**Male/Female specific:**

intergroup-tolerance: -1 to +1

intragroup-tolerance: -1 to +1

male-tolerance: -1 to +1

female-tolerance: -1 to +1

home-base-preference: -1 to +1

food-preference: -1 to +1

conspecific-preference: -1 to +1

;;; mate-preference: -1 to +1

Elements of the Environment:

* conspecific (male, female, in-group, out-group): group-tolerance \* sex-tolerance / r2
* food: food-preference \* energy \* hunger / r2
* home-base: home-base-preference / r2

[ X/Y fighting-ability (-1,+1)

gestation lactation adulthood senescence

in-female (-1,+1) out-female (-1,+1) in-male (-1,+1) out-male (-1,+1)

home-preference (-1,+1) food-preference (-1,+1) friend-preference (-1,+1) enemy-preference (-1,+1)]

Autosomal chromosomes

Sex-linked?

Sex locus

- changes how genotype is expressed as phenotype

~~Turn evolution on or off~~

Gavrilets – boldness

Add in dispersal stuff to chromosomes

randomize the locus scores

body size – fighting ability

life history for next time

LIFE HISTORY:

Effort put into: growth, maintenance, reproduction

parameter: cost per growth unit per step

parameter: basal metabolism energy cost per body size unit

parameter: cost per locomotion unit

EVOLUTION: growth units per step OR energy allocated to growth

Status: fetus (gestating), infant (nursing), juvenile (weaned), adult (fertile), elder (not fertile)

fertile-status: pregnant, ovulating, cycling, lactating

FOR EACH STATUS:

energy for growth

REST in energy for maintenance

(energy for fetus growth) – stored in fetus status

home-base weight

food-weight

friend-weight

enemy-weight

in-f

in-m

out-f

out-m

change groups (y/n)

OTHER HERITABLE:

timing (steps) of all statuses: gestation-length/pregnant, infant-length/lactating, juvenile length, adult-length, longevity, cycle-length, ovulation-length

DISPERSE

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | FETUS | INFANT | JUVENILE | ADULT | ELDER | CYCLING | OVULATING | PREGNANT | LACTATING |
| FEM\_TIME | 10000 | 1000 | 100000 | 1000000 | 10000 | 10000 | 100 | 10000 | 10000 |
| MALE\_TIME | 10000 | 1000 | 100000 | 1000000 | 10000 |  |  |  |  |
| FEM\_GROWTH | 0.5 | 0.5 | 0.5 |  |  |  |  |  |  |
| MALE\_GROWTH | 0.5 | 0.5 | 0.5 |  |  |  |  |  |  |
| GIVE\_ENERGY |  |  |  |  |  |  |  | ENERGY TO GIVE | ENERGY TO GIVE |
| DISPERSE |  |  |  |  |  |  |  |  |  |
| *HOME* | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 |
| *FOOD* | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| *FRIEND* | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| *MATE* | 0 | 0 | 0 | 1 | 0.5 | 0 | 1 | 0 | 0 |
| *ENEMY* | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| WITHIN\_FEM | 0 | 0.5 | 0.5 | 0.5 | 0.5 | 0 | 0 | 0 | 0 |
| WITHIN\_MALE | 0 | 0 | 0 | 0 | 0 | 0.5 | 0.5 | 0.5 | 0.5 |
| OUT\_FEM | 0 | -0.5 | -0.5 | 0.5 | 0.5 | -1 | -1 | -1 | -1 |
| OUT\_MALE | 0 | -0.5 | -0.5 | -1 | -1 | 0 | 0 | 0 | 0 |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | FETUS | INFANT | JUVENILE | ADULT | ELDER | CYCLING | OVULATING | PREGNANT | LACTATING |
| TIME\_LENGTH | 10000 | 1000 | 100000 | 1000000 | 10000 | 10000 | 100 | 10000 | 10000 |
| GROWTH | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |  |  | ENERGY TO GIVE | ENERGY TO GIVE |
| DISPERSE | 0 | 0.0 | 0 | 0.01 | 0 | 0 | 0 | 0 | 0 |
| *HOME* | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| *FOOD* | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| *FRIEND* | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| *MATE* | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| *ENEMY* | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| INF\_INF | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| INF\_JUV | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| INF\_PREG | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| INF\_OVUL | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| INF\_CYC | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| INF\_LAC | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| INF\_ELD | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| INM\_INF | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| INM\_JUV | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| INM\_ADT | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| INM\_ELD | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| OUTF\_INF | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| OUTF\_JUV | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| OUTF\_PREG | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| OUTF\_OVUL | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| OUTF\_CYC | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| OUTF\_LAC | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| OUTF\_ELD | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| OUTM\_INF | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| OUTM\_JUV | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| OUTM\_ADT | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| OUTM\_ELD | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |

