

## Part II. List of Other Arthropod Pheromones and Allomones

Update: Sept. 6, 2025

### (C) Other Compounds

These semiochemicals are divided into the following four groups and listed in ascending order of carbon chain length or ring size.

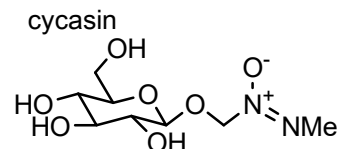
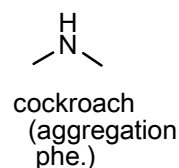
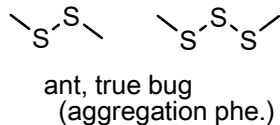
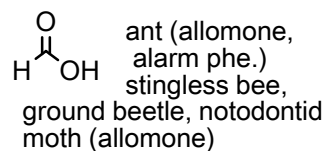
|         |                           |                           |
|---------|---------------------------|---------------------------|
| [ C-1 ] | Other: Acyclic compounds  | i – xxiii (518 compounds) |
| [ C-2 ] | Other: True alkaloids     | i – xii (229 compounds)   |
| [ C-3 ] | Other: Aromatic compounds | i – ix (167 compounds)    |
| [ C-4 ] | Other: Ring compounds     | i – v (102 compounds)     |

See the database, <https://lepipheromone.sakura.ne.jp/mepdb.html>,  
for more information, such as the IUPAC names, arthropod species names,  
and research publications

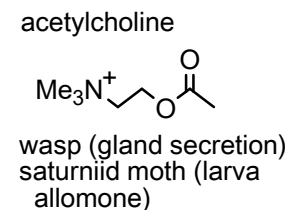
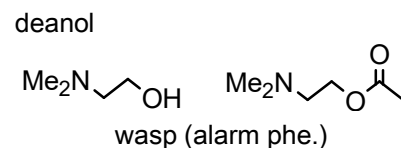
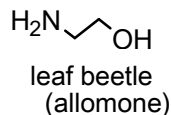
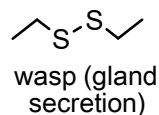
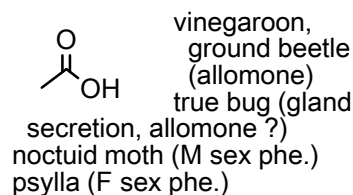
Lepidopteran female sex pheromones and male attractants are listed in **Part I**.  
Other arthropod pheromones and allomones are listed in **Part II**,  
which is composed of **(A)** terpenoid compounds without alkaloids,  
**(B)** non-terpene methyl-branched compounds, and **(C)** other compounds  
including terpene alkaloids.

# [ C-1 ] Other: Acyclic comp. (i)

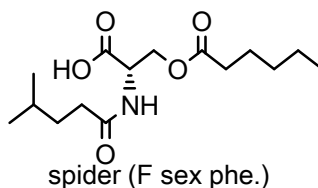
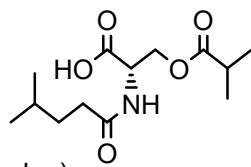
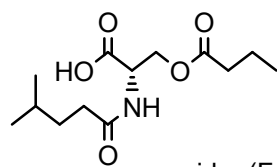
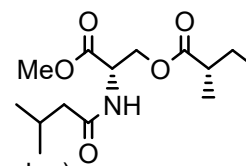
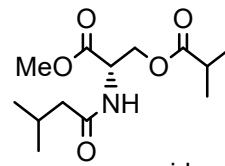
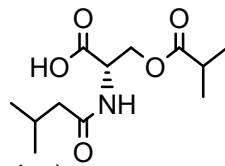
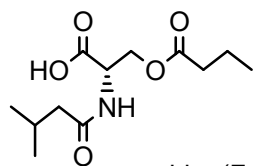
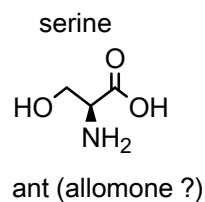
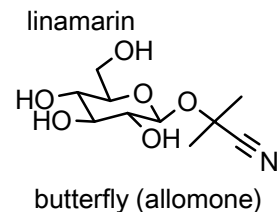
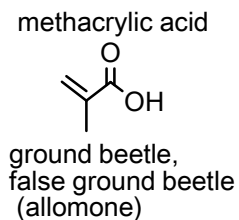
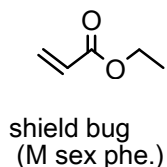
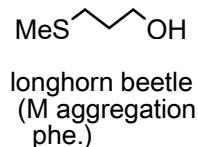
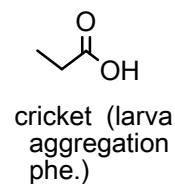
## C1 chain



## C2 chain

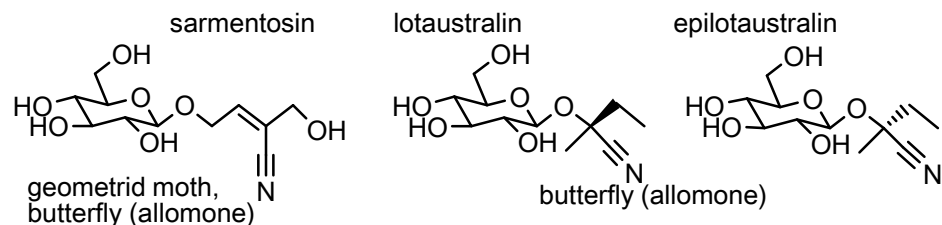
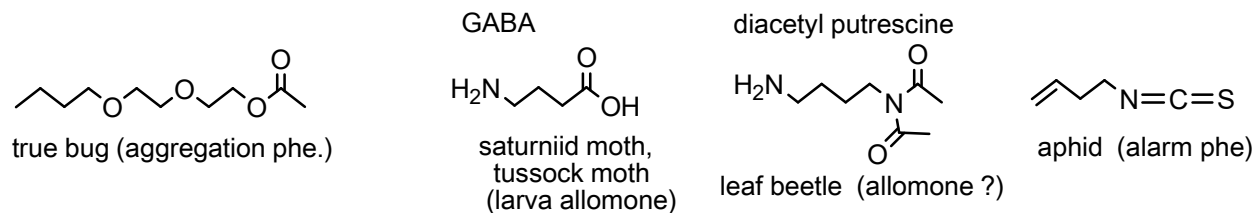
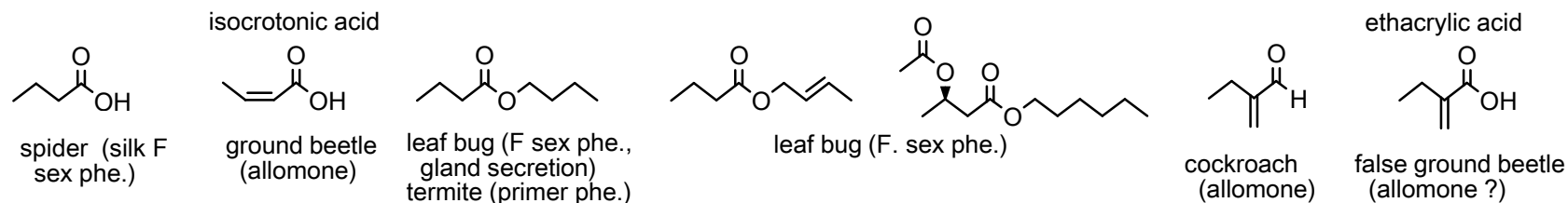
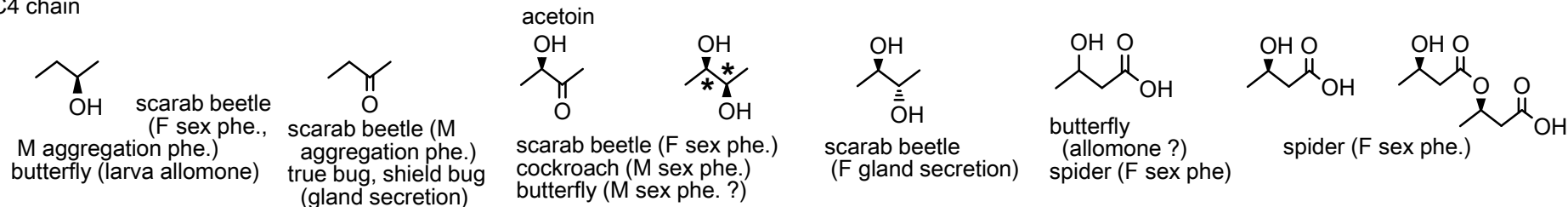


## C3 chain



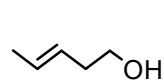
# [ C-1 ] Other: Acyclic comp. (ii)

C4 chain

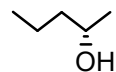


# [ C-1 ] Other: Acyclic comp. (iii)

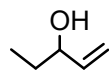
## C5 chain



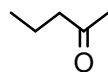
bark beetle  
(F aggregation  
phe. ?)



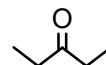
wasp  
(alarm phe.)  
assassin bug  
(sex phe. ?)



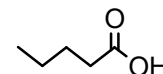
butterfly (larva  
allomone)



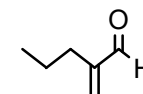
ground beetle,  
darkling beetle  
(allomone ?)



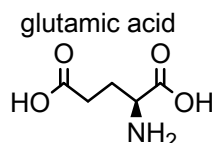
scarab beetle (M  
aggregation phe.)  
assassin bug (alarm phe.)  
butterfly (larva allomone)



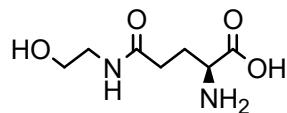
grasshopper  
(F. sex phe.)



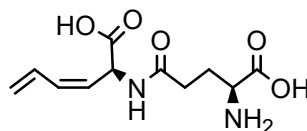
cockroach  
(allomone)



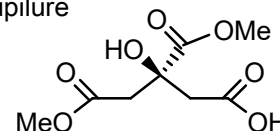
fruit fly (marking phe.)



leaf beetle (allomone)

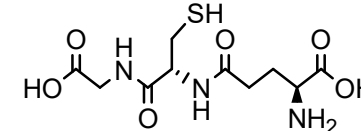


cupilure



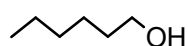
spider (F sex phe.)

glutathione

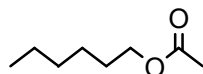


fruit fly (marking phe.)

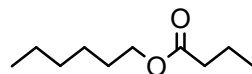
## C6 chain



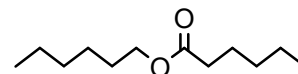
ambrosia beetle  
(aggregation phe.)



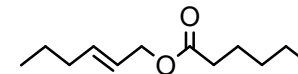
true bug (allomone ?,  
gland secretion)  
leaf bug (F sex phe.)



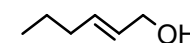
true bug (gland secretion)  
leaf bug (F sex phe.,  
M anti-sex phe., alarm  
phe., allomone)



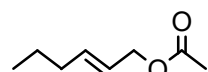
true bug (gland secretion)  
leaf bug (gland secretion,  
F sex phe.)



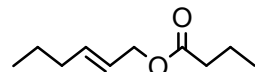
leaf bug (gland secretion,  
alarm phe., F sex phe.)



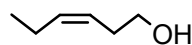
shield bug (allomone)  
leaf bug (F sex phe.)  
stink bug (M  
aggregation phe.)



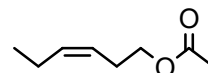
giant water bug, eed  
bug (gland secretion)  
stink bug, true bug  
(allomone)  
leaf bug (F sex phe.)



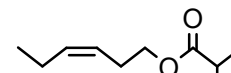
leaf bug (F sex phe.,  
M anti-sex phe.,  
alarm phe., allomone)



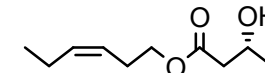
leaf beetle  
(gland secretion)



leaf bug  
(F sex phe.)



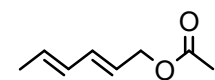
leaf beetle (allomone)  
butterfly (M sex phe. ?)



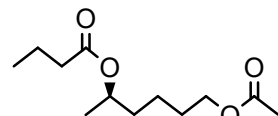
wasp  
(M marking phe.)

# [ C-1 ] Other: Acyclic comp. (iv)

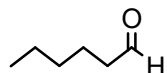
C6 chain



seed bug  
(aggregation phe.)

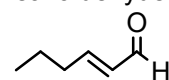


leaf bug (F sex phe.)

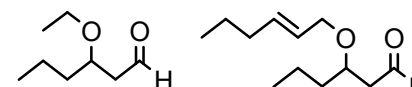


darkling beetle (gland secretion), true bug, shield bug (alarm phe. gland secretion) flesh fly (M sex phe.)

leaf aldehyde

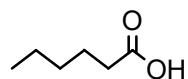


stink bug (alarm phe., aggregation phe., allomone) lace bug, ant (alarm phe.), true bug (aggregation phe. alarm phe.), giant shield bug, rove beetle (allomone)

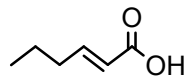


cockroach (allomone)

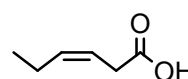
caproic acid



termite (trail phe., allomone), click beetle (F sex phe.) ant (trail phe.), wasp (sex phe.) assassin bug (aggregation phe.) spider (F silk sex phe.)

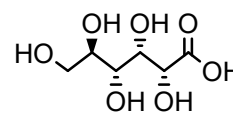


stink bug (gland secretion)

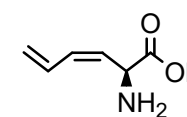


butterfly (M sex phe. ?)

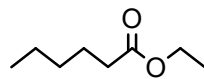
gluconic acid



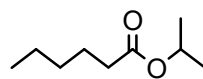
cockroach (allomone ?)



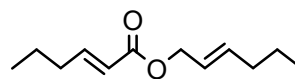
leaf beetle (allomone)



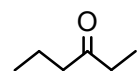
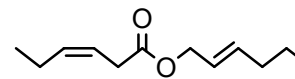
fruit fly (M sex phe.)



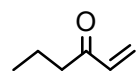
assassin bug (queen phe.)



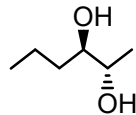
broad-headed bug (M aggregation phe.)



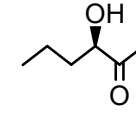
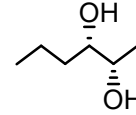
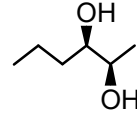
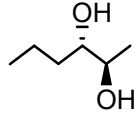
parasitoid wasp (aggregation phe.)



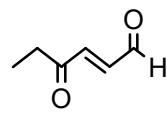
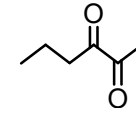
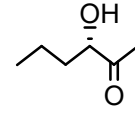
butterfly (gland secretion)



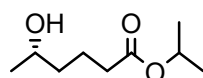
longhorn beetle (M sex or aggregation phe.)



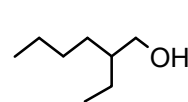
longhorn beetle (M sex or aggregation phe.)



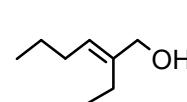
lace bug, stink bug (alarm phe.) leaf bug (F sex phe.) water boatman, giant shield bug, true bug, broad-headed bug, stink bug, rove beetle (allomone)



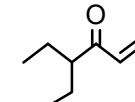
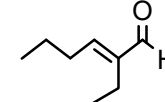
fruit fly (M sex phe.)



butterfly (M sex phe. ?)



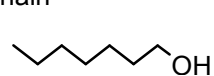
ant (gland secretion)



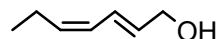
millipede (allomone)

# [ C-1 ] Other: Acyclic comp. (v)

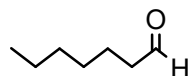
C7 chain



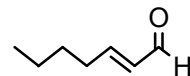
bark beetle (F  
aggregation phe.)  
fruit fly (M sex phe.)



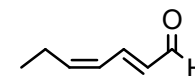
leaf beetle  
(aggregation phe.)



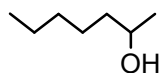
assassin bug  
(M sex phe.)



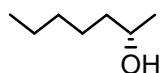
stink bug  
(gland secretion)



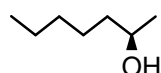
leaf beetle  
(aggregation phe.)



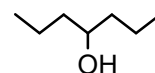
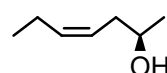
bee, wasp  
(alarm phe.)



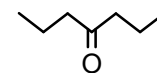
caddis fly  
(F sex phe.)



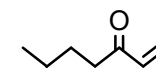
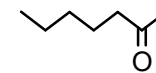
eriocraniid moth (F sex phe.)



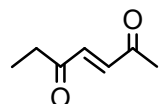
ant (gland secretion)



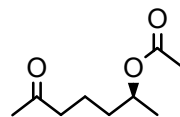
honey bee, ant, ground  
beetle, bumblebee  
(alarm phe.)  
caddis fly (F sex phe.)



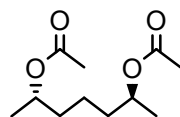
harvestman  
(allomone ?)



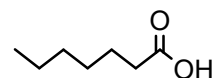
stingless bee  
(allomone)



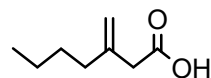
gall midge (F sex phe.)



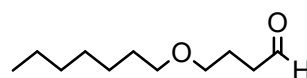
enanthic acid



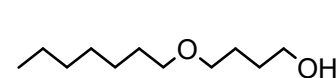
ant (trail phe. ?)



seed beetle  
(F sex phe.)

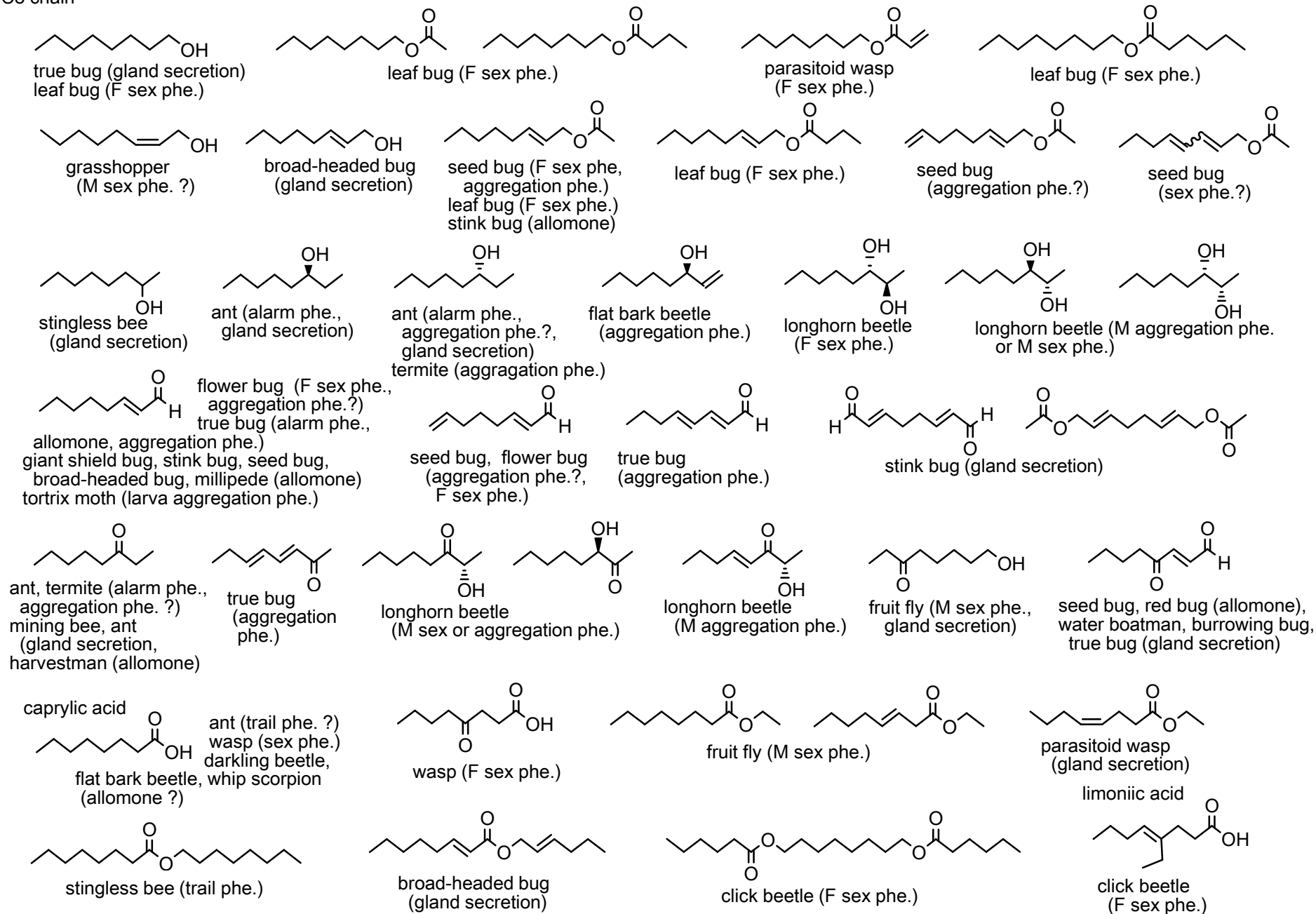


longhorn beetle (M aggregation phe.)



