Index

PHARMACOLOGICAL REVIEWS
Volume 27
1975

Acylophosphate, competition with cardiac glycoside for water in dehydrated environment, 49

Adenosine triphosphatase sodium-potassium
adrenal steroids, effects, 82
ammonium sulfate fraction, 28
antibodies affecting, 106
chlorpromazine effects on, 76
digitalis receptor, 85
diphenylhydantoin (DPH) effects, 72
dimethylsulfoxide (DMSO) effects, 78
ethacrynic acid effects, 69
ethanol effects, 79
fusidic acid effects, 77
glycoside interaction, 42
heart, effect of K+ on ouabain activity, 51
hydroxylamine effects on, 74
inhibition in situ, 85
localization, 7
modifiers (table), 86–88
modifying agents, 68
oligomycin effects, 73
pharmacological, physiological and biochemical aspects, 3
phlorizin effects, 79
proteins from, characterization (table), 17
purification, from heart and other tissues, 8
reactive states of the sodium pump and, 35
relationship with adenylate cyclase, 111
stimulation of, 84
visualization by freeze etch electron microscopy, 26
mercurial diuretics, effect, 68
purification, successive steps, 21, 22, 23, 24
sulfhydryl reagents, effects, 80
suramin effects, 82
transport of ions and organic substrates, 245
S-Adenosylhomocysteine, COMT inhibitor, 173, 172
Adenylate cyclase, relationship with Na+, K+-ATPase, 111
Adrenal steroids, effect on Na+, K+-ATPase, 82
Affective disorders, COMT in, 188
Age, relationship with catechol-O-methyl transferase, 157
Alcoholism model
from dependence method to (animal), 459
requirements for (animal), 457
Allen, Julius C. See Schwartz et al., 3

Amino acid
hormone effects on uptake and distribution in uterine tissue, 254
testosterone influence on transport in male accessory reproductive organs, 256
Androgens, cellular transport of, 264
Apomorphine, COMT inhibitor, 168
L-Ascorbic acid, COMT inhibitor, 174, 172

Behavior
control of
by consequent drug injections, 301
by scheduled drug injections, characteristics, 307, 310
drug-taking. See Drug-taking behavior
environmental control, drug effects and, 429
factors in human drug abuse, 499
stimuli associated with drug injections as events that control, 325
Bigelow, George, Roland Griffiths and Ira Liebson. Experimental human drug self-administration: Methodology and application to the study of sedative abuse, 523
Blood, ethanol elevation in, relation to physical dependence, 451
Blood flow
hormone control of
female, 318
male, 219
increased, relation to growth, 228
Blood pressure, measurement during conditioned withdrawal from narcotics, 538
Brady, Joseph V. See Griffiths et al., 357

Capillary permeability, hormone effect on, 219
Catania, A. Charles. Drug effects and concurrent performances, 385
Catechol, COMT inhibitor, 163, 164, 165
Catecholamine(s)
COMT in assay of, 142
metabolism in peripheral systems, O-methylation and, 174
O-methylation of, in central nervous system, 184, 185
Catechol-O-methyl transferase
activity, principles for determination of, 138
affective disorders, 188
Catechol-O-methyl transferase—continued
antibodies to, 148
catecholamine determinations, use in, 142
catechol-forming enzymes, study, 142
clinical aspects, 188
different forms of, 147
distribution
animals, 148 (table), 149, 150
invertebrates, 148, (table), 149, 150
plants, 148, (table), 149, 150
vertebrates, 163, 164, 165
vertebrates, 150, (table), 149, 150
L-dopa, clinical use, and, 191
enzyme preparations, 139
function, in central nervous system, 187, 189
hypertensive disease and, 192
inhibitors
S-adenosylhomocysteine, 173, 172
apomorphine, 168
L-ascorbic acid, 174, 172
catechols, 163, 164, 165
7,8-dihydroxycarboxyl, 169
dopa, 167
flavonoids, 166
gallic acid, 162
hydrazine derivatives, 168
2-hydroxylated oestrogens, 168
8-hydroxyquinolines, 171, 172
iodide, 174
iodophenol derivatives, 172, 172
isoprenaline, 168
ketone analogues, 166
K, values (table), 159
3-mercaptotyramine, 173, 172
methylnaprin, 167
nordihydroguaiaretic acid, 166
norgaline, 168
pharmacological properties, 158
pyridones, 174
pyridoxal-5'-phosphate, 173, 172
pyrogallol, 158, 159
pyrones, 174
sulphhydryl binding agents, 174
tropones, 169, 169
U-0521, 166
isomers, m- and p-methylation, enzyme/substrate interactions, 142
kinetics of, 144
molecular weight of, 146
noradrenaline concentrations, regulation in sympathetic nervous system, 180
pharmacological aspects, 135
physiological role, 135
purified, 146
radioassay techniques for measurement of activity, 139

