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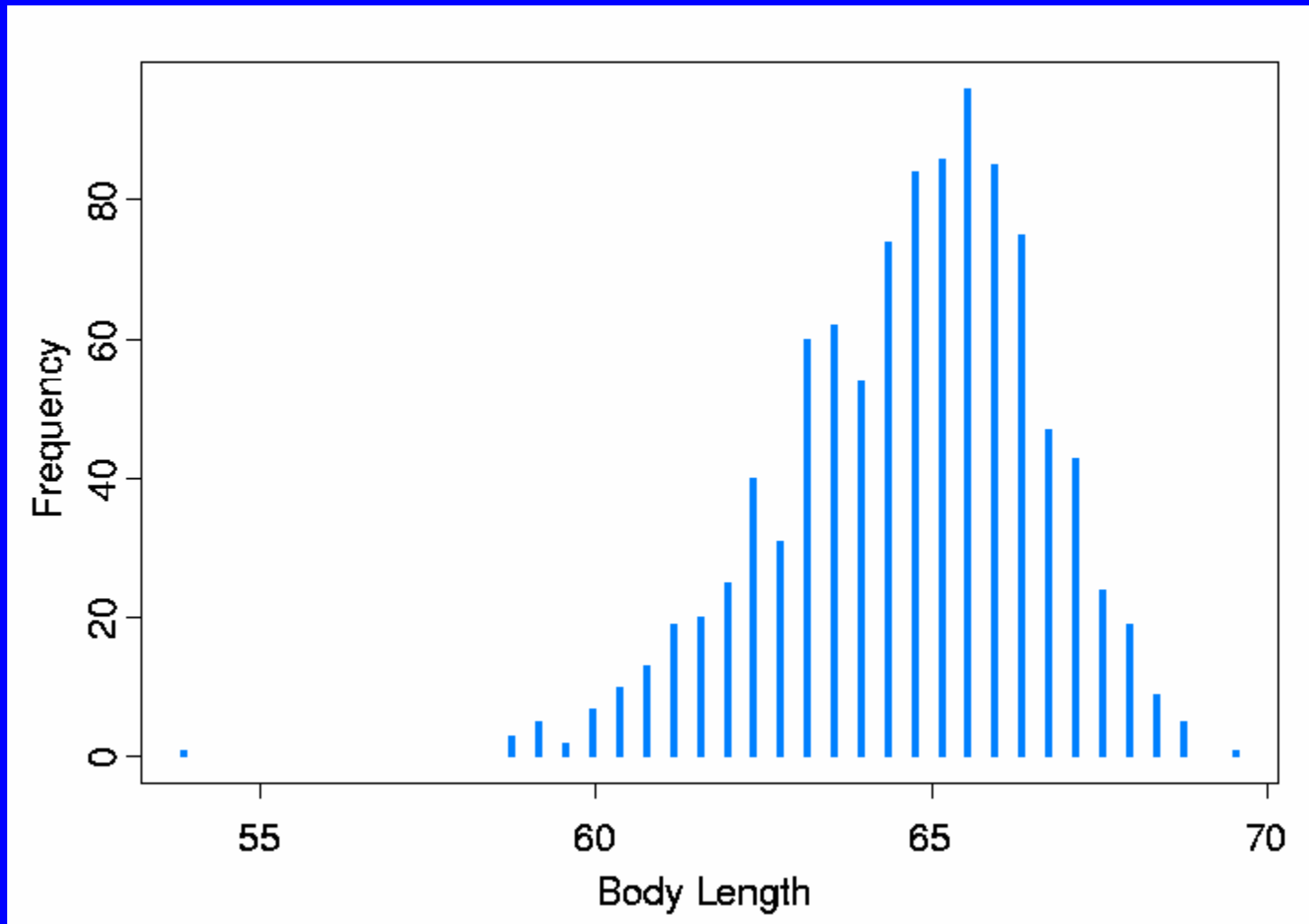
*Introduction to
Bayesian Methods for
QTL Analysis - 3*

Practical: using mixtures

1. Revise mixture modelling in WinBUGS
2. In a package *other than WinBUGS* (your choice), write an algorithm and/or code for estimation of the means, variances and weights of a two-component Normal mixture

Use Clair's data and examples

Mixture of 2 normals



Data

```
→ list(N = 1000, alpha = c(1, 1),  
xi=c(62,66),y=c(53.85,58.75,58.75,58.75,59.15,59.15,59.15,59.15  
,59.15,59.55,59.55,59.95,59.95,59.95,59.95,59.95,59.95,59.95,60  
.35,60.35,60.35,60.35,60.35,60.35,60.35,60.35,60.35,60.75  
,60.75,60.75,60.75,60.75,60.75,60.75,60.75,60.75,60.75,60  
.75,60.75,61.15,61.15,61.15,61.15,61.15,61.15,61.15,61.15,61  
,61.15,61.15,61.15,61.15,61.15,61.15,61.15,61.15,61.15,61  
.55,61.55,61.55,61.55,61.55,61.55,61.55,61.55,61.55,61.55,61.55  
,61.55,61.55,61.55,61.55,61.55,61.55,61.55,61.55,61.95,61  
.95,61.95,61.95,61.95,61.95,61.95,61.95,61.95,61.95,61.95,61.95,61.95,61.95,61.95)
```

etc

```
),.Dim=c(1000,2))
```

```
Initial Values → list(tau=c(1,1),mu=c(62,66))
```

```

model
{
  for(i in 1:N){
    y[i]~dnorm(newxi[i],newtau[i]

    Tmp[i]<-Z[i,1]*1+Z[i,2]*2
    newxi[i]<-mu[Tmp[i]]
    newtau[i]<-tau[Tmp[i]]

    Z[i,1:2]~dmulti(lambda[],1)

  }

  lambda[1:2]~ddirch(alpha[])
  for(j in 1:2){
    mu[j]~dnorm(xi[j],nj[j])
    tau[j]~dgamma(3,6)
    sigma[j]<-1/sqrt(tau[j])
    nj[j]<-1/(5*tau[j])
  }
}

```

program Animal1886Image22

! Program to implement Gibbs sampler

! Sheep 1886, Image 22.

use numerical_libraries

Declare Subroutines

Declare parameters

Set hyperparameters in conjugate prior distributions

Declare starting values

Read in data

Start Gibbs sampling

```
do w=1,NIter
```

```
    Calculate posterior probabilities for simulating  $z_i$ 
```

```
    Allocate vectors  $z_i$ 
```

```
    Calculate  $m_j$  &  $\bar{y}$ 
```

```
    Update estimates of  $\sigma$  &  $\mu$ 
```

```
    Update estimates of  $\lambda$ 
```

```
    call dirichlet( $\lambda_{j(1,1:k)}$ , $dvals$ , $Numk$ )
```

```
end program Animal1886Image22
```

```
subroutine dirichlet
```

```
subroutine UpdateMean
```

```
subroutine UpdateInvS2
```

```
subroutine GetMultinom
```

Try mixture of 4 normals