

Part II. List of Other Arthropod Pheromones and Allomones

Update: February 21, 2026

(A) Terpenoid Compounds

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

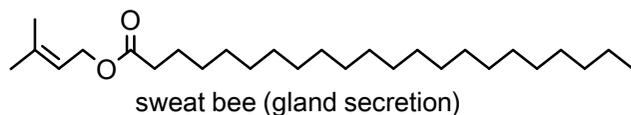
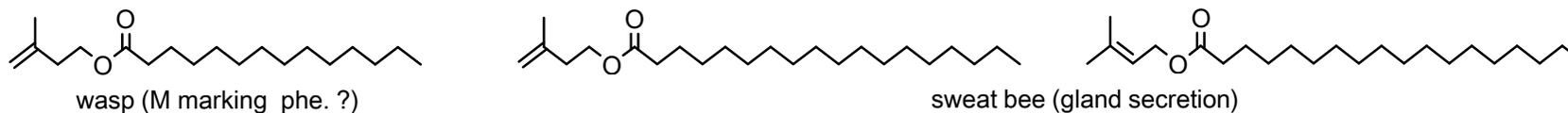
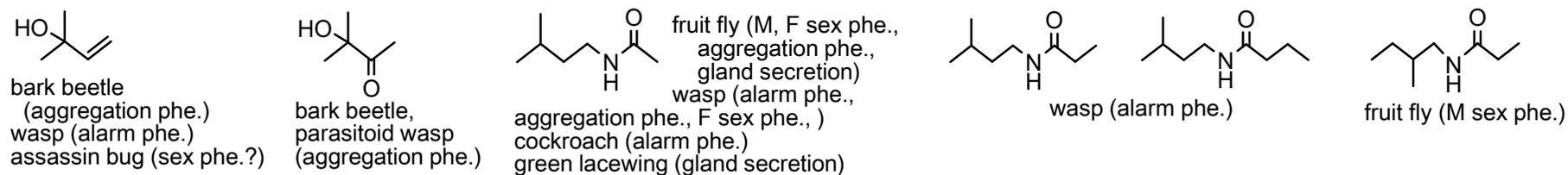
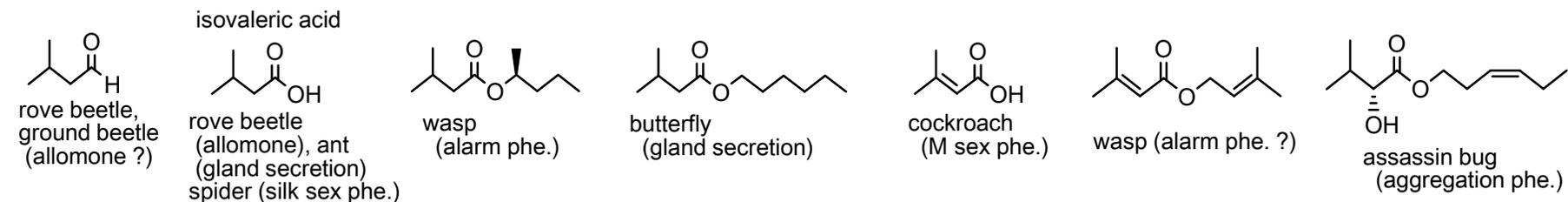
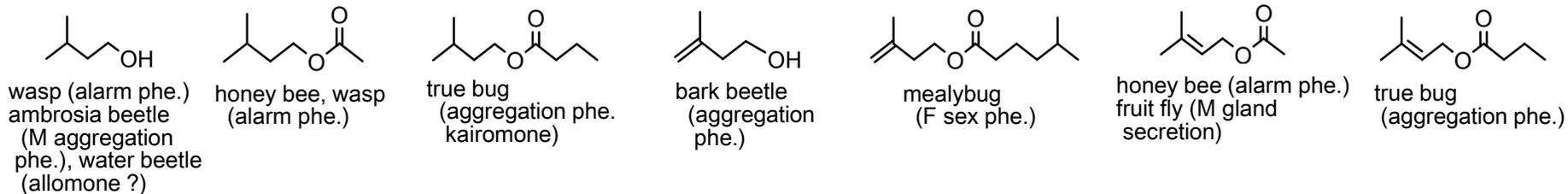
- | | | | |
|---------|---------------------------------|--------|-----------------|
| [A-1] | Terpene: Acyclic compounds | i – x | (194 compounds) |
| [A-2] | Terpene: Small ring compounds | i – v | (105 compounds) |
| [A-3] | Terpene: Large ring compounds | i – ii | (17 compounds) |
| [A-4] | Terpene: Fused-ring compounds | i – xi | (156 compounds) |
| [A-5] | Terpene: Heterocyclic compounds | i – ii | (34 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.

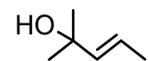
[A-1] Terpene: Acyclic comp. (i)

C5 (C4 chain)



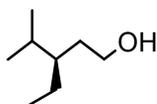
[A-1] Terpene: Acyclic comp. (ii)

C6 (C5 chain)

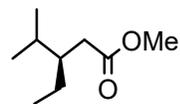


assassin bug
(sex phe.?)

C8 (C5 chain)



ant (queen
sex phe.)

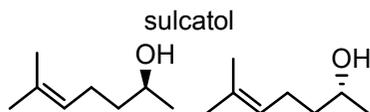


ant (alarm phe ?,
queen sex phe.)

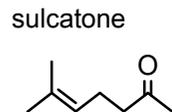
C8 (C7 chain)



rove beetle
(allomone ?)



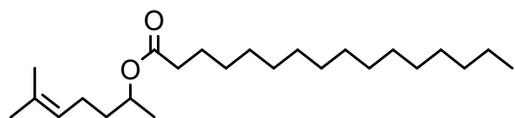
bark beetle, longhorn beetle
(aggregation phe.)
ambrosia beetle (M sex phe.)



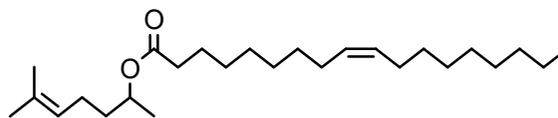
sulcatone

rove beetle, leaf beetle, butterfly, water beetle,
parasitoid wasp, harvestman (allomone)
rove beetle, ant (alarm phe.), stingless bee (kairomone)
aphid, parasitoid wasp (spacing phe.),
moth, butterfly, ambrosia beetle (M sex phe.)
spider, parasitoid wasp (F sex phe.)
moth (larva aggregation phe.), weevil, sap beetle (M aggregation phe.)

sulcatyl palmitate

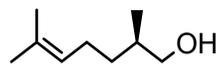


sulcatyl oleate

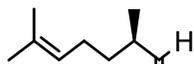


butterfly (allomone)

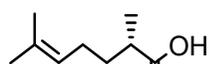
C9 (C7 chain)



acarid mite
(F sex phe.)
ant (M sex phe.
alarm phe.)
ant, mining bee
(allomone)



acarid mite
(F sex phe.)



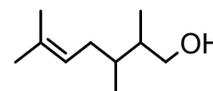
scarab beetle
(M sex phe.)



mealybug
(F sex phe.)

C10 (C7 chain)

lasiol

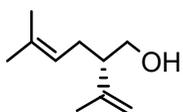


ant (allomone)

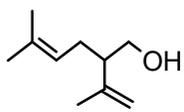
[A-1] Terpene: Acyclic comp. (iii)

C10 (C6 chain)

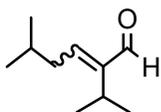
lavandulol



mealybug
(F sex phe.)

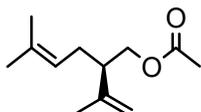


carrion beetle
(allomone)

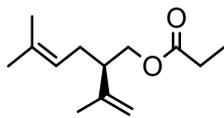


ant (alarm phe.)

lavandulyl acetate

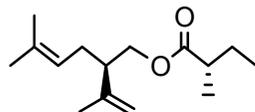


mealybug (F sex phe.)
thrips (aggregation phe.)

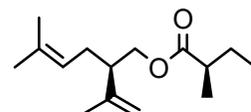


mealybug (F sex phe.)

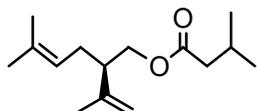
lavandulyl 2-methylbutyrate



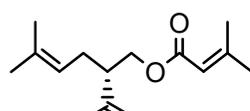
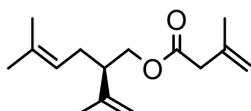
thrips (M aggregation phe.)



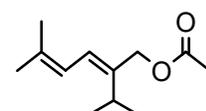
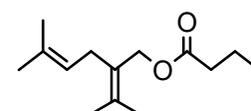
fujikonyl butylate



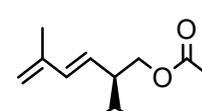
thrips (aggregation phe.)



mealybug (F sex phe.)

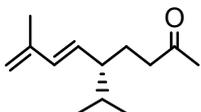


mealybug (F sex phe.)



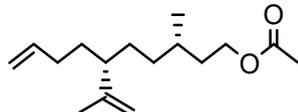
C13 (C9 chain)

solanone

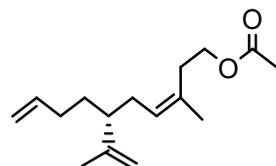


scale (F sex phe.)

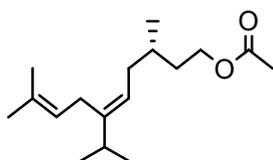
C14 (C10 chain)



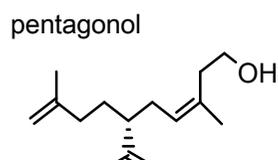
scale (F sex phe.)



C15 (C10 chain)

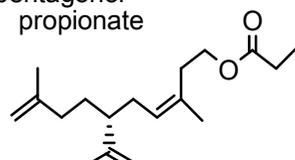


scale (F sex phe.)



pentagonol

pentagonol
propionate

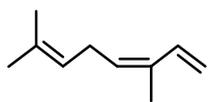


scale (F sex phe.)

[A-1] Terpene: Acyclic comp. (iv)

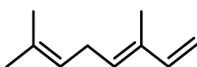
C10 (C8 chain)

Z- β -ocimene



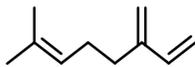
termite, butterfly
(allomone)

E- β -ocimene



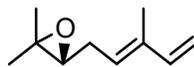
butterfly (antiaphrodisiac
phe.), darkling beetle
(M aggregation phe.)
honey bee (blood primer
phe.), termite (alarm phe.)

β -myrcene



butterfly (larva
allomone)
thrips (alarm phe. ?)
termite (allomone ?,
alarm phe.)

ocimene epoxide

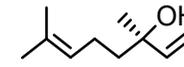


true bug
(M sex phe.)

linalool

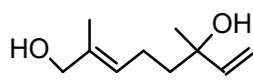


plasterer bee (F sex phe.,
aggregation phe.),
butterfly (M sex phe. ?)
flower bug (allomone)
fruit fly (M sex phe.), darkling
beetle (M aggregation phe.)

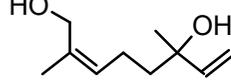


stink bug, red bug
(gland secretion)

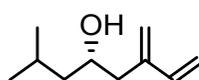
8-hydroxylinalool



scentless plant bug (allomone)

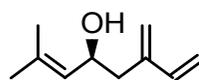


ipsenol

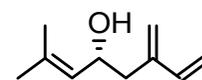


bark beetle
(aggregation phe.)

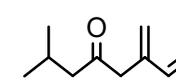
ipsdienol



bark beetle
(aggregation phe.)

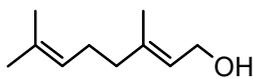


ipsenone



bark beetle
(M gland secretion)

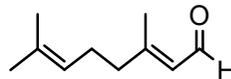
geraniol



stingless bee (primer phe.), mining
bee, cuckoo bee (marking phe. ?)
scarab beetle (allomone)

ant, lace bug
(alarm phe.)

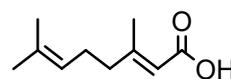
geranial



butterfly (M sex phe. ?), stingless bee (trail
phe., alarm phe.), mining bee (gland
secretion), honey bee, plasterer bee, dried
fruit ambrosia beetle (aggregation phe.)
mite, (alarm phe., allomone)

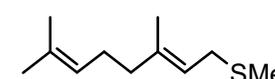
ant (alarm phe.)
parasitoid wasp
(F sex phe.)

geranic acid



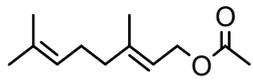
mining bee
(gland secretion)

geranyl methyl thioether



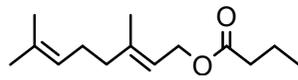
butterfly (M sex phe.)

geranyl acetate

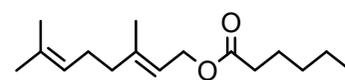


cuckoo bee (marking phe. ?)
venomous spider (F sex phe.)