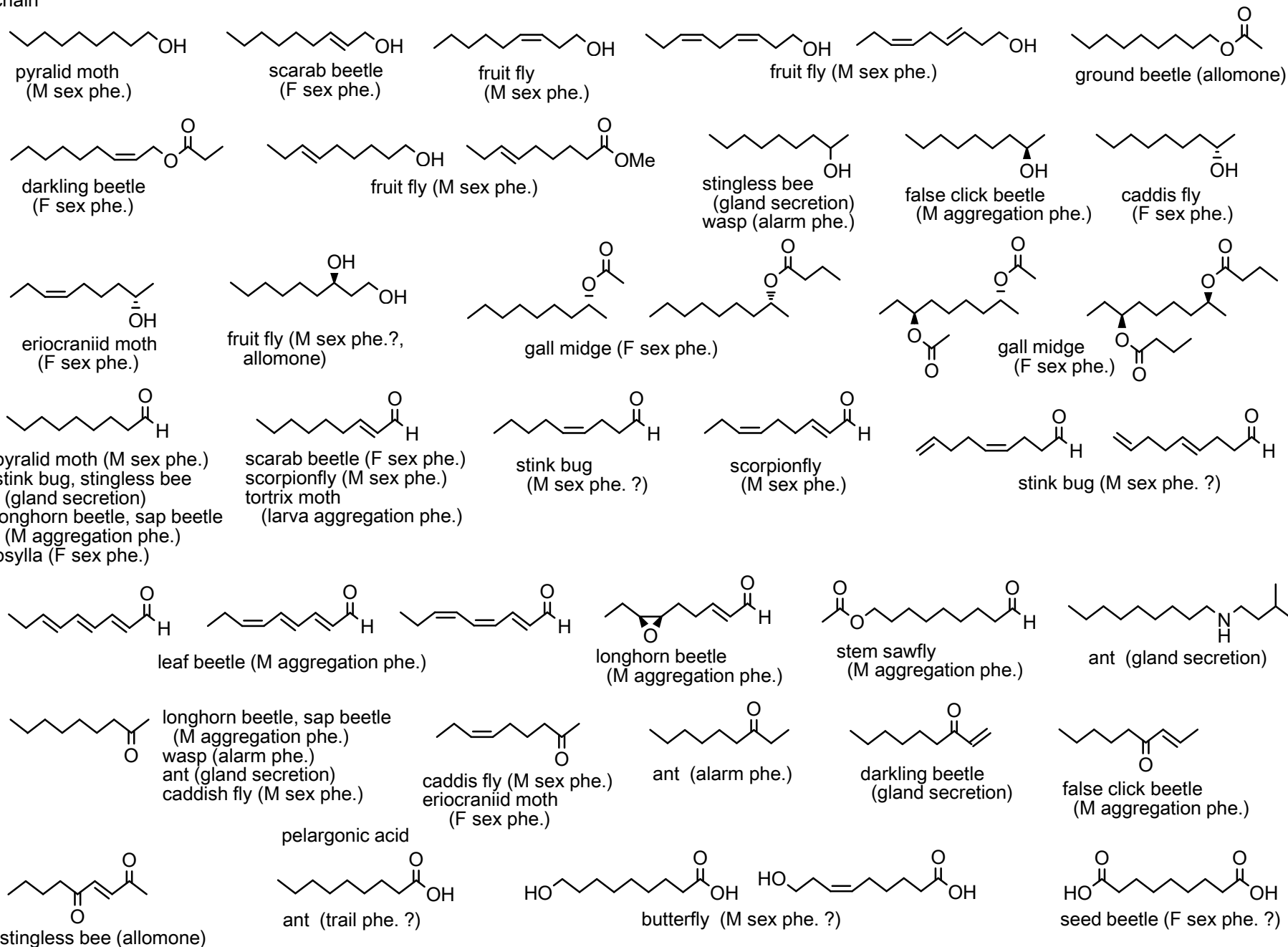
# [ C-1 ] Other: Acyclic comp. (vi)

C8 chain



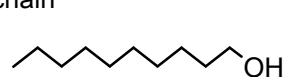
# [ C-1 ] Other: Acyclic comp. (vii)

C9 chain

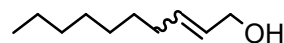


# [ C-1 ] Other: Acyclic comp. (viii)

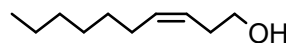
C10 chain



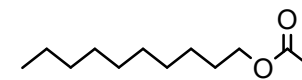
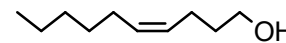
termite (trail phe.)



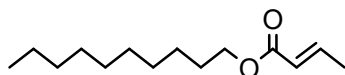
wasp (gland secretion)



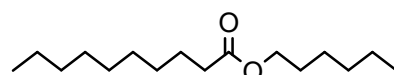
wood wasp (M aggregation phe.)



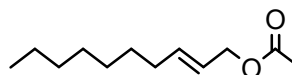
ant (alarm phe., allomone)  
thrips (larva alarm phe.)



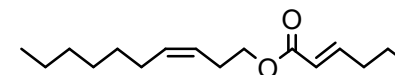
primitive weevil (F sex phe.)



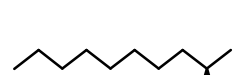
stingless bee (trail phe.)



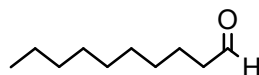
honey bee (alarm phe.)  
stink bug (allomone,  
gland secretion)



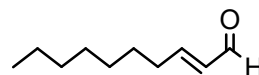
longhorn beetle  
(M aggregation phe.)



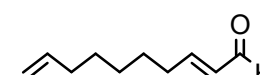
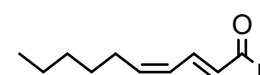
termite (allomone ?)  
assassin bug  
(alarm phe.)



pyralid moth (larva  
aggregation phe.)  
sap beetle (M  
aggregation phe.)

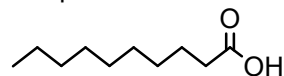


burrowing bug,  
true bug, jewel  
bug, red bug  
(allomone), stink bug (aggregation  
phe., allomone, alarm phe., )

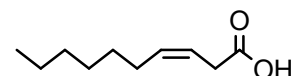


stink bug (sex phe.)

capric acid

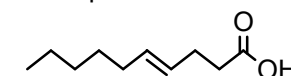


ant (trail phe. ?)

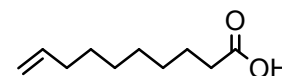


hide beetle (F sex phe.)  
carrion beetle, thrips  
(allomone)

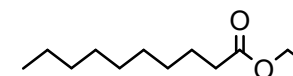
caproic acid



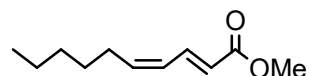
thrips (allomone?)



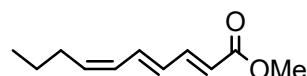
thrips (allomone ?)



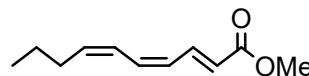
rove beetle  
(gland secretion)



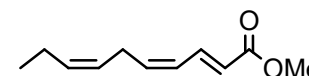
bark beetle, stink bug  
(aggregation phe.)  
seed beetle, stink bug  
(M sex phe.)



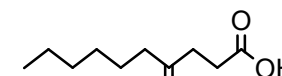
stink bug  
(aggregation phe.)



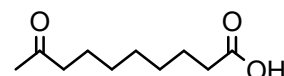
stink bug (M sex phe.)



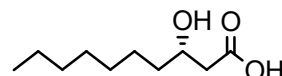
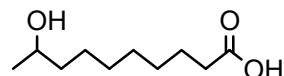
seed beetle (M sex phe.)



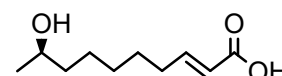
wasp (F sex phe.)



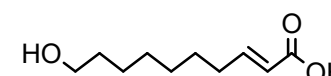
wasp (F sex phe.)



ant, water beetle  
(allomone ?)  
ant, bumblebee  
(gland secretion)



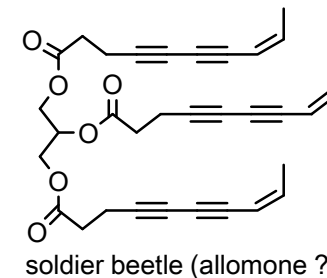
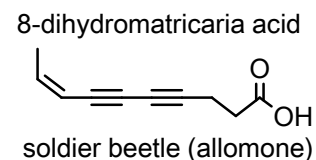
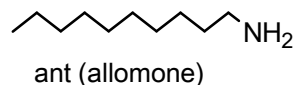
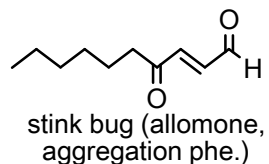
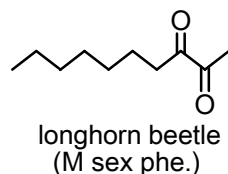
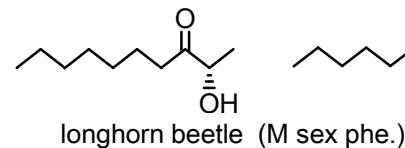
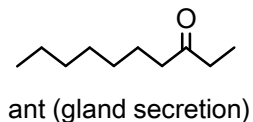
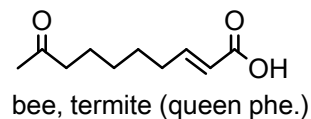
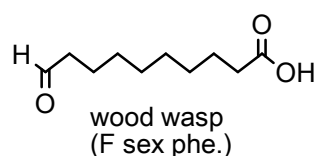
bee (queen phe.)



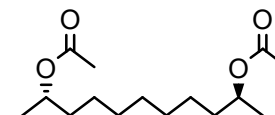
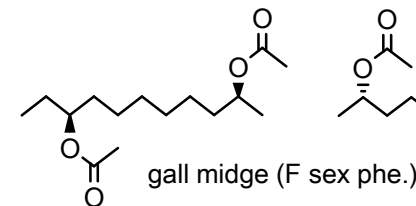
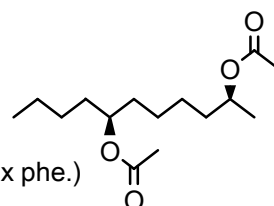
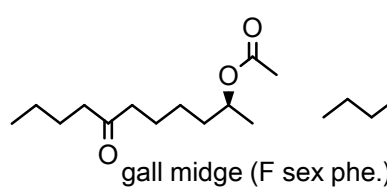
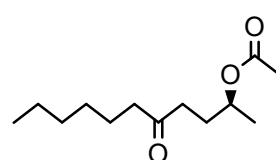
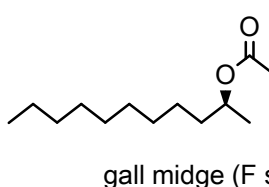
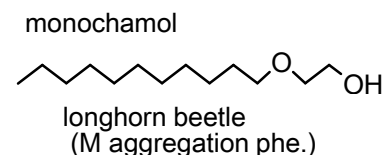
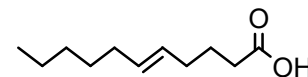
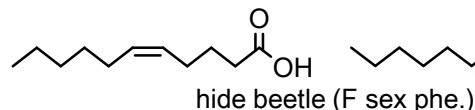
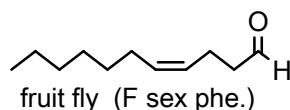
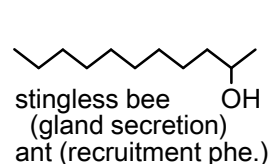
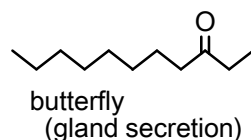
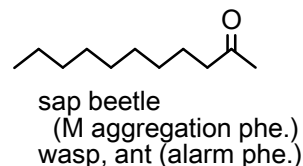
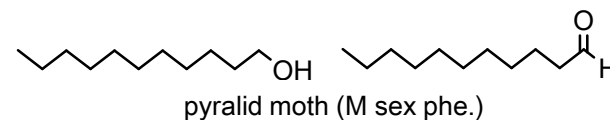
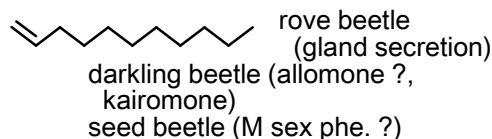
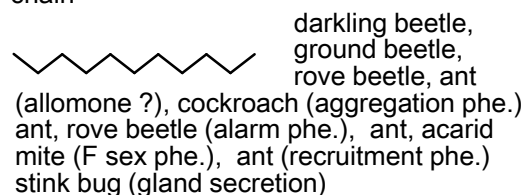
bee (gland secretion,  
queen phe.)

# [ C-1 ] Other: Acyclic comp. (ix)

## C10 chain

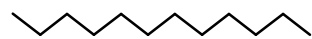


## C11 chain

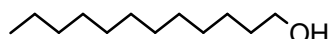


# [ C-1 ] Other: Acyclic comp. (x)

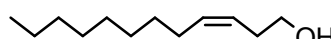
C12 chain



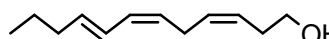
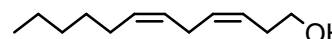
ant (gland secretion)



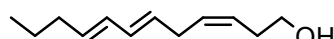
termite (trail phe.)



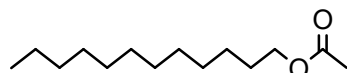
termite (trail phe.)



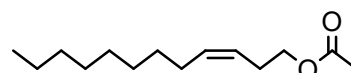
termite (trail phe., F sex phe.)



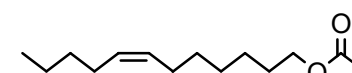
termite (trail phe.)



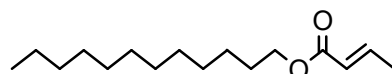
ant (secretion, alarm phe., allomone)  
click beetle (F sex phe.), thrips (larva  
alarm phe., larva aggregation phe.)



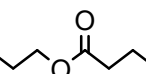
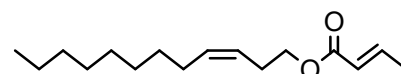
darkling beetle (M sex phe.)



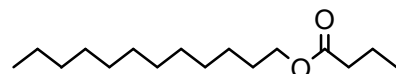
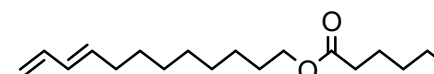
noctuid moth (M sex phe. ?)



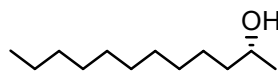
primitive weevil (F sex phe.)



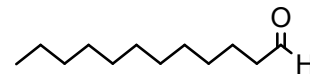
click beetle (F sex phe.)



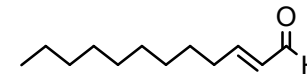
longhorned bee  
(M gland secretion)



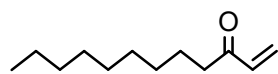
ant (trail phe.)



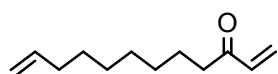
rove beetle (aphrodisiac phe..  
allomone), parasitoid wasp  
(M aggregation phe.)



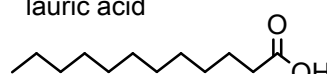
millipede (allomone ?)



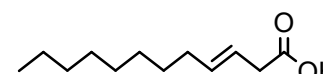
sweat bee (gland secretion)



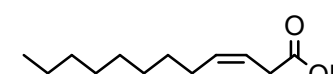
lauric acid



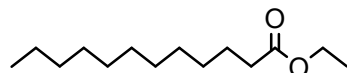
ant (trail phe. ?)  
sand fly (oviposition phe.)



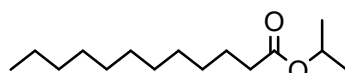
thrips (gland secretion)



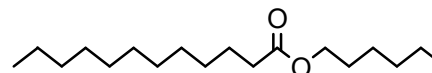
ant (gland secretion)



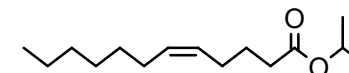
cuckoo bee (allomone ?)  
fruit fly (M sex phe.)  
bark beetle (aggregation phe.)



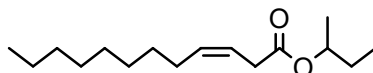
rove beetle (gland secretion)  
hide beetle (M aggregation phe. ?)



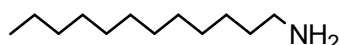
millipede (allomone ?)



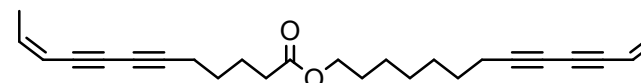
hide beetle (M gland secretion)



rove beetle (gland secretion)



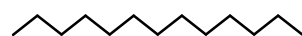
ant (allomone)



soldier beetle (allomone ?)

# [ C-1 ] Other: Acyclic comp. (xi)

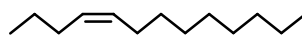
## C13 chain



ant (gland secretion,  
F sex phe., alarm phe.  
allomone)  
burrowing bug, jewel bug,  
stink bug (gland secretion)  
darkling beetle, rove beetle,  
true bug, red bug (allomone)



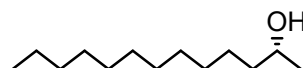
green lacewing, stink bug  
(allomone ?)  
darkling beetle (M sex phe.)



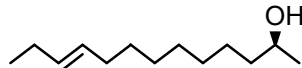
ant (F sex phe.,  
gland secretion)  
green lacewing (allomone, alarm phe., gland secretion)  
rove beetle (allomone, aphrodisiac phe.)  
stink bug (allomone ?)



green lacewing  
(gland secretion)



ant (trail phe.)



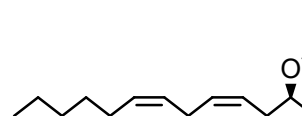
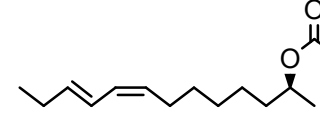
gall midge (F sex phe.)



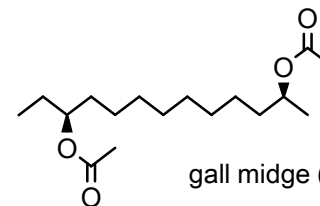
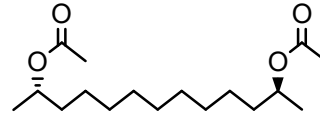
gall midge (F sex phe.)  
fruit fly (M aggregation phe.)



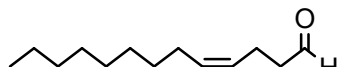
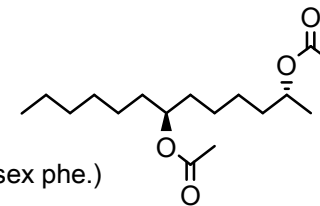
gall midge (F sex phe.)



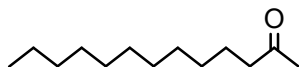
gall midge (F sex phe.)



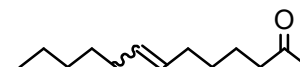
gall midge (F sex phe.)



parasitoid wasp (F sex phe.)



wasp (marking phe. ?)  
caddis fly (F sex phe. ?)  
termite, ant, harvestman (allomone ?)  
fruit fly (M aggregation phe.), ant (secretion)

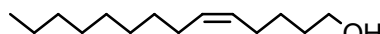


harvestman (allomone ?)

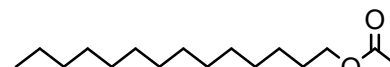
## C14 chain



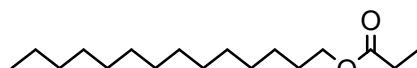
cockroach (aggregation phe.)



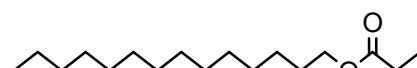
sawfly (F sex phe.)



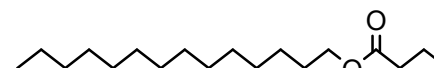
ant (alarm phe.)  
ground beetle, bee (allomone)  
parasitoid wasp (F sex phe.)  
bumblebee (gland secretion)  
thrips (larva aggregation phe.)



termite (F sex phe.)



broad-headed bug  
(M aggregation phe.)

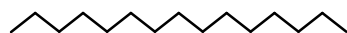


longhorned bee (M gland secretion)

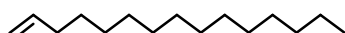


# [ C-1 ] Other: Acyclic comp. (xiii)

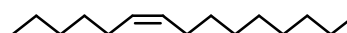
C15 chain



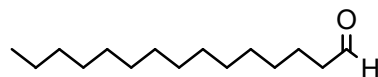
true bug, small carpenter bee  
(allomone ?), wasp (F sex phe.)  
ant (gland secretion)



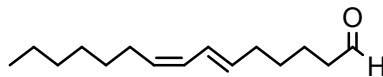
darkling beetle (allomone)



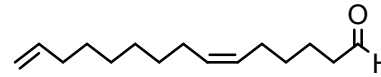
acarid mite (alarm phe.)



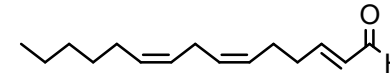
mantid (F sex phe.)



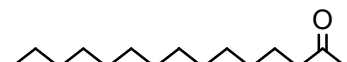
longhorn beetle (M aggregation phe.)



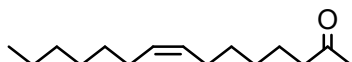
webspinning sawfly (F sex phe.)



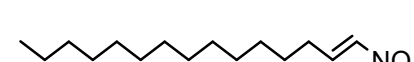
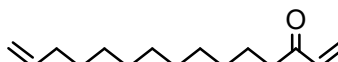
longhorn beetle (aggregation phe.)



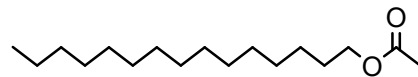
wasp (marking phe.?, trail phe.?)  
fruit fly (M aggregation phe.)  
darkling beetle (allomone ?)  
ant, cuckoo bee (gland secretion)



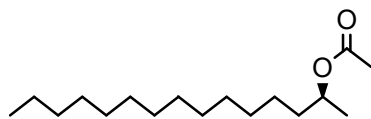
termite (allomone)



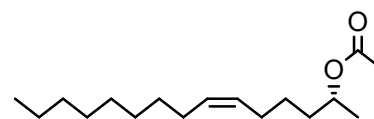
termite (allomone)



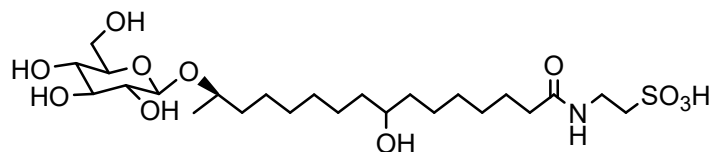
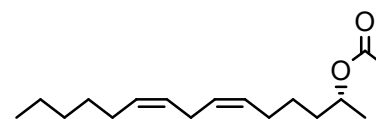
scarab beetle (aggregation phe.)



fruit fly (M aggregation phe.)



gall midge (F sex phe.)



fruit fly (marking phe.)

# [ C-1 ] Other: Acyclic comp. (xiv)

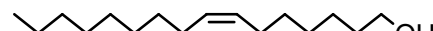
C16 chain



acrolepiid moth (M sex phe.)



bumblebee (M marking phe. ?)  
noctuid moth (M gland secretion)

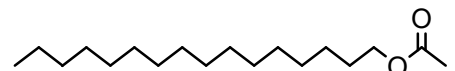


scarab beetle (F sex phe.)

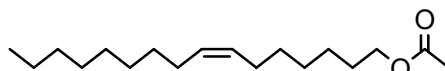
palmitoleyl alcohol



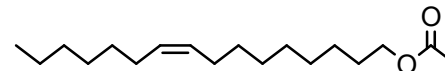
bumblebee (M marking phe. ?)  
seed beetle, bark beetle, darkling  
beetles (gland secretion)



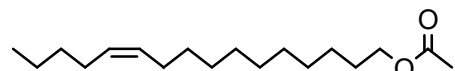
ground beetle, millipede (allomone)  
cuckoo bee (marking phe. ?)  
noctuid moth, bumblebee (gland  
secretion), spider (F sex phe.)



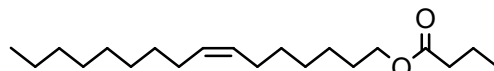
bumblebee (M marking phe. ?)



