

# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)  
**Batch Size:** 32  
**Number of Classes:** 8  
**Epochs:** 10  
**Gaussian Noise STD:** 0.03  
**Salt-Pepper Noise Amount:** 0.01  
**Train Size:** 568  
**Validation Size:** 142  
**Test Size:** 79

## Model Summary:

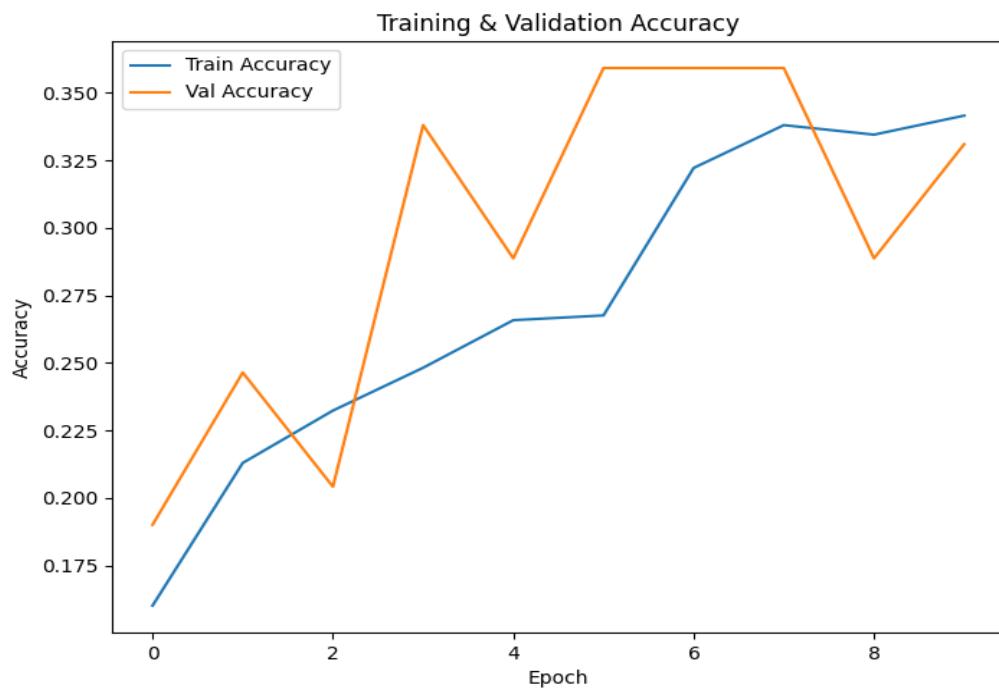
Model: "sequential\_1"

Layer (type)	Output Shape	Param #
conv2d (Conv2D)	(None, 222, 222, 32)	896
max_pooling2d (MaxPooling2D)	(None, 111, 111, 32)	0
conv2d_1 (Conv2D)	(None, 109, 109, 64)	18,496
max_pooling2d_1 (MaxPooling2D)	(None, 54, 54, 64)	0
conv2d_2 (Conv2D)	(None, 52, 52, 128)	73,856
max_pooling2d_2 (MaxPooling2D)	(None, 26, 26, 128)	0
flatten (Flatten)	(None, 86528)	0
dense (Dense)	(None, 128)	11,075,712
dropout (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 8)	1,032

Total params: 33,509,978 (127.83 MB)  
Trainable params: 11,169,992 (42.61 MB)  
Non-trainable params: 0 (0.00 B)  
Optimizer params: 22,339,986 (85.22 MB)

**Test Accuracy:** 0.3165

## Training Accuracy over Epochs:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)  
**Batch Size:** 32  
**Number of Classes:** 8  
**Epochs:** 10  
**Gaussian Noise STD:** 0.03  
**Salt-Pepper Noise Amount:** 0.01  
**Train Size:** 568  
**Validation Size:** 142  
**Test Size:** 79

