contamination, 442, 446–447, 459, 469
 Foot-and-mouth disease, 51, 460
 Ford, Gerald R., 64, 308
 Foreign material
 in wounds, 356
 Formulation, 122
 2-Formyl-1-methylpyridinium chloride
 See 2-Pralidoxime chloride (2-PAM Cl)
 Fort Detrick, Maryland, 43–44, 426–432, 434, 460, 616, 623–624, 651
 Fort Morgan virus, 566
 Forward line of troops (FLOT), 326
 Forward Support Medical Company (FSMC), 329
 Foster, John S., 431
 Fourier Transform Infrared (FTIR) spectrometer, 380
 Fowl pest, 460
 Fox, Leon A., 31–32, 426
 FOX Nuclear, Biological, Chemical Reconnaissance System (NBCRS), 74, 377, 381–383
 France
 biological warfare programs, 32
 chemical warfare programs, 114
 See also World War I; World War II
 Francis, Edward, 504
Francisella tularensis, 383, 429, 504, 506–507
 See also Tularemia
 Freeze drying, 440–441
 French and Indian War, 416
 Fries, Amos A., 18, 25–26, 28, 95
 FSMC
 See Forward Support Medical Company (FSMC)
 FS smoke
 See Sulfur trioxide-chlorosulfonic acid (FS smoke)
 FTIR spectrometer
 See Fourier Transform Infrared (FTIR) spectrometer
 Fugu toxin
 See Tetrodotoxin
 Fuller, J.F.C., 35
 Fuller's earth, 353
 Fumes
 definition, 248
 Fumonisin, 656
 Fungal toxins, 609–610, 656

See also specific toxin

Fusarenon-X

See Monoacetylinalenol

Fusarium, 656, 658–659, 668

Fusarium nivale, 659

Fusarium semitectum var semitectum, 658

G

GA

See Tabun (GA)

D-Galactose, 639

-Aminobutyric acid (GABA), 132

Gangliosides, 648

Gases

airway distribution, 248–249

definition, 248

historical war, 255–260

See also specific gas

“Gas Fright,” 95, 97, 343, 393

Gas gangrene, 417

Gas-liquid chromatography (GLC), 668–669

Gas mask phobia, 393–395

Gastrointestinal disturbances

anthrax-induced, 472–473

CS-induced, 314–315

mustard-induced, 212, 216

nerve agent-induced, 145, 168

staphylococcal enterotoxin-induced, 622–627

See also Diarrhea; Nausea; Vomiting

Gas Warfare Service, 95

See also Chemical Warfare Service (CWS); Chemical Corps

Gates, Robert, 456–457

GB

See Sarin (GB)

GD

See Soman (GD)

Gel diffusion test, 546

General Hospital (GH), 328

General Ordnance Equipment Corp., 310

Genetic engineering, 452, 454, 680

Genetic recombination, 681

Genetic weaponry, 682

Geneva Protocol

history, 29, 34, 57, 64, 67, 69, 290, 427

and riot control agents, 308, 321

and status of chemical proliferation, 114, 679

Genitourinary tract infection, 517

Gentamicin, 473, 497, 507

Germany

biological warfare programs, 16, 32, 36–37, 418, 426, 459, 644

chemical warfare programs, 5, 14–15, 89, 130–131

post-World War II weapons disposal, 46

viral hemorrhagic fever outbreak, 594

See also World War I; World War II

GF, 119, 130–131, 230

aging half-time, 183

decontamination, 354

Iraqi production, 185–186

and pyridostigmine pretreatment, 185–186

GH

See General Hospital (GH)

Gilchrist, Harry L., 93, 96–98

Glanders, 10, 16, 427, 431, 459

GLC

See Gas-liquid chromatography (GLC)

Gloves

protective, 373–375

rubber/surgical, 356–357

Glucocorticosteroids, 670

Glucose-6-phosphate, 203

Glutathione (GSH), 203–204

Glycolates, 295–296, 298

See also specific agent

Glycoprotein synthesis, 570

Goats, 528

Goebbels, Joseph, 418

Gorbachev, Mikhail, 453, 455

Grains

moldy, 659

See also Antiplant weapons; specific grain

Greek fire, 88

Green cross

See Phosgene (CG)

Green vinyl overboot (GVO), 374

Grenades

hydrocyanic acid, 40–42

smoke, 262

tear gas, 90

Ground crew personal protective equipment, 365–368

Ground squirrels, 487–488, 504

Gruinard Island, Scotland, 418, 441

GSH

See Glutathione (GSH)

Guanarito virus, 593

Guanine, 239

Guarnieri bodies, 546

Gulf War syndrome, xvi, 73, 105, 190, 191, 195, 297

GVO

See Green vinyl overboot (GVO)

H

H

See Impure mustard agent (H)

Haber, Fritz, 14, 25, 89–91

Haber's law, 276

Ha bomb, 33

Haemophilus ducreyi, 496

Haffkine, Waldemar M. W., 498

Hague Convention of 1899, 89–90

Hague Peace Conferences, 13

Haig, Alexander M., 68

Haloperidol, 293

Hantaan virus, 593–594, 599

Hantavirus disease, 594, 598

Hantaviruses, 593–596

Hantavirus pulmonary syndrome (HPS), 594–595

Harassing agents

See Riot control agents; specific agent

Harmine, 293

Hart, B. H. Liddell, 35

Haslett, Lewis P., 13

HC

See Hexachloroethane (HC); Zinc oxide (HC)

HD

See Distilled mustard agent (HD)

Healthcare

and biological warfare, 445, 447, 683–684

and chemical surety mission, 397–412

and chemical warfare, 111–126, 328–335, 683–684

Health education

for chemical workers, 407–408

Health service support (HSS), 326–328

Heart block

- atrial-ventricular (A-V), 156
- Heart rate
 - effects of CS on, 315
 - effects of cyanides on, 277
 - effects of nerve agents on, 156–157
 - in toxic inhalational injury, 253
- Heat categories
 - and work/rest cycles, 329–330, 371, 403, 405
- Heat stress
 - and protective gear, 125, 329–330, 367, 370–371, 394, 403, 405–407
- Helminthosporium oryzae* van Brede de Haan, 460
- Hemagglutination assays, 497, 507, 517–518, 531
- Hemagglutination-inhibition (HI) tests, 566, 573
- Hemodialysis, 217
- Hemolysins, 609
- Hemopoietic changes
 - mustard-induced, 215–217
- Hemorrhagic fevers
 - See also Viral hemorrhagic fevers; specific virus
- Hemorrhagic fever with renal syndrome (HFRS), 593–595, 597, 599
- Hemorrhagic meningitis, 471
- Henbane, 294
- HEPA filters
 - See High-efficiency particulate air (HEPA) filters
- Heparin, 217, 597
- Hepatitis, 517
- Hepatitis A virus, 418
- Herbicides, 460
- Herpesviridae*, 575
- Hexachloroethane (HC), 27, 260
- Hexamethamine tetramine, 260
- Hexamethyltetramine, 363
- Hexose monophosphate shunt, 203
- Heydrich, Reinhard, assassination of, 645
- HFRS
 - See Hemorrhagic fever with renal syndrome (HFRS)
- High-efficiency particulate air (HEPA) filters, 430, 432, 434
- Highlands J (HJ) virus, 566–567, 574
- High-mobility, multipurpose, wheeled vehicle (HMMWV), 382–385
- High-performance liquid chromatography–mass spectrometry (HPLC-MS), 669
- Hill, Edwin, 427
- Hinsch, Frederick, 16
- HI tests
 - See Hemagglutination-inhibition (HI) tests
- Hitler, Adolph, 103
- HJ virus
 - See Highlands J (HJ) virus
- HL, 119
- HMMWV
 - See High-mobility, multipurpose, wheeled vehicle (HMMWV)
- Hmong, 3, 67–68, 656–658
- HN-1/HN-2/HN-3
 - See Nitrogen mustard
- Hoffman, Theodore A., 12–13
- Hog cholera, 460
- Homatropine, 147, 166–167, 215
- Honest John rocket, 59
- Hoods
 - M6A2, 366
- Hoplosyllus anomalus*, 487
- Horses
 - biological warfare involving, 417, 459
 - encephalitis viruses, 562–579
 - protective equipment for, 31, 91
 - vaccination, 568, 576, 578
- Hospitals
 - Chemically Hardened Air Transportable (CHATH), 385
 - combat support, 328
 - Echelon V (CONUS and ZOI), 328
 - field, 328
 - general, 328
 - mobile surgical, 328
 - personnel needs, 331
- Hotline
 - in casualty-receiving area, 331–333, 335, 340, 410
- HPLC-MS
 - See High-performance liquid chromatography–mass spectrometry (HPLC-MS)
- HPS
 - See Hantavirus pulmonary syndrome (HPS)
- HS
 - See Mustard (HS)
- HSS
 - See Health service support (HSS)
- HTH solution
 - See Hypochlorite solution
- HT-2 toxin, 660–661, 664, 666
- Hughes, M. L., 514
- HUGO
 - See Human Genome Organization (HUGO)
- Human Genome Organization (HUGO), 682
- Human Genome Project, 682
- Human immune globulin preparations, 434
- Human immunodeficiency virus (HIV) infection, 550, 552
- Humoral immunity, 505, 528, 542, 551, 683
- Hun Stoffe (Germany stuff)
 - See Mustard (HS)
- Hussein, Saddam, 72–74, 113, 416, 421, 679
- Hussein Kamal Hussein, 421
- Hydrocodone, 628
- Hydrogen cyanide (AC), 118, 272–282
 - detection, 380
 - history, 10, 16, 37–38, 40–42, 104, 273–274
 - physical properties, 122–123
 - properties, 272
 - toxicity, 141, 276
- Hydrolysis, 121, 354–355, 387
- Hydroxamine, 162
- Hydroxide
 - dilute, 158
- Hydroxocobalamin (vitamin B_{12a}), 279, 281
- Hyoscine
 - See Scopolamine
- Hyoscyamine
 - See Atropine sulfate
- Hyoscyamus falezlez*, 290
- Hypertension
 - pralidoxime chloride–induced, 163–164, 170
- Hypochlorite solution, 352–358, 387, 408
 - contraindications, 314, 353, 356, 358
 - for nerve agent decontamination, 158, 341
 - preparation, 358
 - for riot control agent decontamination, 314
 - spot decontamination with, 333, 335
 - for toxin decontamination, 616, 660, 669
 - for vesicant decontamination, 214
 - World War I use, 22–23
- “Hypo helmet,” 363
- Hypotension, 170, 598
- Hypoxia
 - and inhalational injury, 252, 257