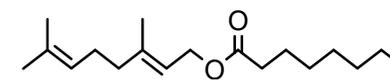
wasp (gland secretion)
leaf bug (F sex phe. ?)



click beetle (F sex phe.)

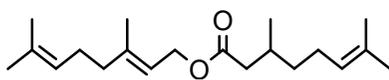


click beetle (F sex phe.)

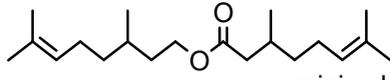


mining bee (marking phe. ?)
click beetle (F sex phe.)

geranyl citronellate

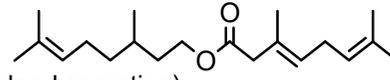


citronellyl citronellate

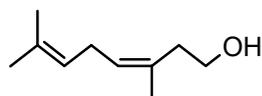


mining bee (gland secretion)

citronellyl geranate

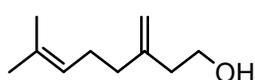


Z-isogeraniol



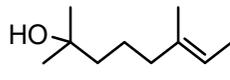
ant (recruitment phe.)

γ -isogeraniol



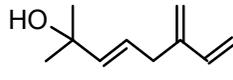
bark beetle
(aggregation phe.)

E-subaeneol



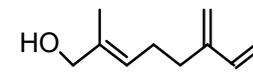
scarab beetle
(M sex phe.)

isomyrcenol (amitinol)



bark beetle (aggregation phe.)

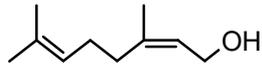
E-myrcenol



[A-1] Terpene: Acyclic comp. (v)

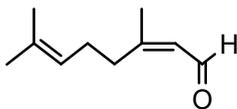
C10 (C8 chain)

nerol



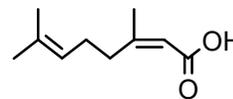
ant, stingless bee
(alarm phe.)
honey bee
(trail phe.)

neral



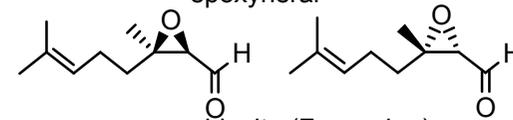
ant (alarm phe.)
parasitoid wasp
(F sex phe.)
butterfly (M sex phe.)
stingless bee (trail phe., alarm phe.), mining
bee (gland secretion), honey bee, plasterer
bee, dried fruit ambrosia beetle (aggregation
phe.), mite (alarm phe., allomone)

nerolic acid



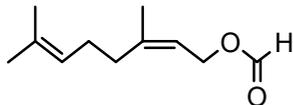
mining bee
(gland secretion)
ant (trail phe.)

epoxyneral



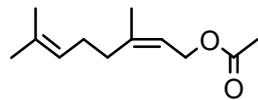
acarid mite (F sex phe.)

neryl formate

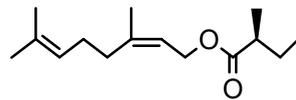


acarid mite (alarm phe.)

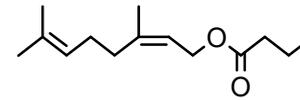
neryl acetate



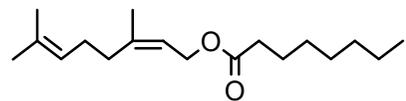
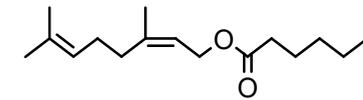
leaf bug (F sex phe. ?)



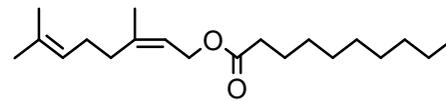
thrips (aggregation phe.)



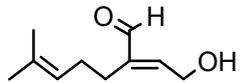
click beetle (F sex phe.)



click beetle (F sex phe.)

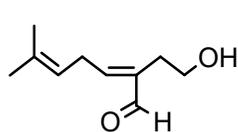


α -acaridolal

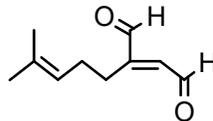


acarid mite (gland secretion)

β -acaridolal

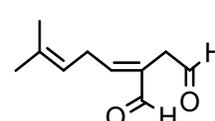


α -acaridial



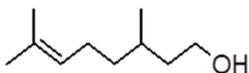
acarid mite (F sex phe.,
gland secretion)
thrips (allomone ?)

β -acaridial



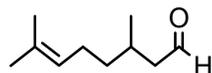
acarid mite (F sex phe.,
alarm phe., aggregation
phe., gland secretion)
thrips (allomone ?)

citronellol



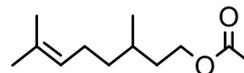
spider mite (F sex phe.)
mining bee (marking phe. ?)
bumblebee (M sex phe)

citronellal

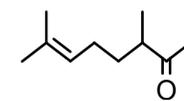


ant (secretion, alarm phe.)
rove beetle (allomone ?)

citronellyl acetate



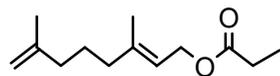
cuckoo bee
(gland secretion)



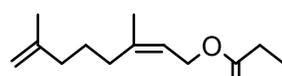
ant (allomone ?)

[A-1] Terpene: Acyclic comp. (vi)

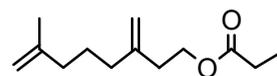
C10 (C8 chain)



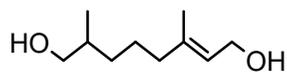
scale (F sex phe.)



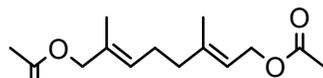
scale (F sex phe.)



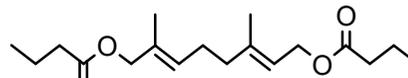
scale (F sex phe.)



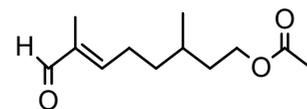
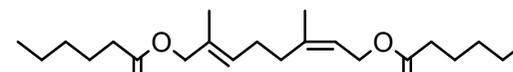
butterfly (M sex phe.)



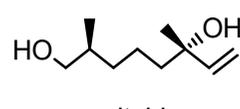
stink bug (M sex phe.)



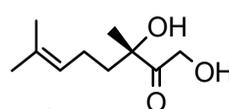
click beetle (F sex phe.)



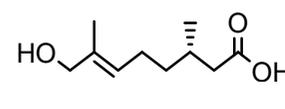
rove beetle (allomone)



parasitoid wasp
(M sex phe.)

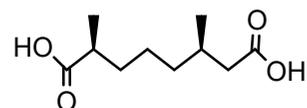


leaf beetle
(aggregation phe.)

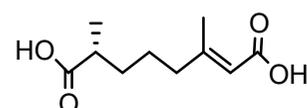
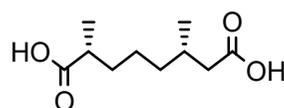


ant (allomone ?)

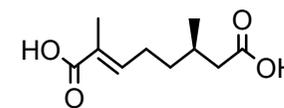
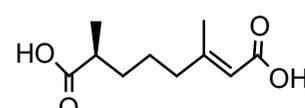
callosobruchusic acid



leaf beetle (F sex phe.)



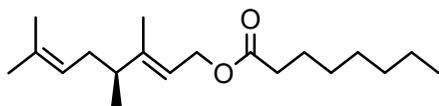
leaf beetle (F sex phe.)



ant (allomone ?)

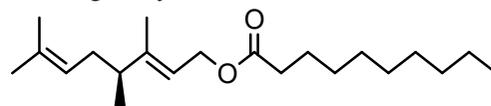
C11 (C8)

Me4-geranyl octanoate



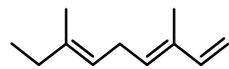
ant (trail phe.)

Me4-geranyl decanoate



C11 (C9)

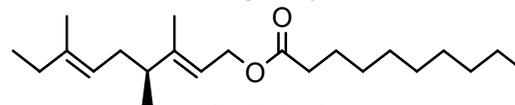
homocimene



ant (allomone ?)

C12 (C9)

bishomogeranyl decanoate

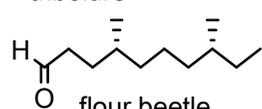


ant (trail phe.)

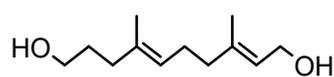
[A-1] Terpene: Acyclic comp. (vii)

C12 (C10 chain)

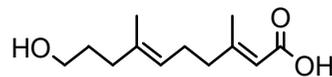
tribolure



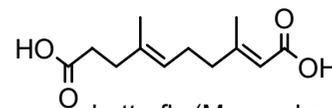
flour beetle
(aggregation phe.)



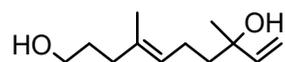
butterfly (M sex phe.)
mining bee (M gland secretion)



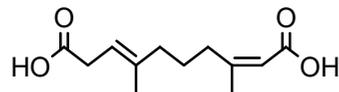
butterfly (M sex phe.)



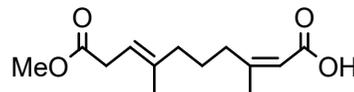
butterfly (M sex phe.)



butterfly (M sex phe.)



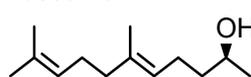
wasp (queen phe.)



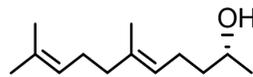
wasp (queen phe.)

C13 (C11 chain)

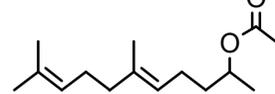
fuscumol



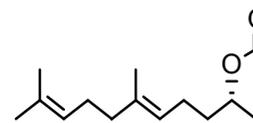
longhorn beetle (aggregation phe.)



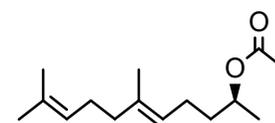
fuscumol acetate



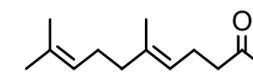
wasp (alarm phe.)



longhorn beetle (aggregation phe.)

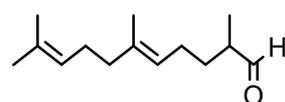


geranyl acetone

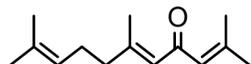


wasp (alarm phe.)
cuckoo bee (secretion)
burying beetle
long horn beetle
(aggregation phe.)
butterfly (M sex phe. ?)
tortrix moth (aggregation
(larva aggregation phr.)
venomous spider
(F sex phe.)

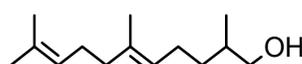
C14 (C11 chain)



termite (F sex phe.)

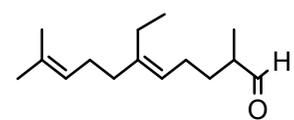


cuckoo bee (allomone)



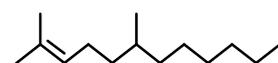
termite (trail phe.)

C15 (C11 chain)



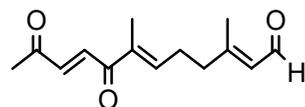
seed beetle (F sex phe.)

C14 (C12 chain)



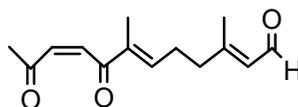
ant (guween
gland secretion)

gyrinidal



water beetle (allomone)

isogyrinidal

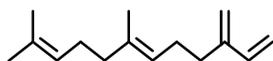


water beetle (allomone)

[A-1] Terpene: Acyclic comp. (viii)

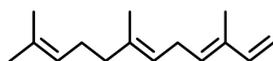
C15 (C12 chain)

E- β -farnesene



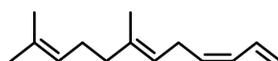
aphid (alarm phe.)
ant (gland secretion)
fruit fly (M aggregation phe.)
butterfly (allomone,
M sex phe. ?)

E,E- α -farnesene



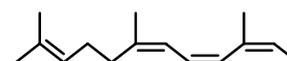
fruit fly, swift moth, butterfly,
seed beetle (M sex phe.)
emerald moth (F sex phe.)
longhorn beetle, true bug
(M aggregation phe.)
termite (alarm phe.)

Z,E- α -farnesene

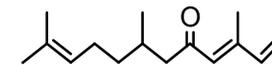


ant (trail phe., marking phe.)
aphid (alarm phe. ?), fruit fly,
seed beetle (M sex phe.)
termite, click beetle (F sex phe.)
seed bug (gland secretion)

Z,Z,Z-allofarnesene

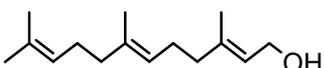


ant (trail phe.)



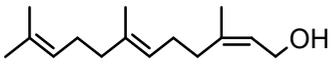
cuckoo bee (allomone)

E,E-farnesol



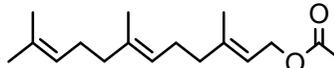
bumblebee (marking phe.)
honey bee (trail phe.)
cuckoo bee (gland secretion)
click beetle (F sex phe.)