## Model Summary:

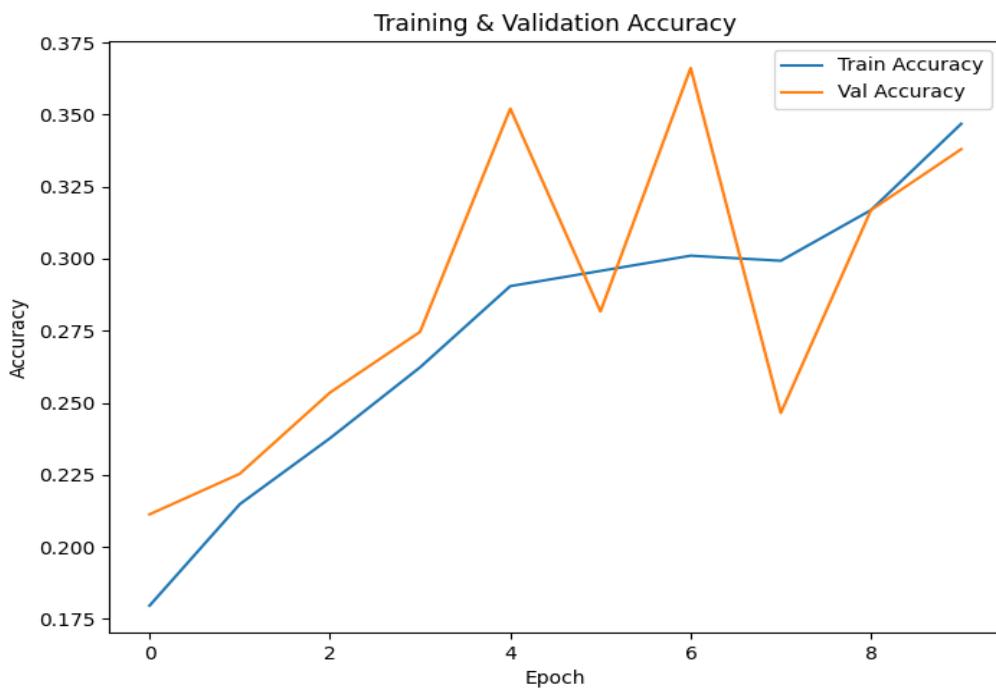
Model: "sequential\_1"

Layer (type)	Output Shape	Param #
conv2d (Conv2D)	(None, 222, 222, 32)	896
max_pooling2d (MaxPooling2D)	(None, 111, 111, 32)	0
conv2d_1 (Conv2D)	(None, 109, 109, 64)	18,496
max_pooling2d_1 (MaxPooling2D)	(None, 54, 54, 64)	0
conv2d_2 (Conv2D)	(None, 52, 52, 128)	73,856
max_pooling2d_2 (MaxPooling2D)	(None, 26, 26, 128)	0
flatten (Flatten)	(None, 86528)	0
dense (Dense)	(None, 128)	11,075,712
dropout (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 8)	1,032

Total params: 33,509,978 (127.83 MB)  
Trainable params: 11,169,992 (42.61 MB)  
Non-trainable params: 0 (0.00 B)  
Optimizer params: 22,339,986 (85.22 MB)

**Test Accuracy:** 0.2785

### Training Accuracy over Epochs:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)  
**Batch Size:** 32  
**Number of Classes:** 8  
**Epochs:** 10  
**Gaussian Noise STD:** 0.03  
**Salt-Pepper Noise Amount:** 0.01  
**Train Size:** 568  
**Validation Size:** 142  
**Test Size:** 79  
**Comments:** Increased augmentation by adding random brightness