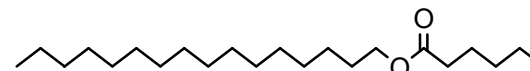
millipede (allomone ?)  
thrips (gland secretion)



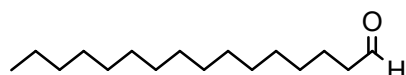
parasitoid wasp (F sex phe.)



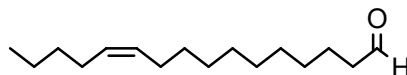
stingless bee (secretion)



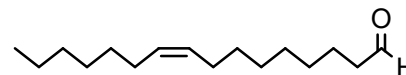
sweat bee (gland secretion)



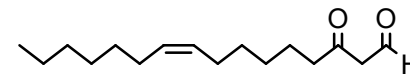
wasp (M marking phe. ?)



bolas spider  
(allomone: prey attractant)

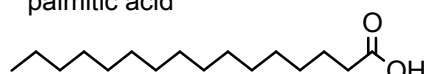


ant (trail phe., aggregation phe.)  
parasitoid wasp (F sex phe.)



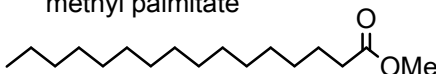
termite (allomone)

palmitic acid

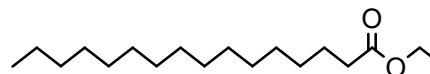


leafroller moth (M-to-M inhibitory phe.)  
longhorned bee (F gland secretion)  
termite (aggregation phe.)

methyl palmitate

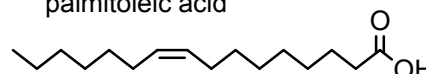


cuckoo bee (F marking phe.)  
wasp (F allomone)  
tineid moth (M aggregation phe.)  
fruit fly (marking phe. ?)



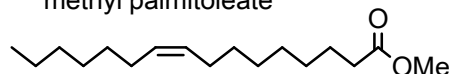
hide beetle (aggregation phe.)  
bark beetle, plasterer bee  
(gland secretion)  
cuckoo bee (allomone ?)

palmitoleic acid

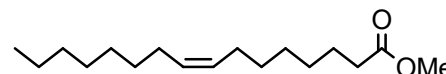


wasp (marking phe. ?)  
termite (aggregation phe.)

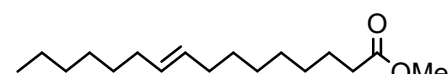
methyl palmitoleate



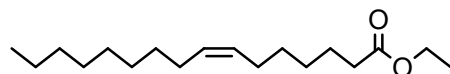
tineid moth (M aggregation phe.)  
tsetse fly (F sex phe.)



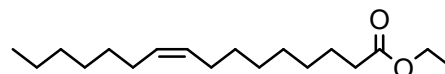
stink bug (M sex phe.)



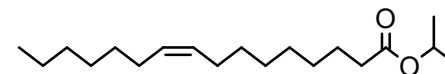
fruit fly (marking phe. ?)



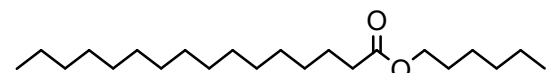
wasp (M marking phe. ?)



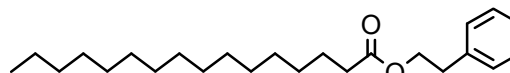
parasitoid wasp (F sex phe.)



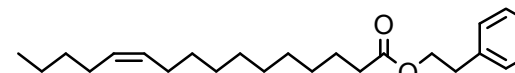
rove beetle (M aggregation phe.)



butterfly (M aphrodisiac phe.)

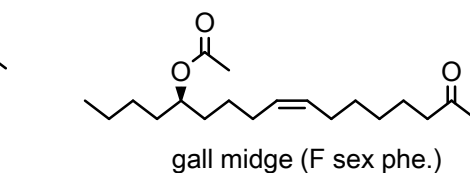
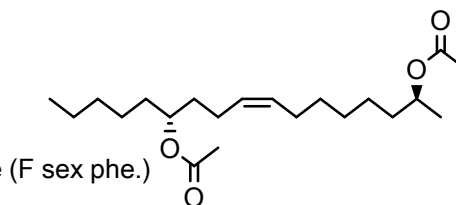
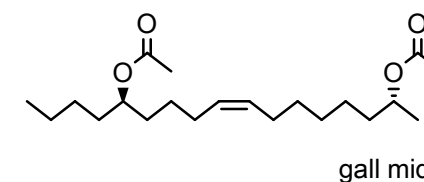
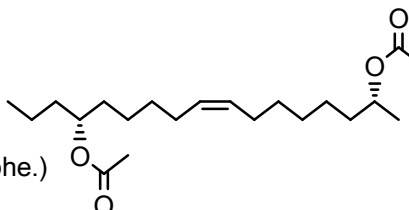
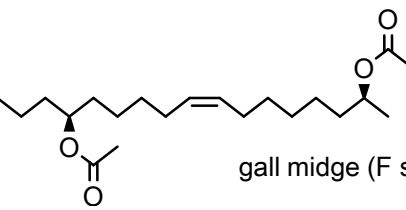
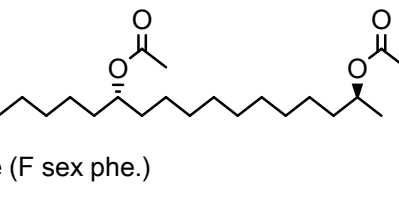
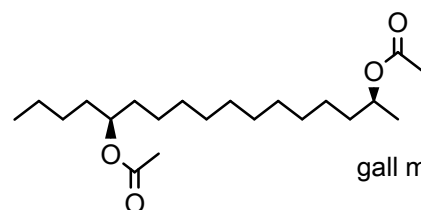
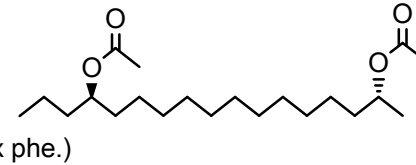
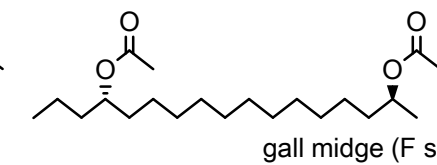
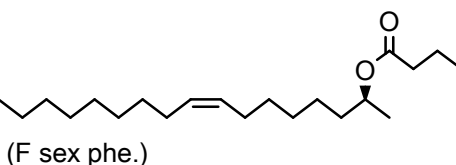
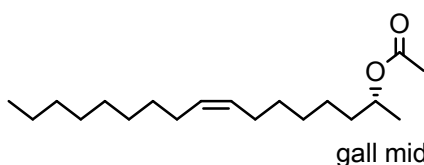
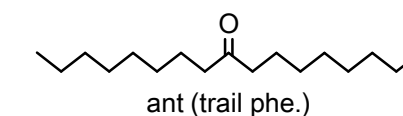
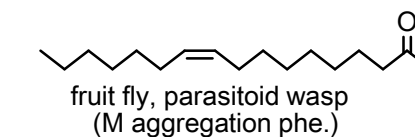
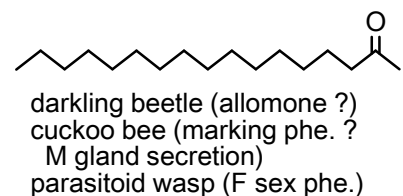
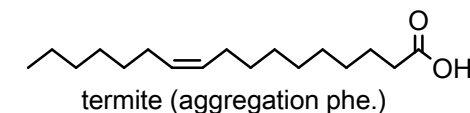
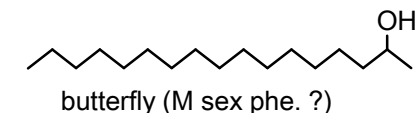
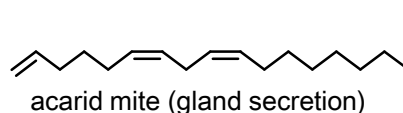
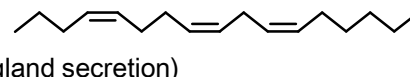
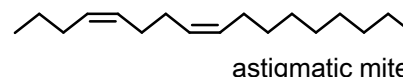
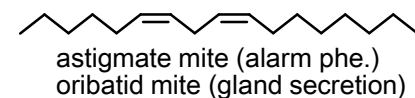
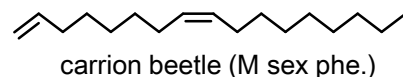
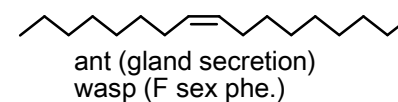
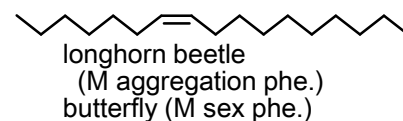
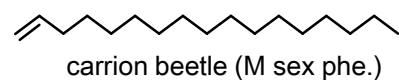
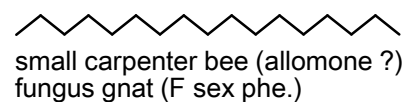


butterfly (M sex phe. ?)



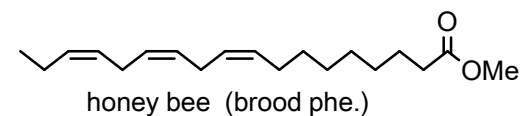
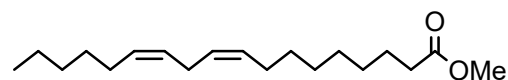
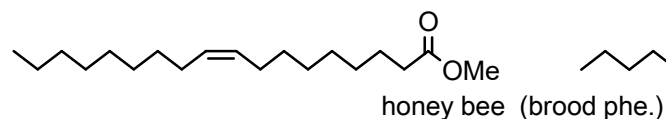
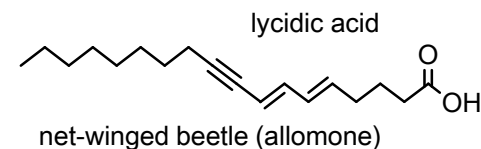
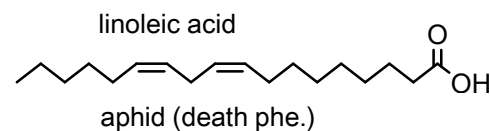
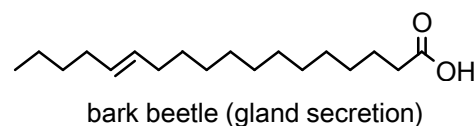
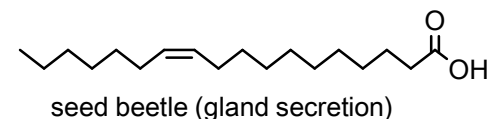
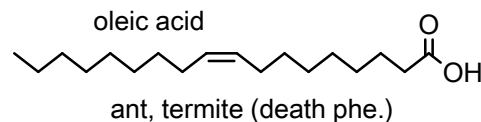
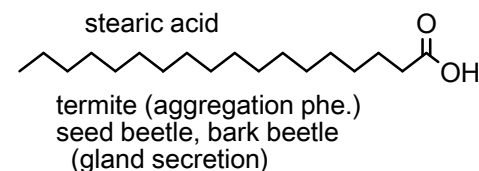
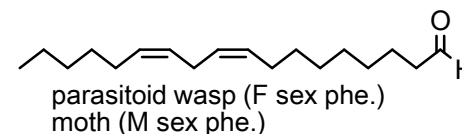
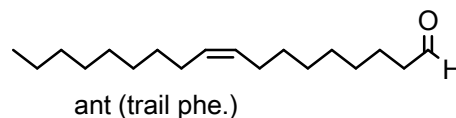
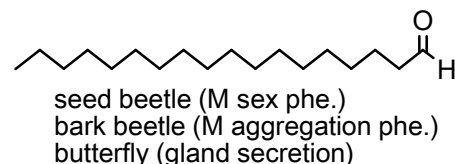
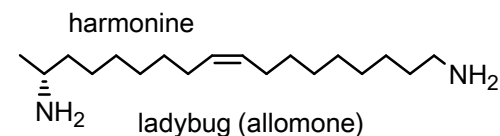
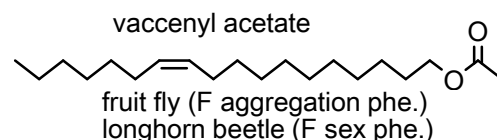
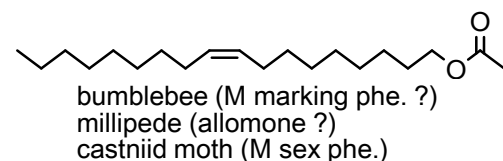
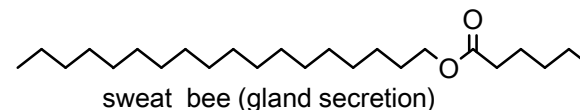
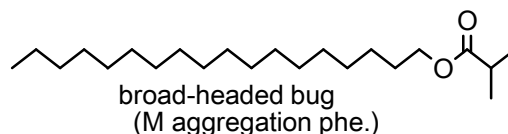
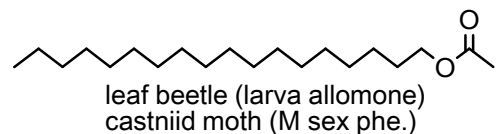
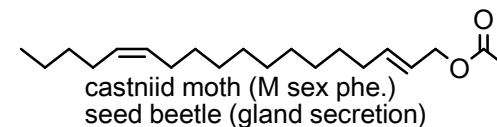
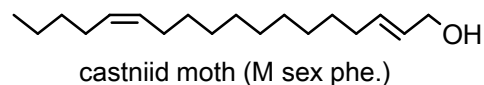
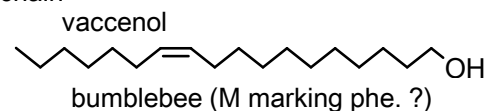
# [ C-1 ] Other: Acyclic comp. (xv)

C17 chain



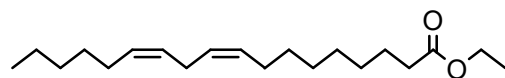
# [ C-1 ] Other: Acyclic comp. (xvi)

C18 chain

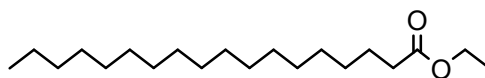


# [ C-1 ] Other: Acyclic comp. (xvii)

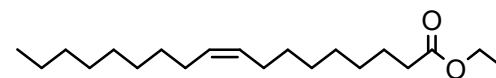
C18 chain



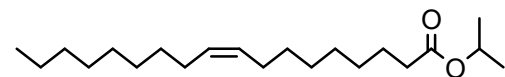
hide beetle (aggregation phe.)



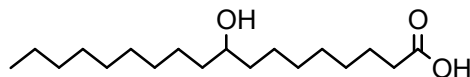
plasterer bee (gland secretion)



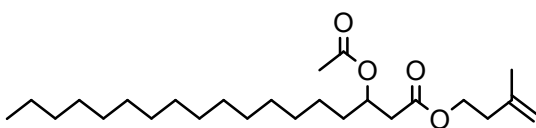
hide beetle (aggregation phe.)  
cuckoo bee (M sex phe. ?)



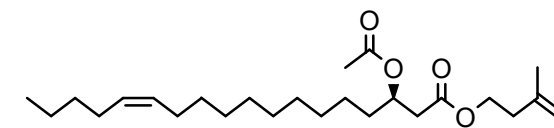
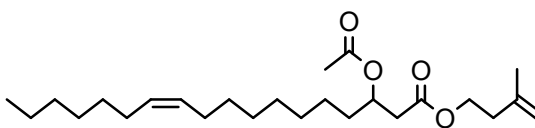
carpenter bee (M gland secretion)



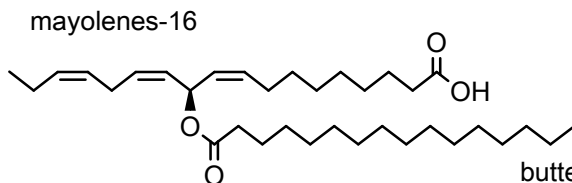
butterfly (M sex phe. ?)



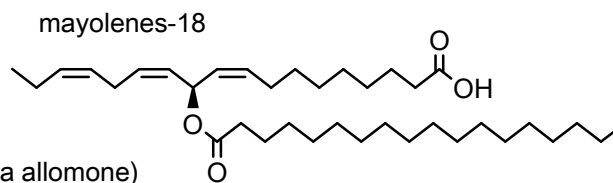
butterfly (M gland secretion)



butterfly (M gland secretion)

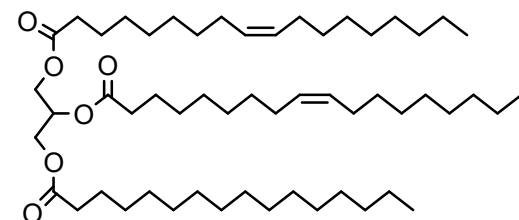


mayolene-16

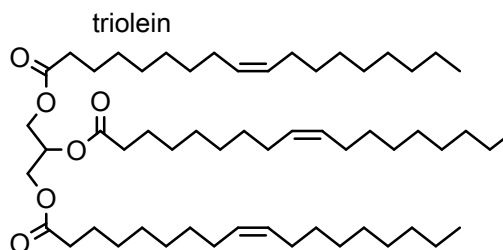


mayolene-18

butterfly (larva allomone)

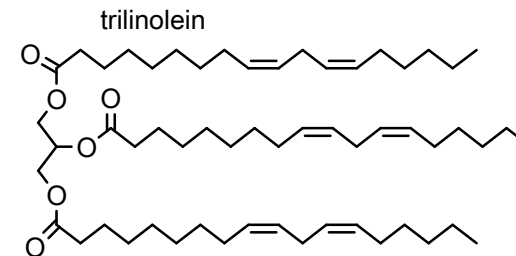


honey bee (brood phe.)



triolein

ant (brood phe.)

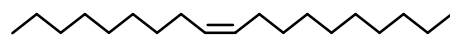


trilinolein

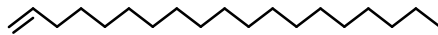
termite (F sex phe. ?)

# [ C-1 ] Other: Acyclic comp. (xviii)

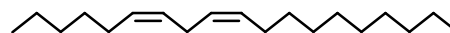
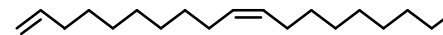
## C19 chain



ant (marking phe.)  
thrips (gland secretion)



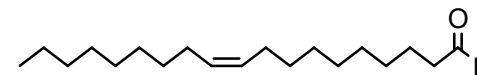
carrion beetle (M sex phe. ?)



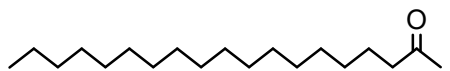
mite (alarm phe.?)



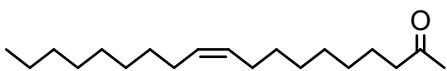
ant (gland secretion)



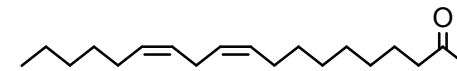
sawfly (F sex phe.)



seed beetle (F sex phe.)



darkling beetle (allomone ?)  
wasp (M marking phe.)



termite (trail phe.)

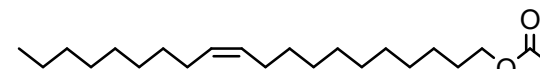
## C20 chain



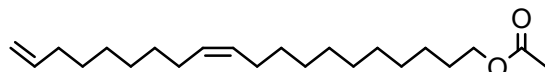
longhorned bee  
(F gland secretion)



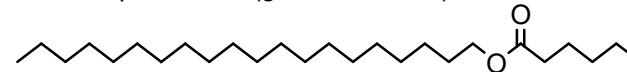
honey bee (worker alarm phe.)  
wasp (M marking phe.)  
carpenter bee (gland secretion)



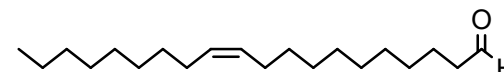
leaf beetle (larva allomone)  
fruit fly (M aggregation phe.)



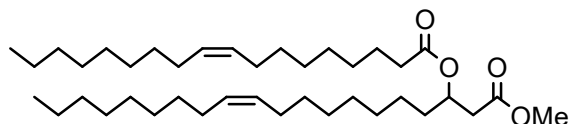
thrips (allomone)



sweat bee (gland secretion)

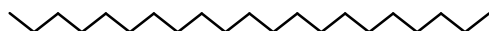


ant (trail phe.)

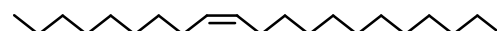


pyralid moth (larva trail phe.)

## C21 chain



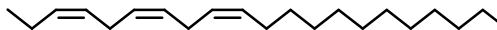
termite (primer phe.)



fruit fly (M aggregation phe.)



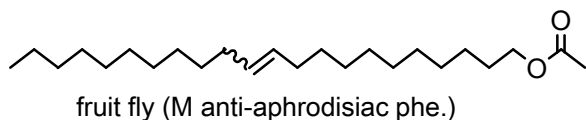
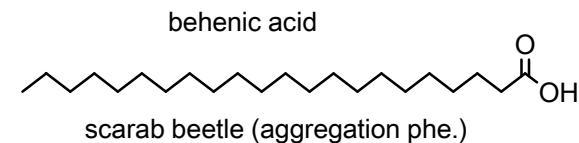
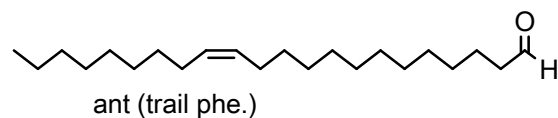
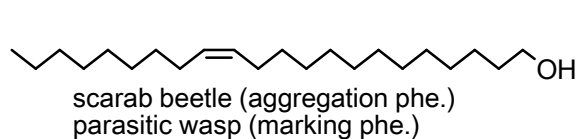
rove beetle, plasterer bee (F sex phe.)