INDEX

reactions, characteristics of, 142
relationship with age, 157
substrate specificity, 142
tumors and, 192
uterine activity, 158
Cell membrane, structure, 4
Cellular structure, relation to control of cellular transport and tissue distribution of molecules, 230
Central nervous system
COMT distribution in animals, 150
COMT function in, 187, 189
O-methylation of catecholamines in, 184, 185
Chlorpromazine effects on Na+, K+-ATPase, 76
Circulation, local, hormone control of, 217
Cocaine injection
concurrent schedules (monkey), 367
dose variations under variable-interval procedures, 367
drugs and dosages, 368
independent concurrent schedules, 368
non-independent concurrent schedules, 376
Collagen, uterine, 210
Cotton, Marion deV. (ed.). Symposium on control of drug-taking behavior by schedules of reinforcement, 291–548
Dews, P. B. Are the techniques and results of studies of self-administration of drugs useful in other areas of psychobiology?, 545
Introduction: Schedule-induced polydipsia and oral intake of drugs, 447
Digitalis
inotropic response, mechanisms, 96
site, on sodium pump, diagrammatic representation, 111
sodium-potassium adenosine triphosphatase, pharmacological receptor for, 85
6,7-Dihydroryethylpaprin, COMT inhibitor, 167
7,8-Dihydroxycarboxyl, COMT inhibitor, 168
3,4-Dihydroxy-2-methylpropophene, COMT inhibitor, 166
2-(3,4-Dihydroxyphenyl)-acetamide, COMT inhibitor, 165
Dimethoxy derivatives, in mental illness, 190
Dimethylsulfoxide effects on Na+, K+-ATPase, 78
Diphenylhydantoin (DPH) effects on Na+, K+-ATPase, 72
Discreet-trial choice procedure
methadone administration, 361
naloxone administration, 360
naloxone and methadone effects on choice between food and heroin, 357
L-Dopa, COMT and clinical use of, 191
Dopa, COMT inhibitor, 167
Dopacetamide, COMT inhibitor, 165
Dopamine, O-methylation in CNS, 184
Downs, David A., and James H. Woods. Naloxone as
Drug abuse, 297
behavioral factors (human), 499
experimental human drug self-administration, 523
human experimentation, 500
model, development from implications of schedule induction, 456
possible therapeutic manipulations, assessment, 518
self-administration and determination of abuse liability, 500
Drug dependence
psychological, criteria for development in animals, 504
tests conducted at CIEA Japan, 506, 509
Drug effects
concurrent performances and, 385
environmental control of behavior and, 429
Drug infusion, termination of stimuli associated with, 443
Drug injections
behavior controlled by, 307, 310
drug injection, schedules, 308
second-order schedules, 316
fixed-interval schedules, 314
fixed-ratio schedules, 309
complex schedules, 341
control of behavior by, 301
