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1247, 1449
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### 5.3. SUBJECT INDEX

The reader is advised to familiarize himself with the convention used in order to extract the maximum information from the Subject Index. A notation has been adopted which conveys condensed information at a glance; the position of a radioisotope or radiation, and the symbols (/) and (,) have a special significance.

When the radioisotopes or radiations represent the cause, they precede the phenomenon reported; when used as a tool for analysing existing conditions, they follow the phenomenon studied. Combinations or comparisons of different experimental factors are indicated by linking them by the symbol (/) or (,), respectively.

The system is illustrated below, with examples drawn from the Bibliography itself.

Radioisotope	Radiation
$^{32}\text{P}$ : growth and development: 25 (effects of $^{32}\text{P}$ on growth and development)	$\gamma$ : ovary: 1335 (effects of $\gamma$ -irradiation on organ studied)  $\gamma$ : behaviour (avoidance reaction): 1466 (“avoidance reaction” caused by $\gamma$ -irradiation)
	x/O: life span: 1454 (“/... = additional experimental factor introduced before, during or after original treatment, in this case x-irradiation)  x, chemosterilant: sterility: 1268 (“ , ... = comparison between effects of different treatments)
Calligypona pellucida, migration, $^{32}\text{P}$ : 504 (migration is <u>traced</u> [not affected] by $^{32}\text{P}$ )  carbohydrate biosynthesis, $^3\text{H}$ : 147 (biosynthesis is <u>traced</u> by $^3\text{H}$ )	Sitotroga cerealella (f, p), development in corn kernels, x : 1705-6  (development <u>traced</u> [not affected] by x-rays)

Differential irradiation of the sexes, with or without mating, is indicated as in the following example:

x: ♀	x-irradiation of female, stage not specified
♀-	irradiation of female, followed by mating
♂-	irradiation of male, followed by mating
♀(♂)	irradiation of inseminated female
♀, ♂	irradiation of both sexes
♀-♂	irradiation of both sexes, followed by mating
p, ♀	irradiation of female pupa

Life stages or tissues relevant to a particular animal study are indicated in brackets, whenever possible. A Glossary of the abbreviations used is given on page XV. The following symbols have also been used:

IV Roman numbers in connection with genetic effects indicate “chromosome, number IV”.

QQ.2 After scientific name of insect: systematic code, referring to appropriate position in Table 1.

[PA.3] After chemical compound: insecticide code, referring to appropriate position in Table 2.

Usually, entries under any one heading in the Subject Index are listed alphabetically. Where the entries are particularly numerous, however, they tend to be listed alphabetically in groups: according to insects — animals other than insects — plants — and miscellaneous.

$\alpha$ -particles

- insects, effects on: 1540  
*Drosophila melanogaster*, chromosome aberrations: 1021  
 sex-linked recessive lethals: 1021  
 -, x: *Drosophila melanogaster*, chromosome aberrations: 1021  
 sex-linked recessive lethals: 1021
- Acantholyda nemoralis* (Thoms.) - W. 19  
 [sawfly]  
 amino acids (haemolymph),  $^{14}\text{C}$ : 135  
 phospholipid choline, origin of,  $^{14}\text{C}$ : 409  
 ethanolamine, origin of,  $^{14}\text{C}$ : 409  
 formate incorporation in,  $^{14}\text{C}$ : 409  
 serine incorporation in,  $^{14}\text{C}$ : 409
- Acanthomyops claviger* Rogers - W. 14  
 [smaller yellow ant]  
 monoterpene synthesis,  $^{14}\text{C}$ : 376
- Acanthoscelides obtectus* (Say) - V. 7  
 [bean weevil]  
 $\gamma$ : stage susceptibility: 1344, 1684
- Acarus siro* Linnaeus - Ac. 1  
 [grain mite]  
 radiation: behaviour (competitiveness,  $\sigma$ ): 1468  
 $\gamma$ : development: 1339  
 stage susceptibility: 1339, 1677
- Aceratagallia sanguinolenta* (Provancher) - QQ. 6  
 [clover leafhopper]  
 food chain,  $^{32}\text{P}$ : 556  
 trophic transfer index,  $^{32}\text{P}$ : 556
- acetate- $^3\text{H}$   
 fatty acid biosynthesis, *Drosophila melanogaster*: 379  
 metabolism, *Drosophila melanogaster*: 378  
 puffing, *Chironomus tentans*: 450  
*Drosophila busckii*: 450
- acetate- $^{14}\text{C}$   
*Acanthomyops claviger*, monoterpene synthesis: 376  
*Calpodex ethlius*, endocuticle deposition: 419  
*Musca domestica*, incorporation in: 891  
 2-imidazolidinone: incorporation: 891  
*Pieris brassicae*: 224
- acetate-1- $^{14}\text{C}$   
*Anthonomus grandis* (f, a), lipid biosynthesis in: 1137, 1138  
*Avicularia avicularia*, incorporation in: 408  
*Coleomegilla maculata*, amino acid requirements: 114
- Drosophila melanogaster*, fatty acid metabolism: 378  
*Leucophaea maderae*, lipid utilization: 107  
 metabolism (isolated abdomen): 446  
*Locusta migratoria*, fat synthesis: 403  
*Periplaneta americana* (abdominal nerve cord): 372  
*Sarcophaga bullata* (f) (fat body), neutral lipid metabolism: 398
- acetate-2- $^{14}\text{C}$   
*Anthonomus grandis* (f, a), lipid biosynthesis in: 1137
- n-decyl 1- $^{14}\text{C}$ -acetate  
*Calliphora erythrocephala* (f): 32
- acetylcholine  
*Musca domestica* (brain), metabolism, significance,  $^{14}\text{C}$ : 463
- acetylcholine- $^{14}\text{C}$   
 blood cholinesterase, estimation: 589
- acetylcholinesterase  
 Sevin, substrate and dilution effects on inhibition by,  $^{14}\text{C}$ : 846
- acetyl- $^{14}\text{C}$  dopamine  
 Diptera, sclerotization in: 182
- acetyl dopamine- $\alpha$ - $^{14}\text{C}$   
 Diptera, sclerotization in: 182
- acetyl tyramine- $^{14}\text{C}$   
 Diptera, sclerotization in: 182
- Acheta domestica* (Linnaeus) - H. 4  
 [(European) brown cricket; house cricket]  
 DNA synthesis (oocyte),  $^3\text{H}$ : 288  
 gonads,  $^3\text{H}$ : 431  
 RNA synthesis (oocyte),  $^3\text{H}$ : 283  
 gonads,  $^3\text{H}$ : 431  
 microbe infection: chromosome aberrations,  $^3\text{H}$ : 538
- predator-prey system,  $^{137}\text{Cs}$ : 543
- $^{134}\text{Cs}$ -distribution: 515  
 turnover: 516
- $^{60}\text{Co}$ -turnover: 516
- fallout: stage sensitivity: 1334
- $^{106}\text{Ru}$ -distribution: 515  
 elimination: 515  
 turnover: 516
- $\delta$ : stage sensitivity: 1334  
 $\gamma$ : stage sensitivity: 1334  
 radiation profiler: 1334
- Aciilius sulcatus* Linnaeus - V. 21  
 DNA, oogenesis (oocyte chromosomes, nucleoli),  $^3\text{H}$ : 418  
 RNA, oogenesis (oocyte chromosomes, nucleoli),  $^3\text{H}$ : 418
- Acrididae - H. 1  
 sterile-male technique: 1534
- actinomycin  
 fibroin synthesis, *Bombyx mori* (f) (posterior silk gland),  $^{14}\text{C}$ : 221



<sup>3</sup>H-actinomycin

- Chironomus, giant chromosome labelling: 263
- Rhynchosciara, giant chromosome labelling: 263

actinomycin C

- RNA (puffs), *Drosophila busckii*, <sup>3</sup>H: 334

actinomycin D

- DNA detection, *Drosophila melanogaster* (f3) (salivary gland), <sup>3</sup>H: 247
- synthesis, *Bombyx mori* (silk gland), <sup>3</sup>H: 329
- NA metabolism, *Tenebrio molitor* (m), <sup>3</sup>H: 288
- RNA, *Blattella germanica*, <sup>3</sup>H: 359
- Bombyx mori* (silk gland), <sup>3</sup>H: 329
- Drosophila*, <sup>3</sup>H: 359
- Drosophila busckii* (puffs), <sup>3</sup>H: 334
- Drosophila hydei* (salivary gland), <sup>3</sup>H: 237
- grasshopper (neuroblast), <sup>3</sup>H: 997
- protein synthesis, *Tenebrio molitor* (m), <sup>3</sup>H: 288
- x: *Drosophila*, spermatogenesis: 950, 1235
- γ: *Drosophila melanogaster*, mutagenic effects: 1211

<sup>3</sup>H-actinomycin D

- DNA detection, *Drosophila melanogaster* (f3) (salivary gland): 247

adenine-<sup>14</sup>C

- Chrysopa perla* (oocyte), incorporation into: 280
- Drosophila melanogaster*: 159
- sepiapterine synthesis: 183

- Gryllus bimaculatus* (e): 265

adenosine-<sup>14</sup>C

- Drosophila melanogaster*: 159

adenosine-U-<sup>14</sup>C

- Colias eurytheme*, pteridine biosynthesis: 234

adenosine diphosphate-<sup>14</sup>C

- Musca domestica* (mitochondria), respiration: 445

Aedes - X,11

- radioecology, pond (Colorado range): 529

*Aedes aegypti* (Linnaeus) - X,11

[yellow fever mosquito]

- α-alanine, metabolism (ageing ♀), <sup>14</sup>C: 226
- aldrin, metabolism of, <sup>14</sup>C: 646
- aspartic acid, metabolism (ageing ♀), <sup>14</sup>C: 226
- chlordane, metabolism of, <sup>14</sup>C: 646
- chloride, flux (f), <sup>36</sup>Cl: 82
- uptake mechanism (f), <sup>36</sup>Cl: 82
- DDT, metabolism of, <sup>14</sup>C: 646
- dieldrin, metabolism of, <sup>14</sup>C: 646
- subcellular components (R- and S-), interaction with, <sup>14</sup>C: 658
- dieldrin-R-, aldrin metabolism in: 585
- dihydroheptachlor, metabolism of, <sup>14</sup>C: 646
- (e) location, <sup>32</sup>P: 11
- predation, <sup>32</sup>P: 11
- endrin, metabolism of, <sup>14</sup>C: 646
- heptachlor, metabolism of, <sup>14</sup>C: 646
- hind-gut, somatic reduction, <sup>3</sup>H: 422
- DNA turnover, <sup>3</sup>H: 422

labelling, <sup>32</sup>P: 1791

<sup>85</sup>Sr: 1791

nicotine, metabolism, <sup>3</sup>H: 863

toxicity, <sup>3</sup>H: 863

phospholipids: 387

R-strain, characteristics (reproductive, immunological): 1187

sodium flux (f), <sup>22</sup>Na: 82

telodrin, metabolism of, <sup>14</sup>C: 646

<sup>32</sup>P: light response (f): 37

γ: blood meal retention: 1249, 1292

cytogenetic effects: 990

development: 990

hybrid lines: 1181

mating behaviour: 1472

R-(e), viability: 1188

resistance: 1167

retention of blood meal: 1249, 1292

sterility: 1472

( ) mutations → structural modification: 1111

γ, chemosterilants: retention of blood meal: 1249, 1292

x: cytogenetic effects: 926

growth rate (f): 1486

longevity: 1486

stage susceptibility (e, f1, p, a): 1486

(e) susceptibility (in different strains): 1343

viability (e): 1486

radiation: chromosome aberrations: 1000

sex-linked recessive lethals: 963

sterility: 963

stage susceptibility: 963, 1333

radiation, chemosterilants: sex-linked recessive lethals: 963

sterility: 963

SMT, prospects: 963

*Aedes cataphylla* (Dyar) - X,11

DNA synthesis (f4), <sup>3</sup>H: 318

karyotype (f4), <sup>3</sup>H: 318

*Aedes communis* - X,11

predators of, <sup>32</sup>P: 545

*Aedes dorsalis* (Meigen) - X,11

DNA synthesis (f4), <sup>3</sup>H: 318

karyotype (f4), <sup>3</sup>H: 318

*Aedes nigromaculis* - X,11

parathion resistance in R- and S- strains, <sup>32</sup>P: 759

*Aedes stimulans* - X,11

predators of, <sup>32</sup>P: 545

*Aedes taeniorhynchus* (Wiedemann) - X,11

[black salt-marsh mosquito]

labelling, <sup>32</sup>P: 1791

*Aedes trichurus* - X,11

predators of, <sup>32</sup>P: 545

*Aedes vexans* - X,11

<sup>32</sup>P, fate during (m), mating and oviposition: 78

*Aeschna cyanera* (Müll.) - F,1

haemolymph circulation (wing), <sup>35</sup>S: 435

*Aeschna grandis* Linnaeus - F.1

## [dragonfly]

haemolymph circulation (wing), <sup>35</sup>S: 435<sup>106</sup>Ru, accumulation (♂): 62<sup>35</sup>S, accumulation (♂): 62*Aeschna viridis* Eversm. - F.1haemolymph circulation (wing), <sup>35</sup>S: 435

## AET

-/x: *Drosophila* (♂), crossover: 1203*Drosophila melanogaster* (♂), crossover:

1204

## age

-/x: *Drosophila melanogaster*, life span: 1405somatic cross-  
over: 1039-/(x, uv): *Tribolium confusum*, lethal effects(p): 1345  
malformations  
(a): 1345*Agelena consociata* Denis - Ar.1food transmission, <sup>32</sup>P: 481

## aging

x: *Drosophila melanogaster*: 1405agmatine-<sup>3</sup>H

nicotine, biosynthesis: 869

## agricultural crops

diazinon, residues of, <sup>35</sup>S: 770*Agrotis orthogonia* Morr. - U.29

[pale western cutworm]

amino acid requirements, <sup>14</sup>C: 175*Agrotis segetum* - U.29

[cutworm]

γ: (♂, p) development: 1412

sterility: 1412

## air

-/x: *Drosophila*, sex-linked recessive lethals: 1263

stage susceptibility

(spermatozoa): 970

*Drosophila melanogaster*, chromosome

aberrations:

1229

lethal effects

(emb): 1395

sex-linked

lethals: 1229

spermatogene-

sis: 1229

stage suscepti-

bility (emb):

1395

suppressor-erupt

system: 1253

tumour inci-

dence: 1174

-/γ: *Musca domestica* (p), eclosion: 1233

## alanine

*Acantholyda nemoralis*, <sup>14</sup>C: 135alanine-<sup>3</sup>H*Tegeneria derhamii* (silk gland), new cyto-  
plasmic com-  
ponent: 230  
silk: 230alanine-<sup>14</sup>C*Bombyx mori* (p)(non-cellular system): 178α-alanine-<sup>14</sup>C*Aedes aegypti*, metabolism in: 226β-alanine-<sup>14</sup>C*Drosophila melanogaster* (p, a), deposition in:  
165(1-<sup>14</sup>C) β-alanine*Tenebrio molitor* (p), metabolism in: 144DL-alanine-<sup>14</sup>C*Bombyx mori*, fibroin, incorporation into: 117DL-alanine-1-<sup>14</sup>C*Leucophaea madeirae* (fat body), protein syn-  
thesis: 235L-alanine-U-<sup>14</sup>C*Phormia regina*, protein synthesis: 142albumin-<sup>125</sup>I*Chironomus tentans* (salivary gland), proteins in  
secretion: 181aldrin-<sup>14</sup>C [C.6]

analysis: 1791

ozonation reaction on: 612

purification of extracts: 1791

*Aedes aegypti*, metabolism in: 646

metabolism in dieldrin-R-: 585

*Anopheles quadrimaculatus*, metabolism in

dieldrin-R-: 585

*Aspergillus niger*, metabolism in: 646

clays, absorption by: 691

mouse, metabolism in: 646

*Penicillium notatum*, metabolism in: 646rabbit, metabolism, distribution and elimina-  
tion from: 645

metabolites in: 648

rat, metabolism in: 646

metabolism, distribution and elimination  
from: 645, 647

soils, absorption by: 691

## alfalfa

4-benzothienyl-N-methylcarbamate,  
metabolism of: 831alfalfa caterpillar: see *Colias eurytheme*alfalfa weevil: see *Hypera postica*

## aliphatic alcohols

*Periplaneta americana* (abdominal nerve cord),  
<sup>3</sup>H, <sup>14</sup>C: 372

## alkylating agents

insects, mechanisms of action, Rev., r.i.: 886

-, γ: *Drosophila melanogaster* (spermatozoa):  
1275(2-<sup>14</sup>C) allantoin*Periplaneta americana*, uric acid metabolism in:  
537

## allatectomy

- Periplaneta americana, amino acid incorporation (fat body), <sup>3</sup>H: 349  
 protein content (tissues), <sup>3</sup>H: 349  
 protein synthesis during ovarian development, <sup>3</sup>H: 229, 349  
 RNA content (tissues), <sup>3</sup>H: 349  
 uric acid content (tissues): 349

allethrin-<sup>14</sup>C [B.8]

- 850  
 Musca domestica, in vitro and in vivo metabolism: 852

dl-cis-trans-allethrin-2-<sup>14</sup>C [B.3]

- Musca domestica, metabolism in: 849  
 Alphitobius diaperinus (Panzer) - V.46  
 [lesser mealworm]

- γ: lethal effects (f, a): 1438  
 Altica marvegens - V.13

- [leaf beetle; flea beetle]  
 food chain, <sup>32</sup>P: 556  
 trophic transfer index, <sup>32</sup>P: 556

## Amblyomma americanum (Linnaeus) - Ac.8

## [Cayenne tick; lone star tick]

- dispersal, <sup>59</sup>Fe: 503  
 ecology, <sup>14</sup>C, <sup>32</sup>P, <sup>144</sup>Ce: 568  
 labelling, <sup>32</sup>P: 1791  
<sup>59</sup>Fe: 503, 1791  
 immature forms, <sup>3</sup>H, <sup>14</sup>C, <sup>32</sup>P, <sup>90</sup>Sr, <sup>137</sup>Cs, <sup>144</sup>Ce: 568

- migration, <sup>59</sup>Fe: 503

- γ: engorgement: 1297  
 reproductive potential: 1297

## American dog tick: see Dermacentor variabilis

## amino acid

- insects, metabolism in, r.i.: 131  
 Rhynchosciara angelae, <sup>3</sup>H: 312

## amino acid-activating enzyme

- Sarcophaga bullata, <sup>32</sup>P: 113

## amino acid pool

- Periplaneta americana (CNS), r.i.: 207

## amino acid requirements

- Agrotis orthogonia, <sup>14</sup>C: 175  
 Argyrotaenia velutinana, <sup>14</sup>C: 212  
 Apis mellifera, <sup>14</sup>C: 183  
 Blattella germanica, <sup>14</sup>C: 175  
 Cephus cinctus, <sup>14</sup>C: 175  
 Coleomegilla maculata, <sup>14</sup>C: 114  
 Ctenicera destructor, <sup>14</sup>C: 175  
 Hypoderma bovis, <sup>14</sup>C: 175  
 Myzus persicae, <sup>14</sup>C: 175  
 Neodiprion pratti, <sup>14</sup>C: 175  
 Periplaneta americana, <sup>14</sup>C: 175  
 Phormia regina, <sup>14</sup>C: 175  
 Tetranychus urticae, <sup>14</sup>C: 213

## amino acids

- Bombyx mori, incorporation into fibroin, <sup>14</sup>C, <sup>35</sup>S: 117

- Chrysopa perla (oocyte), incorporation into, <sup>14</sup>C: 280

- Drosophila (p), proteins (ribosomes), <sup>14</sup>C: 166

- Drosophila hydei (giant chromosomes), <sup>3</sup>H: 894

- Heteroptera, salivary secretions of, <sup>14</sup>C: 192

- Lucilia (Phaenicia) cuprina, activation in, <sup>14</sup>C: 162

- oogenesis, Locusta migratoria, <sup>3</sup>H: 417

- Musca domestica, <sup>3</sup>H: 417

- Sarcophaga bullata (f, p)(fat body), <sup>32</sup>P: 113

amino acids-<sup>3</sup>H

- Calpodex ethlius (f)(fat body), protein granules: 141

- Drosophila (f)(giant chromosomes), puffs: 200

- Periplaneta americana, incorporation into haemolymph proteins: 229

- protein metabolism, oogenesis, Acilius sulcatus: 418

- Dytiscus marginalis: 418

- Gryllus domesticus: 418

- Musca domestica: 418

- Pterostichus niger: 418

amino acids-<sup>14</sup>C

- Bombyx mori (p)(non-cellular system), incorporation into proteins: 178, 179

- Chironomus tentans (salivary glands), proteins in secretion: 181

- Drosophila melanogaster (p, a): 165  
 (cell-free), protein synthesis: 150

- Glossina, flight metabolism: 124

- Peridroma saucia (f), nuclear polyhedrosis virus: 462

- sclerotin (cuticle): 182

- γ-amino butyric acid-1-<sup>14</sup>C: 615

aminoimidazolecarboxamide-4-<sup>14</sup>C

- Pieris brassicae, catechol amines, biosynthesis: 218  
 leucopterin biosynthesis (p): 223

α-aminoisobutyrate-<sup>14</sup>C

- cyanide: rat (brain), transport in: 597

- 2-amino-4-hydroxy-6-(D-erythro-1', 2', 3'-trihydroxypropyl)pteridine-<sup>14</sup>C

- Drosophila melanogaster, pteridine biosynthesis in: 227

- 2-amino-4-hydroxy-6-hydroxymethylpteridine-10-<sup>14</sup>C

- Drosophila melanogaster, synthesis: 198  
 metabolism: 198

2-amino-4-hydroxypteridine-2-<sup>14</sup>C

*Pteris brassicae*, incorporation into isoxanthopterin: 223

2-amino-4-hydroxypteridine-10-<sup>14</sup>C

*Drosophila melanogaster*, synthesis: 198  
metabolism: 198

2-amino-4-hydroxypteridine(reduced)-<sup>14</sup>C

*Drosophila melanogaster*, pteridine biosynthesis in: 227

ammonium cations, quaternary-<sup>3</sup>H-

*Tuberolachnus salignus* (ganglia), permeability of: 84

## ammonium salts, quaternary

*Periplaneta americana* (abdominal nerve cord), <sup>3</sup>H: 61

*Amphimallon majalis* (Razoumowsky) - V.41

[European chafer]

γ: development (f3): 1365  
lethal effects (e, f, a): 1365  
reproductive potential: 1365  
stage susceptibility: 1365  
sterility: 1578

*Amphimallon solstitialis* - V.41

flight muscle, contractile mechanism, <sup>45</sup>Ca: 56

*Anagasta kuhniella* (Zeller) - U.36

[Mediterranean flour moth]

x: parasitized (f): 1297, 1298  
γ: stage susceptibility: 1344

*Anastrepha ludens* (Loew) - X.35

[Mexican fruit fly]

SMT, California-Arizona-Mexico border: 1603  
progress: 1559

γ: sterility: 1603

*Anax imperator* Leach - F.1

haemolymph circulation (wing), <sup>35</sup>S: 435

Angoumois grain moth: see *Sitotroga cerealella**Anisomorpha buprestoides* - H.7

[stick insect]

cyclopentanoid terpene biosynthesis, <sup>14</sup>C: 388

*Anopheles maculipennis atroparvus* - X.11

x: (f4) lethal effects: 1364  
reproductive potential (a): 1364

*Anopheles pharoensis* Theobald - X.11

labelling (f3), <sup>32</sup>P: 1611

γ: (e, p) dominant lethals: 1610

fitness: 1584

longevity: 1583

(p) mating behaviour (a), <sup>32</sup>P: 1611

competitiveness (a, γ): 1612

frequency (a, γ), <sup>32</sup>P: 1611

sperm activity: 1585

SMT, PAR: 1595

SMT (γ): 1583-5, 1610-12

SMT, progress, Middle East: 1544

UAR: 1600

*Anopheles quadrimaculatus* (Say) - X.11

[common malaria mosquito]

dieldrin-R-, aldrin metabolism in: 585

x: morphological markers: 1066

*Anopheles stephensi mysorensis* Sweet and Rao

- X.11

flight range, <sup>32</sup>P: 501-2

gonotrophic cycle, <sup>32</sup>P: 501-2

labelling (f4), <sup>32</sup>P: 501-2

<sup>32</sup>P: longevity: 501

ant, California harvest: see *Pogonomyrmex*

californicus

carpenter: see *Camponotus*

pyramid: see *Dorymyrmex pyramicus*

smaller yellow: see *Acanthomyops claviger*

thief: see *Solenopsis molesta*

## ants - W.14

cuticular excretion, <sup>32</sup>P: 1791

radioactivity detectors: 520

trophallaxis, <sup>32</sup>P: 1791

γ: behaviour (avoidance reaction): 1466

*Antheraea eucalypti* Scott - U.43

sucrose utilization, <sup>14</sup>C: 90

trehalase utilization, <sup>14</sup>C: 90

*Antheraea pernyi* - U.43

[Japanese oak moth; oak silkworm]

r.i.-labelled compounds, incorporation in: 206

thymidine kinase, <sup>14</sup>C: 121

*Antheraea polyphemus* (Cramer) - U.43

[polyphemus moth]

hormones: RNA (post-emb), <sup>3</sup>H: 244

injury: RNA (post-emb), <sup>3</sup>H: 244

RNA (post-emb), <sup>3</sup>H: 244

*Anthonomus grandis* Boheman - V.19

[beet weevil]

azodrin, metabolism of, <sup>14</sup>C, <sup>32</sup>P: 700

carbaryl, metabolism (a), <sup>14</sup>C: 807

absorption and metabolism, <sup>14</sup>C: 815

fatty acid synthesis, <sup>14</sup>C: 1136

metabolic conversion, <sup>14</sup>C: 1136

lipid biosynthesis, <sup>14</sup>C: 1136; (f, a), <sup>14</sup>C: 1137

phosphamidon, metabolism of, <sup>14</sup>C, <sup>32</sup>P: 702

spermatogenesis, time sequence, <sup>3</sup>H: 448

SMT, mating behaviour: 1579

population dynamics: 1579

proposals for: 1553

ratios (♂:♀): 1579

steroids, storage (a), <sup>14</sup>C: 371

excretion (a), <sup>14</sup>C: 371

tepa, absorption of, <sup>14</sup>C: 881

metabolism of, <sup>14</sup>C: 881

turnover, <sup>14</sup>C: 882

tepa: gonads, <sup>14</sup>C: 882

reproductive potential, <sup>14</sup>C: 882

Temik, metabolism of, <sup>14</sup>C, <sup>35</sup>S: 806, 813, 814

uric acid in N-metabolism, <sup>14</sup>C: 414

x: lethal effects (f, p, a): 1439

sterility: 1268, 1439

-, apholate: sterility: 1268

-, bisulfan: sterility: 1268

-, chemosterilants: sterility: 1268

γ: longevity (a): 1141

reproductive potential: 1141

sterility: 1141

- radiation: midgut: 1331  
testis: 1331
- anthracene-<sup>3</sup>H  
*Drosophila hydei* (salivary gland), localization in: 451
- antimetabolites  
insects, mechanisms of action, Rev., r.i.: 886
- aphid, bean: see *Aphis fabae*  
green peach: see *Myzus persicae*  
willow: see *Tuberolachnus salignus*
- Aphidina ovipara* - QQ.2  
radiation: behaviour: 1463
- aphids - QQ.2  
food uptake through artificial membranes, <sup>32</sup>P: 1791  
honeydew, translocation in sieve tubes, <sup>14</sup>C: 452  
host relationship, trophic, <sup>14</sup>C: 471
- Aphis fabae* Scopoli - QQ.2  
[bean aphid]  
feeding punctures, histology and function of, <sup>32</sup>P: 478  
food selection, <sup>32</sup>P: 474  
transmission (mother→larvae), <sup>32</sup>P: 473  
<sup>131</sup>I, incorporation and excretion: 623  
saliva, role in feeding, <sup>86</sup>Rb: 482  
transpiration, <sup>3</sup>H: 454  
virus transmission, r.i.: 560
- apholate [R.1]  
-, x: *Anthonomus grandis*, sterilization: 1268  
-, y: *Drosophila melanogaster*, sterilization: 1613  
*Musca domestica* (e), nucleotide ratios, <sup>14</sup>C: 887
- Apion sp. - V.19  
[snout beetle]  
food chain, <sup>32</sup>P: 556  
trophic transfer index, <sup>32</sup>P: 556
- Apis mellifera* Linnaeus - W.3  
[honey-bee]  
<sup>3</sup>H: 228  
activity (feeding, foraging), <sup>32</sup>P, <sup>158</sup>Au: 554  
different strains, <sup>32</sup>P, <sup>158</sup>Au: 550, 551, 554  
amino acid requirements, <sup>14</sup>C: 188  
biopterin metabolism (workers, queens), <sup>14</sup>C: 209  
dispersal, <sup>32</sup>P, <sup>158</sup>Au: 550, 551, 554  
9-ketodec-2-enoic acid, metabolism of, <sup>14</sup>C: 410  
<sup>32</sup>PO<sub>4</sub><sup>3-</sup> in muscle fibril: 69  
pollination, <sup>32</sup>P, <sup>158</sup>Au: 550, 551, 554  
respiratory metabolism (flight muscle), <sup>32</sup>P: 444  
royal jelly: development (f), <sup>14</sup>C: 188  
sugar utilization, <sup>14</sup>C: 188  
venom/x: mouse, resistance: 69
- Apis mellifica* - W.3  
[honey bee]  
brood chamber: worker trophallaxis, <sup>158</sup>Au: 492  
carbohydrate synthesis, oogenesis, <sup>3</sup>H: 146-7  
food transmission in colony, <sup>32</sup>P: 488  
labelling, <sup>198</sup>Au: 492  
<sup>32</sup>P: 518  
<sup>32</sup>P, external contamination: 518, 519  
pollination: 1334  
protein synthesis, oogenesis, <sup>3</sup>H: 146, 870  
s: stage susceptibility: 1334  
y: life span: 1334  
stage susceptibility: 1334  
n: stage susceptibility: 1334  
radiation: behaviour: 1463  
*Apis mellifica carvica* Pollm. - W.3  
[honey bee]  
x (f): spermatogenesis: 1294  
*Apis mellifica mellifica* L. - W.3  
[honey bee]  
x (f): spermatogenesis: 1294
- aptonin, royal jelly-  
radiation protection: 1724
- apples  
butonate, metabolism of, <sup>32</sup>P: 715  
residues of, <sup>32</sup>P: 715  
Cidial residues in, <sup>32</sup>P: 696  
Rogor, metabolism and residues of, <sup>32</sup>P: 769  
trichlorphon, metabolism of, <sup>32</sup>P: 715
- apricot  
pesticide residues, <sup>35</sup>S: 684  
Rogor, metabolism and residues of, <sup>32</sup>P: 769
- Arge pagana* Panz. - W.4  
<sup>85</sup>Sr, <sup>131</sup>I, <sup>137</sup>Cs, distribution in (f): 53
- Argia translata* - F.3  
y: (n) emergence (a): 1394
- arginine  
insects, metabolism in, <sup>14</sup>C: 125  
-/y: *Drosophila*, mutagenesis (spermatids): 1177  
*Drosophila melanogaster*, spermatogenesis: 1175
- arginine-<sup>3</sup>H  
*Drosophila hydei* (giant chromosomes): 116  
*Sciara coprophila* (f) (salivary gland), nucleoprotein: 331
- arginine-<sup>14</sup>C  
nicotine, biosynthesis: 869  
<sup>14</sup>C-L-arginine  
*Samia cynthia* (p), incorporation in tryptic peptides: 128
- L-arginine, guanidino-<sup>14</sup>C: 615
- argon  
-/x: *Drosophila melanogaster*, dominant  
lethals: 1191  
genetic effects: 1190  
sex-linked  
recessive  
lethals: 1191  
translocations: 1191

- Argyrotaenia velutinana (Walker) - U.49  
[red-banded leaf roller]  
amino acid requirements, <sup>14</sup>C: 212
- Arizona desert beetle: see Eleodes longicollis
- arprocarb-<sup>14</sup>C [X.3]  
Culex pipiens quinquefasciatus, resistance of: 375
- Arrenurus papillator (O.F. Müll.) - Ac.2/3  
dragonfly parasite (wing): 432
- Arthobacter oxidans  
nicotine metabolism in, <sup>14</sup>C: 855
- arthropod  
food chain, <sup>60</sup>Co distribution in: 507  
<sup>106</sup>Ru distribution in: 507  
<sup>137</sup>Cs distribution in: 507  
food chains in salt-marsh ecosystem, <sup>32</sup>P: 525, 526  
food web, broomsedge field, <sup>65</sup>Zn: 875  
predation, <sup>137</sup>Cs: 544
- arthropods  
<sup>137</sup>Cs, <sup>106</sup>Ru, <sup>90</sup>Sr, <sup>60</sup>Co, mineral cycling (forest): 514  
elements, assimilation of: 80  
environmental radiation effects on: 511  
forest-, food chains in, <sup>24</sup>Na, <sup>42</sup>K, <sup>134</sup>Cs, <sup>137</sup>Cs: 533  
labelling of small-, r.i.: 534  
neurochemistry of: text book; r.i.: 481  
recolonization of (γ) soil by small-: 512  
virus vector: 1714
- Asiatic rice borer: see Chilo suppressalis
- aspartate-<sup>14</sup>C  
Celerio euphorbia, pyrimidine synthesis: 202
- aspartate-3-<sup>14</sup>C  
nicotine biosynthesis: 858, 859
- aspartic acid-<sup>14</sup>C  
639  
Aedes aegypti, metabolism in: 226
- aspartic-1-<sup>14</sup>C acid  
Apis mellifera, metabolism in: 188
- DL-aspartic acid-3-<sup>14</sup>C: 615
- Aspergillus niger  
aldrin, metabolism of, <sup>14</sup>C: 646  
chlordane, metabolism of, <sup>14</sup>C: 646  
dieldrin, metabolism of, <sup>14</sup>C: 646  
dihydroheptachlor, metabolism of, <sup>14</sup>C: 646  
endrin, metabolism of, <sup>14</sup>C: 646  
heptachlor, metabolism of, <sup>14</sup>C: 646  
telodrin, metabolism of, <sup>14</sup>C: 646
- Asynarchus sp. - V.21  
mosquito predation, <sup>32</sup>P: 545
- atmosphere  
n-flux: chlorinated hydrocarbons, contamination by, <sup>36</sup>Cl: 685
- ATP (=adenosine triphosphate)  
-/x: Drosophila melanogaster (σ), chromosome loss: 1205, 1207
- /x: Drosophila melanogaster (σ), chromosome aberrations: 1208
- /x/N: Drosophila melanogaster (σ), chromosome aberrations: 1208
- ATP-<sup>3</sup>H  
Drosophila, DNA polymerase activity: 316
- ATP-<sup>32</sup>P  
oxidative phosphorylation, (flight muscle), Musca domestica: 459  
Phormia regina: 459  
intermediate in, blowfly (mitochondria): 480
- dATP = deoxyribonucleoside triphosphate  
<sup>3</sup>H(dATP)  
Drosophila, DNA polymerase activity: 317
- Attagenus piceus (Olivier) - V.20  
[black carpet beetle]  
γ: development: 1390  
lethal effects: 1390  
reproductive potential: 1390
- aureomycin  
γ/-: Habrobracon (?), reproductive potential: 1304
- Australia  
irradiators, γ, various types: 1690  
SMT, Dacus tryoni: 1587  
Perkinsiella saccharicida, prospects: 1144
- Austria  
SMT trials, Ceratitis capitata: 1594
- autoradiography  
Bombyx mori (silk gland), RNA, electron microscopy, <sup>3</sup>H: 236
- Avicularia avicularia - Ar.1/2  
cholesterol, absence of synthesis, <sup>14</sup>C: 408  
fatty acids, synthesis, <sup>14</sup>C: 408  
lipids (non-saponifiable), synthesis of, <sup>14</sup>C: 408
- 6-azauridine-<sup>14</sup>C  
Musca domestica, DNA synthesis (ovary), <sup>3</sup>H: 437  
RNA synthesis (ovary), <sup>3</sup>H: 437  
ovary (development): 437
- aziridinyl-<sup>14</sup>C compounds  
chromosome aberrations: 883
- aziridinyl-<sup>32</sup>P compounds  
chromosome aberrations: 883
- Azodrin-<sup>32</sup>P [PA.4]  
Anthonomus grandis (a), metabolism in: 700  
Heliothis virescens (L5), metabolism in: 700  
Heliothis zea (L5), metabolism in: 700  
Musca domestica (a), metabolism in: 700  
Periplaneta americana (a), metabolism in: 700  
rat, metabolism in: 700  
cotton plant, metabolism in: 751
- Azodrin, N-methyl-<sup>14</sup>C-labelled  
Anthonomus grandis (a), metabolism in: 700

*Heliothis virescens* (L5), metabolism in: 700  
*Heliothis zea* (L5), metabolism in: 700  
*Musca domestica* (a), metabolism in: 700  
*Periplaneta americana* (a), metabolism in: 700  
 rat, metabolism in: 700

## B

*Bacillus cereus*

γ: growth rate: 1711

*Bacillus thuringiensis* Berliner

labelling, <sup>32</sup>P: 539, 541

*Pieris brassicae* (L3), exudates of germinating  
 spores, <sup>32</sup>P: 540

x/-: *Tribolium castaneum*: 1163, 1538

*Tribolium confusum*: 1163, 1538

*Bacillus thuringiensis* var. *entomocidus*

γ: growth rate: 1711

radiosensitivity: 1711

*Bacillus thuringiensis* var. *thuringiensis*

γ: insect control: 1711

backswimmer: see *Notonecta glauca*

## bacteria

DDT, metabolism of, <sup>14</sup>C: 677

bagworm, evergreen: see *Thyridopteryx*  
*ephemeraeformis*

*Banol*-<sup>14</sup>C [X.10]

*Blaberus giganteus* (fat body), degradation by:  
 821

*Musca domestica*, metabolism by NADPH<sub>2</sub>-  
 requiring enzyme: 844

rat, metabolism in: 810, 811, 827

liver microsomes, metabolism in: 839

bean plant, metabolism in: 829

*Banol*, carbonyl-<sup>14</sup>C-labelled

821

rat, hydrolysis products in: 828

metabolism in: 810, 828

bean foliage, metabolism in: 804

plant, persistent glucoside metabolites:

830

*Banol*, <sup>14</sup>CH<sub>3</sub>-labelled

821

synthesis: 820

rat, hydrolysis products in: 828

metabolism in: 810, 828

bean plant, metabolism in: 820

*Banol*, N-<sup>14</sup>CH<sub>3</sub>-labelled

821

*Musca domestica*, metabolism in: 837

bean plant, metabolism in: 829

persistent glucoside metabolites:

830

*Banol*, ring-labelled

*Musca domestica*, metabolism in: 837

rat, metabolism in: 810

*Barathra brassicae* - U.29

RNA (fat body, gut, neurolemma, etc.), <sup>3</sup>H:

314

## barium-140

aquatic insects, assimilation by: 521

concentration by: 521

## barley

4-benzothienyl-N-methylcarbamate, metabo-  
 lism of: 831

DDT: R- and S-, photosynthesis, <sup>14</sup>C: 652

seed infestation, detection of, x: 1707

γ: disinfestation: 1840

Bayer 9017-<sup>35</sup>S [PC.20]

synthesis: 801

cattle (dairy calves), metabolism in: 801

residues in tissue: 801

Baygon-<sup>14</sup>C [X.1]

*Musca domestica*, metabolism in: 897

metabolism by NADPH<sub>2</sub>-

requiring enzyme: 844

*Oncopeltus fasciatus* (e.emb), uptake by: 610

-/piperonyl butoxide: *Musca domestica*,

metabolism in: 897

rat (liver microsomes), metabolism in: 839

metabolism and persistence in: 827

bean foliage, metabolism in: 803

plant, metabolism in: 829

Baygon, carbonyl-<sup>14</sup>C-labelled

albumin: oxidative metabolism by *Musca*

*domestica* microsome-NADPH<sub>2</sub>

system: 843

bean foliage, metabolism in: 804

rat, hydrolysis products in: 828

metabolism in: 828

Baygon, methyl-<sup>14</sup>C-labelled

bean plant, persistent glucoside metabolites:

830

rat, hydrolysis products in: 828

metabolism in: 828

Baygon, isoprop-1,3-<sup>14</sup>C-oxy-labelled

*Musca domestica*, metabolism in: 837

bean plant, metabolism in: 829

persistent glucoside metabolites:

830

## BDU = bromodeoxyuridine

## BdU = 5-bromodeoxyuridine

## BdU

-/x: *Drosophila*, sex-linked recessive lethals:  
 1197

*Ephestia* (L), mitotic activity (wing buds): 249

## bean

γ: disinfestation: 1876

bean aphid: see *Aphis fabae*

## bean foliage

*Banol*<sup>®</sup>, metabolism of, <sup>14</sup>C: 803, 804

Baygon<sup>®</sup>, metabolism of, <sup>14</sup>C: 803, 804

carbaryl, metabolism of, <sup>14</sup>C: 803, 804

HRS-1422, metabolism of, <sup>14</sup>C: 803, 804

Matacil<sup>®</sup>, <sup>3</sup>H: 805

metabolism of, <sup>14</sup>C: 803, 804

Mesuroil<sup>®</sup>, metabolism of, <sup>14</sup>C: 803, 804

UC 10854, metabolism of, <sup>14</sup>C: 803, 804

- Zectran<sup>®</sup>, <sup>3</sup>H: 805  
metabolism of, <sup>14</sup>C: 803, 804
- bean plant
- Banol, metabolism of, <sup>14</sup>C: 820, 829  
metabolism → persistent glycosides,  
<sup>14</sup>C: 830
- Baygon, metabolism of, <sup>14</sup>C: 829  
metabolism → persistent glycosides,  
<sup>14</sup>C: 830
- carbaryl, metabolism of, <sup>14</sup>C: 829  
metabolism → persistent glycosides,  
<sup>14</sup>C: 830
- diazinon, absorption, metabolism and persistence in, <sup>14</sup>C: 744
- dimethoate, metabolism of, <sup>14</sup>C: 753  
<sup>32</sup>P: 753
- dimetilan, metabolism of, <sup>14</sup>C: 187  
metabolism → persistent glycosides,  
<sup>14</sup>C: 830
- Dursban, uptake and translocation of, <sup>14</sup>C: 791  
<sup>36</sup>Cl: 791
- GS 13005, metabolism in foliage, <sup>14</sup>C: 720
- HRS-1422, metabolism of, <sup>14</sup>C: 829  
metabolism → persistent glycosides,  
<sup>14</sup>C: 830
- Isolan, metabolism of, <sup>14</sup>C: 829  
metabolism → persistent glycosides,  
<sup>14</sup>C: 830
- Matacil, metabolism of, <sup>14</sup>C: 829  
metabolism → persistent glycosides,  
<sup>14</sup>C: 830
- Mesuroil, metabolism of, <sup>14</sup>C: 829  
metabolism → persistent glycosides,  
<sup>14</sup>C: 830
- parathion, accumulation and distribution in,  
<sup>35</sup>S: 802  
metabolism, <sup>35</sup>S: 802
- UC 10854, metabolism of, <sup>14</sup>C: 829  
metabolism → persistent glycosides,  
<sup>14</sup>C: 830
- Zectran, metabolism of, <sup>14</sup>C: 829  
metabolism → persistent glycosides,  
<sup>14</sup>C: 830
- bean weevil: see *Acanthoscelides obtectus*  
*Bruchus obtectus*
- bed bug: see *Cimex lectularius*
- bed bugs: see Cimicidae
- bee, honey: see *Apis mellifera*
- bee venom  
radioprotective action: 1723
- beet fly - X.  
 $\gamma$ : germ cells, development: 948  
population density: 1482
- beetle, Arizona desert: see *Eleodes longicollis*  
black carpet: see *Attagenus piceus*  
cigarette: see *Lasioderma serricornis*  
click: see *Conoderus vespertinus*  
Colorado potato: see *Leptinotarsa decemlineata*
- confused flour: see *Tribolium confusum*
- flea: see *Altica marvegans*
- flower: see *Olibrus* sp.  
*Mordellistena* sp.
- ground: see *Salenophorus palliatus*  
*S. ellipticus*
- hider: see *Dermestes vulpinus*
- horn: see *Xylotrupes dichotomus*
- Khapra: see *Trogoderma granarium*  
*Trogoderma glabrum*
- lady: see *Epilachna varivestis*
- leaf: see *Altica marvegans*
- potato: see *Leptinotarsa decemlineata*
- red flour: see *Tribolium castaneum*
- snout: see *Apion* sp.
- western pine: see *Dendroctonus brevicornis*
- willow leaf: see *Chrysomela knabi*
- Bembidion frontale - V.11  
Aedes predation, <sup>32</sup>P: 11
- Bembidion muscicola - V.11  
Aedes predation, <sup>32</sup>P: 11
- $\gamma$ -benzene hexachloride\*-<sup>14</sup>C [C.2]  
microflora (tropical soils), degradation by: 655  
soils (tropical, submerged), persistence in: 655
- 3,4-benzopyrene-<sup>3</sup>H  
*Drosophila hydei* (salivary gland), localization in: 451
- p-benzoquinones  
*Eleodes longicollis*, biogenesis, in defensive secretion, <sup>14</sup>C: 190, 214
- 4-benzothienyl-4,7-<sup>14</sup>C-N-methylcarbamate  
alfalfa, metabolism in: 831  
barley, metabolism in: 831
- benzylpenicillin-<sup>14</sup>C  
*Tenebrio molitor*, excretion: 455
- beta rays  
*Acheta domesticus*, stage susceptibility: 1334  
*Apis mellifica*, stage susceptibility: 1334  
*Drosophila melanogaster*, behaviour: 1469  
grasshopper (spermatocytes): 952  
insects, effects on: 1540  
stage susceptibility: 1514  
sterilization: 1514
- moth (eye): 1317
- Podisma sapporensis*, chromosome aberrations: 1020
- RBE (90 kVp x-, 20 kVp x-, <sup>90</sup>Sr  $\beta$ -): *Elasmopalpus lignosellus* (e): 1277
- Tenebrio molitor*, stage susceptibility: 1334
- BHC [C.1]  
x: *Musca domestica*, BHC susceptibility: 1169
- BHC-<sup>14</sup>C  
mammals (pregnant ♀; ♂), distribution in tissues: 683  
rat (pregnant ♀; ♂), distribution in tissues: 683
- BHC,  $\gamma$ - [C.2]  
*Corcyra cephalonica* (f), growth inhibition: 392

\* See also BHC.



## bibliography

- autocidal control measures: 1758  
 biological effects of ionizing radiation: 1759  
 pesticide chemistry, radioactive nuclides in: 1757  
 radioactive nuclides and pesticide chemistry: 571  
 radioecology, terrestrial and fresh water: 1761, 1762  
 radioisotopes and ionizing radiations in entomology, III: 1755  
 and radiation in helminthology: 1763  
 in the biological sciences: 1764
- bicarbonate- $^{14}\text{C}$   
*Celerio euphorbia*, pyrimidine synthesis: 202
- Bidirin- $^{32}\text{P}$  [P.A.5]  
 cotton plant, metabolism in: 751
- billiverdin  
*Locusta migratoria*, biosynthesis in,  $^{14}\text{C}$ : 199  
*Mantis religiosa*, biosynthesis in,  $^{14}\text{C}$ : 199
- biological control  
 alternative schemes of: 1581
- biopterin- $^{14}\text{C}$   
*Apis mellifera* (workers, queens), metabolism in: 209
- biopterin- $^{14}\text{C}$  (2)  
*Crithia fasciculata*, metabolism in: 210  
*Drosophila melanogaster*, metabolism in: 210  
 rat, metabolism in: 210
- birds  
 DDT, excretion of: 634  
 DDT: steroid metabolism,  $^{14}\text{C}$ : 669  
 dieldrin: steroid metabolism,  $^{14}\text{C}$ : 669
- birds, game  
 food chain, contamination of,  $^{60}\text{Co}$ : 535
- Birlaner: see chlorfenvinphos
- bisulfan  
 -, x: *Anthonomus grandis*, sterilization: 1268
- Blabera fusca* Br. - H.1/2  
 x: midgut: 1328-9
- Blaberus* sp. - H.2  
 scylloinositol, occurrence,  $^{14}\text{C}$ : 362
- Blaberus craniifer* Burmeister - H.2  
 [Florida tropical cockroach]  
 y: survival (heart fragments): 1326  
 -/propyl gallate: survival (heart fragments): 1326
- Blaberus discoidalis* - H.2  
 trehalases in,  $^{14}\text{C}$ : 95
- Blaberus giganteus* - H.2  
 Banol, degradation by fat body,  $^{14}\text{C}$ : 821
- black bean aphid: see *Aphis fabae*
- black blowfly: see *Phormia regina*
- black carpet beetle: see *Attagenus piceus*
- black flies - X.30  
 dispersal (a),  $^{32}\text{P}$ : 4, 24  
 labelling (f, p),  $^{32}\text{P}$ : 4, 24
- black salt-marsh mosquito: see *Aedes taeniorhynchus*
- blasticidin S  
 insect virus vectors,  $^{14}\text{C}$ : 739
- Blattella germanica* (Linnaeus) - H.2  
 [German cockroach]  
 $^3\text{H}$ : 223  
 actinomycin D: RNA synthesis,  $^3\text{H}$ : 359  
 amino acid requirements,  $^{14}\text{C}$ : 175  
 cholesterol, conversion to 7-dehydrocholesterol,  $^{14}\text{C}$ : 394  
 DDT: CNS in R- and S-strains,  $^{14}\text{C}$ : 637  
 dieldrin: hypocalcaemia,  $^{45}\text{Ca}$ : 638  
 ion movement (CNS),  $^{22}\text{Na}$ : 638  
 nerve components, interaction with,  $^{14}\text{C}$ : 657  
 dimetilan, detoxication of,  $^{14}\text{C}$ : 848  
 metabolism of,  $^{14}\text{C}$ : 848  
 glutamic acid, metabolism of,  $^{14}\text{C}$ : 189  
 labelling,  $^{32}\text{P}$ : 1791  
 phospholipids: 387  
 protein synthesis in,  $^3\text{H}$ : 359  
 RNA synthesis in,  $^3\text{H}$ : 359  
 sterol metabolism in,  $^{14}\text{C}$ : 393  
 radiation: mutants, tentative linkage groups: 1100
- blood  
 transfer of substances between CNS and-, r.i.: 930  
 volume ingested, by *Phlebotomus longipalpis*,  $^{59}\text{Fe}$ : 563
- blood (calf)  
 Bayer 9017, residues of,  $^{35}\text{S}$ : 801
- blood (cattle)  
 trichlorphon, residues in,  $^{32}\text{P}$ : 784
- blood cells  
 labelling, DF $^{32}\text{P}$ , in vitro: 755, 756
- blood cholinesterase  
 radiometric estimation, field,  $^{14}\text{C}$ : 589
- blood (pig)  
 trichlorphon, residues in,  $^{32}\text{P}$ : 785
- blowfly - X.5  
 oxidative phosphorylation (soluble high-energy intermediate), (mitochondria),  $^{32}\text{P}$ : 460
- blowfly: see *Calliphora erythrocephala*  
*Lucilia* (Phaenicia) cuprina
- blowfly, black: see *Phormia regina*  
 northern: see *Protophormia terrae-novae*
- bluegill sunfish  
 DDT in,  $^{14}\text{C}$ : 616
- boll weevil: see *Anthonomus grandis*
- bollworm: see *Heliothis zea*
- Bombus lucorum* - W.5/6  
 [bumble bee]  
 flight muscle, contractile mechanism,  $^{45}\text{Ca}$ : 56
- Bombus terrestris* - W.5/6  
 [bumble bee]



## Brachycentrus - T.

[caddisfly]

<sup>32</sup>P-accumulation in stream ecosystem: 523

## Bracon hebetor - W.5

<sup>60</sup>Co-distribution: 63

effective half-life: 63

γ/vibration: egg production: 1456

hatchability: 1456

-, vibration: egg production: 1456

hatchability: 1456

-/centrifugation: life span: 1456

-, centrifugation: life span: 1456

broad-horned flour beetle: see *Gnathocerus*  
comutus

bromodeoxyuridine: see BDU

5-bromodeoxyuridine: see BdU

bromophos-<sup>3</sup>H [PC.9]rat; absorption, distribution, metabolism in:  
795bromophos-<sup>32</sup>Prat; absorption, distribution, metabolism in:  
795

plants; penetration and effectiveness in: 735

5-bromouracildesoxyriboside: see BUDR

brown cricket: see *Acheta domesticus*brown soft scale: see *Coccus hesperidum*

## Bruchus sp. - V.7

*Cicer abietinum*, infestation detection (seed),  
x: 1742*Phaseolus mungo*, infestation detection (seed),  
(a), x: 1742*Triticum aestivum*, infestation detection (seed),  
(f.a), x: 1742*Vicia faba*, infestation detection (seed), (f.),  
x: 1742

## Bruchus obtectus - V.7

[bean weevil]

γ: sterility: 1577

SMT (γ): 1577

BUDR = 5-bromouracildesoxyriboside

BUDR

-/x: *Drosophila melanogaster*, sex-linked  
recessive lethals: 1201

-/n: silkworm, mutations: 1213

bug, giant water: see *Hydrocyrius columbiae*  
*Lethocerus cordofanus*bumble bee: see *Bombus lucorum**Bombus terrestris*

Butacarb [X.15]

synthesis, <sup>3</sup>H, <sup>14</sup>C: 809sheep (fat, liver, kidney, muscle), residues in,  
<sup>3</sup>H, <sup>14</sup>C: 809Butonate-<sup>32</sup>P [PA.11]

cattle, toxicity to: 712

udder resorption in: 706

protective clothing, permeability of: 712

butterfly, cabbage: see *Pieris brassicae*butyl alcohol-<sup>14</sup>C*Periplaneta americana* (abdominal nerve cord),  
permeability: 4291-<sup>14</sup>C-butyric acid*Periplaneta americana* (abdominal nerve cord):  
372n-butyric acid, sodium-3-<sup>14</sup>C: 615

## C

## cabbage

chlorfenvinphos, residues of, <sup>14</sup>C: 697cabbage butterfly: see *Pieris brassicae*cabbage looper: see *Trichoplusia ni*caddisfly: see *Brachycentrus**Hydropsyche*

## caddisfly - T.

concentration of <sup>51</sup>Cr, <sup>59</sup>Fe, <sup>65</sup>Zn: 496

food chain, fresh water, r.i.: 524

radioecology, pond (Colorado range): 529

## caesium

irradiator, portable: 1700

## caesium-134

crickets, metabolism in: 507

spiders (forest floor), turnover in: 73

metabolism in: 507

*Thyridopteryx ephemeraeformis*, turnover in:

79

## caesium-137

accumulation, distribution and elimination in  
insects: 55*Acheta domesticus*, distribution and elimination:  
515

arthropod food chain: 507, 516

predation: 544

arthropods: mineral cycling (forest): 514

*Coleoptera*, distribution in: 54*Chrysomela knabi*, biological half-life in: 48*Dytiscus marginalis*, accumulation in: 510EDTA: *Culex pipiens*, accumulation

coefficient: 83

food chain: predator-prey: 543

consumption, *Chrysomela knabi*: 548

forest arthropod, biological half-life in: 533

food chains: 533

honey contamination (Roumania): 508

*Hydrophilus piceus*, accumulation in: 510*Hymenoptera*, distribution in: 54insects, accumulation and elimination by: 50,  
51phytophagous, accumulation and  
elimination by: 52insects (various), metabolic distribution in: 53  
irradiator: 1642

source, Puerto Rico: 1688

labelling, ticks (immature forms): 568

*Lepidoptera*, distribution in: 54*Notonecta glauca*, accumulation in: 510*Orthoptera*, distribution in: 54

predator-prey systems: 543

*Ranatra linearis*, accumulation in: 510

- Sympetrum depressusculum, accumulation in: 510
- Calandra granaria* \*  
radiation: behaviour [actographic recording]: 1749
- \* For bulk of references, see *Sitophilus granarius*  
calcium-45  
dieltrins: hypocalcemia, *Blattella germanica*: 638  
*Periplaneta americana*: 638
- Hyphantria cunea*, biological half-life in: 57, 58  
(?) assimilation by: 58  
insect flight muscle, contractile mechanism, activation of: 56  
labelling, flies: 1791  
nicotine: frog sartorius muscle, Ca-movements: 866
- calibration  
<sup>90</sup>Sr + <sup>90</sup>Y planes: insects: 1727
- California five-spined ips: see *Ips confusus*
- California flatheaded borer: see *Melanophila californica*
- California harvester ant: see *Pogonomyrmex californicus*
- Callicorixa audeni* (Hung.) - V.21  
mosquito predation, <sup>32</sup>P: 545
- Calligypona pellucida* (Fabricius) - QQ.6  
[leafhopper]  
labelling, <sup>32</sup>P: 504  
migration, <sup>32</sup>P: 504
- Calliphora* - X.5  
sclerotization, <sup>14</sup>C: 215  
scylloinositol, occurrence, <sup>14</sup>C: 364
- Calliphora erythrocephala* (Meigen) - X.5  
[blowfly]  
228  
n-decyl acetate, topically applied, <sup>14</sup>C: 32  
fatty acid biosynthesis (?), <sup>14</sup>C: 361  
ions: valine incorporation into protein (?)  
(fat body), <sup>14</sup>C: 205  
proteins (?) (haemolymph), <sup>14</sup>C: 204  
valine incorporation into protein (?) (fat body),  
in vitro, <sup>14</sup>C: 203
- Calliphoridae* - X.5  
pentose phosphate oxidation, control  
mechanism, <sup>14</sup>C: 89
- Callitroga hominivorax* (Coquerel) - X.5  
[screw-worm fly]  
γ: (p) sterility: 1588  
radiation, sterilization: 1588  
SMT (γ): 1604  
economic aspect: 1588  
Florida: 1588
- Callosobruchus chinensis* Linnaeus - V.7  
[pea weevil]  
γ: development: 1444  
lethal effects: 1444
- γ: stage susceptibility: 1444  
(p) sterility: 1444
- Calopteryx splendens* - F.2/3  
haemolymph circulation (wing), <sup>32</sup>P: 432
- Calotermes flavicollis* (Grassé & Noirot)\* - K.2  
[drywood termite]  
trophallaxis (proctodeal), <sup>32</sup>P: 469  
<sup>198</sup>Au: 469
- Calpodus ethlius* (Stoll) - U.19  
[large canna leaf roller]  
endocuticle deposition in, <sup>3</sup>H, <sup>14</sup>C, <sup>36</sup>S: 419  
protein granules (fat body), <sup>3</sup>H: 141  
sequestration (fat body), <sup>3</sup>H: 140, 187
- carpesterol-<sup>14</sup>C  
*Hyalophora cecropia*, sterol metabolism: 375
- Camponotus* - W.14  
nest area, <sup>32</sup>P: 478  
<sup>131</sup>I: 479
- Camponotus herculeanus* (Linnaeus) - W.14  
[carpenter ant]  
insect localization, <sup>131</sup>I: 552  
nest area, <sup>131</sup>I: 552
- Camponotus ligniperda* (Latr.) - W.14  
[carpenter ant]  
insect localization, <sup>131</sup>I: 552  
nest area, <sup>131</sup>I: 552
- Canada  
SMT, *Carpocapsa pomonella*, trials: 1605, 1620  
moths: 1619
- Canadian bug: see *Perillus bioculatus*
- caproic acid, sodium-1-<sup>14</sup>C: 615
- Carabus* - V.11  
proteins (ovary), <sup>3</sup>H: 416  
RNA (ovary), <sup>3</sup>H: 416
- Carausius morosus* Br. - H.7  
[stick insect]  
lipids (ovarioles), fatty acid incorporation into, <sup>14</sup>C: 390  
lipid synthesis (follicular vesicle), <sup>14</sup>C: 390  
ouabain: sodium efflux (nerve cord), <sup>22</sup>Na: 85  
phospholipid, formate incorporation in, <sup>14</sup>C: 409  
serine incorporation in, <sup>14</sup>C: 409
- carbamate\*\*  
blood cholinesterase inhibition, error in measurement of, r.i.: 845  
metabolism and residues, r.i.: 819  
residue determination, r.i.: 800
- carbaryl [X.5]  
mammals, synergistic action on, <sup>3</sup>H, <sup>14</sup>C: 840  
metabolism and residues, r.i.: 819  
*Musca domestica*, synergistic action on, <sup>3</sup>H, <sup>14</sup>C: 840
- carbaryl-<sup>3</sup>H  
*Oncopeltus fasciatus* (e, emb), uptake by: 610

\* See also *Kalotermes*.

\*\* See Table 2, X.

- man (liver), metabolism in: 835  
 rat (liver), metabolism in: 835  
 carbaryl-<sup>3</sup>H, naphthalene-ring-labelled  
*Pseudomonas melophthora*, degradation by: 754  
 carbaryl-<sup>14</sup>C  
*Anthonomus grandis*, absorption and metabolism: 815  
*Musca domestica*, absorption and metabolism: 815  
     metabolism by NADPH<sub>2</sub>-  
     requiring enzyme: 844  
 albumin: *Musca domestica* (microsome-  
     NADPH<sub>2</sub> system), oxidative  
     metabolism in: 843  
*Sitophilus oryza*, absorption and metabolism: 815  
*Stomoxys calcitrans*, absorption and metabolism: 815  
 catle (lactating cow): metabolism in: 817  
     residues in liver, ovary,  
     kidney: 817  
 rat (liver microsomes), metabolism in: 839  
 bean foliage, metabolism in: 803  
     plant, metabolism in: 829  
     gas chromatography, verification: 842  
 carbaryl, carbonyl-<sup>14</sup>C-labelled  
 bean foliage, metabolism in: 804  
     plant, persistent glucoside metabolites: 830  
     rat, metabolism in: 827, 828  
     persistence in: 827  
 carbaryl, methyl-<sup>14</sup>C-labelled  
 bean plant, metabolism in: 829  
     persistent glucoside metabolites: 830  
 carbaryl, naphthyl-<sup>14</sup>C-labelled  
*Anthonomus grandis* (a), metabolism in: 807  
 bean plant, metabolism in: 829  
     persistent glucoside metabolites: 830  
*Heliothis zea* (f, a), metabolism in: 807  
 carbaryl, naphthyl-1-<sup>14</sup>C-labelled  
 man (liver), metabolism in: 835  
 mouse, metabolism in: 832, 833  
 rabbit, metabolism in: 832, 833  
 rat, metabolism in: 832, 833  
     liver, metabolism in: 835  
 reaction conditions: 842  
 carbohydrate metabolism  
 insects, r. i.: 88, 97  
     <sup>14</sup>C: 87  
*Apis mellifica*, <sup>3</sup>H: 147  
*Hyalophora cecropia*, <sup>14</sup>C: 105  
*Leucophaea maderae*, <sup>14</sup>C: 105, 107  
*Melanoplus bivittatus*, <sup>14</sup>C: 87  
*Oncopeltus fasciatus*, <sup>14</sup>C: 87  
*Periplaneta americana*, <sup>14</sup>C: 87

- carbohydrates  
 Heteroptera, salivary secretion of, <sup>14</sup>C: 192  
 carbohydrate synthesis  
*Apis mellifica*, oogenesis, <sup>3</sup>H: 146, 147  
 carbon-<sup>14</sup>C \*  
     labelling, ticks (immature forms): 568  
     blasticidin S, virus transmission: 739  
 carbon dioxide  
     -γ: *Musca domestica* (p), sterilization: 1233  
 carbon monoxide  
     -x: *Drosophila melanogaster*, genetic effects: 1190  
     -x/time factor: *Drosophila melanogaster*,  
     stage susceptibility, sperm-  
     atogenesis: 1246  
 carbon tetrachloride-<sup>14</sup>C [F,1]  
     rat, effect of diet on metabolism in: 803  
     metabolism in: 668  
 [carboxy-<sup>14</sup>C] acetylcholine  
     Sevin: acetylcholinesterase inhibition, sub-  
     strate and dilution effects on: 846  
 [carboxy-<sup>14</sup>C] acetylcholine chloride  
     *Musca domestica* (brain), metabolism in: 463  
*Carneocephala flaviceps* (Riley) - QQ.8  
     [yellow-headed leafhopper]  
     food chain, <sup>32</sup>P: 556  
     trophic transfer index, <sup>32</sup>P: 556  
<sup>14</sup>C-DL-carnitine  
     *Phormia regina*, role of phosphatidyl-: 386  
     carnitine, DL-(carboxy-<sup>14</sup>C)-labelled: 389  
     carnitine, DL-(methyl-<sup>14</sup>C)-palmityl-labelled: 389  
     carnitine, lipid-bound derivatives  
     *Phormia regina* (♀) (fat body) (cell-free prep-  
     aration), <sup>14</sup>C: 389  
 carpenter ant: see *Camponotus*  
*Carpocapsa pomonella* (Linnaeus) - U.83  
 [codling moth]  
 1590  
     γ: longevity in: 1145, 1620  
     reproductive potential (♂♀): 1307  
     SMT, trials, Canada: 1620  
     sterility: 1145, 1605, 1608, 1620  
     -, chemosterilants: SMT, longevity: 1620  
     trials: 1620  
 radiation: biological control: 1555  
 SMT: New Zealand, prospects: 1590  
     progress: 1559  
     sterile insect release (a, ♂♀): progeny  
     (f): 1606  
     trials: 1361  
     γ: trials, Canada: 1605  
 carrion fly: see *Protophormia terrae-novae*

\* Due to the bulk of pertinent references, these have not been summarized here; the use of <sup>14</sup>C is, however, indicated for each relevant study throughout the subject index.