I

- Ibogaine, 293
- ICAM
 - See Improved Chemical agent monitor (ICAM)
- ICN Pharmaceuticals, 132
- Idoxuridine, 550
- IFA staining
 - See Indirect fluorescent antibody (IFA) staining
- Ig
 - See Immunoglobulin (Ig)
- I. G. Farbenindustrie, 130
- IL-6
 - See Interleukin-6 (IL-6)
- IMA
 - See Installation Medical Authority (IMA)
- Imipenem, 473
- Immune response, 681, 683
 - to brucellosis, 515–516
 - to Q fever, 528
 - to smallpox, 542, 551
 - to staphylococcal enterotoxins, 622–623
 - to tularemia, 505
 - to viral encephalitides, 573, 576–577
- Immunization, 681–683
 - against anthrax, 473–474
 - against botulinum toxins, 651
 - against plague, 498
 - against Q fever, 531–532
 - against smallpox, 540, 546–551
 - against staphylococcal enterotoxin B, 628
 - against toxins, 615, 618–619
 - against trichothecene mycotoxins, 671
 - against viral encephalitides, 564, 576–579
 - against viral hemorrhagic fevers, 599
 - See also Vaccines
- Immunoglobulin (Ig), 434, 516
- Immunology, 632, 681–683
- Immunotoxins, 632
- Imperial Chemicals, Ltd., 49
- Improved Chemical agent monitor (ICAM), 378–379
- Impure mustard agent (H), 199–200
- Incapacitating agents, 118–119, 287–302
 - biological, 292, 431, 439–440
 - chemical, 292
 - and combined injuries, 348
 - delivery systems, 121
 - differential diagnosis, 297–298
 - historical precedents, 52, 57, 289–290
 - ideal, criteria for, 288–289
 - medical management, 298–302
 - nonchemical, 291–292
 - toxin, 608, 622
 - triage considerations, 344, 346
 - use, 289–291
 - See also specific agent
- Incapacitation
 - definition, 288
 - possible approaches to, 291–294
- Incineration
 - of surplus chemical weapons, 72, 411–412
- Indirect fluorescent antibody (IFA) staining, 531
- Individual Equipment Decontamination Kit, 70
- Indoles, 297–298, 302
- Industrial accidents, 119
- Industrial hygienist, 399, 402
- Infant botulism, 644, 646
- Influenza viruses, 680–681
- Information-Telegraph Agency of Russia–Telegraph Agency of Soviet Union (ITAR-TASS), 455
- Inhalational injury, 123, 247–267
 - biological agents, 440
 - clinical effects, 249, 253
 - and condition of exposed tissues, 250
 - evaluation, 250–252
 - exertion and, 254–255
 - and intensity of exposure, 249–250
 - laboratory measurements, 251–252
 - nerve agent-induced, 139–144, 157, 161, 167
 - patient history, 250–251
 - physical aspects, 248–249, 251
 - physiology, 249–250
 - pulmonary effects, 253, 256, 258–259, 265–266, 343
 - therapeutic considerations, 252–253, 255
 - See also specific agent
- Injectors
 - atropine, 54, 73, 155, 159–161, 169
 - diazepam, 165
 - 2-pralidoxime chloride (2-PAM Cl), 73, 155, 163, 169
- Insecticides
 - and plague prevention, 498
 - See also Organophosphorus compounds; Carbamates; specific agent
- Insects
 - as bacterial agent vectors, 33, 50
 - See also specific insect or agent
- Installation Medical Authority (IMA), 402–404, 406–407, 409
- Installation Response Force (IRF), 410
- Institute of Especially Pure Biopreparations, 454–455
- Integrated mobile systems, 381–383
- Interferon-alpha (IFN- α), 599
- Interferon-gamma (IFN- γ), 505, 516, 599
- Interleukin-6 (IL-6), 471
- Intermediate syndrome, 232–233
- International Declaration Concerning the Laws and Customs of War, 13
- Iran
 - biological warfare program, 679
- Iran–Iraq War, 68–69, 321, 362
 - chemical casualties death rate, 6
 - cyanide use during, 273
 - mustard use during, 3–4, 104, 114, 116–117, 157, 198, 200–201, 205, 214–216, 230, 237–239
 - nerve agent use during, 104, 114, 116–117, 122–123, 230, 290
- Iraq
 - biological warfare program, 421–422, 462–463, 657, 679
 - chemical warfare capability, 114–115, 117, 185–186
- Iraqi Kurds, 4, 69, 74, 104, 273, 679
- IRF
 - See Installation Response Force (IRF)
- Irrigation solutions, 353, 357
- Irritants
 - See Riot control agents; specific agent
- Ishii, Shiro, 32–33, 483
- Isolation procedures, 432–433, 497, 547, 598
- Isolators Ltd., 432
- Israel, 190, 608
- Italian–Ethiopian War, 34–35, 102, 200
- ITAR-TASS
 - See Information-Telegraph Agency of Russia–Telegraph Agency of Soviet Union (ITAR-TASS)
- Ivanovskii Institute (Moscow), 562

J

JACADS

See Johnston Atoll Chemical Agent Destruction System (JACADS)

Japan

biological warfare programs, 32, 36–37, 417–418, 426–427, 446, 483–485, 540
chemical warfare programs, 37
Imperial Unit 100, 418
Imperial Unit 731, 417–418, 427, 483, 540
invasion of China, 35–36, 200, 218, 417–418, 485
sarin incidents in, 4, 75, 113, 118, 131, 169, 274, 342, 438, 463, 678

Jenner, Edward, 548

Jerks, 149, 158, 168–169

Jimson weed, 294

Johnston Atoll, 64, 72, 411

Johnston Atoll Chemical Agent Destruction System (JACADS), 72, 411

Joint disease, 517

Joint Service Lightweight Integrated Suit Technology (JSLIST), 375–376

Aviation Overgarment (AVOG), 375–376

Duty Uniform (DU), 375–376

Improved Chemical and Biological Protective Glove (ICBPG), 376–377

Multipurpose Overboot (MULO), 377

Overgarment (OG), 375–376

Vapor-Protective, Flame-Resistant Undergarment (VPFRU), 375–377

Joint United States/United Kingdom/Russia Trilateral Statement on Biological Weapons, 4

Junin virus, 592–593, 599

K

K-agents, 52

Kampuchea, 3, 67–68, 421, 656, 666

Kawasaki disease, 623, 628

Kelocyanor, 281

Keratitis

vaccinia, 550

Keratopathy

delayed, 238

-Ketoglutaric acid, 282

Kevlar, 373, 638

Khmer Rouge, 656, 666

Kitchener, Field Marshal Lord, 13

Koch, Robert, 10, 468, 470

Kops Tissot Monro (KTM) mask, 22, 28, 92

Korea, North, 461–462, 679

Korean hemorrhagic fever, 594

Korean War, 47–48, 104, 394, 418–419, 429, 485, 594

Kostov, Vladimir, 420–421

Kuhn, Richard, 131

Kuntsevich, Anatoly, 453, 455

Kyasanur Forest disease, 593–594

L

L

See Lewisite (L)

LAC

See Operation Large Area Coverage (LAC)

Lacrimators, 292, 308

See also specific agent

Lactic acidosis, 279

Laetrile, 274

Lane, Benjamin I., 13

Laos, 3, 67–68, 421, 656–658, 665

Laser detection systems, 380

Lassa fever, 592–593, 595, 598–599

Lassa virus, 592

LCt₅₀, 142, 183, 606

LD₅₀, 142, 183, 606

LDS

See Lightweight Decontamination System (LDS)

Le 100

See Tabun (GA)

League of Nations, 28–29, 34

Lederle Laboratories, 191

Legionella, 525

Legionnaire's disease, 434

Leporipoxvirus, 542

Lethal factor, 470

Leukocytosis, 635

Leukopenia, 215–217, 667

Lewis, W. Lee, 19

Lewisite (L), 118–119, 218–220

antidote, 102, 218, 220

biochemical mechanisms of injury, 218

chemical structure, 218

clinical effects, 218–219

delivery systems, 121

dermatological effects, 219

detection, 42, 380–381

differential diagnosis, 200, 212, 219–220

history, 19, 36–38, 40, 46, 102, 198

laboratory tests, 220

long-term health effects, 217, 220

military use, 218

mixed with mustard, 201, 218

nations with capability for use, 114, 116

ocular effects, 219

pharmacology, 199

physical properties, 122–123, 218

pulmonary effects, 219

toxicity, 218

treatment, 220

vapor, 218–219

Lewisite shock, 219

Libya, 4, 69, 74, 321, 524

Lice, 487

Light reduction, 145–146

Light sources, high intensity

incapacitation by means of, 291–292

Lightweight Decontamination System (LDS)
M17, 388

Eli Lilly and Company, 280

Lilly Cyanide Antidote Kit, 280–281

Limitation of Arms Conference, 29

Line source

for aerosol delivery, 441–442

Lipid peroxidation, 204

Lipopolysaccharide (LPS), 504, 515, 526, 528

Liston, W. G., 486

Litter

decontaminable, 389

Litter decontamination station, 332–333, 410

Litter-patient airlock

in chemical shelter, 385

Little John rocket, 59

Livens projector, 20–21, 31, 91

Live vaccine strain (LVS), 507

Loco weed, 294

Löffler, F., 10

LOPAIR (*long-path infrared*) alarm, 53–54
 Lorazepam, 302
 LOST
 See Mustard (HS)
 Lott, Joseph, 11
 LPS
 See Lipopolysaccharide (LPS)
 LVS
 See Live vaccine strain (LVS)
 Lymphogranuloma venereum, 495–496
 Lymphoid changes, 471, 495, 505–506, 571, 625
 D-Lysergic acid diethylamide (LSD), 52, 293, 302

M

MacArthur, Douglas, 29
 Mace
 See CN (1-Chloroacetophenone)
 Machupo virus, 593
 Macrocyclics, 660
 Macromolecules, 192
 Macrophages, 515–516, 528
 Mafenide acetate, 214
 Magnesium sulfate, 670
 Mahan, Alfred T., 13
 Major, John, 455
 Major histocompatibility complex (MHC), 505, 622–623
 Malaria, 32, 418, 596–597
 Malathion, 132, 138
 Malononitrile, 315
 Manchuria, 418, 427, 483, 594
 Mandrake root, 289
 Manning, Van H., 17
 Marboran
 See Methisazone
 Marburg hemorrhagic fever, 439, 593–596
 Marburg virus, 594–595
 March, Peyton C., 25
 Marijuana intoxication, 298
 Marine toxins, 609
 See also *specific toxin*
 MARK I kits, 252
 atropine therapy, 161–162
 and combined injuries, 347
 Persian Gulf War use, 73, 155
 pralidoxime chloride therapy, 164–170
 self-administration, 329–330, 341
 Markov, Georgi, 420–421, 632
 Marmots, 481–482, 488
 Marshall, John D., 483
 Marston, J. A., 514
 MASH
 See Mobile Army Surgical Hospital (MASH)
 Mask-Only Command, 371–372
 Masks, 123, 362–370
 Chemical–Biological: Aircraft, M43, 369
 Chemical–Biological: Aircrew MBU-19/P, 369–370
 Chemical–Biological: Field, M40, 363–364, 366–368
 Chemical–Biological: Field, M42, 368
 Chemical–Biological: Field, M17A2, 363, 366–367
 Chemical–Biological: MCU-2/P, 368
 Cold War, 53–54, 105
 and contact lenses, 402–403
 design, 364–365
 developmental, 370
 discipline in use, 94, 124, 393
 drinking tubes in, 60, 366–370
 early, 12–13

function testing, 365–366, 403
 for horses, 31, 91
 microphones in, 364, 366, 368–370
 M45 protective, 365
 M1 Service, 28, 33
 M2 Service, 40
 and nerve agent exposure, 157
 post–World War II, 46–47
 psychological effects of wearing, 393–395
 quality assurance concerns, 94
 1920s, 28, 101
 1930s, 33, 101
 1960s, 60, 105
 1980s, 69–70
 1990s, 74
 and toxin protection, 612, 669
 training, 393–395
 winterization kits, 366
 work of breathing added by use of, 365
 World War I, 15–18, 22, 91–94, 363–364, 393
 World War II, 37, 40–41, 43, 103, 365, 394
 Mask-to-mouth resuscitator, 54
 Mass casualty biological (toxin) weapon (MCBW), 605–606, 611
 Mass hysteria, 124
 Mass spectrometry (MS), 669
Mastomys natalensis, 592
 MAT
 See Medical Augmentation Team (MAT)
 Material
 biological agents directed against, 459, 461
 M256A1 ticket, 355
 Maximum credible event (MCE), 409
 Mayan, Thayer, 89
 Mayaro virus, 562
 MCAT
 See Medical Chemical Advisory Team (MCAT)
 McAuliffe, Anthony C., 47
 McBride, Lewis M., 27
 MCBW
 See Mass Casualty Biological (Toxin) Weapon (MCBW)
 McCarthy, Richard D., 431
 McCoy, G. W., 504
 MCE
 See Maximum credible event (MCE)
 McNamara, Robert S., 55
 McNeill Consumer Products Co., 274
 MD
 See Methyl difluorarsine (MD)
 MDMA
 See 3,4-Methylenedioxyethylamphetamine (MDMA)
 Meade, John, 34–35
 MED₅₀, 295–296
 MEDCEN
 See Medical Center (MEDCEN)
 MEDDAC
 See Medical Department Activity (MEDDAC)
 Mediastinitis, 471–473
Medical Aspects of Chemical Warfare (Vedder), 102
 Medical assistance
 procedures for requesting, 407–408
 Medical Augmentation Team (MAT), 410
 Medical Biological Defense Research Program, 615
 Medical care
 levels of, 410
 safe environment for, 71, 124–125
 Medical Center (MEDCEN), 398
 Medical Chemical Advisory Team (MCAT), 411