Z,E-farnesol

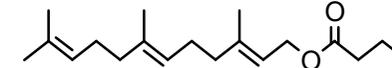


spider mite (F sex phe.)

farnesyl acetate

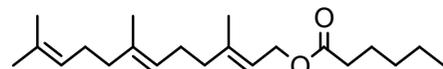


click beetle, spider
(F sex phe.)

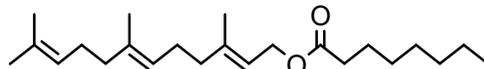


click beetle (F sex phe.)
stingless bee (trail phe. ?)

E,E-farnesyl octanoate

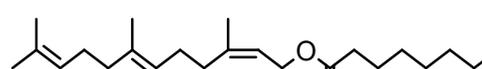


mining bee (marking phe. ?)
click beetle (F sex phe.)

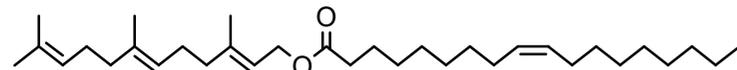


mining bee (F gland secretion)

Z,E-farnesyl octanoate

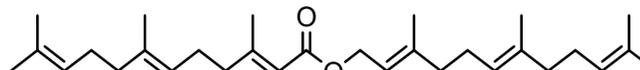


farnesyl oleate



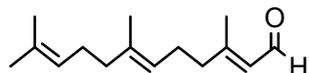
bumblebee (gyne sex phe. ?)

farnesyl farnesoate



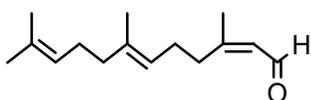
centipede (gland secretion)

E,E-farnesal

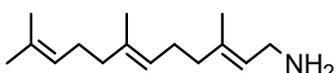


termite (allomone ?)
pyralid moth (M sex phe.)
cuckoo bee, oribatid mite
(gland secretion)

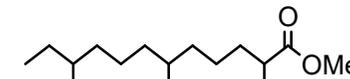
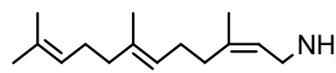
Z,E-farnesal



termite (allomone ?)
pyralid moth (M sex phe.)
cuckoo bee, oribatid mite
(gland secretion)



ant (gland secretion)

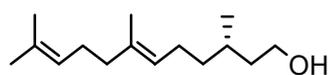


stink bug (M sex phe.)

[A-1] Terpene: Acyclic comp. (ix)

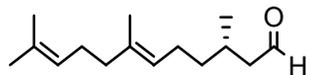
C15 (C12 chain)

2,3-dihydrofarnesol



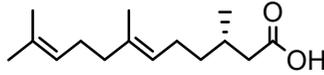
bumblebee (marking phe.)

2,3-dihydrofarnesal

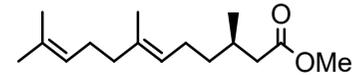


bumblebee (marking phe.)

2,3-dihydrofarnesoic acid

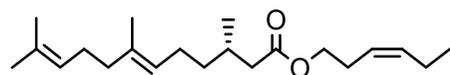


wasp (marking phe.)

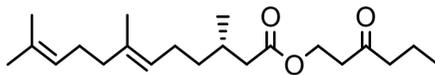


stink bug (M sex phe.)
click beetle (F sex phe.)

farnesyl 2,3-dihydrofarnesoate

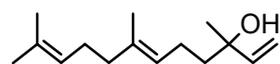


butterfly (gland secretion)

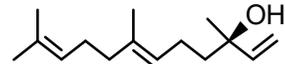


centipede (gland secretion)

E-nerolidol

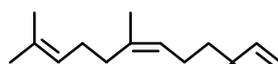


scarab, butterfly (M sex phe.)
moth (oviposition-detering phe.), ant (gland secretion)



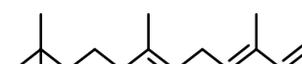
true bug (gland secretion, M aggregation phe.)
termite (F sex phe., queen phe.)

Z-nerolidol



wasp (trail phe. ?)

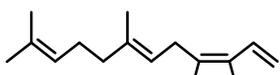
E,E- α -farnesene epoxidel



true bug (M aggregation phe.)

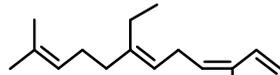
C16 (C12 chain)

Z,E- α -homofarnesene

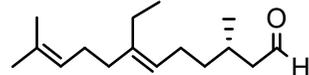


ant (trail phe.)

Z,E-homofarnesene

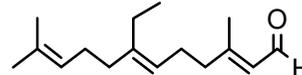


ant (marking phe.)

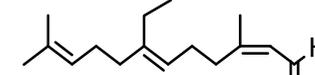


seed beetle (F sex phe.)

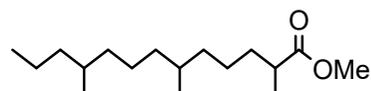
homofarnesal



seed beetle (F sex phe.)



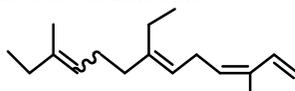
C16 (C13 chain)



stink bug (M sex phe.)

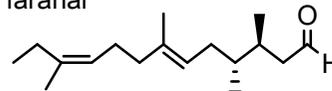
C17 (C13 chain)

bishomofarnesene



ant (marking phe.)

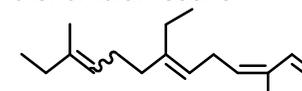
faranal



ant (trail phe.)

C18 (C13 chain)

trishomofarnesene



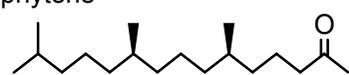
ant (gland secretion)

C18 (C15 chain)



butterfly (M sex phe.)
pyralid moth (F sex phe.)

phytone

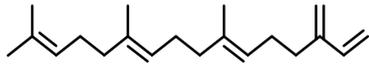


butterfly, orchid bee (M sex phe.)
pyralid moth (F and M sex phe.)
seed beetle (F sex phe.)

[A-1] Terpene: Acyclic comp. (X)

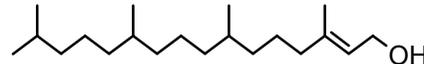
C20 (C16 chain)

β -springene



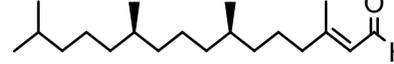
bumblebee (M gland secretion)

phytol



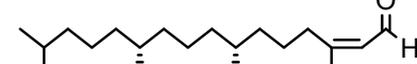
pyralid moth (M sex phe.)
noctuid moth (oviposition-detering phe.)

E-phytal



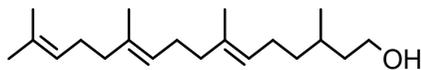
grasshopper (aggregation phe.)

Z-phytal



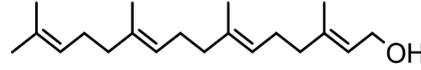
butterfly (M sex phe. ?)

geranylcitronellol



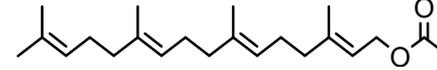
bumblebee (M gland secretion,
marking phe. ?)

geranylgeraniol



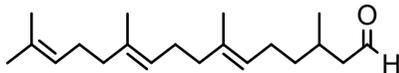
bumblebee (M marking phe.)
cuckoo bee (M gland secretion)
ant (alarm phe.)

geranylgeranyl acetate



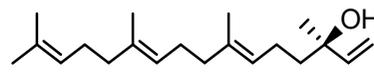
bumblebee, wasp (M marking phe.?)
bumblebee (gland secretion)
ant (trail phe.)

geranylcitronellal



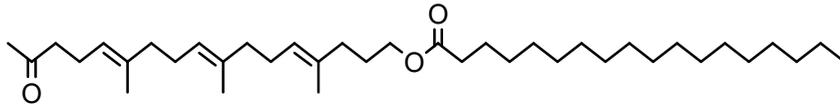
ant (gland secretion)

geranyllinalool

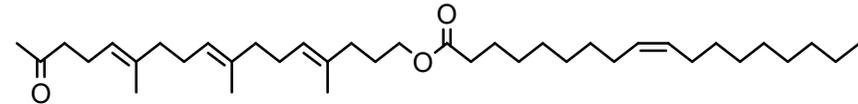


termite (allomone,
aggregation phe. alarm phe.)

C20 (C17 chain)

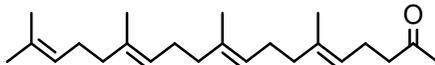


butterfly (M anti-aphrodisiac phe. ?)



C23 (C19 chain)

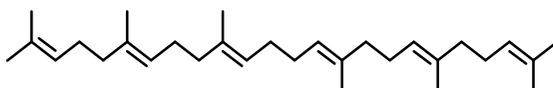
geranylgeranyl acetone



butterfly (M sex phe. ?)

C30 (C24 chain)

squalene

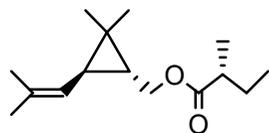


weevil (aggregation phe.)

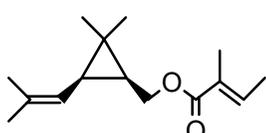
[A-2] Terpene: Small ring comp. (i)

C10 (C3 ring)

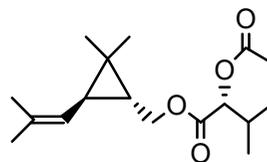
chrysanthemyl ester



mealybug (F sex phe.)



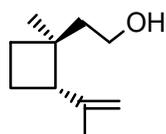
mealybug (F sex phe.)



mealybug (F sex phe.)

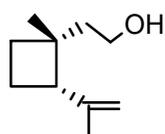
C10 (C4 ring)

fragranol



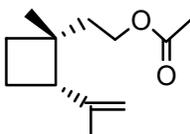
mealybug
(F sex phe.)

grandisol (grandlure I)



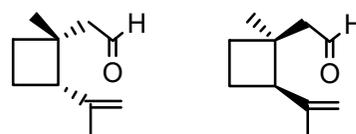
weevil, bark beetle
(aggregation phe.)
weevil M sex phe.)

grandisol acetate

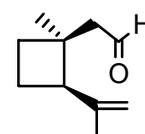


weevil (aggregation phe.)

grandisal

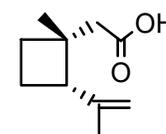


weevil (aggregation phe., M sex phe.)



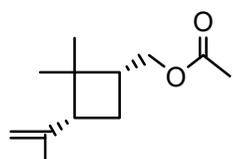
weevil (aggregation phe.)

grandisoic acid



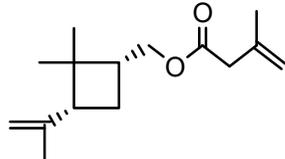
weevil (aggregation phe.)

planococcy ester



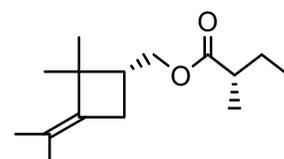
mealybug (F sex phe.)

cryptuslure

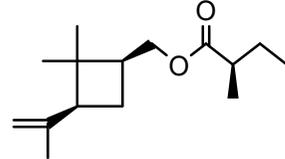


mealybug (F sex phe.)

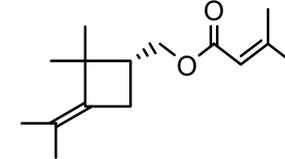
maconelliyl ester



mealybug (F sex phe.)



scale (F sex phe.)



mealybug (F sex phe.)

C15 (C4 ring)

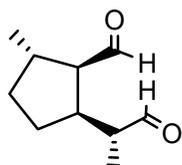
oleanderlure



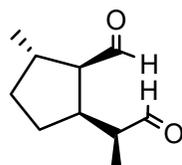
scale (F sex phe.)

[A-2] Terpene: Small ring comp. (ii)

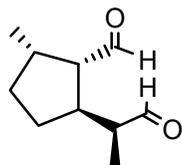
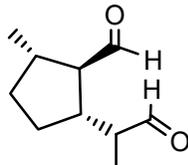
C10 (C5 ring)
iridodial



ant (allomone)
green lacewing
(aggregation phe.)

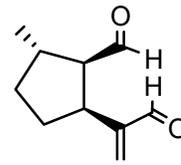


ant, longhorn beetle, rove beetle,
ground beetle (allomone)

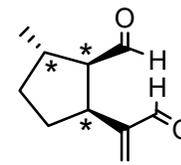


ant (allomone)

dolichodial

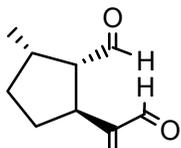


aphid (F sex phe.)