## carrots

- chlorfenvinphos, residues of,  $^{14}\text{C}$ : 697
- DDT, distribution, metabolism, residues,  $^{14}\text{C}$ : 863
- metabolism and residues,  $^{14}\text{C}$ : 671
- methyl parathion, distribution and hydrolysis of,  $^{32}\text{P}$ : 719
- residues of: 718
- TDE, metabolism and residues,  $^{14}\text{C}$ : 671

## cat

- parathion, percutaneous absorption of,  $^{32}\text{P}$ : 723

## catechol amines

- Pieris brassicae, biosynthesis in,  $^{14}\text{C}$ : 218

caterpillar, alfalfa: see *Colias eurytheme*

tent: see *Malacosoma neustria*

## cattle

- Butonate, concentration in blood,  $^{32}\text{P}$ : 715
- milk,  $^{32}\text{P}$ : 715
- toxicity of,  $^{32}\text{P}$ : 716
- udder resorption of,  $^{32}\text{P}$ : 706
- carbaryl, metabolism of,  $^{14}\text{C}$ : 817
- compound 4072, residues of,  $^{32}\text{P}$ : 740
- DDVP, udder resorption of,  $^{32}\text{P}$ : 706
- dimethoate, application and metabolism of,  $^{32}\text{P}$ : 714
- percuteaneous resorption of,  $^{32}\text{P}$ : 713
- udder resorption of,  $^{32}\text{P}$ : 706
- fenthion, metabolism of,  $^{32}\text{P}$ : 747
- residues of,  $^{32}\text{P}$ : 747
- Furadan, metabolism of,  $^{14}\text{C}$ : 824
- Guthion, residues of,  $^{32}\text{P}$ : 721
- ronnel, residues of,  $^{32}\text{P}$ : 746
- Temik, metabolism of,  $^{35}\text{S}$ : 818
- trichlorfon, excretion of,  $^{32}\text{P}$ : 709
- udder resorption of,  $^{32}\text{P}$ : 706, 793
- trichlorometaphos,  $^{32}\text{P}$ ,  $^{35}\text{S}$ : 760
- trichlorophon, concentration in blood,  $^{32}\text{P}$ : 715
- milk,  $^{32}\text{P}$ : 715
- metabolism and residues of,  $^{32}\text{P}$ : 1512
- percuteaneous resorption of,  $^{32}\text{P}$ : 784
- residues in blood,  $^{32}\text{P}$ : 784, 786
- milk,  $^{32}\text{P}$ : 784

## cattle (calf)

- famphur, absorption and metabolism of,  $^3\text{H}$ : 727

## cattle (dairy calves)

- Bayer 9017, metabolism of,  $^{35}\text{S}$ : 801
- residues in tissue,  $^{35}\text{S}$ : 801

## cattle (heifer)

- malathion, metabolism of,  $^{32}\text{P}$ : 794
- residues (tissue),  $^{32}\text{P}$ : 794

cattle tick: see *Boophilus decoloratus*

## cauliflower

- ethyl parathion, degradation of,  $^{32}\text{P}$ : 788
- methyl paraoxon, degradation of,  $^{32}\text{P}$ : 788
- methyl parathion, degradation of,  $^{32}\text{P}$ : 788

Sumithion, degradation of,  $^{32}\text{P}$ : 788

Cayenne tick: see *Amblyomma americanum*

CB 1506 (= 2-chloroethyl-methanesulphonate): 1051

Cecropia moth\* - U.43

blood protein uptake (oocyte),  $^3\text{H}$ : 191

protein yolk sphere formation (oocyte),  $^3\text{H}$ : 191

Celerio euphorbia - U.46

[hawk moth]

pyrimidine synthesis,  $^{14}\text{C}$ : 202

$\gamma$ : acetylcholine (e, p-tissue): 1305

## Central America

*Ceratitis capitata*, SMT: 1599

*Cephus cinctus* Norton - W.6

[wheat stem sawfly]

amino acid requirements,  $^{14}\text{C}$ : 175

*Ceratitis capitata* (Wiedemann) - X.35

[Mediterranean fruit fly]

labelling (a),  $^{32}\text{P}$ : 2

(l),  $^{32}\text{P}$ : 3, 14, 27, 557

-/neutron-activation: 1594

population dynamics, r.i.: 559

$^{32}\text{P}$ : 556

oviposition: 2

sterile males, field test: 1596

trimedlure: fly release monitoring: 1601

(tri)medlure: sperm deficient ♀: 1474

$\gamma$ : biological control: 1556

*Ceratitis capitata* ( $^{32}\text{P}$ -(p)): 27

development: 1666

$\gamma$ : dispersal,  $^{32}\text{P}$ : 1609

lethal effects: 1359, 1647, 1666

(p), mass releases: 1589

(a), midgut epithelium: 1327

ovary: 1335

quarantine control measure: 1647, 1656

reproductive potential: 1354

SMT ratios: 1354

stage susceptibility: 1359; (l, p): 1647

sterility (p): 1119, 1354, 1589, 1595-6, 1598, 1609

testis: 1335

-(fractionated): (p), sterility: 1120

vitality: 1120

-n: sterility: 1562

-/T: (p) longevity (a): 1459

x: (a), midgut epithelium: 1327

ovary: 1335

testis: 1335

radiation: reproductive organs: 1325

SMT: Capri: 1616

Central America: 1599, 1617

projects: 1616

Israel: 1589, 1666

prospects: 1702

Nicaragua: 1602

Panama: 1602

\* See also: *Hyalophora cecropia*

- SMT, progress: 1559  
 report, Middle East: 1544  
 UAR: 1600  
 projects: 1551  
 trials,  $\gamma$ , Austria: 1594  
 $\gamma$ , Israel: 1666  
 UAR: 1595, 1600  
 $\gamma$ : 1545, 1599
- cereals  
 radiation disinfestation: 1698  
 insect control: 1550
- cereal pests  
 radiation disinfestation: 1633
- cerium-144  
 EDTA: *Culex pipiens*, accumulation coefficient: 83  
 labelling, ticks (immature forms): 568
- Ceylon  
 SMT, *Culex fatigans*, prospects: 1607
- Chaetophoria xanthomelas Koch - QQ.2  
 aestivating larvae - host plant relations,  $^{32}\text{P}$ : 549
- Chaetopsis aenea - X.13  
 salt-marsh ecosystem, food chain in,  $^{32}\text{P}$ : 526
- Chaetopsis apicalis - X.13  
 salt-marsh ecosystem, food chain in,  $^{32}\text{P}$ : 526
- chafer, European: see *Amphimallon majalis*
- Chelisoche morio - L.3  
 [earwig]  
 $x$ : (a), midgut epithelium: 1327  
 $\gamma$ : (a), midgut epithelium: 1327
- chemosterilants  
 insects, metabolism in, Rev., r.i.: 886  
*Musca domestica*, metabolism in, r.i.: 888  
 $-x$ : *Anthonomus grandis*, sterilization: 1268  
 $-y$ : *Carpocapsa pomonella*, longevity: 1620  
 SMT trials: 1620  
*Cochliomyia hominivorax*, sterilization: 1570  
*Drosophila melanogaster*, sterilization: 1791  
*Lasioderma serricorne*, sterilization: 1570  
*Musca domestica*, sterilization: 1570
- cherry  
 Rogor, metabolism and residues in,  $^{32}\text{P}$ : 769
- chestnuts  
 radiation disinfestation, possibility of: 1664
- Chilo suppressalis (Walker) - U.8  
 [Asiatic rice borer]  
 ethyl parathion, degradation of,  $^{32}\text{P}$ : 788  
 methyl parathion, degradation of,  $^{32}\text{P}$ : 724, 788  
 methyl paraoxon, degradation of,  $^{32}\text{P}$ : 788  
 recommendations for studies: 1537  
 Sumithion, degradation of,  $^{32}\text{P}$ : 788  
 $x$ : 1385  
 hatchability (e): 1442  
 lethal effects (p): 1442  
 SMT, prospects: 1559
- Chilicorus bipustulatus* (Linnaeus) - V.16  
 (a lady beetle)  
 labelling,  $^{32}\text{P}$ : 13
- Chinese mantid: see *Tenodera aridifolia sinensis*
- Chironomidae - X.9  
 food chain, fresh water, r.i.: 524  
 $^{32}\text{P}$ -uptake and clearance, Roumanian brackish lakes: 531  
 $^{90}\text{Sr}$  concentration of fallout by aquatic-: 528
- Chironomus - X.9  
 DNA (giant chromosomes),  $^3\text{H}$ : 263  
 RNA (giant chromosomes),  $^3\text{H}$ : 263  
 giant chromosomes,  $^3\text{H}$ -actinomycin: 263  
 histones: giant chromosomes,  $^3\text{H}$ : 263
- Chironomus plumosus - X.9  
 radioactive contamination: chromosome aberrations: 1494
- Chironomus tentans - X.9  
 blood protein transport (salivary gland),  $^{14}\text{C}$ : 180  
 chromomere organization,  $^3\text{H}$ : 324  
 cycloheximide: protein synthesis,  $^3\text{H}$ : 256  
 DNA (giant chromosomes),  $^3\text{H}$ : 284  
 replication,  $^3\text{H}$ : 324  
 ecdysone: puffing,  $^3\text{H}$ : 169  
 puff modifications (salivary gland chromosomes): 253  
 puffing,  $^3\text{H}$ : 324, 449  
 protein synthesis,  $^3\text{H}$ : 309, 450  
 protein synthesis,  $^3\text{H}$ : 256  
 puffs,  $^3\text{H}$ : 309, 450  
 transport and puffing,  $^{14}\text{C}$ : 180  
 RNA synthesis,  $^3\text{H}$ : 284, 324  
 puffs,  $^3\text{H}$ : 309  
 salivary gland, isolated nuclear components,  $^3\text{H}$ : 266  
 radiation: chromosome aberrations: 1513  
 radioactive contamination: chromosome aberrations: 1492-4  
 salivary gland, sources of secretion,  $^3\text{H}$ ,  $^{14}\text{C}$ ,  $^{125}\text{I}$ : 181
- Chironomus thummi - X.9  
 blood protein transport (salivary gland),  $^{14}\text{C}$ : 180  
 DNA replication (giant chromosomes),  $^3\text{H}$ ,  $^{14}\text{C}$ : 294  
 synthesis,  $^3\text{H}$ : 293  
 protein transport and puffing,  $^{14}\text{C}$ : 180  
 puff formation, r.i.: 922  
 RNA synthesis (l)(nucleolus),  $^3\text{H}$ : 273  
 $\text{Mg}^{2+}$ : Balbiani ring,  $^3\text{H}$ : 72  
 $^{22}\text{Na}$ -uptake (salivary gland, nuclei): 71
- Chironomus thummi piger - X.9  
 chromomere organization,  $^3\text{H}$ : 324  
 DNA replication,  $^3\text{H}$ : 324  
 RNA synthesis,  $^3\text{H}$ : 324  
 puffing,  $^3\text{H}$ : 324
- Chironomus thummi thummi - X.9  
 chromomere organization,  $^3\text{H}$ : 324  
 DNA replication,  $^3\text{H}$ : 324

- RNA synthesis,  $^3\text{H}$ : 324  
 puffing,  $^3\text{H}$ : 324  
*Chironomus* (Parachironomus) varus - X, 9  
 $^{90}\text{Sr}$  uptake: 68  
 $^3\text{H}$ -chloral  
 insecticide synthesis: 618  
 chlordane [C,3]  
 digoxin- $^3\text{H}$  metabolism, effect on, monkey  
 (heart, liver): 651  
 chlordane- $^{14}\text{C}$   
*Aedes aegypti*, metabolism in: 646  
*Aspergillus niger*, metabolism in: 646  
*Penicillium notatum*, metabolism in: 646  
 mouse, metabolism in: 646  
 rat, metabolism in: 646  
 $\alpha$ -chlordane- $^{14}\text{C}$   
 rabbit, metabolism in: 654  
 chlorfenvinphos- $^{14}\text{C}$  [PC,18]  
 cabbage, residues in: 697  
 carrots, residues in: 697  
 dog, metabolism in: 737  
 onions, residues in: 697  
 rat, metabolism in: 737  
 soil, residues in: 697  
 chlorine-36  
*Aedes aegypti* (l), chloride flux: 82  
 chloride uptake: 82  
*haemolymph*, *Periplaneta americana*: 70  
 DDT, cycling in marsh ecosystem: 661, 662  
 metabolism and residues of: 586  
*Musca domestica*, resistance to: 624  
 residues, in invertebrates: 662  
 in plants: 662  
 wild waterfowl, metabolism storage and  
 excretion of: 620  
 production monitoring of: 672  
 dieldrin, rat, metabolism in: 639  
 toxicity of: 639  
 forage crops uptake of: 666  
 residues in forage crops: 668  
 Dumban, metabolism of: 789, 792  
 uptake and translocation: 791  
 hexachlorocyclohexane, production and pro-  
 cessing of: 679  
 insecticide biochemistry: 1757  
 labelling: 587  
 metabolism: 584  
 organochlorine pesticides, residue analysis of:  
 633  
 residue determinations in tissues, labelled com-  
 pounds: 1752  
 toxaphene, synthesis of: 640, 641  
 chlorine-38  
 n-flux: chlorinated hydrocarbons in atmos-  
 phere: 665  
 chloromycetin  
 $\gamma$ -: *Habrobracon* (?), reproductive potential:  
 1304  
 chlorophos [PA,1]  
 x: *Musca domestica*, chlorophos susceptibility:  
 1169, 1170  
 Chloropropylate $^{\text{R}}$ - $^{14}\text{C}$  [D,3]  
 soil microorganisms, degradation by: 664  
*Trichoderma viride*, degradation by: 664  
 cholestanol- $^3\text{H}$   
*Eurycotis floridana*: 382  
 cholestanol-7 $\alpha$ - $^3\text{H}$   
 364  
*Eurycotis floridana*, diet component: 383  
 4- $^{14}\text{C}$ -cholestanone  
*Musca domestica* (l), utilization by: 370  
 cholestanone-7 $\alpha$ - $^3\text{H}$ : 364  
 cholesterol  
*Avicularia avicularia*, absence of synthesis,  $^{14}\text{C}$ :  
 408  
*Dermostes vulpines*, dietary requirements,  $^{14}\text{C}$ :  
 175  
*Manduca sexta*, conversion in,  $^{14}\text{C}$ : 400  
 cholesterol- $^{14}\text{C}$   
 ecdysone, biosynthesis of: 170  
*Eurycotis floridana*: 382  
 cholesterol-4- $^{14}\text{C}$   
 364  
*Anthonomus grandis* (a), sterol storage: 371  
*Blattella germanica*, conversion to 7-dehydro-  
 cholesterol: 394  
*Bombyx mori* (p, Dp), distribution in tissue: 395  
 metabolism: 395  
*Eurycotis floridana*, diet component in: 383  
*Hyalophora cecropia*, sterol metabolism: 375  
*Musca domestica*, metabolism and utilization  
 by: 466  
 cholesterol-3 $\alpha$ - $^3\text{H}$   
*Eurycotis floridana*, diet component: 383  
 cholesterol-7 $\alpha$ - $^3\text{H}$   
 364  
*Eurycotis floridana*, diet component: 383  
 cholesterol-26- $^{14}\text{C}$   
*Eurycotis floridana*, diet component: 383  
 4- $^{14}\text{C}$ - $\Delta^4$ -cholestenol: 364  
 4- $^{14}\text{C}$ - $\Delta^4$ -cholesten-3-one: 364  
 4- $^{14}\text{C}$ -cholesteryl chloride: 364  
 7 $\alpha$ - $^3\text{H}$ -cholesteryl methyl ether: 364  
 4- $^{14}\text{C}$ - $\Delta^4$ -cholestin-3-one: 364  
 $^{14}\text{C}$ -1,2-choline  
 389  
*Sarcophaga bullata* (l X fat body), phospholipid  
 biosynthesis: 421  
 choline, phospholipid-  
*Acantholyda nemoralis*, synthesis in,  $^{14}\text{C}$ : 409  
*Carausius morosus*, synthesis in,  $^{14}\text{C}$ : 409  
 cholinesterase  
 activity determination,  $^{14}\text{C}$ : 164  
 $\gamma$ : *Musca domestica* (head, homogenates,  
 purified samples): 1295  
 cholinesterase, blood-  
 carbamate: inhibition, i.i.: 845



- Chorthippus elegans - H.1  
x : spermatogenesis: 973
- Chorthippus longicornis - H.1  
DNA, meiosis,  $^3\text{H}$ : 1088
- Chorthippus parallelus - H.1  
x : spermatogenesis: 973
- Chortophaga - H.1  
DNA synthesis (neuroblast),  $^3\text{H}$ : 275
- Chortophaga viridifasciata (De Geer) - H.1  
[green-striped grasshopper]  
DNA (emb-neuroblast),  $^3\text{H}$ : 274, 308  
uv : DNA (neuroblasts),  $^3\text{H}$ : 308  
RNA (emb-neuroblast),  $^3\text{H}$ : 274  
RNA synthesis, spermatogenesis,  $^3\text{H}$ : 252  
x : chromosome aberrations (neuroblasts): 1016, 1017
- chromium-51  
caddisfly (I), concentration in: 496
- chromomere  
Chironomus tentans, organization in,  $^3\text{H}$ : 324  
Chironomus thummi piger, organization in,  $^3\text{H}$ : 324  
Chironomus thummi thummi, organization in,  $^3\text{H}$ : 324
- Chrotogonus incertus Bolivar - H.1  
x : chromosome aberrations (spermatocytes): 1032
- Chrysomela decemlineata Say - V.13  
x : life span (a): 1340  
stage susceptibility (e, p, a): 1340  
sterility: 1340
- Chrysomela knabi Brown - V.13  
[willow leaf beetle]  
food consumption,  $^{137}\text{Cs}$ : 548  
T :  $^{137}\text{Cs}$ , biological half-life: 48
- Chrysomphalus aonidum (Linnaeus) - QQ.1  
[Florida red scale]  
labelling,  $^{32}\text{P}$ : 13
- Chrysopa perla - RRR.1  
protein metabolism (ovaricle),  $^{14}\text{C}$ : 280  
RNA metabolism (ovaricle),  $^{14}\text{C}$ : 280
- Cidial- $^{32}\text{P}$  [PC.14]  
apples, residues in: 696
- cigarette beetle: see Lasioderma serricorne
- Cimex lectularius Linnaeus - Q.5  
[bed bug]  
fenthion, absorption of,  $^{35}\text{S}$ : 801  
metabolism of,  $^{35}\text{S}$ : 801
- Cimicidae - Q.5  
(bed bugs)  
 $^{32}\text{P}$ , biological half-life of: 1728  
 $^{86}\text{Rb}$ , biological half-life of: 1728  
 $^{131}\text{I}$ , biological half-life of: 1728
- Cinara larvicola - QQ.2  
feeding (localization of functioning sieve cells in secondary phloem tissue),  $^{14}\text{C}$ : 480
- cinerins- $^{13}\text{C}$  [B.2]  
850
- Ciodrin $^{\circ}$ - $^{32}\text{P}$  [PC.15]  
meat, residues in: 758  
milk, residues in: 758  
citrate-1,5- $^{14}\text{C}$   
Prodenia eridania, metabolism (m): 411  
L-citrulline, ureido- $^{14}\text{C}$   
615  
citrus  
y : disinfection: 1547  
citrus fruit  
y : disinfection: 1690  
radiation: disinfection: 1702  
quarantine measures: 1702  
citrus mealybug: see Planococcus citri  
Clastoptera xanthocephala Germar - QQ.4  
[sunflower spittle bug]  
food chain,  $^{32}\text{P}$ : 556  
trophic transfer index,  $^{32}\text{P}$ : 556
- clays  
aldrin, absorption of,  $^{14}\text{C}$ : 691
- click beetle: see Conoderus vespertinus
- clover leafhopper: see Aceratagallia sanguinolenta
- CNS  
DDT : Periplaneta americana,  $^{14}\text{C}$ : 622, 623, 658  
Periplaneta americana, free amino acid pool, r.i.: 207  
transfer of substances between blood and-, r.i.: 930
- cobalt-57  
Cryptotermes brevis, intra-colony food transmission: 494
- cobalt-58  
Bracon hebetor, distribution in: 63  
effective half-life in: 63
- cobalt-60  
Acheta domesticus, turnover in: 516  
arthropod food chain: 507, 516  
arthropods: mineral cycling (forest): 514  
EDTA: Culex pipiens, accumulation coefficient: 83  
grain irradiator: 1643, 1645, 1652,  
irradiation, food treatment: 1639  
India: 1639  
labelling, Leptinotarsa decemlineata: 535; (a): 5  
Perillus bioculatus: 489  
Rhodnius prolixus: 497  
Perillus bioculatus, hibernation: 489  
Rhodnius prolixus, dispersal: 497  
Coccus hesperidum Linnaeus - QQ.8  
[brown soft scale]  
y : reproductive potential: 1306
- Cochliomyia hominivorax (Coquerel) - X.5  
[screw-worm fly]  
y : (a) aberrant phenotypes: 1079  
selection on Whaxy: 1504  
stage susceptibility (testis): 927  
sterility: 1570

- $\gamma$ , chemosterilants: sterility: 1570  
 mating behaviour (size, strain), SMT: 1586  
 SMT: 1559  
     eradication, USA: 1615  
     example in Americas: 1542  
     Florida: 1633  
     ( $\gamma$ ), mating behaviour: 1586
- cockchafer: see *Meligethes aeneus*  
     *Melolontha melolontha*  
     *Melolontha vulgaris*
- cockchafers  
     em: behaviour (orientation): APX.7
- cockroach, American: see *Periplaneta americana*  
     Australian: see *Periplaneta australasiae*  
     Florida tropical: see *Blaberus crantifer*  
     German: see *Blattella germanica*  
     Madeira: see *Leucophaea maderae*
- cockroach - H.2  
     parathion, metabolism by fat body,  $^{35}\text{S}$ : 766  
      $\gamma$ : control: 1768
- cockroaches  
     radiation: midgut: 1324  
         species susceptibility: 1324
- codling moth: see *Carpocapsa pomonella*
- coffee leaf miner: see *Leucoptera coffeella*
- colchicine  
     -/x: *Drosophila melanogaster* ( $\sigma$ ), chromo-  
         some loss: 1206
- Coleomegilla maculata* - V.16  
     amino acid requirements (a),  $^{14}\text{C}$ : 114
- Coleoptera* - V.  
      $^{86}\text{Sr}$ ,  $^{131}\text{I}$ ,  $^{137}\text{Cs}$ , accumulation and elimination  
         of: 51  
         distribution of: 54
- Colias eurytheme* Boisduval - U.37  
     [alfalfa caterpillar]  
         pteridine biosynthesis (p)(wing),  $^{14}\text{C}$ : 234
- Colorado potato beetle: see *Leptinotarsa decemlineata*
- common malaria mosquito: see *Anopheles quadrimaculatus*
- compound 4072 [PC.16]  
     cattle, residues in sprayed-,  $^{32}\text{P}$ : 545
- confused flour beetle: see *Tribolium confusum*
- Conoderus vespertinus* (Fabricius) - V.22  
     [tobacco wireworm; click beetle]  
         food chain,  $^{32}\text{P}$ : 556  
         trophic transfer index,  $^{32}\text{P}$ : 558
- control  
     SMT, insects: 1563
- Copelatus* - V.21  
     radioecology, pond (Colorado range): 529
- Corcyra cephalonica* - U.41  
      $\gamma$ -BHC: growth inhibition (f): 392  
     cholesterol metabolism,  $^{14}\text{C}$ : 392  
         synthesis (f),  $^{14}\text{C}$ : 392
- Cordulegaster boltonii* Donovan - F.4  
     haemolymph circulation (wing),  $^{35}\text{S}$ : 435
- Corixa punctata* Hil. - Q.7  
      $^{32}\text{P}$ , biological half-life of: 1728  
      $^{86}\text{Rb}$ , biological half-life of: 1728  
      $^{131}\text{I}$ , biological half-life of: 1728
- corn: see also "maize"
- corn earworm: see *Heliothis armiger*  
     *Heliothis zea*
- corn kernels  
     *Sitotroga cerealella* (f, p), infestation detection,  
         x: 1706
- corn plants  
     Dunsban, uptake and translocation by,  $^{14}\text{C}$ ,  $^{36}\text{Cl}$ :  
         791
- corpora cardiaca  
     effect on protein synthesis, *Leucophaea maderae*  
         (fat body),  $^{14}\text{C}$ : 235
- cortisol- $^{14}\text{C}$   
     DDT: metabolism and synthesis, guinea pig:  
         607
- cosmic rays  
     *Drosophila*, effects on: 1187  
     -/cosmic flight conditions: *Drosophila melano-*  
         *gaster*, dominant  
             lethals: 1232  
             sex-linked  
             recessive  
             lethals;  
                 1232  
         insects, mutagenic  
         and other  
         effects;  
             1231  
     -/space conditions: *Drosophila melanogaster*:  
         1453  
     -/weightlessness: *Drosophila*  
         *melanogaster*: 1453  
             reproductive  
             potential;  
                 1452
- Costelytra zealandica*  
     [New Zealand grass grub]  
         1-naphthol: glucuronide conjugates,  $^{14}\text{C}$ : 596  
         phenols-phosphate conjugation in: 593
- cotton  
     Dasanit, metabolism of: 745  
     malathion persistence,  $^{14}\text{C}$ : 695  
     phosphamidon, metabolism of,  $^{14}\text{C}$ ,  $^{32}\text{P}$ : 702  
     seed, disulfoton-impregnated fertilizer,  
         effectiveness,  $^{32}\text{P}$ : 776  
     Temik, metabolism of,  $^{14}\text{C}$ ,  $^{35}\text{S}$ : 816
- cotton leaf worm: see *Prodenia litura*
- cotton plant  
     Azodrin, metabolism of,  $^{32}\text{P}$ : 751  
     Bidrin, metabolism of,  $^{32}\text{P}$ : 751  
     Dipterex, metabolism of,  $^{14}\text{C}$ : 732  
     disulfoton-impregnated fertilizer, effectiveness,  
          $^{32}\text{P}$ : 776  
     O-methyl O-p-methylthiophenyl methylphos-

- phonothionate-<sup>32</sup>P, uptake and translocation of, <sup>32</sup>P: 705, 774  
metabolism of, <sup>32</sup>P: 705, 774  
SD-9129, distribution of, <sup>32</sup>P: 775  
residues of, <sup>32</sup>P: 775  
systemic activity of, <sup>32</sup>P: 775  
Sevin, translocation and degradation of, <sup>14</sup>C: 838  
Temik, metabolism of, <sup>14</sup>C: 836  
r.i.: 834  
cotton stainer, Peruvian: see *Dysdercus peruvianus*  
coumaphos-<sup>32</sup>P [PH, 1]  
Boophilus microplus (f), metabolism in: 780  
meat, residues in: 758  
milk, residues in: 758  
cow (lactating)\*  
fenthion, metabolism in, <sup>32</sup>P: 747  
residues in, <sup>32</sup>P: 747  
Furadan, metabolism in, <sup>14</sup>C: 824  
ronnel residues in, <sup>32</sup>P: 748  
Crematogaster clara - W.14  
salt marsh ecosystem, food chain in, <sup>32</sup>P: 526  
Crematogaster striatula Emery - W.14  
labelling, <sup>32</sup>P: 59  
cricket, brown: see *Acheta domestica*  
domestic: see *Gryllus domestica*  
European brown: see *Acheta domestica*  
field: see *Gryllus firmus*  
house: see *Acheta domestica*  
tree: see *Oecanthus celerinictus*  
crickets - H.4  
<sup>42</sup>K, metabolism of: 507  
<sup>135</sup>Cs, metabolism of: 507  
<sup>187</sup>W, metabolism of: 507  
Crithia fasciculata  
bipterin, metabolism of, <sup>14</sup>C: 210  
Cryptotermes brevis (Walker) - K.2  
food transmission (proctodeal), intra-colony, <sup>57</sup>Co: 494  
Ctenicera destructor - V.22  
[prairie grain wireworm]  
amino acid requirements, <sup>14</sup>C: 175  
Cuerna costalis - QQ.6  
(leafhopper)  
food chain, <sup>32</sup>P: 556  
trophic transfer index, <sup>32</sup>P: 556  
Culex fatigans - X.11  
fenthion, absorption (f), <sup>32</sup>P: 796  
resistance mechanism to, <sup>32</sup>P: 796  
SMT prospects, Ceylon: 1607  
Culex nigripalpus - X.11  
labelling, <sup>32</sup>P: 6  
Culex pipiens - X.11  
EDTA: accumulation coefficients, <sup>35</sup>S, <sup>59</sup>Fe, <sup>60</sup>Co, <sup>65</sup>Zn, <sup>90</sup>Sr, <sup>91</sup>Y, <sup>96</sup>Zr, <sup>98</sup>Nb, <sup>106</sup>Ru, <sup>137</sup>Cs, <sup>144</sup>Ce: 83  
Culex pipiens fatigans Wiedemann - X.11  
dispersal, <sup>32</sup>P: 8, 500  
<sup>131</sup>I: 8  
labelling, <sup>32</sup>P: 8  
<sup>131</sup>I: 8  
Culex pipiens molestus Forsk. - X.11  
labelling, <sup>32</sup>P: 25  
<sup>32</sup>P: behaviour (f): 25  
development: 25  
growth: 25  
Culex pipiens quinquefasciatus Say - X.11  
[Southern house mosquito]  
aprocab, resistance to, <sup>14</sup>C: 375  
labelling, <sup>32</sup>P, <sup>85</sup>Sr: 1791  
♂ reproductive system, <sup>32</sup>P: 76  
Culex tarsalis Coquillett - X.11  
DNA synthesis (f 4), <sup>3</sup>H: 318  
karyotype (f 4), <sup>3</sup>H: 318  
Culicidae - X.11  
orally effective repellent, <sup>14</sup>C: 901-2  
Culicoides variipennis (Coq.) - X.7  
γ: reproductive potential: 1309  
stage susceptibility (f, p, a): 1309  
Culiseta impatiens (Walker) - X.11  
DNA synthesis (f 4), <sup>3</sup>H: 318  
karyotype (f 4), <sup>3</sup>H: 318  
Culiseta inornata (Williston) - X.11  
DNA synthesis (f 4), <sup>3</sup>H: 318  
karyotype (f 4), <sup>3</sup>H: 318  
cutworm: see *Agrotis segetum*  
cutworm, pale western: see *Agrotis orthogonia*  
variegated: see *Peridroma saucia*  
cuticle  
Musca domestica (f), R- and S-, diazinon penetration, <sup>32</sup>P(?): 750  
Schistocerca gregaria, tyrosine incorporation into, <sup>3</sup>H: 177  
cyanide  
synthesis, <sup>14</sup>C: 602, 805  
apparatus for, <sup>14</sup>C: 581  
rat (brain slices), amino acid transport in, <sup>14</sup>C: 597  
cyclodiene insecticides  
metabolism, r.i.: 611  
Cylas formicarius elegantulus (Summers) - V.19  
[sweetpotato weevil]  
γ: life span: 1320  
mating competitiveness (σ): 1320  
reproductive potential: 1320  
stage susceptibility: 1320  
cynthia moth: see *Samia cynthia*  
cystine-<sup>35</sup>S  
insect parasite, nutrition of: 536  
cystine-<sup>14</sup>C  
Bombyx mori, lysinoalanine formation: 211  
cystine-L-<sup>35</sup>S  
Antheraea pernyi: 206  
Bombyx mori: 206

\* see also under "cattle" and Table 2.

Calpodes ethlius, endocuticle deposition: 419  
cytidine-<sup>3</sup>H

Blattella germanica: 359

Chironomus tentans (salivary gland): 266

Drosophila: 359

T : Drosophila (salivary gland), puffs: 333

Drosophila hydei (lampbrush Y-chromosome),  
protein: 285

(isolated salivary glands,

nuclei): 328

Drosophila melanogaster (giant chromosomes),  
RNA: 339

Galleria mellonella: 359

Malacosoma: 359

Musca domestica: 359

(ovary): 437

Simulium: 359

Sciara coprophila (♀)(salivary gland): 331

cytochrome C

Samia cynthia (p), biosynthesis in, <sup>14</sup>C: 396

## D

Dacus ciliatus - X.35

SMT, prospects: 1559

Dacus cucurbitae (Coquillett) - X.35

[melon fly]

SMT, Guam: 1571

progress: 1559

x : development: 1559

-/O: (p) sterility: 1592

γ : disinfestation: fruits: 1850

lethal effects: 1650; (f, p): 1647

quarantine treatment: 1647, 1656

stage susceptibility (f, p): 1647

sterility: 1592, 1650

Dacus domalis (Hendel) - X.35

[oriental fruit fly]

SMT, progress: 1559

γ : lethal effects (e, f): 1447

quarantine treatment: 1656

stage susceptibility (e, f): 1447

Dacus oleae (Gmelin) - X.35

905

SMT, Greece: 1614

progress: 1559

projects: 1551

x : ovary: 1335

testis: 1335

γ : ovary: 1335

(p) sterility: 1154

testis: 1335

radiation: reproductive organs: 1325

Dacus tryoni (Frogg) - X.35

[Queensland fruit fly]

labelling, <sup>32</sup>P: 1623

SMT (γ), field test, Australia: 1587

sterile fly releases, population flushing: 1623

γ : disinfestation: 1679

(p) sterility: 1587, 1623

Dacus zonatus - X.35

SMT, prospects: 1559

γ : (p) sterility: 1593

Dahlbominus - W.24

γ : eye colour: 1054-5

Dahlbominus fuscipennis - W.24

γ : (a, ♀), eye colour mutations: 1053

-n, <sup>14</sup>MeV: (a, ♀), eye colour mutations: 1053

n, <sup>14</sup>MeV: (a, ♀), eye colour mutations: 1053

Dasanit-<sup>32</sup>P

[PC.12]

cotton plants, metabolism in: 745

DDD

soil, DDT metabolism in, <sup>14</sup>C: 632

DDT [D.1]

aerosol on rape, reinfestation, <sup>32</sup>P: 506

barley, R- and S-, photosynthesis, <sup>14</sup>C: 652

birds, steroid metabolism in, <sup>14</sup>C: 669

dieldrin metabolism, rat, <sup>14</sup>C: 678

digoxin-<sup>3</sup>H metabolism, monkey (heart, liver):  
651

DNA synthesis, HeLa cells, <sup>14</sup>C: 613

guinea pig, cortisol metabolism and synthesis,  
<sup>14</sup>C: 607

Musca domestica: effects on metabolism, <sup>14</sup>C:  
615

formate-, proline metabo-  
lism, <sup>14</sup>C: 138

glucose utilization: 111

glutathione turnover: 111

protein synthesis: 111

plasmocytosis, effects on <sup>198</sup>Au: 628

protein synthesis, Triatoma infestans, <sup>14</sup>C: 110  
HeLa cells, <sup>14</sup>C: 613

rabbit, effect on plasmocytosis in, <sup>198</sup>Au: 627

rat, effect on dieldrin metabolism, <sup>14</sup>C: 678

effect on plasmocytosis in, <sup>198</sup>Au: 627  
(live, cell-free system), protein metabo-  
lism, <sup>14</sup>C: 673

residue analysis: 1729

RNA synthesis, HeLa cells, <sup>14</sup>C: 613

Triatoma infestans (f, 3, 4), effect on glucose  
incorporation into protein,  
<sup>14</sup>C: 104

glutathione turnover, <sup>14</sup>C: 163

NAD kinase induction, <sup>14</sup>C:  
112

x : Musca domestica, DDT-susceptibility: 1169  
susceptibility: 1170

-/x : Tribolium: 1172

fitness: 1161

(Sooty): 1411

Tribolium castaneum, lethal effects:

1301, 1410

reproductive po-  
tential: 1301,  
1410

- DDT/x: *Tribolium confusum*, lethal effects: 1301, 1410  
 reproductive potential: 1301, 1410  
 -, convulsive hydrazides: *Musca domestica*  
 metabolism, <sup>14</sup>C: 615
- DDT-<sup>3</sup>H [D,1]  
 synthesis via <sup>3</sup>H-chloral: 618  
*Musca domestica*, metabolism and toxicity: 670
- DDT-<sup>3</sup>H/<sup>14</sup>C  
 residue determination: 609
- DDT-<sup>14</sup>C  
 double isotope derivative dilution analysis, <sup>3</sup>H: 1737
- Insects:  
*Blattella germanica*, R-, S-, (CNS): 637  
*Boophilus microplus*, metabolism in: 676  
 metabolite recovery from: 676  
*Heliothis virescens* (f): distribution, metabolism in: 685, 686  
 penetration into: 685, 686, 687  
*Heptagenia hebe*, absorption by: 631  
 resistance: 631  
*Musca domestica*, metabolism in: 690, 1791  
 retention by: 690  
*Oncopeltus fasciatus* (e, emb), uptake by: 610  
 metabolism in: 690  
 retention by: 690  
*Periplaneta americana* (CNS): 622, 623  
 absorption and binding: 658  
 (nerve components): 659  
 (nerve cord), binding to: 635  
 metabolism in: 690  
 retention by: 690  
*Stenonema interpunctatum*, resistance: 631  
*Stomoxys calcitrans*, R- and S-, metabolism in: 677  
*Triatoma infestans* (n), toxicity: 625  
 -/piperonyl butoxide: *Triatoma infestans* (n), toxicity: 625  
 -/sesoxane: *Triatoma infestans* (n), toxicity: 625
- Other animals:  
 birds, excretion by: 634  
 blood-sucking leeches \*, absorption by: 643  
 dehydrochlorination by: 643  
 bluegill sunfish, contents: 616
- fish, uptake by: 629  
 elimination by: 630  
 mouse, metabolism in: 608  
 tolerance in: 608  
 rat (liver, muscle, brain), binding to: 635  
 rabbit, metabolism and residues in: 682  
 snails, contents: 616  
Miscellaneous:  
 bacteria, metabolism in: 677  
 carrots, distribution, metabolism and residues: 663  
 metabolism and residues: 671  
 mud, contents: 616  
 potatoes, residues in: 649  
 soil, biodegradation to DDD in: 632  
 contents: 616  
 distribution in: 663  
 residues in: 649  
 yeast, dechlorination by: 642
- DDT-<sup>14</sup>C, ring-labelled  
 sesamex: *Musca domestica* resistance: 667
- DDT-1-<sup>14</sup>C  
 synthesis: 621  
*Aedes aegypti*, metabolism in: 621
- DDT-2-<sup>14</sup>C  
 synthesis: 621  
*Aedes aegypti*, metabolism in: 621
- DDT-<sup>36</sup>Cl  
 carp, residues in: 661  
 crayfish, residues in: 662  
 field tests, metabolism and residues: 586  
 fish (carp), residues in: 662  
 food chains, residues in: 661  
 frog (tadpoles), residues in: 662  
 marsh ecosystem, cycling in: 661, 662  
*Musca domestica*, resistance in: 624  
 plants, residues in: 661  
 production monitoring: 672  
 snake, water-, residues in: 682  
 tadpoles, residues in: 661  
 vertebrates, residues in: 661  
 water snake, residues in: 661  
 weeds, residues in: 662  
 wild waterfowl, metabolism, storage and excretion: 620
- o-Cl-DDT-1-<sup>14</sup>C  
 synthesis: 621  
*Aedes aegypti*, metabolism in: 621
- o-Cl-DDT-2-<sup>14</sup>C  
 synthesis: 621  
*Aedes aegypti*, metabolism in: 621
- DDVP-<sup>3</sup>H [PA,3]  
 synthesis via <sup>3</sup>H-chloral: 618
- DDVP-<sup>32</sup>P  
 cattle, udder resorption in: 706  
 penetrating power (protective clothing): 707  
 protective clothing, permeability of: 712  
 rat, absorption after oral administration: 653

\* Southeast Asian buffalo leech, *Hirudinaria manillensis*.  
 Japanese leech, *Hirudo nipponia*.

## decimetric waves

wood disinfection: APX.1

Delphacodes sp. - QQ.13

[plant hopper]

food chain, <sup>32</sup>P: 556trophic transfer index, <sup>32</sup>P: 556

Dendroctonus brevicornis LeConte - V.42

[western pine beetle]

predators; mortality, x: 1736

Dendrolimus pini - U.22

(pine spinners)

labelling, Eu, Dy: 499

<sup>3</sup>H-deoxycytidine

Drosophila melanogaster (f 1), genetic effects:

292

sex-linked re-

cessive lethals:

33

-, <sup>3</sup>H-thymidine: Drosophila melanogaster (f 1),

sex-linked recessive lethals:

33

(<sup>14</sup>C) deoxycytidineHyalophora cecropia (p), utilization by, <sup>14</sup>C: 269(<sup>14</sup>C) deoxyuridine

Hyalophora cecropia (p), DNA: 269

Dermacentor andersoni Stiles - Ac.8

[Rocky Mountain wood tick]

ecology, <sup>14</sup>C, <sup>32</sup>P, <sup>144</sup>Ce: 568labelling (immature forms), <sup>3</sup>H, <sup>14</sup>C, <sup>32</sup>P, <sup>90</sup>Sr,  
<sup>137</sup>Cs, <sup>144</sup>Ce: 568

Dermacentor occidentalis Marx - Ac.8

[Pacific Coast tick]

γ: development: 1397

mutagenic effects: 1397

reproductive potential: 1397

Dermacentor variabilis (Say) - Ac.8

[American dog tick]

labelling (immature forms), <sup>3</sup>H, <sup>14</sup>C, <sup>32</sup>P, <sup>137</sup>Cs,  
<sup>144</sup>Ce: 568

Dermatobia hominis (Linnaeus, Jr.) - X.12

[human bot fly; tropical warble fly]

γ: reproductive potential: 1545

SMT (γ): 1545

Dermestes - V.20

γ: lethal effects: 1649

stage susceptibility: 1649

fish disinfection: 1627

Dermestes vulpinus - V.20

[hide beetle]

cholesterol, dietary requirements, <sup>14</sup>C: 175

desert locust: see Schistocerca gregaria

desmosterol-<sup>14</sup>C

Manduca sexta: 399, 400

Devorgilla - W.16

x: recessive lethals, segregation of: 1104

DFP = diisopropyl phosphorofluoridate

DFP

mouse (diaphragm), uptake by end plates,

<sup>14</sup>C, <sup>32</sup>P: 773DFP-<sup>3</sup>Hacetylcholinesterase distribution, motor and  
plates (twitch muscle): 1726

Oncopeltus fasciatus (e, emb), uptake by: 610

DFP-<sup>14</sup>C

Pseudomonas melophthora, degradation by: 754

DF-<sup>32</sup>P

labelling, blood cells, in vitro: 755

rabbit (blood), in vivo: 756

mouse, uptake and toxicity: 771

rat, uptake and toxicity: 771

(liver fractions), incorporation by: 693

Diatraea saccharalis (Fabricius) - U.8

[sugarcane borer]

γ: behaviour: 1621

dominant lethals: 1448

lethal effects: 1153

(emb): 1448

sterility: 1621, 1638

(a): 1156

(f, s): 1153

(inherited): 1157

(reduced) survival: 1157

radiation: oviposition: 1159

Trichogramma parasitism: 1159

SMT, prospects: 1559

Puerto Rico: 1156

diazinon-<sup>14</sup>C

[PH.7]

bean plant, absorption, metabolism and per-  
sistence in: 730, 744Boophilus microplus, distribution and  
metabolism in: 782

fish, metabolism in: 761

fresh-water mussel (Elliptio complanatus),  
metabolism in: 761

tomatoes, metabolism in: 770

residues in: 770

wheat grain, absorption, metabolism, and  
persistence in: 744

soils, degradation by: 749

soil, distribution on: 730

persistence in: 728, 730

metabolism in: 729

water, translocation by: 761

diazinon, bis-ethyl-1-<sup>14</sup>C

feed additive for livestock: 752

diazinon-<sup>14</sup>C, diethyl-labelled

Pseudomonas melophthora, degradation by: 754

diazinon-<sup>32</sup>P (?)Musca domestica (f) (cuticle), R- and S-,  
penetration into: 750diazinon-<sup>35</sup>S

agricultural crops, residues in: 770

2-(<sup>14</sup>C) diazoacetate

pyrethrin I, synthesis: 851

dichlorvos-<sup>14</sup>C, diethyl-labelled [PA.9]

Pseudomonas melophthora, degradation by: 754

dichlorvos, 1-<sup>14</sup>C-vinyl-

feed additive for livestock: 752

## Dieldrispa (Hispa) armigera - V.13

- γ: (a, ♂) sterility: 1291
- dieldrin [C.7]
- birds, steroid metabolism in, <sup>14</sup>C: 669
- Blattella germanica (CNS), calcemia, <sup>45</sup>Ca: 638
- ion movement, <sup>22</sup>Na: 638
- DNA synthesis, HeLa cells, <sup>14</sup>C: 613
- forage crops, residues in, <sup>14</sup>C, <sup>36</sup>Cl: 688
- Periplaneta americana (CNS), calcemia, <sup>45</sup>Ca: 638
- ion movement, <sup>22</sup>Na: 638
- protein synthesis, HeLa cells, <sup>14</sup>C: 613
- radiation: decomposition products: 617
- residue analysis: 1729
- RNA synthesis, HeLa cells, <sup>14</sup>C: 613
- dieldrin-<sup>3</sup>H/<sup>14</sup>C
- residue determination: 809
- dieldrin-<sup>14</sup>C
- analysis: 1781
- purification: 1791
- double isotope derivative dilution analysis, <sup>3</sup>H: 1737

Insects:

- Aedes aegypti, metabolism in: 646
- R- and S- (subcellular components), interaction with: 656
- Blattella germanica (nerve components), interaction: 657
- Musca domestica, penetration rate into: 681
- possible resistance factor in: 680
- R- and S-, uptake by: 674
- metabolism in: 674
- application: toxicity and distribution in: 680-1
- penetration rate: 681

Oncopeltus fasciatus (e, emb), uptake by: 610

Miscellaneous:

- Aspergillus niger, metabolism in: 646
- fish, elimination by: 630
- uptake by: 1129
- mouse, metabolism in: 646
- Penicillium notatum, metabolism in: 646
- Pseudomonas melophthora, degradation by: 754
- rabbit, metabolism in: 654
- transport in pregnancy: 636
- rat, metabolism in: 646
- metabolism, distribution and elimination from: 647
- /DDT: rat, metabolism in: 678
- soil microorganisms, degradation by: 660
- dieldrin-<sup>36</sup>Cl
- forage crops, root uptake and accumulation: 666
- rat, metabolism in: 639

- toxicity to: 639
- dieldrin, radioactively labelled
- wool, absorption by: 689
- fastness properties of: 689
- differential grasshopper: see Melanoplus differentialis
- diglycerides
- Locusta migratoria (fat body, haemolymph), role in fat transport, <sup>14</sup>C: 404
- dihydrodihydroxy carbaryl, carbonyl-<sup>14</sup>C-labelled
- bean plant, persistent glycoside metabolites: 830
- dihydroheptachlor-<sup>14</sup>C
- Aedes aegypti, metabolism in: 646
- Aspergillus niger, metabolism in: 646
- mouse, metabolism in: 646
- Penicillium notatum, metabolism in: 646
- rat, metabolism in: 646
- dihydrosofafole-<sup>14</sup>C [A.8]
- synthesis: 896
- diisopropyl phosphorofluoridate: see DFP
- dimefox [PA.13]
- synthesis, <sup>32</sup>P: 748
- hops, metabolism, <sup>32</sup>P: 748
- residues, <sup>32</sup>P: 748
- dimethoate [PA.12]
- guinea pig (♀), EPN: metabolism in, <sup>3</sup>H: 797
- toxicity: 797
- mouse (♀), EPN: metabolism in, <sup>3</sup>H: 797
- toxicity: 797
- Musca domestica, metabolism in, <sup>3</sup>H: 797
- EPN: metabolism in, <sup>3</sup>H: 797
- toxicity: 797
- Oncopeltus fasciatus, EPN: metabolism in, <sup>3</sup>H: 797
- toxicity: 797
- spinach, residues in, r.i.: 779
- dimethoate-<sup>3</sup>H
- Oncopeltus fasciatus (e, emb), uptake by: 610
- dimethoate-<sup>14</sup>C
- bean plant, metabolism in: 753
- dimethoate-<sup>32</sup>P
- insects, metabolism in, in vitro and in vivo: 763
- Periplaneta americana (fat body, gut, muscle), metabolism in: 763
- Other Animals:
- cattle, application and metabolism: 714
- percutaneous resorption by: 713
- under resorption in: 706
- mouse, metabolism in, in vitro and in vivo: 763
- Plants:
- bean plant, metabolism in: 753
- cacao beans, residues in: 717
- Theobroma cacao L., translocation in: 717
- spinach, residues in: 777, 778
- Miscellaneous:
- soil, movement in: 781
- protective clothing, permeability of: 712

- dimethrin-<sup>14</sup>C [B.4]  
*Musca domestica*, in vitro and in vivo metabolism: 852
- 7,12-dimethylbenzanthracene-<sup>3</sup>H  
*Drosophila hydei* (salivary gland), localization in: 451
- dimethylcarbamates-<sup>14</sup>C  
 rat, metabolism in: 828  
 hydrolysis products in: 828
- dimethyl sulphoxide (= DMS) [A.5]  
 -/x: *Drosophila melanogaster*, genetic effects: 1178  
 mouse, lethal effects: 898
- dimethyl sulphoxide-<sup>35</sup>S  
 pear tree, penetration and distribution in: 895
- dimetilan-<sup>14</sup>C [X.6]  
 bean plant, metabolism in: 828  
*Blattella germanica*, detoxication in: 848  
 metabolism in: 848  
*Musca domestica*, detoxication in: 848  
 metabolism in: 848  
*Periplaneta americana*, detoxication in: 848  
 metabolism in: 848  
 rat (liver microsomes), metabolism in: 839
- dimetilan, carbonyl-<sup>14</sup>C-labelled  
 bean plant, persistent glucoside metabolites: 830  
 rat, metabolism in: 828  
 hydrolysis products in: 828
- dimetilan, O-<sup>14</sup>C  
 feed additive for livestock: 752
- dioxathion-<sup>32</sup>P [PH.2]  
 meat, residues in: 758  
 milk, residues in: 758  
 separation of components: 793
- DIP-<sup>3</sup>H (= 3,5-diisopropylphenyl N-methylcarbamate-<sup>3</sup>H) [X.14]  
*Oncopeltus fasciatus* (e, emb), uptake by: 610
- Diprion hercyniae (Hartig) - W.12  
 [European spruce sawfly]  
 virus: DNA synthesis, <sup>3</sup>H: 240
- Diptera - X.  
 chromosomes, functional organization of, r.i.: 994
- DNA (salivary gland), <sup>3</sup>H: 347  
 (salivary gland, polytene chromosomes), <sup>3</sup>H: 337
- RNA (salivary gland), <sup>3</sup>H: 347  
 synthesis (puffs), <sup>3</sup>H: 289
- polytomic replication, r.i.: 337
- puffing phenomena: 43  
<sup>3</sup>H: 290  
<sup>3</sup>H, <sup>14</sup>C: 255  
 r.i.: 254, 298
- sclerotization in, <sup>14</sup>C: 182
- Dipterex-<sup>14</sup>C [PA.1]  
 cotton plant, metabolism in: 732  
 fungus (*Fusarium* sp.), degradation by: 732
- Dipterex-<sup>32</sup>P  
 synthesis: 743
- Dipterex-<sup>35</sup>S  
 synthesis: 743
- disinfestation  
 decimetric waves: wood: APX.1  
 e: wheat: 1644  
 e-accelerators: 1702  
 grain: 1646, 1663  
 stored products: 1660  
 x: economic aspects: 1702  
 γ: citrus fruits: 1690  
 eggplant: 1431  
 fish: 1649  
 flour: 1631  
 food: 1684  
 forages: 1689  
 fruit: 1672  
 grain: 1683, 1686, 1689  
 bulk: 1685  
 Turkey: 1667  
 USA: 1682  
 mango: 1650  
 papaya: 1650  
 pepper: 1650  
*Plodia interpunctella*: 1342  
 rice: 1632  
 Pakistan: 1692  
 seeds, USA: 1682  
*Sitroga cerealella*: 1342  
 tropical fruit: 1682  
 vegetables: 1672  
 wheat: 1631, 1665
- <sup>60</sup>Co: 1702  
 grain: 1701
- <sup>137</sup>Cs: 1702
- radiation: cereals: 1698  
 cereal pests: 1633  
 chestnuts (possibility): 1664  
 fish, possibilities: 1627  
 food: 1671, 1695  
 fruit (packed): 1691  
 grain: 1630, 1634, 1657, 1678, 1773, 1790  
 economics (Italy): 1675  
 insects: 1689  
 stored products: 1628, 1657, 1698  
 vegetables (packed): 1691
- <sup>32</sup>P-disodium phosphate  
*Hyalophora cecropia* (fat body), phospholipids: 401  
*Leucophaea maderae* (fat body), phospholipids: 401  
*Periplaneta americana* (fat body), phospholipids: 401
- disulfoton-<sup>32</sup>P [PA.8]  
 fertilizer (impregnated), effectiveness on cotton (plant, seed): 776
- Di-Syston-<sup>32</sup>P [PA.8]  
*Heliothis zea* (f5), metabolism in: 699
- DMS: see dimethyl sulphoxide



## DNase (= deoxyribonuclease)

*Drosophila*, activity during development,  $^3\text{H}$ :  
316, 317

## DNA

*Acheta domesticus* (gonads),  $^3\text{H}$ : 431  
(oocyte),  $^3\text{H}$ : 283  
*actinomycin D*: *Bombyx mori* (silk gland),  $^3\text{H}$ :  
329  
*Aedes aegypti* (hind-gut),  $^3\text{H}$ : 422  
*Aedes cataphylla*,  $^3\text{H}$ : 318  
*Aedes dorsalis*,  $^3\text{H}$ : 318  
*Anthonomus grandis*, spermatogenesis,  $^3\text{H}$ : 448  
*Bombyx mori* (fat body)(2), infected with  
nuclear-polyhedrosis virus,  $^3\text{H}$ :  
352  
(midgut), cytoplasmic-polyhedro-  
sis virus,  $^3\text{H}$ : 353  
(silk gland),  $^3\text{H}$ : 319, 423-7  
(in vitro),  $^3\text{H}$ : 436  
(f5),  $^3\text{H}$ : 260, 261  
(tissue, various)(f), infected with  
nuclear polyhedrosis virus,  $^3\text{H}$ :  
352  
*Chironomus* (giant chromosomes),  $^3\text{H}$ : 263  
(puffs),  $^3\text{H}$ : 257  
*Chironomus tentans* (giant chromosomes),  $^3\text{H}$ :  
284  
replication in,  $^3\text{H}$ : 324  
*Chironomus tentans thummi piger*, replication  
in,  $^3\text{H}$ : 324  
*Chironomus tentans thummi thummi*,  
replication in,  $^3\text{H}$ : 324  
*Chironomus thummi* (chromosomes), increase in,  
 $^3\text{H}$ : 293  
(giant chromosomes), repli-  
cation in,  $^3\text{H}$ ,  $^{14}\text{C}$ : 294  
*Chorthippus longicornis*, meiosis,  $^3\text{H}$ : 1088  
*Chortophaga* (neuroblast),  $^3\text{H}$ : 275  
*Chortophaga viridifasciata* (emb-neuroblast),  $^3\text{H}$ :  
274  
complementary to rRNA, *Drosophila melano-*  
*gaster*: 350  
*Culex inornata*,  $^3\text{H}$ : 318  
*Culex tarsalis*,  $^3\text{H}$ : 318  
Diptera (salivary gland),  $^3\text{H}$ : 347  
Diptera hercyniae (virus-infected and controls),  
 $^3\text{H}$ : 240  
*Drosophila*, polymerase activity,  $^3\text{H}$ : 320  
(oocyte), replication,  $^3\text{H}$ : 279  
spermatogenesis,  $^3\text{H}$ : 950  
tissue hyperplasia,  $^3\text{H}$ : 304  
*Drosophila hydei* (brain ganglion), polytene  
nuclei,  $^3\text{H}$ : 242  
(lampbrush Y-chromosomes),  
 $^3\text{H}$ : 242  
larval cycle,  $^3\text{H}$ : 262  
(salivary gland),  $^3\text{H}$ : 116

*Drosophila melanogaster*,  $^3\text{H}$ ,  $^{32}\text{P}$ : 335  
(primary cultures of  
embryonic cells),  
 $^{32}\text{P}$ : 286  
(emb)(somatic chromo-  
somes),  $^3\text{H}$ : 238  
(giant chromosomes),  
 $^3\text{H}$ : 339  
(polytene chromo-  
somes),  $^3\text{H}$ : 287, 327  
(neuroblast),  $^3\text{H}$ : 276  
(ovary),  $^3\text{H}$ , EM: 315  
(a)(ovary),  $^3\text{H}$ : 447  
(ooplasm),  $^3\text{H}$ : 315  
(a)(testis cytoplasm),  
 $^3\text{H}$ : 292  
(f3)(salivary gland),  
*actinomycin D*,  $^3\text{H}$ :  
247  
*Drosophila virilis* (giant salivary chromosome),  
 $^3\text{H}$ : 325  
(oocyte), cytoplasmic,  $^3\text{H}$ : 326  
*Dytiscus marginalis* (ovary): 245  
ecdysone: *Musca domestica*, synthesis in,  $^3\text{H}$ : 176  
*Glyptotendipes barbipes* (giant chromosomes),  
replication in,  $^3\text{H}$ : 294  
grasshopper (neuroblast),  $^3\text{H}$ : 307, 997  
*Gryllus bimaculatus*, oogenesis,  $^{14}\text{C}$ : 265  
*Hyalophora cecropia* (a),  $^{14}\text{C}$ : 269  
(p), synthesis,  $^3\text{H}$ : 346  
(p-wing), synthesis in,  $^3\text{H}$ :  
356  
insects, metabolism in,  $^3\text{H}$ ,  $^{32}\text{P}$ : 338  
*Leptinotarsa decemlineata* (emb),  $^3\text{H}$ : 311  
*Megoura viciae* (nurse cells of amphigonic and  
parthenogenetic ovaries): 322  
mosquito, comparative study of synthesis,  $^3\text{H}$ :  
318  
*Oncopeltus fasciatus* (e),  $^3\text{H}$ : 157, 282  
oogenesis, *Acilius sulcatus*: 418  
*Apis mellifica*,  $^3\text{H}$ : 147  
*Dytiscus marginalis*: 418  
*Gryllus domesticus*,  $^3\text{H}$ : 418  
*Musca domestica*,  $^3\text{H}$ : 418  
*Pterostichus niger*,  $^3\text{H}$ : 418  
*Phormia regina* (emb),  $^3\text{H}$ ,  $^{14}\text{C}$ ,  $^{32}\text{P}$ : 268  
polytenic replication, Diptera (salivary gland),  
 $^3\text{H}$ : 337  
*Psorophora signipennis*,  $^3\text{H}$ : 318  
puffs,  $^3\text{H}$ : 313, 334  
*Rhynchosciara* (giant chromosomes),  $^3\text{H}$ : 263  
replication  
in,  $^3\text{H}$ : 294  
*Rhynchosciara angelae* (f),  $^3\text{H}$ : 312  
(salivary gland chromo-  
somes),  $^3\text{H}$ : 341  
larval development,  $^3\text{H}$ :  
313  
puffs,  $^3\text{H}$ : 313

- Samia cynthia* (a),  $^3\text{H}$ : 295  
 (p), synthesis,  $^3\text{H}$ : 346  
*Samia cynthia ricini* (f), moult cycle,  $^3\text{H}$ : 296  
*Sciara coprophila* (chromosomes, germ line),  $^3\text{H}$ : 15  
 (f) (salivary gland chromosomes),  $^3\text{H}$ : 331  
 (giant chromosomes), replication in,  $^3\text{H}$ : 294  
 silk gland,  $^3\text{H}$ : 258, 259  
 silkworm (spermatogonia),  $^3\text{H}$ : 924  
*Tenebrio molitor* (emb),  $^3\text{H}$ : 311  
*Tribolium confusum*, life cycle,  $^{14}\text{C}$ : 250  
 x: *Sarcophaga peregrina* (p): 1382  
*Schistocerca gregaria*,  $\alpha$  meiosis,  $^3\text{H}$ : 981  
 silkworm (spermatogonia),  $^3\text{H}$ : 924  
 $\gamma$  (chronic): silkworm (spermatogonia),  $^3\text{H}$ : 928  
 DNA, irradiated-  
*Drosophila melanogaster*: sex-linked recessive lethals: 1219  
 DNA,  $\gamma$ -irradiated-  
*Drosophila*, mutagenic effects: 1266  
 DNA (heterologous),  $\gamma$ -irradiated-  
*Drosophila melanogaster*, mutagenic effects: 1261  
 DNA (heterologous), x-irradiated-  
*Drosophila melanogaster*, mutagenic effects: 1225  
 sex-linked recessive lethals: 1222  
 DNA- $^{32}\text{P}$  (*Escherichia coli*, *Drosophila*)  
 labelling, *Drosophila* (oocytes 13,14): 357-8  
 DNA- $^{32}\text{P}$  (*Proteus vulgaris*)  
 labelling, *Drosophila* (oocytes 13,14): 357  
 DNA body  
*Tipula oleracea* (oogonia, oocytes), metabolic-,  $^3\text{H}$ : 310  
 DNA polymerase  
*Drosophila*, activity during development,  $^3\text{H}$ : 317  
 DNA, r-  
*Drosophila*,  $^3\text{H}$ : 16  
*Drosophila simulans*,  $^3\text{H}$ : 337  
 DNA transduction  
 $\gamma$ : *Ephestia kuehniella*: 1362  
 DNP  
 -/ $\gamma$ : *Drosophila* (spermatids), recessive sex-linked lethals: 1176  
 dog  
 chlorfenvinphos, metabolism of,  $^{14}\text{C}$ : 737  
 nicotine, metabolism of,  $^{14}\text{C}$ : 864  
 SD 8447, metabolism of,  $^{14}\text{C}$ : 694  
*Dolichoderus quadripunctatus* - W.14  
 $\gamma$ : oviposition (worker ants): 1318  
 DOPA- $^{14}\text{C}$  [=  $\beta$ -(3,4-dihydroxyphenyl)-( $\alpha$ - $^{14}\text{C}$ )alanine]  
 216  
*Calliphora*, metabolism in: 215  
*Drosophila melanogaster*, metabolism in: 216  
*Tenebrio molitor*, metabolism in: 216  
 $\alpha$ - $^{14}\text{C}$ -DL-DOPA  
 Diptera, sclerotization in: 182  
 dopamine- $^{14}\text{C}$  [=  $\beta$ -(3,4-dihydroxyphenyl)-( $\alpha$ - $^{14}\text{C}$ )ethylamine]  
 216  
 Diptera, sclerotization in: 182  
*Drosophila melanogaster*, metabolism in: 216  
*Tenebrio molitor*, metabolism in: 216  
 2- $^{14}\text{C}$ -dopamine  
*Calliphora* (f), sclerotization: 215  
*Dorymyrmex pyramicus* (Roger) - W.14  
 [pyramid ant]  
 food chain,  $^{32}\text{P}$ : 517, 556  
 trophic transfer index,  $^{32}\text{P}$ : 556  
 dragonfly $^{32}\text{P}$  - F.  
*Arrenurus papillator*, substrate suitability of wing for: 432  
 haemolymph circulation,  $^{35}\text{S}$ : 433  
 (wing),  $^{32}\text{P}$ : 432  
 $^{35}\text{S}$ : 434, 435  
*Drosophila* - X.14  
 Radioisotopes:  
 actinomycin D: RNA synthesis,  $^3\text{H}$ : 359  
 biochemical aspects, r.i.: 48  
 DNA: (f3, nucleoli),  $^3\text{H}$ : 289  
 polymerase activity,  $^3\text{H}$ : 320  
 polymerase activity, during development,  $^3\text{H}$ : 316-7  
 replication, oocyte,  $^3\text{H}$ : 279  
 spermatogenesis,  $^3\text{H}$ : 950  
 tissue hyperplasia,  $^3\text{H}$ : 304  
 tumour induction,  $^3\text{H}$ : 303  
 $^{32}\text{P}$ ,  $^3\text{H}$ : 36  
 $^{32}\text{P}$  -  $^{35}\text{S}$  (DNA): lethals (spermatzoa): 36  
 DNase activity during development,  $^3\text{H}$ : 316-7  
 rDNA: bobbed mutants,  $^3\text{H}$ : 16  
 RNA: spermatogenesis,  $^3\text{H}$ : 950  
 synthesis,  $^3\text{H}$ : 359  
 rRNA:  $^3\text{H}$ ,  $^{32}\text{P}$ : 16  
 T: RNA: puffs: 333  
 $^3\text{H}$ : labelling (sperm): 954  
 insemination studies: 954  
 labelling: (e),  $^3\text{H}$ : 16  
 oocytes 13, 14,  $^{32}\text{P}$ : 357, 358  
 $^{32}\text{P}$ : 1283  
 $^{131}\text{I}$ : 1283  
 protein synthesis in,  $^3\text{H}$ : 359  
 (giant chromosomes),  $^3\text{H}$ : 200  
 puffs, amino acid incorporation in,  $^3\text{H}$ : 200  
 radioisotope transmutation: 75  
 $^{32}\text{P}$ -sperm: (f): genetic effects: 34  
 thymidine transfer,  $\sigma \rightarrow \gamma$ ,  $^3\text{H}$ : 1023  
 $^3\text{H}$ -thymidine: mutagenic effects: 28, 950  
 $^{51}\text{Y}$ : reproductive potential: 959

\* See also *Aeschna* sp.