- Medical Collective Protection Systems, 384–385
- Medical defense
 - history, 87–105
- Medical Department Activity (MEDDAC), 398
- Medical directives
 - for chemical surety inspection, 401
- Medical Management of Chemical Casualties Course, 398, 409
- Medical Management of Chemical Casualties Handbook*, 401
- Medical record card, 333, 335
- Medical Reengineering Initiative (MRI), 328
- Medical research
 - on human volunteers, 52, 60–61
- Medical Response Team (MRT), 410
- Medical support
 - in biological warfare environment, 445, 447, 683–684
 - in chemical warfare environment, 111–126, 328–335, 683–684
- Medical surveillance
 - for chemical workers, 402–405
 - definition, 402
- Medical treatment facility (MTF), 328, 409
 - casualty-receiving area, 331–335
 - contamination, 124–125, 353, 357
- Mediterranean fruit fly, 461
- Melanoconion*, 564, 567
- Melioidosis, 431
- Membrane-damaging toxins
 - mechanism of action, 609, 611
 - See also specific toxin*
- Memorandum on Gas Poisoning in Warfare with Notes on its Pathology and Treatment* (U.S. Army War College), 23–24
- Memorandums of Agreement (MOAs), 401, 408–409, 411
- Meningitic plague, 491, 494
- Meningitis
 - anthrax-induced, 471–473
 - hemorrhagic, 471
- Meningococcal infection, 417
- Meningoencephalitic syndrome, 574
- Meningoencephalitis, 517
- Menthol, 670
- Mercaptopyruvate sulfurtransferase, 275
- 3-Mercaptopyruvate sulfurtransferase, 276
- Merck, George W., 43, 426–427
- Merck Company, 43, 198
- Mescaline, 52
- Metabolic disturbances, 277, 315
- Metals
 - contamination with biological agents, 459, 461
- Methanesulfonate salt of pralidoxime (P2S), 163
- Methemoglobin, 275, 280
- Methemoglobin-forming drugs, 280–282
 - See also specific drug*
- Methisazone, 552
- Methyldifluorarsine (MD), 27
- 3,4-Methylenedioxymethylamphetamine (MDMA), 293
- Methylisocyanate, 119
- Methylthiazolidine-4-carboxylate, 670
- Metoclopramide, 670
- Metrazole, 292
- Mevinphos, 138
- Meyer, Karl F., 498
- Meyer, Victor, 10, 198
- MHC
 - See Major histocompatibility complex (MHC)*
- Mice, 487–488, 592, 594
- Michigan Department of Public Health, 473
- Mickey Mouse gas mask, 41, 103
- Microcystin, 609, 611, 616–617
- Microphones
 - in masks, 364, 366, 368–370
- Microwave bombardment
 - incapacitation by means of, 291
- Midazolam, 154, 191
- Middelburg virus, 565
- Militarily significant weapon
 - definition, 604
- Military healthcare providers
 - biological warfare threat and, 6, 445, 447, 683–684
 - chemical warfare threat and, 6, 111–126, 328–335, 683–684
 - detection capability, 124
 - safety from chemical contamination, 125, 157
- Military installations
 - plague on, 483–484
- Military medical facilities
 - contamination, 124–125, 157, 353, 357
- Military occupation specialty (MOS), 327
- Military vehicles
 - collective protection for, 67
- Mines, 31, 52, 58, 123
- Minnesota Multiphasic Personality Inventory (MMPI), 311
- Minnesota Patriots Council, 463–464
- Miosis
 - nerve agent-induced, 144–147, 166–168, 170
- Missile-control vans
 - collective protection for, 67
- Missiles, 120, 446
- Mission-oriented protective posture (MOPP) gear, 101, 123–125, 169–170, 362, 371
 - exchange procedure, 331, 334
 - and heat stress, 125, 329–330, 367, 370–371, 394, 403, 405–407
 - level of efficiency in, 329, 362
 - and medical personnel, 329, 331–332, 334, 338, 340–341
 - postattack measures, 329
 - preattack measures, 328
 - psychological effects of wearing, 362, 393–395
 - removal of, 333, 335, 355, 386, 669
 - training, 393–395
- Mission-oriented protective posture (MOPP) levels, 328, 372
- Mist
 - definition, 248
- MK 4 suit, 123
- MLRS
 - See Multiple Launch Rocket System (MLRS) Binary Chemical Warhead*
- MOAs
 - See Memorandums of Agreement (MOAs)*
- Mobile Army Surgical Hospital (MASH), 328
- Mobile decontamination facilities
 - World War I, 97–98
- Molasses residuum, 37
- Molds, 656, 659
- Molluscipoxvirus*, 542
- Monkeypox virus, 542, 547, 551
- Monoacetylinalenol, 659
- Monoclonal antibodies
 - as nerve agent pretreatment, 192
 - in toxin prophylaxis, 615, 651, 671, 682–683
- MOPP
 - See Mission-oriented protective posture (MOPP)*
 - gear, Mission-oriented protective posture (MOPP) levels
- MOPP Ready, 371–372
- Morocco, 102
- Morphine, 293
- Mortars, 21, 27, 31, 39, 48

MOS

See Military occupation specialty (MOS)

Mosquito, 418, 430

as viral encephalitis vector, 562–564, 566–568, 573, 577

as viral hemorrhagic fever vector, 593–594, 596

as yellow fever vector, 50

Most probable event (MPE), 409–410

Mouth-to-mouth ventilation, 159

MRI

See Medical Reengineering Initiative (MRI)

MRT

See Medical Response Team (MRT)

MS

See Mass spectrometry (MS)

M9 tape, 355, 357

MTF

See Medical treatment facility (MTF)

Mucoid plugs, 148, 158

Multiple Launch Rocket System (MLRS) Binary Chemical

Warhead, 71

Muscarine (mAChR), 132–133

Muscular system

effects of nerve agents on, 145, 149, 232

Mussolini, Benito, 34

Mustard (H)

impure, 199–200

Mustard (HD)

distilled, 38–39, 198–200

Mustard (HS), 118–119, 198–217, 230–231

biochemical mechanisms of injury, 202–204

carcinogenic effects, 217, 237–238

cardiovascular effects, 217

central nervous system effects, 212, 239

clinical effects, 204–212, 342–343

and combined injuries, 347–348, 355–356

deaths related to, 205, 212

decontamination, 22–24, 33–34, 54, 157–158, 213, 354–355, 387

dermatological effects, 98–100, 201–202, 205–210, 214, 217, 238–239, 342–343

detection, 42, 66, 378, 380–381

differential diagnosis, 200, 212–213, 219–220, 343

exposure categories, 213–214

gastrointestinal effects, 212, 216

history, 5, 10, 27, 29–31, 34–40, 46, 56–57, 62–63, 102–104, 198

inhalation, 100

laboratory test for, 213

long-term health effects, 97–101, 217, 230, 236–239

metabolism, 204

military use, 200–201

mixed with Lewisite, 201, 218

mutagenic effects, 239

nations with capability for use, 114–116

neuropsychiatric effects, 239

ocular effects, 202, 208–211, 214–215, 238

pharmacology, 199

physical properties, 122–123, 199, 201

pulmonary effects, 211–212, 215–217, 237–238

recent use, 3–4, 69, 198, 200–201, 205, 214–216, 230, 237–239

reproductive toxicity, 239

teratogenic effects, 239

thickened, 356

toxicity, 201–202, 276

treatment, 213–217

triage considerations, 342–343

vapor, 201–202, 237

World War I use, 16, 19–24, 95–101, 119, 198, 200–201, 205,

210, 212–214, 216, 237–238, 393

and wound decontamination, 355–356

Mustard burns, 98–100, 202, 205–208, 214, 238, 342–343

Mustard shell, 40

Mustargen, 198

Mutagenesis, 239, 315–316

Mutual aid agreements

for chemical surety inspection, 401

Mycotoxicosis, 659, 670

Mycotoxins, 656

See also Trichothecene mycotoxins; specific toxin

Myrothecium, 656

Myrothecium verrucaria, 659

N

NAD⁺ (nicotinamide adenine dinucleotide), 203

Nairovirus, 593

Naloxone, 302, 670

Napalm, 119

NAPP (nerve agent pyridostigmine pretreatment)

See Pyridostigmine bromide

NAPPS

See Nerve agent pyridostigmine pretreatment set (NAPPS)

Narcan

See Naloxone

Nasal effects

of nerve agents, 145, 147, 167–168, 170

Nasal mucosal swabs

for toxin exposure diagnosis, 614, 617, 627, 638, 650

National Academy of Science, 43, 217, 220, 426

National Research Council (NRC), 17, 43, 426

National Security Memoranda

on use of biological weapons, 426, 431

NATO

See North Atlantic Treaty Organization (NATO)

Natural killer (NK) cells, 505, 516, 528

Nausea, 145, 168, 212, 216, 314–315

Nausea-producing agents, 292

See also specific agent; Vomiting agents

NBC officer

See Nuclear, biological, and chemical (NBC) officer

NBC-PC

See Nuclear, biological, chemical protective covers (NBC-PC)

NBCRS

See FOX Nuclear, Biological, Chemical Reconnaissance System (NBCRS)