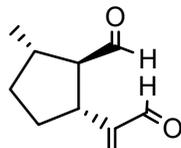
ant, sawfly, thrips,
rove beetle (allomone)

anisomorphal



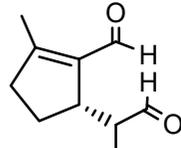
walking stick, ant
(allomone)

peruphasmal



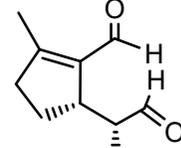
walking stick (allomone)
ant (trail phe.)

chrysolimial



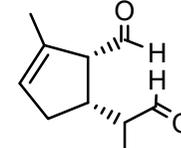
leaf beetle, oribotriiid
mite (allomone)

epi-chrysolimial

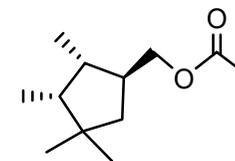


oribotriiid mite
(allomone ?)

plagiodial

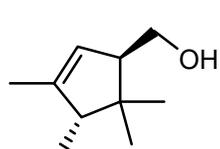


leaf beetle
(allomone)

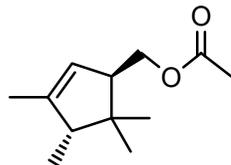


mealybug
(F sex phe.)

α -necrodol

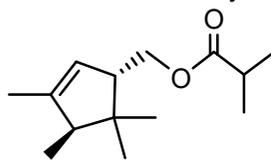


carrion beetle
(allomone)

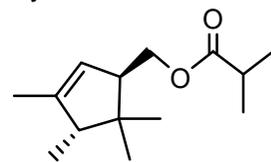


mealybug
(F sex phe.)

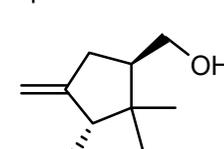
α -necrolyl isobutyrate



mealybug (F sex phe.)

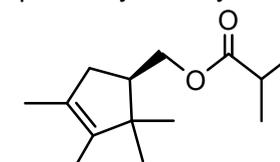


β -necrodol

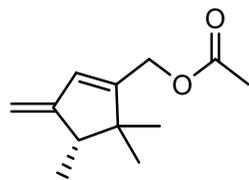


carrion beetle
(allomone)

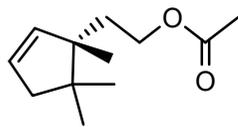
γ -necrolyl isobutyrate



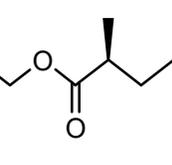
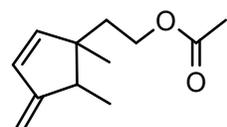
mealybug (F sex phe.)



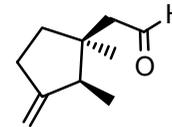
mealybug (F sex phe.)



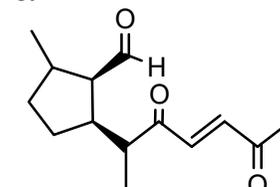
mealybug (F sex phe.)



mealybug (F sex phe.)



C14 (C5 ring)
gyrinidione

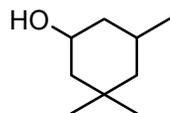


water beetle (allomone)

[A-2] Terpene: Small ring comp. (iii)

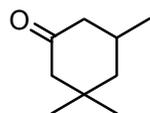
C9 (C6 ring)

cyclonol

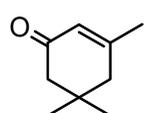


butterfly (gland secretion)

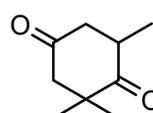
dihydroisophorone



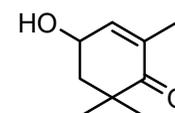
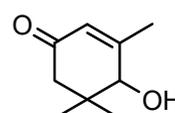
α -isophorone



bark beetle
(aggregation phe.)
butterfly (M sex phe.)

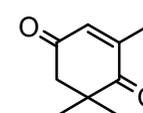


butterfly (M sex phe.)

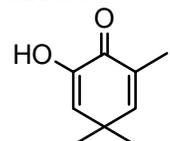


butterfly (M sex phe.)

oxoisophorone

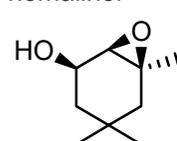


lanierone



bark beetle
(aggregation phe.)

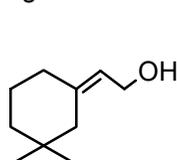
homalinol



weevil (M
aggregation phe.)

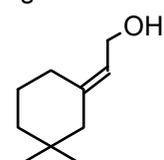
C10 (C6 ring)

Z grandlure II

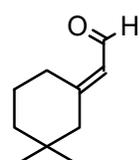


weevil, bark beetle
(M aggregation phe.)

E grandlure II

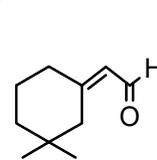


grandlure III

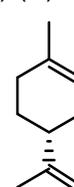


weevil, bark beetle
(M aggregation phe.)

grandlure VI

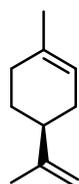


(+)-(R)-limonene



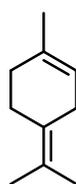
scentsless plant bug, bark beetle (gland secretion)
scentsless plant bug, ground beetle (allomone)
darkling beetle (M aggregation phe.)
ant (alarm phe., recruitment phe.)
termite (alarm phe.)
fruit fly (F sex phe.)

(-)-(S)-limonene



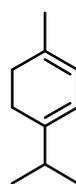
termite (alarm phe.
aggregation phe.)
ground beetle
(allomone)

terpinolene



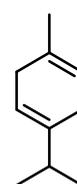
scentsless plant bug,
ant (gland secretion)
termite, firefly
(allomone)

α -terpinene



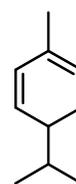
termite
(alarm phe.)

γ -terpinene



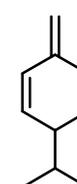
firefly (allomone)
ant (gland
secretion)

α -phellandrene



termite
(allomone ?)

β -phellandrene

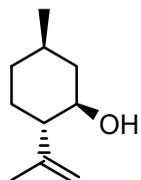


termite, butterfly,
leaf beetle
(allomone)

[A-2] Terpene: Small ring comp. (iv)

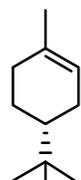
C10 (C6 ring)

isopulegol



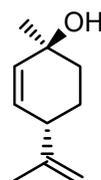
rove beetle
(allomone ?)

α -terpineol

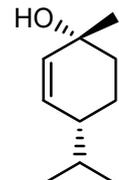


stink bug (M sex phe.)
flower bug (allomone)
weevil (M aggregation phe.)

quercivorol

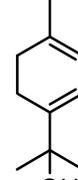


ambrosia beetle
(aggregation phe.)



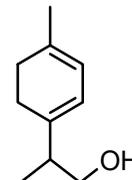
beetle (M aggregation phe.)

p-mentha-1,3-dien-8-ol

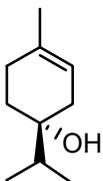


longhorned beetle
(M aggregation phe.)

p-mentha-1,3-dien-9-ol

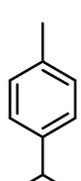


terpinen-4-ol



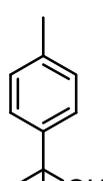
bark beetle
(aggregation phe.)

p-cymenel



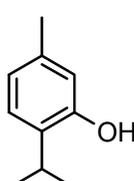
termite
(allomone?)

p-cymenel-8-ol



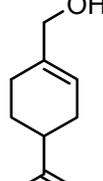
red bug
(allomone?)

thymol



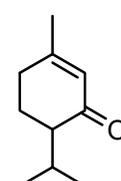
scentless plant bug
(gland secretion)
noctuid moth (oviposition-detering phe.)

perillyl alcohol

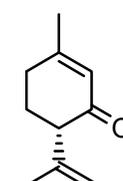


scentless plant bug
(gland secretion)

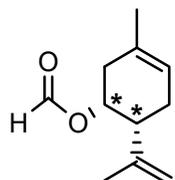
piperitone



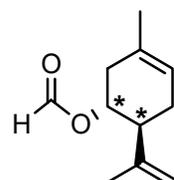
isopiperitenone



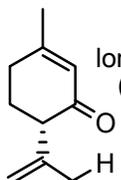
acarid mite (alarm phe., F sex phe.)



oribatid mite (gland secretion)

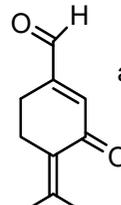


vesperal



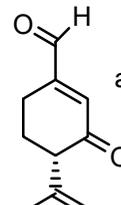
longhorn beetle
(F sex phe.)

robinal



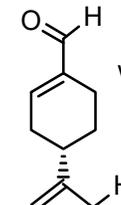
acarid mite
(gland secretion)

isorobinal



acarid mite
(F sex phe.)

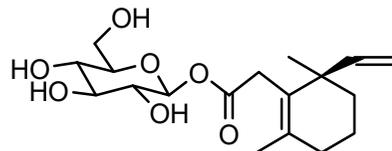
parectadial



walkingstick
(allomone)

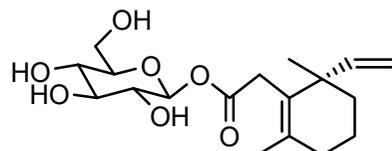
C12 (C6 ring)

suspensoside A



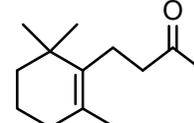
fruit fly (M sex phe.)

suspensoside B



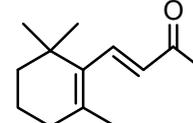
C13 (C6 ring)

dihydro- β -ionone

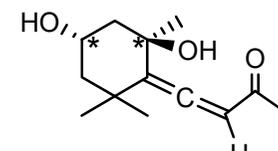


butterfly (gland secretion)

E- β -ionone



romallenone

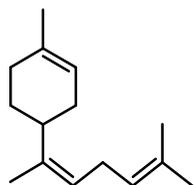


grasshopper (allomone)

[A-2] Terpene: Small ring comp. (v)

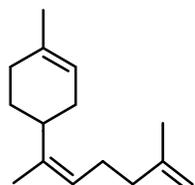
C15 (C6 ring)

α -bisabolene



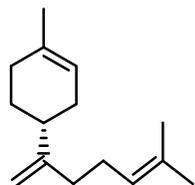
stink bug, fruit fly (M sex phe.)
butterfly, termite (allomone)

α_2 -bisabolene



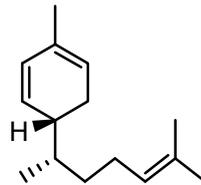
termite (allomone)

β -bisabolene



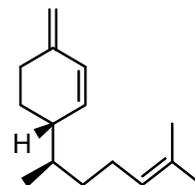
termite (allomone)
fruit fly (gland secretion)

zingiberene



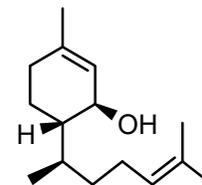
stink bug (M sex phe.)

β -sesquiphellandrenel

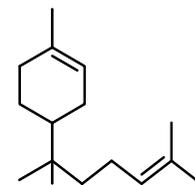


stink bug (M sex phe.)

sesquiperitol

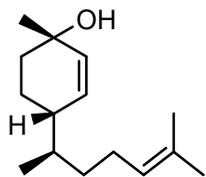


α -bisabolol



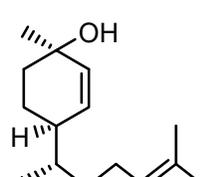
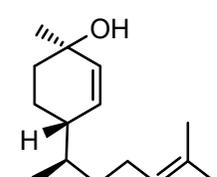
stink bug (aggregation phe.)

zingiberenol

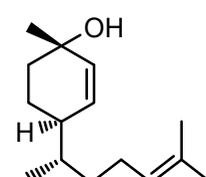


stink bug (M sex phe.)

zingiberenol

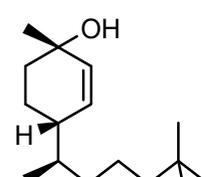


stink bug (M sex phe.)

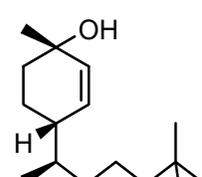


stink bug (M aggregation phe.)

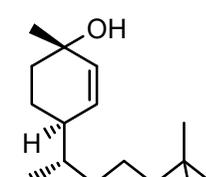
murgantiol



stink bug (M aggregation phe.)

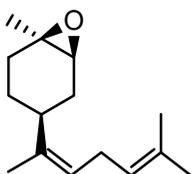


murgantiol

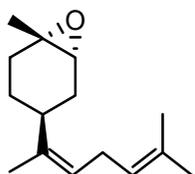


stink bug (M sex phe.)

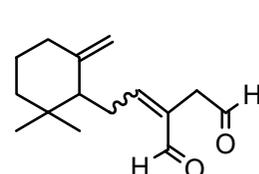
α -bisabolene epoxide



stink bug (M sex phe.)