**Radiation:**

AET/x: chromosome aberrations ( $\sigma$ ): 1203  
 cosmic rays: 1187  
 DNA (irradiated): sex-linked recessive lethals:  
     1027, 1220  
 food (irradiated): sex-linked recessive lethals:  
     1220  
 mechanism of dose-rate effects: 1245  
 mutation and selection, mathematical model in  
     multi-locus: 1483  
 particle irradiation, window holder: 1746  
 radiation: 2nd, 3rd chromosomes, viability:  
     1506  
     chromosome aberrations: 1036  
         (breaks): 1417  
     dominant lethals (theory): 1121  
     genetic effects: 1094  
     life span, shortening: 1417  
     mutagenic effects: 908, 939  
     repair mechanisms: 908  
     segregation - distorter ( $\sigma$ ): 1036  
     -/(e-age): stage susceptibility: 1383  
     -/sensitizing substances: 1200  
 radiosensitivity (germ cells): 953  
 sucrose (irradiated): sex-linked recessive lethals:  
     1027  
 $\alpha$ (18 MeV): 1255  
 $\alpha$ (35 MeV): 1255  
 $e$ (1-8 MeV pulse): (p), spermatogenesis: 950  
 RBE (18 MeV, 35 MeV electron beam): 1255  
 n: 909  
     chromosome aberrations (exchanges), sperm:  
         1008  
 n: mutagenic effects: 1269, 1283  
 -/x: chromosome aberrations (exchanges),  
     sperm: 1088  
 n(15 MeV): spermatozoa, spermatids: 1237  
     stage susceptibility: 1237  
 p: life span: 1418  
     malformation (ovary): 1416  
 P(600 MeV): ( $\sigma$ ) 2nd chromosome recessive  
     lethals: 1080  
 -, x: ( $\sigma$ ) 2nd chromosome recessive lethals:  
     1080  
 y: chromosome aberrations, spermatogenesis:  
     1010  
     DNA: mutagenic effects: 1266  
     (e): 1089  
     gametes: 947  
     germ cells ( $\sigma$ , early premeiotic): 932  
         ( $\sigma$ ): 946  
     glucose, radiomimetic effects of: 1215  
     (l,  $\sigma$ ) mutations: 1177  
     life span: 507; (a): 1425  
     mutagenic effects: 1269, 1283; (acute):  
         1087  
         (chronic):  
             1087

y: point mutations, spermatogenesis: 1010  
     recessive sex-limited lethals (sperm, sperm-  
         atids): 1178  
 -/arginine: mutagenesis (spermatids): 1177  
 -/cosmic flight conditions: genetic effects:  
     1248  
 -/DNP: recessive sex-limited lethals (sperm,  
     spermatids): 1176  
 -/space flight conditions: dominant lethals:  
     1126  
 x: 1255  
     (e): 1089  
     brood sensitivity patterns: 1033  
     chromosome aberrations: 1027, 1033, 1037,  
         1094, 1230  
     exchanges (sperm):  
         1008  
     meiotic stages:  
         961-2  
     spermatocytes:  
         1049, 1050  
     translocations:  
         1263  
     crossover (X-Y and autosomal) (spermato-  
         cytes), simultaneous measure of: 1050  
     crossovers (spermatocytes), Poisson distri-  
         bution analysis of: 1049  
     development genetics: 915  
     dicentric chromosomes: 1022  
     dominant lethals: 1129  
     dominant Minute-bristle mutations: 1263  
     dorsal mesothoracic disc: 1371  
     genetic loads: 1498  
     (hard): point mutations, spermatogenesis:  
         1010  
     isochromosomes: 992  
     lethal effects (e): 1428  
     Minutes (IV): 1260  
     mutagenic effects: 915, 1260, 1269, 1283  
         (acute), (chronic): 1087  
     mutations, genetic risk: 1071  
     non-disjunction: 992  
     recovery preferential: 1065  
     sex-linked lethals: 918  
         lethals, spermatogenesis: 1096  
         recessive lethals: 1197  
             (e): 1438  
         recessives: 1129, 1263  
     sex ratio: 954  
     single-hit effects: 916  
     ( $\sigma$ -) sperm transfer: 931  
     spermatids, spermatozoa, radiosensitivity  
         and recovery: 1234-6  
     spermatogenesis: 950  
     spermatogonia: 959  
     spermatozoa: 951, 970  
     stage susceptibility, oogenesis: 976  
     sterility: 1256

- x: strain susceptibility, chromosome aberrations: 1109  
 suppressor genes: 1263  
 viability: 1065  
 visibles, oogenesis (X-chromosome): 1051  
 (wild type  $\sigma$ ), mutagenic effects: 1098  
 yellow mosaic mutation: 1083  
 (250 kVp): ( $\sigma$ ) 2nd chromosome recessive lethals: 1080
- /actinomycin D: spermatids: 1235  
 spermatozoa: 1235
- /air: sex-linked recessive lethals: 1263  
 spermatids: 1237  
 spermatozoa: 951, 970, 1237
- /anoxia: chromosome aberrations: 1220  
 sex-linked recessive lethals: 1220  
 spermatids: 1235  
 spermatozoa: 1235
- /BdU: sex-linked recessive lethals: 1197
- /He: chromosome aberrations: 1220  
 dominant lethals: 1027  
 oogenesis: 1027  
 sex-linked recessive lethals: 1027  
 spermatogenesis: 1027
- /iodoacetamide: spermatids: 1235  
 spermatozoa: 1235
- /K-phthalate: tumour development: 1173
- /modifying agents: lethals: 1241
- /N: lethal effects (e): 1438  
 post-radiation recovery (spermatids from 24-, 48-h-p): 1244  
 (spermatocytes): 1242
- x/N: sex-linked recessive lethals: 1242;  
 (e): 1263, 1438  
 spermatids: 1234-7  
 spermatogenesis: 950  
 spermatozoa: 951, 970, 1234-6
- /N/O: lethal effects (e): 1438  
 sex-linked recessive lethals (e): 1438
- /O: lethal effects (e): 1438  
 post-radiation recovery (spermatids from 24-, 48-h-p): 1244  
 (spermatocytes): 1242  
 sex-linked recessive lethals: 1242, 1263  
 (e): 1438  
 spermatids: 1234-6  
 spermatogenesis: 950  
 spermatozoa: 970, 1234-7
- /ribonuclease: spermatids: 1235  
 spermatozoa: 1235
- , CB 1506: visible, oogenesis (X-chromosome): 1051
- , e: 1255
- , ethyl methanesulphonate: dumpy locus mutations: 1265
- x, formaldehyde: crossover: 1276  
 -, mutagenic effects: 1280  
 -, quinacrine mustard, azaserine: sterility: 1256  
 -, T: chromosome aberrations: 1285  
 -, triethylenemelamine, phenylalanine (mustard derivative): 1260  
 -,  $\gamma$ : sex-linked recessive lethals: 1272  
 RBE ( $x, n_{15}$  MeV): spermatozoa, spermatids: 1237  
 RBE ( $x, 140$  kVp,  $\gamma, 137$  Cs): sex-linked recessive lethals: 1272
- Drosophila affinis - X, 14  
 x: XO- $\sigma$ , from X-non-disjunction: 1112
- Drosophila ananassae - X, 14  
 x: (emb, f) chromosome crossover (spermato-gonia): 945  
 ( $\sigma$  p) chromosome crossover: 1012  
 ( $\sigma$  a) chromosome crossover (spermato-cytes): 1011  
 radiation: population genetics: 1513
- Drosophila birchii - X, 14  
 x: fitness (population): 1404  
 populations, genetic load: 1497
- Drosophila busckii - X, 14  
 actinomycin C: RNA, puffs: 334  
 actinomycin D: RNA, puffs: 334  
 puffing, DNA synthesis,  $^3$ H: 334  
 RNA synthesis,  $^3$ H: 334, 450  
 protein synthesis,  $^3$ H: 450  
 r.i.: 334  
 puff structure, r.i.: 334  
 puromycin: amino acid incorporation, puffs: 334
- Drosophila hydei Sturtevant - X, 14  
 amino acid, incorporation into giant chromosomes,  $^3$ H: 116  
 carcinogenic hydrocarbons (salivary gland),  $^3$ H: 451  
 DNA (brain ganglion, polytene nuclei),  $^3$ H: 242  
 synthesis, larval cycle,  $^3$ H: 282  
 (salivary gland),  $^3$ H: 116  
 RNA (salivary gland, isolated),  $^3$ H: 237, 328  
 ecdysone: RNA (puffs),  $^3$ H: 115  
 lampbrush Y-chromosome, DNA,  $^3$ H: 285  
 RNA,  $^3$ H: 285  
 protein,  $^3$ H: 285  
 structure and function,  $^3$ H: 285
- $^{23}$ Na, biological half-life: 465  
 turnover to: 465  
 puffs,  $^3$ H: 115, 116
- x: (a  $\sigma$ ) Antennapedia mutant: 1130  
 chromosome aberrations (non-disjunction, X, c): 1005
- Drosophila melanogaster - X, 14  
 Radiolabelled and Labelled Compounds:  
 acid soluble fraction (primary cultures of embryonic cells),  $^{32}$ P: 286

- aging: thymidine incorporation (nurse cells),  $^3\text{H}$ : 354
- amino acids (p, a),  $^{14}\text{C}$ : 165
- 2-amino-4-hydroxy-6-hydroxymethylpteridine-10- $^{14}\text{C}$ , synthesis: 198  
metabolism: 198
- 2-amino-4-hydroxypteridine-10- $^{14}\text{C}$ , synthesis: 198  
metabolism: 198
- $\beta$ -alanine (p, a),  $^{14}\text{C}$ : 165
- biopterin, metabolism of,  $^{14}\text{C}$ : 210
- chitin synthesis, rate of,  $^{14}\text{C}$ : 93b
- DNA-containing body (a)(testis, cytoplasm),  $^3\text{H}$ : 292
- DNA, detection ( $\ell$ 3)(salivary gland), actinomycin D,  $^3\text{H}$ : 247  
(emb)(somatic chromosomes),  $^3\text{H}$ : 238  
(giant chromosomes),  $^3\text{H}$ : 339  
(irradiated-): mutagenic effects: 1225, 1261  
(neuroblast)(mitotic chromosomes),  $^3\text{H}$ : 276  
(ooplasm),  $^3\text{H}$ : 315  
(polytene chromosomes),  $^3\text{H}$ : 287, 327  
(primary cultures of embryonic cells),  $^{32}\text{P}$ : 286
- r-RNA-DNA hybridization,  $^3\text{H}$ : 350
- RNA, (giant chromosomes),  $^3\text{H}$ : 339  
(primary cultures of embryonic cells),  $^{32}\text{P}$ : 286
- puff formation,  $^3\text{H}$ : 1314
- mRNA (imaginal discs),  $^3\text{H}$ : 151
- fatty acid metabolism,  $^3\text{H}$ ,  $^{14}\text{C}$ : 378
- fatty acids, biosynthesis of,  $^3\text{H}$ : 379
- (fish-sperm DNA): sex-linked recessive lethals: 1219
- $^3\text{H}$ : 228
- development: 1073
- $^3\text{H}$ : visibles: 1073
- $^3\text{H}$ , x: visibles: 1073
- $^3\text{H}$ -deoxycytidine: ( $\ell$ 1) genetic effects: 292  
sex-linked recessive lethals: 33
- $^3\text{H}$ -leucine: tumour induction ( $\ell$ ): 31
- $^3\text{H}$ -thymidine: ( $\ell$ 1), genetic effects: 292  
sex-linked recessive lethals: 33  
lethals effects: 1429; ( $\ell$ ): 26  
tumour induction ( $\ell$ ): 31
- $^3\text{H}$ -uridine: tumour induction ( $\ell$ ): 31
- histone acetylation: RNA synthesis,  $^3\text{H}$ : 145
- injury: feeding,  $^{22}\text{Na}$ : 477  
humidity reaction,  $^{22}\text{Na}$ : 477
- kynurenine: Drosophila melanogaster, hydroxylation in,  $^3\text{H}$ : 153
- labelling:  $^3\text{H}$ : 12  
( $\ell$ ),  $^{32}\text{P}$ : 12
- labelling: chromosomes ( $\ell$ 3)(salivary gland, tissue culture),  $^3\text{H}$ : 439  
sperm,  $^3\text{H}$ ,  $^{32}\text{P}$ : 20, 21
- oogenesis:  $^3\text{H}$ : 447  
r.i.: 453
- ovary, thymidine-incorporation in,  $^3\text{H}$ , EM: 315  
 $^{32}\text{P}$ : DNA (sperm), mosaics: 35  
metabolism: 74  
mutagenic effects (lethals): 74  
 $^{32}\text{P}$ , incorporation in sperm: 74
- phospholipids (primary cultures of embryonic cells),  $^{32}\text{P}$ : 286
- ploidy: isotope incorporation rate: 1725
- protein (haemolymph) turnover,  $^3\text{H}$ ,  $^{14}\text{C}$ : 119  
( $\ell$ , p): 118  
synthesis (cell-free preparations),  $^3\text{H}$ ,  $^{14}\text{C}$ : 150  
(imagined discs),  $^3\text{H}$ ,  $^{14}\text{C}$ : 151  
oogenesis,  $^{14}\text{C}$ : 453
- proteins (p), amino acid incorporation into,  $^{14}\text{C}$ : 166
- pteridines, biosynthesis,  $^{14}\text{C}$ : 227
- puffing,  $^3\text{H}$ : 145
- purine catabolism,  $^{14}\text{C}$ : 159; ( $\ell$ ): 160
- redundancy of DNA complementary to amino acid RNA,  $^3\text{H}$ : 335
- $^{22}\text{Rn}$ : sex-linked lethals: 1527
- sepiapterine biosynthesis,  $^{14}\text{C}$ : 198  
synthesis,  $^{14}\text{C}$ : 183
- spermidine: RNA synthesis,  $^3\text{H}$ : 284
- sperm transfer,  $^3\text{H}$ ,  $^{32}\text{P}$ : 20, 21
- thymidine: sex-linked recessive lethals: 1218  
teratogenesis: 1218  
transfer from  $\sigma$  to  $\varphi$ ,  $^3\text{H}$ : 21
- tube closures (plastic caps), feeding tests,  $^{32}\text{P}$ : 1744
- tyrosine, metabolism of,  $^{14}\text{C}$ : 216
- $^{60}\text{Co}$ : mutagenic effects (lethals): 74
- $^{60}\text{Co}$ , incorporation in sperm: 74  
metabolism: 74
- Radiation:**  
cosmic radiation/cosmic flight conditions:  
dominant lethals: 1232  
sex-linked recessive lethals: 1232
- /weightless-vibration: chromosome rearrangements: 1180  
sex ratio: 1180
- /space conditions: chromosome aberrations: 1453
- /weightlessness: mitosis: 1453  
reproductive potential: 1452
- mutation data, computer file: 1785
- radiation: chromosome aberrations: 1006  
dominant lethals, stock differences in frequency: 1155  
(e) development: 1375  
gametogenesis, differential susceptibility: 977

- radiation: histories, recessive lethals (II): 1509  
 interspecific competition: 1484  
 mutations (II), heterozygous effect of: 1102, 1423  
 natural ionizing: reproductive potential: 1484  
 population genetics: 1513  
 stage susceptibility, spermatogenesis: 942  
 various strains, competitive interaction among: 1478
- /H<sub>2</sub>S: 1202  
 radiation damage, repair of genetic: 977  
 radioactivity, natural: development: 1374  
 SMT: 1791  
     cage tests, U.S.A.: 1613  
 α: chromosome aberrations: 1021  
     sex-linked recessive lethals: 1021  
 β: behaviour: 1469  
 e: (l, pp), chromosome aberrations: 940  
     dominant lethals: 940  
     lethal effects: 940  
     sex-linked recessive lethals: 940  
     testis: 940  
 n: chromosome aberrations: 1513  
     dominant lethals: 584  
     germ cells (?): 937  
 n<sub>f</sub>: pre- and post-meiotic germ cells: 949  
 n<sub>f</sub> (0.2-0.3 MeV): stage susceptibility (oogonia, oocytes): 1188, 1189  
 n<sub>f</sub> (12-14 MeV): chromosome aberrations: 1026  
 protons: dominant lethals: 1223  
     sex-linked recessive lethals: 1223  
 P (600 MeV): hind-chromosome recessive lethals: 1081  
 γ: aneuploidy in oogenesis, influence of genotype on: 1004  
     banana diet: development: 1195, 1196  
     longevity: 1195, 1196  
     reproductive potential: 1195, 1196  
     behaviour: 1475  
     chromosome aberrations: 1513  
     dominant lethals: 1223  
     interspecific competition: 1494  
         (acute), (chronic): 1485  
     (l, pp), chromosome aberrations: 940  
         dominant lethals: 940  
         lethal effects: 940  
         sex-linked recessive lethals: 940  
         testis: 940  
     lethal effects: 1429; (l): 1446  
     life span: 1407; (a): 1406, 1415  
     longevity (a): 1358  
     mutagenic effects: 1210  
     radio-resistance and longevity, relationship between: 1424
- radiation resistance, inheritance of: 1024  
 senescence: 1415  
 sex-linked recessive lethals: 33, 1214, 1223, 1270  
     - and sub-lethals (♀ gametes): 1069  
         (e, fertilized by irradiated gametes): 1069  
 spermatogenesis: 1175  
 stage susceptibility: 1446; (e, l, p, a): 1358  
 sterility: 1308, 1613; (F<sub>1</sub>, σ): 1140  
 sucrose: sex-linked recessive lethals: 1222  
 visibles (sternoplural chaetae, number): 1489
- /arginine: spermatogenesis: 1175  
 -/aromatic compounds: sex-linked recessive lethals: 1270  
 -/indene compounds: mutagenic effects: 1210  
     lethal mutations: 1209  
 -/maleic hydrazide: sex-linked recessive lethals: 1214  
 -/<sup>3</sup>H-thymidine: lethal effects: 1429  
 -, apholate: sterility: 1308, 1613  
 -, aromatic compounds: sex-linked recessive lethals: 1270  
 -, chemosterilants: sterility: 1791  
 -, EMS: visibles (sternoplural chaetae, number): 1489  
 -, e.s., e.m.: behaviour: 1475  
 -, indene compounds: mutagenic effects: 1210  
 -, mitomycin C: sex-linked recessive lethals: 1280  
     mitomycin C: semilethals: 1280  
 -, <sup>3</sup>H-thymidine: lethal effects: 1429  
 -, protons: dominant lethals: 1223  
     sex-linked recessive lethals: 1223  
 x: adult emergence: 1311  
     cell killing: 978  
     chromosome exchange: 1786  
     chromosome aberrations: 988, 991, 1007, 1021, 1026, 1048, 1139, 1223, 1420  
         (att-X, Y, exchanges): 1018  
         (IV): 1072  
         (σ)(crossover), mechanism of: 1025  
         (emb) development: 1029  
         (exchange between Y and IV): 960  
         fate in laboratory populations: 1518  
         genetic analysis in laboratory populations: 1519  
         (loss): 1205-7  
         (non-disjunction, X): 998-9  
         (oocytes): 1040-2  
         (oocyte, sperm): 1034-5, 1043

x: chromosome (primary spermatocytes): 983  
 aberrations, (reciprocal translocations):  
     1013-4  
     spermatogenesis: 921, 980  
     (spermatogonial crossover): 945  
 competitive ability: 1470  
 crossovers: 1009, 1030  
 damage and repair (spermatids): 965  
 development: 1254  
 (e), development (early emb), cytological  
     study: 1384  
 DNA: sex-linked recessive lethals: 1222  
 dominant lethals: 978, 1151, 1191  
 egg hatching: 1194  
 egg susceptibility: 1194  
 (e, f), erupt effect: 1097  
 eye, somatic crossover: 1330  
 eye pigment variegation, position effects:  
     1323  
 fecundity: 1491  
 fitness: 1470  
 genetic load: 1508  
 genetic load components: 1510  
 genomes (entire), genetic damage: 1516-7  
 germ cells (♀): 937  
     (♂, ♀), genetic effects: 1683  
     (pre- and post-meiotic): 949  
 hatching time: 1312  
 heterozygotes, viability: 1063, 1500  
 (♂-) insemination success and genetic  
     damage: 1321, 1322  
 (a, ♂), immobilization: 1282  
 lethal effects: 1095; (e): 984;  
     (emb): 1395  
 lethals: 1084, 1491; (II): 1510; (IV): 1072  
 life span (triploid and diploid ♀): 1414;  
     (a): 1415; (a, ♂): 1282  
 microevolutionary processes: 1495  
 Minutes (sperm, consecutive matings): 1078  
 mosaic patches, dumpy locus: 1076  
 mosaic production: 989  
 mutagenic effects: 1095, 1211  
 (soft): mutation dose frequency relations:  
     1086  
 (♂), mutation frequencies in successive  
     sperm ejaculates: 1105  
 (acute): mutation frequency: 1092  
 mutation rates at specific autosomal loci:  
     943  
 oogenesis: 955, 1188-9  
 ovary: 955  
 phenogenetics of fw locus: 1067  
 phenotypic variance: 1515  
 population density: 1481  
 population dynamics: 1480, 1490  
 populations, genetic load: 1497  
 radiosensitivity: 1420

x: radiosensitivity, 3rd-order rotatable design:  
     1419  
 recessive lethals: 1190, 1250-1, 1361  
     (a): 1082  
 recombination (X-): 1259  
 recovery phenomenon: 20  
 (♂, a) reproductive potential: 102; (♂, ♀):  
     1311  
 reversion (white-ivory): 1059  
 rosy mutants, xanthine dehydrogenase: 920  
 selection (bristle number): 1502  
 selection response (abdominal bristles): 1503  
 selection; viability: 1485  
 (a): senescence: 1415  
 sex-linked lethals: 1229  
     (2 wild-type stocks): 1152  
 sex-linked recessive lethals: 33, 965, 984,  
     1075, 1139,  
     1191, 1226,  
     1508  
     dose depend-  
     ency: 980  
     spermato-  
     genesis: 921  
 sex-linked recessive lethals and sublethals  
     (♂ gametes): 1069  
     (e-fertilized by irradiated ♂ gamete):  
     1069  
 sex-linked recessives, spermatogenesis: 944;  
     (♀-, ♀-♂, ♀[♂]): 1085  
 (♂), sex ratio: 1090  
 somatic mosaics (♀): 1110  
 sperm susceptibility: 1108  
 spermatogenesis: 985, 1229, 1246;  
     (♂, a): 102  
     stage susceptibility: 980  
 spermatogoa, autosomal recessive lethals:  
     985  
 spermatogonia, autosomal recessive lethals:  
     985  
     differential radiosensitivity  
     of: 967  
 (f, p, a), spot production (brown): 1116  
 stage susceptibility (e): 984  
     (emb): 1395  
 sterility: 921, 944, 1090, 1139;  
     (F<sub>1</sub>, ♂): 1140  
 stock (homo- and heterozygous) suscepti-  
     bility: 917  
 strain susceptibility (Iso-Amherst, Oslo):  
     1278  
 suppressor-erupt system: 1253  
 (a, ♂) testis: 978  
 translocations: 984, 1190-1; (a): 1062  
     (for lethals study): 272  
     reciprocal: 1013-4  
     (2 wild-type stocks): 1152  
 triplo-X-o incidence, offspring of attached-  
     X: 1044

- x: tumour incidence: 1174  
 viability: 1499; (-a): 1485, 1510;  
 (heterozygotes): 1064  
 viability mutations: 1507  
 spermatogonia: 1064  
 visibles: 1139  
 (polygene), brood sensitivity: 1082  
 white-crimson gene,  $w^c$ : 1070  
 white locus(X-chromosome): 1084  
 (?) whole-body and fractional mutations,  
 frequency comparison: 1074  
 Y-suppressed lethals in autosome: 1057  
 $X_{(250 \text{ kVp})}$ : hind-chromosome recessive lethals:  
 1081  
 x(fractionated): chromosome aberrations  
 (oocyte 7): 1221  
 dominant lethals (oocyte 7):  
 1221  
 sex-linked recessive lethals  
 (oocyte 7): 1221  
 -/actinomycin D: mutagenic effects: 1211  
 -/AET: chromosome aberrations ( $\sigma$ ): 1204  
 -/age: chromosome aberrations (somatic  
 crossing-over): 1039  
 life span: 1405  
 -/air: chromosome aberrations: 1229  
 egg hatching: 1194  
 lethal effects (emb): 1395  
 sex-linked lethals: 1229  
 spermatogenesis: 1229  
 stage susceptibility (emb): 1395  
 suppressor-erupt system: 1253  
 tumour incidence: 1174  
 -/anoxia: dominant lethals: 1224  
 -/Ar: dominant lethals: 1191  
 recessive lethals: 1190  
 sex-linked recessive lethals: 1191  
 translocations: 1190, 1191  
 -/ATP: chromosome aberrations: 1205, 1207-8  
 -/ATP/N: chromosome aberrations: 1208  
 -/BUDR: sex-linked recessive lethals: 1201  
 -/CO (dark): recessive lethals: 1190  
 translocations: 1190  
 -/colchicine: chromosome aberrations (loss):  
 1206  
 -/CO/time factor: stage susceptibility, sperm-  
 atogenesis: 1246  
 -/DMS: chromosome aberrations: 1178  
 dominant lethals: 1178  
 sex-linked recessive lethals: 1178  
 -/ecdysone: lethals: 1184  
 -/ethylenimine: mosaic lethals: 1251  
 recessive lethals: 1250-1  
 -/He: chromosome aberrations (oocyte 7): 1221  
 dominant lethals (oocyte 7): 1221  
 germ cells ( $\sigma$ ,  $\varphi$ ), genetic effects: 1683  
 recessive lethals: 1190  
 sex-linked recessive lethals (oocyte 7):  
 1221  
 translocations: 1190  
 x/heat: recombination (X-chromosome): 1259  
 -/magnetic fields: genetic effects: 1185  
 -/mitomycin C: mutagenic effects: 1211  
 -/n<sub>(12-14 MeV)</sub>: chromosome aberrations: 1026  
 -/N: chromosome aberrations: 1229  
 dominant lethals: 1224  
 egg hatching: 1194  
 lethal effects (emb): 1395  
 post-irradiation recovery (spermatids from  
 24-h (p)): 1243  
 sex-linked lethals: 1229  
 sex-linked recessive lethals: 965  
 sperm physiology: 1224  
 spermatogenesis: 1229  
 stage susceptibility (emb): 1395  
 -/N-ethylmaleimide: sex-linked recessive  
 lethals: 1226  
 -/NaF: chromosome aberrations (translocations):  
 1211  
 mutagenic effects (spermatozoa): 1211  
 -/NO: recessive lethals: 1190  
 translocations: 1190  
 -/NO/time factor: stage susceptibility,  
 spermatogenesis: 1246  
 -/O: dominant lethals: 1191, 1224  
 germ cells ( $\sigma$ ,  $\varphi$ ), genetic effects: 1683  
 lethal effects (emb): 1395  
 post-irradiation recovery (spermatids from  
 24-h (p)): 1243  
 recessive lethals: 1190  
 sex-linked recessive lethals: 965, 1191  
 -/O: sperm physiology: 1224  
 stage susceptibility (emb): 1395  
 suppressor-erupt system: 1253  
 translocations: 1190, 1191  
 tumour incidence: 1174  
 -/O(high pressure): (a,  $\sigma$ ), life span: 1282  
 -/O/time factor: stage susceptibility, sperm-  
 atogenesis: 1246  
 -/penicillin: mutagenic effects: 1095, 1227-8  
 -/puromycin: mutagenic effects: 1211  
 -/sigma virus: development: 1254  
 -/T: chromosome aberrations: 1038  
 dominant lethals (X-chromosome): 1198  
 sex-linked recessive lethals (X-chromo-  
 some): 1198  
 lethal effects (emb): 1395  
 stage susceptibility (emb): 1395  
 -/T(high): sex-linked recessives, spermato-  
 genesis: 944  
 -/thymidine: sex-linked recessive lethals: 1218  
 -/toyomycin: sex-linked recessive lethals: 1508  
 -/urethane: chromosome aberrations (loss): 1206  
 -,  $\alpha$ : chromosome aberrations: 1021  
 sex-linked recessive lethals: 1021  
 -,  $\gamma$ ,  $^3\text{H}$ -deoxycytidine,  $^3\text{H}$ -thymidine: sex-  
 linked recessive lethals: 33



- x, EDTA: chromosome aberrations (crossover),  
different strains: 1230
- , EMS, ICR-100: recessive lethals: 1264
- , formaldehyde: chromosome aberrations: 1273  
mosaics: 1273
- ,  $^3\text{H}$ : visibles: 1073
- , ICR-100: viability mutants: 1262
- ,  $n_f$ : pre- and post-meiotic germ cells: 949
- ,  $n_f(0.2-0.3 \text{ MeV})$ : stage susceptibility  
(oogonia, oocytes): 1189
- , nitroso compounds: mutagenic effects: 1284
- ,  $P(800 \text{ MeV})$ : Hind chromosome recessive  
lethals: 1081
- , tryptophan metabolites, eye colour mutants:  
tumour incidences: 1174
- X-chromosome ( $\sigma$ ,  $\varphi$ ) (salivary gland)( $\ell$ ),  
replication in,  $^3\text{H}$ : 241
- em: behaviour (orientation): APX.7  
genetic effects: APX.7
- RBE( $n$ , x): survival curves ( $e \rightarrow a$ ): 937  
( $n_f$ , x): chromosome aberrations (trans-  
locations II, III): 1186  
sex-linked recessive lethals: 1186  
(x,  $n_f$ ): pre- and post-meiotic germ cells:  
949
- Drosophila nebulosa* - X.14  
 $\gamma$ : fitness: 1505  
interspecific competition: 1505
- Drosophila pseudoobscura* - X.14  
ovary (a), function and growth,  $^{32}\text{P}$ : 441  
x: chromosome aberrations: 1047  
(isogenic strains) inversions, equilibria: 1031  
radiation: population genetics: 1513
- Drosophila serrata* - X.14  
x: fitness: 1404, 1520  
populations, genetic load: 1497
- Drosophila simulans* - X.14  
rDNA,  $^3\text{H}$ : 336  
rRNA,  $^3\text{H}$ : 338  
 $\gamma$ : interspecific competition: 1494  
(acute): interspecific competition: 1465  
(chronic): interspecific competition: 1465
- Drosophila subobscura* - X.14  
age: protein synthesis,  $^3\text{H}$ : 136  
x: (a): life span: 1415  
senescence: 1415  
 $\gamma$ : (a): life span: 1415  
senescence: 1415  
radiation: population genetics: 1513
- Drosophila tropicalis* - X.14  
 $\gamma$ : interspecific competition: 1494
- Drosophila virilis* - X.14  
DNA, cytoplasmic-, (oocyte),  $^3\text{H}$ : 326  
DNA synthesis (giant salivary chromosome),  $^3\text{H}$ :  
325  
histidine incorporation ( $\ell$ )(salivary gland  
chromosomes),  $^3\text{H}$ : 201  
protein synthesis (ribosomes),  $^{14}\text{C}$ : 143
- RNA (13, pp),  $^3\text{H}$ : 277-8  
x: eye pigment variegation, position effect:  
1323  
spermatogenesis: 952
- Drosophila willistoni* - X.14  
 $\gamma$ : fitness: 1505  
interspecific competition: 1505  
lethals: 995  
radiation: population genetics: 1513  
drywood termite: see *Calotermes flavicollis*  
Durban- $^{14}\text{C}$  [PH.5]  
synthesis: 764  
bean plants, uptake and translocation in: 791  
corn plants, uptake and translocation in: 791  
fish, metabolism in: 789, 790  
plants, metabolism in: 789, 790, 793  
sorption and translocation in: 793  
rat, metabolism in: 789  
soil, metabolism in: 790
- Durban- $^{36}\text{Cl}$   
bean plants, uptake and translocation in: 791  
corn plants, uptake and translocation in: 791  
fish, metabolism in: 789  
plants, sorption, translocation, and metabolism  
in: 789, 793  
rat, metabolism in: 789, 792
- Dysdercus peruvianus* - Q.17  
[Peruvian cotton stainer]  
 $\gamma$ : 1290
- dysprosium  
labelling, *Dendrolimus pini*: 499  
(forest) insects: 23  
*Lymantria monacha*: 499  
*Lymantria monacha*, dispersal: 499
- Dytiscus* sp. - V.21  
mosquito predation,  $^{32}\text{P}$ : 545
- Dytiscus marginalis* (Scop.) - V.21  
 $^{54}\text{Mn}$ ,  $^{90}\text{Sr}$ ,  $^{106}\text{Ru}$ ,  $^{137}\text{Cs}$ ,  $^{144}\text{Ce}$ , accumulation  
in: 510  
DNA, oogenesis (oocyte chromosomes  
nucleoli),  $^3\text{H}$ : 418  
(ovary: extrachromosomal): 245  
RNA, oogenesis (oocyte chromosomes  
nucleoli),  $^3\text{H}$ : 418  
radiation: behaviour: 1463

## E

- earwig: see *Chelisoches morio*
- earworm, corn: see *Heliothis armiger*
- Eastern subterranean termite: see *Reticulitermes*  
flavipes
- Eastern tent caterpillar: see *Malacosoma americanum*
- ecdysone  
Rev., r.i.: 171  
mode of action, r.i.: 172  
(bio)chemistry and mode of action: 170, 1015  
biosynthesis,  $^{14}\text{C}$ : 170

- Bombyx mori* (Dp), glucose conversion,  $^{14}\text{C}$ : 98  
*Chironomus tentans*, puffing,  $^3\text{H}$ : 169  
*Drosophila hydei* (f)(puffs),  $^3\text{H}$ : 115  
 -/x: *Drosophila melanogaster*, lethals: 1184  
 leucine incorporation into hepatic protein,  $^{14}\text{C}$ : 123
- Musca domestica*, DNA synthesis,  $^3\text{H}$ : 176  
 glucose metabolism,  $^3\text{H}$ : 176  
 protein metabolism,  $^3\text{H}$ : 176  
 RNA synthesis,  $^3\text{H}$ : 176  
 protein metabolism, insects,  $^3\text{H}$ ,  $^{14}\text{C}$ : 217  
 puff induction: 170  
 puffing phenomena, *Chironomus tentans*,  $^3\text{H}$ : 449
- RNA metabolism,  $^3\text{H}$ : 173  
 insects,  $^3\text{H}$ : 217
- Samia cynthia* (dpp), glucose metabolism,  $^{14}\text{C}$ : 123
- $^3\text{H}$ -ecdysone  
*Chironomus tentans* (puffs): 253
- economics  
 irradiators: agricultural products: 1702  
 $^{60}\text{Co}$ : grain disinfestation, bulk: 1701
- EDTA  
*Culex pipiens*, accumulation coefficient for  
 i.i. (various): 83  
 -, x: *Drosophila melanogaster* (4 different  
 strains), chromosome crossover: 1230
- EDTA = ethylenediaminetetraacetic acid
- Egypt  
 SMT, *Prodenia litura*, prospects: 1148
- Elasmopalpus lignosellus (Zeller) - U.36  
 [lesser cornstalk borer]  
 RBE (90 kVp x-, 20 kVp x-,  $^{90}\text{Sr}$   $\beta$ -): (e): 1277
- Elasmolomus sordidus (Fabricius) - Q.10  
 [peanut litter bug]  
 $\beta$ -indolyl acetic acid (saliva), synthesis,  $^{14}\text{C}$ : 193  
 plant hormone synthesis,  $^{14}\text{C}$ : 193  
 saliva, physiology and biochemistry,  $^{14}\text{C}$ : 192
- electromagnetic radiation  
 abnormalities (functional-morphological): APX.7  
 behaviour (orientation): APX.7  
 genetic effects: APX.7  
 insect control: APX.4  
 possibilities for, Rev.: 1548  
 tumours: APX.7  
 -,  $\gamma$ , e.s.: *Drosophila melanogaster*, behaviour: 1475
- electron accelerators  
 disinfestation, Israel: 1702  
 Japan: 1676
- electron microscopy  
 autoradiography, RNA, *Bombyx mori* (silk gland),  
 $^3\text{H}$ : 236  
 Smittia, RNA (nucleolus),  $^3\text{H}$ : 291  
 x: grasshopper (emb), diapause: 929
- electron microscopy, scanning  
*Musca domestica*: 1747
- Tenebrio molitor*: 1747  
*Tribolium confusum*, developmental stages  
 (e, f, p, a): 1748  
 electron microscopy, stereoscopic scanning  
*Tribolium confusum* (live): 1741
- electrons  
 1-8 MeV pulses: *Drosophila* (p), spermatogenesis: 950  
 18 MeV: *Drosophila*: 1255  
 35 MeV: *Drosophila*: 1255  
 -, x: *Drosophila*: 1255  
 disinfestation: 1644  
 wheat, disinfestation of: 1547  
 wheat products, disinfestation of: 1644  
 RBE (18 MeV, 35 MeV): *Drosophila*: 1255
- electrostatic fields  
 -,  $\gamma$ , e.m.: *Drosophila melanogaster*, behaviour: 1475
- Eleodes hispidulabris* - V.46  
 [darkling beetle]  
 distribution, elevational: 509  
 ecology, Hanford area: 509
- Eleodes longicollis* - V.46  
 [Arizona desert beetle]  
 p-benzoquinones, biogenesis of,  $^{14}\text{C}$ : 190, 214  
 defensive secretion, component of,  $^{14}\text{C}$ : 214
- Empoasca* sp. - QQ.6  
 (leafhopper)  
 food chain,  $^{32}\text{P}$ : 556  
 trophic transfer index,  $^{32}\text{P}$ : 556
- EMS (= ethyl methane sulphonate)  
 1489  
 -,  $\gamma$ : *Drosophila melanogaster*, sternoplural  
 chaetae: 1489  
 -, x: *Drosophila*, dumpy locus mutations: 1265  
 -, x, ICR-100: *Drosophila melanogaster*: 1264
- Encoptopholus sordidus* (Burmeister) - H.1  
 x: chromosome aberrations (stickiness), neuro-  
 blasts: 1017
- endocuticle  
*Calpodex ethlius*, deposition in (f5),  $^3\text{H}$ ,  $^{14}\text{C}$ ,  
 $^{35}\text{S}$ : 419
- endosulfan- $^{14}\text{C}$  [C.9]  
 mouse, metabolism, storage, excretion: 619
- endrin- $^{14}\text{C}$  [C.8]  
*Aedes aegypti*, metabolism in: 646  
*Aspergillus niger*, metabolism in: 646  
 mouse, metabolism in: 646  
*Penicillium notatum*, metabolism in: 646  
 rat, metabolism in: 644, 646
- Enicmus minutus* Linnaeus - V.46  
 [salami pest]  
 x: lethal effects: 1693  
 life span: 1693  
 stage susceptibility (e, a): 1693
- entomology  
 atomic energy in, Dacca: 1779  
 radioisotope applications in, survey: 1777

- radioisotopes and ionizing radiations in;  
bibliography: 1755
- radioisotopes in: 45
- radioisotopes in agricultural-, France: 1780
- use of radioactive isotopes and ionizing radiation  
in, survey: 1787
- entomology, agrarian  
ionizing radiations and radioisotopes in, (survey):  
1533
- Ephestia* - U.36
- <sup>3</sup>H-BDU: abnormal scales (wing): 249  
mitotic activity: 249
- <sup>3</sup>H-BDU: somatic mutations, <sup>3</sup>H: 248
- <sup>3</sup>H-thymidine: abnormalities (wing): 29  
(*l*), lethal effects: 29  
mitotic activity: 249
- Ephestia cautella* - U.36  
[fig moth]
- $\gamma$ : lethal effects: 1668  
sterility: 1668
- Ephestia kuehniella* Zeller - U.36  
[Mediterranean flour moth]
- $\gamma$ : development: 1362  
DNA transductions: 1362  
lethal effects (*l*): 1436  
ovary: 1336  
stage susceptibility: 1362, 1684
- x: stage susceptibility, somatic mutations:  
1367
- /T: (p) somatic mutation spectrum: 1367
- Ephippiger ephippiger* Fieb. - H.9
- <sup>86</sup>Sr, <sup>131</sup>I, <sup>137</sup>Cs, distribution in (a): 53
- 7 $\alpha$ -<sup>3</sup>H-epicholesterol: 364
- Epilachna varivestis* Mulsant - V.16  
[lady beetle]
- $\gamma$ : development: 1258  
reproductive potential: 1258  
stage susceptibility: 1258  
sterility: 1258
- x: lethal doses: 1258
- EPN [PC.6]
- dimethoate metabolism, insects, mammals, <sup>3</sup>H:  
797
- erythropterin-<sup>14</sup>C  
pteridine interconversions, *Colias eurythema*:  
234
- Escherichia coli*
- insecticide absorption, <sup>14</sup>C: 574  
metabolism, <sup>14</sup>C: 574
- ethanolamide, phospholipid-
- Acantholyda nemoralis*, synthesis in, <sup>14</sup>C: 409
- Carausius morosus*, synthesis in, <sup>14</sup>C: 409
- ethanolamine-<sup>14</sup>C
- Hyalophora cecropia* (fat body), phospholipids:  
401
- Leucophaea maderae* (fat body), phospholipids:  
401
- Periplaneta americana* (fat body), phospholipids:  
401
- (2-<sup>14</sup>C) ethanolamine
- Musca domestica* (*l*) (fat body), incorporation  
into: 365-8
- ethyl alcohol-2-<sup>3</sup>H
- Periplaneta americana* (abdominal nerve cord),  
permeability: 429
- 2-(<sup>14</sup>C) ethyl aminoacetate hydrochloride
- pyrethrin I, synthesis: 851
- N-ethylmaleimide
- /x: *Drosophila melanogaster*, radiosensitiza-  
tion: 1226  
sex-linked re-  
cessive lethals:  
1226
- N-ethylmaleimide-1-<sup>14</sup>C
- firefly luciferase analysis: 231
- ethyl methane sulphonate: see EMS
- ethyl parathion-<sup>32</sup>P
- cauliflower: 788
- Chilo suppressalis*, degradation by: 788
- Periplaneta americana*: 788
- rat (liver homogenates): 788
- ethylenediaminetetraacetic acid: see EDTA
- ethylenimine
- /x: *Drosophila melanogaster*, recessive lethals:  
1250
- , x: *Drosophila melanogaster*, recessive lethals:  
1250
- Eudia pavonia* Linnaeus - U.43
- <sup>86</sup>Sr, <sup>131</sup>I, <sup>137</sup>Cs, distribution in (*l*): 53
- Eumecopus punctiventris* Stål - Q.15  
(stink bug)
- $\beta$ -indolyl acetic acid (saliva), synthesis, <sup>14</sup>C:  
193
- plant hormone synthesis, <sup>14</sup>C: 193
- saliva, physiology and biochemistry, <sup>14</sup>C: 192
- EURATOM - ITAL
- research activities (1966): 1551
- European brown cricket: see *Acheta domestica*
- European chafer: see *Amphimallon majalis*
- European corn borer: see *Ostrinia nubilalis*
- European pine shoot moth: see *Rhyacionia buoliana*
- European praying mantis: see *Mantis religiosa*
- European red mite: see *Panonychus ulmi*
- European spruce sawfly: see *Diprion hercyniae*
- Europium
- labelling, *Dendrolimus pini*: 499  
(forest) insects: 23
- Lymantria monacha*: 499
- Lymantria monacha*, dispersal: 499
- Euryotis floridana* - H.2
- cholesterol, -esters and related sterol absorption  
(intestine), <sup>3</sup>H, <sup>14</sup>C: 364
- steroids, tissue distribution of, <sup>3</sup>H, <sup>14</sup>C: 363
- sterols, distribution and turnover of, <sup>3</sup>H, <sup>14</sup>C:  
382
- tissue distribution of, <sup>3</sup>H, <sup>14</sup>C: 383
- evergreen bagworm: see *Thyridopteryx ephemerae-*  
*formis*

## eye

- 8: moth: 1317  
 γ: *Dahibomius*, colour mutations: 1323  
 x: *Drosophila*, variegation pattern of pigment: 1323

## F

fall armyworm: see *Laphygma frugiperda*  
*Spodoptera frugiperda*

fall webworm: see *Hyphantria cunea*

## fallout

removal by insect biomass, <sup>90</sup>Sr: 528

famphur-<sup>3</sup>H [PC.13]

- calf, absorption and metabolism in: 727  
*Oncopeltus fasciatus* (e, emb), uptake by: 610  
 sheep, absorption and metabolism in: 727

famphur, 2-<sup>3</sup>H-phenyl-labelled

feed additive for livestock: 752

*Fannia canicularis* (Linnaeus) - X.19

[little house fly]

- γ: development: 1373  
 lethal effects: 1373  
 stage susceptibility: 1373  
 sterility: 1373

*Farinocystis tribolii*

-/x: *Tribolium castaneum*, radiosensitivity: 1163

## fat body

*Bombyx mori*, glycine accumulation in, <sup>14</sup>C: 134

NA synthesis in nuclear-polyhedrosis-infested-, <sup>3</sup>H: 352

*Calliphora erythrocephala* (L), protein, <sup>14</sup>C: 205  
 protein synthesis, in vitro, <sup>14</sup>C: 203

*Calpodus ethlius*, protein granules in, <sup>3</sup>H: 141  
 (L5, p), protein sequestration, <sup>3</sup>H: 187  
 protein sequestration by, <sup>3</sup>H: 140

*Galleria mellonella* (L), glyceride synthesis, <sup>14</sup>C: 408

(L), uptake and release by, <sup>14</sup>C: 407

*Hyalophora cecropia*, glycogen synthesis in, <sup>14</sup>C: 100

trehalose synthesis in, <sup>14</sup>C: 100-1

*Leucophaea maderae*, glycogen metabolism in, <sup>14</sup>C: 105

glycogen metabolism in reproductive cycle, <sup>14</sup>C: 106

hormones: protein synthesis (in vitro), <sup>14</sup>C: 235

*Locusta migratoria*, diglycerides in, <sup>14</sup>C: 404  
 fat synthesis, <sup>14</sup>C: 403

fatty acid incorporation, <sup>14</sup>C: 404

triglycerides in, <sup>14</sup>C: 404

*Musca domestica* (L), Car: ethalonamine incorporation into, <sup>14</sup>C:

365-6, 368  
<sup>14</sup>C, <sup>32</sup>P: 367

serine incorporation, <sup>14</sup>C: 366, 368

*Periplaneta americana*, uric acid metabolism, <sup>14</sup>C: 537

*Philosamia cynthia ricini*, RNA during development, <sup>32</sup>P: 848

*Phormia regina* (L) (cell-free preparation), lipid-bound carnitine derivatives in, <sup>14</sup>C: 389

*Sarcophaga bullata* (L), neutral lipid metabolism in, <sup>14</sup>C: 398

phospholipid biosynthesis, <sup>14</sup>C, <sup>32</sup>P: 421

## fat synthesis

*Locusta migratoria* (fat body), <sup>14</sup>C: 403

## fat transport

*Locusta migratoria*, <sup>14</sup>C: 404

## fatty acids

*Anthonomus grandis* (L), metabolic conversion in, <sup>14</sup>C: 1136

synthesis, <sup>14</sup>C: 1136

*Avicularia avicularia*, synthesis by, <sup>14</sup>C: 408

*Calliphora erythrocephala* (L), <sup>14</sup>C: 361

*Drosophila melanogaster*, biosynthesis, <sup>3</sup>H: 379  
 metabolism in, <sup>3</sup>H, <sup>14</sup>C: 378

*Galleria mellonella*, (L) esterification in, <sup>14</sup>C: 405-6

lipid synthesis, *Carsaus morosus* (ovariole), <sup>14</sup>C: 390

*Galleria mellonella* (ovariole), <sup>14</sup>C: 390

*Periplaneta americana* (fat body), release from, <sup>14</sup>C: 420

fatty acids-<sup>14</sup>C

*Lucilia cuprina* (thoracic tissues), oxidation, development: 369

*Periplaneta americana* (abdominal nerve cord): 372

*Tuberculachnus salignus* (ganglia), permeability of: 84

fatty acids (saturated), 1-<sup>14</sup>C-labelled

*Bombyx mori*, metabolism in: 397

fenthion-<sup>35</sup>P [PC.11]

cattle (lactating cow), metabolism in: 747  
 residues in: 747

*Culex fatigans* (L), absorption by: 796  
 resistance mechanism of: 796

milk, residues in: 747

fenthion-<sup>35</sup>S

*Cimex lectularius*, metabolism in: 801

- Stomoxys calcitrans, metabolism in: 801
- fibroin synthesis
- Bombyx mori (1) (posterior silk gland), amino acid incorporation into: 222; <sup>14</sup>C, <sup>35</sup>S: 117
- effects of actinomycin on, <sup>14</sup>C: 221
- effects of mitomycin on, <sup>14</sup>C: 221
- field cricket: see Gryllus firmus
- Fiji
- SMT, Perkinsiella saccharida, prospects: 1144
- firefly luciferase - V.26
- sulphydryl peptide, isolation and sequence at active site, <sup>14</sup>C: 231
- fish
- DDT, uptake, <sup>14</sup>C: 629
- elimination of, <sup>14</sup>C: 630
- residues in, <sup>36</sup>Cl: 661
- diazinon metabolism in, <sup>14</sup>C: 761
- dieldrin, uptake, <sup>14</sup>C: 629
- elimination of, <sup>14</sup>C: 630
- Dunban, metabolism of, <sup>14</sup>C: 790
- <sup>14</sup>C, <sup>36</sup>Cl: 789
- lindane, uptake, <sup>14</sup>C: 629
- elimination of, <sup>14</sup>C: 630
- parathion metabolism in, <sup>35</sup>S: 761
- Thiodan, metabolism of, <sup>14</sup>C: 675
- residues of, <sup>14</sup>C: 675
- γ: disinfestation: 1649
- radiation disinfestation, possibilities: 1627
- flea beetle: see Altica marvegans
- flea, oriental rat: see Xenopsylla gerbilli
- fleas - Y.
- marmot population study, radioisotopes: 542
- rats, pest transmission by: 561
- flesh fly: see Sarcophaga bullata
- flies
- em: behaviour (orientation): APX.7
- food chain, <sup>32</sup>P: 556
- labelling, <sup>32</sup>P, <sup>45</sup>Ca, <sup>131</sup>I: 1791
- phenylalanyl-RNA synthetase, <sup>14</sup>C: 267
- trophic transfer index, <sup>32</sup>P: 556
- p: radiation effects: 1101
- x: (a) heptachlor susceptibility: 1171
- malathion susceptibility: 1171;
- (p): sexual differences in: 1171
- Temik susceptibility: 1171; (p): 1171
- γ: respiration: 1310
- /HCN: respiration: 1310
- flight muscle
- respiratory metabolism in, Apis mellifera: 444
- Florida
- Cochliomyia hominivorax, SMT: 1633
- Florida red scale: see Chrysomphalus aonidum
- Florida tropical cockroach: see Blaberus crantifer
- flour
- γ: disinfestation: 1631
- flour beetle, broad-horned: see Gnathocerus cornutus
- confused: see Tribolium confusum
- red: see Tribolium castaneum
- flour products
- radiation; disinfestation: 1550
- flower beetle: see Olibrus sp.
- Mordellistena sp.
- 5-fluorouracil-2-<sup>14</sup>C [R.7]
- Musca domestica (e), incorporation into RNA: 885
- sterilization: 885
- fly, carrion: see Protophormia terrae-novae
- human bot: see Dermatobia hominivorax
- little house: see Fannia canicularis
- melon: see Dacus cucurbitae
- tropical warble: see Dermatobia hominivorax
- food
- exchanges, Formica polyctena, <sup>198</sup>Au: 472
- γ: insect disinfestation: 1684
- radiation\*; disinfestation: 1671, 1695
- food (irradiated)
- fruit flies: 1052
- food chain, forb-arthropod
- Araneida, <sup>32</sup>P: 556
- Coleoptera, <sup>32</sup>P: 556
- Diptera, <sup>32</sup>P: 556
- Hemiptera, <sup>32</sup>P: 556
- Homoptera, <sup>32</sup>P: 556
- Hymenoptera, <sup>32</sup>P: 556
- Lepidoptera, <sup>32</sup>P: 556
- Orthoptera, <sup>32</sup>P: 556
- food chain, fresh water
- insects, role of, r.i.: 524
- food chains
- salt-marsh ecosystem, role of arthropods in, <sup>32</sup>P: 525-6
- food preservation
- radiation: 1535
- forage crops
- dieldrin, residues of, <sup>14</sup>C, <sup>36</sup>Cl: 688
- root uptake and accumulation, <sup>36</sup>Cl: 666
- forages
- γ: attenuation coefficients: 1639
- disinfestation: 1689
- formaldehyde
- , x: Drosophila melanogaster, chromosome aberrations: 1273
- mosaics: 1273
- <sup>14</sup>C-formate
- Acantholyda nemoralis, amino acids: 136
- phospholipid choline origin: 409
- phospholipid ethanolamine origin: 409

\* For radiation disinfestation, see under individual crops or food products.

## G

- Carausius morosus*, phospholipid choline origin: 409  
 phospholipid ethanolamine origin: 409  
 DDT; *Musca domestica*, metabolism in: 138  
 formic acid secretion  
*Formica polyctena*, biosynthesis by, <sup>14</sup>C: 415  
*Formica* - W.14  
 food transfer, neighbouring nests, <sup>32</sup>P, <sup>131</sup>I: 479  
*Formica cinerea* Mayr - W.14  
 colony size estimation, <sup>32</sup>P, <sup>131</sup>I, <sup>198</sup>Au: 495  
 labelling, <sup>32</sup>P, <sup>131</sup>I, <sup>198</sup>Au: 495  
*Formica integra* - W.14  
 γ: avoidance reaction: 1467  
*Formica polyctena* (Förster) - W.14  
 food distribution among workers, <sup>32</sup>P: 483  
 in colony, <sup>32</sup>P: 484  
 food exchange, (daughter colonies), <sup>198</sup>Au: 491  
 inter-colony, <sup>198</sup>Au: 493  
 formic acid secretion, biosynthesis of, <sup>14</sup>C: 415  
 labelling, <sup>32</sup>P: 483-4  
 protein exchanges, inter-colony, <sup>198</sup>Au: 472  
 proteins (ovary), <sup>3</sup>H: 416  
 RNA (ovary), <sup>3</sup>H: 416  
 trophallaxis, <sup>198</sup>Au: 493  
*Formica rufa* - W.14  
 radiations behaviour: 1463  
 France  
 agricultural entomology, r.l.: 1780  
 frit fly: see *Oscinella frit*  
 frog (*sartorius* muscle)  
 nicotine, uptake of: 866  
 nicotine, contracture: 866  
<sup>45</sup>Ca-movements: 866  
 frog (tadpoles)  
 DDT residues in, <sup>36</sup>Cl: 661  
 fruit  
 γ: disinfection: 1674, 1778  
 fruit flies \* - X.35  
 food (irradiated): mutations: 1052  
 SMT: 1569  
 space flight effects: 1179  
 γ: pine apple, disinfection of: 1697  
 fruit fly, Mexican: see *Anastrepha ludens*  
 Queensland: see *Dacus tryoni*  
 fruit, packed  
 radiation: disinfection: 1691  
 fruit, tropical  
 γ: disinfection: 1682  
 fungus (*Fusarium* sp.)  
 Dipteryx, degradation by, <sup>14</sup>C: 732  
 Furan-<sup>14</sup>C [X.7]  
 cow (lactating), metabolism in: 824
- γ-rays  
*Acanthoscelides obtectus*, stage susceptibility: 1344, 1684  
*Acarus siro*, development: 1339  
 stage susceptibility: 1339, 1677  
*Acheta domestica*, stage susceptibility: 1334  
*Aedes aegypti*, blood meal retention: 1292  
 cytogenetic effects: 990  
 development: 990  
 (e) (different strains): 1343  
 (e), R-: 1168  
 R-: 1167  
 (σ'), mutations → structural modifications: 1111  
 (p), sterilization: 1472  
 (hybrid lines), susceptibility: 1181  
*Agrotis segetum* (f, p), development: 1412  
 sterilization: 1412  
*Alphitobius diaperinus* (f, a), lethal effects: 1436  
*Amphimallon majalis* (f, p), development: 1365  
 (e, f, a), lethal effects: 1365  
 reproductive potential: 1365  
 stage susceptibility: 1365  
 sterilization: 1578  
*Anagasta kuhniella*, stage susceptibility: 784  
*Anastrepha ludens*, mass sterilization: 1603  
*Anopheles pharoensis* (e, p), dominant lethals: 1610  
 SMT: 1610  
*Anopheles pharoensis* (p), mating behaviour (a), <sup>32</sup>P: 1611  
 mating competitive-ness (a, σ): 1612  
 mating frequency (a, σ), <sup>32</sup>P: 1611  
 SMT: 1611  
 sperm activity: 1585  
 sterilization: 1583-4, 1595  
 ants, avoidance reaction: 1466  
*Anthonomus grandis*, longevity: 1141  
 reproductive potential: 1141  
 sterilization: 1141  
*Apis mellifica*, life span: 1334  
 pollinating activity: 1334  
 stage susceptibility: 1334  
*Argia translata* (nym), emergence (a): 1394  
*Attageus piceus*, developments: 1390  
 lethal effects: 1390  
 reproductive potential: 1390  
 attenuation coefficients of grain and forages: 1689  
*Bacillus cereus*, growth rate: 1711

\* See also under individual species, e.g. *Dacus*, *Ceratitis*, etc.

- γ: *Bacillus thuringiensis* var. *entomocidus*, growth rate: 1711  
 radiosensitivity: 1711  
 var. *thuringiensis*, insect control efficacy: 1710
- banana: *Drosophila melanogaster*: 1195-6
- beet fly, germ cell development: 948  
 reduction in population: 1482
- Blaberus crantifer* (heart fragments), survival: 1328
- Bombyx mori* (c), killing: 1709  
 silk quality: 1536  
 (c), DNA: 923  
 RNA: 923  
 sex differentiation by colour: 1709  
 (c, f, a): 1356  
 (c, p-tissue), acetylcholine: 1305  
 (emb), lethal effects: 1363  
 (f), intestine: 1401  
 water imbalance: 1401  
 sterilization: 1279
- Bracon hebetor*: 1456
- Callitroga hominivorax* (p), mass sterilization: 1588
- Callosobruchus chinensis*, development: 1444  
 lethal effects: 1444  
 stage susceptibility: 1444  
 (p) sterilization: 1444
- Carpocapsa pomonella*, longevity: 1620  
 sterilization: 1620  
 (a), progeny (f): 1606  
 sterilization: 1606;  
 (p): 1605  
 (p, a), reproductive potential: 1307
- Celerio euphorbiae* (c, p-tissue), acetylcholine: 1305
- Ceratitis capitata* (<sup>32</sup>P-(p)): 27  
 biological control: 1556  
 development: 1666  
 lethal effects: 1359, 1666;  
 (f, p): 1647  
 (a) midgut epithelium: 1327  
 ovary: 1335  
 (p), reproductive potential: 1354  
 (p), SMT ratios: 1354  
 SMT trials, Austria: 1594  
 Israel: 1668  
 SMT, Central Africa: 1599  
 stage susceptibility: 1359, 1666  
 sterilization: 1545, 1562,  
 1595-6, 1598, 1609, 1666  
 (p): 1118, 1120,  
 1354, 1589  
 testis: 1335  
 (p), vitality: 224
- γ: *Chelisoche morio* (a), midgut epithelium: 1327  
 citrus, disinfestation: 1547  
 citrus, fruit disinfestation (*Strumeta tryoni*): 1690  
*Coccus hesperidum*, reproductive potential: 1308  
*Cochliomyia hominivorax*, selection on lethality: 1504  
 sterilization: 1570  
*Cochliomyia hominivorax* (a), aberrant phenotypes: 1079  
 (testis), stage susceptibility (germ cells): 927, 1586
- Coleoptera, stage susceptibility: 1677
- Culicoides variipennis* (f, p, a): 1309
- Cylas formicarius elegantulus*, life span: 1320  
 mating competitiveness (σ): 1320  
 reproductive potential: 1320  
 stage susceptibility: 1320
- Dacus cucurbitae*, lethal effects: 1650; (f, p): 1647  
 sterilization: 1592, 1650
- Dacus dorsalis*, lethal effects: 1650; (f, p): 1647; (c, f): 1447  
 (c, f), stage susceptibility: 1447  
 sterilization: 1650
- Dacus oleae*, ovary: 1335  
 (p), sterilization: 1154  
 testis: 1335
- Dacus tryoni*, disinfestation (fruit): 1679  
 (p), mass sterilization, SMT: 1587  
 sterilization: 1597; (p): 1623
- Dacus zonatus* (p), sterilization: 1598
- Dahlbomimus*, eye colour mutations: 1054-5  
*Dahlbomimus fuscipennis* (a, f), eye colour mutations: 1053
- Dermacentor occidentalis*, development: 1397  
 mutagenic effects: 1397  
 reproductive potential: 1397
- Dermatobia hominis*, sterilization: 1545
- Dermestes*, lethal effects: 1649  
 stage susceptibility: 1649
- Diatraea saccharalis*, dominant lethals: 1448  
 lethal effects: 1158;  
 (emb): 1448  
 reduced survival: 1157  
 sterility (inherited): 395  
 sterilization: 1158, 1621,  
 1688  
 (a), sterilization: 1156
- disinfestation: 1543  
 fruit: 1672  
 tropical fruits: 1650  
 various: 1672  
 vegetables: 1672
- Dolichoderus quadripunctatus*, oviposition: 1318

- γ: *Drosophila* (e): 1089  
 gametes: 947  
 germ cells, ♀: 946  
 germinal selection: 932  
 life span: 507; (a): 1640  
 (f), mutagenesis (spermatids): 1281  
 mutagenic effects: 1087, 1269, 1283  
 point mutations: 1010  
 sperm, spermatids, recessive sex-linked lethals: 1176  
 spermatogenesis, chromosome aberrations: 1010
- Drosophila melanogaster*, aneuploidy in  
 oogenesis: 1004  
 behaviour: 1475  
 chromatid mutations: 1068  
 dominant lethals: 1223  
 inherited radiation resistance: 1024  
 interspecific competition: 1465, 1494  
 lethal effects: 1429; (f): 1446  
 life span: 1407; (a): 1406  
 longevity (a): 1358  
 mutagenic effects: 1211  
 radioresistance and longevity, relationship between: 1424  
 sex-linked recessive lethals: 33, 1069, 1214, 1223
- Drosophila melanogaster*, spermatogenesis: 1175  
 stage susceptibility: 1446; (e, f, p, a): 1358  
 sterilization: 981, 1613; (F<sub>1</sub>, σ): 1140  
 sternoplural chaetae: 1489  
 viability ((e) to (a)-emergence): 1494
- Drosophila nebulosa*, fitness: 1505  
 interspecific competition: 1505
- Drosophila simulans*, interspecific competition: 1465, 1494
- Drosophila tropicalis*, interspecific competition: 1494
- Drosophila willistoni*, fitness: 1505  
 interspecific competition: 1505  
 lethals: 995
- Dysdercus peruvianus*: 1290
- Ephestia cautella*, lethal effects: 1668  
 sterilization: 1668
- γ: *Ephestia kuehniella* (e, f, p), development: 1362  
 DNA transduction: 1362  
 stage susceptibility: 1362  
 (ovary): 1336  
 export fruits, vegetables, disinfestation: 1635  
*Fannia canicularis*, development: 1373  
 lethal effects: 1373  
 stage susceptibility: 1373  
 sterilization: 1373
- fish, disinfestation: 1649  
 flies, respiration: 1310  
 food disinfestation: 1684  
 forages, bulk disinfestation: 1689  
*Formica integra*, avoidance reaction: 1467  
 fruit disinfestation: 1674  
*Galleria mellonella* (f, p), mutant traits: 1103  
 (a, σ), mutagenic effects: 1103
- Glossina*, sterilization: 1712  
 glucose: *Drosophila*, radiomimetic effects: 1215  
*Gnathocerus cornutus* (f, a), lethal effects: 1436  
*Grapholitha molesta*, sterilization, cage for: 1740  
 (a) longevity: 1302  
 mating behaviour: 1302  
 sterility: 1302  
 (p) sterility: 1302
- grain beetles, lethal effects: 1733  
 grain, bulk disinfestation: 1689; ship: 1467  
 disinfestation: 1536, 1547, 1637, 1640, 1668, 1683, 1687
- grain insects: lethal effects: 1686  
 sterility: 1686
- grain mites: lethal effects: 1686  
 sterility: 1686
- Habrobracon*, body weight (aσ, a♀): 1488  
 body weight (aσ, a♀): reproductive potential: 1496  
 mutation spectrum: 1122
- Haematobia irritans*, lethal effects: 1581  
 SMT, field tests, USA: 1581  
 sterilization: 1581
- Heliothis armiger*, sterilization: 1577  
*Heliothis virescens* (p), reproductive potential: 1355  
 sterilization: 1127, 1355
- hexanes: gammexane production: 1718
- Hippelates pusio* (p, a): 1471
- Hispa*, sterility: 1117
- Hylemya antiqua* (p), development: 1366  
 sterilization: 1366
- Hyphantria cunea*, stage susceptibility: 1338  
 sterilization: 1338
- insect control: 1543  
 applications in, Rev.: 1548



- γ: insect disinfection: 1673  
sterilization: 1134, 1786; (σ): 1778  
insects, dominant lethals: 1134  
effects on: 1540  
5 wheat-infesting-, lethal effects: 1699  
longevity: 1699  
reproductive potential: 1699  
Ips confusus, behaviour (gallery pattern) (♀):  
1479  
longevity: 1479  
mating behaviour (σ): 1479  
sterilization: 1479  
irradiator, grains: 1643, 1645, 1652  
Lasioderma serricorne, (e), lethal effects: 1445  
stage susceptibility: 1391;  
(e): 1445  
sterilization: 1391, 1570  
Lathridius minutus (f, p, a), lethal effects: 1436  
Lepidoptera, stage susceptibility: 1677  
Leucoptera coffeella, sterilization: 1545; (p, a):  
1131  
life span, Drosophila melanogaster: 1415  
Drosophila subobscura: 1415  
Lymantria dispar (p), reproductive potential:  
1146  
sterilization: 1146  
Malacosoma americanum (f): 1443  
(nuclear-polyhedrosis-  
infected f): 1443  
mango disinfection: 1636, 1696  
Melolontha melolontha, sterilizations: 1582  
Musca domestica, cholinesterase preparations of:  
1295-6  
eclosion: 1233  
mutations: 1501  
sterilization: 1233, 1570  
oak forest\*, aphid population explosion: 1530  
Oecneria dispar (f), colour mutation: 1570  
development: 1570  
pathogen susceptibility: 1570  
sterilization: 1570  
Ornithorhynchus tholozani, behaviour: 1622  
development: 1622  
SMT, Israel: 1622  
stage susceptibility  
(f, n, a): 1387  
sterilization: 1622  
Oryzaephilus surinamensis, lethal effects: 1657  
sterilization: 1657  
Ostrinia nubilalis, development: 1379  
reproductive potential: 1379  
stage susceptibility: 1379  
papaya disinfection: 1624, 1636  
Paramyeloides transitella, behaviour (σ): 1153  
dominant lethals: 1153  
reproductive potential:  
1153  
pesticide degradation: 1720  
Phorbia brassicae: sterility: 1608  
Phormia regina, lethal effects: 1431  
sterilization: 1431  
pineapple disinfection: 1636, 1697  
Planococcus citri (σ), abnormalities (f3), after  
heterochromatization  
reversal: 1402  
plants: Prodenia litura, growth: 461  
Plodia interpunctella (f, p, a), development:  
1342  
disinfection:  
1342  
Pogonomymex californicus, digging and tun-  
neling: 1473  
Pseudococcus gahani, abnormalities (f3), after  
heterochromatization  
reversal: 1402  
Pseudococcus obscurus (σ), abnormalities (f3),  
after heterochrom-  
atization reversal:  
1402  
quarantine treatment, Hawaii fruits: 1647  
Reticulitermes flavipes (Kollar): 1011  
wood/plastic, termite resistance:  
1715  
Rhyacionia buoliana, spermatogenesis: 1332  
sterilization: 1281  
testis: 1332  
Rhyzopertha dominica, lethal effects: 1657,  
1668  
stage susceptibility: 1477  
sterilization: 1477, 1657,  
1668  
rice disinfection: 1632, 1680-1  
Pakistan: 1692  
Schistocerca gregaria (e): 1441  
cannibalism: 1347  
lethal effects: 1347  
stage susceptibility: 1347  
senescence, Drosophila melanogaster: 1415  
Drosophila subobscura: 1415  
silk, improved properties (c): 1708  
silkworm (c), lethal effects: 1708  
(e): 1370  
(f): 1089  
gonia: 1108  
mosaics: 1271

\* (chronic irradiation).

