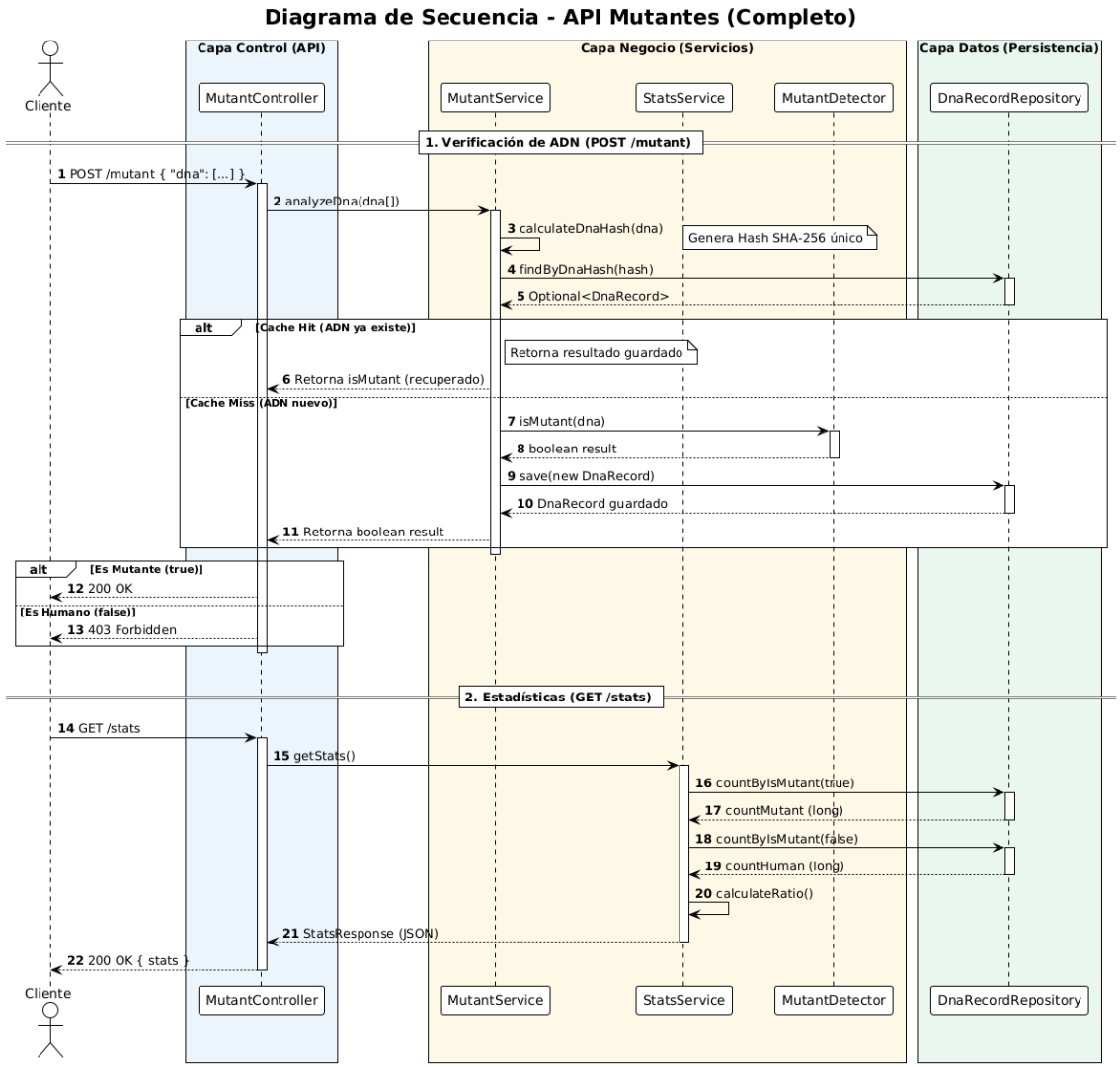
Diagrama de Secuencia



Código para pegar en PlantUML:

@startuml

!theme plain

autonumber

title Diagrama de Secuencia - API Mutantes (Completo)

actor "Cliente" as Client

participant "MutantController" as Controller

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participant "MutantService" as MutService
participant "StatsService" as StatService
participant "DnaRecordRepository" as Database
participant "MutantDetector" as Detector

box "Capa Control (API)" #EBF5FB
  participant Controller
end box

box "Capa Negocio (Servicios)" #FEF9E7
  participant MutService
  participant StatService
  participant Detector
end box

box "Capa Datos (Persistencia)" #E9F7EF
  participant Database
end box

== 1. Verificación de ADN (POST /mutant) ==

Client -> Controller: POST /mutant { "dna": [...] }
activate Controller

  Controller -> MutService: analyzeDna(dna[])
  activate MutService

    MutService -> MutService: calculateDnaHash(dna)
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    note right: Genera Hash SHA-256 único

    MutService -> Database: findByDnaHash(hash)
    activate Database
    Database --> MutService: Optional<DnaRecord>
    deactivate Database

    alt Cache Hit (ADN ya existe)
        note right of MutService: Retorna resultado guardado
        MutService --> Controller: Retorna isMutant (recuperado)
    else Cache Miss (ADN nuevo)
        MutService -> Detector: isMutant(dna)
        activate Detector
        Detector --> MutService: boolean result
        deactivate Detector

        MutService -> Database: save(new DnaRecord)
        activate Database
        Database --> MutService: DnaRecord guardado
        deactivate Database

        MutService --> Controller: Retorna boolean result
    end

deactivate MutService

alt Es Mutante (true)
    Controller --> Client: 200 OK
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  else Es Humano (false)
    Controller --> Client: 403 Forbidden
  end

deactivate Controller

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== 2. Estadísticas (GET /stats) ==

Client -> Controller: GET /stats
activate Controller

  Controller -> StatService: getStats()
  activate StatService

    StatService -> Database: countByIsMutant(true)
    activate Database
    Database --> StatService: countMutant (long)
    deactivate Database

    StatService -> Database: countByIsMutant(false)
    activate Database
    Database --> StatService: countHuman (long)
    deactivate Database

    StatService -> StatService: calculateRatio()
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    StatService --> Controller: StatsResponse (JSON)

  deactivate StatService

  Controller --> Client: 200 OK { stats }

deactivate Controller

@enduml
```