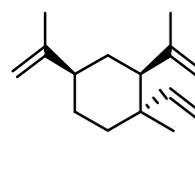


ancistrodial



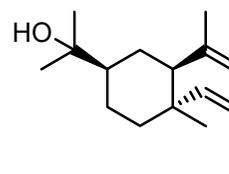
termite (allomone)

β -elemene



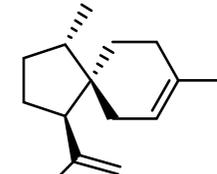
termite (gland secretion, soldier primer phe.)
butterfly (allomone)

α -elemol



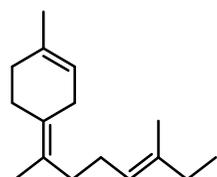
butterfly (gland secretion)

α -acoradiene



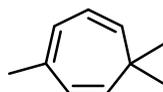
darkling beetle (aggregation phe.)

C16 (C6 ring)



stink bug (M sex phe.)

C10 (C7 ring)

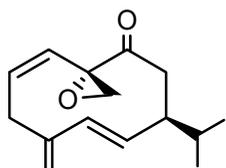


bark beetle (gland secretion)

[A-3] Terpene: Large ring comp. (i)

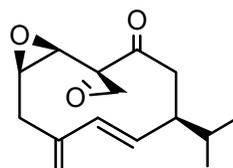
C15 (C10 ring)

periplanone A



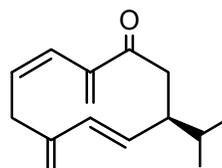
cockroach (F sex phe.)

periplanone B



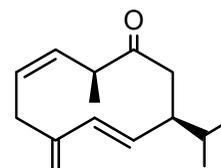
cockroach (F sex phe.)

periplanone C



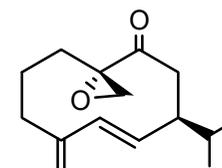
cockroach (F sex phe.)

periplanone D

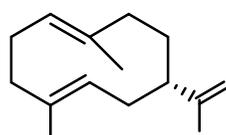


cockroach (F sex phe.)

periplanone J

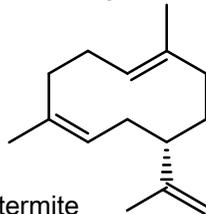


germacrene A

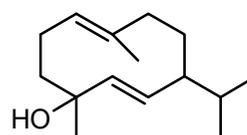


aphid (alarm phe.)
butterfly, termite
(allomone)

helminthogermacrene

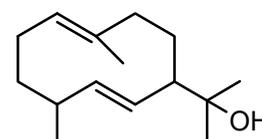


termite
(allomone)

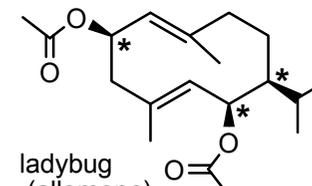


sawfly (allomone ?)

germacradienol



fungus gnat (F sex phe.)

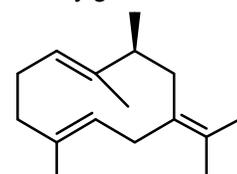


ladybug
(allomone)

cockroach (F sex phe.)

C16 (C10 ring)

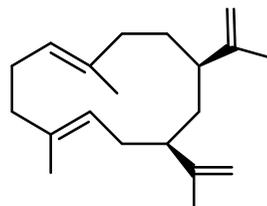
9-methylgermacrene B



sand fly (M sex phe.)

C20 (C12 ring)

cubitene

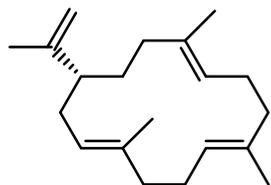


termite (allomone)

[A-3] Terpene: Large ring comp. (ii)

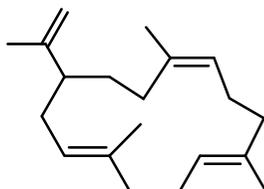
C20 (C14 ring)

cembrene A (neocembrene)



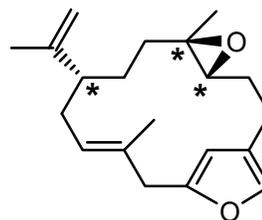
sand fly (M sex phe.)
termite (trail phe., allomone)

(3Z)-cembrene A

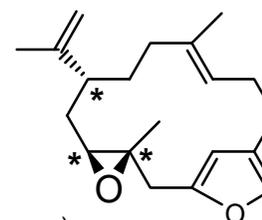


termite (allomone)

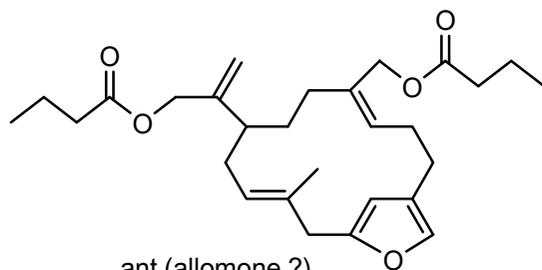
crematofuran



isocrematofuran



ant (allomone)

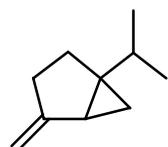


ant (allomone ?)

[A-4] Terpene: Fused-ring comp. (i)

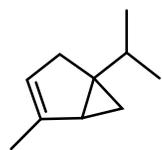
C10 (C6 ring)

sabinene



ant (gland secretion)
leaf beetle (allomone)
butterfly (larva allomone)

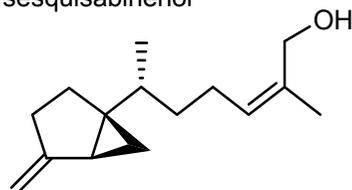
α -thujene



termite, red bug
(allomone)

C15 (C6 ring)

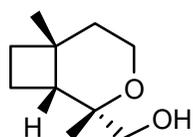
sesquisabinenol



stink bug
(aggregation phe.)

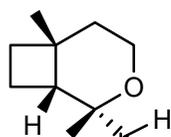
C10 (C7 ring)

papayanol



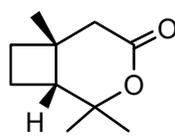
weevil
(aggregation phe.)

papayanal



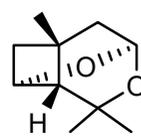
weevil
(aggregation phe.)

grandisolide



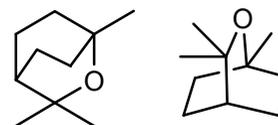
weevil
(aggregation phe.)

lineatin



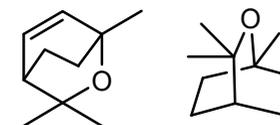
bark beetle
(aggregation phe.)

1,8-cineole (eucalyptol)



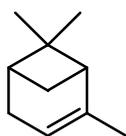
rove beetle, ground beetle,
seed bug (allomone)
bumblebee (recruitment)
mite (gland secretion)

dehydrocineole



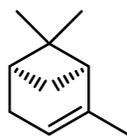
acarid mite, oribatid mite
(gland secretion)

α -pinene



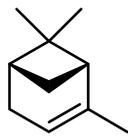
darkling beetle, ant,
butterfly (allomone)
giant stag beetle
(F sex phe.)

(+)- α -pinene



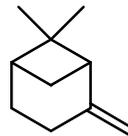
burrowing bug
(allomone)
termite (alarm
phe., allomone)

(-)- α -pinene



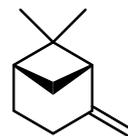
bark beetle
(aggregation phe.)
termite, aphid
(alarm phe.)
termite (allomone)

β -pinene



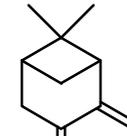
ant (alarm phe.)
millipede
(allomone)

(-)- β -pinene



burrowing bug, scentless
plant bug (allomone)
aphid, (alarm phe.)
termite (allomone, alarm
phe., aggregation phe.)

pinocarvone



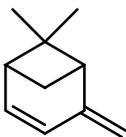
noctuid moth,
bark beetle (M
gland secretion)

trans-pinocarveol



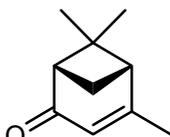
bark beetle (F
gland secretion)

verbenene



bark beetle (aggregation phe.)

verbenone

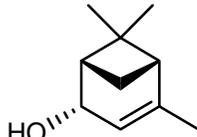


trans-verbenol

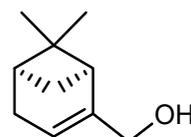


bark beetle (aggregation phe.)

cis-verbenol



(+)-myrtenol



bark beetle (aggregation phe.)

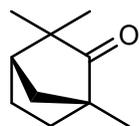
(-)-myrtenol



[A-4] Terpene: Fused-ring comp. (ii)

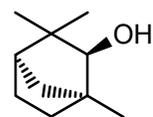
C10 (C7 ring)

fenchone



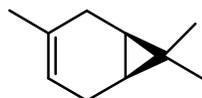
bark beetle
(kairomone)

(-)- β -fenchol



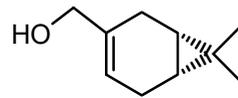
fruit fly (gland secretion)

3-carene



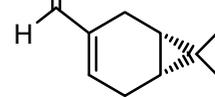
termite (alarm phe., allomone)

3-carene-10-ol



bark beetle
(aggregation phe.)

3-carene-10-al



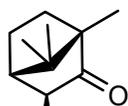
sawfly (allomone ?)

camphor



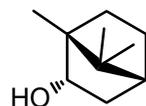
shield bug
(M sex phe.)

hydroxycamphor



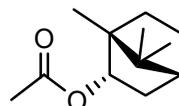
firefly
(F sex phe.)

(+)-borneol



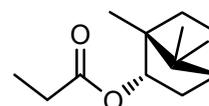
sawfly (allomone ?)
lace bug, shield bug
(sex phe.)

bornyl acetate



harvestman,
sawfly (allomone ?)

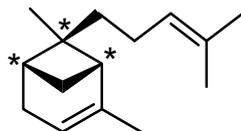
bornyl propionate



harvestman,
(allomone ?)

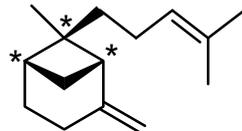
C15 (C7)

α -*trans*-bergamotene



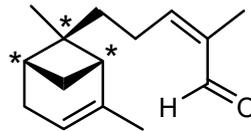
fruit fly (gland secretion)
wasp, true bug
(M sex phe.)

β -*trans*-bergamotene



wasp (M sex phe.)

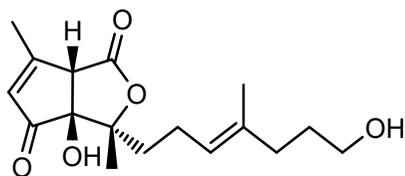
bergamotenal



stink bug (M sex phe.)

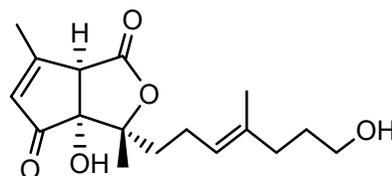
C17 (C7 ring)

gomadalactone A

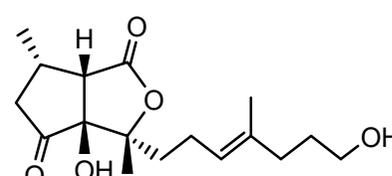


longhorn beetle (F sex phe.)

gomadalactone B



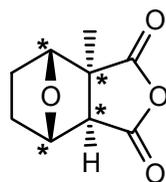
gomadalactone C



longhorn beetle (F sex phe.)

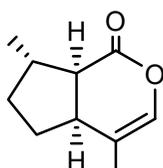
[A-4] Terpene: Fused-ring comp. (iii)

C9 (C8 ring)
palasonin



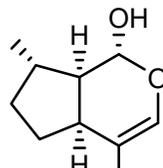
blister beetle,
rove beetle,
checked beetle
(allomone)

C10 (C8 ring)
nepetalactone

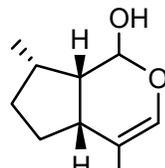


aphid (F sex phe.)