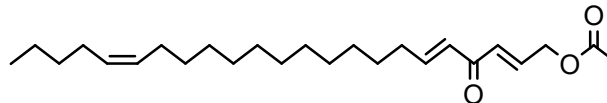
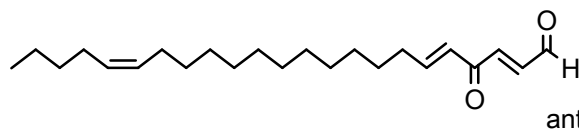
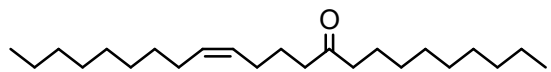
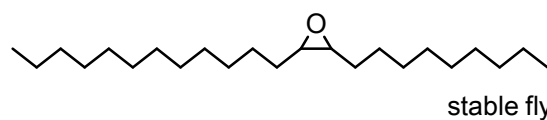
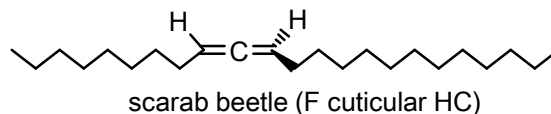
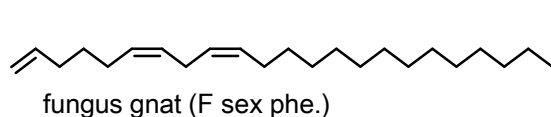
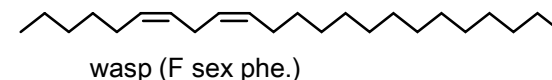
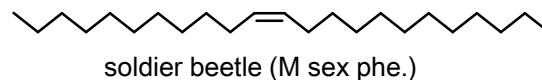
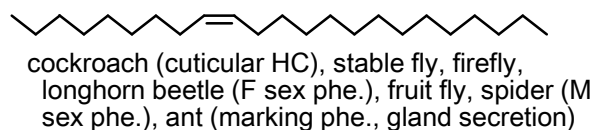
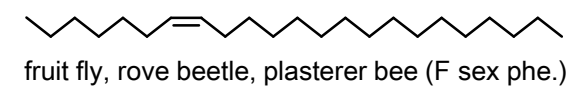
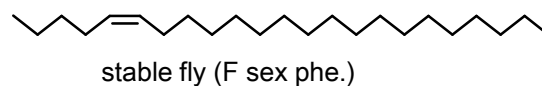
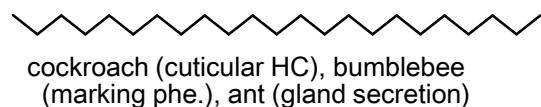
erebid moth (M sex phe.)

# [ C-1 ] Other: Acyclic comp. (xix)

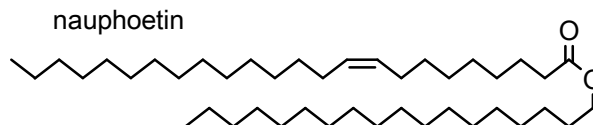
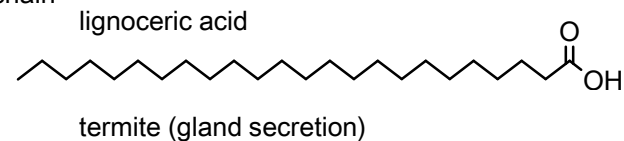
## C22 chain



## C23 chain



## C24 chain

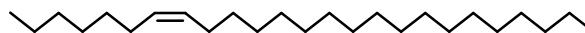


# [ C-1 ] Other: Acyclic comp. (xx)

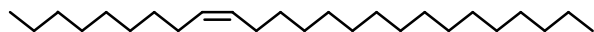
C25 chain



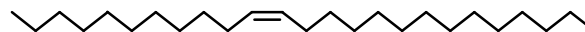
cuckoo bee (gland secretion)



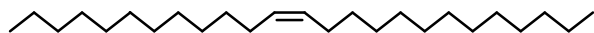
longhorn beetle, plasterer bee (F sex phe.)



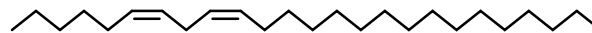
fly, longhorn beetle, mining bee, leaf bug  
(F sex phe.), wasp (brood phe.)



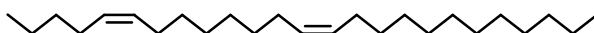
fruit fly (F sex phe.)



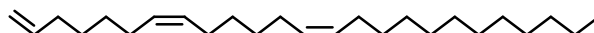
ladybug (oviposition-deterring phe.)



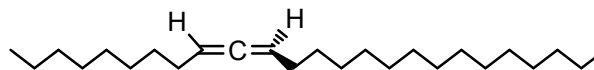
wasp (F sex phe.)



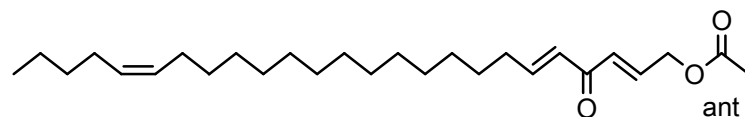
fruit fly (F sex phe.)



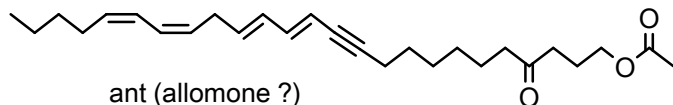
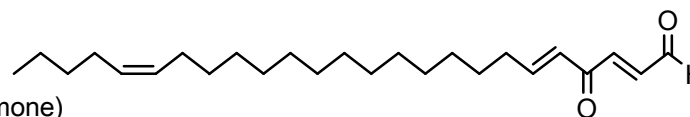
stable fly (M sex phe. ?)



scarab beetle (F cuticular HC)



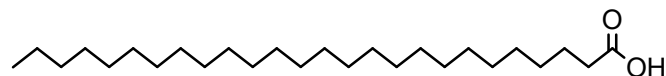
ant (allomone)



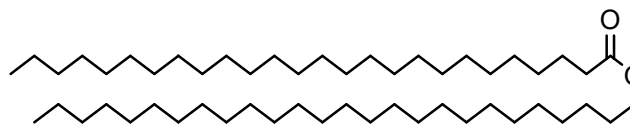
ant (allomone ?)

# [ C-1 ] Other: Acyclic comp. (xxi)

C26 chain

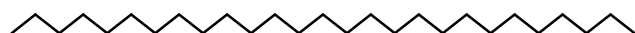


termite (gland secretion)

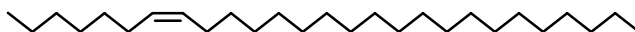


scale (wax)

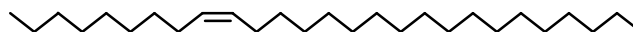
C27 chain



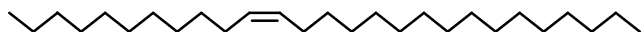
longhorn beetle (F sex phe.)



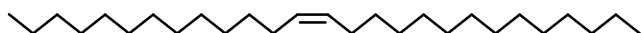
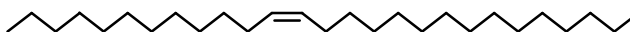
longhorn beetle, wood wasp (F sex phe.)



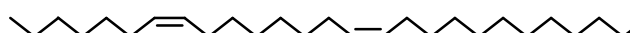
termite (allomone ?), stable fly (M sex phe. ?)  
stable fly, longhorn beetle, mining bee (F sex phe.)



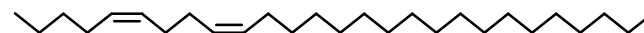
mining bee (F sex phe.)



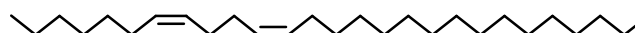
stable fly (M sex phe.)



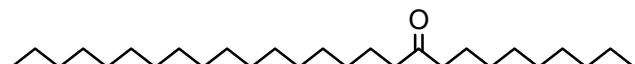
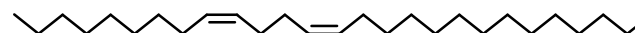
fruit fly (F sex phe.)



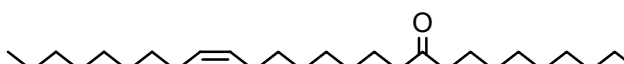
fruit fly (F sex phe.)



parasitoid wasp (F sex phe.)



longhorn beetle (F sex phe.)

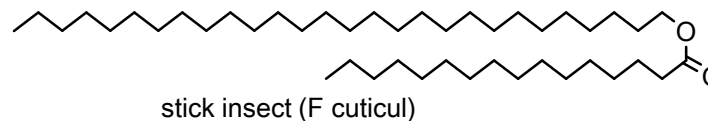
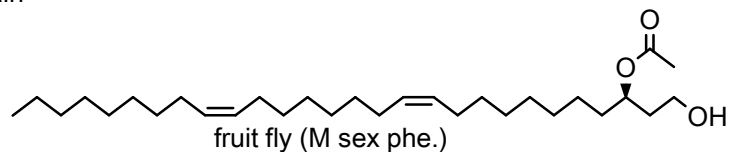


longhorn beetle (F sex phe.)

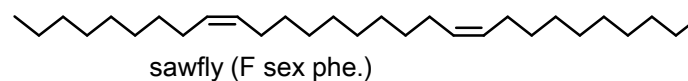
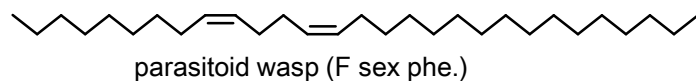
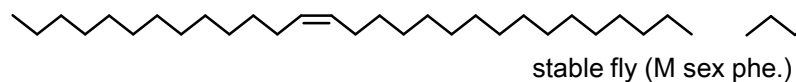
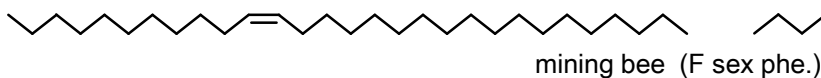
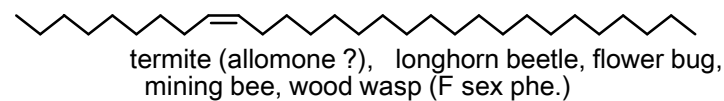
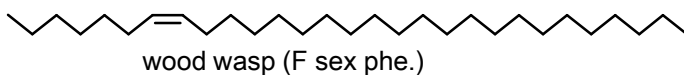
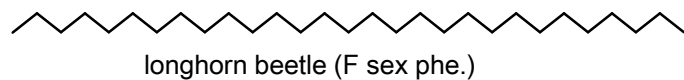


# [ C-1 ] Other: Acyclic comp. (xxii)

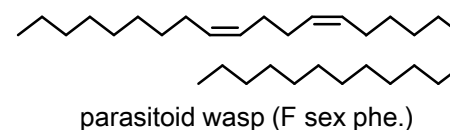
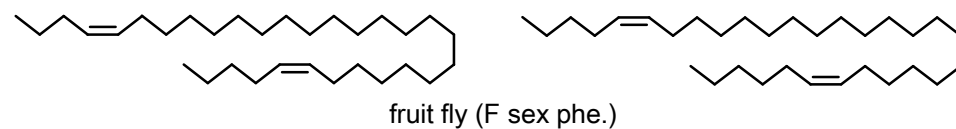
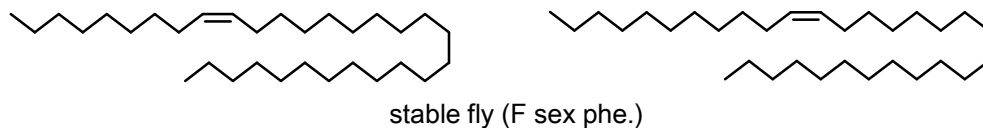
C28 chain



C29 chain

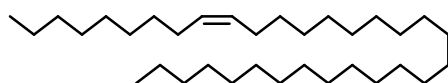


C31 chain

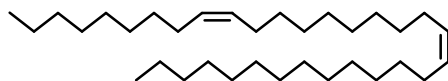


## [ C-1 ] Other: Acyclic comp. (xxiii)

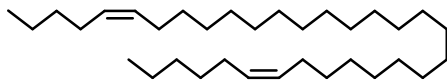
C33 chain



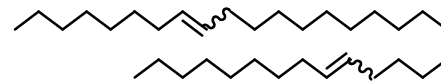
stable fly (F sex phe.)



sawfly (F sex phe.)



fruit fly (F sex phe.)

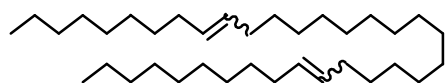


C34 chain

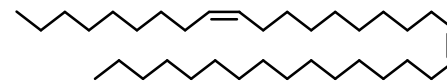


leaf beetle (sex phe. ?)

C35 chain

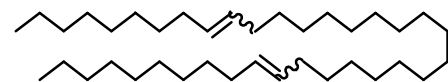


fruit fly (F sex phe.)



sawfly (F sex phe.)

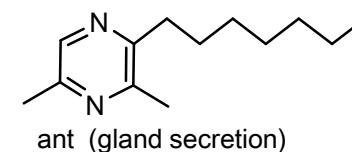
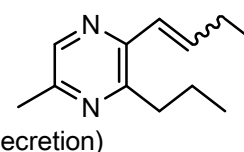
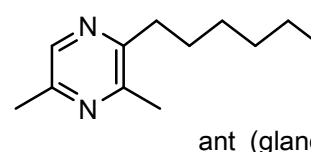
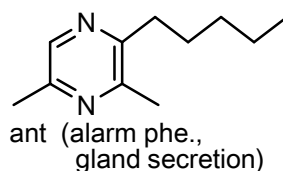
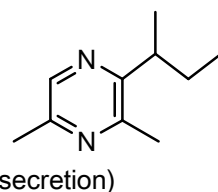
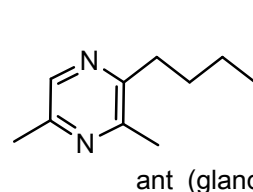
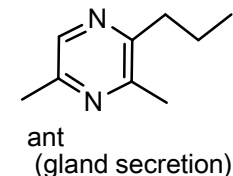
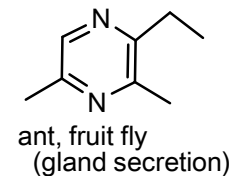
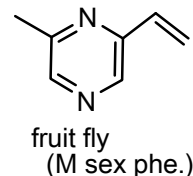
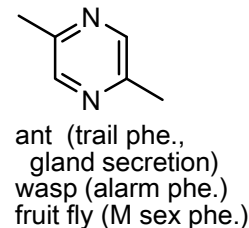
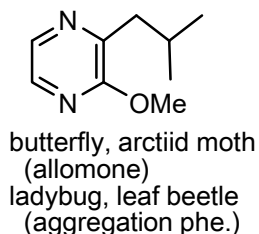
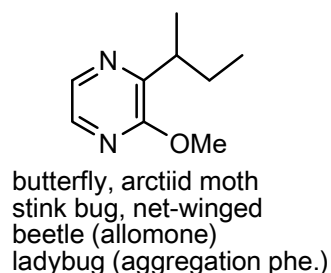
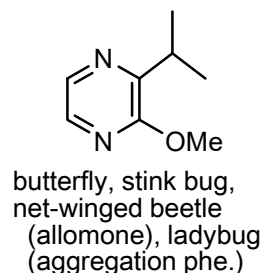
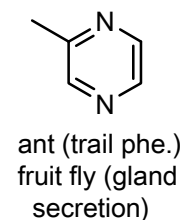
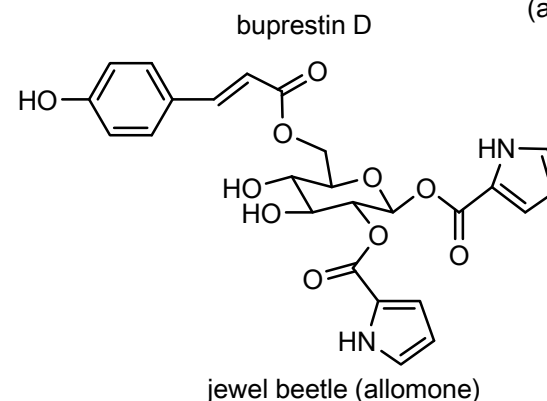
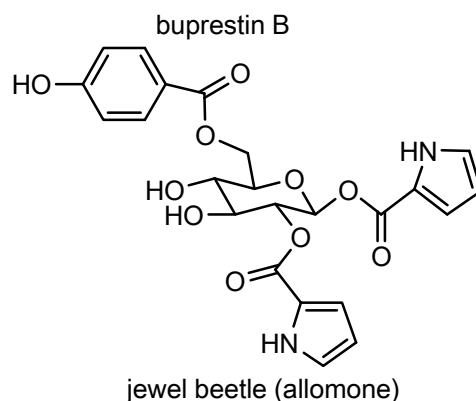
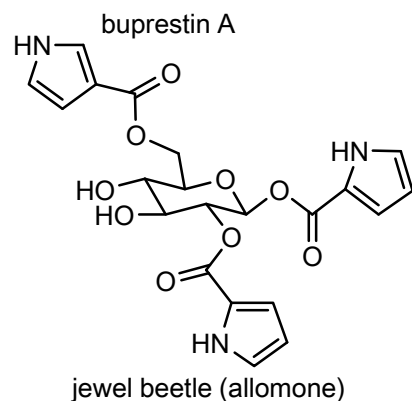
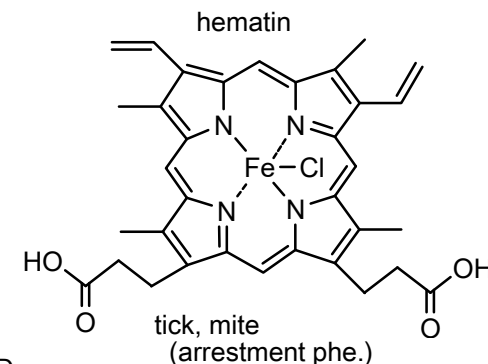
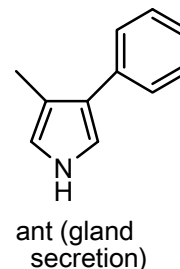
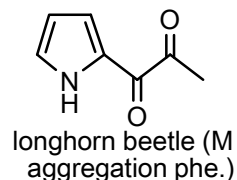
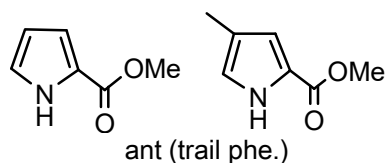
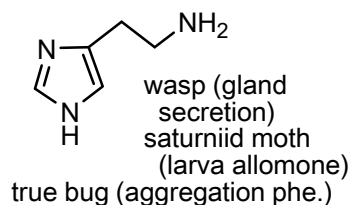
C37 chain



fruit fly (F sex phe.)

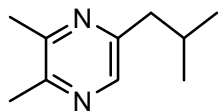
## [ C-2 ] Other: True alkaloids (i)

Aromatic comp.  
histamine

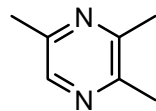


## [ C-2 ] Other: True alkaloids (ii)

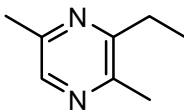
Aromatic comp.



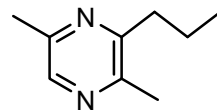
ant (trail phe.)



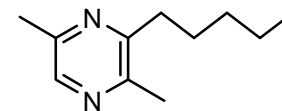
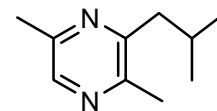
ant (trail phe.,  
gland secretion)  
fruit fly (M sex phe.,  
gland secretion)



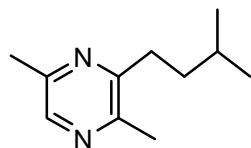
ant (trail phe.,  
alarm phe.)



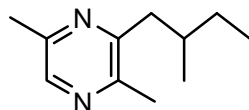
ant (gland secretion)



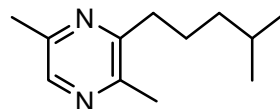
ant (gland secretion)



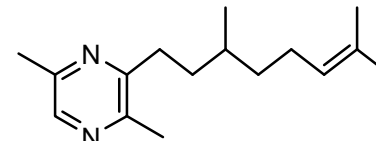
ant (alarm phe., gland  
secretion, allomone)  
flower wasp (F sex phe.)  
wasp (marking phe.)  
leaf insect (allomone)



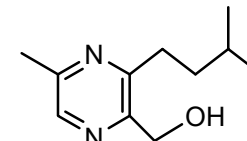
ant (alarm phe.,  
gland secretion)  
leaf insect (allomone)



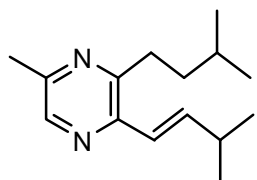
ant (gland secretion)



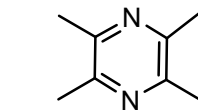
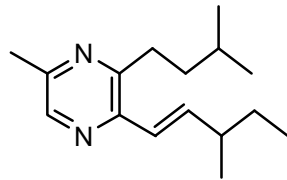
ant (alarm phe.)



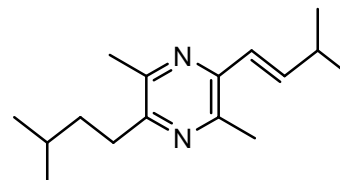
flower wasp  
(F sex phe.)



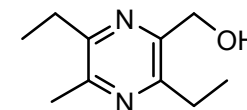
ant (gland secretion)



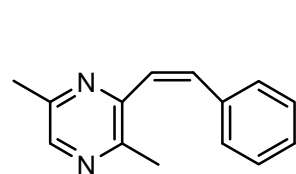
fruit fly (M sex phe.,  
gland secretion)



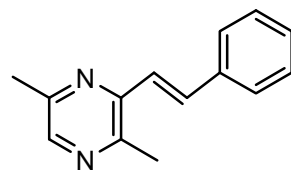
ant (gland secretion)



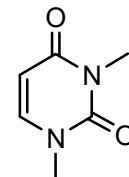
flower wasp  
(F sex phe.)



ant (gland secretion)

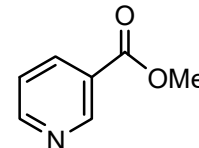


*N,N*-dimethyluracil

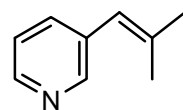


ant (trail phe.)

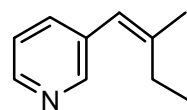
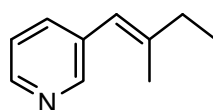
methyl nicotinate



ladybug, tsetse fly  
(aggregation phe.)

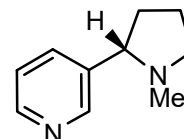


rove beetle (allomone)



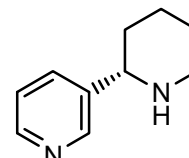
rove beetle  
(allomone)

nicotine



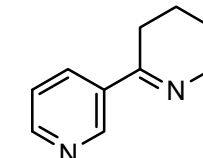
harvestman  
(allomone ?)

anabasine

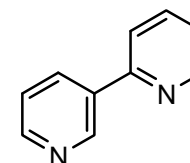


ant (gland secretion, allomone, trail phe.)

anabaseine



harvestman (allomone ?)