NBC Warning and Reporting System, 448

Nduma virus, 565

Nebelwerfer launcher, 36

Neoprene masks, 41

Neosporin, 214

Neostigmine, 132, 298

Nernst, Walther, 14, 91

Nerve agent pretreatments, 132, 134, 181–193

biotechnological, 192–193

and cardiopulmonary response, 156

centrally acting, 191–192

and central nervous system effects, 154, 187

oxime, 164

and pulmonary response, 149

See also Pyridostigmine; specific agent

Nerve agent pyridostigmine pretreatment set (NAPPS), 189

Nerve agents, 118–119, 129–171, 230

aging, 162, 182–183, 230

antidotes, 158–159, 329

binary weapons, 65–66, 70–72, 75, 104

- and blood cholinesterase activity, 138–139
 - cardiovascular effects, 145, 155–157, 165–166, 169
 - central nervous system effects, 145, 149–155, 170, 233–234
 - and combined injuries, 347, 355–356
 - versus commonly used cholinesterase inhibitors, 139
 - in contemporary U.S. munitions inventory, 131
 - decontamination, 47, 157–158, 168–169, 354–355, 387
 - dermal exposure, 143–145, 161–162, 167
 - detection, 53, 66, 378, 380–381
 - differential diagnosis, 613–614, 638
 - effects on organs and organ systems, 144–157, 230, 341–342
 - electrocardiographic (ECG) effects, 156, 165–166, 235–236
 - electroencephalographic (EEG) effects, 153
 - exposure categories, 166–170
 - exposure routes, 142–144
 - gastrointestinal effects, 145, 168
 - “G” series, 130
 - history, 5, 30, 36, 46, 49, 56–58, 62–63, 103–104, 130–131, 290
 - inhalational injury, 139–144, 157, 161, 167
 - intermediate syndrome caused by, 232–233
 - long-term health effects, 153–154, 170, 230–236
 - mechanism of action, 132–136, 230
 - mild exposure, 167–168
 - minimal exposure, 167
 - moderate exposure, 168
 - moderately severe exposure, 168–169
 - muscular effects, 145, 149, 232
 - nasal effects, 145, 147, 167–168, 170
 - nations with capability for use, 114, 116
 - neuropsychiatric effects, 145, 149–155, 233–235
 - occupational exposure, 136, 236
 - ocular effects, 144–147, 166–168, 170
 - oral effects, 145
 - versus organophosphorus compounds, 231
 - pharmacology, 139–142
 - physical properties, 123
 - polyneuropathy caused by, 231–232
 - pulmonary effects, 145, 147–149, 167–168, 170
 - and return to duty, 170
 - severe exposure, 169
 - suspected exposure, 166
 - thickened, 356
 - toxicological studies, 236
 - treatment, 54, 73, 154–155, 157–170, 230
 - triage considerations, 341–342, 344–346
 - vapor exposure, 142–144, 157, 161, 167
 - ventilatory support, 148, 158–159, 166–169
 - “V” series, 130
 - and wound decontamination, 355–356
 - See also specific agent*
 - Neuromuscular conduction, 132–134, 647
 - Neuropsychiatric effects
 - of brucellosis, 516
 - of mustard exposure, 239
 - of nerve agents, 145, 149–155, 233–235
 - of Q fever, 529–530
 - of viral encephalitides, 573–574
 - Neurotoxins
 - clostridial, 644, 647
 - differential diagnosis, 650
 - mechanism of action, 609–611
 - See also specific toxin*
 - Neutrophils, 505
 - Newcastle disease, 460
 - New York State Psychiatric Institute, 52
 - Niacinamide, 203
 - Nicotine (nAChR), 132–133, 292
 - Nightshade, 289, 294
 - NIKE missile-control vans, 60
 - “Nine Mile Agent,” 525
 - Nitric oxide, 263
 - Nitrites, 280–281
 - See also specific agent*
 - Nitrogen dioxide, 263
 - Nitrogen mustard, 198, 200, 231
 - history, 30, 36, 38, 46
 - See also Mustard (HS)*
 - Nitrogen oxides (NO_x), 263–264
 - Nitrous oxide, 263
 - Nivalenol, 659–661
 - Nixon, Richard M., 63–64, 431, 525
 - NK cells
 - See Natural killer (NK) cells*
 - Nobel, Adolph, 89
 - Noguchi, Hideyo, 525
 - Noise
 - incapacitation by means of, 291
 - Nomex, 373
 - Noradrenaline (norepinephrine), 132
 - Norfolk Supply Center, Norfolk, Virginia, 429
 - Noriega, Manuel, 291
 - North Atlantic Treaty Organization (NATO), 70, 74, 182, 185, 354, 368
 - Nosecup, 364–365
 - Nosocomial transmission
 - of viral hemorrhagic fevers, 592–593, 595–596
 - NO_x
 - See Nitrogen oxides (NO_x)*
 - NRC
 - See National Research Council (NRC)*
 - Nuclear, biological, and chemical (NBC) officer, 362, 445
 - Nuclear, biological, chemical protective covers (NBC-PC), 669
 - Nuclear age, 36–47
 - Nuclear weapons
 - versus chemical and biological weapons, 458–459
 - Number Facility (NF) performance, 296
 - Nunn, Sam, 75
 - Nursing care
 - for biological agent-exposed patients, 432–433, 598
- ## O
- Obidoxime
 - See Toxogonin*
 - Obscurants, 260–266
 - See also specific agent; Smokes*
 - Occupational exposure, 119
 - to anthrax, 468–469, 474
 - and chemical surety mission, 398–399, 402–408
 - to Q fever, 524, 532
 - to ricin toxin, 636
 - and U.S. biological warfare program, 398–399, 432, 434
 - Ochratoxins, 656
 - Ocular effects
 - of cyanides, 277
 - of Lewisite, 219
 - of mustard, 202, 208–211, 214–215, 238
 - of nerve agents, 144–147, 166–168, 170
 - of phosgene oxime, 221
 - of riot control agents, 314, 317, 321
 - of trichothecene mycotoxins, 665–666
 - Ocular vaccinia, 549–550
 - Oehler, Gordon, 462
 - Off-gassing, 356
 - Ofloxacin, 497

Okinawa accident, 63–64
 Olfactory assault
 incapacitation by means of, 292
 Olfactory nervous system
 viral encephalitis infection through, 571–572
 Oligonucleotide primers, 627
 Omsk hemorrhagic fever, 593–594
 O'nyong-nyong virus, 562
 Open reading frame, 541
 Operation Cut Holes and Sink 'Em (CHASE), 62–64
 Operation Davy Jones Locker, 46
 Operation Desert Shield, Operation Desert Storm
 See Persian Gulf War
 Operation Geranium, 46
 Operation Just Cause, 291
 Operation Large Area Coverage (LAC), 52
 Operation Red Hat, 64
 Operation Solid Shield 87, 71
 Operation Steel Box, 72
 OPIDN
 See Organophosphorus ester-induced delayed neurotoxicity (OPIDN)
 Opioids, 293, 302
Opischochrois hirsutus, 487
 Optical remote sensing (ORS), 380
 Oral exposure
 to nerve agents, 145
 to trichothecene mycotoxins, 665
 Orenburg, 659
 Orf, 473
 Organofluoride polymers, 264–266, 638
 Organophosphorus compounds, 130, 132, 231, 233–234
 long-term health effects, 231–236
 mechanism of action, 134
 versus nerve agents, 231
 treatment of exposure, 163
 See also Nerve agents; specific agent
 Organophosphorus ester-induced delayed neurotoxicity (OPIDN), 231–232
 Oropharyngeal anthrax, 472–473
Oropsylla idahoensis, 487
Oropsylla labis, 487
 ORS
 See Optical remote sensing (ORS)
Orthopoxvirus, 540–542
 Overgarments, 363, 370–377
 See also Mission-oriented protective posture (MOPP) gear
 Oxidation
 decontamination by, 354–355, 387
 Oximes, 162–165
 contraindications, 167
 dosage and administration, 163–164, 169
 mechanism of action, 162–163
 for pretreatment use, 164, 183
 and pyridostigmine pretreatment, 184–187
 treatment, 164–165
 See also 2-Pralidoxime chloride (2-PAM Cl); specific drug
 Oxygen supplementation, 253, 255, 257, 266, 279
 Oxytetracycline, 531

P

PADPRP
 See Poly(ADP-ribose) polymerase (PADPRP)
 Palmer, John M., 55
Palythoa tuberculosa, 609
 Palytoxin, 609
 2-PAM Cl

See Pralidoxime chloride (2-PAM Cl)
p-Aminoheptanoylphenone (PAHP), 280–281
p-Aminooctanoylphenone (PAOP), 281
p-Aminopropiophenone (PAPP), 275, 280–281
 Panama, 291, 524
Paramyxoviridae, 575
Parapoxvirus, 542
 Paraquat, 638
 Parathion, 132, 138, 232
 Paratyphoid, 42
 Parker, Ralph, 525
 Partial pressure of carbon dioxide (P_{CO₂}), 253, 264
 Partial pressure of oxygen (P_{O₂}), 252, 278
 Particles
 and toxic inhalational injury, 249, 260
 Pasechnik, Vladimir, 453–455
 Passive hemagglutination assays (PHAs), 497
 Pasteur, Louis, 468–469
Pasteurella tularensis, 60
 Patient decontamination, 329, 331–335, 340–341, 352, 386–387, 408–410
 Patient flow pattern
 in chemical environment, 125
 Patient-isolation procedures, 432–433, 497, 547, 598
 Patient protection, 389
 Patient protective wrap (PPW), 335, 389
 Patient transport equipment, 389
 PATS
 See Protection Assessment Test System (PATS)
 PB
 See Pyridostigmine bromide
 PCP
 See Phencyclidine (PCP)
 PCR
 See Polymerase chain reaction (PCR)
 PDA
 See Portable Decontamination Apparatus (PDA)
 PDDA
 See Power-Driven Decontamination Apparatus (PDDA)
 PEEP
 See Positive end-expiratory pressure (PEEP)
 Pellets
 biological agent delivery via, 420–421, 442
 Penicillin, 473
 Pepper spray, 316
 Perfluorocarbon rubber masks, 364
 Perfluoroethylpropylene, 264
 Perfluoroisobutylene (PFIB), 264–266
 Permethrin, 191
Peromyscus species, 487
 Pershing, John J., 6, 18, 25, 95
 Pershing missile, 59
 Persian Gulf War
 anthrax vaccination during, 474
 biological warfare threat during, 2, 6, 72–74, 416, 421, 438, 444–445, 462, 608, 678–679
 botulinum vaccination during, 651
 chemical warfare threat during, 2, 6, 72–74, 117, 130–131, 198, 230, 362, 394, 678–679
 MARK I kits issued during, 73, 155
 medical aftermath of, xvi, 73, 105, 190, 191, 195, 297
 pyridostigmine pretreatment use during, 185, 188–191
 Q fever cases during, 524
 Personal decontamination, 157, 329–330, 352, 408
 Personnel decontamination, 352, 386–387
 Personnel decontamination kits, 386
 Personnel documents
 for chemical surety inspection, 401–402