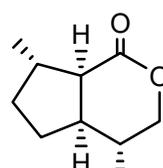
nepetalactol



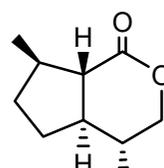
aphid (F sex phe.)



dihydronepetalactone

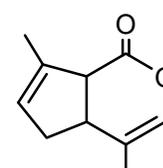


ant (allomone)



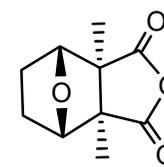
parasitoid wasp
(allomone)

gastrolactone



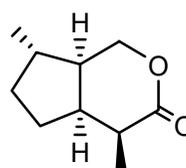
leaf beetle
(allomone)

cantharidin



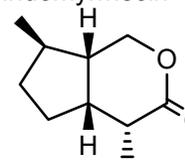
blister beetle, false blister
beetle *etc.* (allomone)
biting midge
(aggregation phe.)

iridomyrmecin

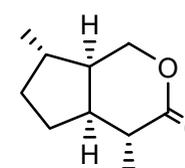


parasitoid wasp (allomone)
ant (allomone,
trail phe.)

epi-
iridomyrmecin

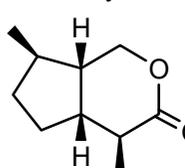


isoiridomyrmecin

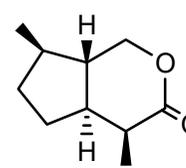
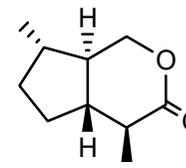


ant (allomone)

epi-
isoiridomyrmecin

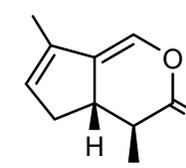


parasitoid wasp (allomone)



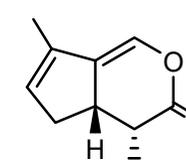
parasitoid wasp
(allomone)

plagiolactone



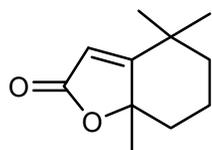
leaf beetle
(allomone)

epiplagiolactone



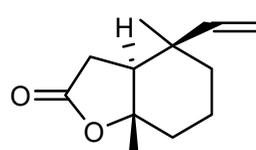
leaf beetle
(allomone)

C11 (C8 ring)
dihydroactinidioliden



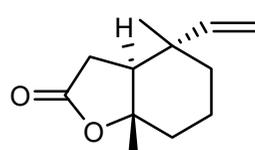
butterfly (M sex phe.)

C12 (C8 ring)
anastrephin



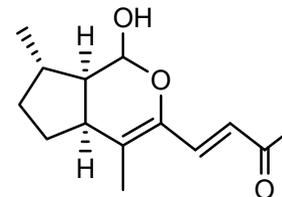
fruit fly (M sex phe.)

epi-anastrephin



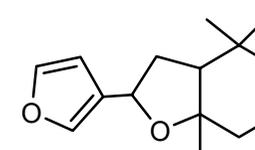
fruit fly (M sex phe.)

C14 (C8 ring)
gyrinidone



water beetle (allomone)

C15 (C8 ring)
ancistrofuran

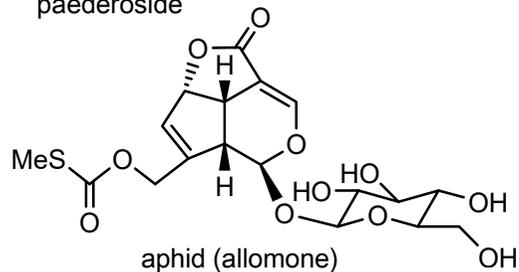


termite (allomone)

[A-4] Terpene: Fused-ring comp. (iv)

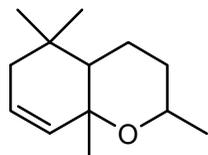
C10 (C9 ring)

paederoside

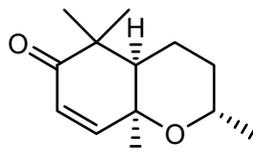
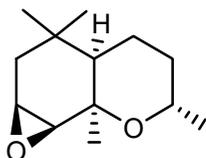


C13 (C9 ring)

dihydroedulan

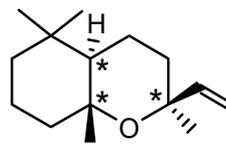


epoxytetrahydroedulan

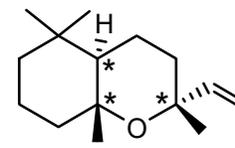


C15 (C9 ring)

cararrapi oxide

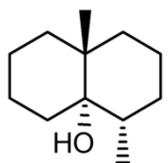


epi-cararrapi oxide



C12 (C10 ring)

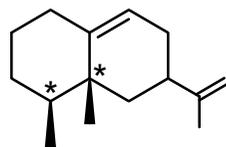
geosmin



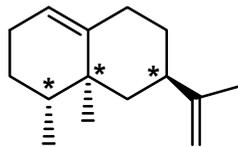
millipede (alarm phe.)

C15 (C10 ring)

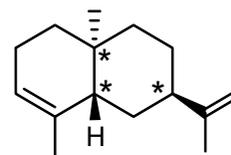
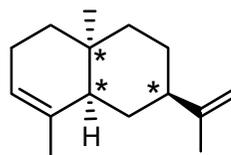
aristolochene



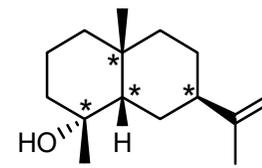
valencene



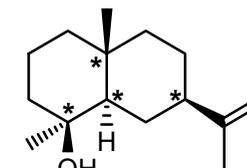
epi- α -selinene



amiteol



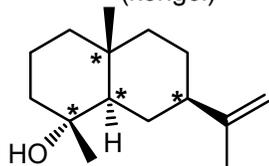
neo-intermedeol



[A-4] Terpene: Fused-ring comp. (v)

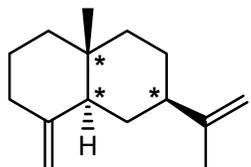
C15 (C10 ring)

selin-11-en-4 α -ol
(kongol)

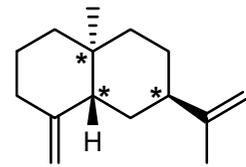


butterfly (larva
allomone ?)

β -selinene

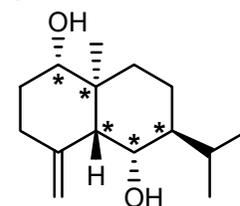


butterfly (larva allomone ?)
termite (aggregation phe.)



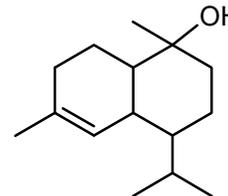
termite
(gland secretion)

platambin



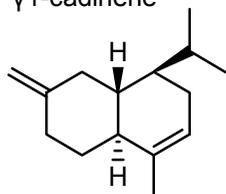
water beetle
(allomone ?)

torreyol (δ -cadinol)



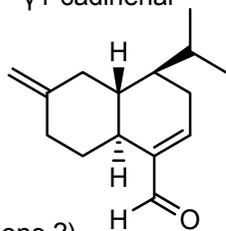
butterfly (M sex phe.)

γ 1-cadinene

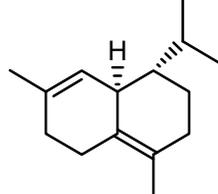


termite (allomone ?)

γ 1-cadinenal

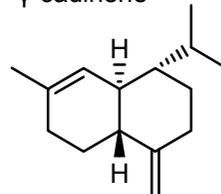


δ -cadinene



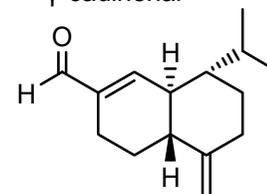
butterfly (larva
allomone ?, M gland
secretion)

γ -cadinene



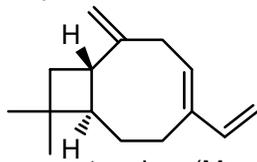
termite (primer phe.,
allomone), leaf beetle
(M sex phe. ?)

γ -cadinenal



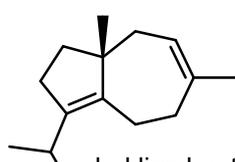
termite (primer phe.,
allomone)

leptotriene



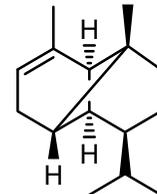
true bug (M
aggregation phe.)

daucene

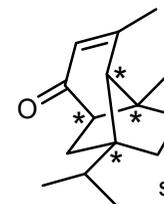


darkling beetle
(M aggregation phe.)

α -copaene



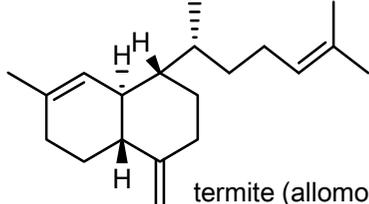
giant stag beetle
(F sex phe.)



stink bug
(M sex phe.)

C20 (C10 ring)

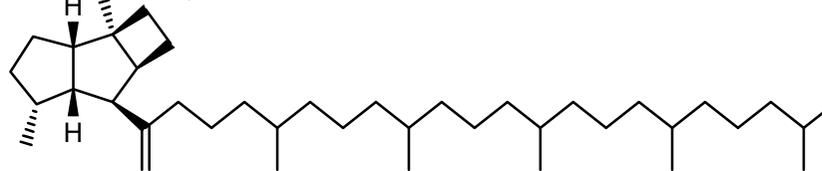
bifloratriene



termite (allomone)

C40 (C10 ring)

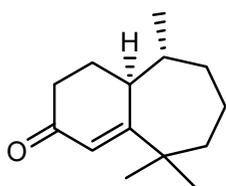
poduran



springtail (allomone ?)

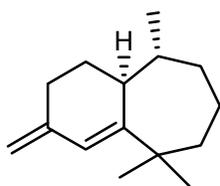
[A-4] Terpene: Fused-ring comp. (vi)

C14 (C11 ring)

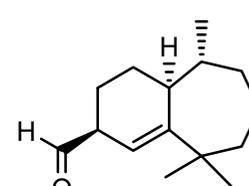
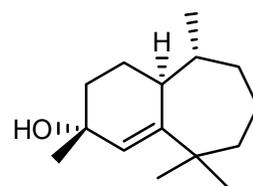


leaf beetle
(M sex phe. ?)

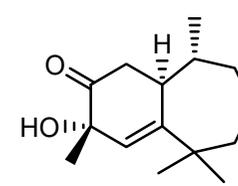
C15 (C11 ring)



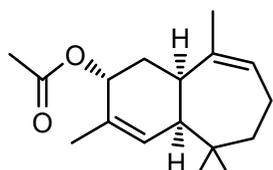
leaf beetle (M sex phe. ?)



leaf beetle (aggregation phe.)

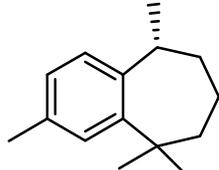


γ -himachalene

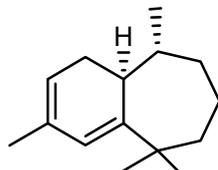


butterfly
(M sex phe. ?)

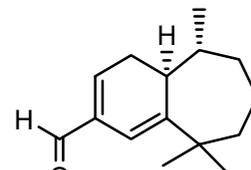
ar-himachalene



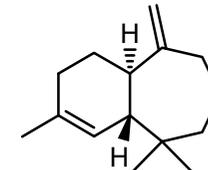
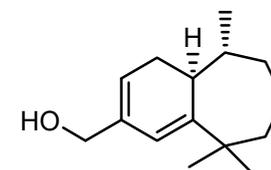
leaf beetle
(M sex phe. ?)



leaf beetle
(aggregation phe.)

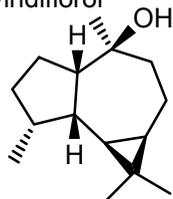


leaf beetle (M aggregation phe.)



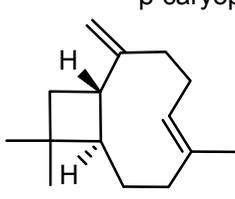
bark beetle
(M sex phe. ?)

viridiflorol

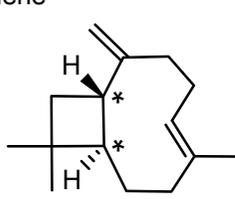


bark beetle (allomone)

β -caryophyllene

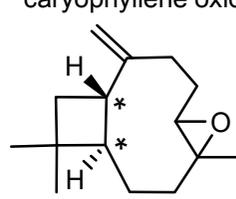


weevil, ladybug
(F aggregation,
ladybug (F sex phe.))



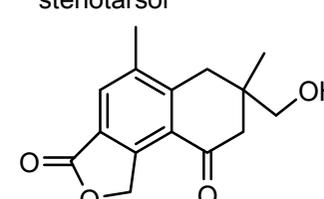
butterfly (allomone)

caryophyllene oxide



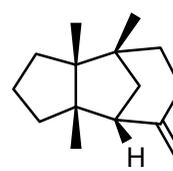
butterfly (allomone)

stenotarsol



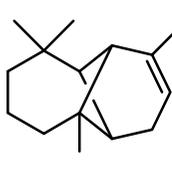
handsome fungus beetle
(allomone ?)

β -barbatene



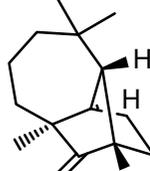
giant stag beetle
(M sexphe.)

α -longipinene



longhorn beetle
(F aggregation phe.)

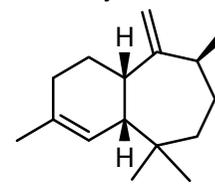
longifolene



bark beetle (M gland
secretion), giant stag
beetle (F sex phe.)

C16 (C11 ring)

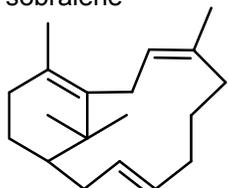
3-methyl- α -himachalene



sand fly (M sex phe.)