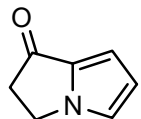


ant (gland secretion)

## [ C-2 ] Other: True alkaloids (iii)

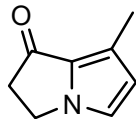
Aromatic comp.

nordanaidone

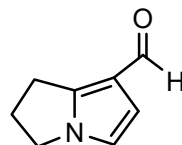


butterfly (M sex phe.)

danaidone

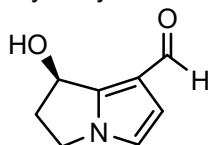


danaidal

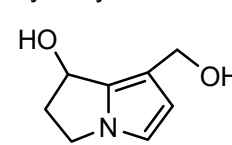


butterfly, arctiid moth (M sex phe.?)

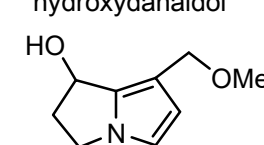
hydroxydanaidal



hydroxydanaidol

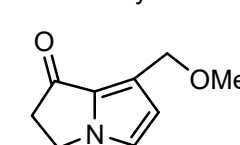


9-O-methyl-  
hydroxydanaidol

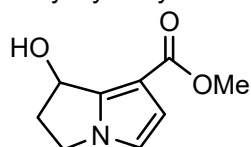


butterfly (M sex phe.?)

9-methoxydanaidol

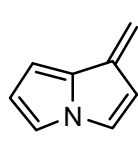


methyl hydroxydanaidoate



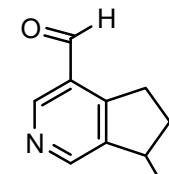
butterfly (M sex phe.?)

actinidine



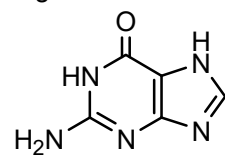
ant (alarm phe.)  
parasitoid wasp,  
rove beetle, tick insect  
(allomone)

boschniakine

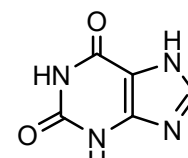


stick insect  
(allomone ?)

guanine

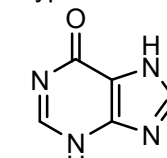


xanthine

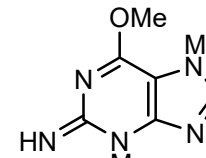


tick (arrestment phe.)

hypoxanthine

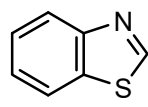


himantarine



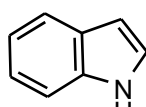
centipede  
(galand secretion)

benzothiazole



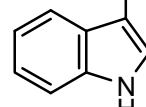
pleasing fungus  
beetle (allomone)  
butterfly (gland  
secretion)

indol



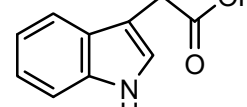
butterfly  
(M sex phe. ?)  
ant (trail phe.)  
pleasing fungus beetle,  
caddis fly (allomone)

skatole



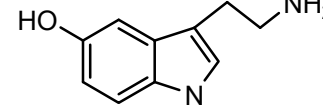
green lacewing,  
stingless bee,  
wasp, caddis fly,  
pleasing fungus  
beetle (allomone)  
ant, wasp (alarm phe.)  
green lacewing (gland secretion)

IAA



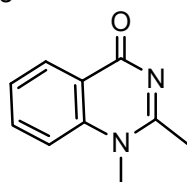
water beetle  
(allomone ?)

serotonin



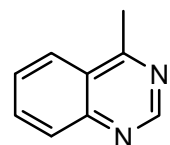
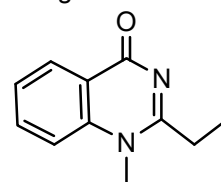
wasp, scorpion, spider  
(venom secretion)

glomerin

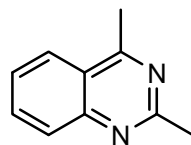


millipede (allomone)

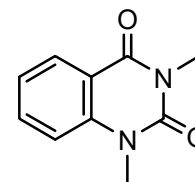
homoglomerin



assassin bug  
(aggregation phe.)  
parasitoid wasp  
(M sex phe.)



assassin bug  
(aggregation phe.)

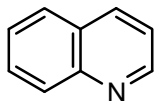


scarab beetle  
(F sex phe.)

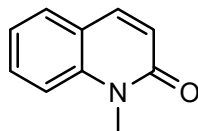
## [ C-2 ] Other: True alkaloids (iv)

Aromatic comp.

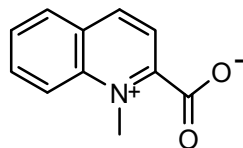
quinoline



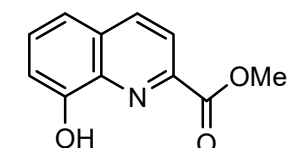
walking stick  
(allomone)



net-winged beetle  
(allomone ?)

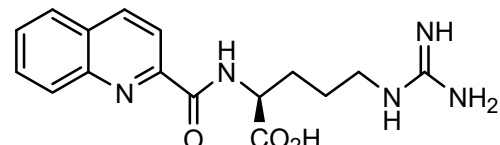


firefly (allomone)

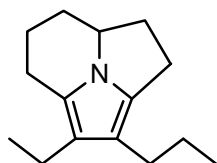


water beetle (allomone)

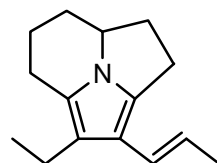
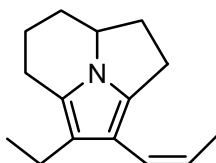
N $\alpha$ -quinaldyl-L-arginine



ladybug (allomone)



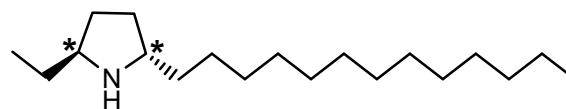
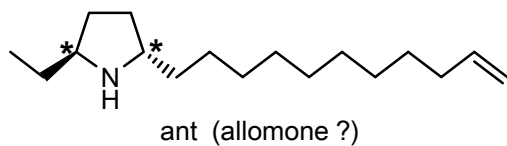
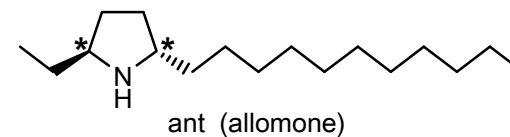
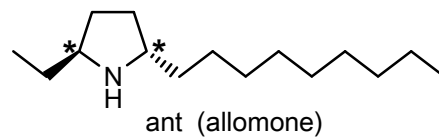
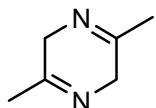
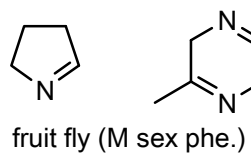
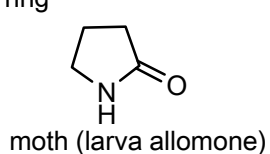
ant (allomone)



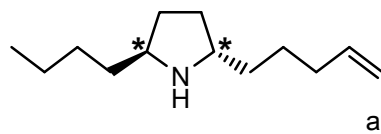
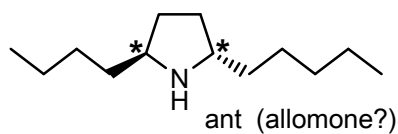
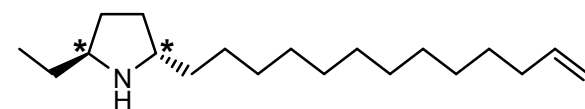
ant (allomone)

## [ C-2 ] Other: True alkaloids (v)

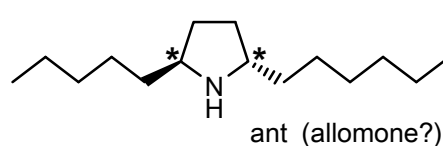
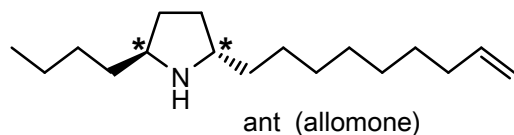
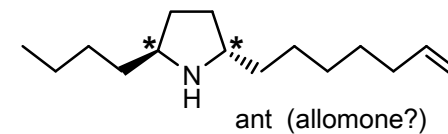
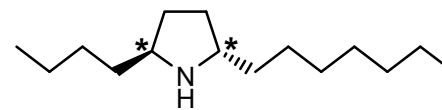
C4 ring



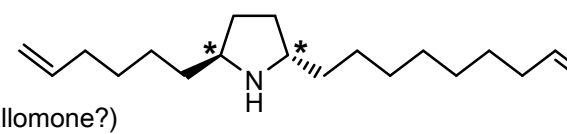
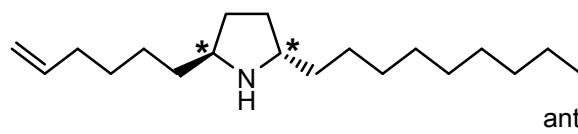
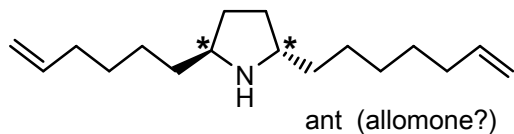
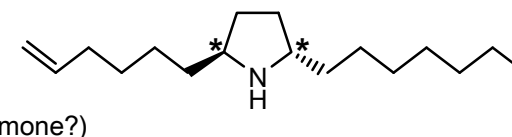
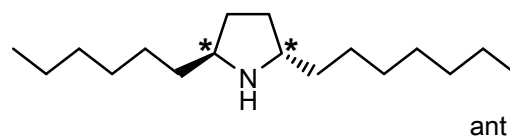
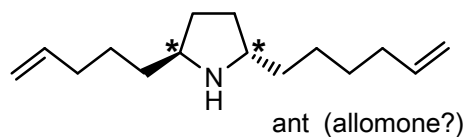
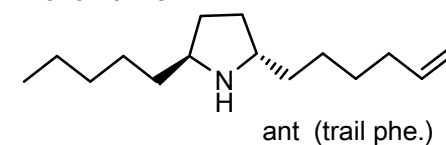
ant (allomone)



ant (allomone?)

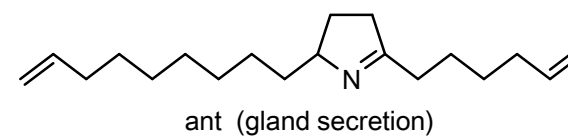
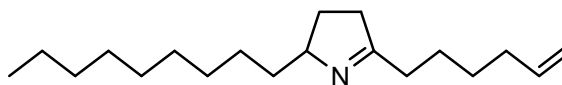
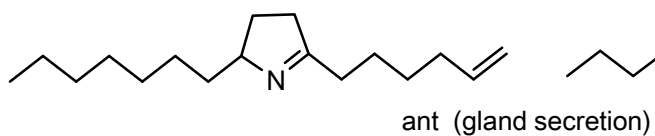
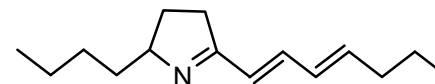
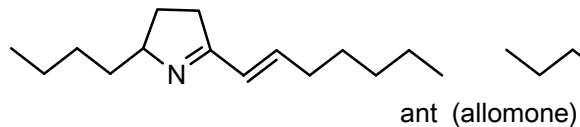
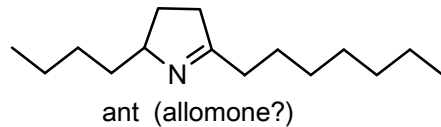
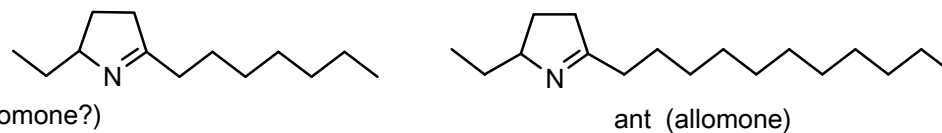
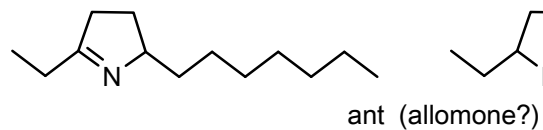
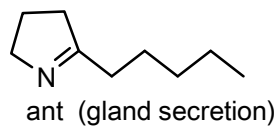
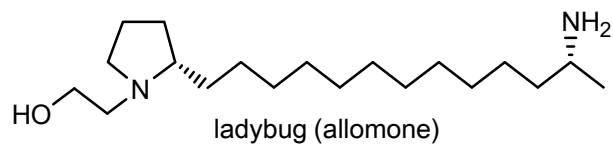
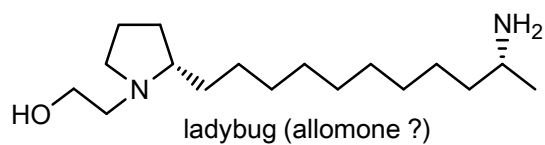
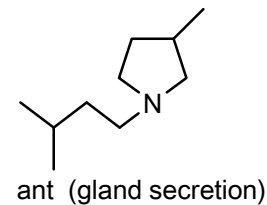
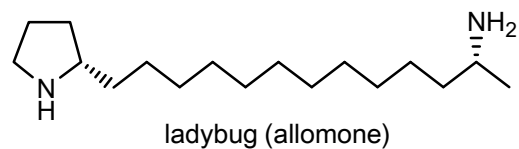
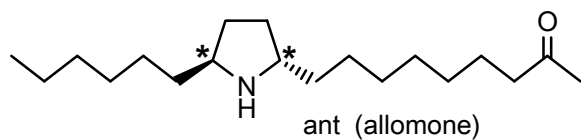


monomorine III

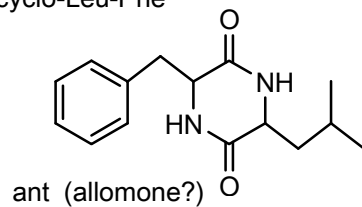


## [ C-2 ] Other: True alkaloids (vi)

C4 ring

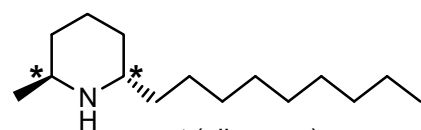


cyclo-Leu-Phe

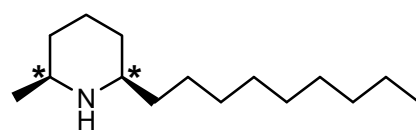


# [ C-2 ] Other: True alkaloids (vii)

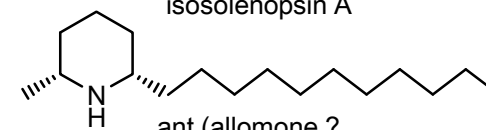
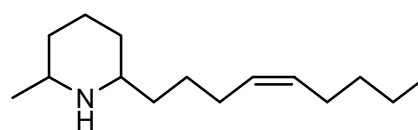
C5 ring



ant (allomone)

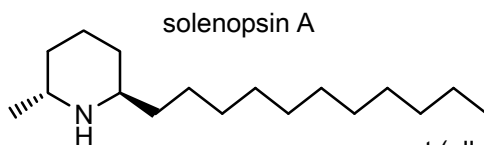


ant (allomone ?)

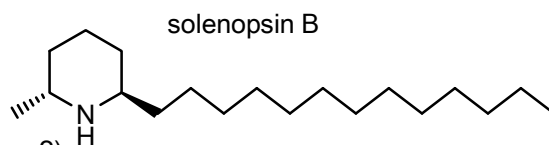


isosolenopsin A

ant (allomone ?,  
queen recognition ? )

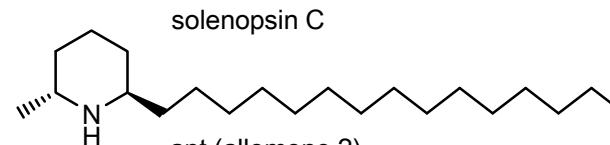


solenopsin A



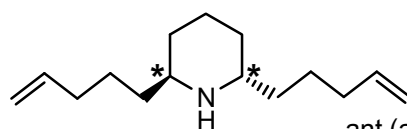
solenopsin B

ant (allomone ?)

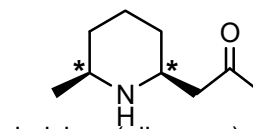
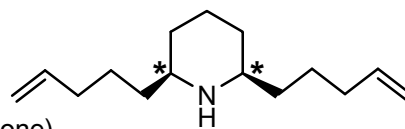


solenopsin C

ant (allomone ?)

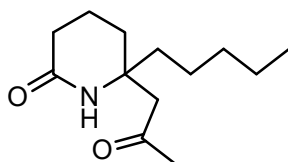


ant (allomone)



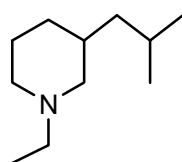
ladybug (allomone)

adalinine



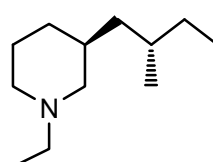
ladybug (allomone ?)

norstenusine

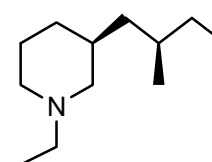


rove beetle (allomone)

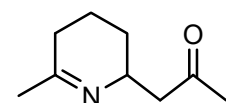
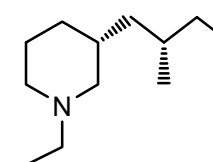
stenusine



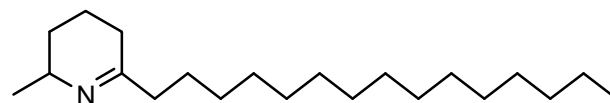
rove beetle (allomone)



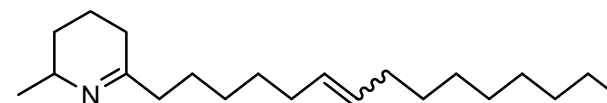
rove beetle (allomone)



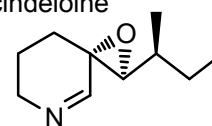
ladybug (allomone)



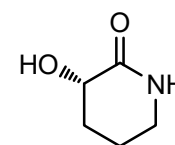
ant (allomone)



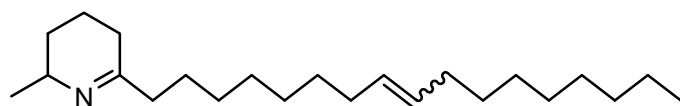
cicindelaine



rove beetle (allomone ?)



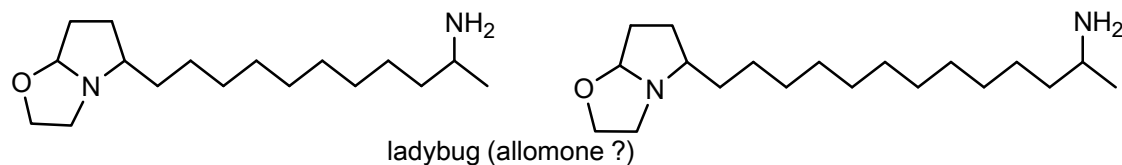
ladybug  
(allomone ?)



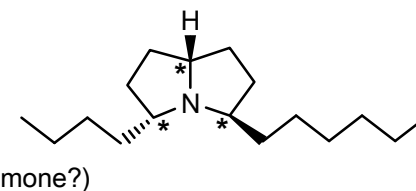
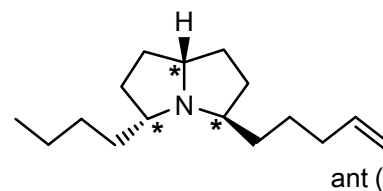
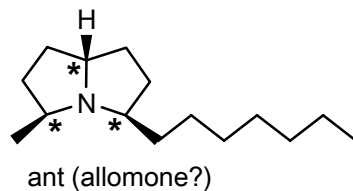
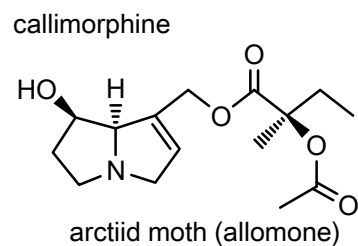
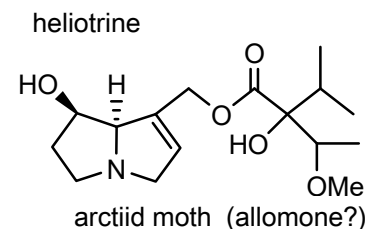
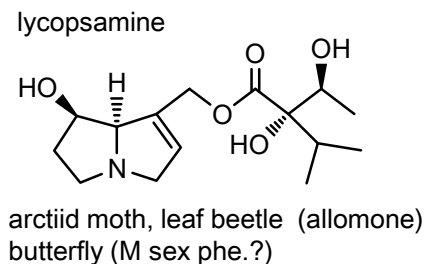
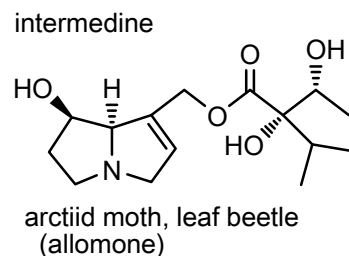
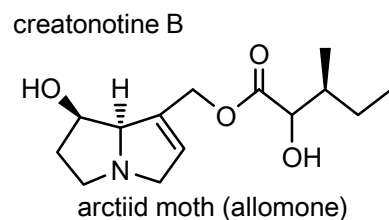
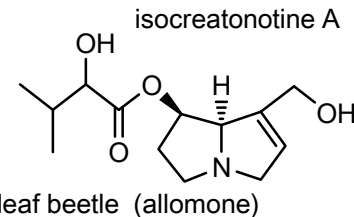
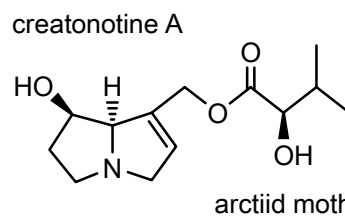
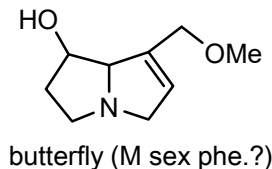
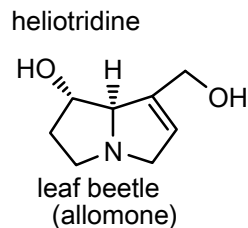
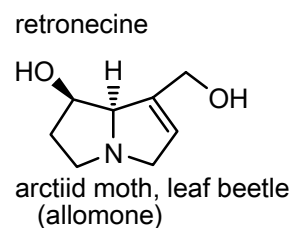
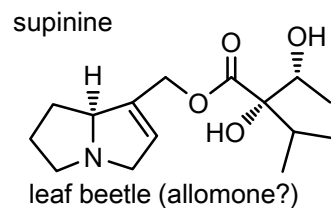
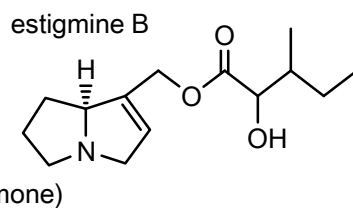
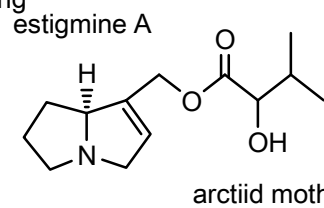
ant (allomone)

## [ C-2 ] Other: True alkaloids (viii)

C6 ring

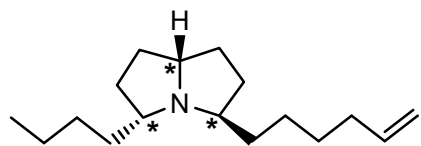


C7 ring



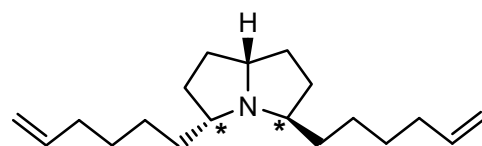
# [ C-2 ] Other: True alkaloids (ix)

C7 ring

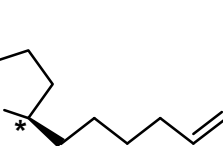


ant (allomone?)