## Model Summary:

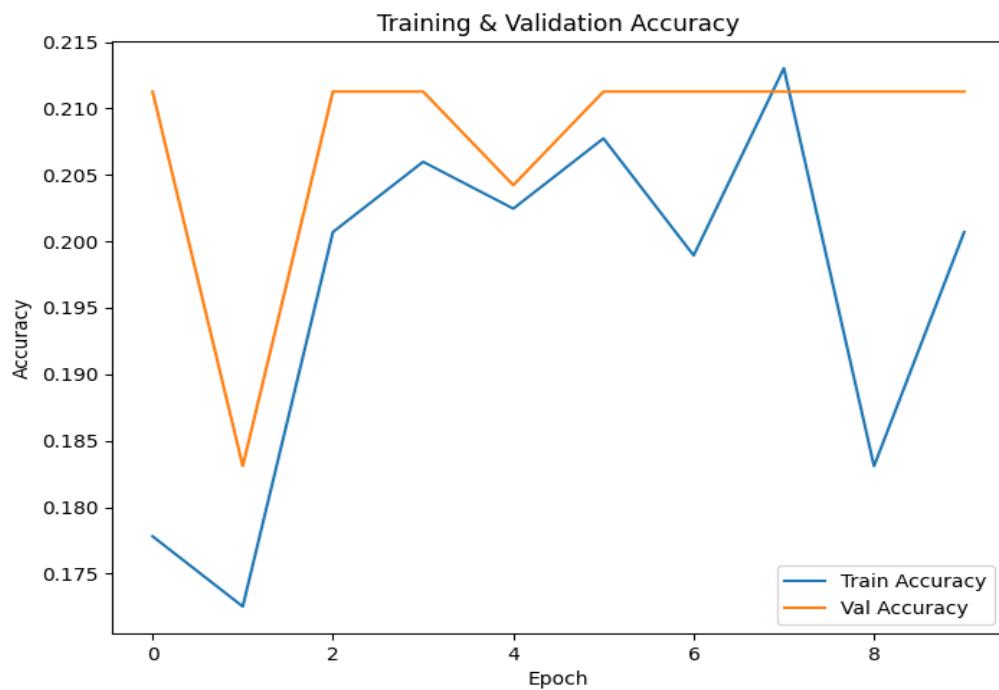
Layer (type)	Output Shape	Param #
conv2d (Conv2D)	(None, 222, 222, 32)	896
max_pooling2d (MaxPooling2D)	(None, 111, 111, 32)	0
conv2d_1 (Conv2D)	(None, 109, 109, 64)	18,496
max_pooling2d_1 (MaxPooling2D)	(None, 54, 54, 64)	0
conv2d_2 (Conv2D)	(None, 52, 52, 128)	73,856
max_pooling2d_2 (MaxPooling2D)	(None, 26, 26, 128)	0
flatten (Flatten)	(None, 86528)	0
dense (Dense)	(None, 128)	11,075,712
dropout (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 8)	1,032

Total params: 33,509,978 (127.83 MB)  
Trainable params: 11,169,992 (42.61 MB)  
Non-trainable params: 0 (0.00 B)

Optimizer params: 22,339,986 (85.22 MB)

**Test Accuracy:** 0.2152

## Training Accuracy over Epochs:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)

**Batch Size:** 32

**Number of Classes:** 8

**Class Weights:** {0: np.float64(1.3653846153846154), 1: np.float64(0.5867768595041323), 2: np.float64(1.3148148148149), 3: np.float64(0.64545454545455), 4: np.float64(1.1639344262295082), 5: np.float64(1.1451612903225807), 6: np.float64(1.3148148148149), 7: np.float64(1.3148148148149)}