- γ: silkworm, mutagenic effects: 1283  
 post-meiotic germ cells: 975  
 spermatogonia, DNA synthesis,  $^3\text{H}$ : 928  
   dose-rate effect: 972  
   lethal effects: 928, 972  
   proliferation kinetics,  
      $^3\text{H}$ : 928  
 spermatozoa, spermatids: 1238  
 stage susceptibility (e, spermatogonia):  
   957  
 visible recessive egg colour mutations:  
   1271
- Sitophilus granarius*, lethal effects: 1426-7, 1449,  
   1657  
   life span: 1449  
   stage susceptibility: 1344,  
     1684  
   sterilization: 1657
- Sitophilus oryzae*, lethal effects: 1341, 1668;  
   (a): 1403  
   reproductive potential: 1361  
   stage susceptibility: 1341,  
     1344, 1391, 1684;  
     (ℓ, p, a): 1361  
   sterilization: 1341, 1391,  
     1668
- Sitophilus zeamais*, survival rate: 4161
- Sitotroga cerealella*, (ℓ) adult emergence: 1377  
   body weight: 1376  
   development: 1376, 1396;  
     (e) 1376; (e, ℓ): 1377;  
     (ℓ, p, a): 1342  
   (ℓ, p, a) disinfestation: 1342  
   life span (a): 1376  
   oviposition: 1396  
   reproductive potential:  
     1376  
   SMT prospects: 1396  
   stage susceptibility: 1376-7  
   sterility: 1342, 1396  
   sterilization (σ', ♀): 1376  
   tumour formation: 1376-7
- SMT, *Anopheles pharoensis*: 1612
- Carpocapsa pomonella*, trials: 1605  
   Canada:  
     1620
- Ceratitis capitata*, Israel: 1589
- Diatraea saccharalis*, prospects, Puerto  
   Rico: 1156
- Drosophila melanogaster*, cage list, USA:  
   1613
- fruit flies, survey: 1536
- soil, (small) arthropod recolonization of: 512
- sterilization: grain pests: 1629
- Sternochetus mangiferae*, lethal effects: 1650  
   sterilization: 1650,  
     1696
- Strumeta tryoni*, disinfestation: 1670  
   lethal effects (e, ℓ, p, a): 1670
- γ: *Strumeta tryoni*, quarantine measures: 1670  
   stage susceptibility: 1670
- Tenebrio molitor* (ℓ), lethal effects: 1436  
   stage susceptibility: 1334
- Thomasiniana ribis*, eradication: 1716
- Thyridopteryx ephemeraeformis*, lethal effects  
   (e): 532  
   stage suscepti-  
   bility (e, ℓ):  
     532
- tick, sterilization: 1267
- Tribolium* (single and mixed species): 1286
- Tribolium castaneum*, lethal effects: 1428,  
   1430, 1657, 1668  
   stage susceptibility: 1428,  
     1430  
   sterilization: 1428, 1430,  
     1657, 1668
- Tribolium confusum*, development: 1440  
   lethal effects: 1657;  
     (ℓ, a): 1436; (a): 1440  
   (a, ♀), reproductive  
     potential: 1447  
   stage susceptibility: 1391,  
     1440  
   sterilization: 1391, 1657  
   wing abnormality: 1396
- Trogoderma glabrum*, development: 1390  
   lethal effects: 1390  
   mating competitiveness  
     (σ'): 1477  
   reproductive potential:  
     1390
- Trogoderma granarium*, lethal effects: 1657,  
   1668  
   stage susceptibility: 1668  
   sterilization: 1667, 1668
- Trichoplusia ni* (a), sterilization: 1142
- tropical fruit, disinfestation: 1682
- Tyrophagus longior* (mixed), lethal effects: 1436
- vegetable disinfestation: 1674
- viruses, arthropod/borne animal-, variability in:  
   1714
- wheat, disinfestation: 1547, 1665
- wheat flour, disinfestation: 1625, 1641
- wood/plastic, termite attack: 1721
- wood, protein value for (ℓ): 1283
- , apholate: *Drosophila melanogaster*,  
   sterilization: 1308, 1613
- , centrifugation: life span: 1456
- , chemosterilants: *Carpocapsa pomonella*,  
   longevity: 1620
- Cochliomyia hominivorax*,  
   sterilization: 1570
- Lasioderma serricorne*,  
   sterilization: 1570
- Musca domestica*,  
   sterilization: 1570

- $\gamma$ , chemosterilants, SMT trials, *Carpocapsa pomonella*: 1820  
ticks: 1267
- , EMS: *Drosophila melanogaster*, sternoplural chaetae: 1489
- , e.s., e.m.: *Drosophila melanogaster*, behaviour: 1475
- ,  $^3\text{H}$ -thymidine: *Drosophila melanogaster*, lethal effects: 1429
- , mitomycin C: *Drosophila melanogaster*, sex-linked recessive lethals: 1280  
sex-linked recessive semilethals: 1280
- ,  $n_{14}\text{MeV}$ : *Dahibomimus fuscipennis* (a?), eye colour mutations: 1053  
silkworm, mosaics: 1271  
visible recessive egg colour mutations: 1271
- , protons: *Drosophila melanogaster*, dominant lethals: 1223  
sex-linked recessive lethals: 1223
- , tepa: *Rhyacionia buoliana*, sterilization: 1281
- , vibration: egg production: 1456  
hatchability: 1456
- , x: *Drosophila melanogaster*, sex-linked recessive lethals: 33  
*Ocnieria dispar* (f), colour mutations: 1360  
development: 1360  
pathogen susceptibility: 1360  
sterilization: 1360  
silkworm (e): 1370
- , x,  $n_{14}\text{MeV}$ : silkworm (f), mutation frequency (gonia): 1091
- , actinomycin D: *Drosophila melanogaster*, mutagenic effects: 1211
- , air: *Musca domestica*, eclosion: 1233
- , antibiotics: *Habrobracon* (?), reproductive potential: 1304
- , arginine: *Drosophila melanogaster*, spermatogenesis: 1175
- , centrifugation: life span: 1456
- ,  $\text{CO}_2$ : *Musca domestica*, sterilization: 1233
- , cosmic flight conditions: genetic effects: 1248
- , DNP: *Drosophila* (sperm, spermatids), recessive sex-linked lethals: 1176
- , humidity: *Sitophilus zeamais*, survival rate: 1460-1
- , maleic hydrazide: *Drosophila melanogaster*, sex-linked recessive lethals: 1214
- , metabolic inhibitors: silkworm (spermatogonia): 957
- $\gamma$ /mitomycin C: *Drosophila melanogaster*, mutagenic effects: 1211
- , N: silkworm (spermatozoa, spermatids): 1238
- , O: *Dacus cucurbitae* (p), sterilization: 1592  
*Musca domestica*, eclosion: 1233
- , propyl gallate: *Blaberus craniifer* (heart fragments), survival: 1326
- , puromycin: *Drosophila melanogaster*, mutagenic effects: 1211
- , space flight conditions: *Drosophila*, dominant lethals in: 1126
- , T: *Bombyx mori*, sterilization: 1279  
*Schistocerca gregaria* (e): 1441  
*Sitophilus granarius*, life span: 1247
- ,  $^3\text{H}$ -thymidine: *Drosophila melanogaster*, lethal effects: 1429
- , vibration: egg production: 1456  
hatchability: 1456
- Galleria mellonella* (Linnaeus) - U.12  
[greater wax moth]  
fatty acid esterification (haemolymph),  $^{14}\text{C}$ : 405-6
- haemocytes, connective tissue, relation between,  $^3\text{H}$ : 1316  
differentiation sequence,  $^3\text{H}$ : 1316
- lipid synthesis (follicular vesicle),  $^{14}\text{C}$ : 390-1  
ovariole,  $^{14}\text{C}$ : 391
- lipids, (f) (fat body), uptake and release,  $^{14}\text{C}$ : 407  
ovariole, fatty acid incorporation into,  $^{14}\text{C}$ : 390
- transport of,  $^{14}\text{C}$ : 406
- nucleic acid metabolism and cell interaction (ovariole),  $^3\text{H}$ : 330
- ovariole, lipid synthesis in: 390-1  
NA metabolism: 330
- palmitate incorporation, glycerides,  $^{14}\text{C}$ : 407  
neutral lipid (fat body),  $^{14}\text{C}$ : 407  
triglycerides (fat body),  $^{14}\text{C}$ : 406  
(haemolymph),  $^{14}\text{C}$ : 405-7
- protein synthesis in,  $^3\text{H}$ : 359
- RNA synthesis in,  $^3\text{H}$ : 359
- x: abnormalities: 1357  
development: 1357
- $\gamma$ : (a,  $\sigma$ ), mutagenic effects: 1103  
mutant traits (f, p): 1103
- gammexane [C.1]  
 $\gamma$ : hexanes (chlorination and sulfoxidation): 1718
- gammexane- $^{14}\text{C}$   
*Boophilus decoloratus*, metabolism in: 614  
locust, metabolism in: 614  
*Musca domestica*, metabolism in: 614
- Gerris buenoi Kirk, - Q.9  
mosquito predation,  $^{32}\text{P}$ : 545

*Gerris lacustris* (Linnaeus) - Q.9

<sup>32</sup>P, biological half-life of: 1728

<sup>86</sup>Rb, biological half-life of: 1728

<sup>131</sup>I, biological half-life of: 1728

giant water bug: see *Hydrocyllus columbiae*

*Lethocerus cordofanus*

gipsy moth: see *Lymantria dispar*

gipsy moth, common: see *Portheia dispar*

unmatched: see *Ocnieria dispar*

*Glossina* sp. - X.19

flight metabolism, <sup>14</sup>C: 124

radiation sterilization: 1568

SALT, progress: 1559

sterile fly releases: 1565

γ: life span: 1712

sterility: 1712

-, tepe, metepa: sterility: 1712

*Glossina morsitans* - X.19

[tsetse fly]

glutamate-alanine metabolism, <sup>14</sup>C: 126

glucosamine-<sup>14</sup>C

*Schistocerca gregaria*, resilin biosynthesis: 139

D-glucosamine-1-<sup>14</sup>C: 615

glucose

ecdysone: *Musca domestica*, metabolism in, <sup>3</sup>H: 176

glucose-<sup>3</sup>H

*Calpodes ethlius*, endocuticle deposition: 419

*Musca domestica*, oogenesis: 92

glucose metabolism: 176

<sup>3</sup>H-D-glucose

*Apis mellifica*, oogenesis, carbohydrate synthesis: 146-7

D-glucose-<sup>14</sup>C

*Antheraea eucalypti* (culture), trehalose utilization by: 90

glucose-1-<sup>14</sup>C

*Anthonomus grandis* (f, a), lipid biosynthesis in: 1137

ecdysone: *Bombyx mori* (Dp), conversion in: 98

Calliphoridae, pentose phosphate oxidation: 89

*Hyalophora cecropia*: fat body, glycogen synthesis in: 101

trehalose syn-

thesis in: 101

trehalose formation: 95

*Melanoplus bivittatus*, carbohydrate metabolism: 87

*Musca domestica*, utilization: 111

*Oncopeltus fasciatus*, carbohydrate metabolism: 87

*Periplaneta americana*, carbohydrate metabolism: 87

D-glucose-1-<sup>14</sup>C: 1342

glucose-<sup>14</sup>C

ecdysone: *Bombyx mori* (Dp), conversion in: 98

*Melolontha vulgaris*, trehalose biosynthesis: 91

*Phormia regina* (emb): 268

*Samia cynthia* (dpp), metabolism in: 99

*Schistocerca gregaria*, resilin biosynthesis: 139

*Triatoma infestans* (f, a), incorporation into protein: 104

glucose-2-<sup>14</sup>C

*Anthonomus grandis* (f, a), lipid biosynthesis: 1137

*Melanoplus bivittatus*, carbohydrate metabolism: 87

*Musca domestica*, utilization: 792

*Oncopeltus fasciatus*, carbohydrate metabolism: 87

*Periplaneta americana*, carbohydrate metabolism: 87

glucose-3(4)-<sup>14</sup>C

*Anthonomus grandis* (f, a), lipid biosynthesis in: 1137

glucose-3-(4)-<sup>14</sup>C

*Melanoplus bivittatus*, carbohydrate metabolism: 87

*Oncopeltus fasciatus*, carbohydrate metabolism: 87

*Periplaneta americana*, carbohydrate metabolism: 87

glucose-6-<sup>14</sup>C

*Anthonomus grandis* (f, a), lipid biosynthesis in: 1137

ecdysone: *Bombyx mori* (Dp), conversion in: 98

Calliphoridae, pentose phosphate oxidation: 89

*Melanoplus bivittatus*, carbohydrate metabolism: 87

*Musca domestica*, utilization: 111

*Oncopeltus fasciatus*, carbohydrate metabolism: 87

*Periplaneta americana*, carbohydrate metabolism: 87

D-glucose-6-<sup>14</sup>C: 615

glucose-<sup>14</sup>C-6-P

trehalose synthesis, *Hyalophora cecropia* (fat body): 100

glucose-U-<sup>14</sup>C

*Apis mellifera*, sugar utilization: 188

*Argyrotaenia velutinana*, amino acid requirements of: 212

chitin synthesis, *Drosophila melanogaster*, cryptocephal: 93b

*Hypoderma bovis*, amino acid requirements: 174

*Leucophaea maderae*: glycogen metabolism: 107

glycogen metabolism in reproductive cycle: 106

isolated abdomen, metabolism in: 446

*Tetranychus urticae*, amino acid requirements of: 213

D-glucose-U-<sup>14</sup>C

615

salivary physiology of plant-bugs (Heteroptera): 192

locust, scylloinositol in: 362

- <sup>14</sup>C-UDP-glucose  
*Periplaneta americana* (?) (fat body homogenates): 103  
 trehalose synthesis, *Hyalophora cecropia* (fat body): 100
- <sup>14</sup>C-glucose-1-phosphate  
*Bombyx mori*: 93a  
 (f), glycogen and trehalose biosynthesis: 86
- glucose-6-phosphate  
*Leucophaea maderae*, glycogen metabolism: 107
- glutamate-<sup>14</sup>C  
 insects, arginine metabolism in: 125
- D-glutamate-<sup>14</sup>C  
 cyanide: rat (brain), transport in: 597
- glutamate-1-<sup>14</sup>C  
*Glossina morsitans*, metabolism: 126
- glutamate-3,4-<sup>14</sup>C  
*Glossina morsitans*, metabolism: 126
- glutamate-5-<sup>14</sup>C  
*Glossina morsitans*, metabolism: 126
- glutamic acid-<sup>14</sup>C  
*Bombyx mori* (p, non-cellular system): 178  
 nicotine, biosynthesis: 887, 889
- L-glutamic acid-U-<sup>14</sup>C: 615
- (U-<sup>14</sup>C)-glutamic acid  
*Blattella germanica*, metabolism in, <sup>14</sup>C: 189
- L-glutamine-U-<sup>14</sup>C: 615
- glycerine-<sup>14</sup>C  
 nicotine, biosynthesis of: 862
- glycerol-<sup>14</sup>C  
*Hyalophora cecropia* (fat body), phospholipids: 401  
*Leucophaea maderae* (fat body), phospholipids: 401  
*Periplaneta americana* (fat body), phospholipids: 401
- glycerol-1-<sup>14</sup>C  
 salivary physiology of plant-bugs (Heteroptera): 192
- glycerol-1,3-<sup>14</sup>C  
 labelling, pyridine ring, nicotine: 856
- glycerol-2-<sup>14</sup>C  
 labelling, pyridine ring, nicotine: 856
- glycine  
*Acantholyda nemoralis*, <sup>14</sup>C: 135  
 silkworm, biosynthesis in, <sup>14</sup>C: 195
- glycine-<sup>14</sup>C  
*Bombyx mori*, fibroin synthesis: 117, 221-2  
 posterior silk gland, incorporation into: 219  
 (f5), proteins: 198  
*Locusta migratoria* (n), protein metabolism: 137  
 (n3,4), protein synthesis: 251  
*Pieris brassicae*: 224  
*Triatoma infestans*, glutathione turnover: 163  
 actinomycin: fibroin synthesis, *Bombyx mori*: 221
- actinomycin D: protein metabolism, *Tenebrio molitor* (m): 288
- apholate: *Musca domestica* (e), nucleotide ratios in: 887
- thiotepa: *Musca domestica* (e), nucleotide ratios in: 887
- glycine-1-<sup>14</sup>C  
 615  
*Bombyx mori* (silk gland), proteins in acellular system: 155  
*Drosophila melanogaster* (imaginal disks), protein synthesis: 151  
*Sphinx ligustri* (p), protein synthesis: 120
- glycine-2-<sup>3</sup>H  
*Blattella germanica*: 359  
*Drosophila*: 359  
*Drosophila melanogaster* (imaginal disks), protein synthesis: 151  
*Galleria mellonella*: 359  
*Malacosoma*: 359  
*Musca domestica*: 359  
*Simulium*: 359
- glycine-2-<sup>14</sup>C  
 615  
*Bombyx mori* (f5) (fat body): 134  
*Pieris brassicae*, catechol amines, biosynthesis: 218  
 (p), leucopterin biosynthesis: 223
- glycocoll-1,2-<sup>14</sup>C  
 billiverdin biosynthesis, *Locusta migratoria* (f): 199  
*Mantis religiosa* (f): 199
- glycogen  
*Bombyx mori* (f), biosynthesis in, <sup>14</sup>C: 86  
 corpus cardiacum hormone: metabolism, *Leucophaea maderae*, <sup>14</sup>C: 107  
*Hyalophora cecropia* (fat body), synthesis in, <sup>14</sup>C: 100-1  
*Leucophaea maderae*, metabolism of, <sup>14</sup>C: 105, 107  
 (fat body, ovary, emb), metabolism in, <sup>14</sup>C: 106  
 metabolism during oogenesis, <sup>14</sup>C: 107  
 radiation: *Pieris brassicae* (testis), content in: 442
- glycolate-<sup>14</sup>C  
 silkworm, glycine biosynthesis: 195
- Glyptotendipes barbipes - X.9  
 DNA replication (giant chromosomes), <sup>3</sup>H: 294
- Gnathocerus cornutus (Fabricius) - V.46  
 [broad-horned flour beetle]  
 γ: lethal effects (f,a): 1436
- goats  
 phosphamidon metabolism in, <sup>32</sup>P: 704

## gold-198

- Apis mellifera, activity (feeding, foraging): 550-1, 554
- pollination by: 550-1, 554
- Calotermes flavicollis, trophallaxis: 469
- Formica cineraria, colony size estimations: 495
- Formica polycetena, food exchanges in: 493
  - food exchange (inter-colony): 491
  - protein exchanges (inter-colony): 472
  - trophallaxis: 493
- labelling, Apis mellifica: 492
  - Formica cineraria: 495
- trophallaxis, Apis mellifica: 492
  - Calotermes flavicollis: 469
  - Formica polycetena: 493
  - Vespa: 485
- Vespa, trophallaxis: 485
- DDT, plasmocytosis: 627-8
- insecticide, homogeneity of spreading: 576

## Gomphocerus maculatus - H.1

- x: spermatogenesis: 973

## grain

- bulk irradiator,  $\gamma$ , Savannah: 393
- disinfestation: 1683, 1773
  - (bulk): 1648
- infestation detection, x: 1526
- irradiation: 1663
  - (bulk): 393, 1640, 1648
- irradiator, ship: 1628
- Sitotroga cerealella detection, kernel infestation, x: 1376
- <sup>60</sup>Co: disinfestation: 1701
- $\gamma$ : attenuation coefficient: 1689
  - disinfestation: 393, 1536, 1637, 1640, 1683, 1686, 1688-9
  - large-scale: 1643
  - India: 1668
  - Turkey: 1667
- insects: lethal effects: 1686
  - sterilization: 1686
- mites: lethal effects: 1686
  - sterilization: 1686
- radiation disinfestation: 1547, 1630, 1634, 1646, 1651-3, 1678, 1790
  - economics (Italy): 1675
  - survey: 1657
  - USA: 1662

## grain beetles - V.46

- $\gamma$ : lethal effects: 1783
- RF: lethal effects: 1783
- i.r.: lethal effects: 1783

## grain mite: see Acarus siro

## grain moth, Anguinois: see Sitotroga cerealella

## grain pests

- $\gamma$ : sterilization: 1629

## grain products

- radiation disinfestation: 1662

## granary weevil: see Sitophilus granarius

## grapes

- Rogor, metabolism and residues of, <sup>32</sup>P: 769

## grapefruit

- Rogor, metabolism and residues in, <sup>32</sup>P: 769

## Grapholitha molesta (Busck) - U.33

- [leaf roller moth; oriental fruit moth]

- labelling (a), <sup>32</sup>P: 30
- <sup>32</sup>P-labelling: oviposition: 30
- longevity: 30
- reproductive potential: 30

## SMT, prospects: 1559

## sterilization, waxed-paper cage for: 1740

 $\gamma$ : longevity (E): 1302

## mating behaviour: 1302

## sterility: 1302

## grass bug: see Hemiostes reflexulus

## grasshopper\* - H.1

actinomycin D: RNA synthesis, <sup>3</sup>H: 997biological half-life, <sup>192</sup>Ir: 1DNA synthesis (neuroblast), <sup>3</sup>H: 307, 997

## em: behaviour (orientation): APX, 7

<sup>3</sup>H-pool formation during mitosis: 307<sup>192</sup>Ir, biological half-life: 1labelling, <sup>192</sup>Ir: 1 $\beta$ : spermatocytes: 952

## x: chromosome structure, EM: 996-7

## development: 1386

## (emb), diapause, EM: 929

## mitosis (neuroblast): 936

## respiration: 1386

## spermatogenesis: 1386

## grasshopper, differential: see Melanoplus

## differentialis

## green-striped: see Chorthophaga

## viridifasciata

## red-legged: see Melanoplus femur-

## rubrum

## two-striped: see Melanoplus bivittatus

## greater wax moth: see Galleria mellonella

## Greece

## SMT, Dacus oleae: 1814

## greenhouse whitefly: see Trialeurodes vaporariorum

## green peach aphid: see Myzus persicae

## green-striped grasshopper: see Chorthophaga viridi-fasciata

## Gregatina gamhami Canning

Locusta migratoria, nutrition via, <sup>35</sup>S: 536

## ground beetle: see Selenophorus ellipticus

## Selenophorus palliatus

## Triplecterus rusticus

## Gryllotalpa gryllotalpa L. - H.5

<sup>85</sup>Sr, <sup>131</sup>I, <sup>137</sup>Cs, distribution in (a): 53

## Gryllus bimaculatus de Geer - H.4

DNA, metabolism in oogenesis, <sup>14</sup>C: 265omnium synthesis, <sup>3</sup>H, <sup>35</sup>S: 188

\* For names of individual species, see under Acrididae (Table 1, H.1).

- ominochromes, biochemistry of,  $^3\text{H}$ ,  $^{35}\text{S}$ : 186  
 RNA, synthesis,  $^{14}\text{C}$ : 265  
 metabolism in oogenesis,  $^{14}\text{C}$ : 265  
 sulphate utilization, r.i.: 456  
*Gryllus campestris* Linnaeus - H.4  
 $^{86}\text{Sr}$ ,  $^{131}\text{I}$ ,  $^{137}\text{Cs}$ , distribution in (a): 53  
*Gryllus domesticus* Linnaeus - H.4  
 [domestic cricket]  
 $^3\text{H}$ : 228  
 DNA, oogenesis (oocyte chromosomes, nucleoli),  $^3\text{H}$ : 418  
 RNA, oogenesis (oocyte chromosomes, nucleoli),  $^3\text{H}$ : 418  
 x: (e): germ core, cell- and mitotic patterns: 968  
*Gryllus firmus* - H.4  
 [field cricket]  
 food chain,  $^{32}\text{P}$ : 556  
 trophic transfer index,  $^{32}\text{P}$ : 556  
 GS 13005- $^{14}\text{C}$   
*Phaseolus vulgaris* (bean plant) foliage, metabolism in: 720  
 guanine- $^{14}\text{C}$   
*Drosophila melanogaster*: 160  
 guanosine-8- $^{14}\text{C}$   
 pteridine biosynthesis, *Colias eurytheme*: 234  
 guanosine-U- $^{14}\text{C}$   
 pteridine biosynthesis, *Colias eurytheme*: 234  
 guinea pig  
 DDT: cortisol metabolism and synthesis,  $^{14}\text{C}$ : 607  
 parathion, metabolism in liver microsomes,  $^{32}\text{P}$ : 768  
 triphenyltin, metabolism of,  $^{113}\text{Sn}$ : 639  
 EPN: (♀): dimethoate metabolism,  $^3\text{H}$ : 797  
 toxicity: 797  
 gut absorption  
 insects, r.i.: 438  
 guthion- $^{32}\text{P}$  [PH, 8]  
 cattle, residues in tissue: 721  
 milk, residues in: 721  
 gypsy moth: see *Porthetria dispar*  
*Gyrinus natator* - V.23  
 radiation: behaviour: 819

## H

- Habrobracon* - W.5  
 space tests, preliminaries: 1216-7  
 x: dominant lethals: 1129, 1150, 1183  
 mutations: 1182  
 oocyte susceptibility (diakinesis): 968-9, 1182  
 ovariole: 941, 968  
 recessive lethals: 1150  
 stage susceptibility (cellular): 941  
 translocations: 1150; (♂): 968  
 -/mitomycin C: mutagenic effects (oocytes, sperm): 1274

- x/space flight conditions: dominant lethals: 1183  
 y: body weight (a♂, a♀): 1496  
 reproductive potential: 1496  
 (chronic): mutation spectrum: 1122  
 sperm: 935  
 -/antibiotics: reproductive potential (♀): 1304  
 radiation: chromosome aberrations (breaks): 1417  
 dominant lethals (theory): 1121  
 lethal effects: 918  
 life span, shortening: 1417  
 -/simulated space/flight conditions: egg production and hatchability: 1457  
*Habrobracon juglandis* (Ashmead) - W.5  
 1488  
 x: genetic variability: 1512  
 y: body weight (a♂, a♀): 1488  
 radiation: dominant lethals: 982  
 genetic variability: 1511  
 oogenesis: 982  
 sex-linked recessive lethals: 982  
 sterility: 982  
 visibles: 982  
*Habrobracon serinopae* - W.5  
 x: life span (a): 1409  
*Haematobia irritans* (Linnaeus) - X.9  
 [horn fly]  
 y: lethal effects: 1591  
 sterility: 1591  
 SMT, field tests, USA: 1591  
 haemocyte  
 connective tissue formation, *Galleria mellonella*,  $^3\text{H}$ : 1316  
 differentiation sequence, *Galleria mellonella*,  $^3\text{H}$ : 1316  
 thymidine incorporation in,  $^3\text{H}$ : 430  
 haemolymph  
*Periplaneta americana*, ionic distribution in,  $^{24}\text{Na}$ ,  $^{32}\text{P}$ ,  $^{36}\text{Cl}$ ,  $^{59}\text{Fe}$ ,  $^{131}\text{I}$ : 70  
 haemolymph- $^{32}\text{P}$   
*Formica polyctena*: 483-4  
 half-life  
 biological and effective-, method for computing: 1238  
 $^{32}\text{P}$ , in *Notonecta glauca*: 1728  
*Pyrrhocoris apterus*: 1728  
 $^{42}\text{K}$ , in forest arthropods: 533  
 $^{58}\text{Co}$ , in *Bracon hebetor*: 83  
 $^{86}\text{Rb}$ , in various insects: 1728  
 $^{131}\text{I}$ , in *Kaloterpes flavicollis*: 488  
 various insects: 1728  
 $^{137}\text{Cs}$ , in *Chrysomela knabi*, effects of temperature on: 48  
*Haplodiplosis equestris* (Wagn.) - X.11  
 [wheat-stem gall mosquito]  
 labelling (e),  $^{22}\text{Na}$ : 467  
 (f),  $^{22}\text{Na}$ : 467

## Harmostes reflexulus - Q.6

[grass bug]

food chain, <sup>32</sup>P: 556trophic transfer index, <sup>32</sup>P: 556

## Hawaii

irradiator (γ), fruit and vegetable disinfection: 1672

γ-irradiator, tropical fruit: 1682

hawk moth: see Celerio euphorbia

## 4-HBT

Musca domestica (microsomes), metabolism in, <sup>14</sup>C: 841  
metabolism in, <sup>14</sup>C: 841

## γ-HCH [C.1/2]

contents in HCH, E.L.: 1717

H<sup>14</sup>CN

Lotus, degradation product in: 592

## HeLa cells

DDT: DNA, RNA, and protein synthesis, <sup>14</sup>C: 613  
dieldrin: DNA, RNA and protein synthesis, <sup>14</sup>C: 613

## Heliothis armiger - U.29

[corn earworm]

γ: sterility: 1577

SMT (γ): 1577

## Heliothis virescens (Fabricius) - U.29

[tobacco budworm]

azodrin, metabolism of, <sup>14</sup>C, <sup>32</sup>P: 700DDT: distribution, metabolism (f), <sup>14</sup>C: 685  
metabolism in (f), <sup>14</sup>C: 686  
penetration rate (f), <sup>14</sup>C: 685-7phosphamidon, metabolism of, <sup>14</sup>C, <sup>32</sup>P: 702

SMT, prospects: 1559

Temik, metabolism of, <sup>14</sup>C, <sup>35</sup>S: 814γ: reproductive potential: 1355  
sterility: 1127; (σ): 1355

## Heliothis zea (Boddie) - U.29

[bollworm; corn earworm; tomato fruitworm]

azodrin, metabolism of, <sup>14</sup>C, <sup>32</sup>P: 700carbaryl-naphthyl, metabolism (f, a), <sup>14</sup>C: 807Di-syston, metabolism (f), <sup>32</sup>P: 699phosphamidon, metabolism of, <sup>14</sup>C, <sup>32</sup>P: 702

SD 8447, toxicity of: 799

SMT, prospects: 1559

Temik, metabolism of, <sup>14</sup>C, <sup>35</sup>S: 813-4

## helium

-/x: Drosophila, chromosome aberrations: 1220  
dominant lethals: 1027  
oogenesis: 1027  
sex-linked recessive lethals: 1027  
spermatogenesis: 1027  
Drosophila melanogaster, genetic effects: 1190

(germ cells): 1099

(oocyte 7),

He/x: Drosophila melanogaster, chromosome

aberrations: 1221

dominant

lethals: 1221

sex-linked

recessive

lethals: 1221

hemel = hexamethylmelamine

hemel-<sup>14</sup>CMusca domestica, metabolism in: 876  
sterilization: 876hempa-<sup>14</sup>C [R.4]

purification and analysis: 890

Musca domestica, metabolism in: 874, 877

sterilization: 874, 877

Trichoplusia ni (f), metabolism in: 889

heptachlor [C.4]

x: flies (p, a), changes in susceptibility, sexual differences: 1171

-/x: Musca domestica, toxicity: 1162

heptachlor-<sup>14</sup>C

Aedes aegypti, metabolism in: 646

Aspergillus niger, metabolism in: 646

Penicillium notatum, metabolism in: 646

mouse, metabolism in: 646

rat, metabolism in: 646

Heptagenia hebe McDunnough - E.6

DDT, absorption of, <sup>14</sup>C: 631resistance to, <sup>14</sup>C: 6311-<sup>14</sup>C-heptanoic acid

Periplaneta americana (abdominal nerve cord): 372

Heteroptera - Q.

nuclear explosion, effects: 1522

hexachlorane

x: Musca domestica, susceptibility to: 1170

γ-isomer in, isotopic dilution method: 649

hexachlorocyclohexane-<sup>36</sup>Cl

production and processing, control: 679

1-<sup>14</sup>C-hexanoic acid

Periplaneta americana (abdominal nerve cord): 372

hexyl alcohol-<sup>14</sup>C

Periplaneta americana (abdominal nerve cord), permeability: 429

Hippelates pusio Loew - X.10

[eye gnat]

reproductive potential: 1471

sterility: 1471

testes: 1471

Hispa - V.13

γ: reproductive potential: 1117

sterility: 1117

<sup>3</sup>H-histidine

Drosophila (f), puffs, incorporation in: 200

Drosophila hydei (giant chromosomes): 116

Drosophila virilis (f, pp)(giant chromosomes), puffs, incorporation in: 201



- Musca domestica*, amino acids, oogenesis: 92  
*Sciara coprophila* (L) (salivary gland), nucleoproteins: 331
- L-histidine-<sup>3</sup>H  
*Apis mellifica*, protein synthesis: 147  
 oogenesis, protein synthesis: 146  
*Calpodes ethlius*, endocuticle deposition: 419  
*Carabus*, proteins: 416  
*Formica polyctena*, proteins: 416  
*Malacosoma neustria*, proteins: 416  
*Vespa vulgaris*, proteins: 416
- histone acetylation  
*Drosophila melanogaster*, gene activation, <sup>3</sup>H: 145
- hollyhock seed moth: see *Pectinophora malvella*  
*Homorocoryphus* - H.3  
<sup>86</sup>Sr, <sup>131</sup>I, <sup>137</sup>Cs, accumulation and elimination of: 51
- Homorocoryphus nitidulus* Scop. - H.3  
<sup>86</sup>Sr, <sup>131</sup>I, <sup>137</sup>Cs, body burden in: 55  
 distribution in (a): 53
- honey  
 artificial radioactivity (Roumania) in, <sup>90</sup>Sr, <sup>137</sup>Cs: 508  
 natural radioactivity (Roumania) in, <sup>40</sup>K, <sup>14</sup>C, <sup>226</sup>Ra: 508  
 toxaphene residues, <sup>36</sup>Cl: 641
- honeydew  
 aphids, translocation in sieve tubes by, <sup>14</sup>C: 452  
*Megoura viciae*, excretion by, <sup>32</sup>P: 428
- hop  
 dimefox, metabolism and residues, <sup>32</sup>P: 748
- hormones: see insect hormones  
 horn beetle: see *Xylotrupes dichotomus*  
 house cricket: see *Acheta domesticus*  
 house fly: see *Musca domestica*
- HRS-1422-<sup>14</sup>C [X.13]  
 bean foliage, metabolism in: 803  
 bean plant, metabolism in: 829  
*Musca domestica*, metabolism by NADPH<sub>2</sub> - requiring enzyme: 844  
 rat, metabolism and persistence in: 827  
 rat (liver microsomes), metabolism in: 839
- HRS-1422, carbonyl-<sup>14</sup>C-labelled  
 bean foliage, metabolism in: 804  
 bean plant, persistent glucoside metabolites: 830  
 rat, metabolism in: 828  
 hydrolysis products in: 828
- human bot fly: see *Dermatobia hominis*
- humidity  
 -/γ: *Sitophilus zeamais*, survival rate: 1461
- Hungary  
 radiation: insect control, possibilities in: 1546
- Hyalophora cecropia* (Linnaeus) - U.43  
 [American silkworm]  
 228  
 actinomycin/injury: protein synthesis, <sup>14</sup>C: 243  
 RNA synthesis, <sup>3</sup>H: 243  
 carbohydrate metabolism, <sup>14</sup>C: 105
- deoxycytidine utilization (a), <sup>14</sup>C: 269  
 DNA: (m), <sup>3</sup>H: 355  
 synthesis, <sup>14</sup>C, <sup>3</sup>H: 269  
 (p), <sup>3</sup>H: 346  
 (p)(wing), <sup>3</sup>H: 356
- glycogen synthesis (fat body), <sup>14</sup>C: 100-1  
 hormones: RNA (post-emb), <sup>3</sup>H: 244  
 injury: protein synthesis (blood), <sup>14</sup>C: 243  
 RNA, <sup>3</sup>H: 243  
 (post-emb), <sup>3</sup>H: 244  
 K-transport (L)(midgut), <sup>42</sup>K: 64-6  
 oogenesis, r.i.: 453  
 phospholipid synthesis (flight muscle), r.i.: 402  
 phospholipids (fat body), release and transport, <sup>14</sup>C, <sup>32</sup>P: 401  
 protein (p)(wing epidermis), in vitro, <sup>3</sup>H: 332  
 synthesis, oogenesis, <sup>14</sup>C: 453  
 (p), <sup>14</sup>C: 225  
 (p)(wing), <sup>3</sup>H: 356  
 RNA: during diapause, <sup>3</sup>H: 243  
 (p)(wing epidermis), in vitro, <sup>3</sup>H: 332  
 (post-emb), <sup>3</sup>H: 244  
 synthesis (p), <sup>3</sup>H: 346  
 (wing), <sup>3</sup>H: 356
- sterols (m): biochemistry, <sup>14</sup>C: 375  
 metabolism, <sup>14</sup>C: 375
- trehalose in, <sup>14</sup>C: 95  
 synthesis (fat body), <sup>14</sup>C: 100-1
- hydrocarbons, carcinogenic  
*Drosophila hydei* (salivary gland), localization in, <sup>3</sup>H: 451
- hydrocarbons, chlorinated-  
 neutron activation analysis: atmosphere, contamination detection, <sup>36</sup>Cl: 665
- 2,3,5,6-<sup>14</sup>C-hydroquinone  
 Diptera, sclerotization in: 182
- Hydrocyrius columbae* - Q.3  
 (giant water bug)  
 flight muscle, contractile mechanism, <sup>45</sup>Ca: 56
- hydrogen cyanide [F.18]  
 micro-synthesis, <sup>14</sup>C: 604  
 synthesis, <sup>14</sup>C: 595  
 -/γ: flies, respiration: 1310
- hydrogen sulphide  
 -/radiation: *Drosophila melanogaster*: 1202
- Hydrophilus piceus* L. - V.25  
 accumulation, <sup>54</sup>Mn, <sup>90</sup>Sr, <sup>106</sup>Ru, <sup>137</sup>Cs, <sup>144</sup>Ce: 510
- Hydropsyche* - T.1  
 (caddisfly)  
<sup>32</sup>P-accumulation in stream ecosystem: 523
- hydroxykynurenine-3-<sup>3</sup>H  
*Bombyx mori*, in: 184  
*Gryllus bimaculatus*, ornithine synthesis in: 186
- hydroxyproline-2-<sup>14</sup>C: 615
- Hylemya antiqua* (Meigen) - X.18  
 [onion maggot]  
 labelling (L), <sup>22</sup>Na: 467  
<sup>32</sup>P: 467

- $\gamma$ : (p) development: 1366  
 sterility: 1366  
*Hylotrupes bajulus* (Linnaeus) - V.12  
 [European house borer]  
 $\gamma$ : quarantine control, timber: 1656  
 wood, nutritional value of proteins in,  
 for (f): 1293  
*Hymenoptera* - W.  
<sup>85</sup>Sr, <sup>131</sup>I, <sup>137</sup>Cs, accumulation and elimination  
 of: 51  
 distribution of: 54  
*Hypera postica* (Gyllenhal) - V.19  
 [alfalfa weevil]  
 $x$ : sterility: 1124  
*Hyphantria cunea* (Drury) - U.2  
 [fall webworm]  
<sup>45</sup>Ca, assimilation of: 58  
 biological half-life: 57; (f): 58  
 $\gamma$ : stage susceptibility: 1338  
 sterility: 1338  
*Hypoderma* - X.21  
 [cattle grub]  
 insecticides against: 708  
 trichlorophen, for combating in cattle: 784  
*Hypoderma bovis* (Linnaeus) - X.21  
 [Northern cattle grub; warble grub]  
 amino acid requirements, <sup>14</sup>C: 174-5

## I

- ICR-100 = quinacrine mustard  
 ICR-100  
 1264  
 $-x$ : *Drosophila melanogaster*, viability mutants:  
 1262  
 $-x$ , EMS: *Drosophila melanogaster*: 1264  
*Ilybius discodens* Shp. - V.21  
 mosquito predation, <sup>32</sup>P: 545  
 Imidan @-<sup>14</sup>C [PH.4]  
 rat, metabolism in: 722  
 residues in: 722  
 2-imidazolidinone [R.6]  
*Musca domestica*, lipid, <sup>14</sup>C: 891  
 (ovary), lipid, <sup>14</sup>C: 891  
 indene compounds  
 $-/\gamma$ : *Drosophila melanogaster*, mutagenic  
 effects: 1209  
 India  
 irradiators: food irradiation: 1668  
<sup>60</sup>Co: irradiation: 1639  
 stored grain: 1668  
 Indian-meal moth: see *Plodia interpunctella*  
 infestation detection  
 $x$ : 1704  
*Lasioderma serricorne*, stored products: 1703  
 information  
 circular, on radiation techniques and applica-  
 tion to insect pests: 1760  
 infra-red radiation  
 grain beetles, lethal effects: 1783  
 injury  
 cecropia, protein synthesis, <sup>14</sup>C: 243  
 RNA synthesis, <sup>3</sup>H: 243  
 insect  
 biochemistry, r.i.: 38  
 infestation detection,  $x$ : 1704  
 food exchange, r.i.: 1791  
 labelling, Eu + neutron activation: 23  
 Dy + neutron activation: 23  
 Tl + neutron activation: 23  
 r.i.: 1791  
 nutritional requirements, <sup>14</sup>C: 44  
 resistance, insecticides, r.i.: 38  
 respirometer, radiometric, <sup>14</sup>C: 1738  
 sterols, r.i.: 396  
 transpiration, <sup>3</sup>H: 454, 1791  
 $\gamma$ -irradiator: disinfestation: 1673  
 radiation: aging: 1413  
 control: 1547  
 insect control  
 atmospheric ions for: 1789  
 e.m. for: 1789; Rev.: 1548  
 genetic means: 1558  
 ionizing radiation for: 1789  
 measures: APX.4  
 new perspectives (general): 1573  
 physical methods of: 1789  
 $\gamma$ : 1548  
*Bacillus thuringiensis* var. *thuringiensis*:  
 1710  
 $x$ : 1548  
 radiation: 1781-2, 1790  
 applications: 42  
 cereal disinfestation: 1550  
 flour product disinfestation: 1550  
 Hungary: 1546  
 sterility: 1118  
 SMT: 1789  
 general: 42  
 prospects for German pests: 42  
 insect diseases, bacterial: see *Bacillus thuringiensis*  
 insect eggs  
 sulphuryl fluoride, application to, <sup>35</sup>Sr: 601  
 insect eradication  
 FAO/IAEA, Joint Division of Atomic Energy in  
 Agriculture, coordinated programmes for:  
 1549  
 insect fauna  
 old field ecosystem, r.i.: 527  
 insect, forest  
 thermonuclear war: outbreaks: 1521  
 insect hormones  
 chemistry and mode of action, Rev.: 1015  
*Samia cynthia* (dpp), glucose metabolism, <sup>14</sup>C:  
 99

## insect pests

information circular, radiation techniques and applications: 1760  
radioisotope and ionizing radiation studies on: 1788

## insect populations

radiation effects on: 907

## insect repellent

orally effective,  $^{14}\text{C}$ : 901-2  
mouse assay,  $^{14}\text{C}$ : 901-2

## insect vectors

r.i. studies: 564

## insects

alkylating agents, mechanisms of action in, r.i.: 886  
amino acid and protein metabolism in development, r.i.: 131  
antimetabolites, mechanisms of action in, r.i.: 886

biochemistry of sugars and polysaccharides in: Rev., r.i.: 109

blood-sucking-, artificial feeding of,  $^{131}\text{I}$ : 1791  
carbohydrate metabolism in, r.i.: 88, 97  
cosmic radiation/cosmic flight conditions:

mutagenic and other effects: 1231

chemosterilants, metabolism of, r.i.: 886  
dimethoate, metabolism of, in vivo and in vitro,  $^{32}\text{P}$ : 763

DNA metabolism,  $^3\text{H}$ ,  $^{32}\text{P}$ : 338  
ecdysone: protein metabolism,  $^3\text{H}$ ,  $^{14}\text{C}$ : 217  
RNA metabolism,  $^3\text{H}$ : 217

feeding rates, r.i.: 1526  
free nucleotides and derivatives in, r.i.: 340  
genetic studies on, Italian universities: 913  
grain infestation, x: 1526  
gut absorption, r.i.: 438  
labelling,  $^{32}\text{P}$ : 1745  
r.i.: 42, 1526

laser, effects of: APX.8  
lipid, metabolism and function of, r.i.: 373  
mass production of: APX.11  
metabolic control mechanisms in, Rev.: 43  
mutations and cell killing, heterogeneous susceptibility: 1143

nitrogen catabolism in, r.i.: 208  
excretion in,  $\gamma$ .i.: 125

nitrogenous and lipid compounds, intermediary metabolism of, r.i.: 130

nuclear catastrophe, effects on: 1529  
nucleic acids in, r.i.: 340  
 $^{32}\text{P}$ -uptake from tree litter: 530  
phenylalanyl-RNA synthetase,  $^{14}\text{C}$ : 267  
physiology of substance transfer between blood and CNS, r.i.: 930

predator/prey relationships, r.i.: 1526  
radioassay, plastic enclosures,  $^{14}\text{C}$ ,  $^{32}\text{P}$ : 1745  
radionuclide accumulation in: 77  
seed infestation, x: 1526  
SMT, control by: 1563

source ( $^{90}\text{Sr}$  +  $^{90}\text{Y}$  planes) calibration: 1727  
sterol metabolism in,  $^{14}\text{C}$ : 393  
tree litter,  $^{32}\text{P}$ -uptake via: 553  
trehalose in,  $^{14}\text{C}$ : 98  
trichlorfon, absorption and metabolism of,  $^{32}\text{P}$ : 701, 739  
vamidothion, metabolism of, in vivo and in vitro,  $^{32}\text{P}$ : 763  
virus transmission by, equine encephalomyelitis: 1160  
yolk formation, mechanism and control, r.i.: 228

$\alpha$ : 1540  
 $\beta$ (fallout): 1540  
stage susceptibility: 1514  
sterility: 1514

$\gamma$ : 1540  
dominant lethals: 1134  
sterility: 1134, 1786  
wheat-infesting species (5), lethal effects: 1699  
longevity: 1699  
reproductive potential: 1699

x: dominant lethals: 1134  
pathogenesis, nuclear polyhedrosis: 1165  
sterility: 1134  
stored products disinfestation: 1694  
e. m. and sonic energy for control of: APX.4  
radiation: effects: 919, 1532, 1784  
pig carrion decomposition pattern: 1525  
eradication of: 41, 1765  
harmful agricultural: 1772  
lethal effects: 1432  
mutagenic effects: 907  
natural ecosystems: 1528  
sterility: 906, 1135, 1252, 1560, 1564, 1567, 1576, 1774  
radiation, chemosterilants: sterility: 1252

insects, agricultural  
r.i. in ecological and biological studies of: 1775

insects, aquatic  
Ba, assimilation of: 521  
radionuclide accumulation in: 510, 522

insects, grain-infesting  
 $\gamma$ : lethal effects: 1686  
sterility: 1686

insects, phytophagous  
accumulation and elimination,  $^{85}\text{Sr}$ ,  $^{131}\text{I}$ ,  $^{137}\text{Cs}$ : 50

insecticide  
Escherichia coli, absorption by,  $^{14}\text{C}$ : 574  
metabolism in,  $^{14}\text{C}$ : 574  
exposure, radiometric detection of: 572  
neutron activation analysis: metabolites: 1730  
residues: 1730  
penetration, leaves (cuticula), r.i.: 578  
residue analysis,  $^{32}\text{P}$ : 758

- systemic, penetration and translocation, r.i.: 570
- Tribolium, pathways in, <sup>131</sup>I: 67
- insecticide residues
- double isotope derivative essays: 609
- DDT, <sup>3</sup>H/<sup>14</sup>C: 609
- dieldrin, <sup>3</sup>H/<sup>14</sup>C: 609
- double isotope derivative dilution analysis, <sup>3</sup>H, <sup>14</sup>C: 1729
- neutron activation analysis: 1734
- insecticide resistance
- mosquitoes, r.i.: 585
- insecticide synergists\*
- mode of action, <sup>14</sup>C: 897
- insecticide translocation
- in natural environment, r.i.: 586
- insecticides\*\*
- action and fate, r.i.: 575
- action and inaction, Rev.: 588
- action and metabolism: textbook: 583
- chlorinated hydrocarbons, metabolism of, r.i.: 1791
- comparative metabolism and toxicology: 591
- cyclodien, metabolism of, r.i.: 611
- labelled, <sup>32</sup>P: 587
- <sup>36</sup>Cl: 587
- bibliography of: 1757
- mechanism of action, target enzymes: 899
- metabolism, <sup>3</sup>H, <sup>14</sup>C, <sup>35</sup>S, <sup>36</sup>Cl: 584
- and toxicology, comparative, r.i.: 590
- mode of action: Rev.: 582
- movement and persistence in plants: 573
- Musca domestica, metabolism in, r.i.: 888
- radioisotope studies on: 38
- residue determinations, r.i.: 1735
- residues, r.i.: 577
- spreading test, <sup>198</sup>Au: 576
- insecticides, systemic
- absorption and translocation, r.i.: 580
- iodine-125
- albumin, Chironomus tentans (haemocoel), protein transport: 181
- iodine-131
- accumulation, distribution and elimination in insects: 50-1, 55
- Aphis fabae (L., a), incorporation into: 60
- biological half-life determination in bugs (various): 1728
- Camponotus, localization of infestation: 552
- nest area: 552
- Coleoptera, distribution in: 54
- Culex pipiens fatigans, dispersal: 8
- <sup>131</sup>I, food transfer to neighbouring nests, Formica: 479
- Formica cinerea, colony size estimation: 495
- haemolymph, Periplaneta americana: 70
- Hymenoptera, distribution in: 54
- insects, accumulation and elimination by: 50-1
- metabolic distribution in, various: 53
- (phytophagous), accumulation and elimination by: 52
- Kaloterme flavicollis, biological half-life in: 488
- trophallaxis: 488
- labelling, Culex pipiens fatigans: 8
- Drosophila: 1283
- flies: 1791
- Formica cinerea: 495
- silkworm: 1283
- Lasius neoniger, habitat selection by queens: 490
- Lepidoptera, distribution in: 54
- metabolic distribution in insects, various: 53
- nest area, Camponotus: 479
- Orthoptera, distribution in: 54
- Periplaneta americana, haemolymph circulation rate: 1791
- Solenopsis molesta, habitat selection by queens: 490
- Tribolium, insecticide pathways in: 67
- iodoacetamide
- x: Drosophila, spermatids, spermatozoa: 1235
- ips, California five-spined: see ips confusus
- ips confusus (LeConte) - V.42
- [California five-spined ips]
- γ: behaviour (gallery pattern)(?): 1479
- longevity: 1479
- mating behaviour (σ): 1479
- (a) sterility: 1479
- iridium-192
- grasshoppers, biological half-life in: 1
- labelling, grasshoppers: 1
- iron-59
- Amblyomma americanum, dispersal: 503
- migration: 503
- caddisfly (L), concentration in: 496
- EDTA: Culex pipiens, accumulation coefficient: 83
- elimination rate, Triatoma infestans: 562
- haemolymph, Periplaneta americana: 70
- Phlebotomus longipalpis, feeding rate: 563
- blood volume ingested: 563
- irradiation\*
- grain disinfestation, Turkey: 1687
- products, disinfestation, USA: 1662
- India, food treatment: 1639
- quarantine control measure: 1656
- Turkey, γ: 1640
- γ: food: 1639
- grain disinfestation: 1640

\* See also Table 2, section A.

\*\* See also under individual insecticides and Table 2.

\* See also under disinfestation.

## irradiator

bulk-grain and packaged-commodity-

Savannah: 1677

Cs, portable: 1700

economics, grain disinfestation, India: 1668

facilities, India: 1668

Japan: 1676

grain disinfestation: 1646, 1648, 1663, 1678

(bulk) disinfestation: 1651

products: 1658

Hawaii: development (HDI), <sup>60</sup>Co: 1661

tropical fruits: 1682

Hawaiian-,  $\gamma$ : 1672

mobile-, Atomic Energy of Canada Ltd.: 1677

mobile gamma: 1642

- (MGI), AEC programme: 1659

pool-type: 1672

portable: bulk disinfestation, Israel: 1702

Puerto Rico, disinfestation: 1688

quarantine (dry unit): 1672

ships: grain disinfestation: 1626

Turkey, grain: 1643, 1645, 1652

 $\gamma$ : bean disinfestation: 1676

disinfestation: 1673, 1688

forage disinfestation: 1689

fruit disinfestation: 1672

South Africa: 1674, 1778

grain: 1637, 1643, 1645, 1652

bulk disinfestation: 1685

disinfestation: 1689

Japan: 1676

insect sterilization: 1778

Israel: 1666

vegetable disinfestation: 1672

South Africa: 1674

<sup>60</sup>Co-source: disinfestation, bulk, Israel: 1702

grain disinfestation, bulk: 1701

bulk eco-

nomics: 1701

India: 1688

portable: grain, India: 1668

<sup>137</sup>Cs-source: disinfestation, bulk, Israel: 1702

food processing: 1642

## irradiators

in agriculture: 1669

for disinfestation: 1669

economics of: 1702

electron accelerators, Israel: 1702

for grain disinfestation: 1702

 $\gamma$ -, various types, Australia: 1690

Ischnodemus badius - Q.8/9

salt-marsh ecosystem, food chain in, <sup>32</sup>P: 526

isobornylthiocyanate

Musca domestica, methylcarbamate

metabolism in, <sup>14</sup>C: 837Isolan-<sup>14</sup>C [X.9]

bean plant, metabolism in: 829

Musca domestica, metabolism by NADPH<sub>2</sub>-

requiring enzyme: 844

rat (liver microsomes), metabolism in: 839

metabolism and persistence in: 827

Isolan, carbonyl-<sup>14</sup>C-labelled

bean plant, persistent glucoside metabolites: 830

rat, metabolism in: 828

hydrolysis products in: 828

L-isoleucine-U-<sup>14</sup>C

Lotus: 592

Isoprenoids

Hyalophora cecropia, (m), <sup>14</sup>C: 3752-isopropyl-<sup>14</sup>C-oxyphenyl methylcarbamate

albumin: oxidative metabolism by Musca

domestica microsome - NADPH<sub>2</sub>

system: 843

isotope detection method

insecticide residue determination: 696

isotopic dilution

 $\gamma$ -isomer in hexachloran: 650

## Israel

food irradiation programmes, economic aspects

of: 1702

irradiators: 1666, 1702

SMT, Ceratitis capitata, trials: 1666

(♂), Ceratitis capitata: 1702

Ornithodoros tholozani, prospects: 1622

## Italian universities

genetic studies on insects: 913

## Italy

radiation: grain disinfestation, economics: 1675

## J

## Japan

irradiator facilities: 1676

 $\gamma$ : bean disinfestation: 1676

grain disinfestation: 1676

Javesella pellucida (Fabricius) - QQ.6

dispersal, <sup>32</sup>P: 498labelling, <sup>32</sup>P: 498migration, <sup>32</sup>P: 18, 498

## juvenile hormone

Locusta migratoria, biochemistry: 194

saturniid moths (p), RNA synthesis in tissue, <sup>3</sup>H:

321

## K

Kaloterpes flavicollis (Fabricius) - K.2

trophallaxis, in pseudoworkers, <sup>131</sup>I: 488

x: (e) lethal effects: 979

radiosensitivity and nucleus differentiation:

979

## karyotype

Aedes cataphylla, <sup>3</sup>H: 318Aedes domalis, <sup>3</sup>H: 318Culiseta impatiens, <sup>3</sup>H: 318Culiseta inornata, <sup>3</sup>H: 318Culex tarsalis, <sup>3</sup>H: 318mosquito, comparative study, <sup>3</sup>H: 318

- Parophora signipennis*, <sup>3</sup>H: 318  
 keto acids-<sup>14</sup>C  
*Peridroma saucia* (L), nuclear polyhedrosis  
     virus: 462  
 9-ketodec-2-enoic acid  
     *Apis mellifera*, metabolism in, <sup>14</sup>C: 410  
 α-ketoglutaric acid, sodium-5-<sup>14</sup>C: 615  
 khapra beetle: see *Trogoderma glabrum*  
     *Trogoderma granarium*  
 kynurenine  
     *Drosophila melanogaster*, hydroxylation in, <sup>3</sup>H:  
     153

## L

- labelled compounds  
     synthesis, apparatus for: 581  
 labelling: see under individual radioisotopes and  
     systems  
 laboratory  
     manual, isotopes and radiation in entomology:  
     1792  
     training course, isotopes and radiation in ento-  
     mology: 1793  
 lampbrush chromosome (Y-)  
     *Drosophila hydei*, structure and function, <sup>3</sup>H: 285  
*Laphygma frugiperda* (J.E. Smith) - U.29  
     [fall army worm]  
     radiation: oxygen uptake: 1303  
 large canna leaf roller: see *Calpodethia*  
 large milkweed bug: see *Oncopeltus fasciatus*  
 laser  
     insects, effects on: APX.8  
     arthropods, phytophagous, effects on: APX.9  
*Lasioderma serricorne* (Fabricius) - V.1  
     [cigarette beetle]  
     infestation detection (biscuits), x: 1703  
     life cycle, x: 1703  
     γ: (e) susceptibility: 1445  
     lethal effects (e): 1445  
     stage susceptibility: 1391  
     sterility: 951, 1391  
     -, chemosterilants: sterility: 951  
*Lasius neoniger* - W.14  
     habitat selection by queens, <sup>131</sup>I: 490  
*Lathridius* (Enicmus) minutus Linnaeus - V.46  
     (salami pest)  
     γ: lethal effects (l.p.a): 1436  
 leaf beetle: see *Altica marvegens*  
 leafhopper: see *Calligypona pellucida*  
     *Cameocephala flaviceps*  
     *Cuerna costalis*  
     *Empoasca* sp.  
     *Javesella pellucida*  
     *Scaphytopius acutus*  
 leafhopper, clover: see *Aceratagallia sanguinolenta*  
     sugarcane: see *Perkinsiella saccharicida*  
 leafhoppers - QQ.6  
     virus transmission by, <sup>14</sup>C: 739  
 leaf roller, large canna: see *Calpodethia*  
 leaf roller moth: see *Grapholitha molesta*  
 leaves\*  
     insecticide penetration (cuticula), r.i.: 578  
 leeches, blood-sucking\*\*  
     DDT, absorption of, <sup>14</sup>C: 643  
     dehydrochlorination of, <sup>14</sup>C: 643  
 lentils  
     neutron activation: methyl bromide residues:  
     1731  
 Lepidoptera - U.  
     <sup>85</sup>Sr, <sup>131</sup>I, <sup>137</sup>Cs, accumulation and elimination  
     of: 51  
     distribution of: 54  
     radiation: sterility: 1133, 1257  
     -, chemosterilants: sterility: 1257  
*Lepisma saccharina* Linnaeus - B.1  
     [silver fish]  
     radiation: antenna movements: 1463  
*Leptinotarsa decemlineata* (Say) - V.13  
     [Colorado (potato) beetle]  
     DNA synthesis (emb), <sup>3</sup>H: 311  
     insecticide application, microdoses: 1753  
     labelling, <sup>60</sup>Co: 535; (a): 5  
     protein synthesis (emb), <sup>3</sup>H: 311  
     RNA synthesis (emb), <sup>3</sup>H: 311  
     SMT (x): 1577  
     x: (e) development: 1337  
     sterility: 1577  
 lesser mealworm: see *Alphitobius diaperinus*  
*Lestes sponsa* - F.7  
     haemolymph circulation (wing), <sup>32</sup>P: 432  
*Lethocerus cordofanus* - Q.3  
     (giant water bug)  
     flight muscle, contractile mechanism, <sup>45</sup>Ca: 56  
 leucine-r.i.  
     puffs, *Drosophila busckii*: 334  
<sup>3</sup>H-leucine  
     age: protein synthesis, *Drosophila subobscura*:  
     136  
     *Calpodethia* (fat body), protein: 140  
     *Cecropia* moth, incorporation into blood proteins  
     and yolk: 191  
     *Chironomus tentans*, protein synthesis in: 256  
     (giant chromosomes),  
     puffing: 449  
     *Drosophila hydei* (giant chromosomes): 316  
     *Hyalophora cecropia* (p)(wing epidermis), protein:  
     332  
     *Leptinotarsa decemlineata* (emb), proteins: 311  
     *Musca domestica*, amino acids, oogenesis: 92  
     proteins: 176  
     *Panorpa communis* (oocytes): 154

\* See also bean (foliage).

\*\* Japanese leech, *Hirudo nipponia*.Southeast Asian buffalo leech, *Hirudinaria  
manillensis*.