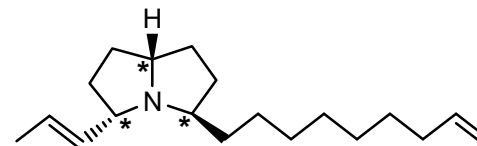
integerrimine



senecionine

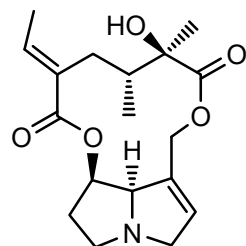


seneciphylline



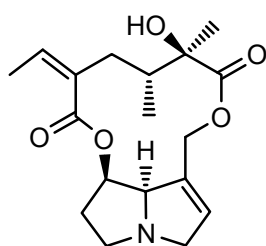
ant (allomone?)  
arctiid moth (allomone)

seneciphylline N-oxide



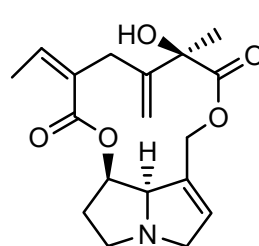
Arctiinae moth (allomone ?)

retusine

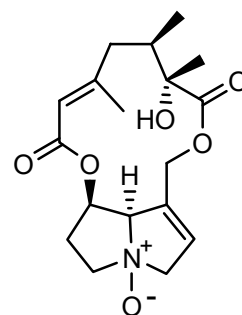


Arctiinae moth, butterfly (allomone ?)

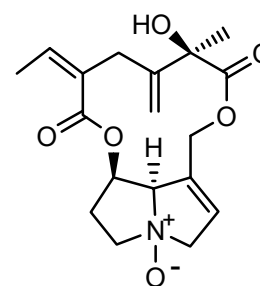
monocrotaline



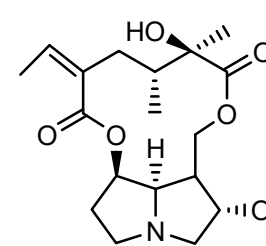
doronenine N-oxide



leaf beetle (allomone ?)

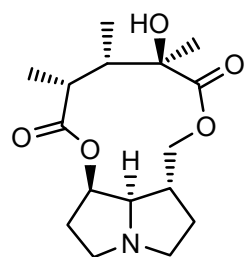


leaf beetle (allomone ?)

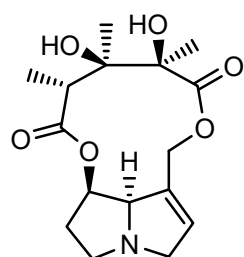


butterfly (allomone ?)

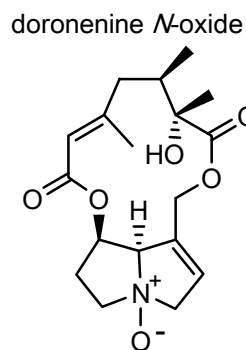
rosmarinine



grasshopper  
(allomone ?)

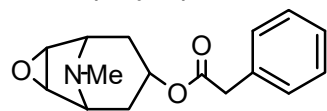


grasshopper, butterfly  
(allomone ?)



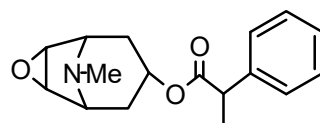
leaf beetle (allomone ?)

3-phenylacetoxy-  
6,7-epoxytropine



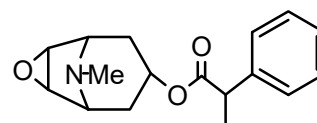
treehopper (allomone ?)

dihydroaposcopamine



butterfly (allomone)

scopolamine



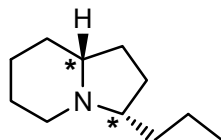
butterfly (allomone)  
treehopper (allomone ?)

## [ C-2 ] Other: True alkaloids (x)

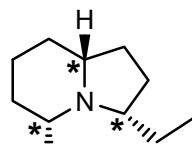
C8 ring  
polyzonimine



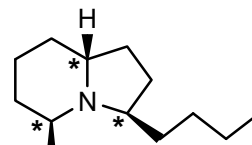
millipede (allomone)



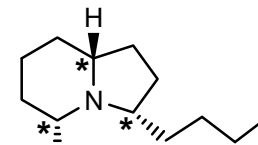
ant (allomone ?)



ant (allomone ?)

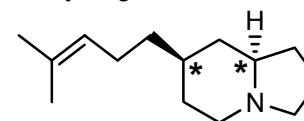


monomorphine I



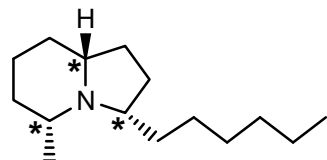
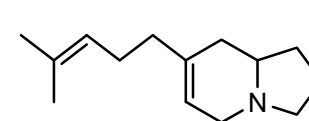
ant (trail phe.)

hydrogosodesmine

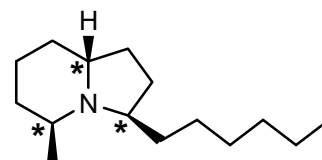
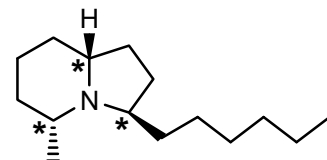


millipede (allomone)

gosodesmine

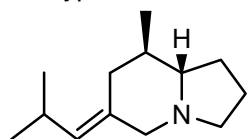


ant (allomone ?)



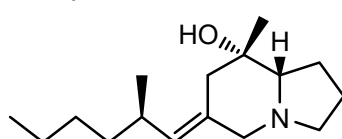
ant (allomone ?)

8-deoxypumiliotoxin 193H



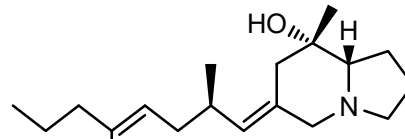
oribatid mite (allomone ?)

pumiliotoxin 251D

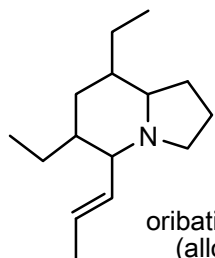


oribatid mite (allomone ?)

pumiliotoxin 291G

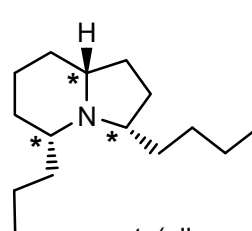
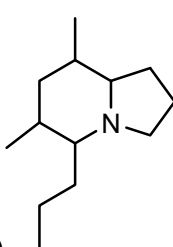


indolizidine 223A

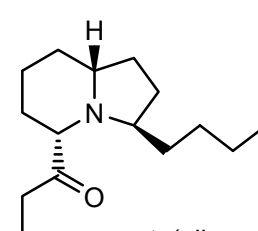
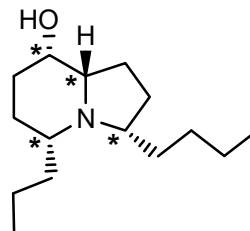


oribatid mite (allomone ?)

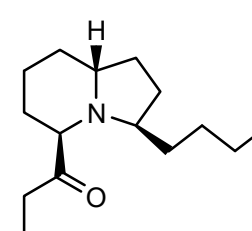
indolizidine 195G



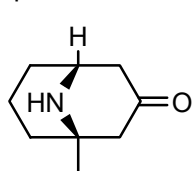
ant (allomone ?)



ant (allomone ?)

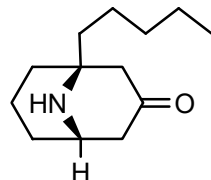


euphoccocinine

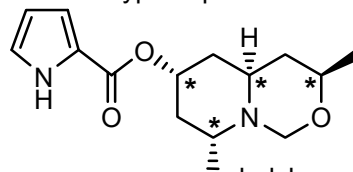


ladybug (allomone)

adaline



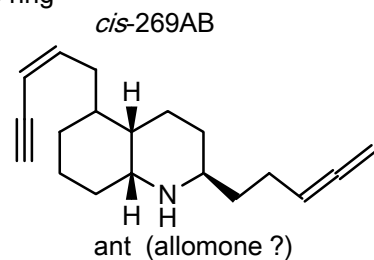
hyperaspine



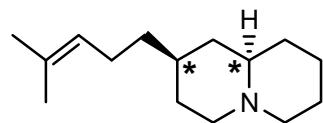
ladybug (allomone ?)

## [ C-2 ] Other: True alkaloids (xi)

C9 ring

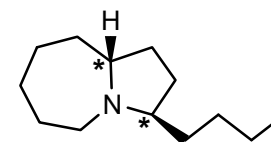
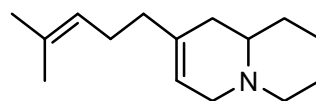


homo-hydrogosodesmine



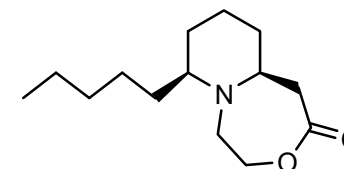
millipede (allomone)

homo-gosodesmine



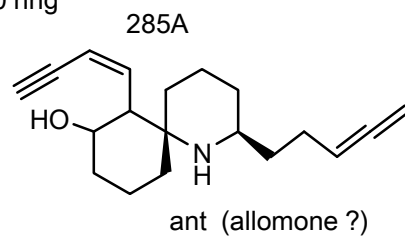
ant (allomone ?)

calvine

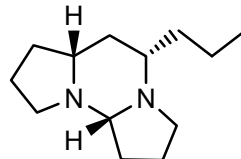


ladybug (allomone ?)

C10 ring

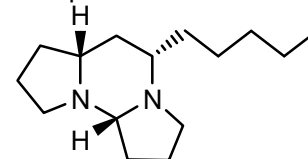


tetraponerine-2

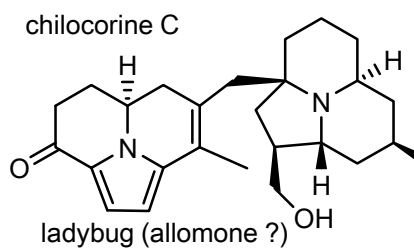
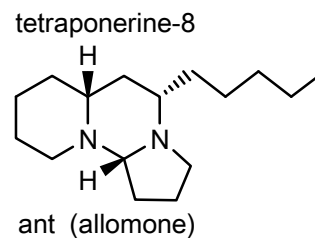
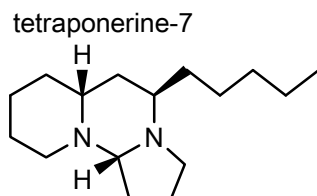
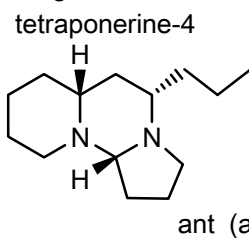


ant (allomone)

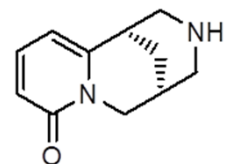
tetraponerine-6



C11 ring

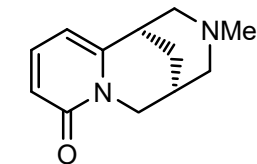


cytisine



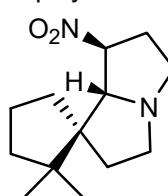
aphid, pyralid moth  
(allomone)

N-methylcytisine



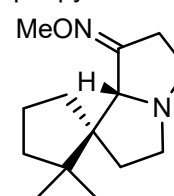
pyralid moth (allomone)

nitropolyzonamine



millipede (allomone)

spiropyrrolizidine 236

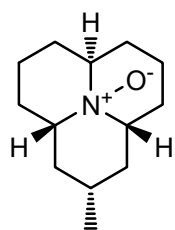


millipede (allomone)

## [ C-2 ] Other: True alkaloids (xii)

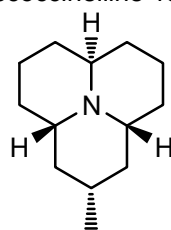
C12 ring

coccinelline



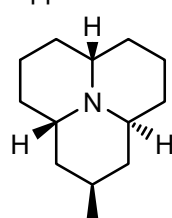
ladybug  
(allomone)

precoccinelline 193C



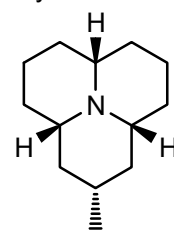
ladybug, soldier  
beetle, oribotriiid  
mite (allomone)

hippodamine



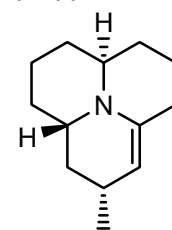
ladybug, soldier  
beetle, (allomone ?)

myrrhine



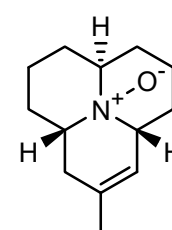
ladybug  
(allomone)

propyleine



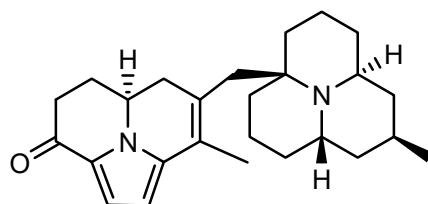
ladybug, soldier  
beetle, (allomone)

2-dehydrococcinelline



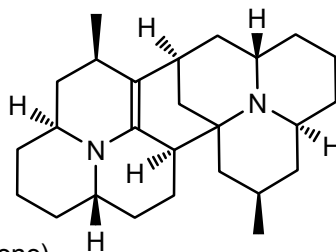
ladybug  
(allomone)

exochoimine

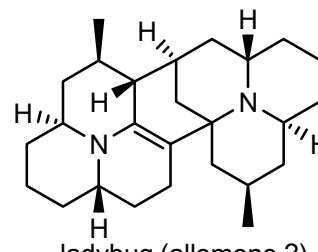


ladybug (allomone)

psylloborine A

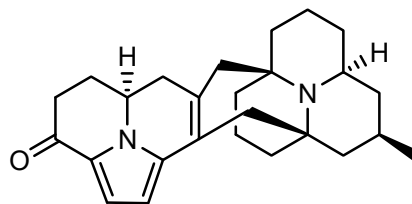


isopsylloborine A



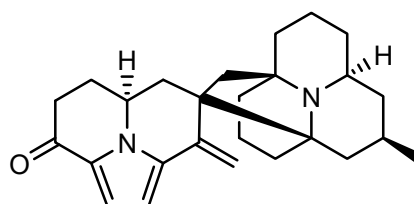
ladybug (allomone ?)

chilocorine A



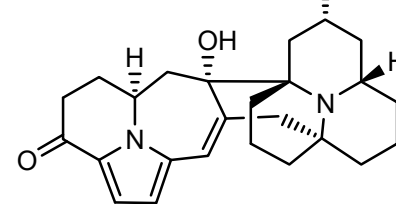
ladybug (allomone ?)

chilocorine B



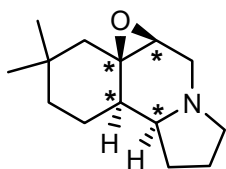
ladybug (allomone)

chilocorine D



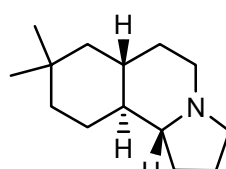
ladybug (allomone ?)

buzonamine

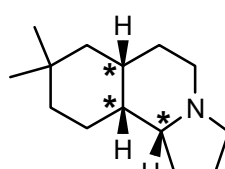


millipede (allomone)

deoxybuzonamine

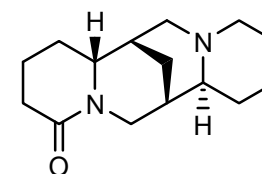


millipede (allomone)



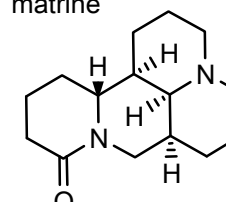
C15 ring

lupanine

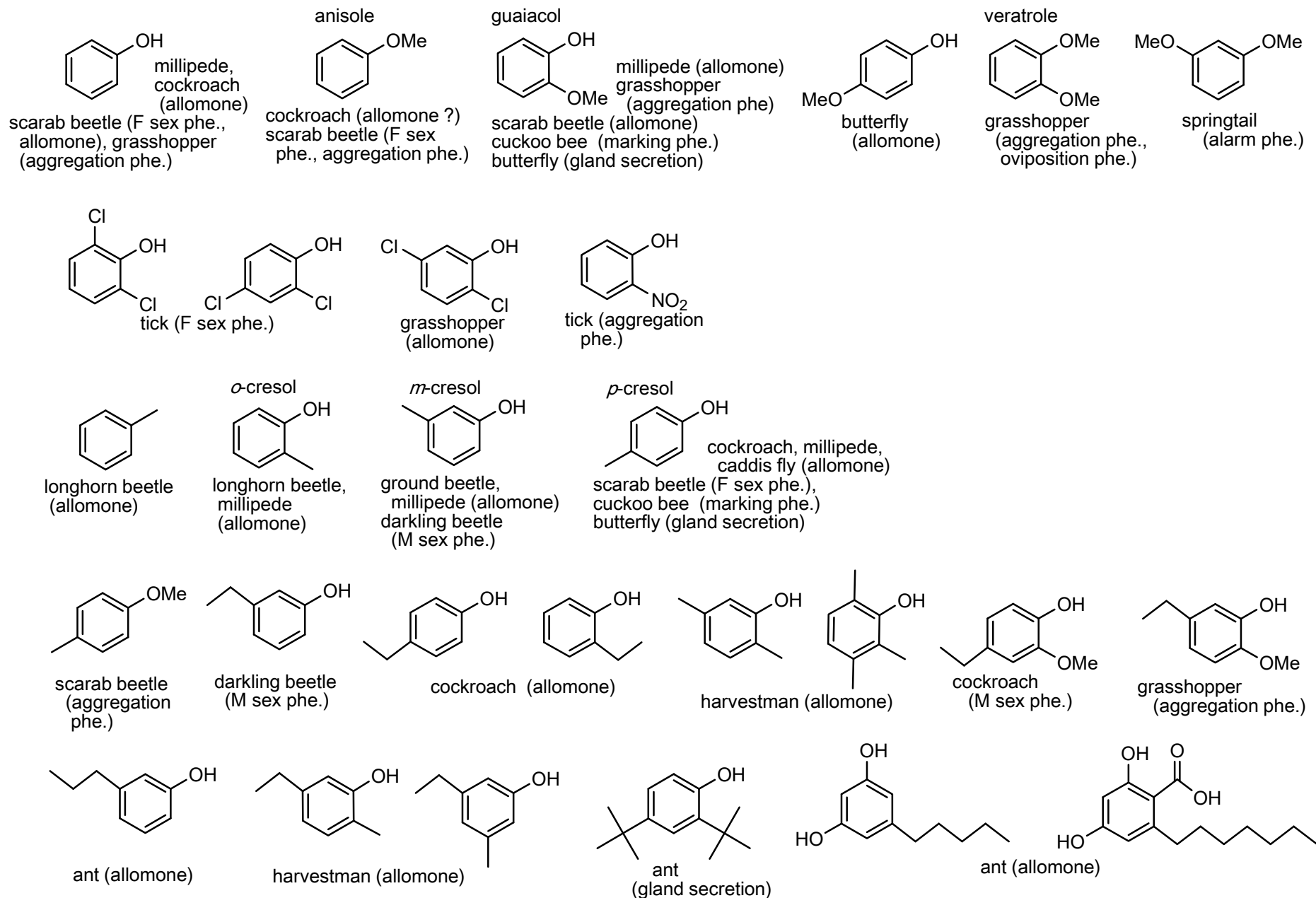


aphid (allomone ?)

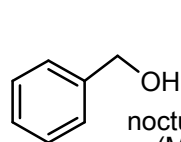
matrine



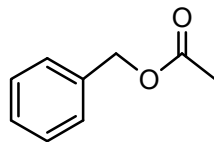
# [ C-3 ] Other: Aromatic comp. (i)



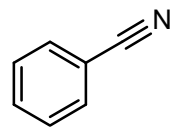
## [ C-3 ] Other: Aromatic comp. (ii)



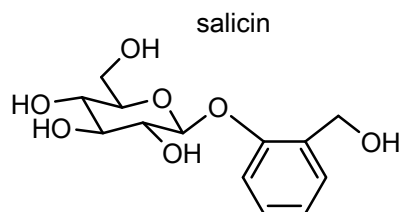
noctuid moth, grasshopper  
(M sex phe.)  
true bug, stink bug (M sex phe.,  
aggregation phe., gland secretion)



honey bee  
(alarm phe.)

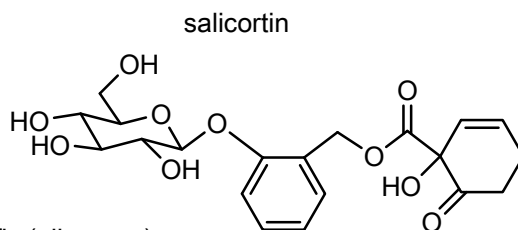


saturniid moth  
(larva allomone)

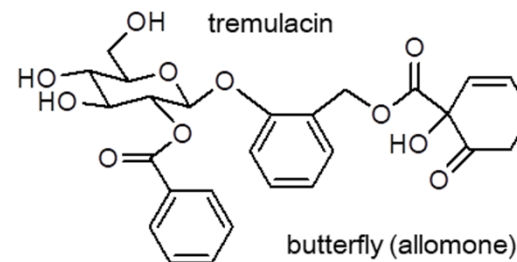


salicin

butterfly (allomone)

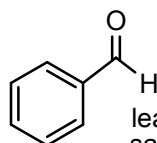


salicortin

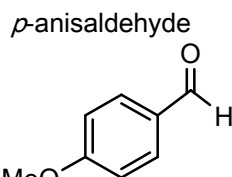


tremulacin

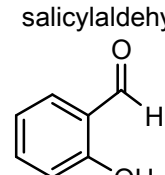
butterfly (allomone)



leaf beetle, tiger beetle,  
saturniid moth, millipede,  
sawfly, centipede (allomone), bee (alarm  
phe.), assassin bug (M sex phe.), stink  
bug, grasshopper (M aggregation phe.)