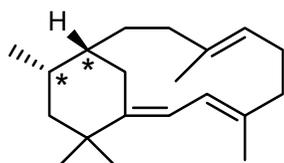
[A-4] Terpene: Fused-ring comp. (vii)

C20 (C15)
sobralene



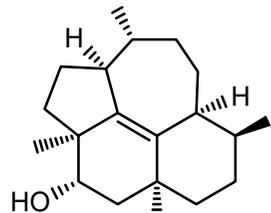
sand fly
(M sex phe.)

cubugene



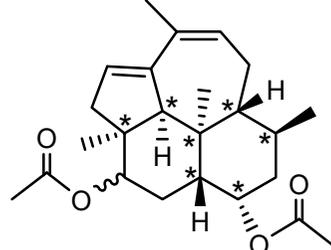
termite (allomone)

C20 (C16 ring)
rippertenol



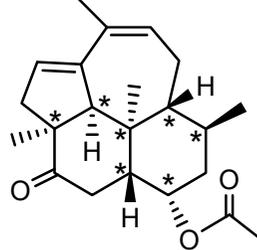
termite (allomone)

kempene 1



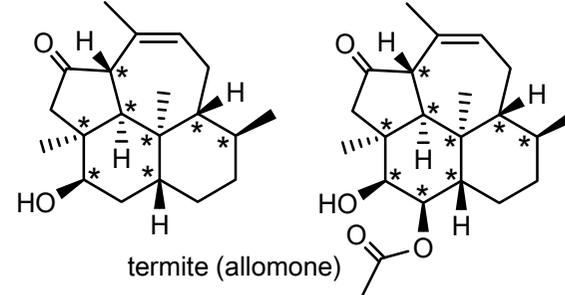
termite (allomone)

kempene 2



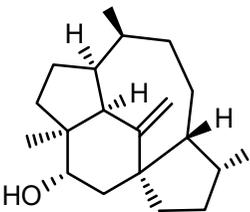
termite (allomone)

kempenone deriv.



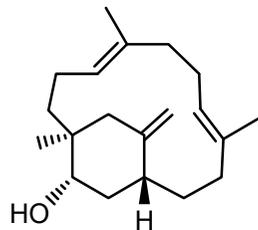
termite (allomone)

longipenol

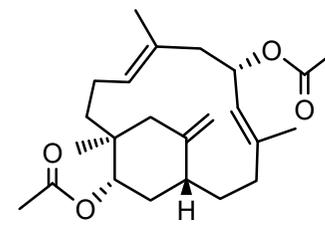
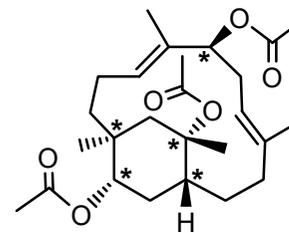


termite (allomone)

secotrinervitane



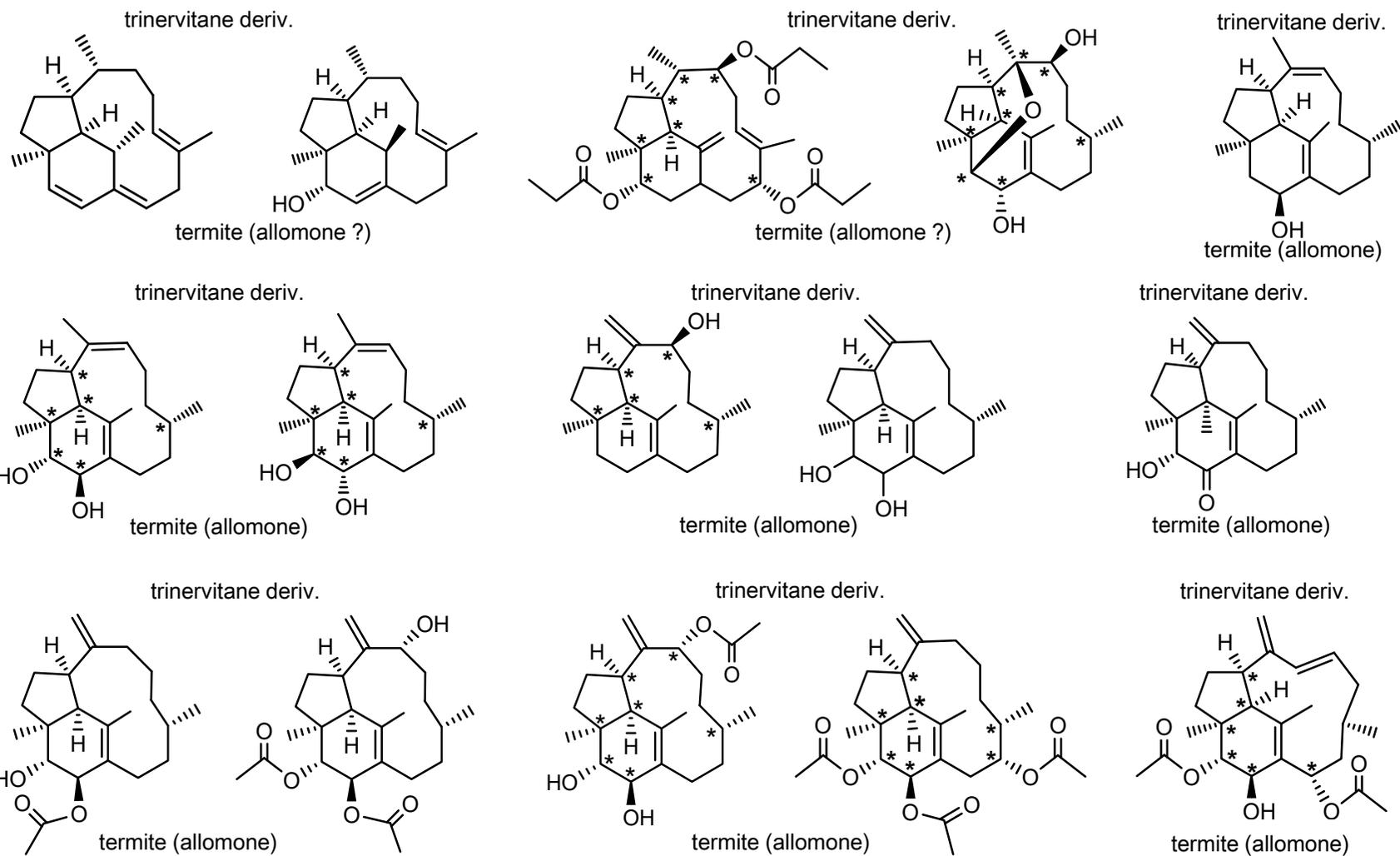
termite (allomone)



termite (allomone ?)

[A-4] Terpene: Fused-ring comp. (viii)

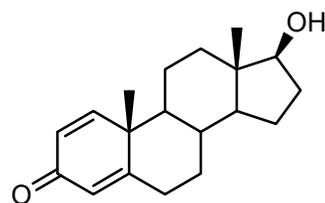
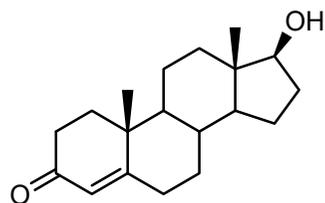
C20 (C16 ring)



[A-4] Terpene: Fused-ring comp. (ix)

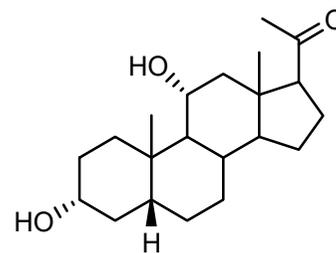
C19 (C17 ring)

testosterone

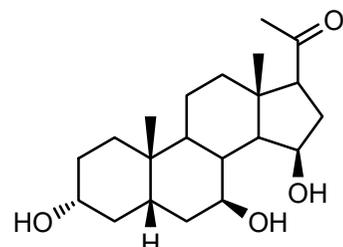
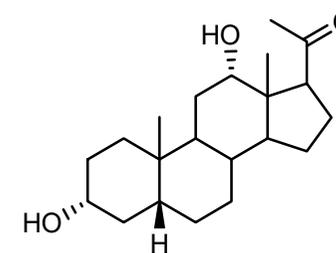


water beetle (allomone ?)

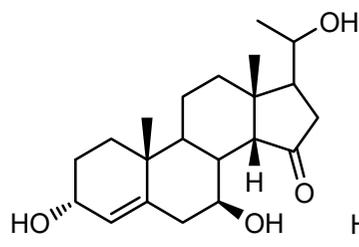
C21 (C17 ring)



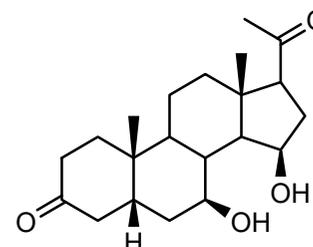
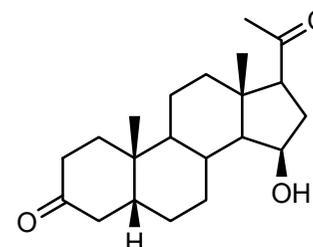
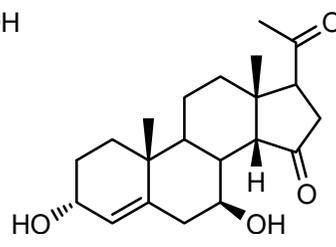
water beetle (allomone)



burying beetle (allomone)

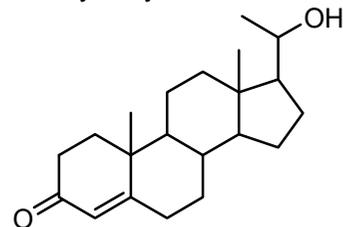


burying beetle (allomone)

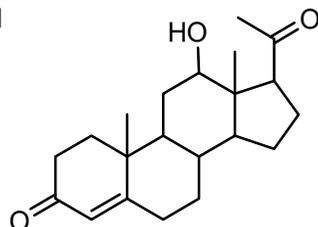


burying beetle (allomone)

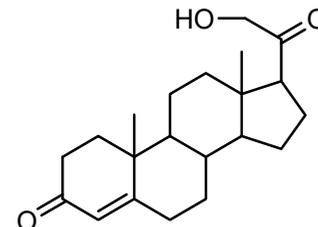
6-dihydrocysterone



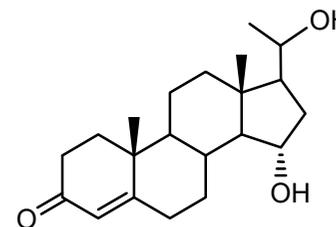
water beetle (allomone)



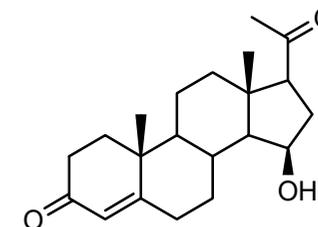
deoxycorticosterone, cortexone



water beetle, aquatic bug (allomone)

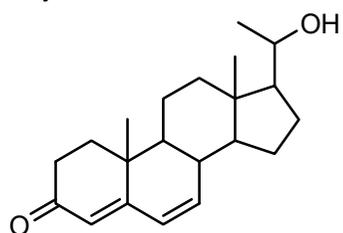


water beetle (allomone)



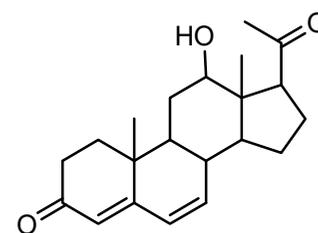
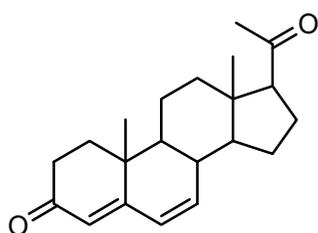
burying beetle (allomone)

cybisterone



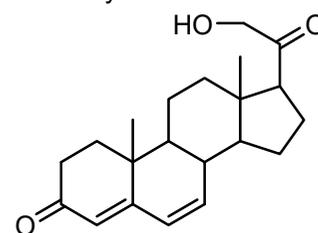
water beetle (allomone)

6-dehydroprogesterone

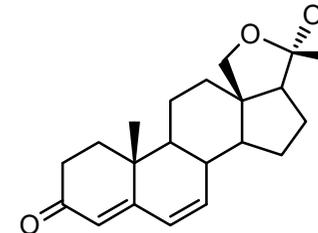


water beetle (allomone)

6-dehydrocortexone



mirasorvone

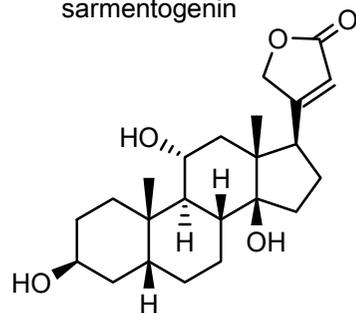


water beetle (allomone)

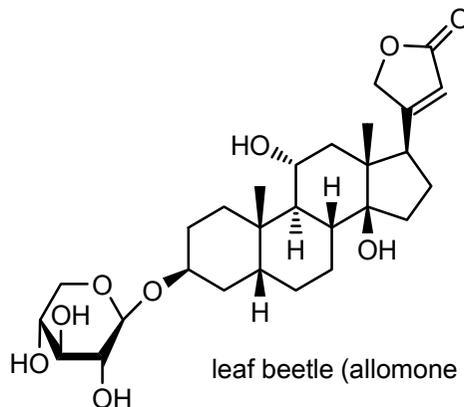
[A-4] Terpene: Fused-ring comp. (x)

C23 (C17 ring)

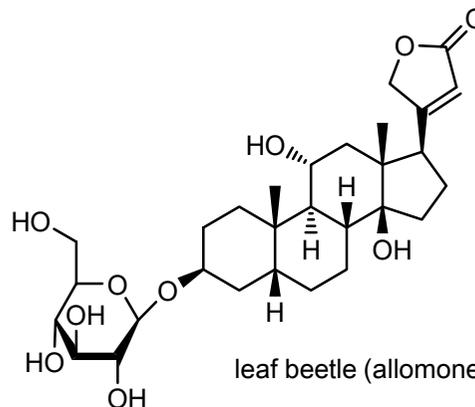
sarmentogenin



leaf beetle (allomone ?)