- Rhynchosclara angelae*: 312  
     proteins, larval development: 313  
     proteins (puffs): 313  
*Tenebrio molitor* (emb), proteins: 311  
 tumour induction, *Drosophila melanogaster* (♀): 31
- L-leucine-<sup>3</sup>H  
   *Drosophila melanogaster* (cell-free preparations), protein synthesis: 150
- <sup>3</sup>H-D/L-leucine  
   *Drosophila hydei* (lampbrush Y-chromosome), protein: 285
- DL-leucine-4,5-<sup>3</sup>H  
   *Blattella germanica*: 359  
   *Drosophila*: 359  
   *Drosophila melanogaster* (imaginal disks): 161  
   *Galleria mellonella*: 359  
   *Malacosoma*: 359  
   *Musca domestica*: 359  
   *Simulium*: 359
- <sup>14</sup>C-leucine  
   *Drosophila melanogaster* (p) (ribosomes), protein synthesis: 166  
   *Drosophila virilis* (ribosomes), protein synthesis: 143  
   *Musca domestica* (polyribosomes), protein synthesis: 232  
   *Phormia regina* (emb): 268  
   *Triatoma infestans*: 112
- DL-leucine-<sup>14</sup>C  
   DDT: protein metabolism, rat (liver): 673  
   *Drosophila hydei* (lampbrush Y-chromosome), protein: 235  
   ecdysone: protein synthesis: 123
- DL-leucine-1-<sup>14</sup>C  
   *Triatoma infestans*, protein biosynthesis in: 110
- <sup>14</sup>C-1-leucine  
   *Bombyx mori* (silk gland), proteins in acellular system: 155  
   Diptera, sclerotization in: 182
- L-leucine-<sup>14</sup>C  
   *Bombyx mori* (p, non-cellular system): 178  
   *Drosophila melanogaster* (cell-free), protein synthesis: 150
- L-leucine-1-<sup>14</sup>C  
   615  
   DDT: protein synthesis, HeLa cells: 613  
   dieldrin: protein synthesis, HeLa cells: 613  
   *Drosophila melanogaster* (imaginal disks), protein synthesis: 151
- leucine-U-<sup>14</sup>C  
   *Leucophaea maderae* (isolated abdomen), metabolism in: 448  
   *Leucophaea maderae* (Fabricius) - H, 2  
     [Madeira cockroach]
- carbohydrate metabolism, <sup>14</sup>C: 107  
     hormonal and metabolic regulation of, <sup>14</sup>C: 105  
   corpus cardiacum hormone(s): glycogen metabolism, <sup>14</sup>C: 105, 107  
     lipid utilization, <sup>14</sup>C: 105, 107  
   glycogen content, variations (fat body, ovary, emb), <sup>14</sup>C: 106  
   metabolism (fat body, ovary, emb), <sup>14</sup>C: 105  
     in oogenesis, <sup>14</sup>C: 107  
   hormone (corpora cardiaca): protein synthesis (fat body, in vitro), <sup>14</sup>C: 235  
   lipid metabolism, <sup>14</sup>C: 374  
   oocyte development (isolated abdomen), <sup>14</sup>C: 446  
   phospholipids (fat body), release and transport, <sup>14</sup>C, <sup>32</sup>P: 401  
   trehalose synthesis, <sup>14</sup>C: 105, 107  
*Leucoptera coffeella* (Guer.) - U, 22/23  
   [coffee leaf miner]  
   SMT (γ): 1545  
   γ: reproductive potential: 1545  
   sterility: 1131
- leucopterin  
   *Pieris brassicae*, <sup>14</sup>C: 218, 224; (p): 223
- leucopterin-<sup>14</sup>C  
   pteridine interconversions, *Colias eurythemer*: 234
- Libellula depressor - F, 8  
   haemolymph circulation (wing), <sup>35</sup>S: 435
- Libellula quadrimaculatus - F, 8  
   haemolymph circulation (wing), <sup>32</sup>P: 432
- lindane-<sup>14</sup>C [C, 2]  
   fish, elimination by: 630  
   uptake by: 629  
   soil, decomposition by: 692
- lipid  
   corpus cardiacum hormone: utilization, *Leucophaea maderae*, <sup>14</sup>C: 105, 107  
   *Galleria mellonella* (follicular vesicle), synthesis in, <sup>14</sup>C: 391  
     (ovariole), synthesis in, <sup>14</sup>C: 391  
   *Leucophaea maderae*, metabolism in, <sup>14</sup>C: 105, 107, 374  
   metabolism and function in insects, r.i.: 373  
   *Musca domestica* (ovary), <sup>14</sup>C: 891  
   2-imidazolidinone: *Musca domestica* (ovary), <sup>14</sup>C: 891  
   (-bound) carnitine derivatives, *Phormia regina* (fat body), <sup>14</sup>C: 389
- lipid compounds  
   insects, intermediary metabolism in, r.i.: 130
- lipid metabolism  
   *Periplaneta americana*, embryogenesis, <sup>14</sup>C: 381
- lipids  
   *Anthonomus grandis*, biosynthesis in, <sup>14</sup>C: 1137-8

- Galleria mellonella* (♂), transport in,  $^{14}\text{C}$ : 406  
lipids, neutral  
*Galleria mellonella* (fat body), palmitate incorporation into,  $^{14}\text{C}$ : 407  
*Sarcophaga bullata* (♀) (fat body), metabolism in,  $^{14}\text{C}$ : 398
- lipids, non-saponifiable  
*Avicularia avicularia*, synthesis in,  $^{14}\text{C}$ : 408
- lipoproteins  
diglyceride-bound, *Philosamia cynthia* (haemolymph),  $^{14}\text{C}$ : 383  
locust flight (haemolymph),  $^{14}\text{C}$ : 385
- little house fly: see *Fannia canicularis*
- liver  
835, 855  
carbaryl in rat-,  $^3\text{H}$ : 835  
DDT metabolism in rat-,  $^{14}\text{C}$ : 673  
malathion metabolism in man- and rat-,  $^{14}\text{C}$ : 835  
methyl parathion, degradation by homogenates of-,  $^{32}\text{P}$ : 788  
methyl paraoxon, degradation by homogenates of-,  $^{32}\text{P}$ : 788  
desalkylation and toxicity,  $^{14}\text{C}$ : 733  
parathion, degradation by homogenates of-,  $^{32}\text{P}$ : 788  
metabolism in rabbit- and rat-,  $^{32}\text{P}$ : 788;  $^{35}\text{S}$ : 786  
Sumithion, degradation by homogenates of-,  $^{32}\text{P}$ : 788
- locust: see *Locusta migratoria*  
locust, desert: see *Schistocerca gregaria*  
*Locusta migratoria* - H.1  
[migratory locust]  
billeriverdin biosynthesis (♂),  $^{14}\text{C}$ : 199  
di- and tri-glycerides (fat body),  $^{14}\text{C}$ : 404  
fat synthesis (fat body),  $^{14}\text{C}$ : 403  
frontal ganglion removal: protein metabolism,  $^{14}\text{C}$ : 137  
protein synthesis (n3,4),  $^{14}\text{C}$ : 251  
RNA synthesis (n3,4),  $^{14}\text{C}$ ,  $^3\text{H}$ : 251
- Gregarina grahami*, nutrition of,  $^{35}\text{S}$ : 536  
juvenile hormone, radioisotopes: 194  
lipoproteins (haemolymph), during flight,  $^{14}\text{C}$ : 385
- oogenesis,  $^3\text{H}$ : 417  
pigmentation (cuticle),  $^{14}\text{C}$ : 152  
protein synthesis, oogenesis,  $^3\text{H}$ : 417  
RNA (oocyte chromosomes),  $^3\text{H}$ : 301-2  
synthesis, oogenesis,  $^3\text{H}$ : 417  
scylloinositol, occurrence,  $^{14}\text{C}$ : 362  
8-sitosterol-28,29- $^{14}\text{C}$  utilization: 360
- lone star tick: see *Amblyomma americanum*
- Lotus  
cyanide metabolism in,  $^{14}\text{C}$ : 592

- Lucilia* (now *Phaenicia*) *cuprina* (Wied.) - X.5  
[blowfly]  
booby-trapping: APX.10  
fatty acid oxidation (thoracic tissues), development,  $^{14}\text{C}$ : 369  
melanin (puparium),  $^{14}\text{C}$ : 156  
pyrophosphate exchange, amino acid dependent-,  $^{32}\text{P}$ : 161
- Lucilia sericata* (Meig.) - X.5  
1-naphthol: glucuronide conjugates,  $^{14}\text{C}$ : 596  
SMT, trials: 1569
- Lutzomyia* (*Phlebotomus*) *longipalpis* (Lutz & Neiva, 1912) - X.27  
(sandflies)  
labelling,  $^{32}\text{P}$ : 7, 464  
 $^{32}\text{P}$ , effective half-life of: 464
- Lycosidae - Ar.4  
(wolf spiders)  
predator-prey system,  $^{137}\text{Cs}$ : 543
- Lycosa punctulata* - Ar.4  
 $^{134}\text{Cs}$ -turnovers: 73
- Lygus oblineatus* - Q.11  
toxicosis vector, r.i.: 560
- Lymantria dispar* - U.25  
[gipsy moth]  
 $\gamma$ : (p) reproductive potential: 1146  
sterility: 1146
- Lymantria monacha* Linnaeus - U.25  
[nun moth]  
dispersal, Eu, Dy: 499  
labelling, Eu, Dy: 499
- lysine-r.i.  
puffs, *Drosophila busckii*: 334  
 $^3\text{H}$ -lysine  
*Chironomus tentans* (salivary gland), proteins in: 181  
*Musca domestica*, amino acids, oogenesis: 92  
*Sciara coprophila* (♂) (salivary gland), nucleoprotein: 331
- DL-lysine- $^{14}\text{C}$   
*Bombyx mori*, fibroin, incorporation into: 117
- L-lysine- $^{14}\text{C}$   
cyanide: rat (brain), transport in: 597
- L-lysine-U- $^{14}\text{C}$   
*Phormia regina*, protein: 142
- lysinoalanine  
*Bombyx mori*, formation in,  $^{14}\text{C}$ : 211

## M

- Macrosiphum pelargonii* (Kaltenbach) - QQ.2  
parathion, uptake,  $^{35}\text{S}$ : 802  
residues after 24 h,  $^{35}\text{S}$ : 802
- Macrosiphum pisi* - QQ.2  
SD 8447, toxicity of: 799
- Macrosteles fascifrons* - QQ.14/15  
virus transmission, r.i.: 560
- Macrothylacia rubi* Linnaeus - U.22  
 $^{85}\text{Sr}$ ,  $^{131}\text{I}$ ,  $^{137}\text{Cs}$ , distribution in (♂): 53



Madeira cockroach: see *Leucophaea maderae*

maize \*

- phorate, metabolism of,  $^{32}\text{P}$ : 798
- uptake and distribution of,  $^{32}\text{P}$ : 798

6-methoxybenzoxazolinone: *Ostrinia nubilalis* resistance,  $^{14}\text{C}$ : 903

$\gamma$ : disinfection: 1640

*Malacosoma americanum* (Fabricius) - U.22

[Eastern tent caterpillar]

protein synthesis in,  $^3\text{H}$ : 359

RNA synthesis in,  $^3\text{H}$ : 359

$\gamma$ : (13,4) lethal effects: 1443

(nucleolar-polyhedrosis-infected  $\ell$ ): 1443

virus (nuclear-polyhedrosis-) development

( $\ell$ ): 1443

*Malacosoma neustria* L. - U.22

[tent caterpillar]

proteins (ovary),  $^3\text{H}$ : 416

RNA (ovary),  $^3\text{H}$ : 416

malathion [PA.9]

-/x: *Musca domestica*, toxicity: 1162

x: flies (p, a), changes in susceptibility, sexual differences: 1171

malathion- $^{14}\text{C}$

cotton, persistence in: 695

man (liver), metabolism in: 835

*Musca domestica*, metabolism in: 1791

*Oncopeltus fasciatus* (e, emb), uptake by: 610

*Pseudomonas* sp., metabolism in,  $^{14}\text{C}$ : 757

rat (liver), metabolism in: 835

soil, degradation by: 757

*Trichoderma viride*, metabolism in,  $^{14}\text{C}$ : 757

malathion- $^{32}\text{P}$

synthesis: 741, 743

cattle (heifer), metabolism in: 794

residues (in bone, liver, meat

cuts, pancreas, thymus,

thyroid): 794

hen nematodes: 794

malathion- $^{35}\text{S}$

synthesis: 743

field tests, metabolism and residues: 586

maleic hydrazide

-/y: *Drosophila melanogaster*, sex-linked

recessive lethals: 1214

mallow moth: see *Pectinophora malvella*

malonate-1- $^{14}\text{C}$

*Locusta migratoria*, fat synthesis: 403

malonate-2- $^{14}\text{C}$

*Locusta migratoria*, fat synthesis: 403

malonate-3- $^{14}\text{C}$

nicotine biosynthesis: 858-9

mammals

BHC, distribution in tissues,  $^{14}\text{C}$ : 883

carbaryl/2,3-methylenedioxynaphthalene,  $^3\text{H}$ ,  $^{14}\text{C}$ : 840

man

carbaryl, metabolism in liver,  $^3\text{H}$ ,  $^{14}\text{C}$ : 835

malathion, metabolism in liver,  $^{14}\text{C}$ : 835

parathion, percutaneous absorption of,  $^{32}\text{P}$ : 723

*Manduca sexta* (Johannson) - U.48

[tobacco hornworm]

hypocholesterolemic agents:  $\beta$ -sitosterol metabolism,  $^{14}\text{C}$ : 400

SMT: proposals for: 1553

prospects: 1559

sterol metabolism,  $^3\text{H}$ ,  $^{14}\text{C}$ : 399

$^{14}\text{C}$ : 400

$\beta$ -sitosterol dealkylation,  $^3\text{H}$ : 399

manganese-54

*Dytiscus marginalis*, accumulation in: 510

*Hydrophilus piceus*, accumulation in: 510

*Notonecta glauca*, accumulation in: 510

*Ranatra linearis*, accumulation in: 510

*Sympetrum depressiusculum*, accumulation in: 510

mango

$\gamma$ : disinfection: 1636

mango seed weevil: see *Sternonchetus mangiferae*

mantis, Chinese: see *Tenodera aridifolia sinensis*

mantis, European praying: see *Mantis religiosa*

*Mantis religiosa* (Linnaeus) - H.6

[European praying mantis; religious mantis]

billiverdin biosynthesis ( $\ell$ ),  $^{14}\text{C}$ : 199

*Melanoplus femurubrum*, predator of,  $^{32}\text{P}$ : 547

*Marmota m. baibacina*

flea parasites, r.i.: 542

marsh ecosystem

DDT cycling in,  $^{36}\text{Cl}$ : 681

Matacil- $^{14}\text{C}$

[X.3]

bean foliage, metabolism in: 803

plant, metabolism in: 829

*Musca domestica*, metabolism in: 837

metabolism by NADPH $_2$ -

requiring enzyme: 844

albumin: oxidative metabolism by *Musca*

*domestica* microsome-NADPH $_2$

system: 843

rat (liver microsomes), metabolism in: 839

metabolism and persistence in: 827

Matacil, carbonyl- $^{14}\text{C}$ -labelled

bean foliage, metabolism in: 804-5

plant, persistent glycoside metabolites: 830

rat, metabolism in: 828

hydrolysis products in: 828

Matacil, dimethylamino- $^{14}\text{C}$ -labelled

bean foliage, metabolism in: 805

Matacil, N-methyl- $^{14}\text{C}$ -labelled

bean foliage, metabolism in: 805

MC-600

*Musca domestica* (microsomes), metabolism in,

$^{14}\text{C}$ : 841

metabolism in,  $^{14}\text{C}$ : 841

mealworm, lesser: see *Alphitobius diaperinus*

\* See also "corn".

- mealworm, yellow: see *Tenebrio molitor*  
 mealbug, citrus: see *Planococcus citri*  
*Mecostethus grossus* - H.1  
   x: spermatogenesis: 973  
 Mediterranean flour moth: see *Anagasta kuhniella*  
*Megaselia scalaris* (Rondani 1856) - X.23  
   x: chromosome aberrations (recombination): 1019  
     -/low T: chromosome aberrations (recombination): 1019
- Megoura viciae* (Buckl.) - QQ.2  
 alimentary tract,  $^{32}\text{P}$ : 428  
 DNA (nurse cells of amphigonic and parthenogenetic ovaries),  $^3\text{H}$ : 322  
 feeding,  $^{32}\text{P}$ : 428  
 feeding mechanism,  $^{32}\text{P}$ : 476  
 labelling,  $^{32}\text{P}$ : 478
- melanine  
*Lucilia cuprina* (puparium),  $^{14}\text{C}$ : 156  
*Melanophila californica* Van Dyke - V.8  
 [California flatheaded borer]  
 habits, x: 1754  
 late larval mortality, x: 1754
- Melanoplus biliteratus* - H.1  
 food chain,  $^{32}\text{P}$ : 556  
 trophic transfer index,  $^{32}\text{P}$ : 556
- Melanoplus bivittatus* (Say) - H.1  
 [two-striped grasshopper]  
 carbohydrate metabolism,  $^{14}\text{C}$ : 87
- Melanoplus differentialis* - H.1  
 [differential grasshopper]  
 x: (e) development: 187  
 yolk-SH curve: 197
- Melanoplus femur-rubrum* (De Geer) - H.1  
 [red-legged grasshopper]  
 food chain,  $^{32}\text{P}$ : 556  
 labelling,  $^{32}\text{P}$ : 547  
 prey of *Mantis religiosa*,  $^{32}\text{P}$ : 547  
 trophic transfer index,  $^{32}\text{P}$ : 556
- Meligethes aeneus* (Fabricius) - V.35  
 dispersal,  $^{32}\text{P}$ : 506  
 labelling,  $^{32}\text{P}$ : 506  
 migration,  $^{32}\text{P}$ : 498
- Melolontha melolontha* Linnaeus - V.41  
 [cockchafer]  
 x: sterility: 1582  
 y: sterility: 1582
- Melolontha vulgaris* (Fabricius) - V.41  
 [cockchafer]  
 trehalose,  $^{14}\text{C}$ : 91  
 SMT: progress: 1559  
   (small scale), Switzerland: 1581  
   trials: 1569  
   (x), field trial: 1580  
 x: (f) sterility: 1580
- melon fly: see *Dacus cucurbitae*  
 menazon- $^{14}\text{C}$  [PH.9]  
 rat, metabolism in: 703, 726  
 plants, metabolism in: 703
- menazon- $^{32}\text{P}$   
 plants, metabolism in: 703
- Mesuro- $^{14}\text{C}$  [X.2]  
 bean foliage, metabolism in: 803  
 plant, metabolism in: 829  
*Musca domestica*, metabolism in NADPH $_2$ -requiring enzyme: 844  
 albumin: oxidative metabolism by *Musca domestica* microsome-NADPH $_2$  system: 843  
 rat, metabolism and persistence in: 827  
   (liver microsomes), metabolism in: 839
- Mesuro- $^{14}\text{C}$ -labelled  
 bean foliage, metabolism in: 804  
 plant, persistent glycoside metabolites: 830  
 rat, metabolism in: 828  
 hydrolysis products in: 828
- Mesuro- $^{14}\text{C}$  = O-labelled  
*Musca domestica*, metabolism in: 837
- Mesuro- $^{14}\text{C}$ - $\text{N-}^{14}\text{CH}_3$ -labelled  
*Musca domestica*, metabolism in: 837
- metabolism  
 control mechanisms in insects, Rev.: 43
- Metafos  
 production monitoring, r.i.: 1717
- metamorphosis  
 biochemical aspects of, r.i.: 40
- $^{32}\text{P}$ -metepa: 873
- methionine  
*Acantholyda nemoralis*,  $^{14}\text{C}$ : 135
- methionine- $^{35}\text{S}$   
*Bombyx mori*, fibroin, incorporation into: 117  
*Gryllus bimaculatus*, ornithine synthesis in: 186  
 insect parasite, nutrition of: 536
- methionine-L- $^{35}\text{S}$   
*Antheraea pernyi*: 206  
*Bombyx mori*: 206
- methionine (methyl- $^{14}\text{C}$ )  
 RNA methylation, *Smittia parthenogenetica* (f)(silk gland): 344
- 2- $^{14}\text{C}$ -6-methoxy-2(3)-benzoxazolinone  
 maize resistance to *Ostrinia nubilalis*: 903
- methyl alcohol- $^{14}\text{C}$   
*Periplaneta americana* (abdominal nerve cord), permeability: 372
- methyl- $^{14}\text{C}$ -amine  
 bean plant, methyl carbamate metabolism in: 829
- methyl- $^{14}\text{C}$ -amine hydrochloride  
 rat, methylcarbamate metabolism in: 828
- methylcarbamates- $^{14}\text{C}$   
 rat, metabolism in: 828  
 metabolism and persistence in: 827
- 3-methylcholanthrene- $^3\text{H}$   
*Drosophila hydei* (salivary gland), localization in: 451
- 2,3-methylene-dioxynaphthalene [A.10]  
 mammals, synergistic action,  $^3\text{H}$ ,  $^{14}\text{C}$ : 840

- Musca domestica*, synergistic action,  $^3\text{H}$ ,  $^{14}\text{C}$ : 849
- methylene- $^{14}\text{C}$ -dioxyphenyl compounds [A.6]  
insecticide synergist: 892  
synthesis: 896
- Musca domestica*, metabolism in: 892-3  
rat, metabolism in: 893
- DL-(N-methyl- $^{14}\text{C}$ )-8-methylcholine chloride: 389
- O-methyl O-p-methylthiophenyl methylphosphonothionate- $^{32}\text{P}$   
cotton plant, metabolism in: 705, 774  
uptake and translocation in: 705, 774
- methyl paraoxon- $^{14}\text{C}$  [PC.1]  
mammalian liver, desalkylation and toxicity: 733
- methyl paraoxon- $^{32}\text{P}$   
cauliflower: 788  
Chilo suppressalis, degradation by: 788  
Periplaneta americana: 788  
rat (liver homogenates): 788
- methyl parathion- $^{32}\text{P}$   
Insects:  
Bombyx mori (f 5, midgut), degradation by: 725  
Chilo suppressalis, degradation by: 724, 788  
*Musca domestica*, R- and S-, metabolism in: 735  
Periplaneta americana: 788  
Xylotrupes dichotomus, degradation by: 724  
(f 3), degradation by: 725
- Other Animals:  
mice, metabolism in: 734, 736  
toxicity in: 736  
rats, degradation by: 724  
(liver), degradation by: 725  
(liver homogenates): 788
- Miscellaneous:  
carrots: distribution and hydrolysis in: 719  
residues in: 718  
cauliflower: 788  
protective clothing, permeability of: 712
- $^3\text{H}$ -methyl thymidine  
Bombyx mori (silk gland), DNA: 280-1
- $^{14}\text{C}$ -mevalonic acid  
Hyalophora cecropia, sterol metabolism: 375
- mevalonate- $^{14}\text{C}$   
Acanthomyops claviger, monoterpene synthesis: 376
- Anisomorpha buprestoides, cyclopentanoid  
terpene biosynthesis in: 388
- $^{14}\text{C}_2$ -mevalonic acid  
Coryra cephalonica, cholesterol metabolism: 392
- Mexican fruit fly: see Anastrepha ludens
- Mexico  
SMT, Anastrepha ludens: 1803
- mice  
methyl parathion, metabolism,  $^{32}\text{P}$ : 736
- Sumithion, metabolism,  $^{32}\text{P}$ : 738
- Microbracon hebetor - W.5  
 $^{14}\text{C}$ -8-azaguanine (a?): 127
- Microcerotermes edentatus Wasmann - K.4  
intestinal transit, x: 1743
- microdoser  
insecticide application: 1753
- microflora  
 $\gamma$ -BHC degradation in tropical soils,  $^{14}\text{C}$ : 655
- microorganisms  
dieldrin degradation by,  $^{14}\text{C}$ : 660
- Middle east  
SMT, progress report, Anopheles pharoensis: 1544  
Ceratitis capitata: 1544
- midgut  
radiation: Anthonomus grandis: 1331
- milk  
fenthion, residues of,  $^{32}\text{P}$ : 747  
Guthion, residues of,  $^{32}\text{P}$ : 721  
Temik, residues of,  $^{35}\text{S}$ : 818  
trichlorfon, degradation of,  $^{32}\text{P}$ : 709  
trichlorfon, residues of,  $^{32}\text{P}$ : 784, 788  
trichlorometaphos,  $^{32}\text{P}$ ,  $^{35}\text{S}$ : 760
- milkweed bugs - Q.10  
 $^{18}\text{W}$ , metabolism of: 507
- mite, grain: see Acarus siro
- mites - Ac.  
on kangaroo rats, radioecology, Nevada test site: 1524
- mites, forest  
mineral cycling: 514
- mites, grain-infesting  
 $\gamma$ : lethal effects: 1686  
sterility: 1686
- mitomycin  
fibroin synthesis, Bombyx mori (f)(posterior silk gland),  $^{14}\text{C}$ : 221  
-, x: Habrobracon (oocytes, sperm), mutagenic effects: 1274  
-,  $\gamma$ : Drosophila melanogaster, sex-linked recessive lethals: 1280  
sex-linked recessive semi-lethals: 1280
- mitomycin C  
-/y: Drosophila melanogaster, mutagenic effects: 1211
- mobile gamma irradiator (MGI)  
AEC irradiator programme: 1659
- monkey  
chlordane/digoxin- $^3\text{H}$ : heart, liver tissue: 651  
DDT/digoxin- $^3\text{H}$ : heart, liver tissue: 651
- monoamine oxidase  
Tribolium confusum, role in,  $^{14}\text{C}$ : 129
- monoterpene  
synthesis in ant,  $^{14}\text{C}$ : 376

- Mordellistena sp. - V.33  
(flower beetle)  
food chain,  $^{32}\text{P}$ : 556  
trophic transfer index,  $^{32}\text{P}$ : 556
- Mormoniella  
x: eye colour mutations: 1115
- Mormoniella vitripennis (Walker) - W.7  
x: dominant lethals: 1129  
(e) dose-action curves: 1114  
eye colour mutations: 1060  
sex-linked recessive lethals: 1129  
sperm, mutagenesis: 1114  
n: (e) dose-action curves: 1114  
 $n_1$ : eye colour mutations: 1060  
 $n_3$ : eye colour mutations: 1060  
radiation: life span (a): 1408
- mosaics  
 $^{32}\text{P}$ : Drosophila (sperm), DNA: 35
- mosquito\* - X.11  
orally effective repellent,  $^{14}\text{C}$ : 901-2  
sterilization: 1713
- mosquito, common malaria: see Anopheles  
quadrimaculatus  
Southern house: see Culex pipiens  
quinquefasciatus  
wheat-stem gall: see Haplodiplosis  
equestris  
yellow fever: see Aedes aegypti
- mosquitoes - X.11  
insecticide resistance in, r.i.: 585  
labelling, dispersal: 22  
ecology: 22  
human blood preferences: 22  
migration: 22  
population density: 22  
SMT, trials: 1569
- moth, Angoumois grain: see Sitotroga cerealella  
cecropia: see Hyalophora cecropia  
codling: see Carpocapsa pomonella  
cynthia: see Samia cynthia  
common gipsy: see Porthetria dispar  
European pine shoot: see Rhyacionia buoliana  
gipsy: see Lymantria dispar  
greater wax: see Galleria mellonella  
hawk: see Celerio euphorbia  
hollyhock seed: see Pectinophora malvella  
Japanese oak: see Antheraea pernyi  
leaf roller: see Grapholitha molesta  
mallow: see Pectinophora malvella  
Mediterranean flour: see Anagasta kuhniella  
Ephestia kuhniella  
polyphemus: see Antheraea polyphemus  
unmatched gipsy: see Ocneria dispar  
wood: see Zeuzera aesculi

- moth  
S: eye: 1317
- moths - U.  
food chain,  $^{32}\text{P}$ : 556  
trophic transfer index,  $^{32}\text{P}$ : 556  
SMT, Canada: popularized: 1619
- mouse  
aldrin, metabolism of,  $^{14}\text{C}$ : 646  
carbaryl, metabolism of,  $^{14}\text{C}$ : 746-7  
chlordane, metabolism of,  $^{14}\text{C}$ : 646  
DDT tolerance,  $^{14}\text{C}$ : 608  
DFP: uptake and toxicity,  $^{32}\text{P}$ : 771  
uptake (diaphragm, end plates),  $^{14}\text{C}$ ,  $^{32}\text{P}$ : 773  
dieldrin, metabolism of,  $^{14}\text{C}$ : 646  
dihydroheptachlor, metabolism of,  $^{14}\text{C}$ : 646  
dimethoate, metabolism of, in vivo and  
in vitro,  $^{32}\text{P}$ : 763  
endosulfan, metabolism, storage and excretion  
of,  $^{14}\text{C}$ : 619  
endrin, metabolism of,  $^{14}\text{C}$ : 646  
EPN: dimethoate metabolism (?),  $^3\text{H}$ : 797  
toxicity (?): 797  
heptachlor, metabolism of,  $^{14}\text{C}$ : 646  
mosquito repellent, assay,  $^{14}\text{C}$ : 901-2  
methyl parathion, metabolism of,  $^{32}\text{P}$ : 734  
parathion, metabolism in liver microsomes,  
 $^{32}\text{P}$ : 763  
Sumithion, metabolism of,  $^{32}\text{P}$ : 734  
telodrin, metabolism of,  $^{14}\text{C}$ : 646  
trichlorometaphos, metabolism,  $^{32}\text{P}$ ,  $^{35}\text{S}$ : 780  
varnidothion, metabolism of, in vivo and  
in vitro,  $^{32}\text{P}$ : 763  
x/ Apis mellifera venom: lethal effects: 1723  
-/dimethyl sulphoxide: lethal effects: 898
- mud  
DDT in,  $^{14}\text{C}$ : 616
- Musca domestica (Linnaeus) - X.19  
[housefly]  
228  
acetylcholine (brain), metabolism and signi-  
ficance of,  $^{14}\text{C}$ : 463  
albumin: oxidative metabolism of Baygon,  $^{14}\text{C}$ :  
843  
Matacil,  $^{14}\text{C}$ :  
843  
Mesurol,  $^{14}\text{C}$ :  
843  
UC-10854,  
 $^{14}\text{C}$ : 843  
Carbaryl- $^{14}\text{C}$ :  
843  
amino acid incorporation: 92  
6-azauridine: DNA synthesis (ovary),  $^3\text{H}$ : 437  
RNA synthesis (ovary),  $^3\text{H}$ : 437  
ovary (development),  $^{14}\text{C}$ : 437  
breeding sites, detection of,  $^{32}\text{P}$ : 9, 10  
Ca: ethanolamine incorporation (fat body)(?),  
 $^{14}\text{C}$ : 365-7

\* See under individual species; also Table 1, X.11,  
Culicidae.

- Ca: serine incorporation (fat body)( $\ell$ ),  $^{14}\text{C}$ : 367
- cholestanone to cholesterol conversion ( $\ell$ ),  $^{14}\text{C}$ : 370
- cholesterol, metabolism and utilization,  $^{14}\text{C}$ : 466
- DNA, oogenesis (oocyte chromosomes, nucleoli),  $^3\text{H}$ : 418
- RNA, oogenesis (oocyte chromosomes, nucleoli),  $^3\text{H}$ : 418
- supply, oogenesis: 92
- synthesis, oogenesis,  $^3\text{H}$ : 417
- synthesis in,  $^3\text{H}$ : 359
- ecdysone: DNA synthesis,  $^3\text{H}$ : 176
- glucose metabolism,  $^3\text{H}$ : 176
- protein metabolism,  $^3\text{H}$ : 176
- RNA synthesis,  $^3\text{H}$ : 176
- ethanolamine incorporation (fat body)( $\ell$ ),  $^{14}\text{C}$ : 368
- 5-fluorouracil: (e) sterility: 885
- RNA: 885
- glycogen accumulation, oogenesis: 92
- 2-imidazolidinone: acetate incorporation,  $^{14}\text{C}$ : 891
- lipid content (ovary),  $^{14}\text{C}$ : 891
- labelling,  $^{32}\text{P}$ : 9, 10, 1791
- mitochondria, oxidative phosphorylation and respiratory control in,  $^{14}\text{C}$ : 445
- oogenesis,  $^3\text{H}$ : 417-8
- phenols-phosphate conjugation in: 593
- phosphatide biosynthesis ( $\ell$ ),  $^{14}\text{C}$ : 368
- phospholipids (subcellular fractions),  $^{32}\text{P}$ : 380
- protein synthesis in,  $^3\text{H}$ : 359
- oogenesis,  $^3\text{H}$ : 417
- polyribosomes,  $^{14}\text{C}$ : 232
- serine incorporation ( $\ell$ ), phosphatides,  $^{14}\text{C}$ : 368
- Insecticides:
- insecticide metabolism, r.i.: 888
- allethrin, metabolism of,  $^{14}\text{C}$ : 852
- apholate: nucleotide ratios (e),  $^{14}\text{C}$ : 887
- RNA synthesis (e),  $^{32}\text{P}$ ,  $^{14}\text{C}$ : 887
- azodrin, metabolism of,  $^{14}\text{C}$ ,  $^{32}\text{P}$ : 700
- Banol, metabolism by  $\text{NADPH}_2$ -requiring enzyme system,  $^{14}\text{C}$ : 844
- metabolism of,  $^{14}\text{C}$ : 837
- Baygon, metabolism by  $\text{NADPH}_2$ -requiring enzyme system,  $^{14}\text{C}$ : 844
- metabolism of,  $^{14}\text{C}$ : 837, 897
- carbaryl, absorption and metabolism,  $^{14}\text{C}$ : 815
- metabolism by  $\text{NADPH}_2$ -requiring enzyme system,  $^{14}\text{C}$ : 844
- carbaryl/2, 3-methylenedioxynaphthalene,  $^3\text{H}$ ,  $^{14}\text{C}$ : 840
- chemosterilants, metabolism, r.i.: 888
- DDT and derivatives, metabolism and toxicity,  $^3\text{H}$ : 870
- DDT: convulsive hydrazides: metabolism,  $^{14}\text{C}$ : 615
- formate and proline metabolism,  $^{14}\text{C}$ : 138
- glucose incorporation (DDT-R-),  $^{14}\text{C}$ : 111
- glycine incorporation (DDT-R-),  $^{14}\text{C}$ : 111
- metabolism of,  $^{14}\text{C}$ : 680, 1791
- retention of,  $^{14}\text{C}$ : 690
- DDT-resistance,  $^{36}\text{Cl}$ : 624
- diazinon penetrability, R- and S- ( $\ell$ ),  $^{32}\text{P}$ : 750
- dieldrin: application method: toxicity and distribution,  $^{14}\text{C}$ : 680-1
- metabolism in S- and R-,  $^{14}\text{C}$ : 674
- uptake by S- and R-,  $^{14}\text{C}$ : 674
- dimethoate, metabolism of,  $^3\text{H}$ : 797
- dimethrin, metabolism of,  $^{14}\text{C}$ : 862
- dimetilan, detoxication of,  $^{14}\text{C}$ : 848
- metabolism of,  $^{14}\text{C}$ : 848
- dl-cis-trans-allethrin-2- $^{14}\text{C}$ , metabolism of: 849
- EPN: dimethoate metabolism,  $^3\text{H}$ : 797
- toxicity: 797
- 4-HBT, metabolism of,  $^{14}\text{C}$ : 841
- hemel, metabolism of,  $^{14}\text{C}$ : 878
- hemel: sterility,  $^{14}\text{C}$ : 876
- hempa, metabolism of,  $^{14}\text{C}$ : 877
- hempa: sterility,  $^{14}\text{C}$ : 877
- HRS-1422, metabolism by  $\text{NADPH}_2$ -requiring enzyme system,  $^{14}\text{C}$ : 844
- Isolan, metabolism by  $\text{NADPH}_2$ -requiring enzyme system,  $^{14}\text{C}$ : 844
- malathion metabolism,  $^{14}\text{C}$ : 1791
- Matacil, metabolism of,  $^{14}\text{C}$ : 837
- metabolism by  $\text{NADPH}_2$ -requiring enzyme system,  $^{14}\text{C}$ : 844
- MC-600, metabolism of,  $^{14}\text{C}$ : 841
- Mesuirol, metabolism of,  $^{14}\text{C}$ : 837
- metabolism by  $\text{NADPH}_2$ -requiring enzyme system,  $^{14}\text{C}$ : 844
- methylenedioxyphenyl compounds, metabolism of,  $^{14}\text{C}$ : 892-3
- methyl parathion, metabolism in R- and S-,  $^{32}\text{P}$ : 735
- 1-naphthol: glucuronide conjugates,  $^{14}\text{C}$ : 596
- metabolism of,  $^{14}\text{C}$ : 598
- naphthalene detoxication (R- and S-strains): 594
- naphthol detoxication (R- and S-strains): 594
- oxidative phosphorylation (flight muscle; particulate fractions of),  $^{32}\text{P}$ : 459
- parathion, metabolism of,  $^{35}\text{S}$ : 767
- phosphamidon, metabolism of,  $^{14}\text{C}$ ,  $^{32}\text{P}$ : 702
- phthalthrins, metabolism of,  $^{14}\text{C}$ : 852
- pyrethrin-I, metabolism of,  $^{14}\text{C}$ : 852
- resistance to,  $^{14}\text{C}$ : 851
- SD 7859, sorption by head homogenates,  $^{14}\text{C}$ : 698
- SD 8447, sorption by head homogenates,  $^{14}\text{C}$ : 698
- toxicity of: 799

- sesamex: DDT-resistance,  $^{14}\text{C}$ : 567  
 Sumithion, metabolism in R- and S-,  $^{32}\text{P}$ : 735  
 Temik, metabolism of,  $^{14}\text{C}$ : 836  
 $^{14}\text{C}$ ,  $^{35}\text{S}$ : 806, 814
- tapa, metabolism of,  $^{14}\text{C}$ : 875  
 tepa: sterility,  $^{14}\text{C}$ : 875  
 thiotapa: nucleotide ratios (e),  $^{14}\text{C}$ : 887  
 RNA synthesis (e),  $^{14}\text{C}$ ,  $^{32}\text{P}$ : 887  
 UC 10854, metabolism by NADPH<sub>2</sub>-requiring enzyme system,  $^{14}\text{C}$ : 844  
 Zectran, metabolism by NADPH<sub>2</sub>-requiring enzyme system,  $^{14}\text{C}$ : 844
- x: chlorophyll susceptibility: 1170  
 chromosome aberrations, cytological analysis of: 1046
- DDT susceptibility: 1170  
 development: 1380  
 hexachlorane susceptibility: 1170  
 lethal effects: 1380  
 life span (♀): 1381  
 longevity: 1380  
 (p), eclosion (a): 1422  
 life span: 1421-2  
 senescence: 1421  
 sex ratio: 1422  
 trehalose content and metabolism: 1314  
 translocation analysis: 1113  
 wing retention: 1380-1, 1421
- γ: cholinesterase (brain): 1296  
 (various preparations): 1295  
 eclosion: 1233  
 sterility: 1233, 1570, 1791  
 -, chemosterilants: sterility: 1570  
 -/air: eclosion: 1233  
 -/CO<sub>2</sub>: sterility: 1233  
 -/O: eclosion: 1233  
 EM, scanning-, head, eye: 1747
- Musca domestica nebulosa - X, 19  
 x: (p) adult emergence: 1372
- muscle, fibril  
 $^{32}\text{PO}_4$ , Apis mellifera: 69
- mussel, fresh water  
 diazinon metabolism in,  $^{14}\text{C}$ : 761  
 parathion metabolism in,  $^{35}\text{S}$ : 761
- mutants  
 Drosophila melanogaster, computer file: 1785
- Mutillidae - W, 18  
 sphaerophthalmine (♂), Nevada test site: 1523  
 (U- $^{14}\text{C}$ ) myoinositol  
 locust, scylloinositol in: 362  
 myristicin- $^{14}\text{C}$  [A.9]  
 synthesis: 896
- Myrmica l. fracticornis - W, 14  
 Aedes predation,  $^{32}\text{P}$ : 11
- Myzocallis discolor - QQ, 2  
 γ(chronic): oak forest, aphid population explosion: 1530
- Myzodes persicae Sulzer - QQ, 2  
 host plant, trophic relation with,  $^{14}\text{C}$ : 471
- labelling,  $^{14}\text{C}$ : 471  
 $^{32}\text{P}$ : 470  
 nutrition,  $^{32}\text{P}$ : 470
- Myzus ascalonicus - QQ, 2  
 virus transmission, radioisotopes: 560
- Myzus persicae (Sulzer) - QQ, 2  
 [green peach aphid]  
 amino acid requirements,  $^{14}\text{C}$ : 175  
 feeding,  $^{32}\text{P}$ : 475  
 through parafilm membrane,  $^{32}\text{P}$ : 486  
 labelling,  $^{32}\text{P}$ : 19  
 laser: APX, 9  
 phosphamidon, uptake of,  $^{32}\text{P}$ : 486  
 virus (beet western yellows) transmission,  $^{32}\text{P}$ : 475  
 transmission, r.i.: 560
- N
- NAD kinase  
 DDT: Triatoma infestans, induction in,  $^{14}\text{C}$ : 112
- naphthalene-1- $^{14}\text{C}$   
 Musca domestica (R- and S-), detoxication: 594
- ( $^{14}\text{C}$ )1-naphthol  
 Costelytra zealandica, glucuronide conjugates in: 596  
 Lucilia sericata, glucuronide conjugates in: 596  
 Musca domestica, glucuronide conjugates in: 596  
 metabolism in: 593
- 1-naphthol-1- $^{14}\text{C}$   
 synthesis: 606  
 bean plant, metabolism in: 829  
 Musca domestica (R- and S-detoxication): 594  
 rat, methylcarbamate metabolism in: 828
- Nasonia brevicornis: see Mormoniella vitripennis
- Nauphoeta cinerea - H, 2  
 x: ovary: 1125  
 sterility, ♀: 1125
- Necrobia - V, 15  
 (-ham beetle)  
 γ: lethal effects: 1649  
 stage susceptibility: 1649  
 fish disinfection: 1627
- Necrophorus sp. - V, 43  
 $^{86}\text{Sr}$ ,  $^{131}\text{I}$ ,  $^{137}\text{Cs}$ , distribution in (a): 53
- nematodes  
 malathion: lethal effects on,  $^{32}\text{P}$ : 794
- Nemeritis canescens (Gravenhorst) - W, 16  
 x: behaviour: 1298  
 development: 1298  
 lethal effects: 1298  
 life span: 1298  
 stage susceptibility: 1298
- Neodiprion pratti Dyar - W, 12  
 [Virginia sawfly; jack-pine sawfly]  
 amino acid requirements,  $^{14}\text{C}$ : 175

## nerve components

DDT: *Periplaneta americana*, interaction with,  
<sup>14</sup>C: 659

dieldrin: *Blattella germanica*: 657

## nerve cord

*Periplaneta americana* (abdominal-), aliphatic  
alcohol permeability, <sup>3</sup>H, <sup>14</sup>C: 372  
ammonium salt (quaternary),  
permeability to, <sup>3</sup>H: 61  
fatty acid permeability, <sup>14</sup>C: 372

## neurochemistry

arthropods; textbook; r.f.: 461

## neurohormones

*Periplaneta americana*, properties, <sup>35</sup>S: 168

## neutron activation

labelling, *Ceratitis capitata*: 1594

*Lymantria monacha*: 499

## neutron activation analysis

chlorinated hydrocarbons in atmosphere, <sup>38</sup>Cl:  
665

Dyprosium labelling, *Lymantria monacha*: 499

Europium labelling, *Lymantria monacha*: 499

insecticide metabolites: 1730

residues: 1730, 1734

pesticide efficacy: 1732

residue determination: 579, 1732-3

stored products, methyl bromide residues in:  
1731

## neutrons

*Apis mellifica*, susceptibility: 1334

*Ceratitis capitata*, sterilization: 1562

(14 MeV): *Dahlbomius fuscipennis* (a, ♀), eye  
colour mutations: 1053

-, γ: 1053

*Drosophila*: 909

mutagenic effects: 1269, 1283

(sperm), chromosome aberrations

(exchanges): 1008

*Drosophila melanogaster*: chromosome

aberrations: 1513

(12-14 MeV): chromo-

some breaks: 1026

chromatid mutations:

1068

dominant lethals:

1147

germ cells (♀): 937

(14 MeV): germ

cells, pre- and

post-meiotic: 949

(0.2-0.3 MeV):

oogonia, oocytes:

1189

*Mormoniella*, eye colour mutations: 1060

*Mormoniella vitripennis* (e): 1114

silkworm: mutagenic effects: 1283

mutations: 1213

(14 MeV): mosaics: 1271

silkworm, visible recessive egg

colour mutations: 1271

visible recessives: 957;

(Xgonia): 1091

(14 MeV)/x: *Drosophila* (sperm), chromosome  
aberrations (exchanges): 1008

*Drosophila melanogaster*, chromo-

some breaks: 1026

-, x: *Drosophila melanogaster*, germ cells, pre-  
and post-meiotic: 949

oogonia, oocytes: 1189

-/5-BUDR: silkworm, mutations: 1213

## neutrons (fast)

*Drosophila melanogaster*, sex-linked recessive

lethals: 1186

translocations: 1186

*Mormoniella*, eye colour mutations: 1060

## Nevada Test Site

environmental radiation: arthropods: 511

## New Zealand

SMT: *Carpocapsa pomonella*, prospects: 1590

## Nicaragua

SMT, *Ceratitis capitata*: 1602

## Nicotiana tabacum

nicotine biosynthesis, <sup>14</sup>C: 865, 868

## nicotine [B.6]

biosynthesis, <sup>3</sup>H, <sup>14</sup>C: 867, 869; Rev.: 862

methyl-labelled, metabolism, <sup>14</sup>C: 853

*Nicotiana tabacum*, biosynthesis in, <sup>14</sup>C: 868

nicotinic acid, incorporation of, <sup>14</sup>C: 865

pyridine ring, biosynthesis, <sup>14</sup>C: 856

ring-labelled, metabolism, <sup>14</sup>C: 853

nicotine-<sup>14</sup>C

synthesis: 857, 860

*Nicotiana glutinosa*, <sup>14</sup>CO<sub>2</sub>: 861

aspartate and malonate in pyridine ring of: 858,

859

frog sartorius muscle, <sup>45</sup>Ca-movements: 866

contracture: 866

uptake by: 866

metabolism: 857

tobacco leaves, stereospecific demethylation  
in: 860

nicotine-2-<sup>3</sup>H

biosynthesis: 863

*Aedes aegypti* (♀), metabolism and toxicity:

863

nicotine-2-<sup>14</sup>C-DL

synthesis: 853-4

*Arthobacter oxidans*, metabolism in: 855

rabbit (liver), metabolism in: 855

(—)-nicotine-<sup>14</sup>CH<sub>3</sub>

dog, metabolism in: 864

rat, metabolism in: 864

d-nicotine-<sup>14</sup>CH<sub>3</sub>

nicotine demethylation: 860

l-nicotine-<sup>14</sup>CH<sub>3</sub>

*Arthobacter oxidans*, metabolism in: 855

- nicotine demethylation: 860  
 rabbit (liver), metabolism in: 855  
 nicotinic acid-<sup>3</sup>H  
 nicotine, biosynthesis of: 862, 869  
 (7-<sup>14</sup>C)-nicotinic acid  
 nicotine synthesis: 864  
 nicotinic acid [2, 3, 7-<sup>14</sup>C]  
 nicotine, biosynthesis: 865, 867  
 niobium-95  
 EDTA: *Culex pipiens*, accumulation coefficient: 83  
 nitric oxide  
 -/x: *Drosophila melanogaster*, genetic effects: 1190  
 -/x/time factor: *Drosophila melanogaster*, stage susceptibility, spermatogenesis: 1246  
 nitrogen  
 catabolism in insects, r.i.: 208  
 insects, excretion by, γ.i.: 125  
 metabolism and uric acid, *Anthonomus grandis*, <sup>14</sup>C: 414  
 -/x: *Drosophila*: post-radiation recovery (spermatids, spermatocytes): 1242  
 sex-linked recessive lethals: 1242, 1263  
 spermatogenesis: 950  
 spermatids, spermatozoa: 1235  
 radiosensitivity and recovery: 970, 1234, 1236, 1244  
*Drosophila melanogaster*, chromosome aberrations: 1229  
 dominant lethals: 1224  
 (e): 1194  
 (e), lethal effects: 1438  
 sex-linked recessive lethals: 1438  
 (emb), lethal effects: 1395  
 stage susceptibility: 1395  
 sex-linked lethals: 1229  
 sex-linked recessive lethals: 985, 1438  
 spermatogenesis: 1229  
 sperm physiology: 1224  
 (24-h-p), post-irradiation recovery (spermatids): 1243  
*Periplaneta americana*: lethal effects: 1193  
 -/x/ATP: *Drosophila melanogaster* (σ), chromosome aberrations: 1208  
 -/γ: silkworm (spermatozoa, spermatids): 1238  
 nitrogenous compounds  
 insects, intermediary metabolism, r.i.: 130  
 nitroso compounds  
 -, x: *Drosophila melanogaster*, mutagenic effects: 1284  
 Noctuidae - U.29  
<sup>85</sup>Sr, <sup>131</sup>I, <sup>137</sup>Cs: accumulation and elimination of: 52  
 x: behaviour: 1476  
 Northern blowfly: see *Protophormia terrae-novae*  
 Northern cattle grub: see *Hypoderma bovis*  
 Nosema whitei  
 -/x: *Tribolium castaneum*, radiosensitivity: 1163  
*Notonecta glauca* (Linnaeus) - Q.14  
 accumulation, <sup>54</sup>Mn, <sup>90</sup>Sr, <sup>106</sup>Ru, <sup>137</sup>Cs, <sup>144</sup>Ce: 510  
<sup>32</sup>P: biological half-life of: 1728  
<sup>86</sup>Rb: biological half-life of: 1728  
<sup>131</sup>I: biological half-life of: 1728  
 nuclear catastrophe  
 insects, effects on: 1529  
 nuclear energy  
 in agriculture: 1576  
 in the food industry: 1576  
 nuclear polyhedrosis  
 x: pathogenesis, insects: 1165  
 nuclear polyhedrosis virus  
*Bombyx mori* (f), DNA synthesis, <sup>3</sup>H: 352  
 protein synthesis, <sup>3</sup>H: 233  
 RNA synthesis, <sup>3</sup>H: 352  
*Peridromasauca* (f), transaminase activity, <sup>14</sup>C: 462  
 γ: *Malacosoma americanum*: 1443  
 nucleoprotein  
*Sciara coprophila* (f) (salivary gland chromosomes), <sup>3</sup>H: 331  
 nucleosides, halogenated  
 -/x: *Tribolium confusum*, lethal effects: 1458  
 nucleotide  
 ratios, *Musca domestica* (e), effects of apholate on, <sup>14</sup>C: 887  
 effects of thiotepa on, <sup>14</sup>C: 887  
 nucleotides  
*Bombyx mori* (silk gland), acid soluble, <sup>14</sup>C: 122  
 nucleotides, free  
 insects, r.i.: 340  
 nun moth: see *Lymantria monacha*  
 nutrition\*  
 insect-, <sup>14</sup>C: 44  
*Nysius raphanus* - Q.10  
 food chain, <sup>32</sup>P: 556  
 trophic transfer index, <sup>32</sup>P: 556

\* See also "amino acid requirements", "sterols", and sections 1.3.2.1. and 1.2.10.



## O

- oak  
 y (chronic): aphid population explosion: 1530  
 oak silkworm: see *Antheraea pernyi*
- oals  
 seed infestation, detection of, x: 1707
- Ocnieria dispar* (Linnaeus) - U.25  
 [unmatched gipsy moth]  
 x: colour mutation: 1360  
 (f) development: 1360  
 pathogen susceptibility: 1360  
 sterility: 1360  
 y: colour mutation: 1360  
 (f) development: 1360  
 pathogen susceptibility: 1360  
 sterility: 1360  
 x, y: (f) colour mutation: 1360  
 development: 1360  
 pathogen susceptibility: 1360  
 sterility: 1360
- octanoate, sodium-1-<sup>14</sup>C: 615  
 1-<sup>14</sup>C-octanoic acid  
*Periplaneta americana* (abdominal nerve cord): 372
- octyl alcohol-1-<sup>14</sup>C  
*Periplaneta americana* (abdominal nerve cord), permeability: 429
- Odonata* - F.  
<sup>32</sup>P-uptake and clearance, Roumanian brackish lakes: 531
- Oecanthus celerinictus* - H.4  
 [tree cricket]  
 food chain, <sup>32</sup>P: 556  
 trophic transfer index, <sup>32</sup>P: 556
- Oedipoda coerulea* Linnaeus - H.1  
<sup>85</sup>Sr, <sup>131</sup>I, <sup>137</sup>Cs, distribution in (a): 53
- old-house borer: see *Hylotrpes bajulus*
- Olibrus* sp. - V.39  
 (flower beetle)  
 food chain, <sup>32</sup>P: 556  
 trophic transfer index, <sup>32</sup>P: 556
- olives  
 Rogor, metabolism and residues in, <sup>32</sup>P: 769
- olive oil  
 Rogor, residues in: 696
- ommies  
*Gryllus bimaculatus*, synthesis in, <sup>3</sup>H, <sup>35</sup>S: 186
- ommochrome  
 grasshopper (eye), <sup>14</sup>C: 185
- ommochromes  
*Gryllus bimaculatus*, biochemistry of, <sup>3</sup>H, <sup>35</sup>S: 186
- omnivorous leaf roller - V.19  
 radiation: biological control: 1555
- Omocestus viridulus* - H.1  
 x: spermatogenesis: 973
- Oncopeltus fasciatus* (Dallas) - Q.10  
 [large milkweed bug]
- <sup>3</sup>H: 228  
 Baygon, (e, emb) uptake by, <sup>14</sup>C: 810  
 carbaryl, (e, emb) uptake by, <sup>3</sup>H: 610  
 carbohydrate metabolism, <sup>14</sup>C: 87  
 DDT, (e, emb) uptake by, <sup>14</sup>C: 610  
 metabolism of, <sup>14</sup>C: 690  
 retention of, <sup>14</sup>C: 690  
 DFP, (e, emb) uptake by, <sup>3</sup>H: 610  
 dieldrin, (e, emb) uptake by, <sup>14</sup>C: 610  
 dimethoate, (e, emb) uptake by, <sup>3</sup>H: 610  
 metabolism of, <sup>3</sup>H: 797  
 DIP, (e, emb) uptake by, <sup>3</sup>H: 610  
 DNA, (e-development), <sup>3</sup>H: 282  
 synthesis (e)(ribosomes), <sup>3</sup>H: 157  
 EPN: dimethoate metabolism, <sup>3</sup>H: 797  
 toxicity: 797  
 famphur, (e, emb) uptake by, <sup>3</sup>H: 610  
 haemocytes, thymidine incorporation in, <sup>3</sup>H: 430  
<sup>131</sup>I, biological half-life of: 1728  
 malathion, (e, emb) uptake by, <sup>14</sup>C: 610  
<sup>32</sup>P, biological half-life of: 1728  
 pteridines in, <sup>14</sup>C: 149  
<sup>86</sup>Rb, biological half-life of: 1728  
 RNA, (e-development), <sup>3</sup>H: 282  
 (ribosomal) synthesis (e), <sup>3</sup>H: 157  
 transpiration, <sup>3</sup>H: 454
- onions  
 chlorfenvinphos, residues of, <sup>14</sup>C: 697
- onion maggot: see *Hylemya antiqua*
- oogenesis  
*Drosophila melanogaster*, r.i.: 453  
*Hyalophora cecropia*, r.i.: 453
- Orchelimum fidicinum* - H.9  
 salt-marsh ecosystem, food chain in, <sup>32</sup>P: 526
- organochlorine pesticides  
 residue analysis, chlorine interference, <sup>36</sup>Cl: 633
- organophosphate  
 residue determination, r.i.: 800
- oriental fruit moth: see *Grapholitha molesta*
- ornithine-<sup>14</sup>C  
 nicotine, biosynthesis: 867, 869
- ornithine-2-<sup>14</sup>C  
 nicotine, biosynthesis of: 862
- DL-ornithine-5-<sup>14</sup>C: 615
- Ornithodoros papillipes* - Ac.2  
 labelling: 17
- Ornithodoros tholozani* (Lab. & Mègn.) - Ac.2  
 SMT, γ, Israel, prospects: 1622  
 γ: behaviour: 1622  
 development: 1622  
 hatchability (e): 1387  
 lethal effects (f): 1387  
 (m)(u): 1387  
 stage susceptibility (n, a): 1387  
 sterility: 1622
- Ornithonyssus* (*Liponyssus*) *bacoti* (Hirst) - Ac.7/8  
 [tropical rat mite]

- x: life span: 1813  
     parasite susceptibility: 1313  
 Orosius argentatus - QQ, 14/15  
     virus transmission, radioisotopes: 560  
 orotate-<sup>14</sup>C  
     Celerio euphorbia, pyrimidine synthesis: 202  
 Orthoptera - H.  
     <sup>86</sup>Sr, <sup>131</sup>I, <sup>137</sup>Cs: accumulation and elimination  
         of: 51  
         distribution of: 54  
 Oryctes rhinoceros - V, 41  
     SMT, preliminaries: 1561  
 Oryzaephilus surinamensis (Linnaeus) - V, 18  
     [saw-toothed grain beetle]  
     γ: lethal effects: 1657  
         sterility: 1657  
 Oscinella frit (Linnaeus) - X, 10  
     [frit fly]  
         host plant survey, <sup>32</sup>P: 555  
 Ostrinia nubilalis (Hübner) - U, 42  
     [European corn borer]  
         maize resistance to, <sup>14</sup>C: 903  
         SMT, prospects: 1559  
     x: (2/3/4), diffuse centromere, evidence for:  
         934  
     γ: development: 1379  
         reproduction potential: 1379  
         stage susceptibility: 1379  
 Otocryptops  
     predator-prey system, <sup>137</sup>Cs: 543  
 ouabain  
     sodium efflux, Carausius morosus (nerve cord),  
         <sup>22</sup>Na: 85  
         Periplaneta americana (nerve  
         cord), <sup>22</sup>Na: 85  
 ovariole  
     Acheta domesticus, DNA, <sup>3</sup>H: 431  
     Chrysopa perla, protein metabolism in, <sup>14</sup>C: 280  
         RNA metabolism in, <sup>14</sup>C: 280  
     fatty acids in lipid synthesis, Carausius morosus,  
         <sup>14</sup>C: 390  
         Galleria mel-  
         lonella, <sup>14</sup>C: 390  
     Galleria mellonella, lipid synthesis in, <sup>14</sup>C: 391  
         RNA metabolism in, <sup>3</sup>H:  
         330  
     x: Habrobracon: 968  
         cellular susceptibility: 941  
 ovary  
     aging: DNA synthesis in nurse cells, <sup>3</sup>H: 354  
     allatectomy: Periplaneta americana, <sup>3</sup>H: 349  
     Carabus, proteins and RNA, <sup>3</sup>H: 416  
     Cecropia moth, yolk sphere protein formation,  
         <sup>3</sup>H: 191  
     cow (lactating), carbaryl residues in, <sup>14</sup>C: 817  
     DNA, Drosophila melanogaster, <sup>3</sup>H: 315  
         (a), oogenesis:  
         477  
     ovary, DNA (extrachromosomal), Dytiscus marginalis:  
         245  
     Drosophila melanogaster, DNA, <sup>3</sup>H, EM: 315  
     Drosophila pseudoobscura (a), function and  
         growth, <sup>32</sup>P: 441  
     Formica polyctena, proteins and RNA, <sup>3</sup>H: 416  
     labelling, <sup>3</sup>H: 354  
     Leucophaea maderae, glycogen metabolism,  
         <sup>14</sup>C: 105; in repro-  
         ductive cycle, <sup>14</sup>C:  
         106  
     Malacosoma neustria, proteins and RNA, <sup>3</sup>H:  
         416  
     Megoura viciae (amphigonous and parthenogen-  
         etic), DNA (nurse cells), <sup>3</sup>H: 322  
     Musca domestica, effect of 6-azauridine on  
         development, <sup>3</sup>H, <sup>14</sup>C: 437  
     2-imidazolidinone: lipid content, Musca  
         domestica, <sup>14</sup>C: 891  
     rat, thiotepa concentration in, <sup>32</sup>P: 880  
     Vespa vulgaris, proteins and RNA, <sup>3</sup>H: 416  
     x: Ceratitis capitata: 1335  
         Dacus oleae: 1335  
         Drosophila melanogaster: 955  
         Nauphoeta cinerea: 1125  
     γ: Ceratitis capitata: 1335  
         Dacus oleae: 1335  
     p: Drosophila, malformation: 1416  
 oviposition  
     <sup>32</sup>P: Ceratitis capitata: 2  
 ovitron  
     Drosophila, oocyte laying: 357-8  
 oxygen  
     -/x: Drosophila, post-radiation recovery: 1234,  
         1236, 1242, 1244  
         sex-linked recessive lethals:  
         1242, 1263  
         spermatogenesis: 950  
         stage susceptibility, (σ germ  
         cells): 970, 1234-6  
     Drosophila melanogaster: dominant lethals:  
         1192, 1224  
         germ cells: 1099  
         lethal effects: (e): 1438;  
         (emb): 1395  
         life span (a σ): 1282  
         post-radiation recovery  
         (p)(spermatids): 1243  
         sex-linked recessive  
         lethals: 965, 1192  
         sperm physiology: 1224  
         stage susceptibility: 1395  
         suppressor-erupt system:  
         1253  
         translocations: 1192  
         turnover incidence: 1174  
     Sitophilus granarius, life span: 1454  
     -/x/time factor: Drosophila melanogaster,  
         spermatogenesis: 1246

- /γ: *Dacus cucurbitae* (p), sterilization: 1592  
*Musca domestica* (p), eclosion: 1233  
 oxygen uptake  
 radiation: *Laphygma frugiperda*: 1303  
*Musca domestica*: 1303

## P

- Pacific Coast tick: see *Dermacentor occidentalis*  
 Pakistan  
 γ: rice disinfection: 1692  
 Pakistan, East  
 sericulture, atomic energy in: 1709  
 palmitate-<sup>14</sup>C  
*Leucophaea maderae*, lipid metabolism in: 374  
 lipoproteins, *Locusta migratoria* (haemolymph, flight): 385  
*Schistocerca gregaria* (haemolymph, flight): 385  
 palmitate-1-<sup>14</sup>C  
*Drosophila melanogaster*, fatty acid metabolism: 378  
*Galleria mellonella* (fat body), neutral lipids: 407  
 (haemolymph lipids), incorporation into: 405-6  
*Hyalophora cecropia* (fat body), phospholipids: 401  
*Leucophaea maderae* (fat body), phospholipids: 401  
 glycogen metabolism  
 during oogenesis: 107  
 during reproductive cycle: 108  
*Locusta migratoria* (fat body), diglycerides: 404  
 triglycerides: 404  
 fat transport in: 404  
*Periplaneta americana* (fat body): 420  
 phospholipids: 401  
*Sarcophaga bullata* (fat body), neutral lipid metabolism: 398  
 (1-<sup>14</sup>C) palmitic acid  
 lipoprotein, *Philosamia cynthia*: 363  
 Panama  
 SMT, *Ceratitis capitata*: 1602  
*Panonychus ulmi* (Koch) - Ac, 14  
 [European red mite]  
 laser: APX.9  
*Panorpa communis* Linnaeus - S, 3  
 [scorpion fly]  
<sup>3</sup>H: 228  
 protein metabolism, oocyte nuclei, <sup>3</sup>H, <sup>14</sup>C: 154  
 papayas  
 disinfection: 1636  
 γ: disinfection: 1624  
*Papilio machaon* (Linnaeus) - U, 34  
<sup>86</sup>Sr, <sup>131</sup>I, <sup>137</sup>Cs, distribution in (f): 53

- Parachironomus*: see *Chironomus*  
*Paramyelois transitella* (Walker) - U, 36  
 [navel orangeworm]  
 SMT, trials: 1569  
 γ: behaviour (σ): 1153  
 dominant lethals: 1153  
 reproductive potential (σ): 1153  
 parathion-<sup>32</sup>P [PC, 2]  
 synthesis: 741  
*Aedes nigromaculis*, R- and S-resistance determination: 759  
 cat, percutaneous absorption in: 723  
 guinea pig (liver microsomes), metabolism in: 768  
 man, percutaneous absorption in: 723  
 mouse (liver microsomes), metabolism in: 768  
 rabbit, percutaneous absorption in: 723  
 rat, metabolism in: 765  
 (liver microsomes), metabolism in: 768  
 percutaneous absorption in: 723  
 parathion-<sup>35</sup>S  
 cockroach, metabolism in: 766  
 fish, metabolism in: 761  
 fresh-water mussel (*Elliptio complanatus*), metabolism in: 761  
*Macrosiphum persicae*: uptake, residues after 24 h: 802  
*Musca domestica*, metabolism in: 767  
*Periplaneta americana*, metabolism in: 767  
*Planococcus citri*, uptake, residues after 24 h: 802  
 rabbit (liver microsomes), metabolism in: 766  
 rat (liver microsomes), metabolism in: 766  
 metabolism in: 765  
*Trialeurodes vaporariorum*, uptake, residues after 24 h: 802  
 water, translocation by: 761  
 parathion-<sup>3</sup>H, diethyl-labelled  
*Pseudomonas melophthora*, degradation by: 754  
 pea weevil: see *Callosobruchus chinensis*  
 peach  
 Rogor, metabolism and residues in, <sup>32</sup>P: 769  
 peanut litter bug: see *Elasmolus sordidus*  
 pear psylla: see *Psylla pyricola*  
*Pectinophora gossypiella* (Saunders) - U, 13  
 [pink bollworm]  
 γ: 1536  
 SMT, progress: 1559  
*Pectinophora malvella* Herbst - U, 13  
 [mallow moth; hollyhock seed moth]  
 x: development: 1392  
 lethal effects: 1392  
 malformations: 1392  
 reproductive potential: 1618  
 stage susceptibility (p): 1618  
 sterility: 1392  
 radiation: stage susceptibility: 1123  
 sterility: 1123  
*Pegomyia hyoscyami* - X, 18

- γ: stage susceptibility: 911  
*Pelecyporus* sp. - V.44  
 [darkling beetle]  
 movement, short-term: 496  
 penicillin  
 -/x: *Drosophila melanogaster*, mutagenic effects: 1095, 1227-8  
 -/γ: *Habrobracon* (?), reproductive potential: 1304  
*Penicillium notatum*  
 aldrin, metabolism of,  $^{14}\text{C}$ : 646  
 chlordane, metabolism of,  $^{14}\text{C}$ : 646  
 dieldrin, metabolism of,  $^{14}\text{C}$ : 646  
 endrin, metabolism of,  $^{14}\text{C}$ : 646  
 heptachlor, metabolism of,  $^{14}\text{C}$ : 646  
 dihydroheptachlor, metabolism of,  $^{14}\text{C}$ : 646  
 telodrin, metabolism of,  $^{14}\text{C}$ : 646  
 peptides, tryptic  
*Samia cynthia* (p), biosynthesis in,  $^{14}\text{C}$ : 128  
*Peridroma saucia* - U.29  
 [variegated cutworm]  
 nuclear polyhedrosis virus: transaminase activity (B),  $^{14}\text{C}$ : 462  
*Perillus bioculatus* (Fabricius) - Q.15  
 [two-spotted stink bug; Canadian bug]  
 labelling,  $^{60}\text{Co}$ : 489  
 hibernation,  $^{60}\text{Co}$ : 489  
*Periplaneta americana* (Linnaeus) - H.2  
 [American cockroach]  
 amino acid requirements,  $^{14}\text{C}$ : 175  
 aliphatic alcohol permeability (abdominal nerve cord),  $^{14}\text{C}$ : 372  
 allatectomy: amino acid incorporation (tissue; various,  $^3\text{H}$ : 349  
 protein content of tissues,  $^3\text{H}$ : 349  
 protein synthesis during ovarian development,  $^3\text{H}$ : 229  
 RNA content of tissues,  $^3\text{H}$ : 349  
 uric acid content of tissues: 349  
 azodrin, metabolism of,  $^{14}\text{C}$ ,  $^{32}\text{P}$ : 700  
 carbohydrate metabolism,  $^{14}\text{C}$ : 87  
 DDT: activity patterns of,  $^{14}\text{C}$ : 622  
 CNS,  $^{14}\text{C}$ : 822-3  
 absorption and binding,  $^{14}\text{C}$ : 658  
 metabolism of,  $^{14}\text{C}$ : 690  
 negative T-coefficient: CNS,  $^{14}\text{C}$ : 622  
 nerve components, interaction with,  $^{14}\text{C}$ : 659  
 retention of,  $^{14}\text{C}$ : 690  
 dieldrin: hypocalcaemia,  $^{45}\text{Ca}$ : 638  
 ion movement (CNS),  $^{22}\text{Na}$ : 638  
 dimethoate, metabolism of, in vivo and in vitro,  $^{32}\text{P}$ : 763  
 dimetilan, detoxication of,  $^{14}\text{C}$ : 848  
 metabolism of,  $^{14}\text{C}$ : 848  
 dispersal, r.f.: 1791  
 ethyl parathion, degradation by (a),  $^{32}\text{P}$ : 788  
 fatty acid permeability (abdominal nerve cord),  $^{14}\text{C}$ : 372  
 fatty acids (fat body),  $^{14}\text{C}$ : 420  
 free amino acid pool (CNS), r.f.: 207  
 β-glucosylprotocatechuic acid formation (fat body homogenates),  $^{14}\text{C}$ : 103  
 haemolymph circulation rate,  $^{32}\text{P}$ : 1791  
 ionic distribution in,  $^{24}\text{Na}$ ,  $^{32}\text{P}$ ,  $^{36}\text{Cl}$ ,  $^{59}\text{Fe}$ ,  $^{131}\text{I}$ : 70  
 laser: damage: APX.8  
 mortality: APX.8  
 lipid metabolism, embryogenesis,  $^{14}\text{C}$ : 381  
 liquid scintillation counting of  $^3\text{H}$ - and  $^{14}\text{C}$ -compounds (cuticle): 1739  
 methyl paraoxon, degradation by (a),  $^{32}\text{P}$ : 788  
 methyl parathion, degradation by (a),  $^{32}\text{P}$ : 788  
 (nerve cord), DDT binding to: 635  
 neurohormones C and D, properties of,  $^{35}\text{S}$ : 168  
 ouabain: sodium efflux (nerve cord),  $^{22}\text{Na}$ : 85  
 parathion, metabolism of,  $^{35}\text{S}$ : 767  
 phospholipids: 387  
 (fat body), release and transport,  $^{14}\text{C}$ ,  $^{32}\text{P}$ : 401  
 quaternary ammonium salts, permeability to (abdominal nerve cord),  $^3\text{H}$ : 61  
 scylloinositol, occurrence,  $^{14}\text{C}$ : 362  
 sterol, concentration: 383  
 Sumithion, degradation by (a),  $^{32}\text{P}$ : 788  
 symbiotic bacteria, uric acid metabolism (fat body),  $^{14}\text{C}$ : 537  
 triglycerides (fat body),  $^{14}\text{C}$ : 420  
 uric acid excretion,  $^{14}\text{C}$ : 413  
 oxidation (ureide carbon 2),  $^{14}\text{C}$ : 412  
 vamidothion, metabolism of, in vivo and in vitro,  $^{32}\text{P}$ : 763  
 x: lethal effects: 1193  
 -/N: lethal effects: 1193  
*Periplaneta australasiae* (Fabricius) - H.2  
 [Australian cockroach]  
 scylloinositol, occurrence,  $^{14}\text{C}$ : 362  
*Perkinsiella saccharicida* (Kirkaldy) - QQ.10  
 [sugarcane leafhopper]  
 predators and SMT: 1575  
 γ: (n) sterility: 1144  
 (n5) development (wing): 1149  
 longevity (a): 1149  
 sterility (σ): 1149; (♀): 1149  
 SMT, Australia and Fiji, prospects: 1144  
*Peruvian cotton stainer*: see *Dysdercus peruvianus* pest  
 rat, flea vectors: 561  
 pest control  
 radiation, radioisotopes: 1766  
 physical means, including radiation: 1771  
 pesticide residues  
 detection and measurement of, r.f.: 579  
 neutron activation analysis: 1732-3  
 pesticides  
 metabolism, radioisotopes: 1765  
 γ: degradation: 1720

phenylalanine-<sup>3</sup>H

- protein, *Leptinotarsa decemlineata* (emb): 311  
*Tenebrio molitor* (emb): 311