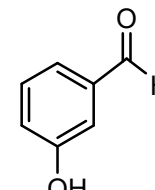


*p*-anisaldehyde  
cockroach (allomone ?)  
green lacewing  
(M aggregation phe.?)

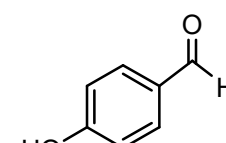


salicylaldehyde

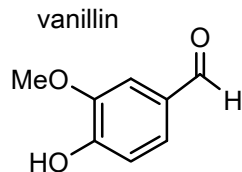
ground beetle, leaf beetle,  
creeping water bug, cuckoo  
bee, butterfly (allomone)



creeping water bug  
(allomone)  
ant (gland secretion)

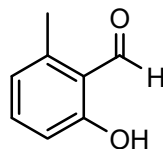


water bug  
(gland secretion)  
water beetle, creeping  
water bug (allomone)

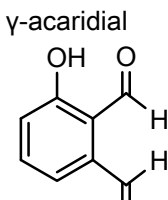


vanillin

shield bug, pyralid moth,  
butterfly (M sex phe.)  
cuckoo bee (marking phe.)

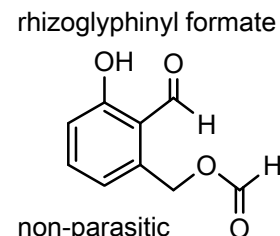


longhorn beetle  
(allomone ?)  
acarid mite, dust  
mite (alarm phe., F sex phe.)  
oribatid mite (alarm phe., allomone)



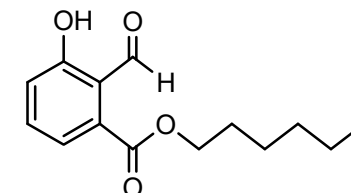
$\gamma$ -acaridial

acarid mite, oribatid  
mite (F sex phe.)



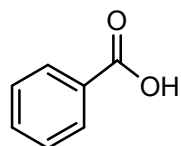
rhizoglyphinyl formate

non-parasitic  
mite, oribatid mite  
(gland secretion)



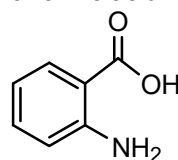
acarid mite (allomone ?)

# [ C-3 ] Other: Aromatic comp. (iii)

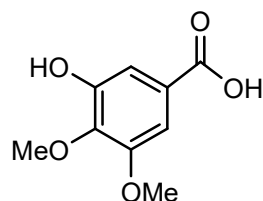


water beetle  
(allomone ?)  
ant (allomone ?,  
gland secretion)

anthranilic acid

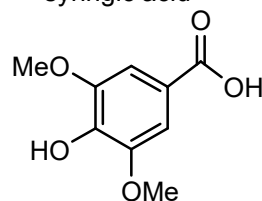


scarab beetle  
(F sex phe.)



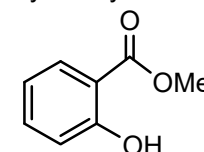
springtail (allomone)

syringic acid

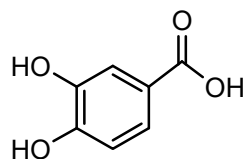


water bug (gland secretion)  
creeping water bug, water  
beetle (allomone)  
bee (queen phe.)

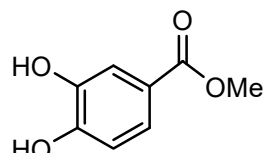
methyl salicylate



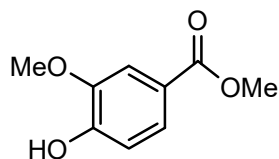
tick (aggregation phe.)  
butterfly (allomone,  
M anti-aphrodisiac phe.)  
dung beetle (allomone)  
ant (M aggregation phe. ?)



darkling beetle  
(cuticle)

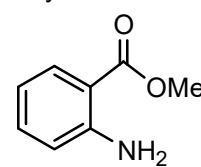


water beetle  
(allomone ?)

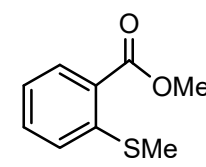


butterfly (M sex  
phe. ?)

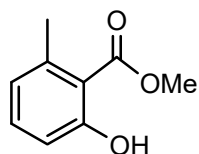
methyl anthranilate



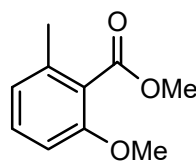
ant (alarm phe. trail phe.,  
M aggregation phe. ?)



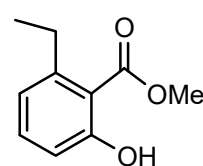
scarab beetle  
(F sex phe.)



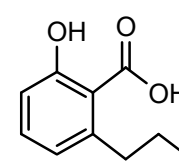
ant (primer phe., alarm phe.,  
trail phe., queen sex phe.,  
allomone, M aggregation phe.)  
parasitoid wasp (F sex phe.)  
ground beetle, darkling beetle  
(allomone)



ant (trail phe.)

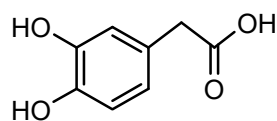


darkling beetle  
(allomone)

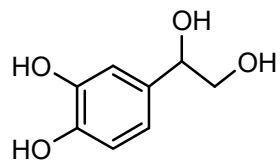


ant (allomone)

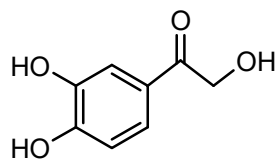
## [ C-3 ] Other: Aromatic comp. (iv)



grasshopper, auger beetle, bark beetle (cuticle)

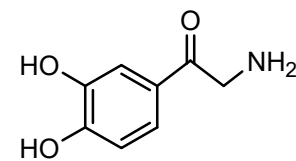
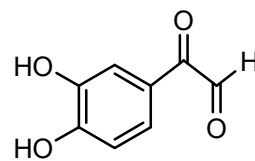


grasshopper (cuticle)



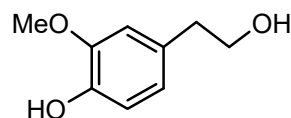
grasshopper, cicada (cuticle)

arterenone



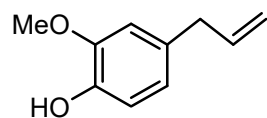
grasshopper, crane fly, blowfly, saturniid, butterfly, cockroach (cuticle)

homovanillyl alcohol

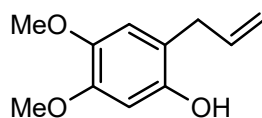


bee (queen phe.)  
butterfly (M sex phe. ?)

eugenol

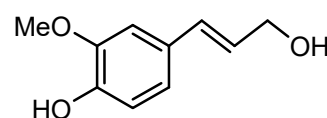


fairy wasp (F sex phe.)

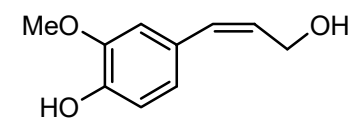


fruit fly (M sex phe.,  
allomone)

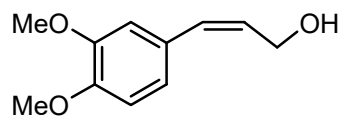
coniferyl alcohol



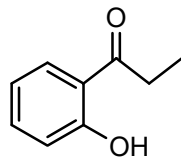
bee (queen phe.)  
fruit fly (M sex phe.,  
M allomone)



fruit fly (M sex phe.)

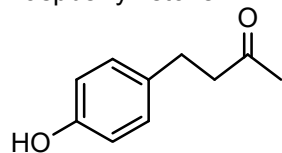


fruit fly (M sex phe.)



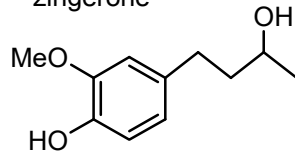
sap beetle (F sex phe.?)

raspberry ketone



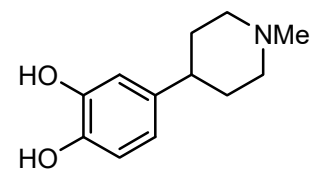
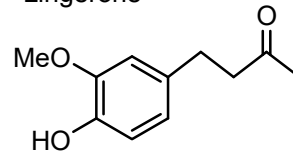
fruit fly (M sex phe.)

zingerone



fruit fly (M sex phe.)

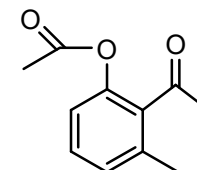
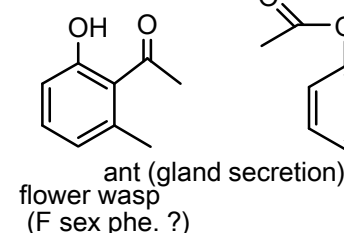
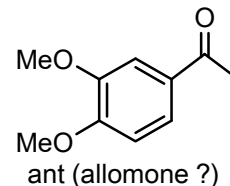
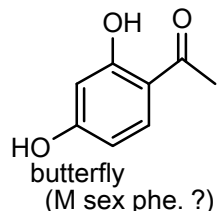
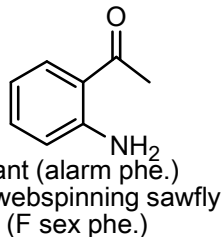
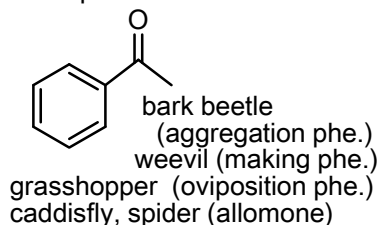
zingerone



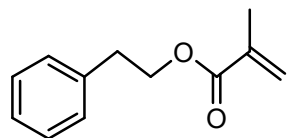
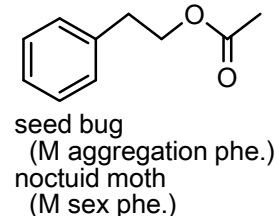
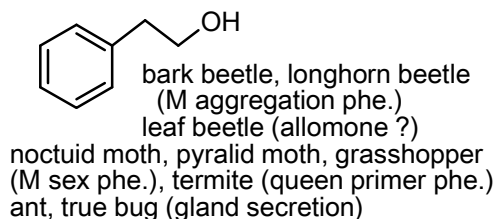
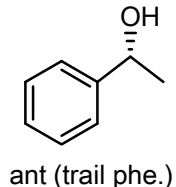
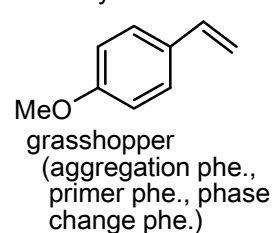
sap beetle (F sex phe.?)

## [ C-3 ] Other: Aromatic comp. (v)

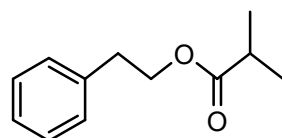
acetophenone



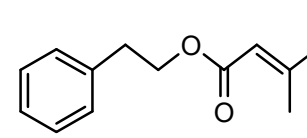
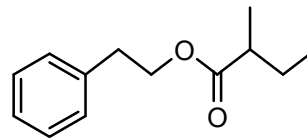
4-vinylanisole



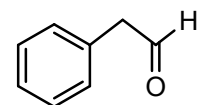
false ground beetle  
(allomone ?)



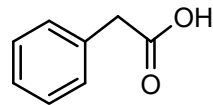
leaf beetle (allomone)



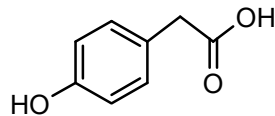
butterfly (gland secretion)



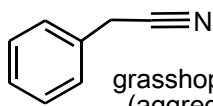
termite, saturniid  
moth (allomone)  
scarab beetle  
(F aggregation phe.)



water beetle  
(allomone ?)  
ant (gland secretion)

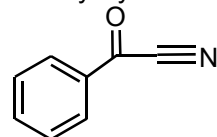


water beetle  
(allomone ?)



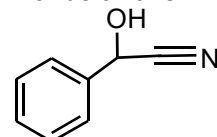
grasshopper  
(aggregation phe.,  
grasshopper, butterfly  
(courtship-inhibition phe)

benzoyl cyanide



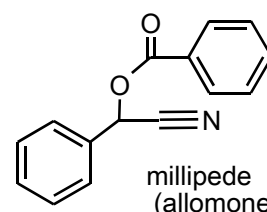
millipede (allomone)

mandelonitrile



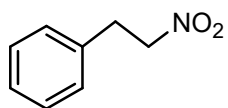
millipede, sawfly, thyridd  
caterpillar (allomone)

mandelonitrile benzoate

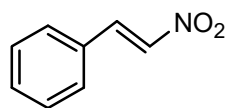


millipede  
(allomone)

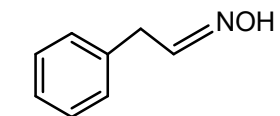
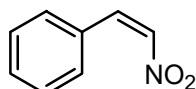
# [ C-3 ] Other: Aromatic comp. (vi)



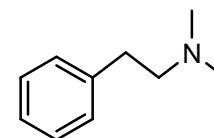
butterfly  
(gland secretion)



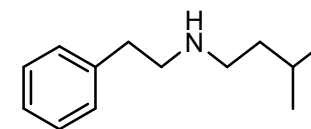
millipede (allomone)



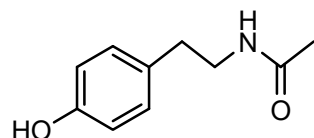
ant (gland secretion)



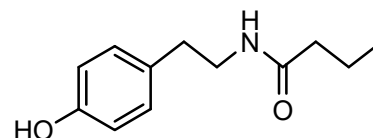
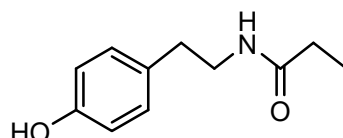
harvestman  
(allomone ?)



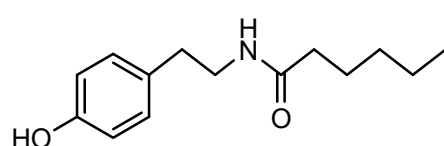
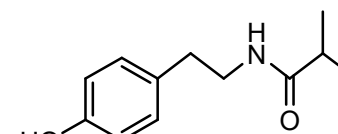
ant (trail phe.)



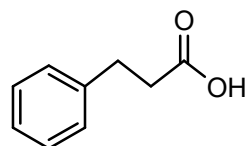
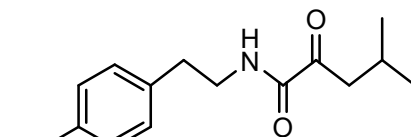
ant (M sex phe. ?)



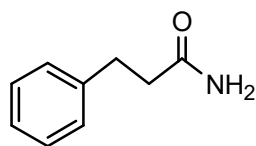
ant (M sex phe. ?)



ant (M sex phe. ?)

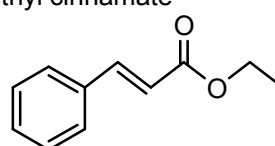


wasp (trail phe. ?)  
stingless bee  
(gland secretion)

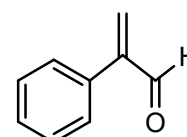


net-winged beetle  
(allomone ?)

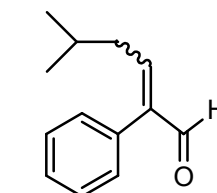
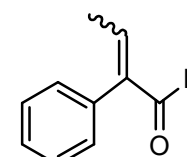
ethyl cinnamate



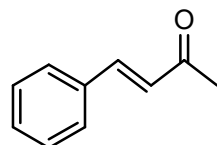
tortricid moth (M sex phe.)



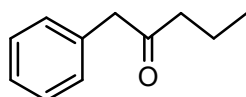
ant (gland secretion)



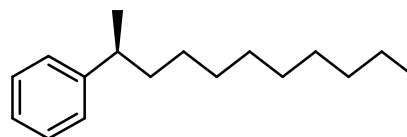
cave cricket  
(M gland secretion)



ant (alarm phe. ?)

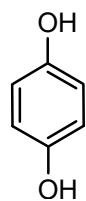


millipede (allomone)

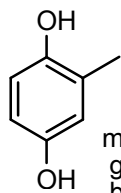


termite (aggregation phe.)

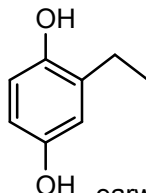
# [ C-3 ] Other: Aromatic comp. (vii)



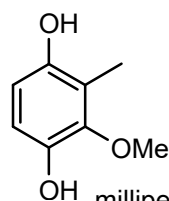
grasshopper,  
ground beetle  
(allomone)  
scarab beetle  
(F sex phe.)  
termite (phago-  
stimulating phe.)  
water beetle (gland secretion)



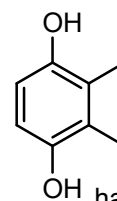
millipede,  
ground  
beetle, rove  
beetle (allomone)



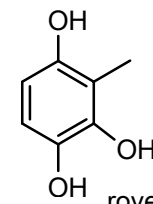
earwig  
(allomone)



millipede  
(allomone)

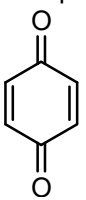


harvestman  
(allomone)

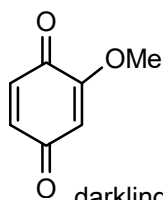


rove beetle  
(allomone)

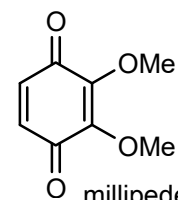
benzoquinone



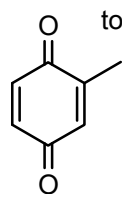
ground beetle,  
darkling beetle,  
cockroach, termite,  
harvestman, millipede  
(allomone), termite,  
cockroach (alarm phe.)  
scarab beetle (F sex phe.)



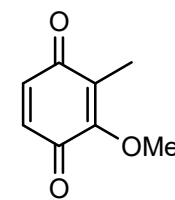
darkling beetle  
(allomone)



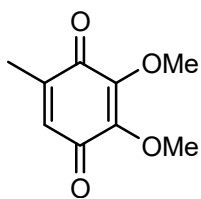
millipede  
(allomone)



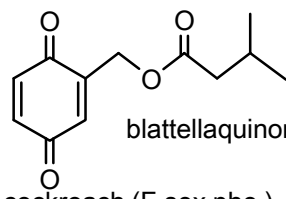
toluquinone  
ground beetle,  
darkling beetle,  
rove beetle,  
termite, earwig,  
cockroach, millipede (allomone)



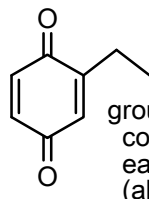
millipede,  
darkling  
beetle,  
rove beetle (allomone)



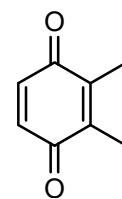
millipede (allomone)



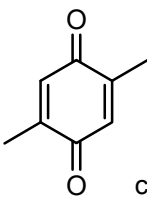
blattellaquinone  
cockroach (F sex phe.)



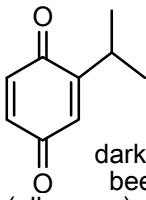
ground beetle,  
cockroach,  
earwig, millipede  
(allomone)  
darkling beetle (M sex phe.)



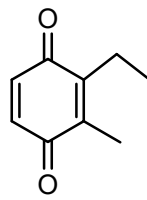
ground beetle,  
darkling beetle,  
cockroach,  
harvestman, earwig (allomone)



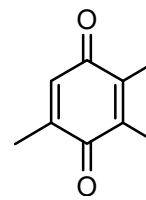
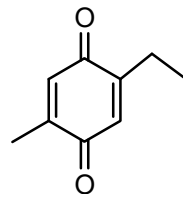
cockroach  
(allomone, alarm phe.)



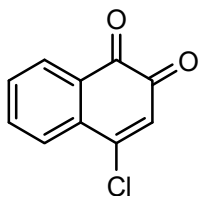
darkling  
beetle  
(allomone)



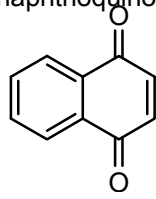
harvestman (allomone)



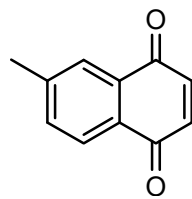
naphthoquinone



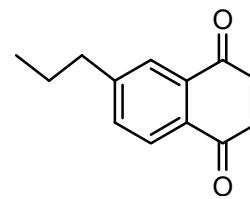
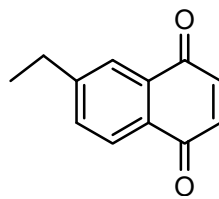
harvestman  
(allomone ?)



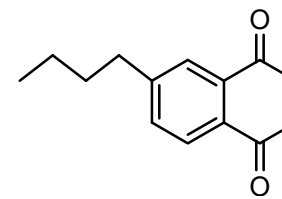
firefly, harvestman  
(allomone)



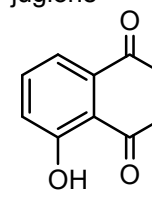
harvestman, darkling  
beetle, (allomone)



darkling beetle (allomone)



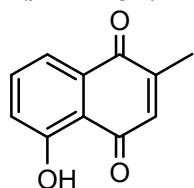
juglone



leaf beetle, thrips  
(allomone)

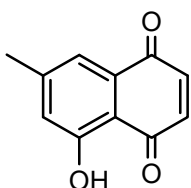
## [ C-3 ] Other: Aromatic comp. (viii)

2-methyljuglone  
(plumbagin)

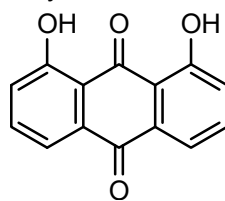


thrips (allomone), mite (gland secretion)

7-methyljuglone

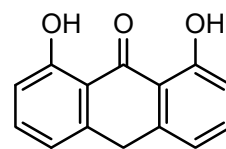


chrysazin

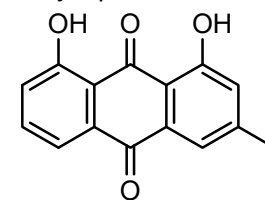


leaf beetle (allomone)

dithranol

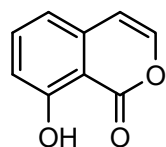
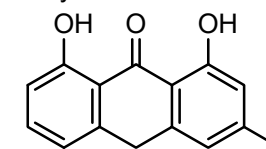


chrysophanol

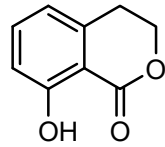


leaf beetle, aphid (allomone)

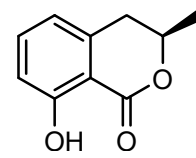
chrysarobin



darkling beetle (allomone)

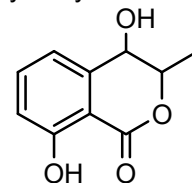


mellein

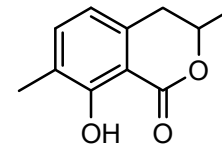


ant (M sex phe. ?, trail phe.  
allomone, gland secretion)  
termite, thrips (allomone)  
moth (M sex phe.)