FETUS: inside mother, grows, maximum possible size

INFANT: stays on mother, nurses from mother

JUVENILE: no longer nursing, growing

|  |  |  |
| --- | --- | --- |
|  | **+ fighting-ability** | **- fighting-ability** |
| **in-female +** | move-to friendly | move-to friendly |
| **in-female -** | move-to-aggressively | run-away (move-to-not-weighted high) |
| **in-male +** | move-to friendly | move-to friendly |
| **in-male -** | move-to-aggressively | run-away |
| **out-female +** | move-to friendly | move-to friendly |
| **out -female -** | move-to-aggressively | run-away |
| **out -male +** | move-to friendly | move-to friendly |
| **out -male -** | move-to-aggressively | run-away |

ENEMY:

intolerance \* likelihood of winning fight \* enemy-weight

FRIEND:

tolerance \* friend-weight

Males body size + fat

[69343 43916 21122 89778 91416 7664 57923 28438 90065 0.36360722427672365 0.15063301068376844 -0.18934313765362487 -0.02589932473289347 0.43784770443578924 -0.5536477505462248 -0.6839846445902379 -0.3470520675942387 0.7031677641147824 -0.2914843579555352 -0.4527940897042758 0.08799985749684824 0.08918176877131145 -0.027120915016322633 -0.18376051818818884 -0.1118361693633465 -0.34335840962967823 -0.3219097060202133 0.3046314292133496 -0.8050519295180971 -0.33283605256002735 -0.4895502788664339 0.39462026567583275 -0.0828315169777637 0.19913553115987137 -0.08821029789355916 -0.08376749151413465 -0.16947439355287164 -0.32127101062354246 -0.670969057838747 0.12386812562316596 0.3141196018386332 -0.5054941205837122 0.8197358115315065 0.20284924414471128 -0.02049420666513435 -0.16022011218669452 -0.23147453751279168 -0.006111969623562752 0.003489385658553057 0.6769443827566998 0.08276190245731108 0.4982776649501637 -0.2519322934566781 -0.7704640814370363 -0.15884813307643952 -0.3349223184584016 -0.5185537024152018 0.3237509109401887 0.05243421402692916 0.1441986328908339 0.9048546871049433 0.620052402031259 0.3392839594408661 -0.24438870782223887 -0.04669595156824058 0.4604693186740262 0.6045758492472052 -0.0016704954310418074 0.29536143061413955 0.23231279275937244 -0.6007700178652607 -0.396403953171218 0.8873422321600198 -0.1914939688706363 -0.021147878814886223 0.4467674129636727 0.3035705540406871 -0.7091530002288737 0.8296712053471248 -0.10608231149516378 -0.4557420862145035 -0.06082333707920451 -0.18503985510017396 0.5589848586921061 -0.054888009193170495 -0.35998017657148074 -0.5283184910689981 0.8651566407783093 0.7264242394471075 0.3903610570068605 0.4467776152582693 0.14958841754744068 -0.8887396300316199 -0.6549608121212623 -0.28757408928411865 -0.08618235820112019 0.5121952420951176 0.699046475109967 -0.29916523722553534 -0.4858827459257741 0.6711511597109852 -0.2626477250971301 -0.13178931526443805 0.4858115836570438 0.0449724817797571 -0.1517963497206053 0.31530511787421767 -0.7313577960880832 0.23005271780827363 -0.33802585249010253 0.09602497267279886 0.32276028199107065 -0.4998235830951938 -0.14701816475380403 0.1857214805162859 -0.0961121902693145 0.38072477536893434 0.5625912775035569 0.5673379054561484 -0.39801965061937783 -0.5170398096671632 0.3042513902041425 -0.9236836673294294 0.04986219723883789 0.3070719099672442 -0.7447533663471261 0.09697571826259732 -0.48927956143882767 0.10462141356156729 0.07185063463473373 -0.05333707107540253 0.29997903174909146 -0.825328454597651 -0.2577426975730741 -0.08547976621952202 0.12137093977146707 -0.7877000420684015 -0.3138108525984653 0.2521397019365166 -0.32835000870360276 0.11993228207154127 0.1603845518788366 0.05767860675938452 -0.2823015887559136 -0.4082314248885216 -0.2881695832543002 -0.7488548585519371 0.21556269561799457 -0.26865247272329906 0.6560130661411115 -0.14543591577045778 0.42066385337975976 -0.4551718872706122 0.19105881949574244 -0.19292898296716798 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