negative reinforcers, 437
punishment, 438
reinforcers, 294
schedules of termination, 395
stimuli associated with, as events that control behavior, 325
Drug preference
different drugs, comparison, 349
different drug dosages, comparison, 346
drug and saline, comparison, 345
environmental variable (monkey), 343, 351
pharmacological variables (monkey), 343, 345
punishment, concurrent, 353
reinforcement, delay, 352
response requirements, changes, 351
Drug reinforcement
investigations of underlying mechanisms, 520
study, as means of predicting abuse potential, 511
Drug self-administration
experimental (human), 523
cost variations, effects, 527
drug availability, restriction of, 524
environmental alternatives, restriction of, 525
experimental conditions, variation, 526
short-term subject participation, 525
stability and sensitivity, 524
subject withdrawal, 525
value of techniques and studies in other areas of psychobiology, 545
Drug-taking behavior
analysis of, 292
control by schedules of reinforcement, 291-548
environmental determinants, 296
historical background, 291
reinforcement and punishment of, 393
Drugs
comparison with food as reinforcer, 385
conditioned suppression procedure, 442
dependence-producing properties
assessment (animals), 503
reliability of animal tests in assessment of, 503
efficacy, as reinforcers, 295
functional versus topographical effects, 392
oral intake
absorption, control of variables affecting, 495
drug blood levels, assessment, 494
fluid intake, control, 491
physical dependence, assessment, 495
schedule-induced polydipsia and, 447, 489
psychotropic, negative reinforcers, 419
reinforcement schedules and, 293
reinforcers (monkey, man), 511
schedule-induction situation as model for reinforcing effects of, 460
Electrolyte, hormonal control of distribution and transport, 230
Environment
determinant of drug-taking behavior, 296
factors affecting behavior control, drug effects and, 429
variable in, affecting drug preference (monkey), 343
Enzymes, catechol-forming, use of COMT in study of, 142
Enzyme preparations, COMT activity study, 139
Estrogen
cellular transport of, 263
effects on
amino acid uptake and distribution in uterine tissue, 254
metabolism, 248
nucleic acid precursors in uterus and vagina, 256
nucleotide pools, 258
nucleotide synthesis, 259
RNA metabolism, 257
Ethacrynic acid, effects on Na⁺, K⁺-ATPase, 69
Ethanol
effects on Na⁺, K⁺-ATPase, 79
elevation in blood, relation to physical dependence, 451
enhancement of schedule-induced polydipsia by saccharin, 452
initiation of drinking by
access to solid food, 468
exposure to ethanol, 469
schedule-induced polydipsia, 465
other fluids and, choice in dependent animals, 453
INDEX