**Epochs:** 10

**Gaussian Noise STD:** 0.03

**Salt-Pepper Noise Amount:** 0.01

**Train Size:** 568

**Validation Size:** 142

**Test Size:** 79

**Comments:** Apply class weights for balancing

## Model Summary:

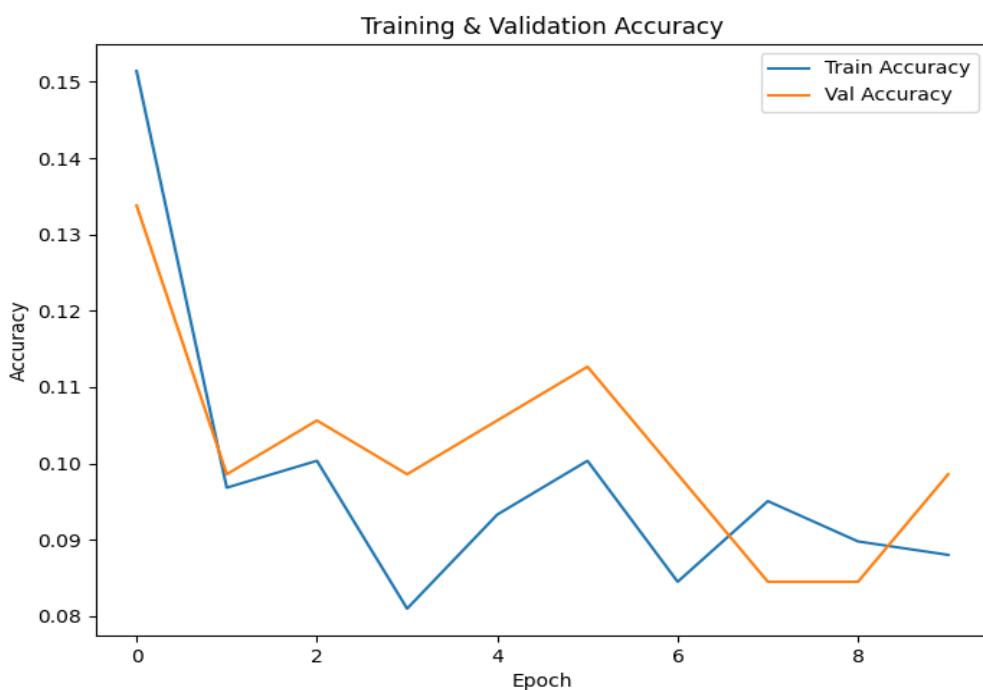
Model: "sequential\_1"

Layer (type)	Output Shape	Param #
conv2d (Conv2D)	(None, 222, 222, 32)	896
max_pooling2d (MaxPooling2D)	(None, 111, 111, 32)	0
conv2d_1 (Conv2D)	(None, 109, 109, 64)	18,496
max_pooling2d_1 (MaxPooling2D)	(None, 54, 54, 64)	0
conv2d_2 (Conv2D)	(None, 52, 52, 128)	73,856
max_pooling2d_2 (MaxPooling2D)	(None, 26, 26, 128)	0
flatten (Flatten)	(None, 86528)	0
dense (Dense)	(None, 128)	11,075,712
dropout (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 8)	1,032

```
[  
[  
Total params: 33,509,978 (127.83 MB)  
Trainable params: 11,169,992 (42.61 MB)  
Non-trainable params: 0 (0.00 B)  
Optimizer params: 22,339,986 (85.22 MB)
```

**Test Accuracy:** 0.1013

## Training Accuracy over Epochs:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)

**Batch Size:** 32

**Number of Classes:** 8

**Class Weights:** {0: np.float64(1.3653846153846154), 1: np.float64(0.5867768595041323), 2: np.float64(1.3148148148149), 3: np.float64(0.64545454545455), 4: np.float64(1.1639344262295082), 5: np.float64(1.1451612903225807), 6: np.float64(1.3148148148149), 7: np.float64(1.3148148148149)}

**Epochs:** 10

**Gaussian Noise STD:** 0.03

**Salt-Pepper Noise Amount:** 0.01

**Train Size:** 568

**Validation Size:** 142

**Test Size:** 79

**Comments:** Applied real random brightness augmentation

## Model Summary:

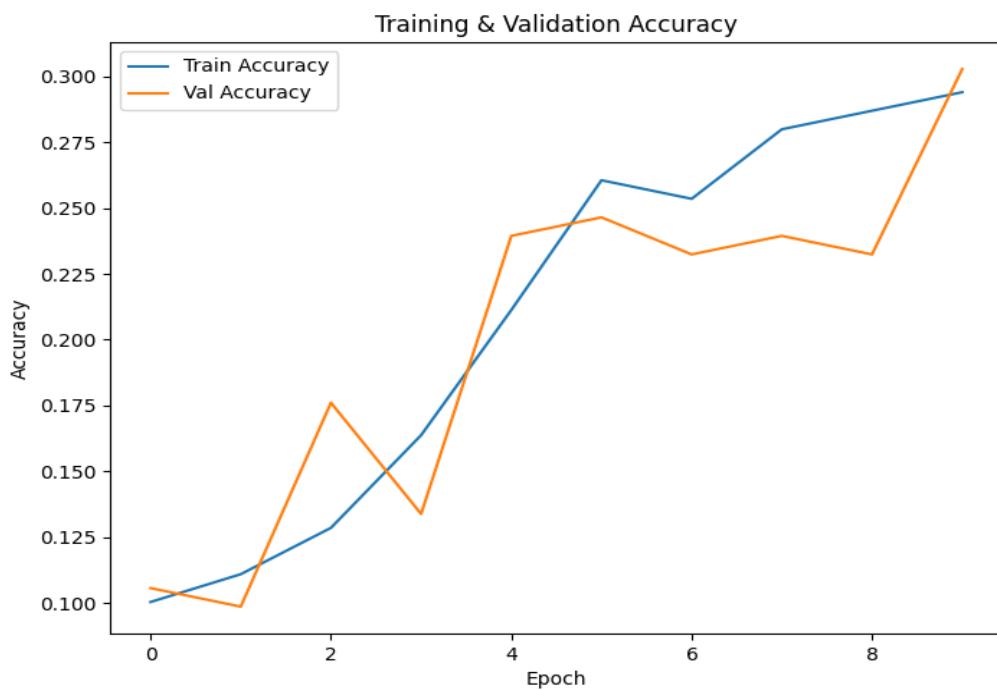
Model: "sequential\_1"