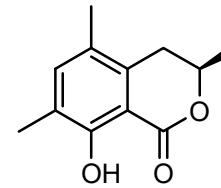
hydroxymellein



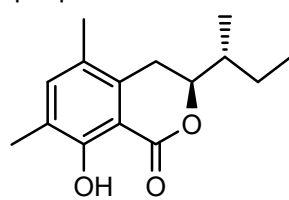
ant (gland secretion)



ant (trail phe.)

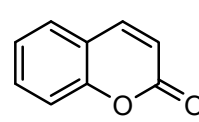


periplanotide E



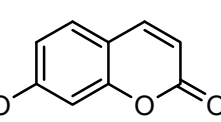
cockroach  
(aggregation phe.)

coumarin

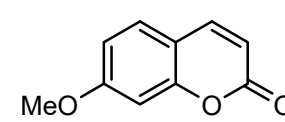


ermine moth (allomone ?)

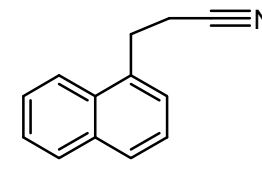
umbelliferone



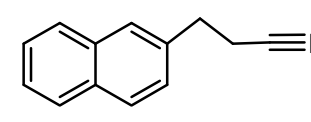
herniarin



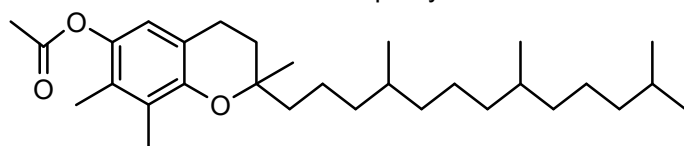
ermine moth (allomone ?)



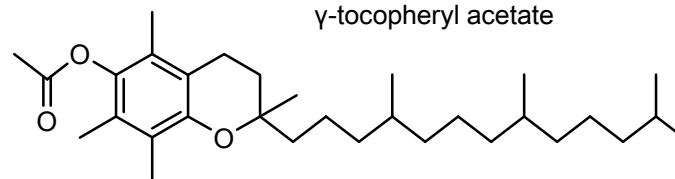
grasshopper (M sex phe. ?)



$\alpha$ -tocopheryl acetate

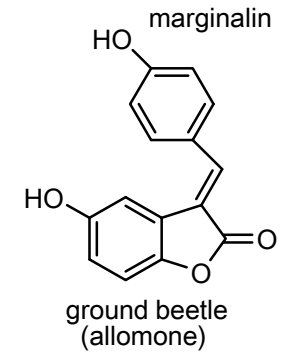
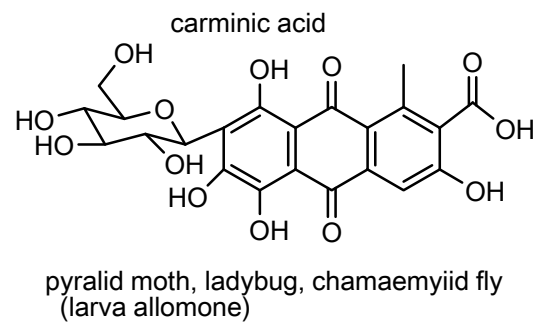
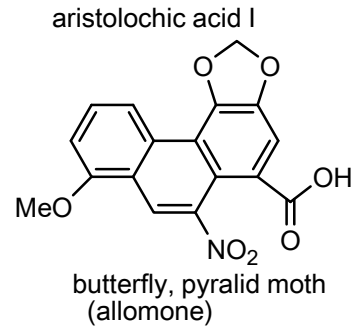
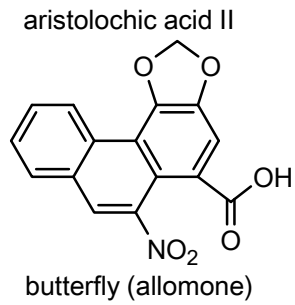


$\gamma$ -tocopheryl acetate



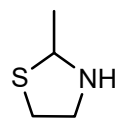
ladybug (allomone ?)

## [ C-3 ] Other: Aromatic comp. (ix)

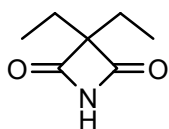


# [ C-4 ] Other: Ring comp. (i)

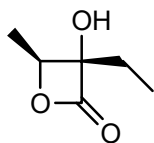
C3 ring



cockroach  
(M sex phe.)

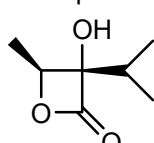


scarab beetle  
(F sex phe.?)

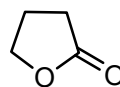


butterfly (M sex phe.)

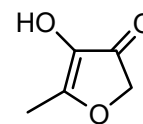
viridifloric  $\beta$ -lactone



C4 ring

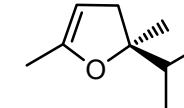
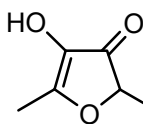


burrowing bug  
(gland secretion)



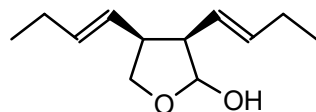
cockroach (M sex phe.)

furaneol

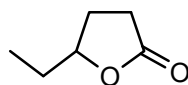


ship-timber beetle  
(F sex phe. ?)

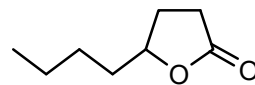
biprorulure



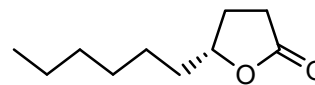
stink bug (M sex phe.)



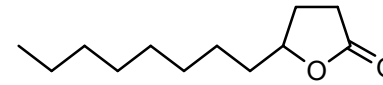
hide beetle  
(F sex phe.)



parasitoid wasp, honey  
bee (gland secretion)

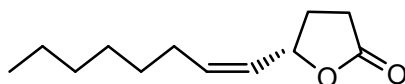


scarab beetle (M sex phe.,  
M aggregation phe.)  
rove beetle, thrips (allomone)  
butterfly (M scent secretion)

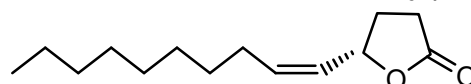


rove beetle (allomone ?)  
parasitoid wasp (gland secretion)

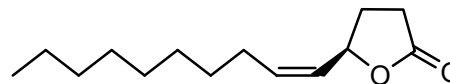
buibuilactone



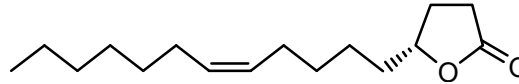
scarab beetle (F sex phe.)



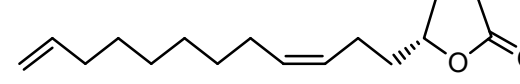
scarab beetle (F sex phe.)



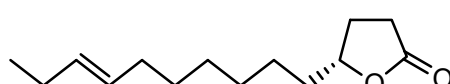
desmolactone



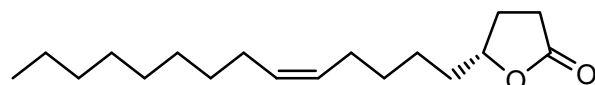
longhorn beetle (F sex phe.)



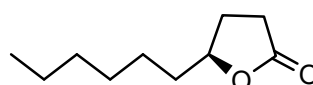
scarab beetle (F sex phe.)



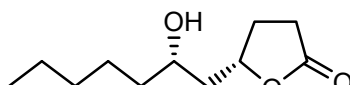
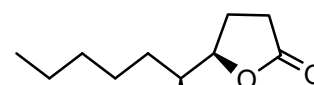
parasitoid wasp (M aggregation phe.)



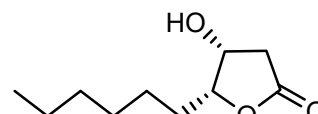
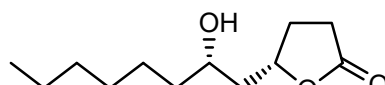
ant (secretion), stem sawfly (F sex phe.)



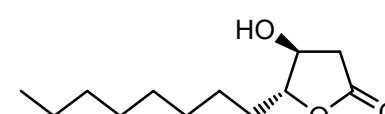
parasitoid wasp (M sex phe.)



butterfly (M sex phe.)



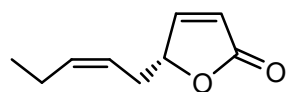
fruit fly (M sex phe.?)



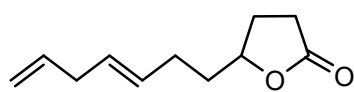
harvestman (allomone)

## [ C-4 ] Other: Ring comp. (ii)

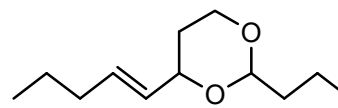
### C4 ring



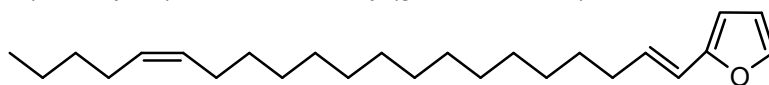
pyralid moth (M sex phe.)



fruit fly (gland secretion)



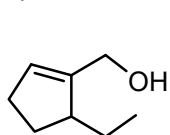
cockroach (allomone ?)



ant (allomone ?)

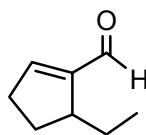
### C5 ring

phoracanthol

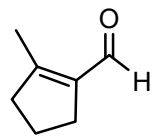


longhorn beetle (allomone?)

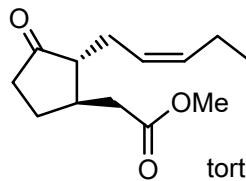
phoracanthal



ant (gland secretion)

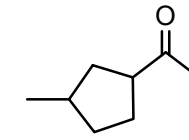
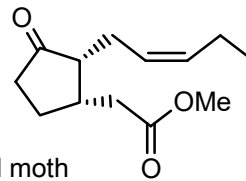


methyl jasmonate

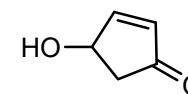


tortricid moth (M sex phe.)

methyl epijasmonate

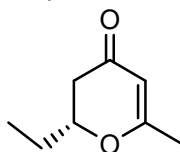


stick insect (allomone ?)

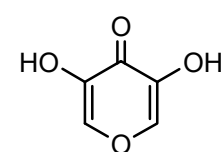
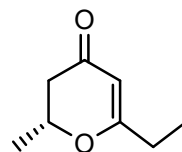


butterfly (secretion)

hepialone

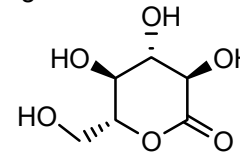


swift moth (M sex phe.)

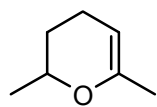


shield bug (M sex phe.)

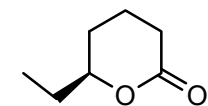
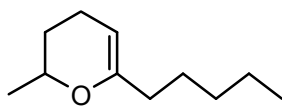
gluconolactone



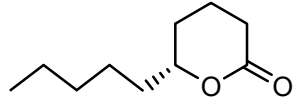
cockroach (allomone ?)



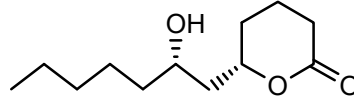
bee (cephalic secretion)



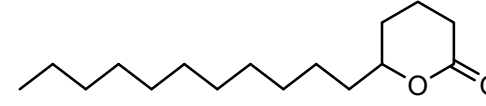
fruit fly (M sex phe.)



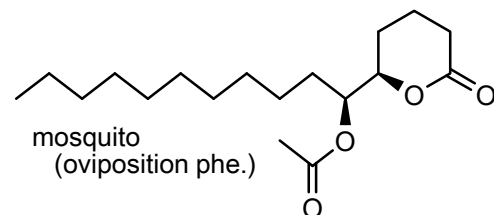
butterfly (M sex phe. ?)



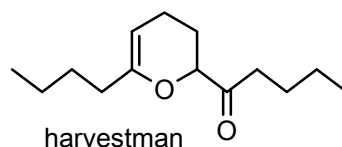
butterfly (M sex phe.)



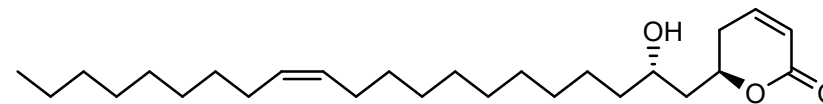
wasp (queen primer phe.)



mosquito (oviposition phe.)



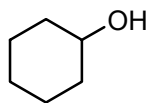
harvestman (allomone ?)



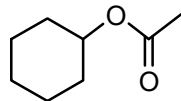
ant (gland secretion)

# [ C-4 ] Other: Ring comp. (iii)

C6 ring

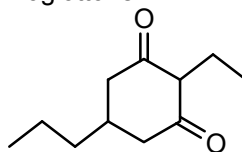


grasshopper  
(aggregation phe.)

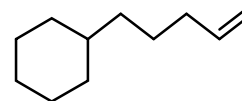


butterfly (F sex phe. ?)

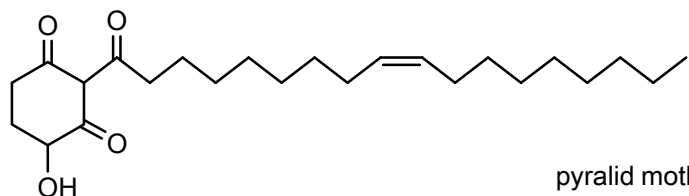
chiloglottone



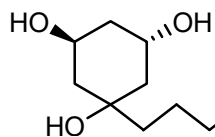
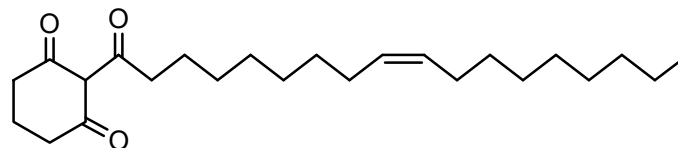
solitary wasp (F sex phe.)



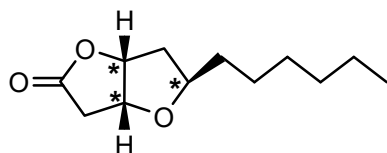
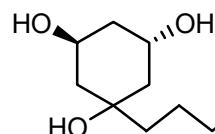
sap beetle (anti-  
aphrodisiac phe. ?)



pyralid moth (larva trail phe.)

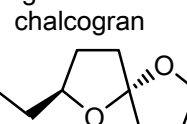


ant (gland secretion)



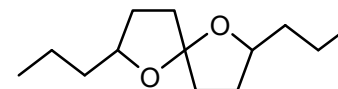
parasitoid wasp (gland secretion)

C7 ring



chalcogran

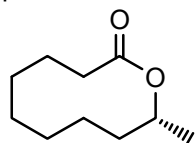
bark beetle  
(aggregation phe.)



mining bee  
(gland secretion)

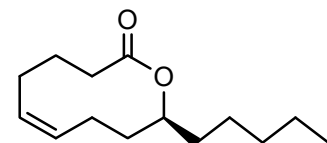
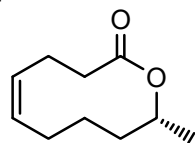
C9 ring

phoracantholide I



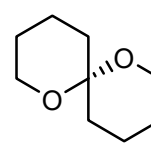
longhorn beetle (allomone ?)

phoracantholide J

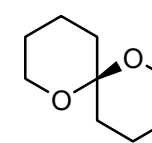
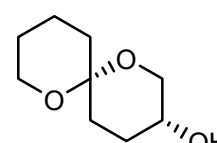


termite (queen recognition ?)

olean



fruit fly (F sex phe.)

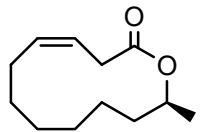


fruit fly  
(F sex phe.)

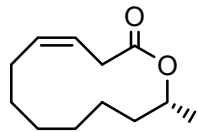
## [ C-4 ] Other: Ring comp. (iv)

C11 ring

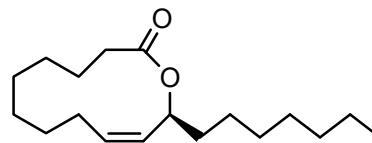
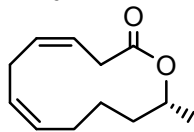
cucujolide II



cucujolide IV



cucujolide IV

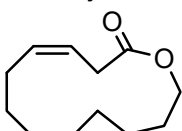


flat bark beetle (M aggregation phe.)

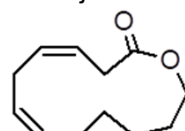
butterfly (M sex phe.)

C12 ring

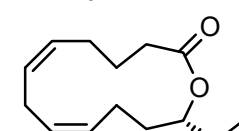
cucujolide VIII



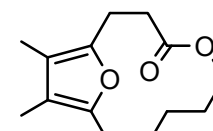
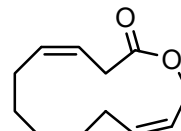
cucujolide IX



cucujolide X



parcoblattalactone



flat bark beetle (M aggregation phe.)

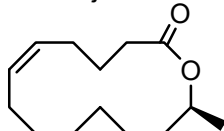
flat bark beetle  
(M sex phe. ?)

cockroach (F sex phe.)

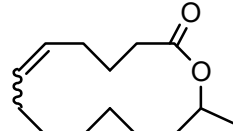
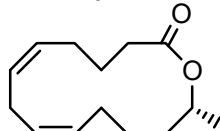
leaf beetle  
(M aggregation phe.)

C13 ring

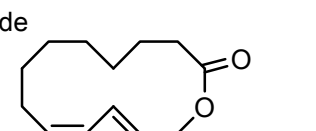
cucujolide III



cucujolide V



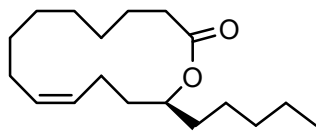
coriolide



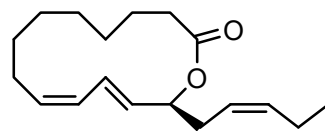
flat bark beetle (M aggregation phe.)

longhorn beetle  
(allomone)

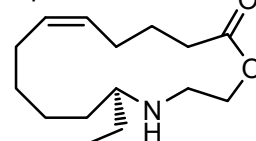
butterfly (M sex phe.)



butterfly (M sex phe.)

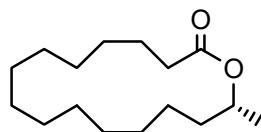


epilachnene



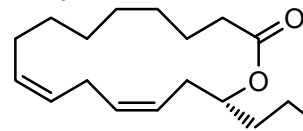
ladybug  
(allomone)

C15 ring



stink bug (M sex phe.)

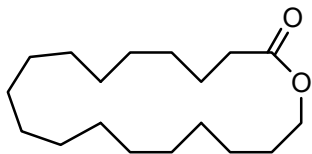
cucujolide XI



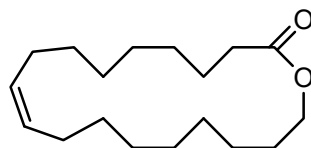
flat bark beetle (M sex phe. ?)

## [ C-4 ] Other: Ring comp. (v)

C18 ring

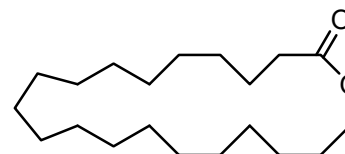


sweat bee (gland secretion,  
F sex phe., queen phe.)



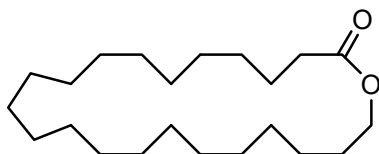
wasp (trail phe. ?)

C20 ring

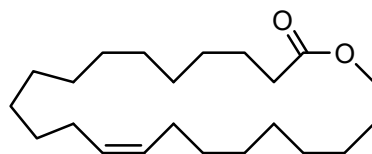


sweat bee (gland secretion,  
F sex phe., queen phe.)  
mining bee, plasterer bee  
(gland secretion)

C22 ring

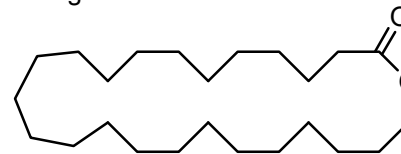


sweat bee (gland secretion,  
F sex phe., queen phe.)  
plasterer bee (gland secretion)

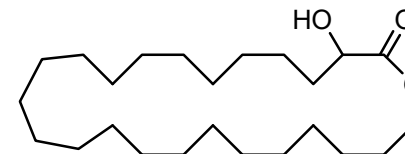


sweat bee (gland secretion)

C24 ring

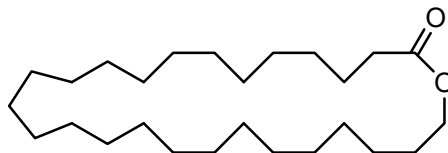


sweat bee (gland secretion,  
F sex phe.)  
plasterer bee (gland secretion)  
termite (allomone ?)

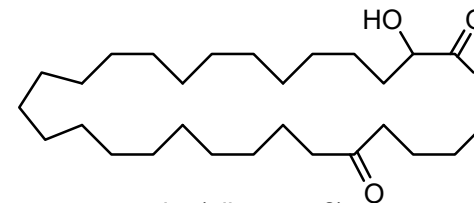
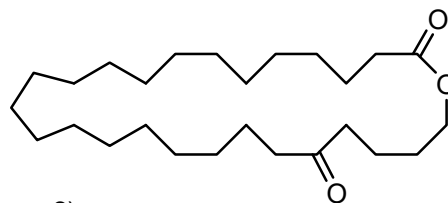


termite (allomone ?)

C26 ring

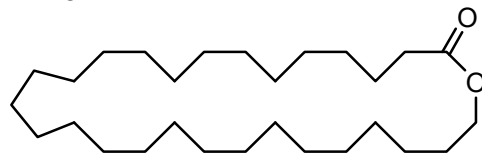


termite (allomone ?)



termite (allomone ?)

C28 ring



termite (allomone ?)