L-phenylalanine-<sup>3</sup>H

- Calpodex ethlius*, endocuticle deposition: 419

phenylalanine-<sup>14</sup>C

- Chrysopa perla*, protein metabolism in, <sup>14</sup>C: 280  
 RNA metabolism in, <sup>14</sup>C: 280

flies, RNA synthetase: 267

insects, RNA synthetase: 267

*Panorpa communis* (oocytes): 154

DL-phenyl(alanine-1-<sup>14</sup>C)

- salivary physiology of plant-bugs (*Heteroptera*): 192

DL-3-phenyl(alanine-1-<sup>14</sup>C)

*Elasmolomus sordidus* (haemolymph): 193

*Eumecopus punctiventris* (f 5) (haemolymph): 193

DL-phenylalanine, ring-<sup>14</sup>C-labelled

*Eleodes longicollis*, p-benzoquinone biosynthesis: 190

L-phenylalanine-1-<sup>14</sup>C: 615[U-<sup>14</sup>C] phenylalanine

*Calliphora erythrocephala* (f 5) (fat body), protein synthesis: 205

## phenylalanine, mustard derivative

-, triethylenemelamine: *Drosophila*, mutagenic effects: 1280

## Philosamia cynthia - U.43

lipoprotein (diglyceride-bound), (haemolymph), <sup>14</sup>C: 363

x: chromosome aberrations (translocations, (f 1)): 993

## Philosamia cynthia ricini Donovan - U.43

RNA (fat body), <sup>32</sup>P: 348

## Phlebotomus: see Lutzomyia

## Phlebotomus longipalpis - X.27

blood volume ingested, <sup>59</sup>Fe: 563

feeding rate, <sup>59</sup>Fe: 563

phorate-<sup>32</sup>P [PA.7]

maize, metabolism in: 798

uptake and distribution in: 798

phorate-<sup>35</sup>S

seed, residues in: 742

## Phorbia brassicae Bouché - X.19

[cabbage fly]

γ: (p), competitiveness, sexual: 1608

life span: 1608

sterility: 1608

## Phormia regina (Meigen) - X.5

[black blowfly]

amino acid metabolism, <sup>14</sup>C: 142

requirements, <sup>14</sup>C: 175

carbitine, lipid-bound derivatives in fat body (f 1), <sup>14</sup>C: 389

crop-emptying, x: 94

DNA (emb), <sup>3</sup>H, <sup>32</sup>P, <sup>14</sup>C: 268

oxidative phosphorylation (flight muscle; particulate fractions of), <sup>32</sup>P: 458

phosphatidyl β-methylcholine, biosynthesis, <sup>14</sup>C: 386

proline metabolism (flight muscle), <sup>14</sup>C: 458

protein biosynthesis (emb), <sup>3</sup>H, <sup>14</sup>C: 268

proteins (haemolymph), <sup>14</sup>C: 132-3

pyruvate oxidation (flight muscle), <sup>14</sup>C: 458

RNA (emb), <sup>3</sup>H, <sup>32</sup>P, <sup>14</sup>C: 268

sugar absorption rate (midgut), <sup>14</sup>C: 94

<sup>32</sup>P-incorporation: 288

x: lethal effects: 1431

sterility: 1431

γ: lethal effects: 1431

sterility: 1431

## phosphamidon [PA.6]

goats, metabolism in, <sup>32</sup>P: 704

rats, metabolism in, <sup>32</sup>P: 704

phosphamidon, <sup>14</sup>C-labelled in methyl-vinyl and carbonyl positions

*Anthonomus grandis* (a), metabolism in: 702

cotton, metabolism in: 702

*Heliothis virescens* (f 5): 702

*Heliothis zea* (f): 702

*Musca domestica* (a): 702

phosphamidon-<sup>32</sup>P

*Anthonomus grandis* (a), metabolism in: 702

beans, metabolism in: 1791

cotton, metabolism in: 702, 1791

*Heliothis virescens* (f 5), metabolism in: 702

*Heliothis zea* (f), metabolism in: 702

*Musca domestica* (a), metabolism in: 702

*Myzus persicae*, uptake by, <sup>32</sup>P: 486

## phosphatides

*Musca domestica* (f), <sup>14</sup>C: 368

## phosphatidyl β-methylcholine

*Phormia regina*, biosynthesis in, <sup>14</sup>C: 386

## phospholipids

*Acantholyda nemoralis*, <sup>14</sup>C: 409

*Carausius morosus*, <sup>14</sup>C: 409

*Drosophila melanogaster* (primary cultures of embryonic cells), <sup>32</sup>P: 286

*Heteroptera*, salivary secretions of, <sup>14</sup>C: 192

*Hyalophora cecropia*, <sup>14</sup>C, <sup>32</sup>P: 401

(flight muscle), synthesis

in, r.f.: 402

insects, <sup>32</sup>P: 387

*Leucophaea maderae*, <sup>14</sup>C, <sup>32</sup>P: 401

*Musca domestica*: (f) (fat body), ethanolamino incorporation, <sup>14</sup>C: 366

serine

incorporation, <sup>14</sup>C: 367

*Periplaneta americana*, <sup>14</sup>C, <sup>32</sup>P: 401

*Sarcophaga bullata* (f) (fat body), <sup>14</sup>C, <sup>32</sup>P: 422

*Schistocerca gregaria* (haemolymph), <sup>32</sup>P: 387

phosphonic acid butonate-<sup>32</sup>P, ester of

apples, metabolism in: 715

residues in: 715

- mammals (serum), metabolism in: 715  
 milk, metabolism in: 715  
 plums, metabolism in: 715  
     residues in: 715  
 wheat, metabolism in: 715  
     residues in: 715
- phosphorus-32
- Insects:**  
*Aedes aegypti* (f), light response: 37  
*Aedes vexans*, fate during metamorphosis, mating and oviposition: 73  
*Agelena consociata*, food transmission in: 481  
*Anopheles stephensi*, flight range: 502  
     gonotrophic cycles: 502  
     labelling: 502  
*Anopheles stephensi mysorensis*, flight range: 501  
     gonotrophic cycle: 501  
     longevity of labelled-,: 501  
 ants, cuticular excretion in: 1791  
 aphid, food uptake through artificial membranes: 1791  
*Aphis fabae*: feeding punctures: 478  
     food selection: 474  
     food transmission inside: 473  
*Apis mellifera*: activity (feeding, foraging): 550-1, 554  
     dispersal: 550-1, 554  
     (flight muscle), respiratory metabolism in: 444  
     pollination: 550-1, 554  
 arthropod food chains in salt-marsh ecosystem: 525-6  
 biological half-life determination in bugs (various): 1728  
*Brachycentrus*, accumulation by: 523  
*Calotermes flavicollis*: 489  
*Calligypona pellucida*, migration: 504  
*Camponotus*, nest area: 479  
*Ceratitis capitata*: 1556  
     (f), recapture of sterile males: 557  
 Chironomidae, uptake and clearance in Roumanian brackish lakes: 531  
*Culex pipiens fatigans*: dispersal: 8  
*Culex pipiens molestus*: development and growth: 25  
     labelling: 25  
*Culex pipiens quinquefasciatus* (♂ reproductive system), distribution in: 76  
 dispersal: *Bombus terrestris*: 498  
     black flies: 4, 24  
*Calligypona pellucida*: 504  
*Ceratitis capitata*: 1609  
*Culex pipiens fatigans*: 500  
*Javesella pellucida*: 498  
*Meligethes aeneus*: 498, 506  
*Dorymyrmex pyramicus*, food-chain: 517  
 dragonfly (wing), haemolymph circulation in: 432  
*Drosophila*: chromosome stability: 34  
*Drosophila melanogaster*: fractions (primary cultures of embryonic cells): 286  
     incorporation in sperm: 74  
     metabolism: 74  
     mutagenic effects (lethals): 74  
     (sperm), mosaics: 35  
*Drosophila pseudoobscura* (a)(ovary), functions and growth: 441  
 external contamination, *Apis mellifica*: 518-9  
 food chain, accumulation by: 523  
 food transfer to neighbouring nests, *Formica*: 479  
 food transmission, *Apis mellifica*: 468  
 food uptake tests (novel tube closures), *Drosophila melanogaster*: 1744  
*Formica cinerea*, colony size estimation: 495  
*Grapholita molesta* (a), effects of labelling on: 30  
 haemolymph, *Periplaneta americana*: 70  
     circulation (wing): 432  
 half-life (effective) in *Lutzomyia longipalpis*: 464  
 Hydropsyche, accumulation by: 523  
 insect (f) - host plant relations, *Chaetophoria xanthomelas*: 549  
     uptake via tree litter: 553  
 insecticide biochemistry: 1757  
     labelling: 587  
*Javesella pellucida*, migration: 18, 498  
*Lucilia cuprina*, pyrophosphate exchange in: 161  
*Lutzomyia longipalpis*, labelling: 7  
*Megoura viciae*, feeding, honeydew excretion: 428  
     feeding mechanism: 476  
*Musca domestica*, breeding sites, detection of: 9  
     (subcellular fractions), phospholipids: 380  
     phosphorylethanolamine incorporation into phospholipids, (f)(fat body): 367  
*Myzodes persicae*, nutrition: 470  
*Myzus persicae*, feeding via membrane: 486  
     labelling: 475  
     phosphamidon uptake: 486  
 nest area, *Camponotus*: 479  
 Odonata, uptake and clearance in Roumanian brackish lakes: 531  
*Oscinella frit*, host specificity: 555  
*Periplaneta americana*, haemolymph circulation rate: 1791

- Phormia regina* (emb): 268  
*Sarcophaga bullata* (f), phospholipid bio-synthesis: 421  
*Sarcophaga bullata* (fat body), pyrophosphate-ATP exchange: 113  
 sperm labelling, *Bombyx mori*: 440  
*Drosophila melanogaster*: 20  
*Tetranychus urticae*, ingestion: 213  
 tree litter, insect uptake from: 530  
 trophallaxis, *Calotermes flavicollis*: 469  
 trophic transfer index, arthropods: 556  
 uridine, *Drosophila* (rRNA): 16  
 labelling: *Aedes aegypti*: 1791  
     (e): 11  
     *Aedes communis*: 545  
     *Aedes stimulans*: 545  
     *Aedes trichurus*: 545  
     (e): 11  
     *Anopheles pharoensis* (f 3): 1611  
         (semen): 1611  
     *Anopheles stephensi mysorensis* (f 4): 501  
     *Apis mellifica*: 518  
     *Bacillus thuringiensis*: 539, 540-1  
     black flies: 24  
         (f, p): 4  
     *Blattella germanica*: 1791  
     *Bombus terrestris*: 498  
     *Bombyx mori*, semen: 440  
     *Calligypona pellucida*: 504  
     *Ceratitis capitata* (a): 2  
         (f): 3, 14  
     *Chiloconus bipistulatus*: 13  
     *Chrysomphalus aonidum*: 13  
     *Crematogaster striatula*: 59  
     *Culex nigripalpus*: 6  
     *Culex pipiens fatigans*: 8  
     *Culex pipiens quinquefasciatus*: 1791  
     *Dacus tryoni*: 1623  
     *Drosophila*: 1283  
     *Drosophila melanogaster*, (f), pulse: 12  
         sperm: 20  
     flies: 1791  
     food uptake, *Pieris brassicae* (f 3): 487  
     *Formica cinerea*, colony size estimation: 495  
     *Formica polyctena*: 483-4  
     *Grapholita molesta* (a): 30  
     *Hylemyia antiqua* (f): 467  
     insecticide: 587  
     insects: 1745  
     *Javesella pellucida*: 18  
     *Lutzomyia longipalpis*: 464  
     *Megoura viciae*: 476  
     *Meligethes aeneus*: 506  
     *Musca domestica*: 9, 10, 1791  
     *Myzus persicae*: 19  
     *Myzodes persicae*: 470  
     *Pieris brassicae* (f 3): 487  
     *Pseudococcus njalensis*: 59  
     *Psorophora confinis*: 1791  
     pulse, *Drosophila melanogaster* (f): 12  
     scale predators: 13  
     *Schistocerca gregaria*: 558  
     *Scoliopteryx* (f): 484  
     semen, *Bombyx mori*: 440  
     silkworm: 1283  
     ticks (immature forms): 568  
Insecticides:  
     Azodrin: 700  
         metabolism in cotton plant: 751  
     Bidrin, metabolism in cotton plant: 751  
     bromophos, metabolism in rat: 795  
         penetration and action in plants: 738  
     butonate, labelled: 706, 716  
         rubber material, permeability to: 712  
     Cidial: 696  
     Ciodrin<sup>®</sup>, residue analysis: 758  
     compound 4072, residues in cattle: 740  
     coumaphos, metabolism in *Boophilus microplus*: 730  
         residue analysis: 758  
     Dasanit: 745  
     DDVP: 653, 707  
         labelled: 706  
         rubber material, permeability to: 712  
     DFP: 693  
         labelling: 755-6  
         uptake and toxicity in mouse, rat: 771  
         uptake, mouse (diaphragm, end plates): 773  
     dimefox: metabolism, residues (hop plant): 748  
         synthesis: 748  
     dimethoate: labelled: 706  
         metabolism in bean: 753  
         metabolism of: 763  
         movement in soil: 781  
         percutaneous resorption by cattle: 713  
         residues in spinach: 777-8  
         rubber material, permeability to: 712  
     dioxathion: 733  
         residue analysis: 758  
     Dipterex: Malathion, synthesis: 743  
         synthesis: 743  
     disulfoton: 776  
     Di-Syston, metabolism: 699  
     ethyl parathion, degradation of: 788  
     fenthion, metabolism in cattle: 747  
         residues in cattle: 747  
         resistance mechanisms of *Culex fatigans*: 796

- Guthion, residues in cattle: 721  
 malathion: 741  
     metabolism and residues: 794  
 menazon metabolism, plants: 703  
 metepa: 873  
 methyl parathion: 724  
     degradation of: 788  
     distribution and hydrolysis in  
         carrots: 719  
     metabolism of: 725, 735  
     residues in carrots: 718  
     rubber material,  
         permeability to: 712  
 methyl paraoxon, degradation of: 788  
 O-methyl O-p-methylthiophenyl methylphos-  
 phonothionate, labelled: 705,  
     774  
     metabolism in  
         cotton plants: 774  
 parathion: 741  
     metabolic studies of: 723  
     metabolism in guinea pig, mouse  
         (liver microsomes): 768  
     rat: 765  
     metabolism in rat (liver microsomes):  
         768  
     resistance in *Aedes nigromaculis*: 759  
 phosphamidon: 702  
     metabolism in beans, cotton:  
         1791  
 phosphonic acid butonate, ester of: 715  
 phosphorylethanolamine incorporation into  
 phospholipids, *Musca domestica* (fat  
 body): 367  
 pyrophosphate - ATP exchange, *Sarcophaga*  
*bullata* (fat body): 113  
 RNA: *Bombyx mori* (silk gland): 220  
     *Philosamia cynthia ricini* (fat body): 348  
     synthesis, silkworm (fat), (silk gland):  
         299, 300  
 Rogor: 896  
     metabolism and residues in food crops:  
         769  
 ronnel: residue analysis: 758  
     residues in cattle (cow): 746  
 ruelene, residue analysis: 758  
 sarin: 731  
     synthesis: 772  
 SD-8447, metabolic studies: 799  
 SD-9129, systematic activity in cotton: 775  
 Shell Compound 4072, residue analysis: 758  
 Sumithion, degradation of: 788  
     metabolism of: 725, 735  
     residues in rice: 762  
 thiotepa: 880  
 Tinox: 707, 711  
     metabolism and residues: 708  
 tribuphon, metabolism and residues: 708  
 trichlorfon: 701  
     cattle degradation and excretion:  
         709  
     metabolism and residues: 708, 739  
     resorption from udder: 787  
 trichlorfon, labelled: 708  
 trichlorometaphos metabolism, cattle: 760  
     milk: 760  
     mouse: 780  
     rabbit: 760  
 trichlorphon: 715  
     fate in cattle: 784  
     metabolism and residues in cattle:  
         786  
     percutaneous resorption by cattle:  
         713  
     residues in pork: 785  
 vamidothion, metabolism of: 763  
 phosphorylation, oxidative  
*Musca domestica* (flight muscle), <sup>32</sup>P: 459  
*Phormia regina* (flight muscle), <sup>32</sup>P: 459  
 soluble high-energy intermediate of, blowfly  
 (mitochondria), <sup>32</sup>P: 460  
<sup>32</sup>P-phosphorylcholine  
*Sarcophaga bullata* (fat body), phospholipid  
 biosynthesis: 421  
<sup>32</sup>P-phosphorylethanolamine  
*Musca domestica* (fat body), incorporation  
 into: 367  
 phthalthr-<sup>14</sup>C [B.5]  
*Musca domestica*, in vitro and in vivo  
 metabolism: 852  
 Phytometra gamma Linnaeus - U.29  
<sup>85</sup>Sr, <sup>131</sup>I, <sup>137</sup>Cs, distribution in (fat), a: 53  
 Pieris brassicae (Linnaeus) - U.37  
 [cabbage butterfly]  
*Bacillus thuringiensis* (fat), exudates, <sup>32</sup>P: 540  
 catechol amines, biosynthesis, <sup>14</sup>C: 218  
 folic acid: tumour induction: 303  
 food uptake (fat), <sup>32</sup>P: 467  
 labelling (fat), <sup>32</sup>P: 467  
 leucopterin, biosynthesis, <sup>14</sup>C: 223  
     - and relation to purine  
         metabolism, <sup>14</sup>C:  
             224  
 pathogen ingestion, volume of, <sup>32</sup>P: 539, 541  
 purine, biosynthesis, <sup>14</sup>C: 223-4  
<sup>85</sup>Sr, <sup>131</sup>I, <sup>137</sup>Cs, distribution in (fat): 53  
 x: chromosome aberrations, (translocations)  
     (fat): 993  
 radiation: glycogen content (testicle): 442  
 pigmentation  
*Locusta migratoria* (cuticle), <sup>14</sup>C: 152  
 pineapple  
     γ: disinfestation: 1836, 1697  
 pink bollworm: see *Pectinophora gossypiella*  
 piperonyl butoxide [A.1]  
*Musca domestica*, methylcarbamate metabo-  
 lism in, <sup>14</sup>C: 837, 887



- /DDT: *Triatoma infestans* (n), toxicity,  $^{14}\text{C}$ : 625
- piperonyl butoxide- $^{14}\text{C}$   
 synthesis: 898
- Pissonotus delicatus* - QQ.13  
 [plant hopper]  
 food chain,  $^{32}\text{P}$ : 556  
 trophic transfer index,  $^{32}\text{P}$ : 556
- pituitary  
 rat, thiotepa concentration in,  $^{32}\text{P}$ : 880
- Planococcus citri* (Rossi) - QQ.18  
 [citrus mealybug]  
 parathion, uptake,  $^{35}\text{S}$ : 802  
 residues after 24 h,  $^{35}\text{S}$ : 802  
 $\gamma$ : ( $\sigma$ ) abnormalities (E3), after hetero-  
 chromatization reversal: 1402
- plant bug: see *Nysius raphanus*
- plant hopper: see *Delphacodes* sp.  
*Pissonotus delicatus*
- plants\*  
 bromophos, penetration and action of,  $^{32}\text{P}$ : 738  
 dimethoate, metabolism of, in vivo and  
 in vitro,  $^{32}\text{P}$ : 763  
 Dursban, metabolism of,  $^{14}\text{C}$ : 790  
 metabolism of,  $^{14}\text{C}$ ,  $^{36}\text{Cl}$ : 789, 793  
 3,5,6-trichloro-2-pyridinol, sorption, trans-  
 location and metabolism of,  $^{14}\text{C}$ ,  $^{36}\text{Cl}$ :  
 793  
 vamidothion, metabolism of, in vivo and  
 in vitro,  $^{32}\text{P}$ : 763
- plastic caps  
 novel tube closures: 1744
- plastic enclosure  
 insects, radioassay in vivo,  $^{14}\text{C}$ ,  $^{32}\text{P}$ : 1745
- Platyneris pennipes* - F.2  
 haemolymph circulation (wing),  $^{32}\text{P}$ : 432
- Plodia interpunctella* (Hübner) - U.41  
 [Indian-meal moth]  
 $\gamma$ : development: 1342  
 disinfection: 1342  
 stage susceptibility ( $\ell$ , p, a): 1342
- ploidy  
*Drosophila melanogaster* (11-3X) (polytene chromo-  
 somes), isotope incorporation rate: 1725
- plums  
 butonate, metabolism of,  $^{32}\text{P}$ : 715  
 residues of,  $^{32}\text{P}$ : 715  
 trichlorphon,  $^{32}\text{P}$ : 715
- Podisma sapporensis* - H.1  
 $\delta$ : chromosome aberrations: 1020
- Pogonomyrmex californicus* (Buckley) - W.14  
 [California harvester ant]  
 $\gamma$ : behaviour (digging and tunneling): 1473
- pollination  
*Apis mellifera*,  $^{32}\text{P}$ ,  $^{108}\text{Au}$ : 550-1, 554
- polyhedrosis  
*Diprion hercyniae*, effects on DNA synthesis,  
 $^3\text{H}$ : 240
- polyhedrosis virus, cytoplasmic-  
*Bombyx mori* ( $\ell$ ) (midgut),  $^3\text{H}$ : 351, 353
- polymer-insecticide systems  
 feed additives, use as livestock-,  $^3\text{H}$ ,  $^{14}\text{C}$ : 752
- polyphemus moth: see *Antheraea polyphemus*
- polyribosomes  
*Musca domestica*: 232
- polysaccharides  
 insects, biochemistry of, Rev.: r.i.: 109
- pond  
 insect, trophic levels: 529
- pool, tritium  
 formation during mitosis, grasshopper (neuro-  
 blast): 307
- population flushing  
 sexually sterile insects for, theory: 1623  
*Dacus tryoni* trials:  
 1623
- pork  
 trichlorphon, residues in,  $^{32}\text{P}$ : 785
- Portheia dispar* (Linnaeus) - U.25  
 [gipsy moth]  
 tepla, metabolism of,  $^{14}\text{C}$ : 878  
 SMT, progress: 1559
- potassium-42  
 crickets, metabolism in: 507  
 DDT: *Periplaneta americana* (nerve membrane),  
 ion transport: 659  
 forest arthropods, biological half-life in: 533  
*Hyalophora* ( $\ell$ ) (midgut): 65  
*Hyalophora cecropia* ( $\ell$ ) (midgut), K-transport:  
 64, 66
- potassium cyanide- $^{14}\text{C}$   
 Dursban synthesis: 764
- potassium phthalate  
 $\gamma$ : *Drosophila*, tumour formation: 1173
- potatoes  
 DDT, residues in,  $^{14}\text{C}$ : 849
- predation  
 SMT, theoretical role in: 1566, 1575
- Prodenia eridania* (Cramer) - U.29  
 [Southern armyworm]  
 citrate oxidation and turnover,  $^{14}\text{C}$ : 411
- Prodenia litura* (Fabricius) - U.29  
 [cotton leaf worm]  
 copulation frequency: 1148  
 Dipterex, detoxification: 732  
 Sevin, metabolism of,  $^{14}\text{C}$ : 823, 847  
 $x$ : (p) development: 1148  
 malformation (a): 1148  
 sterility: 1148  
 $\gamma$ , SMT, prospects: 1148  
 $\gamma$  (plants): growth: 481
- progesterone-4- $^{14}\text{C}$   
 DDT: steroid metabolism in birds: 669  
 dieldrin: steroid metabolism in birds: 669
- Prokelisia marginata* - QQ.13  
 salt-marsh ecosystem, food chain in,  $^{32}\text{P}$ : 526

\* See also under individual species.

- proline  
DDT: *Musca domestica*, metabolism in,  $^{14}\text{C}$ : 138
- Glossina, flight metabolism,  $^{14}\text{C}$ : 124
- proline- $^3\text{H}$   
*Drosophila hydei* (giant chromosomes): 116  
*Sciara coprophila* (f)(salivary gland): 331
- L-proline- $^3\text{H}$   
*Calpodes ethlius*, endocuticle deposition: 419
- L-proline- $\text{U-}^{14}\text{C}$ : 615  
DL-proline-5- $^{14}\text{C}$ : 615
- proline- $^{14}\text{COOH}$   
*Phormia regina* (flight muscle), metabolism in: 458
- 1- $^{14}\text{C}$ -propionic acid  
*Periplaneta americana* (abdominal nerve cord): 372
- propyl gallate  
-/ $\gamma$ : *Blaberus craniifer* (heart fragments), survival: 1326
- protein granules  
*Calpodes ethlius* (f)(fat body),  $^3\text{H}$ : 141
- protein sequestration  
*Calpodes ethlius* (fat body),  $^3\text{H}$ : 140
- protein transport  
*Chironomus* (salivary gland),  $^{14}\text{C}$ : 180
- proteins  
age: *Drosophila subobscura*, synthesis by: 136  
allatectomy: *Periplaneta americana*, synthesis during ovarian development,  $^3\text{H}$ : 349
- amino acid incorporation into, *Bombyx mori* (p)(non-cellular system),  $^{14}\text{C}$ : 178
- Apis mellifica*, oogenesis,  $^3\text{H}$ : 146  
synthesis, oogenesis,  $^3\text{H}$ : 147
- Blattella germanica*,  $^3\text{H}$ : 359
- blood-, *Cecropia* moth (oocyte), uptake of,  $^3\text{H}$ : 191
- Bombyx mori*, Rev., r.i.: 148  
(f5), synthesis,  $^{14}\text{C}$ : 196  
(silk gland), acellular system,  $^{14}\text{C}$ : 155  
(f)(various tissues), infected with nuclear polyhedrosis virus,  $^3\text{H}$ : 233
- Calliphora erythrocephala* (f)(fat body), in-vitro valine incorporation,  $^{14}\text{C}$ : 203  
valine incorporation,  $^{14}\text{C}$ : 205  
(f)(haemolymph),  $^{14}\text{C}$ : 204
- Calpodes ethlius* (f5, p)(fat body),  $^3\text{H}$ : 187
- Cecropia* (p), synthesis in injured-,  $^{14}\text{C}$ : 243  
(oocyte), blood-,  $^3\text{H}$ : 191; yolk sphere formation,  $^3\text{H}$ : 191
- Chironomus*: (puffs),  $^3\text{H}$ : 257
- Chironomus tentans*: puffs,  $^3\text{H}$ : 309  
(salivary gland), secretion of,  $^3\text{H}$ ,  $^{14}\text{C}$ : 181
- Chrysopa perla* (oocyte), metabolism,  $^{14}\text{C}$ : 280
- cycloheximide: *Chironomus tentans*,  $^3\text{H}$ : 256
- DDT: metabolism, rat (liver),  $^{14}\text{C}$ : 672
- Drosophila*,  $^3\text{H}$ : 359  
*Drosophila* (f)(giant chromosomes), puffs,  $^3\text{H}$ : 200
- Drosophila hydei* (lampbrush Y-chromosome),  $^3\text{H}$ ,  $^{14}\text{C}$ : 285
- Drosophila melanogaster* (f, p)(haemolymph), turnover in,  $^3\text{H}$ ,  $^{14}\text{C}$ : 118-9  
(imaginal disks),  $^3\text{H}$ ,  $^{14}\text{C}$ : 151  
(cell-free preparations)  $^3\text{H}$ ,  $^{14}\text{C}$ : 150  
oogenesis,  $^{14}\text{C}$ : 453  
(p)(ribosomes),  $^{14}\text{C}$ : 166
- ecdysone: insect,  $^3\text{H}$ ,  $^{14}\text{C}$ : 217  
*Musca domestica*, metabolism in,  $^3\text{H}$ : 176
- frontal ganglion removal: *Locusta migratoria* (n3-5), protein metabolism in,  $^{14}\text{C}$ : 137
- Galleria mellonella*,  $^3\text{H}$ : 359
- Hyalophora cecropia*, oogenesis,  $^{14}\text{C}$ : 453  
(p)(wing), synthesis in,  $^3\text{H}$ : 356  
(wing epidermis),  $^3\text{H}$ : 332
- insects, metabolism in, r.i.: 131
- Leptinotarsa decemlineata* (emb),  $^3\text{H}$ : 311
- Leucophaea maderae* (fat body), synthesis in,  $^{14}\text{C}$ : 235
- Malacosoma*,  $^3\text{H}$ : 359
- Musca domestica*,  $^3\text{H}$ : 176, 359  
polyribosomes,  $^{14}\text{C}$ : 232
- Phormia regina* (haemolymph),  $^{14}\text{C}$ : 132-3  
amino acid incorporation in,  $^{14}\text{C}$ : 142
- ribosomes, synthesis,  $^{14}\text{C}$ : 143
- Rhynchosciara angelae*: larval development,  $^3\text{H}$ : 313  
puffs,  $^3\text{H}$ : 313
- Schistocerca gregaria* (wing), valine incorporation into,  $^{14}\text{C}$ : 158
- Simulium*,  $^3\text{H}$ : 359
- Tenebrio molitor* (emb),  $^3\text{H}$ : 311
- yolk sphere formation, *Cecropia* moth (oocyte),  $^3\text{H}$ : 191
- $^{14}\text{C}$ -protocatechuic acid  
*Periplaneta americana* (f)(fat body homogenates): 103
- protons  
*Drosophila*, life span: 1418  
malformations: 1418

- (120 MeV, 680 MeV): flies: 1101  
*Drosophila melanogaster*,  
 dominant lethals: 1223  
 sex-linked recessive  
 lethals: 1223
- (800 MeV): *Drosophila* ( $\sigma$ ), II-recessive  
 lethals: 1080
- (600 MeV): *Drosophila melanogaster*;  
 II-recessive lethals: 1081
- , x: *Drosophila* ( $\sigma$ ), II-recessive lethals: 1080
- , x (250 kV): *Drosophila melanogaster*,  
 II-recessive lethals: 1081
- , y: *Drosophila melanogaster*, dominant  
 lethals: 1223  
 sex-linked re-  
 cessive lethals:  
 1223
- Protoparce sexta* (Johannson) - U.46  
 [tobacco hornworm]  
 sterile moth releases: 1565
- Protophormia terrae-novae* R.D. - X.5  
 [Northern blowfly; carrion fly]  
 y: lethal effects (l, c): 1166  
 reproductive potential: 1166
- protozoan infection  
*Rhynchosciara angelae* (l)(chromosomes),  $^3\text{H}$ :  
 323
- Pseudococcus gahani* Green - QQ.18  
 y: ( $\sigma$ ) abnormalities (l3), after hetero-  
 chromatization reversal: 1402
- Pseudococcus njalensis* Laing - QQ.18  
 labelling,  $^{32}\text{P}$ : 59
- Pseudococcus obscurus* Essig - QQ.18  
 y: ( $\sigma$ ) abnormalities (l3), after hetero-  
 chromatization reversal: 1402
- Pseudomonas* sp.  
 malathion, metabolism of,  $^{14}\text{C}$ : 757
- Pseudomonas melophthora*  
 carbaryl, degradation of,  $^3\text{H}$ : 754  
 DFP, degradation of,  $^{14}\text{C}$ : 754  
 diazinon, degradation of,  $^{14}\text{C}$ : 754  
 dichlorvos, degradation of,  $^{14}\text{C}$ : 754  
 dieldrin, degradation of,  $^{14}\text{C}$ : 754  
 parathion, degradation of,  $^3\text{H}$ : 754
- Psorophora confinis* - X.11  
 labelling,  $^{32}\text{P}$ ,  $^{86}\text{Sr}$ : 1791
- Psorophora signipennis* - X.11  
 DNA synthesis (l4),  $^3\text{H}$ : 318  
 karyotype (l4),  $^3\text{H}$ : 318
- Psylla pyricola* (Foerster) - QQ.19  
 [pear psylla]  
 laser: APX.9  
 sorbitol, (l, a) transfer to pear seedlings,  $^{14}\text{C}$ :  
 108
- pteridine-2- $^{14}\text{C}$   
*Pieris brassicae* (p): 223
- pteridine(s)  
*Colias eurytheme* (p)(wing), biosynthesis in,  $^{14}\text{C}$ :  
 234
- Drosophila melanogaster*, biosynthesis in,  $^{14}\text{C}$ :  
 227
- Oncopeltus fasciatus*,  $^{14}\text{C}$ : 149  
 NA inhibition by,  $^3\text{H}$ : 157
- Pieris brassicae*, biosynthesis,  $^{14}\text{C}$ : 218;  
 (p): 223
- pterinic growth factor  
 DNA: *Drosophila*, tumour induction,  $^3\text{H}$ : 303
- Pterostichus* (*Feronia*) *niger* Schall - V.11  
 DNA, oogenesis (oocyte chromosomes, nucleoli),  
 $^3\text{H}$ : 418  
 RNA, oogenesis (oocyte chromosomes, nucleoli),  
 $^3\text{H}$ : 418
- Puerto Rico  
 irradiator, disinfestation: 1688  
 SMT, *Diatraea saccharalis*, prospects: 1156
- puff formation  
 $^3\text{H}$ ,  $^{14}\text{C}$ : 255  
*Chironomus*,  $^3\text{H}$ : 257  
*Chironomus* (salivary gland), protein transport,  
 $^{14}\text{C}$ : 180
- Chironomus tentans*,  $^3\text{H}$ : 324, 449, 450  
 effects of ecdysone on,  $^3\text{H}$ :  
 253  
 (salivary gland chromo-  
 somes), protein,  $^3\text{H}$ : 309  
 RNA,  $^3\text{H}$ : 309
- Chironomus thummi*, r.i.: 922  
*Chironomus thummi piger*,  $^3\text{H}$ : 324  
*Chironomus thummi thummi*,  $^3\text{H}$ : 324
- Diptera, r.i.: 298  
 (giant chromosomes), r.i.: 254  
 (salivary gland chromosomes),  $^3\text{H}$ : 290
- Drosophila* (l), amino acid incorporation in,  
 $^3\text{H}$ : 200
- Drosophila busckii*,  $^3\text{H}$ : 450  
 amino acid incorporation,  
 r.i.: 334  
 antibiotics: formation, r.i.:  
 334  
 DNA,  $^3\text{H}$ : 334  
 protein, r.i.: 334  
 RNA,  $^3\text{H}$ : 334
- Drosophila hydei*,  $^3\text{H}$ : 116  
*Drosophila melanogaster*,  $^3\text{H}$ : 145  
*Drosophila virilis* (l, pp), amino acid incorpor-  
 ation in,  $^3\text{H}$ : 201
- ecdysone: *Chironomus tentans*,  $^3\text{H}$ : 169  
 induction by: 170  
 RNA (l),  $^3\text{H}$ : 115
- Rhynchosciara angelae*, DNA,  $^3\text{H}$ : 313  
 (l),  $^3\text{H}$ : 312  
 proteins,  $^3\text{H}$ : 313  
 RNA,  $^3\text{H}$ : 313
- RNA, metabolism, *Rhynchosciara angelae*  
 (l)(salivary gland): 305-6  
 synthesis,  $^3\text{H}$ : 289

- Sciara coprophila*, RNA (nucleolar),  $^3\text{H}$ : 270  
(salivary chromosomes) (f, 4),  
 $^3\text{H}$ : 271  
T: *Drosophila* (salivary gland), RNA,  $^3\text{H}$ : 333  
purine

*Drosophila melanogaster*, catabolism in,  $^{14}\text{C}$ :  
159, 160

*Pieris brassicae*, biosynthesis,  $^{14}\text{C}$ : 223  
metabolism in,  $^{14}\text{C}$ : 224

# purines- $^{14}\text{C}$

*Pieris brassicae* (f, p): 224

# puromycin

amino acid incorporation, puffs, *Drosophila*  
buskii, r.i.: 334

-/ $\gamma$ : *Drosophila melanogaster*, mutagenic  
effects: 1211

# putrescine- $^{14}\text{C}$

nicotine, biosynthesis: 869

pyramid ant: see *Dorymyrmex pyramicus*

pyrethrin-I- $^{14}\text{C}$  [B.2]

synthesis: 851

*Musca domestica*, in vitro and in vivo

metabolism: 852

resistance: 851

pyrethrin-II- $^{14}\text{C}$ , O-demethyl analogues

*Musca domestica*, oxidation products: 852

pyrethrins- $^{14}\text{C}$ : 850

# pyrimidine

*Celerio euphorbia*, synthesis in,  $^{14}\text{C}$ : 202

# pyrimidines- $^{14}\text{C}$

*Pieris brassicae* (f, p): 224

pyrimidines, halogenated

-/ $x$ : *Tribolium confusum*, lethal effects: 1458

# pyrophosphate

*Lucilia cuprina*, exchange in,  $^{32}\text{P}$ : 161

*Pyrrhocoris apterus* Linnaeus - Q.17

$^{32}\text{P}$ , biological half-life of: 1728

$^{86}\text{Rb}$ , biological half-life of: 1728

$^{121}\text{I}$ , biological half-life of: 1728

# pyrrolidine ring

labelling pattern, nicotine synthesis ( $^{14}\text{CO}_2$ ):  
861

# pyruvate- $^{14}\text{C}$

*Bombyx mori*: 93a

# pyruvate-1- $^{14}\text{C}$

*Anthonomus grandis* (f, a), lipid biosynthesis in:  
1137

# pyruvate-3- $^{14}\text{C}$

*Anthonomus grandis* (f, a), lipid biosynthesis in:  
1137

# Q

# quarantine

demonstration, irradiators for: 1672

# quarantine measures

$\gamma$ : *Strumeta tryoni*: 1670

# quarantine treatment

$\gamma$ : Hawaii fruit flies: 1647

# queen, ant

habitat selection by,  $^{131}\text{I}$ : 490

Queensland fruit fly: see *Strumeta tryoni*

quinacrine mustard: see ICR-100

# R

# rabbit

aldrin, metabolism, distribution and elimin-

ation of,  $^{14}\text{C}$ : 645

metabolites of,  $^{14}\text{C}$ : 648

carbaryl, metabolism of,  $^{14}\text{C}$ : 832-3

$\alpha$ -chlordane, metabolite isolation and detection,  
 $^{14}\text{C}$ : 654

DDT, metabolism and residues of,  $^{14}\text{C}$ : 682

plasmocytosis,  $^{198}\text{Au}$ : 627

dieldrin, metabolite isolation and detection,  
 $^{14}\text{C}$ : 654

transport in pregnancy,  $^{14}\text{C}$ : 636

labelling (blood cells), DF $^{32}\text{P}$ , in vivo: 756

nicotine, metabolism in liver,  $^{14}\text{C}$ : 855

metabolism in liver fractions,  $^{14}\text{C}$ :  
853

parathion, metabolism by liver microsomes,  
 $^{35}\text{S}$ : 766

percutaneous absorption of,  $^{32}\text{P}$ : 723

trichlorometaphos, metabolism,  $^{32}\text{P}$ ,  $^{35}\text{S}$ : 760

# radiation

behaviour: actographic recording: 1749

*Aphidina ovipare*: 1463

*Apis mellifica*: 1463

*Drosophila melanogaster*: 1463

*Dytiscus marginalis*: 1463

*Formica rufa*: 1463

*Gyrinus natator*: 1463

*Lepisma saccharina*: 1463

*Tenebrio molitor*: 1463

*Tettigonia viridissima*: 1463

biological effects of ionizing-, bibliography:  
1759

dominant lethals, theory of induction: 1121

in applied entomology: 1770

insect control: 42, 1547, 1781-2, 1790

-, prospects in Hungary: 1546

disinfection, cereals: 1550, 1633, 1698

chestnut, possibility of: 1664

fish, possibilities: 1627

food: 1532, 1638, 1655, 1671,  
1695

flour products: 1550

food preservation: 1535

fruit (packed): 1691

grain: 1547, 1630, 1634, 1651,  
1653, 1675, 1790

insect: 1689

stored products: 1628, 1660, 1698

vegetables (packed): 1691

wheat: 1655

- genetics, review of: 971  
 grain disinfestation: see disinfestation  
 sterilization: *Aedes aegypti*: 983  
     *Habrobracon juglandis*: 982  
     insect pests: 118, 1564  
     insects: 1252, 1560, 1567-8, 1576, 1774  
     -, (species table): 1135  
     Lepidoptera: 1133, 1257  
     Pectinophora malvella: 1123  
     spider mites: 1128  
 life span, *Drosophila*: 1417  
     *Habrobracon*: 1417
- Insects:  
*Acarus siro* (♂), competitiveness: 1488  
*Aedes aegypti*, chromosome aberrations: 1000  
     stage susceptibility: 963, 1333  
*Anthonomus grandis*, midguts: 1331  
     testis: 1331  
*Aphidina ovipare*, behaviour: 1463  
*Apis mellifica*, behaviour: 1463  
*Blattella germanica*, mutants (4): 1100  
*Bombyx mori*: 912  
     development (ontogenetical): 1061  
     sex ratio: 1061  
*Carpocapsa pomonella*, biological control: 1555  
*Chironomus tentans*, chromosome aberrations: 1513  
*Diatraea saccharalis* (p), oviposition: 1159  
     Trichogramma parasitism: 1159  
*Drosophila*: 939, 1200  
     (II, III), detrimental genes, viability: 1508  
     genetic effects: 1094  
     (germ cells), sensitivity of: 953  
     life span: 1417  
     mutagenic effects: 908  
     repair mechanisms: 908  
     (♂), segregation distorter: 1036  
     (e) susceptibility: 1383  
*Drosophila ananassae*, population genetics: 1513  
*Drosophila melanogaster*: 1202  
     behaviour: 1463  
     chromosome aberrations: 1006  
     gametogenesis: 977  
     (II) mutations, heterozygous effect of: 1102, 1423  
     population genetics: 1513  
     repair of genetic damage: 977  
     stage susceptibility: 942  
     (various stock), dominant lethals: 1155  
     (various strains), competitive interaction: 1478  
*Drosophila melanogaster*/D. simulans, inter-specific competition: 1464  
*Drosophila pseudoobscura*, population genetics: 1513  
*Drosophila subobscura*, population genetics: 1513  
*Drosophila willistoni*, population genetics: 1513  
*Dytiscus marginalis*, behaviour: 1463  
*Formica rufa*, behaviour: 1463  
*Gyrinus natator*, behaviour: 1463  
*Habrobracon*, lethal effects (nuclear damage): 918  
     life span: 1417  
*Habrobracon juglandis*, dominant lethals: 982  
     genetic variability: 1511  
     oogenesis: 982  
     sex-linked recessive lethals: 982  
     visibles: 982  
 insect, disinfestation: 1669  
     eradication: 41, 1765  
     populations: 907  
 insects: 1532, 1784  
     aging: 1413  
     effects at cellular level: 919  
     harmful agricultural: 1772  
     in natural ecosystems: 1528  
     lethal effects: 1432  
     mutagenic effects: 907  
     pig carrion decomposition pattern: 1525  
*Lepisma saccharina*, behaviour: 1463  
*Mormoniella vitripennis* (a): 1408  
 omnivorous leaf roller, biological control: 1555  
*Pectinophora malvella*, stage susceptibility: 1123  
*Pieris brassicae* (testis), glycogen content of: 442  
 silkworm, genetic effects: 1094  
     (gonia), mutagenic effects: 974  
     (fractionated): 974  
     lethal effects and mutations: 956;  
     (emb) strain differences: 1369  
     S- and R-, lethal effects (emb): 1368  
*Tenebrio molitor*, behaviour: 1463  
*Tettigonia viridissima*, behaviour: 1463  
*Tribolium confusum*, stage susceptibility: 1352, 1535  
*Trichoplusia ni*, resistance, cytogenetic basis of: 925  
*Trogoderma granarium*, lethal effects: 1462  
*Tyrophagus dimidiatus*, stage susceptibility: 1352, 1535  
 radiation/bee venom: protection: 1722  
 -/diapause duration: *Trogoderma granarium*, radiosensitivity: 1462  
 -/H<sub>2</sub>S: *Drosophila melanogaster*: 1202  
 -/sensitizing substances: *Drosophila*: 1200  
 -/simulated space flight conditions: *Habrobracon*, egg production and hatchability: 1457  
 -, chemosterilants: sterilization: 873  
     *Aedes aegypti*: 963  
     Lepidoptera: 1257

- radiations, ionizing  
in applied entomology: 1789
- radiation, natural ionizing  
*Drosophila melanogaster*, development: 1374  
reproductive potential: 1484
- radio frequency electrical fields  
grain beetles, lethal effects: 1783  
*Tenebrio molitor* (L), abnormalities: APX.2  
metabolism,  $^{14}\text{C}$ : 167
- radioactive contamination  
*Chironomus plumosus*, chromosome aberrations: 1494  
*Chironomus tentans*, chromosome aberrations: 1492-4
- radioactivity, natural  
*Drosophila melanogaster*, development: 1374
- radioecology  
pond, trophic levels, insects: 529
- radiography\*  
seed infestation, damage, x: 1742
- radioisotope  
programme of the IAEA: 1773
- radioisotopes  
agriculture, early applications: 39  
and ionizing radiations in entomology:  
bibliography: 1755  
applications in entomology, survey: 1777  
aquatic insects, accumulation in: 522  
ecological and biological studies of agricultural  
insects: 1775  
entomological research: 1767  
- studies of endemic and tropical  
diseases: 564  
entomology: 45  
- and tropical medicine, in: 565  
-, in: 1776  
insecticides, residue determinations: 1735  
labelling, *Xenopsylla gerbilli*: 546, 566  
tropical medicine, insect studies in: 38
- radionuclide  
insects, accumulation in: 77
- radon-222  
*Drosophila melanogaster*, sex-linked lethals: 1527
- Ranatra linearis* L. - Q.13  
accumulation,  $^{54}\text{Mn}$ ,  $^{90}\text{Sr}$ ,  $^{106}\text{Ru}$ ,  $^{137}\text{Cs}$ ,  $^{144}\text{Ce}$ : 510
- rapeseed oil  
toxaphene residues,  $^{36}\text{Cl}$ : 841
- rat  
aldrin, metabolism, distribution and elimination of,  $^{14}\text{C}$ ,  $^{32}\text{P}$ : 645-7  
Azodrin, metabolism of,  $^{14}\text{C}$ ,  $^{32}\text{P}$ : 700  
Banol, hydrolysis products of,  $^{14}\text{C}$ : 828  
metabolism of,  $^{14}\text{C}$ : 810, 811, 828  
metabolism and persistence of,  $^{14}\text{C}$ : 827

- Baygon, hydrolysis products of,  $^{14}\text{C}$ : 828  
metabolism of,  $^{14}\text{C}$ : 828  
metabolism and persistence of,  $^{14}\text{C}$ : 827
- BHC, distribution in tissues,  $^{14}\text{C}$ : 683  
biopterin, metabolism of,  $^{14}\text{C}$ : 210  
bromophos: absorption, distribution,  
metabolism of,  $^3\text{H}$ ,  $^{32}\text{P}$ : 795
- carbaryl, hydrolysis products of,  $^{14}\text{C}$ : 828  
metabolism in liver,  $^3\text{H}$ : 835  
metabolism of,  $^{14}\text{C}$ : 828, 832-3  
metabolism and persistence of,  $^{14}\text{C}$ : 827
- $^{14}\text{CCl}_4$ , metabolism of: 668  
diet:  $\text{CCl}_4$  metabolism,  $^{14}\text{C}$ : 603  
chlorfenvinphos, metabolism of,  $^{14}\text{C}$ : 737  
chlordane, metabolism of,  $^{14}\text{C}$ : 646  
DDT: (brain, liver, muscle) DDT binding to:  
635  
plasmacytosis,  $^{198}\text{Au}$ : 827  
protein metabolism (liver, cell-free  
system),  $^{14}\text{C}$ : 673
- DDVP (orally applied), absorption of,  $^{32}\text{P}$ : 653  
DFP, uptake (liver fractions),  $^{32}\text{P}$ : 693  
uptake and toxicity,  $^{32}\text{P}$ : 771
- dieldrin, metabolism, distribution and elimination of,  $^{14}\text{C}$ : 646-7;  $^{36}\text{Cl}$ : 639  
metabolism in DDT-treated-,  $^{14}\text{C}$ : 678  
toxicity of,  $^{36}\text{Cl}$ : 639
- dihydroheptachlor, metabolism of,  $^{14}\text{C}$ : 646
- dimethylcarbamates, hydrolysis products of,  
 $^{14}\text{C}$ : 828  
metabolism of,  $^{14}\text{C}$ : 828
- Dimetilan, metabolism of,  $^{14}\text{C}$ : 828
- Dipterex, detoxification: 732
- Dursban, metabolism of,  $^{14}\text{C}$ ,  $^{36}\text{Cl}$ : 789  
 $^{36}\text{Cl}$ : 792
- endrin, metabolism: 644  
metabolism of,  $^{14}\text{C}$ : 646
- ethyl parathion, degradation by liver homogenates,  $^{32}\text{P}$ : 788
- flea, pest transmission by: 561
- heptachlor, metabolism of,  $^{14}\text{C}$ : 646
- HRS-1422, hydrolysis products of,  $^{14}\text{C}$ : 828  
metabolism of,  $^{14}\text{C}$ : 828  
metabolism and persistence of,  $^{14}\text{C}$ : 827
- Imidan, metabolism of,  $^{14}\text{C}$ : 722  
residues of,  $^{14}\text{C}$ : 722
- Isolan, hydrolysis products of,  $^{14}\text{C}$ : 828  
metabolism of,  $^{14}\text{C}$ : 828  
metabolism and persistence of,  $^{14}\text{C}$ : 827
- malathion, metabolism in liver,  $^{14}\text{C}$ : 835
- Matacil, hydrolysis products of,  $^{14}\text{C}$ : 828  
metabolism of,  $^{14}\text{C}$ : 828  
metabolism and persistence of,  $^{14}\text{C}$ : 827
- menazon, metabolism of,  $^{14}\text{C}$ : 703, 726

\* See also under "x-rays".

- Mesurol, hydrolysis products of,  $^{14}\text{C}$ : 828  
 metabolism of,  $^{14}\text{C}$ : 828  
 metabolism and persistence of,  $^{14}\text{C}$ : 827  
 methylcarbamate, hydrolysis products of,  $^{14}\text{C}$ : 828  
 metabolism of,  $^{14}\text{C}$ : 828  
 methylcarbamates, metabolism and persistence of,  $^{14}\text{C}$ : 827  
 methyl parathion, degradation of,  $^{32}\text{P}$ : 724-5  
 degradation by liver homogenates,  $^{32}\text{P}$ : 788  
 methyl paraoxon, degradation by liver homogenates,  $^{32}\text{P}$ : 788  
 nicotine, metabolism of,  $^{14}\text{C}$ : 864  
 parathion, metabolism,  $^{32}\text{P}$ ,  $^{35}\text{S}$ : 765  
 metabolism by liver microsomes,  $^{35}\text{S}$ : 766  
 $^{32}\text{P}$ : 768  
 percutaneous absorption of,  $^{32}\text{P}$ : 723  
 phosphamidon metabolism in,  $^{32}\text{P}$ : 704  
 sarin: acetylcholinesterase (brain),  $^{32}\text{P}$ : 731  
 SD 8447, metabolism,  $^{32}\text{P}$ : 799  
 $^{14}\text{C}$ : 694  
 toxicity,  $^{32}\text{P}$ : 799  
 Sumithion, degradation of,  $^{32}\text{P}$ : 725  
 degradation by liver homogenates,  $^{32}\text{P}$ : 788  
 telodrin, metabolism of,  $^{14}\text{C}$ : 646  
 Temik, metabolism of,  $^{14}\text{C}$ : 808, 826  
 $^{14}\text{C}$ ,  $^{35}\text{S}$ : 806  
 residues of,  $^{14}\text{C}$ : 826  
 thiotepa, distribution of,  $^{32}\text{P}$ : 880  
 triphenyltin, metabolism of,  $^{113}\text{Sn}$ : 639  
 Tropical-methylene, metabolism of: 894  
 UC 10854, hydrolysis products of,  $^{14}\text{C}$ : 828  
 metabolism of,  $^{14}\text{C}$ : 828  
 metabolism and persistence of,  $^{14}\text{C}$ : 827  
 Zectran, hydrolysis products of,  $^{14}\text{C}$ : 828  
 metabolism of,  $^{14}\text{C}$ : 828  
 metabolism and persistence of,  $^{14}\text{C}$ : 827  
 x' apitonin (royal jelly, lyophilized): radiation protection: 1724
- rat (liver microsomes)  
 Baygon, metabolism of,  $^{14}\text{C}$ : 839  
 Banol, metabolism of,  $^{14}\text{C}$ : 839  
 Carbaryl, metabolism of,  $^{14}\text{C}$ : 839  
 Dimetilan, metabolism of,  $^{14}\text{C}$ : 839  
 HRS-1422, metabolism of,  $^{14}\text{C}$ : 839  
 Isolan, metabolism of,  $^{14}\text{C}$ : 839  
 Matacil, metabolism of,  $^{14}\text{C}$ : 839  
 Mesurol, metabolism of,  $^{14}\text{C}$ : 839  
 UC 10854, metabolism of,  $^{14}\text{C}$ : 839  
 Zectran, metabolism of,  $^{14}\text{C}$ : 839
- RBE ( $x_{90}$  kVp,  $x_{20}$  kVp,  $\beta_{30}\text{Sr}$ ):  
 Elasmopalpus lignosellus (e): 1277
- RBE. ( $x_{140}$  kVp,  $\gamma_{137}\text{Cs}$ ): *Drosophila*, sex-linked recessive lethals: 1272  
 ( $x, n$ ): *Drosophila melanogaster*: 937  
 ( $x, n_1$ ): *Drosophila melanogaster* (pre- and post-meiotic germ cells), mutagenic effects: 949  
 sex-linked recessive lethals: 1186  
 translocations: 1186  
 ( $x, n_{15}$  MeV): *Drosophila*: 1237  
 ( $\gamma, n_{14}$  MeV): silkworm, mosaics: 1271  
 visible recessive egg colour mutations: 1271  
 ( $\text{P}_{120}$  MeV,  $\text{P}_{600}$  MeV,  $\gamma$ ): *Drosophila melanogaster*: 1223  
 red-legged grasshopper: see *Melanoplus femurrubrum*  
 repellent: see insect repellent  
 residue  
 pesticide-, removal by washing,  $^{35}\text{S}$ : 684  
 residues\*  
 insecticide-, r.i.: 577  
 tissues, determination in,  $^{36}\text{Cl}$ : 1752  
 residues, terminal  
 carbamates, r.i.: 819  
 resilin  
 Schistocerca gregaria, synthesis by,  $^{14}\text{C}$ : 139  
 resistance  
 maize to *Ostrinia nubilalis*,  $^{14}\text{C}$ : 903  
 respirometer  
 radiometric, insects,  $^{14}\text{C}$ : 1738  
 Reticulitermes flavipes (Kollar) - K.3  
 [Eastern subterranean termite]  
 $\gamma$ : wood/plastic, resistance: 1715, 1721  
 Rhagoletis pomonella (Walsh) - X.35  
 [apple maggot]  
 Pseudomonas melophthora, symbiote of: 754  
 Rhodnius prolixus (Stål) - Q.18  
 dispersal,  $^{60}\text{Co}$ : 705  
 labelling,  $^{60}\text{Co}$ : 705  
 Rhinocoris iracundus Pd. - Q.18  
 (water bugs)  
 $^{32}\text{P}$ , biological half-life of: 1728  
 $^{86}\text{Rb}$ , biological half-life of: 1728  
 $^{131}\text{I}$ , biological half-life of: 1728  
 Rhyacia c-nigrum Linnaeus - U.29  
 $^{85}\text{Sr}$ ,  $^{131}\text{I}$ ,  $^{137}\text{Cs}$ , distribution in ( $\delta, a$ ): 53  
 Rhyacionia buoliana (Schiffmüller) - U.33  
 [European pine shoot moth]  
 $\gamma$ : spermatogenesis: 1332  
 sterility: 1281  
 testis: 1332  
 -, tepa: sterility: 1281
- \* See under individual insecticides, and Table 2 (final column).

- Rhynchosciara - X.29/30  
 giant chromosomes,  $^3\text{H}$ -actinomycin: 263
- Rhynchosciara angelae - X.29/30  
 amino acid incorporation, larval development,  
 $^3\text{H}$ : 312  
 DNA, metabolism and synthesis, larval develop-  
 ment,  $^3\text{H}$ : 312-13  
 puffs,  $^3\text{H}$ : 313  
 replication (giant chromosomes),  $^3\text{H}$ : 394  
 synthesis (salivary gland chromosomes),  
 $^3\text{H}$ : 341  
 infection (protozoan): chromosomes (f), RNA  
 coating,  $^3\text{H}$ : 323  
 protein synthesis, larval development,  $^3\text{H}$ : 313  
 puffs,  $^3\text{H}$ : 313  
 puffs,  $^3\text{H}$ : 312-13  
 RNA, metabolism and synthesis, larval develop-  
 ment,  $^3\text{H}$ : 306-8, 312-13  
 puffs,  $^3\text{H}$ : 306, 313
- Rhyzopertha dominica (Fabricius) - V.5  
 [lesser grain borer]  
 $\gamma$ : lethal effects: 1657, 1668  
 stage susceptibility: 1391  
 sterility: 1391, 1657, 1668
- ribonuclease  
 -/x: Drosophila (spermatids, spermatozoa):  
 1235
- ribose- $^{14}\text{C}$   
 Pieris brassicae: 224
- ribose-1- $^{14}\text{C}$   
 Pieris brassicae (p), leucoprotein biosynthesis:  
 223
- rice  
 Sumithion, residues of,  $^{32}\text{P}$ : 762  
 $\gamma$ : disinfection: 1632, 1680-1  
 -, Pakistan: 1692
- rice borer, Asiatic: see Chilo suppressalis
- rice pests  
 recommendations for studies: 1637
- rice weevil: see Sitophilus oryzae
- RNA  
 Achaete domesticus (gonads),  $^3\text{H}$ : 431  
 (oocyte),  $^3\text{H}$ : 330  
 actinomycin D: Bombyx mori (silk gland),  $^3\text{H}$ :  
 329  
 grasshopper (neuroblast),  $^3\text{H}$ :  
 997  
 allatectomy: Periplaneta americana, synthesis  
 during ovarian development,  $^3\text{H}$ :  
 349  
 amino acids, Musca domestica, oogenesis,  $^3\text{H}$ :  
 92  
 Achaete domesticus, embryogenesis,  
 $^{14}\text{C}$ : 285  
 Antheraea polyphemus (post-emb),  $^3\text{H}$ : 244  
 apholate: Musca domestica (e): 887  
 Barathra brassicae (fat body, gut, neurolemma,  
 etc.),  $^3\text{H}$ : 314  
 Blattella germanica,  $^3\text{H}$ : 359
- RNA, Bombyx mori (midgut), cytoplasmic-polyhedrosis  
 virus,  $^3\text{H}$ : 353; (f): 351  
 (f)(fat body), infected with nuclear  
 polyhedrosis virus,  $^3\text{H}$ : 352  
 (f)(tissue, various), infected with  
 nuclear polyhedrosis virus,  $^3\text{H}$ :  
 352  
 (silk gland), electron microscopy/  
 autoradiography,  $^3\text{H}$ : 841
- cecropia, synthesis in injured-,  $^3\text{H}$ : 243
- Chironomus (giant chromosomes),  $^3\text{H}$ : 263  
 (puffs),  $^3\text{H}$ : 257
- Chironomus tentans (giant chromosomes),  $^3\text{H}$ :  
 284  
 puffs,  $^3\text{H}$ : 308, 324  
 (salivary gland),  $^3\text{H}$ : 266
- Chironomus thummi (f)(nucleolus),  $^3\text{H}$ : 273  
 Mg $^{2+}$ : Balbiani ring,  $^3\text{H}$ :  
 72
- Chironomus thummi piger, synthesis during  
 puffing,  $^3\text{H}$ : 324
- Chironomus thummi thummi, synthesis during  
 puffing,  $^3\text{H}$ : 324
- Chortophaga viridifasciata (emb)(neuroblast),  
 $^3\text{H}$ : 274  
 spermatogenesis,  $^3\text{H}$ :  
 252
- chromosome coating, Rhynchosciara angelae  
 (f), protozoan-infected,  $^3\text{H}$ : 323
- Chrysopa perla (oocyte), metabolism,  $^{14}\text{C}$ : 280
- cycloheximide: Chironomus tentans,  $^3\text{H}$ : 256
- Diptera (salivary gland),  $^3\text{H}$ : 346
- Drosophila,  $^3\text{H}$ : 359  
 spermatogenesis,  $^3\text{H}$ : 950
- Drosophila hydei (isolated salivary glands,  
 nuclei),  $^3\text{H}$ : 328  
 (lampbrush Y-chromosome),  
 $^3\text{H}$ : 285  
 (salivary gland),  $^3\text{H}$ : 237
- Drosophila melanogaster (giant chromosomes),  
 $^3\text{H}$ : 339  
 (primary cultures of  
 embryonic cells),  
 $^{32}\text{P}$ : 286  
 puff formation,  $^3\text{H}$ :  
 339  
 (salivary gland), effects  
 of spermidine on  
 synthesis: 264
- Drosophila virilis (f3),  $^3\text{H}$ : 277  
 (f3, pp)(salivary gland): 278;  
 in vitro,  $^3\text{H}$ : 277
- Dytiscus marginalis, oogenesis,  $^3\text{H}$ : 245
- ecdysone: Drosophila hydei (f)(puffs),  $^3\text{H}$ : 115  
 insect,  $^3\text{H}$ : 217  
 metabolism,  $^3\text{H}$ : 173  
 Musca domestica, synthesis in,  $^3\text{H}$ :  
 176



- 5-fluorouracil: *Musca domestica* (e): 885  
*Galleria mellonella*,  $^3\text{H}$ : 359  
     (ovariole),  $^3\text{H}$ : 330  
*Gryllus bimaculatus*, oogenesis,  $^{14}\text{C}$ : 285  
*Hyalophora cecropia* (post-emb),  $^3\text{H}$ : 244  
     (p), synthesis,  $^3\text{H}$ : 346  
     (p)(wing), synthesis in,  $^3\text{H}$ :  
         356  
     (p)(wing epidermis),  $^3\text{H}$ :  
         332  
*Leptinotarsa decemlineata* (emb),  $^3\text{H}$ : 311  
*Locusta migratoria* (oocyte chromosomes),  $^3\text{H}$ :  
     301-2  
*Malacosoma*,  $^3\text{H}$ : 359  
*Musca domestica*,  $^3\text{H}$ : 359  
*Oncopeltus fasciatus* (e),  $^3\text{H}$ : 157, 282  
 oogenesis, *Acilius sulcatus*,  $^3\text{H}$ : 418  
     *Apis mellifica*,  $^3\text{H}$ : 147  
     *Dytiscus marginalis*,  $^3\text{H}$ : 418  
     *Gryllus marginalis*,  $^3\text{H}$ : 418  
     *Locusta migratoria*,  $^3\text{H}$ : 417  
     *Musca domestica*,  $^3\text{H}$ : 417-8  
     *Pterostichus niger*,  $^3\text{H}$ : 418  
*Philosamia cynthia ricini* (fat body),  $^{32}\text{P}$ : 348  
*Phormia regina* (emb),  $^3\text{H}$ ,  $^{14}\text{C}$ ,  $^{32}\text{P}$ : 268  
*Rhynchosciara* (giant chromosomes),  $^3\text{H}$ : 263  
*Rhynchosciara angelae* (salivary gland),  $^3\text{H}$ :  
     305-6  
     larval development,  $^3\text{H}$ :  
         313  
     (l), metabolism,  $^3\text{H}$ :  
         312  
     puffs,  $^3\text{H}$ : 313  
*Samia cynthia* (a),  $^3\text{H}$ : 295  
     (p), synthesis,  $^3\text{H}$ : 346  
*Samia cynthia ricini* (post-emb),  $^3\text{H}$ : 244  
     (l), moult cycle,  $^3\text{H}$ : 296  
*Samia cynthia walkeri* (post-emb),  $^3\text{H}$ : 244  
 Saturniid moths (p)(tissues),  $^3\text{H}$ : 321  
*Sciara coprophila* (salivary gland chromo-  
     somes),  $^3\text{H}$ : 331  
     (nucleolar), puff formation,  
          $^3\text{H}$ : 270  
 silkworm (salivary gland),  $^{32}\text{P}$ : 299, 300  
*Simulium*,  $^3\text{H}$ : 359  
*Smittia* (salivary gland explant)(nucleolus),  
      $^3\text{H}$ , EM: 291  
     (nucleolar),  $^{14}\text{C}$ : 342  
*Smittia parthenogenetica* (salivary gland),  
     nucleolar synthesis,  $^3\text{H}$ : 343-4  
     methylation,  $^{14}\text{C}$ : 344  
 T : puffs, *Drosophila* (salivary gland),  $^3\text{H}$ : 333  
*Tenebrio molitor* (emb),  $^3\text{H}$ : 311  
 γ : *Bombyx mori* (e): 923  
 mRNA  
     *Drosophila melanogaster* (imaginal disks),  $^3\text{H}$ :  
         151  
 rRNA  
     *Drosophila*,  $^3\text{H}$ ,  $^{32}\text{P}$ : 16  
     *Drosophila melanogaster*,  $^3\text{H}$ : 350  
     *Drosophila simulans*,  $^3\text{H}$ : 336  
 tRNA  
     *Drosophila melanogaster*,  $^3\text{H}$ ,  $^{32}\text{P}$ : 335  
     *Smittia parthenogenetica* (nucleolus),  $^3\text{H}$ : 345  
 RNA synthetase, phenylalanyl  
     flies,  $^{14}\text{C}$ : 267  
     insects,  $^{14}\text{C}$ : 267  
 roach, Madeira: see *Leucophaea maderae*  
 Rocky Mountain wood tick: see *Dermacentor*  
     andersoni  
 Rogor- $^{32}\text{P}$  [PA.12]  
     apple, metabolism and residues in: 769  
     apricot, metabolism and residues in: 769  
     cherry, metabolism and residues in: 769  
     grapefruit, metabolism and residues in: 769  
     grapes, metabolism and residues in: 769  
     olive oil, residues in: 696  
     olives, metabolism and residues in: 769  
     peach, metabolism and residues in: 769  
     tangerine, metabolism and residues in: 769  
 ronnel- $^{32}\text{P}$  [PC.8]  
     cattle, residues in: 746  
     cow (lactating), residues in: 746  
     meat, residues in: 758  
     milk, residues in: 758  
 rotenone- $^{14}\text{C}$  [B.1]  
     binding characteristics in respiratory chain: 871  
     inhibition sites of amygdal and ptericidin A: 871  
 rotenone-6a- $^{14}\text{C}$   
     respiratory chain, reaction sites in: 872  
 Roumania  
     honey, radioactivity in: 508  
 royal jelly  
     *Apis mellifera*, development,  $^{14}\text{C}$ : 188  
 rubidium-86  
     biological half-life determination in bugs  
         (various): 1728  
     labelling, saliva, *Aphis fabae*: 482  
 ruelene- $^{32}\text{P}$  [PC.16]  
     meat, residues in: 758  
     milk, residues in: 758  
 ruthenium-106  
     *Acheta domesticus*: distribution and elimination:  
         515  
         turnover in: 516  
     *Aeschna grandis*, accumulation in: 62  
     arthropod food chain: 507, 516  
     arthropods: mineral cycling (forest): 514  
     *Dytiscus marginalis*, accumulation in: 510  
     EDTA: *Culex pipiens*, accumulation coef-  
         ficient: 83  
     *Hydrophilus piceus*, accumulation in: 510  
     *Notonecta glauca*, accumulation in: 510  
     *Ranatra linearis*, accumulation in: 510  
     *Sympetrum depressiusculum*, accumulation in:  
         510  
 rye  
     γ : disinfection: 1840