Ethanol—continued
positive reinforcer, function of schedule-induced
polydipsia in establishment of, 465
schedule-induced physical dependence, 449
schedule induction as method for producing physi-
cal dependence, 450
Etonitazene, positive reinforcer, 484

Falk, John L., and Herman H. Samson. Schedule-
induced physical dependence on ethanol, 449

Flavonoids, COMT inhibitor, 166

Food
comparison with drugs as reinforcers, 385
naloxone and methadone effects on choice between
heroin and, 357
solid, initiation of ethanol drinking by access to, 468
Food pellets, independently delivered, and schedule-
induced licking, 481

Fusidic acid, effects on Na+, K+-ATPase, 77

Gallic acid, COMT inhibitor, 162
Gill, C. A. See Holz and Gill, 437

Glycosides

cardiac
antibodies to, 101
competition with acylphosphatase for water in
dehydrated environment, 49
interaction with Na+, K+-ATPase 42
uptake and localization in myocardial tissue, 93
Goldberg, S. R. Stimuli associated with drug injec-
tions as events that control behavior, 325
Goldberg, S. R. See Kelleher and Goldberg, 291, 341
and R. T. Kelleher. Introduction: Schedules of
termination of drug injections, 395

Griffiths, Roland R., Richard M. Wurster, and Joseph
V. Brady. Discrete-trial choice procedure: Ef-
fects of naloxone and methadone on choice be-
between food and heroin, 357
Ground substance, female reproductive tract, 211
Growth, increased blood flow relation to, 228
Guldberg, Hans C., and Charles A. Marsden. Cate-
chol-O-methyl transferase: Pharmacological
aspects and physiological role, 135

Heart
antibodies to glycosides in, 101
glycoside uptake and localization in tissue, 93
Na+, K+-ATPase, effect of K+ on ouabain activ-
ity, 51
sodium-potassium adenosine triphosphatase purifi-
cation from tissue of, 8
Heroin, naloxone and methadone effects on choice
between food and, 357
Hoffmeister, Friedrich, and Wolfgang Wuttke. Psy-
chotropical drugs as negative reinforcers, 419
Holz, W. C., and C. A. Gill. Drug injections as
negative reinforcers, 437

Hormone. See also specific name of hormone.
binding and transport, hypothetical significance, 265
control of cellular transport and tissue distribution
of molecules, 230
relations to cellular structure, physiology, and
metabolism, 230
control of connective tissue formation, structure,
and function, 208
control of local circulation, 217
effect on capillary permeability, 219
electrolyte distribution and transport
ATPase activity, 245
uterine smooth muscle, 233
whole organs, 230
modes of regulation, 221
humeral mediation, 224
neurogenic mediation, 221

Hydrazine derivatives, COMT inhibitors, 168
Hydrolases
lyosomal function, relation, 212
female, 212
male, 214

Hydroxyamine effects on Na+, K+-ATPase, 74
8-Hydroxyquinolines, COMT inhibitor, 171, 172
2-Hydroxylated estrogens, COMT inhibitors, 168
Hypertensive disease, COMT and, 192

Iglauer, Carol, Mark E. Llewellyn, and James H.
Woods. Concurrent schedules of cocaine injec-
tion in rhesus monkeys: Dose variations under
independent and non-independent variable-
interval procedures, 367

Iodide, COMT inhibitor, 174
Iodophenol derivatives, COMT inhibitors, 172, 172
Ions, hormonal control of transport, 230
Isoprenaline, COMT inhibitor, 168

Johanson, Chris E. Pharmacological and environ-
mental variables affecting drug preference in rhesus
monkeys, 343

Kelleher, R. T. Characteristics of behavior controlled
by scheduled injections of drugs, 307
See Goldberg and Kelleher, 395
Kelleher, R. T., and S. R. Goldberg. General intro-
duction: Control of drug-taking behavior by
schedules of reinforcement, 291
Introduction: Complex schedules of drug injection,
341
Ketone analogues, COMT inhibitors, 166
Krasnegor, N. A. Introduction: Behavioral factors in
human drug abuse, 499

Leander, J. David, and D. E. McMillan. Schedule-
induced narcotic ingestion, 475
INDEX