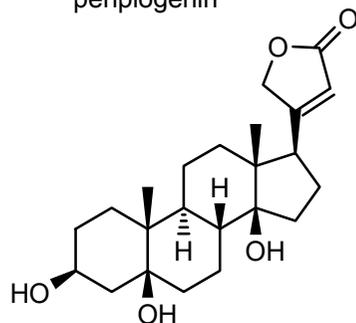


leaf beetle (allomone ?)

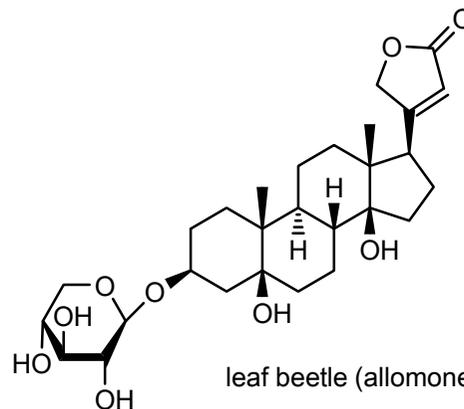


leaf beetle (allomone ?)

periplogenin

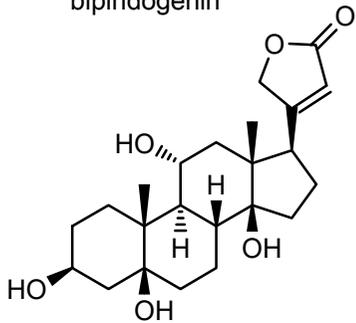


leaf beetle (allomone ?)

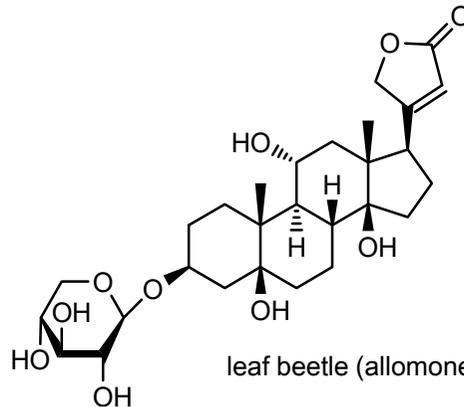


leaf beetle (allomone ?)

bipindogenin



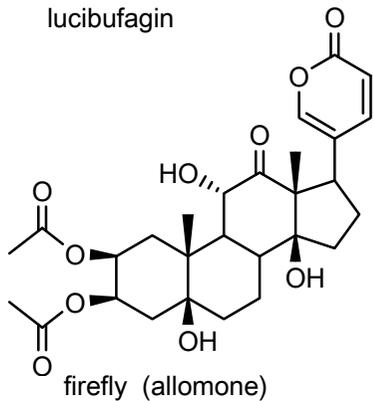
leaf beetle (allomone ?)



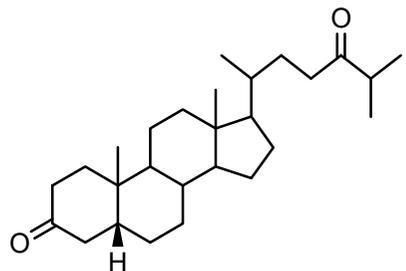
leaf beetle (allomone ?)

[A-4] Terpene: Fused-ring comp. (xi)

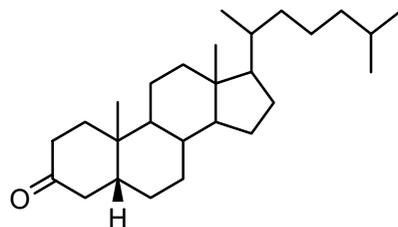
C24 (C17 ring)
lucibufagin



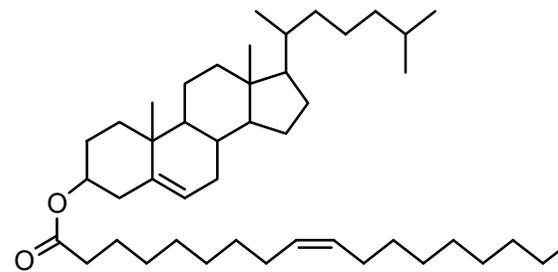
C27 (C17 ring)



lappet moth (larva trail phe.)

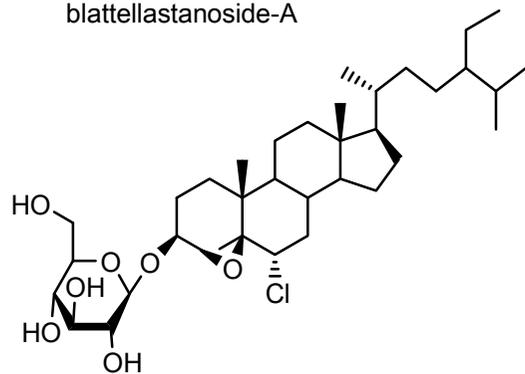


cholesteryl oleate



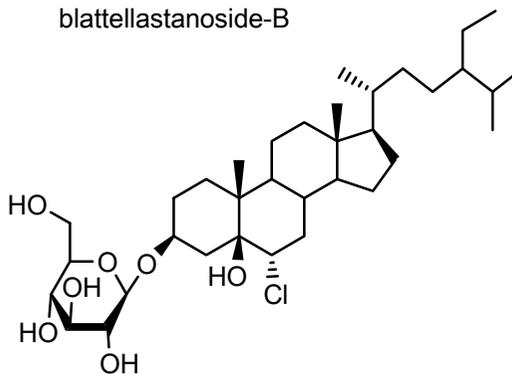
tick (F sex phe.)

C29 (C17 ring)
blattellastanoside-A



cockroach (aggregation phe.)

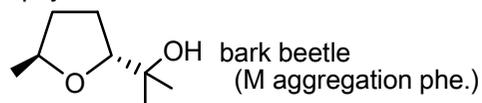
blattellastanoside-B



[A-5] Terpene: Heterocyclic comp. (i)

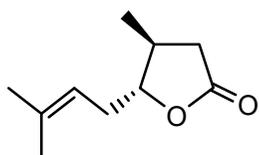
C8 (C4 ring)

pityol

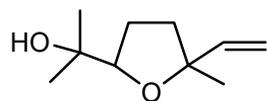


C10 (C4 ring)

eldanolide

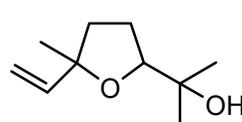


pyralid moth
(M sex phe.)



butterfly (M sex phe.)

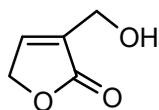
linalool oxide



butterfly (M sex phe. ?)

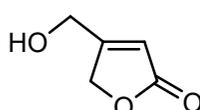
linalool oxide acetate

isosiphonodin

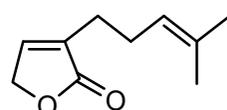


ermine moth
(larva allomone ?)

siphonodin

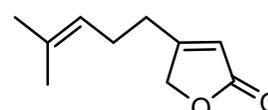


α,α -acariolide



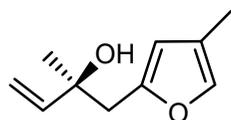
acarid mite, ant
(gland secretion)

α,β -acariolide



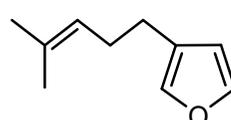
acarid mite
(gland secretion)

elymniafuran



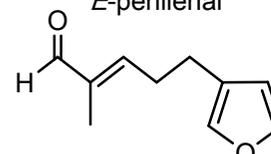
butterfly (M sex phe.)

perillen



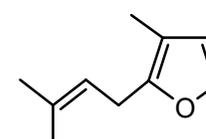
ant, thrips (alarm phe.)
parasitoid wasp, acarid mite
(gland secretion)

E-perillenal



sawfly (sex phe.)

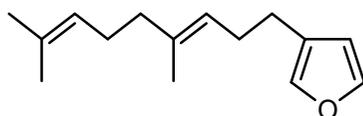
rosefuran



acarid mite (F sex phe.,
gland secretion)

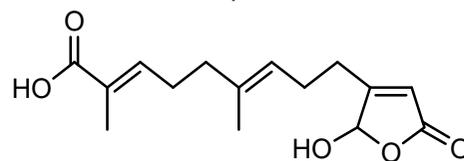
C15 (C4 ring)

dendrolasin



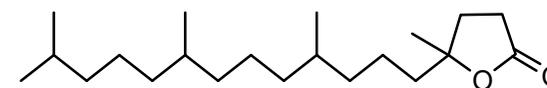
ant (alarm phe.)

dolichovespulid



wasp (queen phe.)

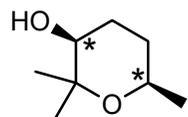
C21 (C4 ring)



butterfly (sex phe. ?)

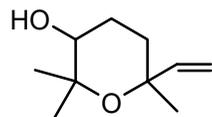
[A-5] Terpene: Heterocyclic comp. (ii)

C8 (C5 ring)
cis-vittatol

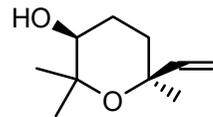


bark beetle
(M aggregation phe.)

C10 (C5 ring)

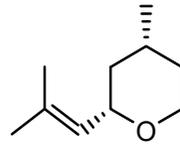


butterfly
(M sex phe.)

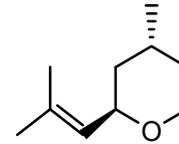


pyralid moth
(M sex phe.)

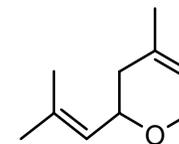
rose oxide



longhorn beetle (allomone)
assassin bug (F sex ?)
bumblebee (alarm phe.)

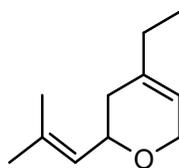


nerol oxide



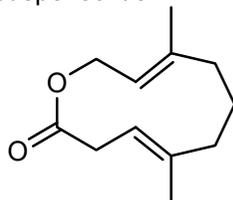
ant-lion (M sex phe. ?)

C11 (C5 ring)
10-homonerol oxide



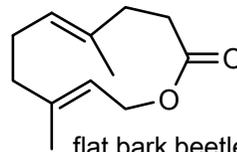
ant-lion (M sex phe. ?)

C12 (C10 ring)
suspensolide



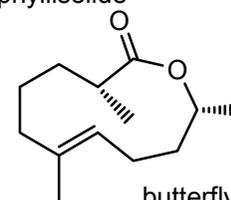
frute fly (M sex phe.)

cucujolide I,
ferrulactone



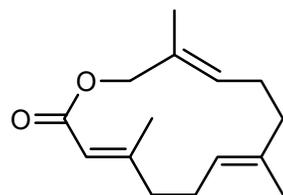
flat bark beetle
(aggregation phe.)
butterfly (M sex phe.)

C13 (C10 ring)
phyllisolide



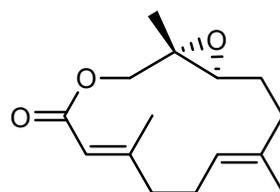
butterfly (M anti-
aphrodisiac phe.)

C15 (C12 ring)
niaviolide

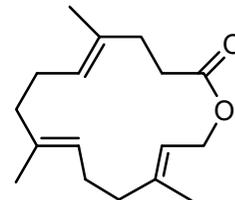


butterfly (M sex phe.)

epoxyniaviolide



C17 (C14 ring)
brassicalactone



butterfly (M sex phe.)