## S

safrrole-<sup>14</sup>C [A, 7]

synthesis: 896

saliva

Aphis fabae, <sup>86</sup>Rb: 482Elasmolomus sordidus (a), physiology and biochemistry, <sup>14</sup>C: 192Eumecopus punctiventris (F5), physiology and biochemistry, <sup>14</sup>C: 192polyphenol oxides, Hemiptera, biosynthesis in, <sup>14</sup>C: 183

salt-marsh ecosystem

arthropod food chains, <sup>32</sup>P: 525-6

Samia cynthia (Drury) - U, 43

[cynthia moth]

DNA synthesis (p), <sup>3</sup>H: 346- rate (a), <sup>3</sup>H: 295ecdysones: glucose metabolism (dpp), <sup>14</sup>C: 99injury: RNA, <sup>3</sup>H: 243insect hormones: glucose metabolism (dpp), <sup>14</sup>C: 99(p) cytochrome C, biosynthesis of, <sup>14</sup>C: 128RNA synthesis (p), <sup>3</sup>H: 346- rate (a), <sup>3</sup>H: 285tryptic peptides, biosynthesis of, <sup>14</sup>C: 128

Samia cynthia ricini (Drury) - U, 43

DNA synthesis, moult cycle (f), <sup>3</sup>H: 296hormones: RNA (post-emb, no-diapause-(p)), <sup>3</sup>H: 244injury: RNA (post-emb, no-diapause-(p)), <sup>3</sup>H: 244RNA, (post-emb, no-diapause-(p)), <sup>3</sup>H: 244synthesis, moult cycle (f), <sup>3</sup>H: 296

Samia cynthia walkeri (Drury) - U, 43

hormones: RNA (post-emb), <sup>3</sup>H: 244injury: RNA (post-emb), <sup>3</sup>H: 244RNA (post-emb), <sup>3</sup>H: 244

sandflies: see Lutzomyia longipalpis

Sarcophaga bullata - X, 29

[flesh fly]

amino-acid activating enzymes in, <sup>32</sup>P: 113neutral lipid metabolism (f)(fat body), <sup>14</sup>C: 398phospholipid biosynthesis (f)(fat body), <sup>14</sup>C, <sup>32</sup>P: 421

Sarcophaga peregrina (Robineau-Desvoidy) - X, 29

x: development (post-emb): 1382

DNA synthesis (p): 1382

respiration (p): 1315

stage susceptibility: 1382

sarcosine, methyl-<sup>14</sup>C: 615

sarin

synthesis, <sup>32</sup>P: 772sarin-<sup>32</sup>P

rat (brain), acetylcholinesterase inhibition: 731

sarin-<sup>37</sup>S: 904

Saturniid moths - U, 43

RNA (p)(fat body, blood cells, tracheal epithelium), <sup>3</sup>H: 321juvenile hormone: RNA (p)(abdomen without thoracic glands), <sup>3</sup>H: 321

sawfly: see Acantholyda nemoralis

sawfly, European spruce: see Diprion hercyniae

jack-pines: see Neodiprion pratti

Virginia pine: see Neodiprion pratti

wheat stem: see Cephus cinctus

scale, brown soft: see Coccus hesperidum

Florida red: see Chrysomphalus aonidum

Scaphytopius acutus - QQ, 6

[leafhopper]

food chain, <sup>32</sup>P: 556trophic transfer index, <sup>32</sup>P: 556

Scarabaeidae - V, 41

<sup>86</sup>Sr, <sup>131</sup>I, <sup>137</sup>Cs, accumulation and elimination of: 52

Schistocerca gregaria (Forsk) - H, 1

[desert locust]

age: wing protein, <sup>14</sup>C: 158cuticle, tyrosine incorporation into, <sup>3</sup>H: 177labelling, <sup>32</sup>P: 558lipoproteins (haemolymph), during flight, <sup>14</sup>C: 385phospholipids (haemolymph), <sup>32</sup>P: 387population estimates, <sup>32</sup>P: 558resilin biosynthesis, <sup>14</sup>C: 139sulphuryl fluoride, uptake (e), <sup>35</sup>S: 599, 600<sup>86</sup>Sr: K-contracture (leg muscle): 47

x: (emb), chromosome aberrations: 938, 1001-3

♂ meiosis, chiasma frequency: 981

DNA synthesis, <sup>3</sup>H: 981

y: behaviour (cannibalism): 1347

lethal effects: 1347; (e): 1441

stage susceptibility: 1347

-T: lethal effects (e): 1441

Sciara coprophila (Lintner) - X, 20

chromosomes (germ line), elimination and differentiation, <sup>3</sup>H: 15DNA: replication (giant chromosomes), <sup>3</sup>H: 294salivary gland chromosomes (f4), <sup>3</sup>H: 271(f, p), <sup>3</sup>H: 331nucleoprotein metabolism (f)(salivary gland chromosomes), <sup>3</sup>H: 331puffs, salivary gland chromosomes (f4), <sup>3</sup>H: 271RNA, (nucleolar), puff formation, <sup>3</sup>H: 270(f)(salivary gland chromosomes), <sup>3</sup>H: 331

scintillation counting, liquid -

<sup>3</sup>H- and <sup>14</sup>C-compounds, Periplaneta americana (cuticle): 1739

sclerotin

structure, <sup>14</sup>C: 182

sclerotization

<sup>14</sup>C: 182

## Scoliopteryx

- labelling (f),  $^{32}\text{P}$ : 484
- scorpion fly: see *Panorpa communis*
- Scotia segetum* (Schiff.) - U.29
- $^{85}\text{Sr}$ ,  $^{131}\text{I}$ ,  $^{137}\text{Cs}$ , body burden in: 55
- distribution in (f, a): 53
- screw-worm fly: see *Callitroga hominivorax*
- Cochliomyia hominivorax*
- SD 3562 (methoxy- $^{14}\text{C}$ -labelled) [PA.5]
- protein sorption, cholinesterase I-50 values: 698
- SD 7859- $^{14}\text{C}$  [PC.16]
- protein sorption, cholinesterase I-50 values: 698
- 1,2- $^{14}\text{C}$ -SD 8447
- protein sorption, cholinesterase I-50 values: 698
- SD 8447- $^{14}\text{C}$  [PC.17]
- dog, metabolism in: 694
- rat, metabolism in: 694
- SD 8447- $^{32}\text{P}$
- Heliothis zea*, toxicity: 799
- Macrosiphum pisi*, toxicity: 799
- Musca domestica*, toxicity: 799
- rat, metabolism in: 799
- Sitophilus oryzae*, toxicity: 799
- Tetranychus telarius*, toxicity: 799
- SD 9129- $^{14}\text{C}$  [PA.4]
- protein sorption, cholinesterase I-50 values: 698
- SD 9129- $^{32}\text{P}$
- cotton plant, distribution in: 775
- residues in: 775
- systemic activity in: 775
- seed
- infestation detection, x: 1526, 1707
- seeds
- radiation disinfestation, USA: 1662
- Selenophorus ellipticus* - V.11
- food chain,  $^{32}\text{P}$ : 556
- trophic transfer index,  $^{32}\text{P}$ : 556
- Selenophorus palliatus* - V.11
- food chain,  $^{32}\text{P}$ : 556
- trophic transfer index,  $^{32}\text{P}$ : 556
- semen
- labelling, *Bombyx mori*,  $^{32}\text{P}$ : 440
- Bombyx mori* (♀ reproductive system), distribution and translocation,  $^{32}\text{P}$ : 440
- sepiapterine
- Drosophila melanogaster*, biosynthesis in,  $^{14}\text{C}$ : 183, 198
- sericulture
- atomic energy for improving, East Pakistan: 1709
- serine
- Acantholyda nemoralis*,  $^{14}\text{C}$ : 135
- 3- $^{14}\text{C}$ -serine
- Acantholyda nemoralis*, phospholipid choline origin: 409
- phospholipid ethanolamine origin: 409

*Carassius morosus*, phospholipid choline origin: 409

phospholipid ethanolamine origin: 409

L-(3- $^{14}\text{C}$ )serine

- Antheraea pernyi*: 206
- Bombyx mori*: 206
- Musca domestica* (f)(fat body), incorporation into: 366-8
- incorporation into phosphatides: 368
- sesamex [A.3]
- Musca domestica*, DDT-resistance,  $^{14}\text{C}$ : 667
- sesoxane [A.3]
- /DDT: *Triatoma infestans* (n), toxicity,  $^{14}\text{C}$ : 625
- Sevin [X.6]
- acetylcholinesterase inhibition, substrate and dilution effects on,  $^{14}\text{C}$ : 846
- Sevin- $^{14}\text{C}$
- cotton plant, translocation and degradation in: 838
- Prodenia litura*, metabolism in: 823, 847
- sex ratio
- SMT (theoretical): 1554
- sheep
- butacarb, residues of,  $^3\text{H}$ ,  $^{14}\text{C}$ : 809
- Famphur, absorption and metabolism of,  $^3\text{H}$ : 727
- Shell Compound 4072- $^{32}\text{P}$
- meat, residues in: 758
- milk, residues in: 758
- sigma virus
- /x: *Drosophila melanogaster*, development: 1254
- silk gland\*
- thymidine metabolism in,  $^3\text{H}$ : 258-9
- silkmoth, American: see *Hyalophora cecropia*
- silkworm - U.3
- 43
- glycine synthesis,  $^{14}\text{C}$ : 195
- labelling,  $^{32}\text{P}$ ,  $^{131}\text{I}$ : 1283
- RNA synthesis (f)(silk gland),  $^{32}\text{P}$ : 299, 300
- n: mutagenic effects: 1283
- $n_{(14\text{ MeV})}$  (fractionated): mitosis: 1091
- visible recessives (f)(gonia): 1091
- $n_{(14\text{ MeV})}$ : mutations: 1213
- visible recessive egg colour mutations: 1271
- visible recessives: 957
- , x, y: mitosis: 1091
- mutation frequency (gonia): 1091
- , y: visible recessive egg colour mutations: 1271
- $n_{(14\text{ MeV})}$ /5-BUDR: mutations: 1213

\* See also section 1.2.9, and *Bombyx mori*.

- x: DNA, spermatogonia,  $^3\text{H}$ : 924  
 (e) maculae distribution: 1107  
 mutagenic effects: 1283  
 mutations: 933  
 spermatogonia: 958  
 stage susceptibility (e): 1370  
 (f): 1089  
 (spermatogonia): 924  
 -, y: stage susceptibility (e): 1370  
 y: (c), silk improvement: 1708  
 germ cells (post-meiotic): 975  
 gonias: 1108  
 (f): 1089  
 lethal effects: 1708  
 - (spermatogonia): 972  
 mosaics, visible recessive egg colour  
 mutations: 1271  
 mutations (spermatozoa, spermatids): 1238  
 spermatogonia, dose-rate effect: 972  
 stage susceptibility (e): 1370  
 (e, spermatogonia): 957  
 visible recessive egg colour mutations: 1271  
 -/metabolic inhibitors: stage susceptibility  
 (spermatogonia): 957  
 -/N: mutations (spermatozoa, spermatids):  
 1238  
 radiation: (fractionated): 974  
 genetic effects: 1094  
 lethal effects and mutations: 956  
 (emb),  
 strain differences: 1388-9  
 mutagenic effects (gonia): 974  
 irradiated-(p) food: piglet development: 1719  
 silkworm (strain C 108)  
 y(acute):  $G_2$  accumulation of primary  
 spermatogonia: 964  
 spermatogonia proliferation kinetics,  
 $^3\text{H}$ : 964  
 y(chronic): spermatogonia proliferation  
 kinetics,  $^3\text{H}$ : 928  
 spermatogonia, lethal effects: 928  
 silkworm, oak: see *Antheraea pernyi*  
 silver fish: see *Lepisma saccharina*  
 Simulium sp. - X, 30  
 protein synthesis in,  $^3\text{H}$ : 359  
 RNA synthesis in,  $^3\text{H}$ : 359  
 Stirex spp. - W, 23  
 (horntails)  
 y: quarantine control, timber: 1656  
 Sitophilus oryzae (Linnaeus) - V, 19  
 [rice weevil]  
 carbaryl, absorption and metabolism of,  $^{14}\text{C}$ :  
 815  
 SD 8447, toxicity of: 799  
 y: lethal effects: 1341, 1426-7, 1657, 1668;  
 (a): 1403  
 reproductive potential: 1361  
 stage susceptibility: 1341, 1344, 1391, 1684  
 stage susceptibility (f, p, a): 1361  
 sterility: 1341, 1391, 1657  
 Sitophilus zeamais (Motschulsky) - V, 19  
 y: survival rate: 1481  
 -/humidity: survival rate: 1480-1  
 3  $\alpha$ - $^3\text{H}$ -sitosterol: 384  
 $\beta$ -sitosterol  
 Manduca sexta, conversion inhibition,  $^{14}\text{C}$ : 400  
 $\beta$ -sitosterol- $^3\text{H}$   
 Bombyx mori, conversion in: 377  
 Manduca sexta: 399  
 $\beta$ -sitosterol- $^{14}\text{C}$   
 Hyalophora cecropia, sterol metabolism: 375  
 $\beta$ -sitosterol-28, 29- $^{14}\text{C}$   
 Locusta migratoria, utilization by: 360  
 Sitophilus granarius (Calandra granaria) (Linnaeus) -  
 [granary weevil] V, 19  
 oviposition rate, x: 1751  
 Triticum aestivum, infestation detection (seed),  
 (f), x: 1742  
 x: life span: 1433, 1454  
 -/O: lethal effects: 1433  
 life span: 1454  
 y: lethal effects: 1449, 1657  
 life span: 1449  
 stage susceptibility: 1344, 1657, 1684  
 sterility: 1657  
 -/T: life span: 1477  
 Sitotroga cerealella (Olivier) - U, 13  
 [Angoumois grain moth]  
 behaviour, x: 1705-6  
 development, x: 1376, 1705  
 (f, p) in corn kernels, x: 1706  
 sorghum kernels, x:  
 1706  
 wheat kernels, x: 1706  
 infestation detection (grain, kernel), x: 1376  
 SMT, prospects: 1396  
 y: (f) adult emergence: 1377  
 body weight: 1376  
 development: 1342, 1376; (e): 1377-8;  
 1396 (f): 1377  
 disinfection: 1342  
 life span: 1342; (a): 1376  
 (e) malformations: 1378  
 oviposition: 1396  
 reproductive potential: 1376  
 stage susceptibility: 1376-7  
 (f, p, a): 1342  
 sterility: 1376, 1396  
 tumour formation: 1376  
 (abdomen): 1377  
 smaller yellow ant: see *Acanthomyops claviger*  
 Smittia sp. - X, 9  
 RNA synthesis (nucleolus)(salivary gland  
 explants),  $^3\text{H}$ , EM: 291  
 Smittia parthenogenetica - X, 9  
 RNA, methylation (f)(salivary gland),  $^{14}\text{C}$ : 344

RNA, nucleolar- ( $\ell$ ),  $^{14}\text{C}$ : 342  
 nucleolar- ( $\ell$ )(silk gland),  $^3\text{H}$ : 343  
 4S-, (nucleolar) synthesis ( $\ell$ )(salivary gland),  $^3\text{H}$ : 344

RNA, nucleolus,  $^3\text{H}$ : 345

## SMT

*Aedes aegypti*, prospects: 963  
 Americas, possible applications in: 1542  
*Anastrepha ludens*, California-Arizona-Mexico border: 1603  
*Anopheles pharoensis*: Middle East, progress report: 1544  
     UAR: 1600  
     ( $\gamma$ ): 1583-5, 1610-11  
*Anthonomus grandis*: mating behaviour: 1579  
     population dynamics  
     ratios ( $\sigma$ :  $\phi$ ): 1579  
     proposals for: 1553  
*Bruchus obtectus* ( $\gamma$ ): 1577  
*Callitroga hominivorax* ( $\gamma$ ): 1588  
     Florida: 1588  
*Carpocapsa pomonella*: 1569  
     Canada, trials: 1605  
     ( $\gamma$ ): 1620  
     New Zealand, prospects: 1590  
*Ceratitis capitata* ( $\gamma$ ): 1545  
     ( $\gamma$ ) Austria, trials: 1594  
     Capri: 1616  
     Central America: 1616-7  
     ( $\gamma$ ): 1599  
     Israel, prospects: 1702  
     ( $\gamma$ ): 1589, 1666  
     Middle East, progress report: 1544  
     Nicaragua: 1602  
     Panama: 1602  
     projects, EURATOM-ITAL: 1551  
     release ratios ( $\gamma$ ): 1354  
     UAR: 1600  
*Cochliomyia hominivorax*, examples: 1542  
     Florida: 1633  
     USA: 1615  
     ( $\gamma$ ): 1586  
 computer simulation of theory: 1557  
*Culex fatigans*, Ceylon, prospects: 1607  
*Dacus cucurbitae*, Rota Island: 1791  
*Dacus dorsalis*, Guam: 1791  
*Dacus oleae*, Greece: 1614  
     projects, EURATOM-ITAL: 1551  
*Dacus tryoni*, Australia: 1587  
*Dermatobia hominis* ( $\gamma$ ): 1546  
*Diatraea saccharalis* ( $\gamma$ ), Puerto Rico, prospects: 1156  
*Drosophila melanogaster*: 1791  
     ( $\gamma$ ) USA, cage tests: 1613

SMT, economic aspects: 1539  
 examples: 1541  
 fruit flies: 1569  
*Haematobia irritans* ( $\gamma$ ), field tests, USA: 1591  
*Heliothis armiger* ( $\gamma$ ): 1577  
 IAEA-sponsored projects: 1773  
 insect control: advances in, survey: 1574  
     - by: 42  
 introductory article: 1552  
*Leptinotarsa decemlineata* ( $x$ ): 1577  
*Leucophaea coffeella* ( $\gamma$ ): 1545  
*Lucilia sericata*: 1569  
*Manduca sexta*, proposals for: 1553  
*Melolontha melolontha* ( $x$ ,  $\gamma$ ), laboratory experiments: 1582  
*Melolontha vulgaris*: 1569  
     (small scale), Switzerland: 1581  
     ( $x$ ,  $\ell$ ), field trials, Switzerland: 1580  
 mosquitoes: 1569  
 moths, Canada: 1619  
*Musca domestica*: 1569  
 new perspectives in insect control (general): 1573  
*Ornithodoros tholozani* ( $\gamma$ ), Israel: 1622  
*Paramyelois transitella*: 1569  
*Perkinsiella saccharicida*, predators: 1575  
     ( $\gamma$ ), Australia: 1144  
     Fiji: 1144  
     prospects: 1144  
 pest control, co-ordinated techniques in: 1571  
 potential role: 1531  
 predation, theoretical role of: 1566  
 predators, role of: 1575  
 principles: 1539, 1541, 1553, 1789  
*Prodenia litura*, Egypt, prospects: 1148  
 progress and prospects, species review 1967: 1559  
 review of projects: 1569  
 sex ratio, optimal (theoretical): 1554  
*Sitotroga cerealella*, Thailand, prospects: 1396  
 theory: 1554, 1572  
 snails  
     DDT in,  $^{14}\text{C}$ : 616  
 snout beetle: see *Apion* sp.  
 social insects  
     food exchange in, r.i.: 1791  
 sodium palmitate- $^{14}\text{C}$   
     lipid synthesis, *Carausius morosus* (ovariole),  $^{14}\text{C}$ : 390  
     *Galleria mellonella* (follicular vesicle): 391  
     (ovariole): 390  
 sodium-22  
     *Aedes aegypti* ( $\ell$ ), Na flux: 82  
     *Carausius morosus* (nerve cord), ouabain: Na efflux: 85

- Chironomus thummi* (salivary gland), nuclear uptake: 71
- dieldrin: ion movement, *Blattella germanica* (CNS): 638
- Periplaneta americana* (CNS): 638
- Drosophila melanogaster*, biological half-life in: 465
- effects of injury on feeding and humidity reaction: 431
- (a), turnover in: 465
- labelling, *Haplodiplosis equestris* (c, f): 467
- Hylemya antiqua* (f): 467
- Periplaneta americana* (nerve cord), ouabain: Na efflux: 85
- sodium-24
- DDT: *Periplaneta americana* (nerve membrane), ion transport: 659
- forest arthropods, biological half-life in: 533
- haemolymph, *Periplaneta americana*: 70
- [2-<sup>14</sup>C] anhydrous sodium acetate
- Musca domestica* (brain), acetylcholine metabolism: 463
- sodium acetate-<sup>3</sup>H
- Drosophila melanogaster*, puffing: 145
- sodium acetate-<sup>14</sup>C
- Anthonomus grandis* (f), fatty acid synthesis: 1136; metabolic conversion: 1136
- sodium acetate-<sup>14</sup>C<sub>1</sub>
- Corcyra cephalonica*, cholesterol metabolism: 392
- sodium acetate-1-<sup>14</sup>C
- Calliphora erythrocephala*, fatty acids: 361
- Eleodes longicollis*, p-benzoquinone biosynthesis: 190
- sodium acetate-2-<sup>14</sup>C
- Anisomorpha buprestoides*, cyclopentanoid terpene biosynthesis: 388
- sodium fluoride
- /x: *Drosophila* (spermatids, spermatozoa): 1235
- Drosophila melanogaster* (spermatozoa), mutagenic effects: 1212
- translocations: 1212
- sodium (1-<sup>14</sup>C) glyoxylate
- Periplaneta americana*, uric acid metabolism in: 537
- sodium propionate-1-<sup>14</sup>C
- Eleodes longicollis*, p-benzoquinone biosynthesis: 190
- sodium pyruvate-2-<sup>14</sup>C
- Phormia regina* (flight muscle), oxidation stimulation: 458
- sodium (2-<sup>14</sup>C) urate
- Periplaneta americana*, uric acid metabolism in: 537
- soil
- chlorfenvinphos, residues in, <sup>14</sup>C: 697
- soil, DDT, biodegradation to DDD, <sup>14</sup>C: 632
- distribution in, <sup>14</sup>C: 616, 663
- residues in, <sup>14</sup>C: 649
- diazinon, metabolism of, <sup>14</sup>C: 729, 730
- persistence in: 728, 730
- dieldrin, degradation by microorganisms in, <sup>14</sup>C: 660
- dimethoate, movement of, <sup>32</sup>P: 781
- Dunban, metabolism of, <sup>14</sup>C: 790
- lindane, decomposition of, <sup>14</sup>C: 692
- malathion, metabolism of, <sup>14</sup>C: 757
- Temik, fate of, r.i.: 834
- metabolism of, <sup>32</sup>S: 816
- Zinophos, metabolism of, <sup>14</sup>C: 729
- persistence in: 728
- soil microorganism
- Chloropropylate degradation, <sup>14</sup>C: 664
- soils
- aldrin, absorption by, <sup>14</sup>C: 691
- diazinon, degradation by, <sup>14</sup>C: 749
- soils, tropical, submerged -
- γ-BHC degradation by, <sup>14</sup>C: 655
- persistence in, <sup>14</sup>C: 655
- Solenopsis molesta* (Say) - W, 14
- [chief ant]
- habitat selection by queens, <sup>131</sup>I: 490
- Somatochlora flavomaculata* - F, 8
- haemolymph circulation (wing), <sup>32</sup>P: 432
- sonic energy
- insect control: APX, 4
- sorbitol-<sup>14</sup>C
- Psylla pyricola* (f, a), transfer to pear seedlings by: 108
- sorghum kernels
- Sitotroga cerealella* (f, p), infestation detection, x: 1706
- South Africa
- irradiator (γ-), agricultural products
- disinfestation: 1674
- fruit, insect disinfestation: 1778
- Southern armyworm: see *Prodenia eridania*
- Southern cattle tick: see *Boophilus microplus*
- Southern house mosquito: see *Culex pipiens quinquefasciatus*
- soybean
- γ: disinfestation: 1876
- space flight
- fruit flies: 1179
- /γ: *Drosophila*, dominant lethals in: 1126
- spermidine
- Drosophila melanogaster*, RNA synthesis, <sup>3</sup>H: 264
- Sphinx ligustri* - U, 46
- protein synthesis (p), <sup>14</sup>C: 120
- spices
- neutron activation: methyl bromide residues: 1731
- spider mite, two-spotted: see *Tetranychus urticae*
- spider mites - Ac, 14
- radiation: sterility: 1128

- spider, wolf: see *Lycosa punctulata*  
 spiders, wolf: see *Lycosidae*  
 spiders - Ar.  
<sup>134</sup>Cs, metabolism of: 507  
 food chain, <sup>32</sup>P: 556  
 trophic transfer index, <sup>32</sup>P: 556  
 spinach  
 dimethoate, residues of, <sup>32</sup>P: 777-8  
 r.i.: 779  
*Spodoptera frugiperda* (J.E. Smith) - U, 29  
 [fall armyworm]  
 teapa, distribution in, <sup>14</sup>C: 884  
 DNA (e) metabolism, <sup>14</sup>C: 884  
 persistence in, <sup>14</sup>C: 879  
 stable fly: see *Stomoxys calcitrans*  
*Stenochetus mangiferae* (Fabricius) - V, 19  
 [mango seed weevil]  
 γ: sterilization: 1696  
*Stenonema fuscum* (Clemens) - E, 6  
 DDT, resistance to, <sup>14</sup>C: 631  
*Stenonema interpunctatum* (Say) - E, 6  
 DDT, resistance to, <sup>14</sup>C: 631  
 sterile-male technique: see section 2.4.2.1. and SMT  
 sterility  
 γ: *Diatraea saccharalis*, inherited: 1157  
 sterilization  
*Callitroga hominivorax*: 1568  
 chemosterilants, radiation: effectiveness of: 873  
*Glossina* sp.: 1568, 1712  
 hemel: *Musca domestica*: 876  
 hempa: *Musca domestica*, <sup>14</sup>C: 874, 877  
 insect control: 1580  
 mosquito control: 1713  
*Nauphoeta cinerea* (?): 1125  
 pest control, principles: 1565  
 population control: 1568  
 teapa: *Musca domestica*: 876  
 tobacco hornworm: 1565  
 tsetse fly: 1565  
 x: *Anthonomus grandis*: 1263; (♂): 1439  
*Chrysomela decemlineata*: 1340  
*Drosophila*: 1268  
*Drosophila melanogaster*: 944, 1139;  
 (♂): 921, 1090; (F<sub>1</sub>, ♂): 1140  
  
*Hypera postica*: 1124  
 insects: 1134  
*Ocnaria dispar* (f): 1360  
*Pectinophora malvella*: 1392  
*Phormia regina*: 1431  
*Tribolium castaneum*: 1350  
*Tribolium confusum*: 1437  
*Tyrophagus dimidiatus*: 1437  
 -, apholate: *Anthonomus grandis*: 1268  
 -, bisulfan: *Anthonomus grandis*: 1268  
 -, chemosterilants: *Anthonomus grandis*: 1268  
 -, quinacrine mustard, azaserine: *Drosophila*:  
 1256  
 γ: *Aedes aegypti* (p): 1472  
*Agrotis segetum* (f, p): 1412  
*Amphimallon majalis*: 1578  
*Anastrepha ludens*: 1603  
*Anopheles pharaonis*: 1595  
*Anthonomus grandis*: 1141  
*Bombyx mori*: 1279  
*Callitroga hominivorax*: 1588  
*Callosobruchus chinensis* (p): 1444  
*Carpocapsa pomonella* (a, ♂, ♀): 1606  
 (p): 1605  
*Ceratitis capitata*: 1120, 1354, 1595-6,  
 1598, 1666, 1696  
 - (p): 1119  
*Cochliomyia hominivorax*: 1570  
*Dacus cucurbitae*: 1791  
 - (p): 1592  
*Dacus dorsalis*: 1791  
*Dacus oleae* (p): 1154  
*Dacus tryoni* (p): 1597  
*Dacus zonatus* (p): 1592  
*Diatraea saccharalis*: 1688  
*Dicladispa* (Hispa) armigera: 1291  
*Drosophila melanogaster*: 1308, 1613, 1791;  
 (F<sub>1</sub>, ♂): 1140  
*Ephestia cautella*: 1668  
*Fannia canicularis*: 1373  
*Grapholitha molesta*, cage for: 1740  
 (p, a): 1302  
*Haematobia irritans* (p): 1591  
*Heliothis virescens* (p): 1127, 1355  
*Hippelates pusio* (p, a): 1471  
*Hispa*: 1117  
*Hylemya antiqua* (p): 1366  
*Hyphantria cunea*: 1338  
 insects: 1134, 1786  
 - (♂) (fruit): 1778  
*Ips confusus* (a): 1479  
*Lasioderma serricornis*: 1391, 1570  
*Leucoptera coffeella* (p, a): 1131  
*Lymantria dispar* (p): 1146  
*Musca domestica*: 1570; (p): 1233  
*Ocnaria dispar* (f): 1360  
*Omithodoros tholozani*: 1622  
*Oryzaephilus surinamensis*: 1657  
*Perkinsiella saccharida* (n): 1144  
*Phorbia brassicae*: 1608  
*Phormia regina*: 1431  
*Rhyacionia buoliana*: 1281  
*Rhyzopertha dominica*: 1391, 1657, 1668  
*Sitophilus granarius*: 1657  
*Sitophilus oryzae*: 1341, 1391, 1657, 1668  
*Sitotroga cerealella*: 1342; (♂, ♀): 1376  
*Sternochetus mangiferae*: 1696  
 tick: 1267  
*Tribolium castaneum*: 1430, 1657, 1668;  
 (a): 1428  
*Tribolium confusum*: 1391, 1657  
*Trichoplusia ni* (a): 1142

- Trogoderma granarium*: 1657, 1668  
*γ. apholate*: *Drosophila melanogaster*: 1308, 1613  
 -, chemosterilants: *Aedes aegypti*: 963  
   *Cochliomyia hominivorax*: 1570  
   *Lasioderma serricorne*: 1570  
   *Musca domestica*: 1570  
   ticks: 1267  
 -, n: *Ceratitidis capitata*: 1562  
 -, tepa: *Rhyacionia buoliana*: 1281  
 -/CO<sub>2</sub>: *Musca domestica* (p): 1233  
 -/T: *Bombyx mori*: 1279  
 B: insects: 1514  
 5-fluorouracil: *Musca domestica* (e): 885  
 radiation: *Aedes aegypti*: 963  
   *Habrobracon juglandis*: 982  
   insects: 906, 1118, 1252, 1564, 1567, 1576  
   Rev., with species table: 1135  
   Lepidoptera: 1133, 1257  
   mallow moth: 1123, 1774  
   spider mites: 1128  
 radiation, chemosterilants: insects: 1252  
*Sternonchus mangiferae* (Fabricius) - V.19  
 [mango seed weevil]  
 γ: disinfestation: mango: 1650  
   lethal effects: 1650  
   sterility: 1650  
 steroid  
   hormone: see ecdysone  
 steroids  
   *Anthonomus grandis* (a), storage and excretion: 371  
   DDT: birds, metabolism in, <sup>14</sup>C: 669  
   dieltrin: birds, metabolism in, <sup>14</sup>C: 669  
   *Euryotis floridana*, distribution in, <sup>3</sup>H, <sup>14</sup>C: 383  
 steroid utilization  
   *Musca domestica* (f), <sup>14</sup>C: 370  
 sterol\*  
   *Blattella germanica*, metabolism in, <sup>14</sup>C: 393  
   *Bombyx mori* (p, Dp), metabolism in, <sup>14</sup>C: 395  
   *Manduca sexta*, metabolism in, <sup>3</sup>H, <sup>14</sup>C: 399  
   metabolism in insects, <sup>14</sup>C: 393  
 sterols  
   *Bombyx mori*, <sup>3</sup>H: 377  
   *Euryotis floridana*: distribution in, <sup>3</sup>H, <sup>14</sup>C: 383  
   distribution and dynamic  
   state in, <sup>3</sup>H, <sup>14</sup>C: 382  
   function in, <sup>3</sup>H, <sup>14</sup>C: 382  
   *Hyalophora cecropia*, metamorphosis, <sup>14</sup>C: 375  
   insect-, biochemistry of, r.i.: 396  
   *Musca domestica* (e, f, p, a), utilization by, <sup>14</sup>C: 466  
   Periplaneta americana, concentration in: 383  
 stick insect: see Anisomorpha buprestoides  
   *Carausius morosus*

- stink bug: see Eumecopus punctiventris  
 stink bug, two-spotted: see Perillus bioculatus  
*Stomoxys calcitrans* (Linnaeus) - X.19  
 [stable fly]  
   carbaryl, absorption and metabolism, <sup>14</sup>C: 815  
   DDT, metabolism in R- and S-, <sup>14</sup>C: 677  
   fenthion, absorption of, <sup>35</sup>S: 801  
   metabolism of, <sup>35</sup>S: 801  
 stone flies - G.  
   food chains, fresh water, r.i.: 524  
 stored products  
   radiation disinfestation of: 1628, 1660, 1698  
 strontium-85  
   Coleoptera, distribution in: 54  
   Hymenoptera, distribution in: 54  
   insects, accumulation and elimination by: 50, 51, 55  
   metabolism and distribution: 53  
   insects, phytophagous-, accumulation and elimination by: 52  
   Lepidoptera, distribution in: 54  
   Orthoptera, distribution in: 54  
 strontium-89  
   labelling: *Aedes aegypti*: 1791  
   *Culex pipiens quinquefasciatus*: 1791  
   *Psorophora ferox*: 1791  
   *Schistocerca gregaria* (leg muscle),  
   K-contraction in: 47  
 strontium-90  
   arthropods: mineral cycling (forest): 514  
   Chironomidae (aquatic), fallout concentration  
   by: 528  
   Chironomus varus, uptake by: 68  
   Dytiscus marginalis, accumulation in: 510  
   EDTA: *Culex pipiens*, accumulation  
   coefficient: 83  
   honey contamination (Romania): 508  
   Hydrophilus piceus, accumulation in: 510  
   Notonecta glauca, accumulation in: 510  
   Ranatra linearis, accumulation in: 510  
   Sympetrum depressiusculum, accumulation in:  
   510  
   labelling, ticks (immature forms): 568  
   +<sup>90</sup>Y planes, calibration for insect irradiation:  
   1727  
*Strumeta tryoni* - X.35  
 [Queensland fruit fly]  
   γ: disinfestation: 1670  
   lethal effects: 1690; (e, f, p, a): 1670  
   quarantine measure: 1670  
   stage susceptibility: 1670  
 succinate-<sup>14</sup>C  
   nicotine, biosynthesis of: 862  
 sucrose-<sup>14</sup>C  
   Antheraea eucalypti (culture), sucrose  
   utilization by: 90  
 sucrose-U-<sup>14</sup>C  
   Apis mellifera, sugar utilization: 188

\* See also cholesterol.



sucrose,  $\gamma$ -irradiated

*Drosophila melanogaster*, sex-linked recessive  
lethals: 1222

## sugar

absorption rate, *Phormia regina* (midgut),  $^{14}\text{C}$ :  
94

sugar-cane leafhopper: see *Perkinsiella saccharicida*

## sugars

insects, biochemistry of: Rev., r.i.: 109

## sugar utilization

*Antheraea eucalypti* (culture),  $^{14}\text{C}$ : 90

*Apis mellifera*,  $^{14}\text{C}$ : 188

sulfoxide, diastereoisomers of,  $^{14}\text{C}$  (See [A.4])

synthesis: 896

sulfuryl- $^{32}\text{S}$  fluoride [F.4]

synthesis: 601

application to insect eggs: 601

*Schistocerca gregaria* (e), uptake by: 599, 600

*Tenebrio molitor* (e), uptake by: 599, 600

## sulphur-35

## Insecticides:

Bayer 9017, metabolism and residues in cattle:  
801

diazinon, residues in agricultural crops: 770

Dipterex, synthesis: 743

EDTA: *Culex pipiens*, accumulation  
coefficient: 83

fenthion, metabolism in blood-sucking arthro-  
pods: 801

insecticide biochemistry: 1757

insecticide metabolism: 584

neurohormones, *Periplaneta americana*: 168

malathion, synthesis: 743

parathion, accumulation in plants and insects:  
802

metabolism: 761

metabolism in cockroach (fat body):  
766

*Musca domestica*: 767

*Periplaneta americana*:  
767

rabbit (liver micro-  
somes): 766

rat: 765

(liver microsomes):  
766

pesticide residue, removal by washing: 684

phorate: 742

sulphuryl fluoride, uptake by insect eggs: 599,  
600

Temik: 806, 808, 813-14, 816

metabolism in cow (lactating): 818

sulphone: 816

sulphoxide: 808

trichlorometaphos metabolism: 760

## Insects:

*Aeschna grandis*, accumulation in: 82

*Bombyx mori*, fibroin, methionine incorporation  
into: 117

*Calpodes ethlius*, endocuticle deposition: 419

dragonfly, haemolymph circulation in: 433-5

*Gryllus bimaculatus*, ommine synthesis: 186

insect parasite, nutrition of: 536

## Other Animals:

cattle, trichlorometaphos in: 760

milk, trichlorometaphos in: 760

mouse, trichlorometaphos in: 760

rabbit, trichlorometaphos in: 760

## sulphur-37

sarin poisoning: 904

Sumithion [PC. 7]

cauliflower: 788

*Chilo suppressalis*, degradation by: 788

*Periplaneta americana*: 788

rat (liver homogenates): 788

Sumithion- $^{32}\text{P}$ 

*Bombyx mori* (L5, midgut), degradation by: 725

rice, metabolism in: 734, 736

toxicity to: 736

*Musca domestica*, R- and S-, metabolism in:  
735

rat (liver), degradation by: 725

rice, residues in: 762

*Xylotrupes dichotomus* (L3), degradation by: 725

sunflower spittlebug: see *Clastoptera xanthocephala*

sweetpotato weevil: see *Cylas formicarius*  
elegantulus

## Switzerland

SMT, *Melolontha vulgaris*: 1581

## symbiotic bacteria

*Periplaneta americana* (fat body), uric acid  
metabolism,  $^{14}\text{C}$ : 537

*Sympetrum danae* - F.8

haemolymph circulation (wing),  $^{32}\text{P}$ : 432

*Sympetrum depressusculum* Sel. - F.8

$^{54}\text{Mn}$ ,  $^{90}\text{Sr}$ ,  $^{106}\text{Ru}$ ,  $^{137}\text{Cs}$ ,  $^{144}\text{Ce}$  accumulations:  
510

*Sympetrum vulgatum* - F.8

haemolymph circulation (wing),  $^{32}\text{P}$ : 432

## T

## tangerine

Rogor, metabolism and residues in,  $^{32}\text{P}$ : 769

TDE- $^{14}\text{C}$  [D.2]

carrots, residues: 671

*Tegeneria denhamii* - Ar.1

silk,  $^3\text{H}$ : 230

silk gland, new cytoplasmic component  
(secreting cell),  $^3\text{H}$ : 230

telodrin- $^{14}\text{C}$  [C.10]

*Aedes aegypti*, metabolism in: 646

*Aspergillus niger*, metabolism in: 646

mouse, metabolism in: 646

*Penicillium notatum*, metabolism in: 646

rat, metabolism in: 646

## Temik [X, 8]

-/x: flies (p, a), changes in susceptibility,  
sexual differences: 1171

Musca domestica, toxicity: 1162

Temik-<sup>14</sup>C

Anthonomus grandis (a), metabolism in: 813

cotton plant, metabolism in: 836

Heliothis zea (f), metabolism in: 813

Musca domestica, metabolism in: 836

rat, metabolism in: 826

residues in: 826

Temik-<sup>35</sup>S

Anthonomus grandis, metabolism in: 806, 813,  
814

cattle (lactating cow) metabolism in: 818

cotton, metabolism in: 816

Heliothis virescens, metabolism in: 814

Heliothis zea, metabolism in: 813; (f): 814

milk, residues in: 808, 818

Musca domestica, metabolism in: 806, 814

rat, metabolism in: 806

soil, metabolism in: 816

## Temik-r.i. labelled

cotton plants, metabolism in: 834

soil, metabolism in: 834

## Tenebrio molitor (Linnaeus) - V.46

[yellow mealworm]

actinomycin D: nucleic acid metabolism, (m),  
<sup>3</sup>H: 288

protein biosynthesis, (m), <sup>14</sup>C:  
288

B-alanine metabolism, <sup>14</sup>C: 144

DNA synthesis (emb), <sup>3</sup>H: 311

EM, scanning-, bristie: 1747

excretion, <sup>14</sup>C: 455

fallout: stage susceptibility: 1334

peristaltic movements: 1463

protein synthesis (emb), <sup>3</sup>H: 311

proteins, <sup>14</sup>C: 144

RF treatment: (f), abnormalities: APX.2

metabolism, <sup>14</sup>C: 167

RNA synthesis (emb), <sup>3</sup>H: 311

sulphuryl fluoride, uptake (e), <sup>35</sup>S: 589, 800

tyrosine, metabolism of, <sup>14</sup>C: 216

B: stage susceptibility: 1334

x: (emb) lethal effects: 1418

-/visible light: (emb) lethal effects: 1418

survival time: 1418

γ: lethal effects (f): 1436

stage susceptibility: 1334

radiation: behaviour: 1463

radiation profile: 1334

## Tenodera aridifolia sinensis Saussure - H.6

[Chinese mantid]

predator-prey system, <sup>137</sup>Cs: 543

## tent caterpillar: see Malacosoma neustria

## tepa [R, 2]

- , γ: Rhyacionia buoliana, sterilization: 1281

tepa-<sup>14</sup>C

873

Anthonomus grandis, absorption by: 881

gonads: 882

metabolism in: 881

reproductive potential: 882

turnover in: 882

Musca domestica, metabolism in: 875

sterilization: 875

Porthetria dispar, metabolism in: 878

Spodoptera frugiperda, distribution in, <sup>14</sup>C: 884

DNA (e), <sup>14</sup>C: 884

persistence in: 879

termite, Eastern subterranean: see Reticulitermes  
flavipes

## termites

em: behaviour (orientation): APX.7

## terpene, cyclopentanoid

Anisomorpha buprestoides, biosynthesis in, <sup>14</sup>C:  
388

## testis

DNA-containing body in cytoplasm, Drosophila  
melanogaster, <sup>3</sup>H: 292

Hippelates pusio (p, a): 1471

x: Ceratitis capitata: 1335

Dacus oleae: 1335

Drosophila melanogaster: 978

γ: Ceratitis capitata: 1335

Cochliomyia hominivorax: 927

Dacus oleae: 1335

Rhyacionia buoliana: 1332

radiation: Anthonomus grandis: 1331

Pieris brassicae, glycogen content:

442

## Tetranychus telarius - Ac.14

SD 8447, toxicity of, <sup>32</sup>P: 799

## Tetranychus urticae Koch - Ac.14

[two-spotted spider mite]

amino acid requirements, <sup>14</sup>C: 213

laser: APX.9

wave length (visible range): ingestion, <sup>32</sup>P: 487

## Tettigonia viridissima - H.9

radiation: behaviour: 1463

## Thailand

SMT, Sitotroga cerealella, prospects: 1396

## Thaumetopoeidae - U.48

<sup>85</sup>Sr, <sup>131</sup>I, <sup>137</sup>Cs, accumulation and elimination  
of: 52

## Thaumetopoea pityocampa (Schiff.) - U.48

805

<sup>85</sup>Sr, <sup>131</sup>I, <sup>137</sup>Cs, body burden in: 55

distribution in (f): 53

## Theobroma cacao Linnaeus

dimethoate, metabolism of, <sup>32</sup>P: 717

translocation of, <sup>32</sup>P: 717

## thief ant: see Solenopsis molesta

## Thiodan [C, 9]

fish, metabolism in, <sup>14</sup>C: 675

residues in, <sup>14</sup>C: 675

- Thiodan-<sup>14</sup>C  
 autoradiolysis behaviour: 626
- thiotepa [R, 3]  
*Musca domestica* (e), nucleotide ratios, <sup>14</sup>C: 887
- thiotepa-<sup>32</sup>P  
*Musca domestica* (e), RNA: 887  
 rat (ovary, pituitary), uptake by: 880
- Thomasiniana ribis Mar. - X.6  
 γ: eradication: 1718
- thoracic tissue  
*Lucilia cuprina*, fatty acid oxidation in, <sup>14</sup>C: 369
- threonine-<sup>14</sup>C  
*Bombyx mori* (p)(non-cellular system): 178
- thulium  
 labelling, (forest) insects: 23
- thymidine-<sup>3</sup>H  
*Acheta domesticus* (gonads), DNA: 431  
 (oocytes), DNA: 283  
*Aedes aegypti* (hindgut), DNA turnover in: 422  
 somatic reduction in: 422  
*Anthonomus grandis*, DNA, spermatogenesis: 448  
*Apis mellifica*, DNA, oogenesis: 147  
*Bombyx mori* (f)(fat body and other tissues),  
 infected with nuclear poly-  
 hedrosis virus, DNA: 352  
 (midgut), DNA: 353  
 (silk gland), DNA: 258-9, 319,  
 423-7; in vitro: 436  
*Chironomus* (giant chromosomes), DNA: 263  
*Chironomus tentans* (giant chromosomes), DNA: 284  
*Chironomus thummi* (chromosomes), DNA: 293  
*Chorthippus longicornis*, DNA, meiosis: 1088  
*Chortophaga* (neuroblast), DNA: 275  
*Chortophaga viridifasciata* (emb-neuroblast),  
 DNA: 274, 308  
 chromomere organization, *Chironomus* sp.: 324  
*Diprion hercyniae*, DNA synthesis: 240  
 Diptera (salivary gland), DNA: 347  
*Drosophila*, insemination studies: 954  
 (f3, nucleoli) DNA: 239  
 mutagenic effects on: 28, 950  
 (oocyte) replication in, DNA: 279  
 spermatogenesis, DNA: 950  
 tissue hyperplasia, DNA: 304  
 transfer from ♂ → ♀: 1023  
*Drosophila hydei* (brain ganglion), polytene  
 nuclei, DNA: 242  
 DNA (salivary gland): 116  
 (lampbrush Y-chromosome),  
 DNA: 285  
 larval cycle, DNA: 262  
 X-chromosome (♂, ♀), repli-  
 cation: 241  
*Drosophila melanogaster* (giant chromosomes),  
 DNA: 339  
 (polytene chromosomes): 287  
 (emb)(somatic chromosomes),  
 DNA: 238  
 X-chromosome (♂, ♀),  
 replication: 241  
 (f1) genetic effects: 292  
 sex-linked recessive  
 lethals: 33  
 (f3)(salivary gland, tissue  
 culture), chromosome  
 labelling, <sup>3</sup>H: 439  
 labelling: 12, 20-1  
 lethal effects: 28, 1429  
 (neuroblast), DNA: 276  
 (nurse cells), incorporation  
 in: 354  
 (ooplasm) DNA: 315  
 EM, DNA: 315  
 (ovary) DNA: 315, 447  
 EM, DNA: 315  
 sperm transfer: 20-1  
*Drosophila virilis*, DNA synthesis: 325-6  
*Ephesia*: 248  
 (f), abnormalities (wing): 29  
 lethal effects: 29  
 mitotic activity: 249  
*Galleria mellonella* (haemocytes), differenti-  
 ation sequence: 1316  
 grasshopper (neuroblast), DNA: 307, 997  
*Hyalophora cecropia*, DNA synthesis: 346;  
 (m): 355; (p): 269  
 karyotype; mosquitoes, comparative study: 318  
*Leptinotarsa decemlineata* (emb), DNA: 311  
*Megoura viciae* (nurse cells of amphigonic and  
 parthenogenetic ovaries), DNA: 322  
 microbe infection: *Acheta domesticus*, chromo-  
 some breaks: 538  
 mosquitoes, comparative study, DNA: 318  
*Musca domestica*, DNA (ovary): 176, 437  
*Oncopeltus fasciatus*, (e), DNA: 282  
 (haemocyte), incorpora-  
 tion in: 430  
*Phormia regina* (emb), DNA: 268  
 pteric growth factor → DNA: *Drosophila*,  
 tumour induction: 303  
 replication: *Chironomus* sp., DNA: 324  
*Chironomus thummi* (giant chromo-  
 somes), DNA: 294  
*Drosophila melanogaster* (polytene  
 chromosomes), DNA: 327  
*Glyptotendipes barbipes* (giant  
 chromosomes), DNA: 294  
*Rhyncosciara angelae* (giant  
 chromosomes), DNA: 294  
*Sciara coprophila* (giant chromo-  
 somes), DNA: 294  
*Samia cynthia*, (a), DNA: 295  
 DNA synthesis: 346  
 (f), DNA, moult cycle: 286

- Sciara coprophila* (chromosomes, germ line): 15  
 (1)(salivary gland chromosomes), DNA: 331  
 (14)(salivary chromosomes), DNA: 271  
*silkworm* (spermatogonia), DNA: 924  
*Tenebrio molitor* (emb), DNA: 311  
*Tipula oleracea* (oogonia, oocytes), DNA: 310  
 tumour induction: *Drosophila melanogaster* (1): 31  
*uv*: *Chortophaga viridifasciata* (neuroblasts), incorporation into: 308  
 -, <sup>3</sup>H-deoxycytidine: *Drosophila melanogaster* (1), sex-linked recessive lethals: 33  
 -,  $\gamma$ : *Drosophila melanogaster*, lethal effects: 1429  
 -/ $\gamma$ : *Drosophila melanogaster*, lethal effects: 1429  
 -/ $\gamma$ (acute): *silkworm* spermatogonia, proliferation kinetics: 984  
 -/ $\gamma$ (chronic): *silkworm* spermatogonia, DNA synthesis: 928  
 thymidine-<sup>14</sup>C  
*Chironomus thummi* (giant chromosomes), DNA replication: 294  
*Gryllus bimaculatus* (e): 265  
*Phormia regina* (emb), DNA: 268  
*Tribolium confusum*, life cycle, DNA: 250  
 thymidine-2-<sup>14</sup>C  
*Antheraea pernyi*, thymidine kinase in: 121  
*Bombyx mori* (silk gland), DNA: 261  
 thymidine-<sup>32</sup>P  
*Drosophila melanogaster*, sperm labelling: 20  
 transfer: 20  
 thymidine, methyl-<sup>3</sup>H  
 actinomycin D: *Bombyx mori* (silk gland), DNA: 329  
 thymidine, x-irradiated  
*Drosophila melanogaster*, sex-linked recessive lethals: 1218  
 thymine-<sup>14</sup>C  
 DDT: DNA synthesis, HeLa cells: 613  
 dieldrin: DNA synthesis, HeLa cells: 613  
 thymine, methyl-<sup>14</sup>C: 615  
*Thyridopteryx ephemeraeformis* (Haworth) - U.39  
 [evergreen bagworm]  
<sup>134</sup>Cs turnover, (m): 79  
 $\gamma$ : lethal effects (e, 1): 532  
 stage sensitivity: 532  
 tick, cattle: see *Boophilus decoloratus*  
 Cayennes: see *Amblyomma americanum*  
 lone star: see *Amblyomma americanum*  
 Pacific Coast: see *Dermacentor occidentalis*  
 Southern cattle: see *Boophilus microplus*  
 ticks  
 labelling, r.f.: 568  
 tin-113  
 triphenyltin, metabolism and residues: 639  
 Tinex-<sup>32</sup>P [PA.2]  
 metabolism and residues (various systems): 708  
 penetrating power (protective clothing): 707  
 tomato, metabolism in: 711  
*Tipula oleracea* - X.36  
 (a crane fly)  
 DNA body (oogonia, oocytes), <sup>3</sup>H: 310  
 tobacco budworm: see *Heliothis virescens*  
 tobacco hornworm: see *Manduca sexta*  
*Protoparce sexta*  
 tobacco leaves  
 nicotine, stereospecific demethylation of: 860  
 tobacco wireworm: see *Conoderus vespertinus*  
 tomato  
 diazinon, metabolism of, <sup>14</sup>C: 770  
 residues of, <sup>14</sup>C: 770  
 Tinex, metabolism of, <sup>32</sup>P: 711  
 tomato fruitworm: see *Heliothis zea*  
 toxaphene [C.5]  
 rape, reinfestation, <sup>32</sup>P: 506  
 toxaphene-<sup>36</sup>Cl  
 synthesis, semi-micro: 640  
 honey, residues in: 641  
 rapeseed oil, residues in: 641  
 toyomycin  
 -/x: *Drosophila melanogaster*, sex-linked recessive lethals: 1508  
 (+)-2-(<sup>14</sup>C) trans-chrysanthemum-monocarboxylic acid  
 pyrethrin I, synthesis: 851  
 transpiration  
 insect-, <sup>3</sup>H: 454  
 transmutation  
*Drosophila*, radioisotope- : 75  
 tree cricket: see *Oecanthus celerinictus*  
 tree litter-<sup>32</sup>P  
 insects, feeding by: 553  
 trehalose  
*Antheraea eucalypti* (culture), utilization by, <sup>14</sup>C: 90  
*Bombyx mori*, metabolism in, <sup>14</sup>C: 93a  
 (1), synthesis in, <sup>14</sup>C: 86  
*Hyalophora cecropia* (fat body), synthesis in, <sup>14</sup>C: 100-1  
 insects, <sup>14</sup>C: 96  
*Leucophaea maderae*, carbohydrate mobilization: 107  
 synthesis in, <sup>14</sup>C: 105  
*Melolontha vulgaris*, <sup>14</sup>C: 91  
 x: *Musca domestica* (p): 1314  
 (1,1-<sup>14</sup>C) trehalose  
*Blaberus discoidalis*: 95  
*Trialeurodes vaporariorum* (Westwood) - QQ.1  
 [greenhouse whitefly]  
 parathion, uptake, <sup>35</sup>S: 802  
 residues after 24 h, <sup>35</sup>S: 802  
 laser: APX.9

## Triatoma infestans - Q.18

- DDT: glucose incorporation into protein (l, 4, 5),  
<sup>14</sup>C: 104
- glutathione turnover, <sup>14</sup>C: 163
- NAD kinase induction, <sup>14</sup>C: 112
- protein biosynthesis, <sup>14</sup>C: 110
- toxic effects (n), <sup>14</sup>C: 625
- iron elimination, <sup>59</sup>Fe: 562
- Tribolium sp. - V.46
- insecticide pathway, <sup>131</sup>I: 67
- x: mutagenic effects: 1172
- stage susceptibility (l, p): 1389
- /DDT: 1172
- fitness: 1161
- Sooty: 1411
- γ: populations (single and mixed species): 1286
- Tribolium castaneum (Herbst) - V.46
- [red flour beetle]
- x: eye colour mutations: 1056
- fitness: 1301, 1410
- lethals: 1301, 1410
- lethal effects: 1301, 1350, 1410
- (p): 1345
- malformations (a): 1345
- pathogen (bacterial toxins, protozoan infection), susceptibility: 1163
- quantitative traits: 1487
- reproductive potential: 1300-1, 1410
- stage susceptibility: 1350
- sterility: 1350
- /age: lethal effects (p): 1345
- malformations (a): 1345
- /Bacillus thuringiensis: life span: 1538
- /DDT: lethal effects: 1410
- reproductive potential: 1300
- /DMSC: reproductive potential: 1455
- viability: 1455
- /magnetic fields/T: development: 1451
- /protozoan disease: mortality: 323 (= III/890)
- /T: reproductive potential: 1300
- γ: lethal effects: 1430, 1657, 1668
- (e, l, p, a): 1428
- stage susceptibility: 1430
- (e, l, p, a): 1428
- sterility: 1430, 1657, 1668
- (a): 1428
- n: (a) reproductive potential: 1299
- Tribolium confusum (Duval) - V.46
- [confused flour beetle]
- developmental stages (e, l, p, a), EM-scanning:  
 1748
- DNA, throughout life cycle, <sup>14</sup>C: 250
- monoamine oxidase in, <sup>14</sup>C: 129
- x: (p)(wing) abnormality: 1398
- development: 1348-9, 1351
- lethal effects: 1301, 1349, 1410, 1435, 1437,  
 1458
- life span (a): 1349, 1351
- longevity: 1348

- x. pathogen (bacterial toxins, protozoan infection susceptibility: 1163
- reproductive potential: 1300-1, 1410
- stage susceptibility: 1435; (e, l, a): 1437
- sterility: 1435; (e, a): 1437
- /age: stage susceptibility (a): 1346
- /Adelina tribolii: mortality: 323 (= III/890)
- /Bacillus thuringiensis: life span: 1538
- /DDT: lethal effects: 1301, 1410
- reproductive potential: 1301, 1410
- /G: (p), development: 1398
- /halogenated nucleosides: lethal effects: 1458
- pyrimidines: lethal effects: 1458
- /protozoan disease: mortality: 323 (= III/890)
- /T: (p), wing abnormality: 1398
- /T: reproductive potential: 1300
- /5-bromouracil: lethal effects: 1458
- /5-iodouracil: lethal effects: 1458
- γ: development: 1440
- lethal effects: 1440, 1657
- (l, a): 1436
- (p), wing abnormality: 1398
- reproductive potential (a, γ): 1319
- stage susceptibility: 1381, 1440
- sterility: 1391, 1657
- radiation: stage susceptibility: 1352, 1635
- stereoscopic scanning, EM: 1741
- tribuphon
- cattle, metabolism and residues: 708
- trichlorofon [PA.1]
- metabolism and residues: 708
- trichlorfon-<sup>32</sup>P [PA.1]
- blood, residues in: 786
- cattle, (blood), residues in: 784
- metabolism and residues in: 786
- percutaneous resorption by: 713, 784
- udder, resorption by: 706, 787
- chewing insects, degradation by: <sup>32</sup>P: 739
- insects, absorption and metabolism in: 701
- milk, degradation in: 709
- excretions: 709
- residues in: 784, 786
- pig (blood), residues in: 785
- pork, residues in: 785
- sucking insects, degradation by: <sup>32</sup>P: 739
- trichlorometaphos
- cattle, metabolism, <sup>32</sup>P, <sup>35</sup>S: 760
- mice, s.c. penetration, metabolism, <sup>32</sup>P, <sup>35</sup>S:  
 760
- milk, metabolism, <sup>32</sup>P, <sup>35</sup>S: 760
- rabbit, metabolism, <sup>32</sup>P, <sup>35</sup>S: 760
- trichlorfon [PA.1]
- metabolism, Rev., r.i.: 710
- trichlorfon-<sup>3</sup>H
- synthesis via <sup>3</sup>H-chloral: 618
- trichlorfon-<sup>32</sup>P
- apples: 715
- cattle (lactating cow): 715
- plums: 715
- wheat: 715

- 3,5,6-trichloro-2-pyridinol-<sup>14</sup>C  
plants, sorption, translocation and metabolism  
in: 793
- 3,5,6-trichloro-2-pyridinol-<sup>36</sup>Cl  
plants, sorption, translocation and metabolism  
in: 793
- Trichoderma viride*  
Chloropropylate degradation, <sup>14</sup>C: 664
- Trichogramma*  
radiation: *Diatraea saccharalis* (p), parasitism  
in: 1159
- Trichoplusia ni* (Hübner) - U.29  
[cabbage looper]  
hemp, metabolism in (f), <sup>14</sup>C: 889  
γ: (a) sterility: 1142  
radiation resistance, cytogenetic basis of: 925
- triethylenemelamine  
-, x, phenylalanine (mustard derivative):  
*Drosophila*, mutagenic effects: 1260
- triglycerides\*  
*Locusta migratoria* (fat body), <sup>14</sup>C: 404  
*Periplaneta americana* (fat body), release from,  
<sup>14</sup>C: 420
- Trigonophora meticulosa* Linnaeus - U.29  
<sup>85</sup>Sr, <sup>131</sup>I, <sup>137</sup>Cs, distribution in (a): 53
- Trigonotylus* sp. - Q.8/9  
salt-marsh ecosystem, food chain in, <sup>32</sup>P: 526
- trimeclure  
*Ceratitis capitata*, fly-release monitoring: 1601
- Triphaena pronuba* Linnaeus - U.29  
<sup>85</sup>Sr, <sup>131</sup>I, <sup>137</sup>Cs, body burden in: 55  
distribution in (f, a): 53
- triphenyltin-<sup>113</sup>Sn [R.5]  
guinea pig, metabolism in: 639  
rat, metabolism in: 639
- Tripterus rusticus* - V.11  
(ground beetle)  
food chain, <sup>32</sup>P: 556  
trophic transfer index, <sup>32</sup>P: 556
- tritium\*\*  
insecticides, metabolism: 584
- Trogoderma glabrum* (Herbst) - V.20  
[khapra beetle]  
γ: development: 1390  
lethal effects: 1390  
mating competitiveness (σ): 1477  
reproductive potential: 1390
- Trogoderma granarium* Everts - V.20  
[khapra beetle]  
*Triticum aestivum*, infestation detection (seed),  
(f, x): 1742  
γ: stage susceptibility: 1688  
lethal effects: 1657, 1688
- γ: quarantine control: 1656  
sterility: 1657, 1668  
radiation: lethal effects: 1462  
-/diapause duration: radiosensitivity: 1462
- Trogoderma versicolor* - V.20  
laser: damage: APX.8  
mortality: APX.8
- trophallaxis\*  
*Apis mellifica*, workers, <sup>198</sup>Au: 492  
*Formica polyctena*, <sup>198</sup>Au: 493  
*Kaloterpes flavicollis*, pseudoworkers, <sup>131</sup>I: 488  
<sup>32</sup>P, <sup>198</sup>Au: 469  
*Vespa*, <sup>198</sup>Au: 485
- trophic transfer index  
*Araneida*, <sup>32</sup>P: 556  
*Coleoptera*, <sup>32</sup>P: 556  
*Diptera*, <sup>32</sup>P: 556  
*Hemiptera*, <sup>32</sup>P: 556  
*Hornoptera*, <sup>32</sup>P: 556  
*Hymenoptera*, <sup>32</sup>P: 556  
*Lepidoptera*, <sup>32</sup>P: 556  
*Orthoptera*, <sup>32</sup>P: 556
- tropical rat mite: see *Ornithonyssus* (*Liponyssus*)  
baci
- tropical warble fly: see *Dermatobia hominivorax*
- tropital-methylene-<sup>14</sup>C [A.2]  
rat (bile, urine), metabolism in: 894
- Tryporyza incertulas* - U.8  
SMT, prospects: 1559
- <sup>14</sup>C-tryptamine  
*Tribolium confusum*, monoamine oxidase in:  
129
- tryptophan-r.i.  
puffs, *Drosophila busckii*: 334
- tryptophan-<sup>3</sup>H  
*Drosophila hydei* (giant chromosomes): 116
- tryptophan-<sup>14</sup>C  
omochrome identification, grasshopper (f):  
185
- L-tryptophan-<sup>3</sup>H  
*Calpodex ethilus*, endocuticle deposition: 419
- DL-tryptophan-3-<sup>14</sup>C: 615
- DL-tryptophan (methylene-<sup>14</sup>C)  
salivary physiology of plant-bugs (*Heteroptera*):  
192  
*Elasmolomus sordidus*, incorporation into: 193  
*Eumecopus punctiventris*, incorporation into: 193
- tsetse fly: see *Glossina morsitans*
- Tuberolachnus salignus* - Q.Q.2  
[willow aphid]  
ganglia permeability to fatty acids, <sup>14</sup>C: 84  
quaternary ammonium  
cations, <sup>3</sup>H: 84
- tumour  
pterine growth factor/DNA: *Drosophila*, <sup>3</sup>H:  
303  
K-phthalate/x: *Drosophila*, development in:  
1173

\* See also section 1.2.6.

\*\* Due to the bulk of pertinent references, these have not been summarized here; the use of <sup>3</sup>H is, however, indicated for each relevant study throughout the subject index.