Lever pressing, fixed-interval, 475
Licking
  schedule-dependent, 479
  schedule-induced, 475, 479
  independently delivered food pellets and, 481
Lindenmayer, George E. See Schwartz et al., 3
Llewellyn, Mark E. See Iglauer et al., 367
Lysosomal function, hydrolases and, relation, 212
McKearney, James W. Drug effects and the environmental control of behavior, 429
McMillan, D. E. See Leander and McMillan, 475
Mammals, accessory reproductive organs, sex hormone control of cell and tissue transport, 207
Marsden, Charles A. See Guldberg and Marsden, 135
Matching law, fallibility of, 388
Meisch, Richard A. The function of schedule-induced polydipsia in establishing ethanol as a positive reinforcer, 465
Mello, N. K. Schedule-induced polydipsia and oral intake of drugs, 489
Mental illness, dimethoxy derivatives in, 190
  3-Mercaptotyramine, COMT inhibitor, 173, 172
Mercurial diuretics, effects on Na+, K+-ATPase, 68
Metabolism
  catecholamines, in peripheral systems, O-methylation and, 174
  relation to control of cellular transport and tissue distribution of molecules, 230
  ribonucleic acid
    estrogen effect, 257
    male accessory tissues, 262
Methadone
  administration in discrete-trial choice procedure, 361
  effects on choice between food and heroin, 357
  results in choice procedure, 362
O-Methylation
  catecholamines in central nervous system, 184, 185, 186
  metabolism of catecholamines in peripheral systems, 174
Methylisoproterenol, COMT inhibitor, 167
Morphine-dependent monkeys, termination of schedule complex associated with intravenous injections of nalorphine in, 407
Morphine dependence
  behavior and performance under 3-response fixed-ratio schedule, 408
  performance under 30-response fixed-ratio schedule, 411
Morphine injections, stimuli associated with, 332
Morphine withdrawal
  performance under 3-response fixed-ratio schedule, 409
  performance under 30-response fixed-ratio schedule, 411
Morse, W. H. Introduction: The control of behavior by consequent drug injections, 301
  See Tang and Morse, 407
Nalorphine
  injections in morphine-dependent monkeys, termination of schedule complex associated with, 407
  termination of stimulus light associated with different doses of, 414
Naloxone
  administration in discrete-trial choice procedure, 360
  avoidance-escape schedule, 403
  effect on
    choice between food and heroin, 357
    choice procedure, 361
  fixed-interval schedules, 400
  fixed-ratio schedules, 398
  negative reinforcer (monkey), 397
  effects of dose, schedule, and narcotic regimen, 397
  superimposed and response-contingent, 404
Narcotic addiction
  conditioned withdrawal studies, 533
  blood pressure, 538
  conditioning procedure, 535
  observer ratings, 537
  performance measure, 537
  pulse, 538
  respiratory tracings, 537
  subject ratings, 536
  temperature, 538
  experimental analysis of conditioning factors (human), 533
  self-injection studies, 539
Narcotic antagonist injections, stimuli associated with, 326
Narcotic ingestion, schedule-induced, 475
Noradrenaline
  COMT and the regulation of concentrations of, in sympathetic nervous system, 180
  O-methylation in CNS, 185
Norhydroguaiaetie acid, COMT inhibitor, 166
Nucleic acid precursors, estrogen effects on uterine and vaginal content, 256
Nucleotide pools, estrogen effects on, 258
Nucleotide synthesis, estrogen effects on, 259
Nucleoside transport, estrogen effects on, 259
O’Brien, C. P. Experimental analysis of conditioning factors in human narcotic addiction, 533
Oligomycin, effects on Na+, K+-ATPase, 73
Organs, reproductive. See Reproductive organs
Ouabain
  kinetics of binding and inhibition, 50
  plot of rate constant for binding of, versus concentration of Mg-ATP, 55
INDEX