- Petroleum products
 - biological agents directed against, 461
- PFIB
 - See Perfluoroisobutylene (PFIB)
- PG
 - See Staphylococcal enterotoxin B (SEB)
- Pharyngeal plague, 494
- Pharyngitis, 506
- PHAs
 - See Passive hemagglutination assays (PHAs)
- P helmet, 17
- Phencyclidine (PCP), 293–294
- Phenethylamine derivatives, 302
- Phenethylamines, 292
- Phenothiazine derivatives, 627
- Phenoxybenzamine, 280
- Phentolamine, 163–164
- PH helmet, 91
- Phillips Duphar, 132
- Phlebovirus, 593
- Phosgene (CG), 118–119, 257–260
 - clinical effects, 258, 343–344
 - and combined injuries, 348
 - detection, 42
 - history, 5, 10, 27, 29–30, 36–38, 40, 248
 - long-term health effects, 260
 - physical properties, 123
 - therapy, 258–260
 - toxicity, 276
 - triage considerations, 343–347
 - World War I use, 16, 19, 21, 91–93, 95, 119
- Phosgene oxime (CX), 220–222
 - biochemical mechanisms of injury, 221
 - chemical structure, 220
 - clinical effects, 221
 - dermatological effects, 221
 - differential diagnosis, 200, 219–220, 638
 - history, 220
 - military use, 220
 - ocular effects, 221
 - pharmacology, 198–199
 - physical properties, 220–221
 - pulmonary effects, 221
 - treatment, 221–222
- Phospholipases, 609
- Phosphoric acid, 262
- Phosphorus pentoxide, 262
- Phosphorus smokes, 262
- Phosphorus trioxide, 262
- Phossy jaw, 262
- Photochemical smog, 263
- Photostimulation, high intensity
 - incapacitation by means of, 291–292
- p*-Hydroxylaminopropiophenone, 281
- Physical decontamination methods, 354, 358, 363–364, 370
- Physical disturbances
 - incapacitation by means of, 291
- Physical examinations
 - for Chemical Personnel Reliability Program, 403–406
- Physostigmine, 130, 132
 - as anticholinergic antidote, 298–302
 - chemical structure, 184
 - dosage and administration, 299, 302
 - mechanism of action, 134, 299
 - as nerve agent pretreatment, 187, 191–192
 - side effects, 191
- Picornaviridae*, 575
- Pine Bluff Arsenal, Arkansas, 429, 431
- Pioneer Chemical Co., 62
- Plague, 479–499
 - as biological warfare agent, 482–485
 - bubonic, 480, 486, 491–492, 497
 - clinical manifestations, 491–495
 - cutaneous manifestations, 494–495
 - cycles, 489
 - diagnosis, 495–497
 - differential diagnosis, 574
 - epidemiology, 486–489
 - history, 10, 16, 32–33, 37, 42, 75, 416–417, 431, 454, 462–463, 480–482
 - incidence, 489–491
 - laboratory confirmation, 495–497
 - lethality, 439
 - meningitic, 491, 494
 - pathogenesis, 491
 - patient isolation procedures, 497
 - pharyngeal, 494
 - pneumonic, 454, 489, 491, 494, 497
 - prophylaxis, 498
 - septicemic, 480, 491–494, 497
 - treatment, 497
 - on U.S. military installations, 483–484
 - vaccination, 498
 - See also *Yersinia pestis*
- Plants
 - transgenic research involving, 683
 - weapons directed against, 44, 51–52, 60, 427–429, 431, 460–461
 - See also Defoliants; specific agent or plant
- Plant toxins, 610
 - See also specific toxin
- Plaque reduction neutralization (PRN) antibodies, 573
- Plasma carboxylesterase, 192
- Plasma cholinesterase
 - See Butyrylcholinesterase (BuChE)
- Plasminogen activator, 491
- Playfair, Sir Lyon, 11, 88
- Pneumonia, 506, 623
- Pneumonic plague, 454, 489, 491, 494, 497
- Pneumonitis, 253
- Point detectors, 377–380
- Point source
 - for aerosol delivery, 442
- Point-source explosives, 120
- The Poisoner's Handbook*, 463
- Polish Academy of Science, 419
- Pollution control
 - and weapons disposal programs, 412
- Poly(ADP-ribose) polymerase (PADPRP), 203
- Poly-D-glutamic acid, 469
- Polymerase chain reaction (PCR)
 - in biological agent diagnosis, 448–449
 - in toxin exposure diagnosis, 617
 - See also specific agent diagnosis
- Polymer fume fever, 264–265
- Polyneuropathy, 231–232
- Polyparaphenyleneterephthalamide
 - See Kevlar
- Polytetrafluoroethylene
 - See Teflon
- Portable Decontamination Apparatus (PDA), 62, 70, 388
- Porter, William N., 37–38, 45
- Porton Down Laboratory, England, 658
- Positive end-expiratory pressure (PEEP), 253, 257, 259, 266
- Positive-pressure total body suits, 432–434
- Postattack measures

- for medical support, 328–329
- Postsynaptic potential, 133–134
- Potassium cyanide, 273
- Poultry, 460
- Powders
 - biological agent dispersal as, 441
 - decontamination with, 353–354
- Powell, Colin, 74
- Power-Driven Decontamination Apparatus (PDDA), 388
- Poxviruses, 540–542
 - See also *specific virus*
- Poxvirus virions, 541
- PPW
 - See Patient protective wrap (PPW)
- Prairie dogs, 487–488
- 2-Pralidoxime chloride (2-PAM Cl), 149, 162–165
 - dosage and administration, 163–165, 169
 - and endurance time in protective gear, 394
 - injectors, 73, 155, 163, 169
 - and nerve agent cardiovascular effects, 156
 - and nerve agent–induced seizures, 154–155
 - pharmacokinetics, 163
 - and pyridostigmine pretreatment, 184–187
 - side effects, 163–164, 170
- Preattack measures
 - for medical support, 328
- Prentiss, Augustin M., 123
- Preplacement examination
 - for Chemical Personnel Reliability Program, 403–404, 406
- Presidential Decision Directive 39, 6
- Prison incidents
 - use of riot control agents during, 318
- PRN antibodies
 - See Plaque reduction neutralization (PRN) antibodies
- Prochlorperazine, 627
- Project 80, 55
- Project 112, 55
- Project CD-22, 430
- “Project Whitecoat,” 428
- Promazine, 280
- Promethazine, 217, 280
- Propranolol, 165
- Prostigmin
 - See Neostigmine
- Protection and Detection Sets, 54
- Protection Assessment Test System (PATS), 365–366
- Protection factor (PF), 366
- Protective antigen, 470
- Protective boots, 373–375
- Protective ensembles, 371–373
- Protective equipment, 363, 370–377
 - acclimatization period, 406
 - biological, 431, 447–448
 - factors that restrict wearing of, 402
 - toxins, 612–613, 669
 - See also Chemical defense equipment; Masks; Mission-oriented protective posture (MOPP) gear; *specific item*
- Protective gloves, 373–375
- Protective Ointment Kit, 42
- Protective ointment sets, 54
- Protective ratio (PR), 183, 186
- Protein exotoxins, 469–470
- Protopam Chloride
 - See 2-Pralidoxime chloride (2-PAM Cl)
- PS
 - See Chloropicrin (PS)
- P2S
 - See Methanesulfonate salt of pralidoxime (P2S)
- Pseudocholinesterase
 - See Butyrylcholinesterase (BuChE)
- Pseudomonas*, 609
- Psilocybin, 293
- Psittacosis, 43–44, 427, 431
- Psychedelics, 293–294
 - See also *specific agent*
- Psychochemical agents, 292–294
 - See also *specific agent*
- Psychochemical Agents project, 52
- Psychological effects
 - of wearing mission-oriented protective posture gear, 362, 393–395
 - See also Neuropsychiatric effects
- Public hostility, 62–63
- Public Law 91-121, 63
- Public Law 91-672, 64
- Public Law 92-532, 64
- Public Law 99-145, 71–72
- Public Law 102-484, 72
- Public Law 607, 45
- Public water systems
 - biological warfare testing involving, 428–429
- Pulex irritans*, 483, 487
- Pulmonary effects
 - of anthrax, 472
 - of brucellosis, 517
 - of cyanides, 277
 - of Lewisite, 219
 - of mustard, 211–212, 215–217, 237–238
 - of nerve agents, 145, 147–149, 167–168, 170
 - of phosgene oxime, 221
 - of Q fever, 530
 - of ricin toxicity, 636–637
 - of riot control agents, 311–312, 315–316, 321
 - of staphylococcal enterotoxin B, 624–627
 - of toxic inhalational injury, 253, 256, 258–259, 265–266, 343
 - of trichothecene mycotoxins, 666, 670
 - of tularemia, 506
- Pulmonary function tests (PFT), 252, 265
- Pulmonary toxicants, 118–119, 247–267
 - See also Inhalational injury; *specific agent*
- Pungi sticks, 419
- Puumala virus, 594
- Pyridine-2-aldoxime methyl chloride
 - See 2-Pralidoxime chloride (2-PAM Cl)
- 2-Pyridine aldoxime methyl chloride
 - See 2-Pralidoxime chloride (2-PAM Cl)
- Pyridostigmine, 124, 183–191, 298
 - blister pack, 189
 - blood–brain barrier permeability, 187
 - chemical structure, 184
 - dosage and administration, 187–188, 191
 - drug interactions, 188
 - efficacy, 184–187
 - FDA informed consent waiver for, 188
 - mechanism of action, 134
 - and nerve agent cardiovascular effects, 156
 - and nerve agent–induced pulmonary effects, 158
 - and nerve agent–induced seizures, 154–155, 165
 - as nerve agent pretreatment, 134, 149, 154–156, 158, 165, 182
 - pharmacology, 183–184
 - precautions, 187
 - safety, 187–188
 - side effects, 187, 189–190
 - wartime use, 185, 188–191
- Pyridostigmine bromide, 73, 132

Pyrogenic toxins

See Staphylococcal enterotoxin B; *specific toxin*

Pyruvate dehydrogenase complex, 218

Q

QDH/SS

See Quick Doff Hood/Second Skin (QDH/SS)

Q fever, 5, 523–532

acute, 529–530

chronic, 528, 530

clinical manifestations, 528–530

diagnosis, 530–531

differential diagnosis, 574

in domestic animals, 528

epidemiology, 526–527

history, 52, 430–431, 525

lethality, 444

military relevance, 524–525

occupational exposure, 524, 532

pathogenesis, 527–528

prophylaxis, 531–532

treatment, 531

vaccination, 430, 531–532

See also *Coxiella burnetii*

Q fever endocarditis, 528, 530

QNB

See BZ (3-Quinuclidinyl benzilate)

Quarrel-treated fabric, 373

Quayle, Dan, 73

Quick Doff Hood/Second Skin (QDH/SS), 74

3-Quinuclidinyl benzilate

See BZ (3-Quinuclidinyl benzilate)

R

Rabbits, 504

Radiation Detector

ANVDR2, 382

Radiographic findings

in brucellosis, 517

See also Chest radiography

Radioimmunoassays (RIAs), 448, 668

Rales, 343, 530

Rapidity of action, 123

Rats, 481–482, 486–488

Rattus norvegicus, 482, 487–488

Rattus rattus, 482, 487

RBC-ChE

See Erythrocyte cholinesterase (RBC-ChE)

RDIC (resuscitation device, individual, chemical), 159, 169

Reagan, Ronald, 68, 70–71

Receptor-mediated endocytosis (RME), 648–649

Red mold disease, 659

Red phosphorus, 262

Reed, Walter, 10

Remote sensing capability, 53–54, 74, 380–381, 447–448

Remote Sensing Chemical Agent Alarm (RSCAAL)

M21, 74, 381–382

Reoviridae, 575

Replicating agents, 604

Reproductive toxicity

and mustard exposure, 239

Resin kit

M291, 353–354, 387

Respiration

depth and frequency of, and toxic inhalational injury, 250, 255

Respirators

See Masks

Respiratory failure, 148, 252

RESPO 21, 370

Resuscitation

See Ventilatory support

Return to duty, 170, 213, 331

Reverse transcriptase polymerase chain reaction (RT-PCR), 597

Revolutionary War, 417

RFK mask

See Richardson, Flory, and Kops (RFK) mask

RH-195, 33–34

Rhabdoviridae, 575

Rhinoirrhoea, 145, 147, 167–168, 170

Rhodanese, 275

Rhonchi, 343–344

RIAs

See Radioimmunoassays (RIAs)