- γ : *Sitotroga cerealella* (♀): 214, 487  
 tumour incidence  
 x : *Drosophila melanogaster*: 1174  
 tumour induction  
<sup>3</sup>H-leucine: *Drosophila melanogaster* (♀): 31  
<sup>3</sup>H-thymidine: *Drosophila melanogaster* (♀): 31  
<sup>3</sup>H-uridine: *Drosophila melanogaster* (♀): 31  
 tungsten-187  
   crickets, metabolism in: 507  
   milkweed bugs, metabolism in: 507  
 Turkey  
   grain disinfection, pilot plant: 1887  
   grain irradiation plant: 1843, 1845, 1852  
 two-spotted spider mite: see *Tetranychus urticae*  
 two-spotted stink bug: see *Perillus bioculatus*  
*Tyrophagus* sp. - Ac.1  
   food web, broomsedge field, <sup>65</sup>Zn: 513  
*Tyrophagus dimidiatus* (Hermann) - Ac.1  
   x : lethal effects: 1435, 1437  
       reproductive potential: 1435, 1437  
       stage susceptibility: 1437  
   radiation: stage susceptibility: 1352, 1535  
*Tyrophagus longius* (Gerv.) (*dimidiatus*, auct.) - Ac.1  
   γ : lethal effects: 1436  
 tyrosine-<sup>3</sup>H  
   *Bombyx mori* (♀)(various tissues), infected with nuclear polyhedrosis virus, protein synthesis: 233  
   *Calpodex ethlius* (♀5, p)(fat body), protein metabolism: 140, 187  
   *Sciara coprophila* (♀)(salivary gland), nucleoprotein metabolism: 331  
 tyrosine-<sup>14</sup>C  
   *Calliphora*, metabolism in: 215  
   *Calliphora erythrocephala* (♀)(fat body), protein synthesis: 205  
   *Chrysopa perla* (oocyte), incorporation into: 280  
   *Locusta migratoria* (cuticle), pigmentation: 152  
   *Lucilia cuprina* (puparium), melanin synthesis: 156  
 α-<sup>14</sup>C-DL-tyrosine  
   Diptera, sclerotization in: 182  
 L-tyrosine-<sup>3</sup>H  
   *Calpodex ethlius*, endocuticle deposition: 419  
   *Schistocerca gregaria* (cuticle): 177  
 L-tyrosine-<sup>14</sup>C  
   Diptera, sclerotization in, <sup>14</sup>C: 182  
 L-tyrosine-U-<sup>14</sup>C  
   *Eleodes longicollis*, p-benzoquinone biosynthesis: 190  
 (U-<sup>14</sup>C) tyrosine  
   *Drosophila melanogaster*, metabolism in: 216  
   *Tenebrio molitor*, metabolism in: 216

## U

- UAR: see United Arab Republic  
 (UC 10854)-<sup>14</sup>C [X.12]  
   albumin: oxidative metabolism by *Musca domestica* microsome-NADPH<sub>2</sub> system: 843  
   bean foliage, metabolism in: 803  
   plant, metabolism in: 829  
   *Musca domestica*, metabolism by NADPH<sub>2</sub>-requiring enzyme: 844  
   rat, metabolism and persistence in: 827  
     (liver microsomes), metabolism in: 839  
 UC 10854, carbonyl-<sup>14</sup>C-labelled  
   bean foliage, metabolism in: 804  
   plant, persistent glucoside metabolites: 830  
   rat, metabolism in: 828  
     hydrolysis products in: 828  
 United Arab Republic  
   SMT, *Anopheles pharoensis*: 1600  
   *Ceratitis capitata*: 1600  
 unmatched gipsy moth: see *Ocneria dispar*  
 uracil-<sup>3</sup>H  
   *Musca domestica* (ovary): 437  
 uranium mill waste  
   insect monitoring: 443  
 urethane  
   -/x: *Drosophila melanogaster* (♂), chromosome loss: 1208  
 uric acid  
   *Periplaneta americana*: excretion by, <sup>14</sup>C: 413  
     (fat body), metabolism in, <sup>14</sup>C: 537  
 uric acid-<sup>14</sup>C  
   *Periplaneta americana* (a, ♀), preferential oxidation of uric acid carbon 2: 412  
 uric acid-2-<sup>14</sup>C  
   *Anthrenus grandis*, N-metabolism: 414  
<sup>3</sup>H-uridine  
   actinomycin D: RNA, *Drosophila hydei* (salivary gland): 237  
   *Tenebrio molitor*, (m): 288  
   *Acheta domestica* (gonads), RNA: 431  
   (oocyte), RNA: 283  
   *Antheraea polyphemus*, RNA: 244  
   *Apis mellifica*, oogenesis, RNA: 147  
   *Barathra brassicae*, tissue contents, RNA: 314  
   *Blattella germanica*, RNA: 359  
   *Bombyx mori*: (♂)(fat body and other tissue), infected with nuclear polyhedrosis virus, RNA: 352  
   (♀)(midgut), infected with cytoplasmic polyhedrosis virus, RNA: 351  
   RNA (midgut): 353  
   (silk gland): 236  
   *Carabus*, RNA: 416

- Chironomus* (giant chromosomes), RNA: 263  
*Chironomus tentans* (giant chromosomes), RNA: 284  
     RNA synthesis in: 256  
     (salivary gland, isolated nuclear constituents), RNA: 266  
 -/Mg<sup>2+</sup>: *Chironomus thummi*: Baibiani ring, RNA: 72  
     (♂)(nucleolus), RNA synthesis: 273  
*Chortophaga viridifasciata* (emb-neuroblast), DNA: 274  
 Diptera (salivary gland), DNA: 347  
*Drosophila*, DNA: 359  
*Drosophila hydei* (isolated salivary glands, nuclei), DNA: 328  
     (lampbrush Y-chromosome), RNA: 285  
     (salivary gland), RNA: 237  
*Drosophila melanogaster*: (imaginal disks), mRNA: 151  
     puffing: 145  
     (salivary gland), RNA: 264  
     rRNA: 350  
     tRNA: 356  
*Drosophila virilis* (♂3, pp)(salivary gland), RNA: 277-8  
 ecdysone: RNA, *Drosophila hydei* (♂), puffs: 116  
     RNA metabolism: 173, 217  
*Formica polyctena*, RNA: 416  
*Galleria mellonella*, (ovariole), RNA: 330, 359  
 grasshopper (neuroblast), RNA: 397  
*Hyalophora cecropia*: 224, 346  
     - (p), RNA (blood): 243  
     - (p)(wing epidermis): 332, 358  
*Leptinotarsa decemlineata* (emb), RNA: 311  
*Locusta migratoria*, DNA: 417  
     (oocyte chromosomes), RNA: 301-2  
     (n3,4), RNA synthesis: 251  
*Malacosoma*, RNA: 359  
*Malacosoma neustria*, RNA: 416  
*Musca domestica*, RNA: 176, 359, 417  
     RNA, oogenesis: 92  
     RNA (ovary): 437  
*Oncopeltus fasciatus* (e), DNA: 282  
 oogenesis, *Acilius sulcatus*, DNA: 418  
     *Dytiscus marginalis*, DNA: 245, 418  
     *Gryllus domesticus*, RNA: 418  
     *Musca domestica*, RNA: 418  
     *Pterostichus niger*, RNA: 418  
*Phormia regina* (emb), RNA: 268  
 puffing, *Chironomus tentans*: 324, 450  
     *Drosophila busckii*: 450  
*Rhynchosciara angelae*, larval development, RNA: 313; puffs: 313  
     (♂) RNA metabolism: 305-6, 312  
 RNA-coating of chromosomes, *Rhynchosciara angelae* (♂), protozoan-infected: 323  
*Samia cynthia* (a), DNA: 295  
     (♂), moult cycle, DNA: 296  
     (p), RNA (blood): 243  
     RNA synthesis: 348  
*Samia cynthia ricini*: 244  
*Samia cynthia walkeri*: 244  
 Saturniid moths (p)(tissues), RNA: 321  
*Sciara coprophila* (♂)(salivary gland chromosomes), RNA: 331  
     nucleolar RNA: 270  
*Simulium*, DNA: 359  
*Smittia* (♂)(silk gland)(nucleolus), RNA: 291, 343-4  
*Smittia parthenogenetica* (nucleolus), tRNA: 345  
*Tenebrio molitor* (emb), RNA: 311  
 tRNA (nucleolus) synthesis, *Smittia parthenogenetica*: 345  
 tumour induction, RNA, *Drosophila melanogaster* (♂): 31  
*Vespa vulgaris*, RNA: 418  
 uridine-<sup>14</sup>C  
     *Chortophaga viridifasciata*: 252  
     DDT: RNA synthesis, HeLa cells: 618  
     dieltrin: protein synthesis, HeLa cells: 613  
     *Locusta migratoria* (n3,4), RNA synthesis: 251  
     *Phormia regina* (emb), RNA: 268  
 uridine-5-<sup>3</sup>H  
     actinomycin D: RNA, *Bombyx mori* (silk gland): 329  
 uridine-<sup>32</sup>P  
     tRNA, *Drosophila melanogaster*: 335  
 USA  
     SMT, *Cochliomyia hominivorax*, eradication of: 1615  
     *Drosophila melanogaster*, cage test: 1613  
 USAEC  
     irradiators (various): 1658  
 V  
 1-<sup>14</sup>C-valeric acid  
     *Periplaneta americana* (abdominal nerve cord): 372  
 valine-<sup>3</sup>H  
     *Chironomus tentans*, protein synthesis in: 256  
     *Musca domestica*, amino acids, oogenesis: 92  
 valine-<sup>14</sup>C  
     *Schistocerca gregaria* (wing), protein: 158  
 valine-1-<sup>14</sup>C  
     *Hyalophora cecropia* (dpp), protein synthesis: 225



- Lotus: 592  
 [U-<sup>14</sup>C] valine  
*Calliphora erythrocephala* (f)(fat body), in-vitro-incorporation  
     in protein: 203  
     protein synthesis: 205  
     (haemolymph),  
     protein synthesis: 204
- varnidothion-<sup>32</sup>P [PA.10]  
     insects, metabolism in, in vitro and in vivo: 763  
     mouse, metabolism in, in vitro and in vivo: 763  
     *Periplaneta americana* (fat body, gut, muscle),  
         metabolism in: 763  
     plants, metabolism in, in vitro and in vivo: 763
- vectors  
     genetics and cytogenetics of: 914
- vegetables  
     γ: disinfestation: 1674
- vegetables, packed  
     radiation, disinfestation: 1691
- Vespa - W.29  
     trophallaxis, <sup>198</sup>Au: 485
- Vespa vulgaris Linnaeus - W.29  
     proteins (ovary), <sup>3</sup>H: 416  
     RNA (ovary), <sup>3</sup>H: 416
- Vikane: see sulfur fluoride
- virus  
     plant-, insect-transmitted, <sup>14</sup>C: 739
- virus, animal-, arthropod-borne  
     γ: variability: 1714
- virus, beet western yellows  
     Myzus persicae, uptake by, <sup>32</sup>P: 475
- virus, cytoplasmic polyhedrosis  
     Bombyx mori (f)(midgut), RNA synthesis, <sup>3</sup>H: 351
- virus, equine encephalomyelitis: 1160
- virus, nuclear polyhedrosis: see nuclear polyhedrosis virus
- virus, sigma: see sigma virus
- W
- walnuts  
     neutron activation; methyl bromide residues: 1731
- warble grub: see Hypoderma bovis
- wasps - W.  
     food chain, <sup>32</sup>P: 556  
     trophic transfer index, <sup>32</sup>P: 556
- water  
     diazinon translocation, <sup>14</sup>C: 761  
     parathion translocation, <sup>35</sup>S: 761
- water-<sup>3</sup>H  
     Aphis fabae, transpiration: 454
- <sup>3</sup>H<sub>2</sub>O Boophilus microplus, elimination via salivary excretion: 569
- Oncopeltus fasciatus, transpiration: 454
- water boatmen: see Corixa punctata
- water bug, giant: see Hydrocyrtus columbiae  
     Lethocerus cordofanus
- waterfowl, wild  
     DDT, metabolism, storage and excretion of, <sup>36</sup>Cl: 620
- water strider: see Gerris lacustris
- weevil, alfalfa: see Hypera postica  
     beans: see Acanthoscelides obtectus  
         Bruchus obtectus  
     boll: see Anthonomus grandis  
     granary: see Sitophilus granarius  
     mango seed: see Stenochetus mangiferae  
     rice: see Sitophilus oryzae  
     sweetpotato: see Cylas formicarius  
         elegantulus
- weight  
     γ: (f) Sitotroga cerealella, in adult: 1376
- western pine beetle: see Dendroctonus brevicornis
- wheat  
     butonate, metabolism of, <sup>32</sup>P: 715  
         residues of, <sup>32</sup>P: 715  
     neutron activation; methyl bromide residues: 1731  
     trichlorphon, <sup>32</sup>P: 715  
     e: disinfestation: 1547, 1644  
     γ: disinfestation: 1547, 1631, 1640, 1665  
         (5) infesting species, lethal effects: 1699  
         longevity: 1699  
         reproductive potential: 1699  
     radiation disinfestation: 1655
- wheat flour  
     γ: disinfestation: 1625, 1641
- wheat grain  
     diazinon, absorption, metabolism and persistence in, <sup>14</sup>C: 744
- wheat kernels  
     Sitotroga cerealella (f, p), infestation detection, x: 1706
- wheat products  
     e: disinfestation: 1644  
     neutron activation; methyl bromide residues: 1731
- wheat-stem-gall mosquito: see Haplodiplosis equestris
- willow aphid: see Tuberosiphum salignum
- willow leaf beetle: see Chrysomela knabi
- wireworm, prairie grain: see Ctenicera destructor
- wolf spiders: see Lycosidae
- wood  
     γ: protein value for Hylotrupes bajulus (f): 1293  
     decimetric waves; disinfestation: APX.1
- wood moth: see Zeuzera aesculi

## wood/plastic

$\gamma$ : degree of subsequent termite attack: 1721

## wool

dieldrin, absorption of, r.i.: 689

fastness properties in, r.i.: 689

## X

xanthine-<sup>14</sup>C

*Drosophila melanogaster*: 159, 160

xanthine-2-<sup>14</sup>C

*Pteris brassicae*, biosynthesis: 218

leucopterin biosynthesis: 223

purine synthesis: 223

xanthopterin-<sup>14</sup>C

pteridine interconversions, *Collas eurytherme*:  
234

xanthopterin-8a-<sup>14</sup>C

*Oncopeltus fasciatus*: 149

*Xenopsylla gerbilli* (Rothschild) - Y, 2

[oriental rat flea]

ectoparasitic contacts, gerbil colonies, r.i.:  
566

epizootic spread, r.i.: 567

gerbil ecology, r.i.: 546

## x-rays

*Aedes aegypti*, cytogenetic effects: 926

growth rate ( $\ell$ ): 1486

longevity: 1486

stage susceptibility (e,  $\ell$ , p, a):  
1486

viability (e): 1486

*Amblyomma americanum*, engorgement: 1297

reproductive po-

tential: 1297

*Anagasta kuhniella*, ( $\ell$ ): 1298; parasitized:  
1298

*Anopheles maculipennis atroparvus* ( $\ell$  4), lethal  
effects: 1364

reproductive

potential (a):

1364

*Anopheles quadrimaculatus*, morphological  
markers: 820

*Anthonomus grandis*, lethal effects ( $\ell$ , p, a):

820

sterilization: 820, 1268

*Apis mellifica*, ( $\ell$ ), spermatogenesis: 1294

*Blattella fusca*, (midgut): 1328-9

*Bombyx mori*: 1287

(e): 1093, 1450

(emb): 1400; anomalies: 1399

mutagenic and cell-killing effects,  
comparison: 1093

visibles: 1093

*Ceratitis capitata*, (a), midgut epithelium: 1327

ovary: 1335

testis: 1335

x: *Chelisothes morio*, (a), midgut epithelium:

1327

*Chilo suppressalis*: 1385

hatchability (e): 1442

lethal effects (p): 1442

chlorophos susceptibility: *Musca domestica*:

1170

*Chorthippus elegans*, spermatogenesis: 973

*Chorthippus parallelus*, spermatogenesis: 973

*Chortophaga viridifasciata* (neuroblasts),

chromosome aber-

rations: 1016

chromosome

stickiness: 1017

*Chrotogonus incertus* (spermatocytes), chromo-

somal aberrations: 1032

*Chrysomela decemlineata* (p), sterilization:

1340

crop-emptying: *Phormia regina*: 94

*Dacus cucurbitae*, development: 1393

*Dacus oleae*, ovary: 1335

testis: 1335

DDT susceptibility: *Musca domestica*: 1170

*Dendroctonus brevicornis*, predation on: 1736

*Devorgilla*, recessive lethals, segregation of:  
1104

*Drosophila*: 1255

aneuploid gametes: 1037

brood sensitivity patterns: 1033

chromosome aberrations: 961-2,

1023, 1027, 1033, 1220

(translocations): 1263

chromosome II, isochromosomes:

992

non-disjunction:

992

development genetics: 915

dicentric chromosomes: 1022

dominant lethals: 1129

dominant Minute-bristle muta-

tions: 1263

dorsal mesothoracic disk: 1371

(e): 1089

genetic loads: 1498

Minutes (IV): 1260

mutagenic effects: 915, 1087,

1280, 1269, 1283

( $\sigma$ ) mutants (4): 1312

mutations, genetic risk: 1071

recovery preferential: 1065

sex-linked lethals: 1065

recessive lethals: 1129,

1197, 1263

sex ratio: 954

single-hit effects: 1065

sperm, chromosome aberrations

(exchanges): 1008

( $\sigma$ ) sperm transfer: 931

- Drosophila*, spermatocytes, crossover,  
Poisson distribution,  
analysis of: 1049  
crossover (X-Y,  
autosomal), simultaneous  
measure of: 1050  
spermatids, spermatozoa, radio-  
sensitivity and recovery:  
1234-6  
spermatogenesis: 950  
point muta-  
tions: 1010  
sex-linked  
lethals: 1096  
spermatogonia: 959  
spermatozoa: 951  
stage susceptibility:  
970  
sterilization: 1256  
stage susceptibility, oogenesis:  
976  
strain susceptibility, chromosome (X-)  
breaks: 1109  
suppressor genes: 1283  
viability: 1065  
visibles (X-chromosome): 1051  
yellow mosaic mutation: 1083  
*Drosophila affinis*: XO- $\sigma$ : 1112  
*Drosophila ananassae*: ( $\sigma$ , p), chromosome  
aberrations (crossover):  
1012  
chromosome aberrations  
(crossover), (spermato-  
cytes): 1011; (sperm-  
atogonia: 945  
*Drosophila birchii*: population fitness: 1404  
*Drosophila hydei*: (a,  $\sigma$ ), Antennapedia mutant:  
1130  
(X,  $\varphi$ ), non-disjunction: 1005  
*Drosophila melanogaster*: adult emergence: 1311  
cell killing: 978  
chromosomal rearrangements,  
fate in laboratory populations:  
1518  
genetic analysis of laboratory  
populations: 1519  
chromosome aberrations: 921  
991, 1028, 1139, 1229;  
( $\varphi$ ): 1007  
(att-X, Y chromosomes): 1018  
(emb) development: 1028  
(reciprocal translocations):  
1013-4  
(spermatogonial crossover):  
945  
chromosome breaks: 1026  
spermatogenesis: 1045  
( $\sigma$ ), chromosome loss: 1205-7  
chromosome substitution: 1420  
crossover: 1030; ( $\varphi$ ): 1009  
crossover mechanisms,  
( $\sigma$ , chromosomes): 1025  
development: 1028, 1254;  
(early emb): 1384  
dominant lethals: 978, 1191;  
(2 strains): 1151  
(e,  $\varphi$ ), erupt effect: 1097  
eye pigment variegation,  
position effect: 1323  
fitness: 1500  
genetic load: 1508  
genetic load components: 1510  
(genomes), genetic damage  
frequency: 1517  
total genetic damage: 1516  
(germ cells): 1099; ( $\varphi$ ): 937;  
pre- and post-meiotic: 949  
hatching time: 1312  
( $\sigma$ ), insemination success and  
genetic damage: 1321-2  
( $\varphi$ , p, a), (brown) spot  
production: 1116  
lethal effects: 1095  
- (e): 984, 1194  
- (emb): 1395  
lethals: 1084, 1491; (II):  
1510; (IV) and chromosome  
aberrations: III/599  
life span: 1282  
mature oocytes, autosomal  
translocations: 1040  
mosaic patches, dumpy locus:  
1076  
mosaics: 989  
mutagenic effects: 1095  
mutation dose-frequency  
relation: 1086  
( $\sigma$ ), mutation frequencies  
in successive sperm  
ejaculates: 1105  
mutation frequency: 1092  
mutation rates at specific  
autosomal loci: 943  
mutations, brood sensitivity,  
polygene: 1082  
non-disjunction: 998;  
(X): 999  
( $\varphi$ ), whole-body and fractional  
mutations: 1074  
oocyte chromosomes, trans-  
locations: 1043  
oocytes, X-loss: 1041  
oocytes, translocations: 1042  
oocyte, sperm: crossover  
suppressing aberrations:  
1034-5  
(oocyte  $\varphi$ ), chromosome  
aberrations: 1221

- dominant lethals: 1221  
 sex-linked recessive lethals: 1221  
 oogenesis: 955  
 oögonia, oocytes: 1188-9  
 ovary: 955  
 phenogenetics of fw locus: 1067  
 phenotypic variance: 1515  
 population density: 1481  
     dynamics: 1480, 1490  
 (pp), meiotic X-Y exchange, non-disjunction: 986  
 primary spermatocytes, meiotic X-Y exchange and non-disjunctions: 983  
 radiosensitivity: 1419, 1420  
 recessive lethals: 1190, 1250-1, 1361; (a): 1062  
 recovery phenomenon: 20  
 reproductive potential: ( $\sigma$ , a): 102; (fecundity): 1491; ( $\sigma$ ,  $\phi$ ): 1311  
 reversion (white-ivory): 1059  
 rosy mutants: xanthine dehydrogenase: 118  
 selection in: 1495  
 selection (abdominal bristles): 1503  
     (bristle number): 1502  
 sex-linked lethals: 1152, 1229  
 sex-linked recessive lethals: 33, 965, 984, 1069, 1075, 1139, 1191, 1226, 1508  
     dose dependence: 980  
     translocations: 1186  
 sex-linked recessives, spermatogenesis: 944; ( $\phi$ ,  $\phi$ - $\sigma$ ,  $\phi$  [ $\sigma$ ]): 1085  
 ( $\sigma$ ), sex ratio: 1090  
 ( $\phi$ ), somatic mosaics: 1110  
 (sperm chromosomes), translocations: 1043  
 (sperm), consecutive matings, Minutes: 1078  
 (sperm), susceptibility: 1106  
 spermatogenesis: 102, 1229  
     sex-linked recessive lethals: 921  
     stage susceptibility: 980, 1246  
 spermatogonia: 1064  
     autosomal recessive lethals: 985  
     differential susceptibility: 967  
 stage susceptibility, (emb): 1395  
     (spermatozoa): 985  
     sterilization: 921, 944, 1090, 1139; ( $F_1$ ,  $\sigma$ ): 1140  
     stock susceptibility: 917  
     strain susceptibility: 1278  
     suppressor-erupt system: 1253  
     (a,  $\sigma$ ), (testis): 978  
     translocations: 984, 1040, 1152, 1190, 1191; (a): 1082  
     triplo-X- $\phi$  incidence: 1044  
     tumour incidence: 1174  
     twin spots (eye): 1330  
     viability: 1485, 1499; (e-a): 1510  
         (heterozygotes): 1063-4  
         mutants: 1262  
     visibles: 1073, 1139  
     white-crimson gene, wc: 1070  
     X-autosomal translocations: 1048  
     (X-) recombination: 1259  
     (X-) white locus: 1084  
     (Y, IV), exchanges at meiosis: 960  
     Y-suppressed lethals (autosome): 1057  
     2 wild-type stocks: 1152  
     x/e.m.: 1185  
     -/N: (e) lethal effects: 1194  
      $\gamma$ , n (0.2-0.3 Mev): oögonia, oocytes: 1188  
*Drosophila pseudoobscura*: chromosomal polymorphism: 1047  
     (isogenic strains), inversions: 1031  
*Drosophila serrata*, fitness: 1520  
     population fitness: 1404  
*Drosophila virilis*, eye pigment variegation, position effect: 1323  
     spermatogenesis: 952  
 e.m./x: *Drosophila melanogaster*: 1185  
*Enicmus minutus*, lethal effects: 1693  
     life span: 1693  
     stage susceptibility: 1693  
*Ephesia kuehniella*, (p), somatic mutations: 1367  
     stage susceptibility: 1367  
*Epilachna varivestis*, lethal effects: 1258  
 flies (p, a), insecticide susceptibility, sexual differences: 1171  
 flour disinfection: 1631  
     pests, stage susceptibility: 1693  
*Galleria mellonella*, abnormalities: 1357  
     development: 1357  
*Gomphocerus maculatus*, spermatogenesis: 973  
 grasshopper, development: 1386  
     (emb), diapause, morphological changes, EM: 929

- (neuroblast), chromosome structure, EM: 996-7  
mitosis: 936  
respiration: 1386  
spermatogenesis: 1386
- Gryllus domesticus* (e), cell- and mitotic patterns: 966
- Habrobracon*, dominant lethals: 1129  
genetic effects: 1150  
mutations: 1182  
(oocyte), susceptibility at diakinesis: 968  
oocyte susceptibility: 1182  
oocytes: 968  
ovariole: 941, 968  
(♂), translocations: 988  
-/space flight conditions: dominant lethals: 1183
- Habrobracon juglandis*: genetic variability: 1512  
*Habrobracon serinopae* (a), life span: 1409  
hexachlorane susceptibility: *Musca domestica*: 1170
- Hypera postica*, sterilization: 1124  
infestation detection: 1528  
agricultural seeds: 1742  
*Lasioderma serricornis*: 1703
- insect control, applications in: Rev. : 1548  
detection: 1704
- insects, dominant lethals: 1134  
sterilization: 1134
- Kaloterme flavicollis* (e), lethal effects: 979  
radiosensitivity and nucleus differentiation: 979
- K-phthalate/x: *Drosophila*, tumour development: 1173
- Leptinotarsa decemlineata* (e), development: 1337  
sterilization: 1577
- life span, *Drosophila melanogaster*: 1415;  
triploid and diploid ♀: 1414  
*Drosophila obscura*: 1415
- Mecostethus grossus*, spermatogenesis: 651  
*Megaselia scalaris*, chromosome recombination: 1019
- Melanophila californica*, habits (radiography): 1754  
late larval mortality (radiography): 1754
- Melanophus differentialis* (e), development: 197  
SH groups (emb): 197
- Melolontha melolontha*, sterilization: 1582
- Mormoniella*, dominant lethals: 1129  
eye colour mutations: 1060, 1115  
sex-linked recessives: 1129
- Mormoniella vitripennis*, (e): 1114  
(sperm): 1114
- Musca domestica*, BHC susceptibility: 1169  
chlorophos susceptibility: 1169  
DDT susceptibility: 1169  
development: 1380  
(p) eclosion: 1422  
lethal effects: 1380;  
(♀): 1169  
life span: 1421; (♀): 1381;  
(p): 1422  
linkage group - karyotype correlation: 1046  
longevity: 1380  
senescence: 1421  
(p) sex ratio: 1422  
translocation analysis: 1113  
trehalose content and metabolism: 1314  
wing retention: 1380, 1421  
(♂): 1381  
(♀), viability: 1169
- Musca domestica nebulosa* (p) adult emergence: 1372
- Nauphoeta cinerea* (♀), sterilization: 1125
- Nemeritis canescens* (f), behaviour: 1298  
development: 1298  
lethal effects: 561  
life span: 561  
(f, p, a), stage susceptibility: 1298
- Noctuidae, behaviour: 1476
- nuclear polyhedrosis: pathogenesis, insects: 1185
- Ocnieria dispar* (f), colour mutation: 1360  
development: 1360  
pathogen susceptibility: 1360  
sterilization: 1360
- Omocestus viridulus*, spermatogenesis: 973
- Ornithonyssus bacoti*, life span: 1313  
parasite susceptibility: 1313
- Ostrinia nubilalis* (f 3/4), diffuse centromere in: 934
- Pectinophora malvella*: development: 1392  
lethal effects: 1392  
malformation: 1392  
stage susceptibility (p): 1618  
sterilization: 1392
- Periplaneta americana*, lethal effects: 1193
- Philosamia cynthia*, translocations (f): 993
- Phormia regina*, lethal effects: 1431  
sterilization: 1431
- Pieris brassicae*, translocations (f): 993
- pine infestation detection, *Dendroctonus brevicornis*: 1736

- Prodenia litura* (p), development: 1148  
 malformations (a): 1148  
 sterilization: 1148  
 SMT prospects, Egypt: 1148
- radiography\*: *Microcerotermes edentatus*,  
 intestinal transit in: 1743
- RBE( $^{90}\text{KVP}$ ,  $^{20}\text{KVP}$ ,  $^{90}\text{Sr}$ ): *Elasmopalpus lignosellus* (e): 1277
- Sarcophaga peregrina*: development (post-embryonic): 1382  
 DNA synthesis (p): 1382  
 (p) respiration: 1315  
 stage susceptibility: 1382
- Schistocerca gregaria*: (emb), chromosome aberrations: 938, 1001-3  
 $\sigma$  meiosis, chiasma frequency: 981  
 DNA synthesis,  $^3\text{H}$ : 981
- seed infestation, detection of: 1707
- senescence: *Drosophila melanogaster*: 1415  
*Drosophila subobscura*: 1435
- silkworm: chromosome aberrations: 987  
 mutagenic effects on: 933, 1735  
 (spermatogonia): 924, 958  
 DNA,  $^3\text{H}$ : 924  
 stage susceptibility: 987; (e): 1107, 1370; (f): 1089
- Sitophilus granarius*, lethal effects: 1433  
 life span: 1433, 1454  
 oviposition rate, radiography: 1751
- Sitotroga cerealella*, infestation detection (grain kernel): 1376  
 (f, p), development in corn kernels, x: 1705-6  
 radiography, behaviour, x: 1705-6  
 sorghum kernels, x: 1706  
 wheat kernels, x: 1706
- Tenebrio molitor*: (emb), lethal effects: 1418
- Tribolium*: 1411; (f, p): 1389  
 Sooty: 1411  
 (a), life span: 1346
- Tribolium castaneum* (a), reproductive potential: 1300  
 (e, f, p, a), stage sensitivity: 1350  
 eye colour mutations: 1056  
 lethal effects: 1301, 1345, 1350, 1410  
 malformations: 1345  
 pathogen susceptibility: 1163  
 quantitative traits: 1487  
 sterilization: 1350  
 reproductive potential: 1301, 1410
- Tribolium confusum* (a), lethal effects: 1434  
 reproductive potential: 1300  
 development: 1351  
 lethal effects: 1301, 1349, 1437, 1410, 1435, 1458  
 life span (a): 1349, 1351  
 (p), development: 1348-9  
 life span: 1349  
 longevity: 1348  
 pathogen susceptibility: 1163  
 stage susceptibility (e, f, a): 1437  
 sterilization (e, a): 1437  
 wing abnormality: 1398
- Tribolium* sp., mutagenic effects: 1172
- Tyrophagus dimidiatus*, lethal effects: 1437  
 reproductive potential: 1437  
 stage susceptibility: 1437
- wheat disinfection: 1631
- Zeuzera aesculi*: behaviour: 1132  
 development: 1132  
 flight activity: 1132  
 lethal effects: 1132
- x, aging: *Bombyx mori* (emb): 1400
- , apholate: *Anthonomus grandis*, sterilization: 1268
- , bisulfan: *Anthonomus grandis*, sterilization: 1268
- , CE 1506: *Drosophila*, visibles (X-): 1051
- , chemosterilants: *Anthonomus grandis*, sterilization: 1268
- , EDTA: 4 strains of *Drosophila melanogaster* (chromosomes), crossover: 1230
- , e: *Drosophila*: 1255
- , ethylenimine: *Drosophila melanogaster*, recessive lethals: 1250-1
- , ethyl methanesulphonate: *Drosophila*, dumpy locus mutations: 1265
- , formaldehyde: *Drosophila*, crossover: 1276  
*Drosophila melanogaster*, chromosome aberrations: 1273  
 mosaics: 1273
- ,  $\gamma$ : *Drosophila melanogaster*, sex-linked recessive lethals: 33
- Ocnieria dispar* (f), colour mutation: 1360  
 development: 1360

\* See also section 3.1.6.

- x,  $\gamma$ : *Ocnaria dispar* (l), pathogen susceptibility: 1360  
 sterilization: 1360  
 silkworm (e): 1370  
 -, mitomycin C: *Habrobracon* (oocyte, sperm), mutagenic effects: 1274  
 -,  $\mu_{14}$  MeV,  $\gamma$ : silkworm (l), mutation frequency (gonia): 1091  
 -,  $\mu_{14}$ : *Drosophila melanogaster* (pre- and post-meiotic germ cells): 949  
 -,  $n$  (0.2-0.3 MeV): *Drosophila melanogaster* (oogonia, oocytes): 1188-9  
 -, nitroso compounds: *Drosophila melanogaster*, mutagenic effects: 1284  
 -,  $P$  (600 MeV): *Drosophila* ( $\sigma$ ), II-, recessive lethals: 1080  
*Drosophila melanogaster*, II-, recessive lethals: 1081  
 -, quinacrine mustard, azaserine: *Drosophila*, sterilization: 1258  
 -, T: *Drosophila*, crossover recovery: 1285  
 -, triethylenemelamine, phenylalanine (mustard derivative): 1260  
 -,  $^3H$ : *Drosophila melanogaster*, visibilities: 1073  
 (-, uv)/age: *Tribolium castaneum*, lethal effects: 1345  
 malformations: 1345  
 -,  $\mu_{14}$ : *Drosophila melanogaster* (oogonia, oocytes): 1188  
 -, actinomycin D: *Drosophila* (spermatids, spermatozoa), susceptibility and recovery: 1235  
*Drosophila*, spermatogenesis: 950  
 -, AET: *Drosophila* ( $\sigma$ ), crossover: 1203  
*Drosophila melanogaster* ( $\sigma$ ), crossover: 1204  
 -, age: *Bombyx mori* (emb): 1400  
*Drosophila melanogaster*, life span: 1405  
 somatic crossover: 1039  
*Tribolium castaneum*, lethal effects: 1345  
 malformations: 1345  
 (a), stage susceptibility: 1346  
 -, air: *Drosophila*, sex-linked recessive lethals: 1263  
 (spermatozoa): 951, 970, 1237  
 (spermatids): 1237  
*Drosophila melanogaster*, chromosome aberrations: 1229  
 (emb), lethal effects: 1395  
 stage susceptibility: 1395  
 sex-linked lethals: 1229  
 spermatogenesis: 1229  
 suppressor-erupt system: 1253  
 tumour incidence: 1174  
 x/anoxia: *Drosophila*, chromosome aberrations: 1220  
 sex-linked recessive lethals: 1220  
 (spermatids, spermatozoa) susceptibility and recovery: 1235  
 -, *Aphis mellifera* venom: mouse, lethal effects: 1723  
 resistance: 1289  
 -, apitonin (royal jelly, lyophilized): rat, radiation protection: 1724  
 -, Ar: *Drosophila melanogaster*, dominant lethals: 1191  
 recessive lethals: 1190  
 sex-linked recessive lethals: 1191  
 translocations: 1190-1  
 -, ATP: *Drosophila melanogaster* ( $\sigma$ ), chromosome loss: 1205, 1207  
 chromosome aberrations: 1208  
 -, ATP/N: *Drosophila melanogaster* ( $\sigma$ ), chromosome aberrations: 1208  
 -, *Bacillus thuringiensis*: *Tribolium castaneum*, life span: 1538  
 pathogen susceptibility: 1163  
*Tribolium confusum*, life span: 1538  
 pathogen susceptibility: 1163  
 -, BdU: *Drosophila*, sex-linked recessive lethals: 1197  
 -, BUdR: *Drosophila melanogaster*, sex-linked recessive lethals: 1201  
 -, CO: *Drosophila melanogaster*, recessive lethals: 1190  
 translocations: 1190  
 -, CO/time factor: *Drosophila melanogaster*, stage susceptibility, spermatogenesis: 1246  
 -, colchicine: *Drosophila melanogaster* ( $\sigma$ ), chromosome loss: 1208

- x/DDT: *Tribolium* sp.: 1172  
 fitness: 1161  
 (Sooty): 1411  
*Tribolium castaneum*, lethal effects:  
 1301, 1410  
 reproductive potential:  
 1301, 1410  
*Tribolium confusum*, lethal effects:  
 1301, 1410  
 reproductive potential:  
 1301, 1410  
 -/dimethyl sulphoxide: mouse, lethal effects:  
 898  
 -/ecdysone: *Drosophila melanogaster*, lethals:  
 1184  
 -/e.m.: *Drosophila melanogaster*: 1185  
 -/e.m./T: *Tribolium castaneum*, development:  
 1451  
 -/ethylenimine: *Drosophila melanogaster*, re-  
 cessive lethals: 1250-1  
 -/G: *Tribolium confusum*, development: 1398  
 -/halogenated nucleosides: *Tribolium con-*  
*fusum*, lethal effects: 1458  
 -/halogenated pyrimidines: *Tribolium con-*  
*fusum*, lethal effects: 1458  
 -/He: *Drosophila*, chromosome aberrations:  
 1220  
 dominant lethals: 1027  
 oogenesis: 1027  
 sex-linked recessive lethals:  
 1027  
 spermatogenesis: 1027  
*Drosophila melanogaster* (germ cells):  
 1099  
 (oocyte 7),  
 chromosome aberrations: 1221  
 dominant lethals: 1221  
 sex-linked recessive lethals:  
 1221  
 -/iodoacetamide: *Drosophila*, spermatids,  
 spermatozoa, radiosensitivity and re-  
 covery: 1235  
 -/ICR 100: *Drosophila melanogaster*, viability  
 mutants: 1262  
 -/modifying agents: *Drosophila*, lethals: 1241  
 -/n: *Drosophila* (sperm), chromosome aber-  
 rations (exchanges): 1008  
 -/n(12-14 MeV): *Drosophila melanogaster*,  
 chromosome breaks: 1026  
 -/N: *Drosophila*, recovery (spermatids, sperm-  
 atocytes): 1242, 1244  
 sex-linked recessive lethals:  
 1242, 1263  
 (spermatids): 1237  
 (spermatids, spermatozoa),  
 susceptibility and recovery:  
 1234-6  
 spermatogenesis: 950  
 spermatozoa, spermatids:  
 1237  
*Drosophila melanogaster*, dominant lethals:  
 1191  
 (emb), lethal effects:  
 1395  
 stage susceptibility:  
 1395  
 (germ cells): 970, 1099  
 life span: 1282  
 sex-linked recessive  
 lethals: 965, 1191  
 spermatogenesis: 950  
 (spermatozoa): 951, 970,  
 1237  
*Drosophila melanogaster*, chromosome  
 aberrations:  
 1229  
 (emb), lethal  
 effects: 1395  
 stage  
 susceptibility:  
 1395  
 sex-linked  
 lethals: 965,  
 1229  
 spermatogenesis: 1229  
 (24-h-p) post-  
 irradiation  
 recovery  
 (spermatids):  
 1243  
*Periplaneta americana*, lethal effects:  
 1193  
 x/N-ethylmaleimide: *Drosophila melanogaster*,  
 radiosensitization: 1226  
 sex-linked recessive  
 lethals: 1226  
 -/NaF: *Drosophila* (spermatids, spermatozoa),  
 susceptibility and recovery: 1235  
*Drosophila melanogaster* (spermatozoa),  
 mutagenic effects: 1212  
 -/NO: *Drosophila melanogaster*, recessive  
 lethals: 1190  
 translocations:  
 1190  
 -/NO/time factor: *Drosophila melanogaster*,  
 stage susceptibility,  
 spermatogenesis: 1246  
 -/O: *Drosophila*, post-radiation recovery  
 (spermatids, spermatocytes):  
 1242, 1244  
 sex-linked recessive lethals:  
 1242, 1263  
 (spermatids, spermatozoa)  
 susceptibility and recovery:  
 1234-6  
 spermatogenesis: 950  
 spermatozoa, spermatids:  
 1237  
*Drosophila melanogaster*, dominant lethals:  
 1191  
 (emb), lethal effects:  
 1395  
 stage susceptibility:  
 1395  
 (germ cells): 970, 1099  
 life span: 1282  
 sex-linked recessive  
 lethals: 965, 1191



- x/O: *D. melanogaster*, translocations: 1191  
 suppressor-empty system: 1253  
 tumour incidence: 1174  
 recovery (spermatids): 1243  
*Sitophilus granarius*, life span: 1454  
 -/O/time factor: *Drosophila melanogaster*,  
 stage susceptibility, spermatogenesis: 1246  
 -/penicillin: *Drosophila melanogaster*, mutagenic effects: 1095, 1227-8  
 -/protozoa infection: *Tribolium castaneum*, radiosensitivity: 1163  
 -/RNase: *Drosophila* (spermatids, spermatozoa), recovery: 1235  
 -/sigma virus: *Drosophila melanogaster*, development: 1254  
 -/T: *Bombyx mori* (e): 1450  
*Drosophila melanogaster*, chromosome aberrations: 1038  
 (X-), dominant lethals: 1198  
 sex-linked recessive lethals: 1198  
 (emb), lethal effects: 1395  
 -/T(high): *Drosophila melanogaster* (X-), recombination: 1259  
 sex-linked recessives, spermatogenesis: 944  
*Ephestia kuehniella* (p), somatic mutations: 1367  
 -/T(low): *Megaselia scalaris*, chromosome recombination: 1019  
*Tribolium castaneum* (a), reproductive potential: 1300  
*Tribolium confusum* (a), reproductive potential: 1300  
 wing abnormality: 1398  
 -/thymidine: *Drosophila melanogaster*, sex-linked recessive lethals: 1218  
 -/toyomycin: *Drosophila melanogaster*, sex-linked recessive lethals: 1508  
 -/urethane: *Drosophila melanogaster* (♂), chromosome loss: 1206  
 -/visible light: *Tenebrio molitor* (emb), lethal effects: 1418  
 -/He: *Drosophila melanogaster*, recessive lethals: 1190  
 translocations: 1190  
 -/5-bromouracil: *Tribolium confusum*, lethal effects: 1458  
 -/5-iodouracil: *Tribolium confusum*, lethal effects: 1458  
 (250 kVp): *Drosophila* (♂), recessive lethals (II): 1080

- Drosophila melanogaster*, recessive lethals (II): 1081  
*Xylotrupes dichotomus* - V.41  
 methyl parathion, degradation of, <sup>32</sup>P: 724-5  
 Sumithion, degradation of, <sup>32</sup>P: 725

## Y

- yeast  
 DDT, dechlorination, <sup>14</sup>C: 642  
 yellow fever mosquito; see *Aedes aegypti*  
 yolk  
 formation, insects, r.i.: 228  
 yttrium-91  
 EDTA: *Culex pipiens*, accumulation coefficient: 83  
*Drosophila*, reproductive potential: 959  
*Drosophila melanogaster*, incorporation in sperm: 74  
 metabolism: 74  
 mutagenic effects (lethals): 74

## Z

- Zectran-<sup>14</sup>C [X.4]  
 bean foliage, metabolism in: 803  
 plant, metabolism in: 829  
*Musca domestica*, metabolism by NADPH<sub>2</sub>-requiring enzyme: 844  
 rat (liver microsomes), metabolism in: 839  
 metabolism and persistence in: 827  
 Zectran, carbonyl-<sup>14</sup>C-labelled  
 bean foliage, metabolism in: 804-5  
 plant, persistent glucoside metabolites: 830  
 rat, metabolism in: 828  
 hydrolysis products in: 828  
 Zectran, dimethylamino-<sup>14</sup>C-labelled  
 bean foliage, metabolism: 805  
 Zectran, N-methyl-<sup>3</sup>H-labelled  
 bean foliage, metabolism in: 805  
 Zectran, N-methyl-<sup>14</sup>C-labelled  
 bean foliage, metabolism in: 805  
 Zeuzera aesculi - U.7  
 [wood moth]  
 x: behaviour: 1132  
 development: 1132  
 flight activity: 1132  
 lethal effects: 1132  
 zinc-65  
 arthropod food web, broomsedge field: 513  
 caddisfly (f), concentration in: 496  
 EDTA: *Culex pipiens*, accumulation coefficient: 83  
 Zinophos-<sup>14</sup>C [PH.6]  
 diazinon, persistence in: 728  
 soil, metabolism in: 729  
 Zinophos, persistence in: 728  
 zirconium-95  
 EDTA: *Culex pipiens*, accumulation coefficient: 83



## 6. APPENDIX

### 6.1. INSECT CONTROL BY RADIATION (not necessarily ionizing)

(Some selected references)

#### 6.1.1. Electromagnetic and Sonic Energy

- APX1 Dyck, W. van LA DESTRUCTION D'INSECTES DANS LE BOIS PAR IRRADIATION DIRECTE AVEC DES ONDES DECIMETRIQUES. (Destruction of insects in wood by direct irradiation with decimetric waves.) Revue Agric., Brux. **18**, 7/8 (1965) 901-904.

La fréquence utilisée était 2425 MHz (longueur d'onde  $\sim 12,5$  cm) et le chauffage ne se produit pas entre deux électrodes auxquelles on applique la tension à haute fréquence, mais par irradiation directe. Il a fallu se limiter à 120 watts de l'émetteur. Les insectes étaient en pleine activité au moment du traitement. Leur présence se traduisait par le rejet continu de vermoulure. Ce témoignage d'activité a cessé immédiatement dans le bois traité. Il ne s'était pas encore renouvelé après 8 mois alors que de nouvelles manifestations d'attaques sont perceptibles dans le même immeuble sur le bois non traité. Les résultats constatés sont encourageants. Le traitement n'exclut pas toutefois la réinfestation des boiseries.

- APX2 Kadoun,\* A.M., Ball, H.J., Nelson, S.O. MORPHOLOGICAL ABNORMALITIES RESULTING FROM RADIOFREQUENCY TREATMENT OF LARVAE OF Tenebrio molitor. Ann.ent.Soc.Am. **60** (1967) 889-892.

T.molitor larvae were exposed to two different RF intensities at a frequency of 39 MHz. With the electrodes in contact with the top and bottom of the polystyrene holder, an electrode voltage of 3.6 kV was used for one experiment, and 0.9 kV was used for another. Adults developing from larvae exposed at sublethal levels exhibited malformed and missing legs. The number of imaginal legs was reduced as exposure time increased. The degree of leg malformation increased when treatment was administered again during the 6th instar. Similar treatments of 5th-instar larvae did not interfere with normal imaginal leg development. Deformities most likely resulted from heat damage to the histoblasts that project into the legs of the 6th or least-instar larvae. (NSA 22:1968, 10847)

\* For full initials, see APX3.

- APX3 Kadoun, A.M. A.A.G. EFFECTS OF RADIO-FREQUENCY ELECTRICAL FIELDS ON THE METABOLISM OF THE YELLOW MEALWORM, Tenebrio molitor (L.). Diss.Abst. **27B**, 8 (1967) 2553.

The purpose of this research was to explore some of the biochemical changes initiated in T.molitor (L.) larvae by exposure to radio-frequency electric fields. T. molitor (L.) larvae were exposed to both continuous and pulse-modulated RF electric fields. Continuous exposures were conducted at a frequency of 39 mCi using 3.5 kV for 5.5 sec, whereas the pulse-modulated treatments were made at the same frequency at an energy level of 6.0 kV at the rate of 20 pps using a pulse width of 5 ms respectively. RF treated larvae lost significantly more weight than the starved and control larvae during the 5 d following RF exposure. The respiratory rates of RF treated larvae were significantly higher than the rates for the control insects. This increase in oxygen consumption in RF treated larvae persisted throughout the 4th day following RF treatment. The rate of incorporation of labelled amino acids into soluble protein was higher in RF treated insects as compared to control insects. An increase in  $^{14}\text{CO}_2$  expired following injection of labelled amino acids was noticed in RF treated larvae during the

24-h period following treatment. *T. molitor* (L.) larvae tended to void excess amino acids injected into the haemocoel. The results of this work indicated that a mechanism other than general internal heating might be responsible for the death of irradiated insects. Death, it was concluded, could result from a change in the normal metabolic activity of irradiated insects as well as physical change in the waxy layer of the epicuticle. (From DA)

- APX4 Nelson, S.O. ELECTROMAGNETIC AND SONIC ENERGY FOR INSECT CONTROL. Trans Am. Soc. agric. Engrs 9 (1966) 398-403.

Past accomplishments, current studies, and future possibilities for insect control using electromagnetic, sonic, and ultrasonic energy are reviewed. References (134) are included. (NSA 21:1967, 34748)

- APX5 See 1771 Pest control by physical means. (Carleton, W.M. et al., 1966)  
1783 New ways to control insects. (Nelson, S.O., 1966)  
1789 Physical methods of insect control. (Watters, F.L., 1965)

- APX6 See 1784 Electromagnetic energy. (Nelson, S.O., 1967)  
1475 The responses of *Drosophila melanogaster* to weak electromagnetic fields. (Picton, H.D., 1964)

- APX7 Vilenchik, M.M. EFFETS MAGNETIQUES EN BIOLOGIE. Usp.sovrem.Biol. 63, 1 (1967) 54-72. (In Russian)

A review paper dealing with the question whether the constant magnetic field represents a biologically active factor. The problems covered are (1) orientation effects, (2) disturbances in the reflex activity of animals in the magnetic field, (3) magnetotropisms, (4) functional-morphological disturbances observed in animals exposed to prolonged action of the magnetic field, (5) changes of radiation effects due to the magnetic field, (6) inhibition in the growth of tumours by the magnetic field, (7) and any genetic effects of the magnetic field. The great variety of biological objects discussed included some insects: *Drosophila melanogaster* [under (1) and (7)], and termites, flies, grasshoppers, and cockchafers [under (1)].

### 6.1.2. Lasers

- APX8 Wilde, W.H.A. LASER EFFECTS ON TWO INSECTS. Can.Ent. 97, 1 (1965) 88-92.

The effects of a laser of 1.5 mm diameter were studied on *Trogoderma versicolor* and *Periplaneta americana*. The damage and mortality observed are described.

- APX9 Wilde, W.H.A. LASER EFFECTS ON SOME PHYTOPHAGOUS ANTHROPODS AND THEIR HOSTS. Ann.ent.Soc.Am. 60 (1967) 204-207.

Low-energy ruby laser pulses of 0.6 J/msec<sup>2</sup> produced degrees of damage relative to the coloured pigmentation of certain arthropods and their plant hosts; the darker the pigmentation, the more severe the damage. Structural shape and microdistance between arthropod life stages and host surfaces were other factors affecting the degree of laser damage. Rounded surfaces reflected laser pulses more than did elliptical or flat surfaces, even when colouration was similar. Microdistances appeared to serve as insulation against residual or reflected heat from lasered host-plant areas. Two species of mites, *Panonychus ulmi* and *Tetranychus urticae*; the greenhouse white fly, *Trialeurodes vaporariorum*; the green peach aphid, *Myzus persicae*; and the pear psylla, *Psylla pyricola*, were used as test arthropods. The host plants were pear seedlings, alfalfa, and rye grass (*Bromus* sp.). (NSA 21:1967, 22760)

### 6.1.3. Booby Traps

- APX10 Whitten, M.J., Norris, K.R. "BOOBY-TRAPPING" AS AN ALTERNATIVE TO STERILE MALES FOR INSECT CONTROL. Nature, Lond. 216 (1967) 1136.

A system is proposed in which a resistant strain, available in the field or developed in the laboratory, might be used against a susceptible strain in the field. Some experiments have already been carried

out with the Australian sheep blowfly, *Lucilia cuprina*. Dieldrin-resistant females (which survived 0.5 µl of 2% dieldrin applied topically to the thorax) were exposed to a susceptible strain (LD 50 < 0.005% dieldrin). Each female killed up to 100 males through contact during attempted matings. The male was less effective. - Resistant insects thus require mass rearing, sterilization, loading with the appropriate insecticide and release among susceptible populations. Another possibility is to load insects with a non-lethal topical dose of a stable chemosterilant of a type to have a sterilizing effect on the carrier and on would-be mates. A low natural density would be necessary; the adult stage should not be attracted to humans, if highly toxic insecticides are employed; behavioural characteristics should be such as to lead to frequent bodily contact between individuals. *L. cuprina* would fulfil these conditions.

## 6.2. INSECT REARING

### 6.2.1. Survey\*

APX11 Smith, C.N. INSECT COLONIZATION AND MASS PRODUCTION. "Insect Colonization and Mass Production". Smith, C.N., Ed. New York, Academic Press. 1966, 618 p.

Recent developments in entomological research have augmented the importance of insect colonies to basic research and practical control. Control methods now in use, or foreseen for the future, such as the release of sterile males, the extensive distribution of insect pathogens, the practical use of pheromones, and the genetic manipulation of natural populations, will require the production of millions of insects per week for the control of certain economically important species. An attempt has been made to bring together the most recent information on method of rearing representative species, with emphasis on the general principles of nutrition and management that can be applied to the colonization of other species as well. Chapters are largely self-contained. Some are concerned with only a single species, selected to stand as an example of its taxonomic group, and to a lesser extent of other insects with similar nutritional and environmental requirements. Other chapters discuss rearing methods for entire groups of species that share common requirements. Extensive bibliographical material is given at the end of each chapter.

\* See Table 3.

TABLE 3. SOME INSECT AND RELATED ARTHROPOD PESTS: GUIDE TO COLONIZATION AND MASS REARING \*

Common Name	INSECT Scientific Name	Systematic Code	Order	Family	Class	Author(s)	Affiliation
ANIMAL PARASITES AND HAEMATOPHAGOUS ARTHROPODS							
body louse	<i>Pediculus humanus humanus</i> L.	O. 4	Anoplura	Pediculidae	Insecta	Cole, M. M.	Entomology Research Division, ARS, USDA, Gainesville, Fla., USA
parasitic mites				Dermanysidae			
dermanysid mites		Ac. 4	Acarina (Mesostigmata)	Macronyssidae		Audy, J. R. Lavoipierre, M. M. J.	The George Williams Hooper Foundation, University of California Medical Center, San Francisco, Calif., USA
chigger mites		Ac. 15	Acarina (Trombidiformes)	Haemogamasidae			
itch mites		Ac. 11	Acarina (Sarcoptiformes)	Laelapidae			
scab mites		Ac. 9		Trombiculidae			
				Sarcoptidae			
				Pseudoptidae			
ticks							
	<i>Argas</i>	Ac. 2	Acarina	Argasidae	Arachnida	Gregson, J. D.	Research Station, Canada De- partment of Agriculture, Kamloops, British Columbia, Canada
	<i>Rhipicephalus secundus</i> Feldman-Mulhausen						
	<i>Amblyomma</i>						
southern cattle tick	<i>Boophilus micro- plus</i> (Canestrini)	Ac. 8					
American dog tick	<i>Dermacentor varia- bilis</i> (Say)						
	<i>Hyalomma</i>						
	<i>Ixodes</i>						
	<i>Onchodoros</i>	Ac. 2					

\* See reference APX. 11.

INSECT		Systematic Code	Order	Family	Class	Author(s)	Affiliation
Common Name	Scientific Name						
rat flea	Xenopsylla cheopis (Rothsch.)	Y. 2	Siphonaptera	Pulicidae	Insecta	Krishnamurthy, B. S.	National Institute of Communicable Diseases, Delhi, India
common malarial mosquito	Anopheles quadrimaculatus Say	X. 11	Diptera	Culicidae	Insecta	Gahan, J. B.	Entomology Research Division, ARS, USDA, Gainesville, Fla., USA
mosquito	Culex pipiens fatigans Wied.	X. 11	Diptera	Culicidae	Insecta	de Meillon, B. Thomas, V.	Army Mosquito Project, Smithsonian Institute, U. S. National Museum, Washington, D. C. - USA College of Agriculture, Serdang-Selangor, Sungai Besi, P. O. Malaysia
biting midges	Culicoides	X. 7	Diptera	Ceratopogonidae	Insecta	Jones, R. H.	Entomology Research Division, ARS, USDA, Denver, Colo., USA
black flies	Simulium	X. 30	Diptera	Simuliidae	Insecta	Multhead-Thomson, R. C.	Division of Communicable Diseases, WHO, Geneva, Switzerland
stable flies	Stomoxys calcitrans (L.)	X. 19	Diptera	Muscidae	Insecta	Jones, C. M.	Insectary, University of Nebraska, Lincoln, Neb., USA
tsetse flies	Glossina morsitans Westwood Glossina spp.	X. 19	Diptera	Muscidae	Insecta	Lumsden, W. H. R.  Saunders, D. S.	Trypanosomiasis Research Unit, Department of Animal Health, Royal (Dick) School of Veterinary Studies, University of Edinburgh, Easter Bush, Roslin, Midlothian, Edinburgh, Scotland Department of Zoology, University of Edinburgh, Easter Bush, Roslin, Midlothian, Edinburgh, Scotland
bed bugs	Cimex lectularius Linnaeus Cimex hemipterus Fabricius	Q. 5	Heteroptera	Cimicidae	Insecta	Burden, G. S.	Entomology Research Division, ARS, USDA, Gainesville, Fla., USA

Common Name	INSECT Scientific Name	Systematic Code	Order	Family	Class	Author(s)	Affiliation
redwired bug	Reduvius Triatoma	Q. 18	Heteroptera	Reduviidae Triatominae	Insecta	Ryckman, R. E. Ryckman, A. E.	Department of Microbiology, School of Medicine, Graduate School, Loma Linda University, Loma Linda, Calif., USA
DOMESTIC AND STORED PRODUCT INSECTS							
house flies	Musca domestica L.	X. 19	Diptera	Muscidae	Insecta	Spillner, D.	Plant Diseases Division, Department of Scientific and Industrial Research, Auckland, New Zealand
cockroaches	Blattella germanica (L.)  Periplaneta americana (L.)	H. 2	Orthoptera	Blattellidae	Insecta	Smittle, B. J.	Entomology Research Division, ARS, USDA, Gainesville, Fla., USA
granary weevil	Sitophilus granarius (L.)	V. 19	Coleoptera	Curculionidae	Insecta	Havelin, P. K.  Soderstrom, E. L.	Department of Entomology, Fisheries, and Wildlife, University of Minnesota, St. Paul, Minn., USA. Stored-Products Insects Research and Development Laboratory, USDA, Savannah, Ga., USA
rice weevil	Sitophilus oryzae (L.)			Tenebrionidae			
corn weevil	Sitophilus zeamais (Mots.)	V. 46					
cadelle	Tenebrionides mauritanicus (L.)						
red flour beetle	Tribolium castaneum (Fab.)	U. 36	Lepidoptera	Phycitidae	Insecta	Boles, H. P.	Midwest Grain Insects Investi- gations, Stored-Products Insects Branch, Market Quality Research Division, ARS, USDA, Manhattan, Kans., USA. Stored-Products Insects Research and Development Laboratory, Savannah, Ga., USA
confused flour beetle	Tribolium confusum Div.						
almond moth	Cadra cautella (Wlk.)	U. 41		Pyralidae		Marzke, F. O.	
Mediterranean flour moth	Anagasta kuhniella Z.						
Indian meal-moth	Plodia interpunctella (Hbn.)						



Common Name	INSECT Scientific Name	Systematic Code	Order	Family	Class	Author(s)	Affiliation
PHYTOPHAGOUS INSECTS (DIETS)							
bill weevil	<i>Anthonomus grandis</i> Boh.	V. 19	Coleoptera	Curculionidae	Insecta	Vanderzant, E. S.	Entomology Research Division, ARS, USDA, Texas A&M University, College Station, Tex., USA
European can borer	<i>Pyrausta nubilalis</i> (Fib.)	U. 41	Lepidoptera	Pyrallidae			
green peach aphid	<i>Myzus persicae</i> (Sulzer)	QQ. 2	Hemiptera (Homoptera)	Aphididae			
milkwed bug	<i>Onopeltus fasciatus</i> (Dall.)	Q. 20	Hemiptera (Heteroptera)	Lygaeidae			
onion maggot	<i>Hyelomyia antiqua</i> Meigen	X. 18	Diptera	Anthomyiidae			
oriental fruit moth	<i>Grapholitha molesta</i> (Buck)	U. 33	Lepidoptera	Olethreutidae			
pink bollworm	<i>Pectinophora gossypiella</i> (Saunders)	U. 19	Lepidoptera	Gelechiidae			
rice stem borer	<i>Chilo suppressalis</i> (Wlk.)	U. 8	Lepidoptera	Crambidae			
silkworm	<i>Bombyx mori</i> (L.)	U. 3	Lepidoptera	Bombycidae			
south m pine beetle	<i>Dendroctonus frontalis</i> Zitn.	V. 42	Coleoptera	Scolytidae	Insecta	Clark, E. W.	U.S. Forest Service, Forestry Sciences Laboratory, Durham, N. C., USA.
coarse writing engraver	<i>Ips calligraphus</i> Germ.					Osgood, E. A., Jr.	Department of Entomology, University of Maine, Orono, Maine, USA
greater elm bark beetle	<i>Scolytus multistriatus</i> Marsh						
lesser elm bark beetle	<i>Hylurgopinus rufipes</i> Eich						

Common Name	INSECT Scientific Name	Systematic Code	Order	Family	Class	Author(s)	Affiliation
grasshopper Egyptian -	Anacridium aegyptium L.	H.1	Orthoptera	Acrididae	Insecta	Cowan, F.T.	Entomology Research Division, ARS, USDA, Bozeman, Mont., USA
two-striped -	Melanoplus bivittatus (Say)						
migratory -	Melanoplus sanguinipes (Fabricius)						
locust African	Locusta nigrita- toroides R&F						
red -	Nomadacris septemfasciata Say						
desert -	Schistocerca gregaria Forsk.						
European corn borer	Ostrinia nubilalis (Hbn.)	U. 42	Lepidoptera	Pyraustidae	Insecta	Raun, E. S.	Corn Borer Laboratory, ARS, USDA, Ames, Iowa, USA
codling moth	Carpocapsa pomonella (L.)	U. 83	Lepidoptera	Olethreutidae	Insecta	Hamilton, D. W.  Hathaway, D. O.	Japanese Beetle Investigations, Entomology Research Division, ARS, USDA, Moorestown, N.J., USA. Entomology Research Division, ARS, USDA, Yakima, Wash., USA
pink boll- worm	Pectinophora gossypiella (Saunders)	U. 13	Lepidoptera	Gelechiidae	Insecta	Martin, D.F.	Cotton Insect Research Branch, Entomology Research Division, ARS, USDA, Beltsville, Md., USA
corn root- worms	Diabrotica spp.	V.13	Coleoptera	Chrysomelidae	Insecta	Howe, W.L. George, S.W.	Northern Grain Insects Research Laboratory, Entomology Research Division, ARS, USDA, Brookings, S. Dak., USA
northern -	D. longicornis (Say)						
western -	D. virgifera Lec.						
southern -	D. undecimpunctata howardi Barber						

INSECT		Systematic Code	Order	Family	Class	Author(s)	Affiliation
Common Name	Scientific Name						
false wireworms	<i>Eledus</i> sp. <i>Eledus saturalis</i>	V. 46	Coleoptera	Tenebrionidae	Insecta	Matteson, J. W.	Montano Company, Agricultural Division, Insecticide Chemicals Development Department, St. Louis, Miss., USA
peach tree bore	<i>Saundersia exitiosa</i> (Say)	U. 1	Lepidoptera	Aegeriidae	Insecta	Smith, E. H.	Department of Entomology, North Carolina State University, Raleigh, N. C., USA
boll weevil	<i>Anthonomus grandis</i> Boh.	V. 19	Coleoptera	Curculionidae	Insecta	Gard, R. T. Davich, T. B.	Boll Weevil Research Laboratory, Entomology Research Division, ARS, USDA, State College, Miss., USA
wheat stem sawfly	<i>Cephus cinctus</i> Noel.	W. 6	Hymenoptera	Cepidae	Insecta	Wallace, L. E.	Wheat Stem Sawfly Investiga- tions, ARS, USDA, Bozeman, Mont., USA
Lygus bugs	<i>Lygus hesperus</i> Knight <i>L. lineolaris</i> (P. de B.) <i>L. elaeus</i> Vanduzee	Q. 11	Hemiptera (tetraptera)	Myrdae	Insecta	Botiger, C. T.	Entomology Research Division, ARS, USDA, Tucson, Ariz., USA
aphids	<i>Aphis fabae</i> Scop. <i>Macrosiphum euphorbiae</i> (Thomas) <i>Acyrthosiphon pisum</i> (Linnaeus) <i>Myzus persicae</i> (Sulzer) <i>Schizaphis graminum</i> (Rondani)	Q. 2	Hemiptera (homoptera)	Aphididae	Insecta	Harris, F. H.	Tree Fruit Research Center, Wenatchee, Wash., USA
bean aphid							
potato aphid							
pea aphid							
green peach aphid							
greenbug							

Common Name	INSECT	Scientific Name	Systematic Code	Order	Family	Class	Author(s)	Affiliation
wooly apple aphid		<i>Eriosoma laticornis</i> (Hausman)	QQ. 2					
chrysanthemum aphid		<i>Macropsiphonia umboni</i> (Gull.)						
spotted alfalfa aphid		<i>Therioaphis maculata</i> (Buckton)						
green two-spotted spider mite		<i>Tetranychus urticae</i> (Koch)	Ac. 14		Tetranychidae	Insecta	Jacklin, S. W. Smith, E. F.	Entomology Research Division, ARS, USDA, Beltsville, Md., USA
coneworms		<i>Doryctia abietella</i> (D. & S.) <i>Doryctia amatella</i> Hulst	U. 36	Lepidoptera	Phycitidae	Insecta	Michael, E. F. Fitzinger, C. W.	Southeastern Forest Experiment Station, Forest Service, USDA, Olahee, Fla., USA
cabbage looper		<i>Trichoplusia ni</i> (Hbn.)	U. 29	Lepidoptera	Noctuidae	Insecta	Henneberry, T. J. Kishaba, A. N.	Entomology Research Division, ARS, USDA, Riverside, Calif., USA
tobacco hornworm		<i>Protoparce (Manduca) sexta</i> (Fab.)	U. 46	Lepidoptera	Sphingidae	Insecta	Hoffman, J. D. Lawson, F. R.	Entomology Research Division, ARS, USDA, Oxford, N.C., USA. Entomology Research Division, ARS, USDA, Columbia, Miss., USA.
tomato hornworm		<i>Manduca quinquemaculata</i> (Haworth)					Yamanoto, R.	Department of Entomology, North Carolina State University, Raleigh, N. C., USA
MASS REARING OF INSECTS IN TERMS OF MILLIONS								
scree-worm		<i>Cochliomyia hominivorax</i> (Coq.)	X. 5	Diptera	Calliphoridae	Insecta	Baumhover, A. H. Huffman, C. N. Graham, A. J.	Entomology Research Division, USDA, Oxford, N. C., USA. Administrative Services, USDA, Beltsville, Md., USA. Animal Health Division, USDA, Mission, Tex., USA

Common Name	INSECT Scientific Name	Systematic Code	Order	Family	Class	Author(s)	Affiliation
fruit flies							
Mediterranean -	<i>Ceratitis capitata</i> (Wied.)	X. 35	Diptera	Tephritidae	Insecta	Steiner, L. F. Mitchell, S.	Entomology Research Division, ARS, USDA, Honolulu, Hawaii, USA
oriental -	<i>Dacus dorsalis</i> Hendel						
olive -	<i>Dacus oleae</i> (Gmel.)						
Queensland -	<i>Dacus tryoni</i> (Froggatt)						
melon fly	<i>Dacus cucurbitae</i> Coq.						
yellow fever mosquito	<i>Aedes aegypti</i> (L.)	X. 11	Diptera	Culicidae	Insecta	Morlan, H. B.	<i>Aedes aegypti</i> Eradication Branch, Communicable Disease Center, Public Health Service, U. S. Department of Health, Education and Welfare, Atlanta, Ga., USA

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