

```
breed [whitecells whitecell] ;; randomly move around
breed [redcells redcell] ;; sit there and get infected by parasite
breed [sicklecells sicklecell] ;; immune to the parasites. dont move
breed [parasites parasite] ;; when touches white dies. can spawn more
```

```
;; controls if the turtles are infected
```

```
globals
[
  redcell-spawn
  whitecells-count
  parasites-spawn
  sicklecells-count
]
```

```
redcells-own [
  infected?
  redtime           ;;controls when the infected redcells spawn malaria
]
```

```
parasites-own [
  time             ;;controls when will randomly spawn more
]
```

```
;; Set up the world
```

```
to setup
  clear-all
  reset-ticks
  ;;
  ;; Set spawn of the different turtles
  ;; Set coordinates of the cells
  ;;
  create-whitecells spawn-white [
    setxy random-xcor random-ycor
    set size 1.3
  ]
  create-redcells spawn-red [
    setxy random-xcor random-ycor
    set size 1.3
    set redtime 0
    set infected? false ;;default cells are not infected
  ]
  create-sicklecells spawn-sickle [
    setxy random-xcor random-ycor
    set size 1.3
  ]
  create-parasites spawn-para [
    setxy random-xcor random-ycor
    set time 0
    set size 1.5
  ]
end
```

```

]
;;
;; End of setting the spawn

;; Set up different classes of turtles
set-default-shape whitecells "whitecell"
set-default-shape redcells "redcell"
set-default-shape sicklecells "sickle"
set-default-shape parasites "parasite"
;; End

;;sets the color of the world
ask patches [set pcolor black]

end ;;END OF SETUP

                ;; Provides all movement of the program
to Go
  set redcell-spawn redcell-spawn + 1
  set parasites-spawn parasites-spawn + 1
  redmove
  paramove
  sicmove
  whitemove
  tick
end;;END OF GO

to whitemove                ;; movement of the white cells!!!!
  ask whitecells [
    right random 110
    left random 110
    forward 0.4
  ]
end

                ;; method of movement for the red cells
to redmove
  spawnredcells
  ask redcells [
    right random 120
    left random 120
    forward 0.5
    if infected? = true
    [
      infectedcell
    ]
  ]
end;;me

```

```

to paramove
  parasite-breed
  ask parasites [
    right random 120
    left random 120
    forward 0.3
    let infect one-of redcells in-radius 1
    if infect != nobody [
      ask redcells-here [set infected? true]
    ]
    ask parasites[
      if any? whitecells in-radius 1 [
        ask parasites-here [die]
      ]
    ]
  ]
end;;me

```

```

to sicmove
  ask sicklecells [
    right random 120
    left random 120
    forward 0.5
  ]
end;;me

```

;; The method for the infected cells

```

to infectedcell
  set redtime redtime + 1
  if redtime = 200
  [
    ask redcells-here [
      hatch-parasites random 5
      die
    ]
    set redtime 0      ;; resets the timer of the infected cells
  ]
end
;;end of the infected method

```

```

to spawnredcells      ;; spawns more red cells while running
  if redcell-spawn = 100 [
    create-redcells 5[
      setxy random-xcor random-ycor
      set size 1.3
    ]
    set redcell-spawn 0
  ]
end

```

```
end
;;end of the spawn of red cells

to parasite-breed
  if parasites-spawn = 150
    [
      create-parasites random 5 [
        setxy random-xcor random-ycor
        set size 1.5
      ]
    ]
  ]
end
```