Ribavirin, 598–599

Ribonucleic acid (RNA), 541, 569, 662

genomic, 569–570

Ribonucleic acid (RNA) viruses, 592

Ribosomal ribonucleic acid (rRNA) analysis, 504, 525

Rice, George S., 17

Rice blast disease, 60, 460–461

Rice fungus, 44, 427, 460

Richardson, Flory, and Kops (RFK) mask, 22

Ricinis communis

See Castor beans

Ricin toxin, 604, 631–639

anticancer effects, 632

availability or ease of production, 438

cause of death, 636–637

clinical manifestations and pathology, 635–637

detection, 383

diagnosis, 637–638

history, 10, 420–421, 446, 463–464, 632–633

immunization, 638–639

inhalation, 636–639

injection, 635

lethality, 608

mechanism of action, 610–611

military significance, 632–633

native, 632

occupational exposure, 636

oral intoxication, 635

pathogenesis, 634

sample collection, 617

structure, 633

toxicity, 633–634

treatment, 611, 616, 638–639

Ricketts, Howard T., 10

Rickettsia mooseri, 418

Rickettsia prowazekii, 418

Rifampin, 518, 531, 552, 616

Rift Valley fever (RVF), 434, 444, 593, 595–596, 599

Rift Valley fever (RVF) virus, 593, 595, 599

Rinderpest, 51, 460

Riot control agents, 118–119, 292, 307–322

characteristics, 308–309

decontamination, 320

definition, 308

future use, 321

history, 5, 48, 56, 62, 75, 308–310

medical care, 320–321

nations with capability for use, 114

severe medical complications from, 317–318

types, 308

See also Tear agents; specific agent

Ripley, James W., 11

RME

See Receptor-mediated endocytosis (RME)

RNA

See Ribonucleic acid (RNA)

Rockets

chemical, 40, 58–59, 62, 71

Rock squirrels, 487

Rocky Mountain Arsenal, Denver, Colorado, 460–461

Rocky Mountain spotted fever, 10, 525

Rodents

that harbor plague, 480–482, 486–488, 498

that harbor viral encephalitides, 567

that harbor viral hemorrhagic fevers, 592–594, 596

See also specific rodent

Roosevelt, Franklin D., 36, 43–44, 125, 426–427

Roridin A, 661

Ross River virus, 562

Royall, Kenneth C., 45

RSCAAL

See Remote Sensing Chemical Agent Alarm (RSCAAL)

Rubratoxins, 656

Russia

biological warfare programs, 420, 422, 453, 455, 679

chemical warfare capability, 75, 115–116, 218, 679

Russo-Japanese War, 11

RVF

See Rift Valley fever (RVF)

S

Sabia virus, 593

Sacroiliitis, 517

Sag Paste (Salve Antigas), 22

Salmonella, 12, 447, 574, 683

Salt intake

and protective gear use, 407

Sanders, Murray, 32

San Francisco Bay

biological agent testing, 429

Sarin (GB), 118–119, 130, 230

aging half-time, 162, 183

and blood cholinesterase activity, 138

cardiovascular effects, 156

case reports, 135–136, 147

decontamination, 354

detection, 378–381

electroencephalographic (EEG) effects, 153, 236

history, 30, 36, 46, 49–50, 58–59, 63–64, 66, 103, 130–131

LC₅₀, 141

long-term health effects, 154, 232, 235–236

molecular model, 140

nations with capability for use, 114–115

neuropsychiatric effects, 152–153, 235

ocular effects, 144–147

pharmacology, 141

physical properties, 122–123

polyneuropathy caused by, 232

pulmonary effects, 148

and pyridostigmine pretreatment, 184–186

recent use in Japan, 4, 75, 113, 118, 131, 169, 274, 342, 438, 463, 678

toxicological studies, 236

treatment, 163, 165

Satratoxin, 659, 661

Saxitoxin, 604, 609

availability or ease of production, 439

dual use, 457

lethality, 608

mechanism of action, 610

treatment, 610, 616

SBR

See Small-box respirator (SBR)

Scarification, 548

Schäfer method of assisted ventilation, 159

Scheele, Carl, 10

Schrader, Gerhard, 30, 130

Schutz, W., 10

Schwarzkopf, H. Norman, 73

Scopolamine, 191, 294–295, 298–299

ID₅₀, 295

Scopolamine hydrochloride, 153

Scopolamine methylbromide, 153

SCPE

See Simplified Collective Protective Equipment (SCPE)

Screening

for Chemical Personnel Reliability Program, 399–404

Scrub typhus, 495

SDS polyacrylamide gel electrophoresis

See Sodium dodecyl sulfate (SDS) polyacrylamide gel electrophoresis

SEA

See Staphylococcal enterotoxin A (SEA)

Sea dumping

of surplus chemical agents, 45–46, 62–64

SEB

See Staphylococcal enterotoxin B (SEB)

Secobarbital, 293

Secondary inoculation

and vaccinia vaccination, 548–549

Secretion precautions

with biological agent-exposed patients, 433

SED

See Staphylococcal enterotoxin D (SED)

SEE

See Staphylococcal enterotoxin E (SEE)

Seizures, 154–155, 165, 187, 279

Selassie, Haile, 34

Selenium, 671

Self-aid

and chemical workers, 407, 409–410

Self-decontamination, 157, 329–330, 352, 408

Semliki Forest virus, 565, 569

Sensory stimulation

incapacitation by means of, 291

Seoul virus, 594

Septic abortion, 516

Septicemic plague, 480, 491–494, 497

Sergeant missile system, 59

Serotherapy

for viral encephalitides, 577

Serratia marcescens, 32, 428–429

Service Response Force (SRF), 410–411

Sesquiterpenoids, 660

Sevin, 132

Shalikashvili, John M., 104

Shanty, Frank, 53

Sheep, 528

Shellfish toxins, 439

See also specific toxin

Shelter System, 67

Shepherd, Forrest, 11

Sherman, W. T., 416

Shigella

- See Dysentery
- Shuffle pit, 333
- Sibert, William L., 19, 25, 28
- Silent Death* (Uncle Fester), 463
- Silicone rubber masks, 364–366
- Silver nitrate solution, 320
- Silver sulfadiazine, 214
- Simplified Collective Protective Equipment (SCPE), 385–386
- Sindbis virus, 562, 566–567, 577
- Sin nombre virus, 594
- Skin decontamination, 157–158, 333, 335, 352–353, 356, 386–387, 408, 669–670
- Skin Decontamination Kit
 - M291, 387
 - M238A1, 669
 - M258A1, 387, 669
 - XM291, 669–670
- S-LOST
 - See Mustard (HS)
- Small-box respirator (SBR), 18, 91, 93–94, 364, 393
- Smallpox, 539–553
 - and biological warfare, 540–541
 - chemoprophylaxis and chemotherapy, 552–553
 - versus chickenpox, 546
 - clinical manifestations, 542–546
 - complications, 543–544
 - diagnosis, 546–547
 - eradication, 540, 543
 - flat-type, 543, 545
 - hemorrhagic-type, 543, 545
 - history, 10, 12, 416–417, 462, 540
 - immunoprophylaxis, 548–552
 - modified-type, 546
 - pathogenesis, 542–546
 - patient-isolation procedures, 547
 - treatment, 547–553
 - vaccination, 540, 546–551
 - See also Variola virus; Vaccinia vaccines
- SmithKline Beecham Pharmaceuticals, 302
- Smoke inhalation
 - and cyanide poisoning, 273–274, 280, 282
- Smokes, 118, 260–266
 - definition, 248
 - See also specific agent
- Smoke tank
 - airplane, 31
- Snake venom toxins, 610, 650
- Soap and water
 - decontamination with, 353–354, 357–358, 388, 616, 669–670
- Sodium bicarbonate, 279, 670
- Sodium carbonate, 408
- Sodium dodecyl sulfate (SDS) polyacrylamide gel electrophoresis, 647
- Sodium hypochlorite
 - See Hypochlorite solution
- Sodium nitrite, 279–280
- Sodium phosphate, 670
- Sodium thiosulfate, 217, 279, 281, 363
- Solanaceae, 290, 294
- Somalia, 525, 540
- Soman (GD), 118–119, 130, 230
 - aging half-time, 162, 183
 - blood–brain barrier permeability, 187
 - cardiovascular effects, 156
 - case report, 150–151
 - decontamination, 354
 - detection, 381
 - history, 3, 103, 131
 - LC₅₀, 141
 - long-term health effects, 153–154, 232, 235
 - molecular model, 140
 - muscle necrosis caused by, 232
 - nations with capability for use, 114, 116
 - neuropsychiatric effects, 153, 235
 - pharmacology, 141
 - physical properties, 122
 - polyneuropathy caused by, 232
 - pretreatments, 183–187, 192
 - pulmonary effects, 148–149
 - toxicological studies, 236
 - treatment, 165
- SOPs
 - See Standing operating procedures (SOPs)
- Southeast Asia
 - trichothecene mycotoxin use, 419, 421, 609, 657–658
 - See also specific country
- Soviet Institute of Microbiology and Virology, 420
- Soviet PKhR-RM Chemical Agent Detector Kit for Medical and Veterinary Services, 65
- Soviet Union
 - biological warfare program, 4, 29, 55, 67–68, 418, 429, 452–455, 485, 656–658, 679
 - chemical warfare program, 47, 54–55, 67–68, 72, 104, 114–117, 130–131, 679
- SPE
 - See Streptococcal pyrogenic exotoxins (SPE)
- SPE-A
 - See Streptococcal enterotoxin A (SPE-A)
- SPE-C
 - See Streptococcal enterotoxin C (SPE-C)
- Spermophilus*, 487
- Spermophilus beechyi*, 487
- Spermophilus lateralis*, 487
- Spermophilus richardsoni*, 487
- Spermophilus variegatus*, 487
- Spondylitis, 517
- Spot decontamination, 333, 341, 353
- Spray delivery, 40, 120–121, 441–442
- Spray drying, 440–441
- Squirrels, 487–488, 504
- SRF
 - See Service Response Force (SRF)
- SS John Harvey, 40, 103–104, 200
- Stachybotryotoxicosis, 659
- Stachybotrys*, 656
- Stachybotrys atra*, 659
- Standing operating procedures (SOPs), 401, 407–408
- Standoff detection, 53–54, 74, 380–381, 447–448
- Stanton, Edwin, 88
- Staphylococcal enterotoxin A (SEA), 622–623
- Staphylococcal enterotoxin B (SEB), 621–628
 - clinical manifestations, 626–627
 - detection, 383, 627
 - diagnosis, 627
 - differential diagnosis, 473, 613–614, 638
 - immunotherapy, 628
 - incapacitation caused by, 622
 - inhalational exposure, 623–626
 - mechanism of action, 609
 - pathogenesis, 623–626
 - prophylaxis, 628
 - toxicity, 608, 622
 - treatment, 627–628
 - vaccines, 628

Staphylococcal enterotoxin C1 (SEC1), 622
 Staphylococcal enterotoxin C2 (SEC2), 622
 Staphylococcal enterotoxin C3 (SEC3), 622
 Staphylococcal enterotoxin D (SED), 622–623
 Staphylococcal enterotoxin E (SEE), 622
 Staphylococcal enterotoxins, 5, 622–623
 classification, 622
 decontamination, 616
 diagnosis, 613
 incapacitation caused by, 431
 mechanism of action, 609
 sample collection, 617
 treatment, 616
Staphylococcus, 609
Staphylococcus aureus, 622–623, 626
Status epilepticus, 155
 STB
 See Super tropical bleach (STB)
 Steam heat, 358
 Stenhouse, John, 10, 13
 Sterilization
 definition, 357
 Sternutators, 308
 Steroid therapy
 contraindications, 597
 for riot control agent exposure, 320–321
 for toxic inhalational injury, 253, 257, 264, 266
 Stimson, Henry L., 29, 43, 426
 Stimulants, 292–293
 See also specific agent
 Stokes mortar, 21, 27, 31
 Strategic Biological Standoff Detection System, 448
 Streptococcal adenitis, 495
 Streptococcal disease, 473
 Streptococcal enterotoxin A (SPE-A), 622–623
 Streptococcal enterotoxin C (SPE-C), 622–623
 Streptococcal pneumonia, 623
 Streptococcal pyrogenic exotoxins (SPE), 622–623
 Streptomycin, 497, 507, 518
 Stress testing, 254
 Strychnine, 292
 Stubbs, Marshall, 54–55
 Submarine mine, 52
 Succinylcholine, 137
 Sudan, 594
Suipoxvirus, 542
 Sulfur dioxide, 13–14
 Sulfur donors, 281
 Sulfur mustard
 See Mustard (HS)
 Sulfur trioxide-chlorosulfonic acid (FS smoke), 262–263
 Superantigens, 622–623
 Super tropical bleach (STB), 54, 388, 408
 Surgical gloves, 356–357
 Surgical instruments
 decontamination, 357
 Surgical irrigation solutions, 353, 357
 Survival Technology, 155
 Sverdlovsk accident, 4, 68, 420, 452–453, 468
 Synaptotagmin, 648
 Systox, 138