Layer (type)	Output Shape	Param #
conv2d (Conv2D)	(None, 222, 222, 32)	896
max_pooling2d (MaxPooling2D)	(None, 111, 111, 32)	0
conv2d_1 (Conv2D)	(None, 109, 109, 64)	18,496
max_pooling2d_1 (MaxPooling2D)	(None, 54, 54, 64)	0
conv2d_2 (Conv2D)	(None, 52, 52, 128)	73,856
max_pooling2d_2 (MaxPooling2D)	(None, 26, 26, 128)	0
flatten (Flatten)	(None, 86528)	0
dense (Dense)	(None, 128)	11,075,712
dropout (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 8)	1,032

```
[  
[  
Total params: 33,509,978 (127.83 MB)  
Trainable params: 11,169,992 (42.61 MB)  
Non-trainable params: 0 (0.00 B)  
Optimizer params: 22,339,986 (85.22 MB)
```

**Test Accuracy:** 0.3544

## Training Accuracy over Epochs:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)

**Batch Size:** 32

**Number of Classes:** 8

**Class Weights:** {0: np.float64(1.3653846153846154), 1: np.float64(0.5867768595041323), 2: np.float64(1.3148148148149), 3: np.float64(0.645454545454555), 4: np.float64(1.1639344262295082), 5: np.float64(1.1451612903225807), 6: np.float64(1.3148148148149), 7: np.float64(1.3148148148149)}

**Epochs:** 10

**Gaussian Noise STD:** 0.03

**Salt-Pepper Noise Amount:** 0.01

**Train Size:** 568

**Validation Size:** 142

**Test Size:** 79

**Comments:** Applied real random translation augmentation

## Model Summary:

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
conv2d (Conv2D)	(None, 222, 222, 32)	896
max_pooling2d (MaxPooling2D)	(None, 111, 111, 32)	0
conv2d_1 (Conv2D)	(None, 109, 109, 64)	18,496
max_pooling2d_1 (MaxPooling2D)	(None, 54, 54, 64)	0
conv2d_2 (Conv2D)	(None, 52, 52, 128)	73,856
max_pooling2d_2 (MaxPooling2D)	(None, 26, 26, 128)	0
flatten (Flatten)	(None, 86528)	0
dense (Dense)	(None, 128)	11,075,712
dropout (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 8)	1,032

```
[  
[  
Total params: 33,509,978 (127.83 MB)  
Trainable params: 11,169,992 (42.61 MB)  
Non-trainable params: 0 (0.00 B)  
Optimizer params: 22,339,986 (85.22 MB)
```

**Test Accuracy:** 0.2532

## Training Accuracy over Epochs:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)

**Batch Size:** 32

**Number of Classes:** 8

**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

**Epochs:** 10

**Data Augmentation:** RandomFlip(horizontal), RandomRotation(0.1 radians), RandomZoom(0.1), RandomContrast(0.1), RandomBrightness(0.1)RandomTranslation(0.05, 0.05)