Reproductive

Reinforcement

Radioassay

Papaverolone, COMT inhibitor, 168
Phosphatase, potassium-dependent, 63
Polydipsia
schedule-induced
and oral intake of drugs, 447, 489
by ethanol, enhancement by saccharin, 452
function in establishing ethanol as positive reinforcer, 465
initiation of ethanol drinking by, 465
Potassium
-sodium-, adenosine triphosphatase. See under
Adenosine triphosphatase, sodium-potassium
potassium, simultaneous versus sequential, 59
Potassium transport, model for, 62
Progesterone, cellular transport of, 264
Protein, characterization of, from Na⁺,K⁺-ATPase
preparations (table), 17
Psychobiology, use of techniques and study results of
self-administration of drugs in other areas of, 545
Psychotropic drugs, negative reinforcers, 419
Pulse measurement during conditioned withdrawal
from narcotics, 538
Punishment, drug injections, 438
Pyridones, COMT inhibitors, 174
Pyridoxal-5'-phosphate, COMT inhibitor, 173, 172
Pyrogallol, COMT inhibitor, 158, 159
Pyrones, COMT inhibitors, 174
Radioassay techniques, COMT activity, measurement
by, 139
Reinforcement
comparison of food and drugs in, 385
delay between responding and drug reinforcement, 352
drug, investigation of underlying mechanisms, 520
punishment and, of drug-taking behavior, 393
schedules of, drugs and, 293
discriminative-stimulus properties of, 391
drugs as (monkey, man), 511
drug injections as, 294
efficacy of drugs as, 295
negative
drug injections as, 437
naloxone as (monkey), 397
psychotropic drugs, 419
positive, etonitazene as, 484
Reinforcer potency, absolute and relative measures of, 387
Reproductive organs, accessory, in mammals, sex
hormone control of cell and tissue transport by, 207
Ribonucleic acid metabolism
estradiol effect on, 257
male accessory tissues, 262
Saccharin enhancement of schedule-induced ethanol
polydipsia, 452
Samson, Herman H. See Falk and Samson, 449
Schuster, Charles R. Drugs as reinforcers in monkey
and man, 511
Schwartz, Arnold, George E. Lindenmayer, and
Julius C. Allen. The sodium-potassium adenosine
triphosphatase: Pharmacological, physiological
and biochemical aspects, 3
Sedative abuse. See Drug abuse
Sex hormones, cellular transport of, 263
Sodium
effect on 1H-digoxin binding to cardiac Na⁺, K⁺-ATPase (table), 45
-potassium adenosine triphosphatase. See under
Adenosine triphosphatase
potassium and, interaction, simultaneous versus
sequential, 59
Sodium pump
antibodies affecting, 106
cardiac glycoside interaction with, 42
digitalsis and catalytic sites, diagrammatic representa-
tion, 111
mechanism, general considerations, 27
membrane orientation, stoichiometry, and energet-
ics of forward reaction of, 29
molecular nature of, 22
orientation within membrane, 25
proposed mechanisms for, 60
reactive states, with Na⁺,K⁺-ATPase, 35
sodium and potassium activation sites, nature of, 29
Sodium transport, model for, 62
Spaziani, Eugene. Accessory reproductive organs in
mammals: Control of cell and tissue transport
by sex hormones, 207
Stimuli
associated with
drug infusion, termination of, 443
drug injections as events that control behavior, 325
morphine injections, 332
narcotic antagonist injections, 326
Sugar
transport in male accessory sex organs, 253
hormone effects on metabolism in uterine tissue, 249
Sulfinylhydryl binding agents, COMT inhibitors, 174
Sulfinylhydryl reagents, effects on Na⁺, K⁺-ATPase, 80
Suramin, effects on Na⁺, K⁺-ATPase, 82
Sympathetic nervous system, COMT and regulation of
centers in noradrenaline, 180
Tang, Andrew H., and W. H. Morse. Termination of...
INDEX

a schedule complex associated with intravenous injections of nalorphine in morphine-dependent rhesus monkeys, 407
Temperatures measurement during conditioned withdrawal from drugs, 538
Testosterone, amino acid transport in male accessory reproductive organs, 256
2,3,5,8-Tetrahydroxy-6-methyl-1,4-naphthoquinone, COMT inhibitor, 167
Tissue, connective, hormonal control of formation, structure and function, 208
Triphosphatase, adenosine. See Adenosine triphosphatase
Tropolones, COMT inhibitors, 169, 169
Tumors, COMT and, 192

Uterus
collagen in, 210

COMT activity, 158
estrogen effects on metabolism, 248
uptake and transport of amino acids, 254
hormonal control of electrolyte distribution and transport, 230

Water, hormonal control of transport, 230
Woods, James H. See Downs and Woods, 397
See Iglauer et al., 367
Wurster, Richard M. See Griffiths et al., 357
Wuttke, Wolfgang, See Hoffmeister and Wuttke, 419

Yanagita, Tomoji. Some methodological problems in assessing dependence-producing properties of drugs in animals, 503