T

T-144
 See Sarin (GB)
 TAB
 See *N,N'*-Trimethylenebis-[pyridine-4-aldoxime bromide]

(TMB4)
 Tabun (GA), 118–119, 130, 230
 aging half-time, 162, 183
 behavioral effects, 152
 decontamination, 354
 detection, 381
 history, 30, 36, 46, 103, 130–131
 LC₅₀, 141
 long-term health effects, 232
 molecular model, 140
 nations with capability for use, 114
 pharmacology, 141
 physical properties, 122
 polyneuropathy caused by, 232
 pulmonary effects, 148–149
 and pyridostigmine pretreatment, 184–186
 recent use, 69
 toxicological studies, 236
 Tacrine
 See Tetrahydroaminoacridine (THA)
 Tactical Biological Standoff Detection System, 448
 Tank Collective Protector, 53
 Tank masks, 53, 70, 74
 TAP ensemble
 See Toxicological agent protective (TAP) ensemble
 T cells, 505, 577, 622–623, 628
 Tear agents, 118–119, 308
 delivery systems, 121
 history, 11, 13, 35–36, 56, 90, 104–105
 See also Riot control agents; specific agent
 Techne, 132
 Teflon, 264–266, 617, 638
 Temperature
 and agent delivery, 122–123
 and protective gear use, 125, 329–330, 367, 370–371, 394, 403, 405–407
 TEMPER (tent, extendable, modular, personnel) system, 384
 TEPP
 See Tetraethyl pyrophosphate (TEPP)
 Teratogenesis
 and mustard exposure, 239
 Terrorism, 6, 75, 117–118, 678, 683
 and biological weapons, 117–118, 422, 438, 446–447, 461, 463–464, 604, 609, 611, 633, 678, 683
 and toxin weapons, 604, 609, 611, 633
 Terrorist weapon
 definition, 604
 Tetanus toxin, 609, 644, 646–647
 Tetracycline, 473, 497–498, 507, 531–532
 Tetraethyl pyrophosphate (TEPP), 130
 Tetrahydroaminoacridine (THA), 301
 Tetrahydrocannabinol (THC), 52, 298
 Tetradotoxin, 417–418, 609–610
 Thermal burns, 343
 Thiamine, 163
 Thickeners, 122, 356
 Thin-layer chromatography (TLC), 668
 Thiocyanate, 276
 Thiodiglycol, 213
 Thiolcalcium hypothesis
 of mustard injury, 203–204
 Thiosulfate reductase, 275–276
 Third World nations
 biological weapons programs, 456–458, 461, 678–679
 chemical warfare capabilities, 116–117
 See also specific nation
 Thorazine
 See Chlorpromazine

- Thrassus bacchi*, 487
 Threshold limit value (TLV), 250
 Tick-born encephalitis, 444
 Ticks
 as biological agent vector, 504, 525, 528, 593–594, 596
 Titanium tetrachloride (FM), 27, 263
 TLC
 See Thin-layer chromatography (TLC)
 TMB4
 See *N,N'*-Trimethylenebis-[pyridine-4-aldoxime bromide] (TMB4)
 TNF
 See Tumor necrosis factor (TNF)
 TOCP
 See Triorthocresyl phosphate (TOCP)
Togaviridae, 562, 575
 Tooele demilitarization plant (Utah), 72, 411
 Topical skin protectants
 for chemical warfare agents, 669
 Torsade de pointes, 156
 Tourniquet test, positive, 596
 Towelettes
 decontamination, 158
 Toxic Agent Training Course, 409
 Toxic Chemical Training for Medical Support Personnel Course, 398
 Toxicological agent protective (TAP) ensemble, 404
 Toxic shock syndrome, 623, 626–627
 Toxic shock syndrome toxin-1 (TSST-1), 622–623, 627–628
 Toxins
 aerosolized, 605–608, 612
 analysis and identification, 617
 bacterial, 609, 647
 bioengineered production, 682
 chimeric, 632
 countermeasures, 610–619
 decontamination, 616, 660, 669–670
 definition, 604
 detection, 613
 diagnosis, 613–614
 ease of production, 605–608
 fungal, 609–610, 656
 immunization, 615, 618–619
 incapacitation caused by, 608, 622
 marine, 609
 mechanisms of action, 608–611, 648–649
 physical protection, 612–613
 plant, 610
 prevention, 614–616
 route of exposure, 604
 sample collection, 616–617
 shellfish, 439
 sources, 608–610
 stability, 605–608
 toxicity, 605–608, 612
 treatment, 614–616
 venom, 610, 650
 water purification methods effective against, 617–618
 See also Biological agents; specific agent
 Toxin weapons
 versus chemical weapons, 605, 607
 defense against, 603–619
 populations at risk, 611–612
 possible, 439
 terminology, 604
 Toxogonin, 163
 TPS1/TPS2
 See Topical skin protectants
 Tracheobronchial destruction, 100
 Tracheobronchial stenosis, 215–217
 Training
 chemical warfare, 48, 55–56, 71–72, 94, 124
 for chemical workers, 407–410
 of civilian resources, 409–410
 decontamination, 352, 387, 408
 protective gear, 393–395
 Training Mask, 40
 Tranquilizers, 293
 Transport equipment, 389
 Treaties
 chemical weapons, 4, 13, 72, 75, 104–105, 113, 115, 117, 411
 verification of compliance, 117, 420
 See also specific treaty
 Treaty of Versailles, 29
 Trench fan, 22–23
 Triage, 337–349
 definition, 338
 objective, 338
 Triage categories, 331, 334, 339–341, 344–347
 chemical intermediate, 339
 delayed, 340, 344–346
 expectant, 340, 345–347
 immediate, 340, 344–345
 minimal, 340, 345–346
 urgent, 339
 Triage officer, 331
 qualifications, 338
 Triage station, 331–332
 Trichloromethyl chloroformate
 See Diphosgene (DP)
Trichoderma, 656
 Trichotecin, 665
 Trichothecene mycotoxins, 655–671
 acute effects, 664–666
 aerosolized, 658–659, 666–667, 670
 anticancer potential, 667
 chemical and physical properties, 660
 chronic toxicity, 667
 clinical manifestations, 658, 664–667
 decontamination, 616, 660, 669–670
 dermal exposure, 665–666, 670
 diagnosis, 667–669
 ease of production, 659
 history, 655–659
 lethality, 658–659
 mechanism of action, 611, 660–662
 metabolism, 662–664
 military significance, 655–659
 occurrence in nature, 659
 ocular exposure, 666
 prophylaxis, 670–671
 protective equipment, 669
 recent use, 3, 68, 419, 421
 respiratory exposure, 666, 670
 structure, 659
 toxicology and toxicokinetics, 660–664
 treatment, 611, 669–671
 use in Southeast Asia, 419, 421, 609, 657–660, 665–666, 668
 See also specific toxin
 Trichothecene ring, 656
 Trihexyphenidyl, 191
 Trilateral Agreement, 455
 Trilon-46
 See Sarin (GB)
 Trilon-83
 See Tabun (GA)

Trimethoprim/sulfamethoxazole, 498, 518, 531
N,N'-Trimethylenebis-[pyridine-4-aldoxime bromide] (TMB4), 159, 163
 Trinitrotoluene (TNT), 89
 Triorthocresyl phosphate (TOCP), 232
 Truman, Harry S, 64
 T-Shell, 14
 TSST-1
 See Toxic shock syndrome toxin-1 (TSST-1)
 T-2 toxin, 608–610, 659
 aerosolized, 658–659
 chemical and physical properties, 660
 clinical manifestations, 658
 decontamination, 670
 dermal exposure, 665–666
 diagnosis, 668
 ease of production, 659
 lethality, 658–659
 mechanism of action, 660–662
 metabolism, 662–664
 ocular exposure, 666
 prophylaxis, 671
 protective equipment, 669
 toxicity, 661
 treatment, 670
 Tuberculosis, 495
 Tularemia, 5, 503–508
 clinical manifestations, 505–506
 diagnosis, 506–507
 differential diagnosis, 473, 495–496
 epidemiology, 504
 history, 10–11, 427, 429, 454, 504
 lethality, 444
 pathogenesis, 504–505
 prophylaxis, 507
 treatment, 507
 typhoidal, 505–507
 ulceroglandular, 505–507
 vaccination, 507
 See also *Francisella tularensis*
 Tumor necrosis factor (TNF), 471, 505
 Twitches, 149, 158, 168–169
 Tylenol, 274, 447
 Typhus, 10, 33, 37, 42, 444, 495

U

UJI bomb, 32–33
 Ultraviolet radiation
 decontamination with, 358
 Umbrella gun, 420–421
 United Kingdom
 anticrop research programs, 460–461
 biological warfare programs, 32, 418–419, 427, 455, 645
 chemical warfare divisions
 See World War I; World War II
 United Nations, 683
 chemical/biological weapons reports/inspections, 63, 104–105, 419–422, 444, 458, 461
 and Iraqi chemical weapons program, 69, 73–74, 114, 201, 462–463, 679
 Resolution 687, 462–463, 679
 Resolution 715, 462–463, 679
 Security Council, 420, 462–463, 679
 Yemen Civil War investigation, 56–57
 United Nations Special Commission (UNSCOM), 421, 463, 679
 United States
 animals that harbor plague in, 487–488

anticrop research programs, 460–461
 biological field testing in, 429
 biological warfare and defense programs, 425–435, 455, 645
 chemical warfare agencies
 See Chemical Warfare Service (CWS); Chemical Corps
 chemical warfare policies, 29, 36, 44–45, 48, 56, 63, 72, 75, 89–90, 104–105, 112, 117
 nerve agent inventory, 131
 plague cycles in, 489
 Q fever epidemiology in, 527
 See also Continental United States (CONUS)
 UNSCOM
 United Nations Special Commission (UNSCOM)
 U.S. Army Chemical Research and Development Center, Edgewood, Maryland, 658
 U.S. Army General Order No. 100, 13
 U.S. Army Medical Department (AMEDD), 328, 428
 U.S. Army Medical Research Institute of Chemical Defense (USAMRICD), 410, 434
 U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID), 431–434, 596, 599, 616, 623, 651
 U.S. Army Medical Unit, 430–431
 See also U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID)
 U.S. Army regulations/publications
 for chemical surety inspection, 400
 U.S. Biological Warfare Committee, 43
 U.S. Biological Warfare Program, 59–60
 U.S. Biological Weapons Program, 44
 U.S. House of Representatives Committee on Armed Services, 114
 Defense Policy Panel, 456
 Special Inquiry Into the Chemical and Biological Threat, 461, 678–679
 U.S. Public Health Service, 411
 U.S. Senate Committee on Governmental Affairs, 114
 USAMRICD
 See U.S. Army Medical Research Institute of Chemical Defense (USAMRICD)
 USAMRIID
 See U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID)
 Ustinov, D. F., 453
 U Thant, 57

V

Vaccine interference, 578
 Vaccines
 for animals, 434, 460, 464, 568, 576, 578
 biological agent, 60–61, 73, 434, 441, 460, 462, 681–683
 live attenuated, 507, 683
 recombinant vector, 683
 verified clinical take, 547
 See also specific agent or vaccine
 Vaccinia
 generalized, 549
 ocular, 549–550
 progressive, 549–550
 Vaccinia-immune globulin (VIG), 550–552
 Vaccinia keratitis, 550
 Vaccinia necrosum, 549–550
 Vaccinia vaccines, 540, 548–551, 683
 Vancomycin, 473
 V antigen, 486, 491
 Vapor, 121–122
 airway distribution, 248–249

- decontamination, 352, 356
- definition, 248
- delivery systems, 121–122
- Lewisite, 218–219
- mustard, 201–202, 237
- nerve agent, 142–144, 157, 161, 167
- off-gassing from contaminated wounds, 356
- Vapor Detector Kit, 42
- Variable domain- (V), 622
- Varicella
 - versus variola, 546
- Variola major, 543–544, 547
- Variola minor, 543, 545, 547
- Variola virus, 540–542
 - See also Smallpox
- Variolization, 548
- Vector Laboratories (Russia), 540
- Vectors
 - for bacterial agent dispersal, 33, 37, 50
 - See also specific vector or agent
- Vedder, Edward B., 102
- VEE
 - See Venezuelan equine encephalitis (VEE)
- Vegetable killer acid
 - See 2,4-Dichlorophenoxyacetic acid (VKA)
- Vegetable killer liquid (VKL), 44
- “Veil” respirators, 91
- Venezuela
 - hemorrhagic fever outbreak, 593
- Venezuelan equine encephalitis (VEE)
 - clinical manifestations, 572–573
 - diagnosis, 573
 - enzootic, 567–568, 572
 - epizootic, 567–568, 571–572
 - history, 44, 431, 434
 - immunization, 576–579
 - incapacitation caused by, 439
 - pathogenesis, 570–572
- Venezuelan equine encephalitis (VEE) virus, 5, 562–564
 - C-84 strain vaccine, 578–579
 - TC-83 strain vaccine, 577–578
 - Trinidad donkey (TrD) strain, 571, 577–578
- Venezuelan equine encephalitis (VEE) virus complex, 564–566
- Venom toxins, 610, 650
 - See also specific toxin
- Ventilatory support
 - for cyanide poisoning, 279
 - for first interventions, 341
 - history, 54, 60
 - for mustard-exposed patients, 215
 - for nerve agent-exposed patients, 148, 158–159, 166–169
 - for toxic inhalational injury, 252–253, 257, 259, 266
 - for toxin exposure, 616
 - for viral hemorrhagic fevers, 597
- Ventricular fibrillation, 156
- Verrucar A, 661
- Verticimonosporium*, 656
- Vesicants, 118–119, 197–222
 - clinical differences among, 200
 - definition, 198
 - detection, 378, 380–381
 - incapacitation caused by, 292
 - pharmacology, 199
 - triage considerations, 342–347
 - and wound decontamination, 355
 - See also specific agent
- VHF syndrome
 - See Viral hemorrhagic fever (VHF) syndrome
- Vibrio cholerae*
 - See Cholera
- Vickers Medical Containment Stretcher Transit Isolator, 432
- Victor, Joseph, 427
- Vietnam, North, 656–657
- Vietnam War
 - adaptation of biological warfare during, 419
 - and biological defense program, 431
 - defoliant use during, 56, 62, 104–105, 297
 - mask use during, 124, 394
 - plague outbreaks during, 480, 483
 - riot control agent during, 56, 62, 104–105
 - riot control agent use during, 308–309
- VIG
 - See Vaccinia-immune globulin (VIG)
- Viral encephalitides, 561–579
 - aerosolized, 570–572
 - alphavirus structure and replication, 569–570
 - antigenicity, 564–567
 - clinical manifestations, 572–576
 - diagnosis, 572–576
 - differential diagnosis, 574–576
 - epidemiology, 567–568
 - history and significance, 563–564
 - immunoprophylaxis, 564, 576–579
 - pathogenesis, 570–572
 - treatment, 576
 - weaponization, 562–564
 - See also specific virus
- Viral hemorrhagic fevers, 591–600
 - aerosolized agents, 592
 - antiviral therapy, 598–599
 - classification, 593
 - clinical manifestations, 594–595
 - diagnosis, 596–597
 - epidemiology, 592–594
 - immunoprophylaxis and immunotherapy, 599
 - infectivity, 592
 - isolation and containment procedures, 598
 - nosocomial transmission, 592–593, 595–596
 - treatment, 597–599
 - See also specific virus
- Viral hemorrhagic fever (VHF) syndrome, 592
- Viruses
 - modification, 680–681
 - possible biological warfare agents, 439
 - See also Biological agents; specific agent
- Virus particles
 - progeny, budding and release, 570
- Vitamin B_{12a}
 - See Hydroxocobalamin
- Vitamin E, 217, 671
- VKA
 - See 2,4-Dichlorophenoxyacetic acid (VKA)
- Voicemitters, 364, 366, 368–370
- Volatility, 122–123
- Voles, 594
- Vomiting
 - CS-induced, 314–315
 - mustard-induced, 212, 216
 - nerve agent-induced, 145, 168
 - relation of cholinesterase activity to, 139
- Vomiting agents, 119, 292, 308, 319
 - See also specific agent
- von Deimling, General, 15
- von Liebig, Justus, 89

von Steinmetz, Erich, 16
 von Tappen, Hans, 14
 VX, 118–119, 130, 230
 aging half-time, 162, 183
 as anticholinergic antidote, 301
 and blood cholinesterase activity, 138–139
 decontamination, 158, 354–355, 387
 delivery systems, 121
 detection, 378, 380
 history, 49–50, 57–58, 63, 70, 131
 LC₅₀, 141–142
 long-term health effects, 234
 molecular model, 140
 nations with capability for use, 114–116
 neuropsychiatric effects, 152, 234
 pharmacology, 141
 physical properties, 122–123
 pulmonary effects, 148–149
 and pyridostigmine pretreatment, 184–186
 treatment, 163
 and wound decontamination, 356

W

Waco, Texas, 75, 291, 310
 Waitt, Alden H., 29–30, 45, 47
 Walcott, C. D., 17
 Walter Reed Army Medical Center, Washington, D. C., 432, 434
 Ward, Kyle, Jr., 30
 Warning systems
 See Alarms; Detection; *specific detector*
 War Research Service (WRS), 43, 426–427
 Wart hog disease, 460
 Washington, George, 417
Washington Post, 114
 Water
 decontamination with, 158, 353–354, 357–358, 388, 616, 669–670
 Water intake
 and protective gear use, 370–371, 406–407
 Water solubility
 of toxic inhalants, 249
 Water supply contamination, 442, 446, 459
 Water testing kit
 M272 Chemical Agent, 380
 Water treatment
 for toxin contamination, 617–618
 Watson, Gerald G., 71
 Watson, James D., 679
 WBGT index
 See Wet bulb globe thermometer (WBGT) index
 W bomb, 632
 Weapons disposal programs, 45–46, 62–64, 72, 411–412, 431, 525, 564
 Weapons of mass destruction
 comparison, 458–459
 Weather
 and agent delivery, 122–123, 125
 and protective gear use, 125, 329–330, 367, 370–371, 394, 403, 405–407
 Webster, William H., 73, 114, 117, 462
 Wedum, Arnold G., 430
 Western equine encephalitis (WEE)
 clinical manifestations, 574
 diagnosis, 574
 immunization, 576–579
 pathogenesis, 570–572

 treatment, 576
 Western equine encephalitis (WEE) virus, 562–564
 B-11 strain vaccine, 579
 CM-4884 strain vaccine, 579
 Western equine encephalitis (WEE) virus complex, 565–567
 Wet bulb globe thermometer (WBGT) index, 329–330, 407
 Wheat blast fungus, 460
 Wheat stem rust, 51, 60
 Wheezing, 251–252
 White phosphorus (WP), 27, 260, 262
 Whole-body-protection equipment items, 375
 Wilson, George, 13
 Wilson, Woodrow, 16–17, 19
 Winter, Dennis, 92
 Winterization kits
 for masks, 366
 Wipedown mitts, 387
 Wisner, Frank, 455
 Woehler, Frederick, 89
 Work/rest cycles
 heat categories and, 329–330, 371, 403, 405
 World Health Organization, 419, 443, 456, 540, 542–543
 World Trade Center bombing (New York), 446
 World War I, 5, 13–25, 90–97
 Allied chemical warfare program, 13–16, 93–94
 biological warfare programs, 16, 21–22, 90–97, 417, 446, 459, 540
 chemical casualties, 6, 24, 91–92, 100–101, 200, 205
 chemical warfare usage, 14–20, 96, 290
 cyanide use during, 273
 decontamination facilities, 97–98
 detection, 23
 gas casualty treatments, 23–24, 95–101
 mustard use during, 16, 19–24, 95–101, 119, 198, 200–201, 205, 210, 212–214, 216, 237–238, 393
 protective devices, 15–18, 22, 91–94, 363–364, 393
 riot control agent use during, 309–310, 320
 smokes used during, 260
 toxic inhalational injury during, 248, 254–260, 343
 World War II, 36–47, 103–104
 anticrop research programs, 460
 biological warfare programs, 36–37, 42–44, 103–104, 417–419, 426–427, 446, 483–485, 540, 632, 644–645
 chemical warfare preparations, 37–40, 125, 131, 200, 290
 civil defense program, 41
 cyanide use during, 273
 defensive equipment, 40–42
 demilitarization of captured weapons after, 45–46
 detection, 42
 plague outbreaks during, 482
 protective devices, 37, 40–43, 103, 365, 394
 Q fever outbreaks during, 524
 smokes used during, 262
 tularemia outbreaks during, 504
 U.S. chemical warfare policy, 44–45
 Wound botulism, 644
 Wound contamination, 124, 347–348, 356
 Wound decontamination, 352, 355–357, 387
 Wounds
 in casualties with combined injuries, 340, 347–348
 exploration and debridement, 356–357
 foreign material in, 356
 off-gassing from, 356
 thickened agents in, 356
 WP
 See White phosphorus (WP)
 Wyeth, 551
 Wyeth-Ayerst Laboratories, 149, 163, 302

Wyoming MOU, 72

X

Xenopsylla cheopis, 482–483, 486–487

Xylol bromide, 14

Y

Yatapoxvirus, 542

Yellow cross

See Mustard (HS)

Yellow fever, 593–595, 599

history, 10, 12, 32, 37, 50, 418

Yellow rain, 419, 421, 609, 656–660, 665–666, 668

Yeltsin, Boris, 4, 68, 420, 422, 453–455

Yemen Civil War, 56, 104, 200, 657

Yersin, Alexandre J. E., 482

Yersinia enterocolitica, 485

Yersinia pestis, 75, 463, 482, 485–486, 491

detection, 383

lethality, 439

outer-membrane proteins (Yops), 485–486, 491

staining for, 495–496

virulence factors, 485–486

See also Plague

Yersinia pseudotuberculosis, 482, 485

Yom Kippur War

See Arab–Israeli War of 1973

Yperite

See Mustard (HS)

Ypres, Belgium, 14–15, 90, 200, 248, 308

Y 62-63 virus, 566–567

Z

Zaire, 432, 435, 594

Zhukov, Georgi, 54

Zinc, 363

Zinc cadmium sulfide, 52

Zinc oxide (HC), 260–262

Zone of Interior (ZOI), 326

Zyklon B, 273