**Gaussian Noise STD:** 0.03

**Salt-Pepper Noise Amount:** 0.01

**Train Size:** 568

**Validation Size:** 142

**Test Size:** 79

**Comments:** Reduced random translation augmentation to 5%

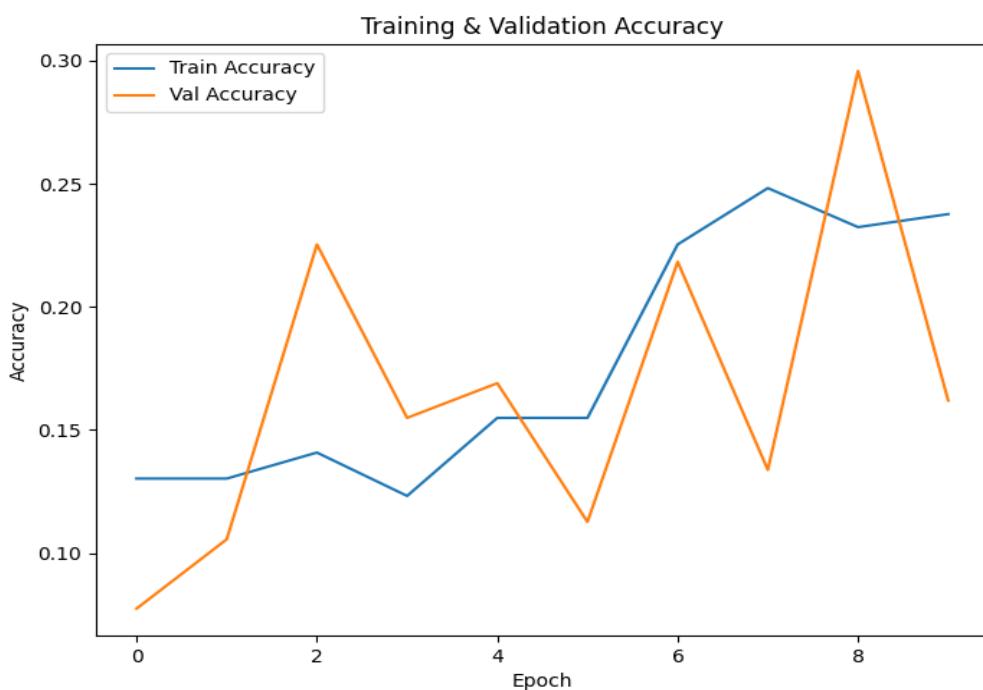
## Model Summary:

Layer (type)	Output Shape	Param #
conv2d (Conv2D)	(None, 222, 222, 32)	896
max_pooling2d (MaxPooling2D)	(None, 111, 111, 32)	0
conv2d_1 (Conv2D)	(None, 109, 109, 64)	18,496
max_pooling2d_1 (MaxPooling2D)	(None, 54, 54, 64)	0
conv2d_2 (Conv2D)	(None, 52, 52, 128)	73,856
max_pooling2d_2 (MaxPooling2D)	(None, 26, 26, 128)	0
flatten (Flatten)	(None, 86528)	0
dense (Dense)	(None, 128)	11,075,712
dropout (Dropout)	(None, 128)	0
dense_1 (Dense)	(None, 8)	1,032

```
[  
[  
Total params: 33,509,978 (127.83 MB)  
Trainable params: 11,169,992 (42.61 MB)  
Non-trainable params: 0 (0.00 B)  
Optimizer params: 22,339,986 (85.22 MB)
```

**Test Accuracy:** 0.1519

## Training Accuracy over Epochs:



# Model Training Report

### **Configuration and Parameters:**

**Image Size:** (224, 224)

**Image S1C. (E)**

**Number of Classes: 8**

**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

**Class Weight**  
**Epochs: 10**

**Data Augmentation:** RandomFlip(horizontal), RandomRotation(0.1 radians), RandomZoom(0.1), RandomContrast(0.1), RandomBrightness(0.1)RandomTranslation(0.05, 0.05)

Gaussian Noise STD: 0.03

Salt-Pepper Noise Amount: 0.01

## Salt-Pepper No Train Size: 568

**Train Size:** 568  
**Validation Size:** 143

## Validation Size

**Comments:** Implemented transfer learning with EfficientNetB0

## Model Summary

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
efficientnetb0 (Functional)	(None, 7, 7, 1280)	4,049,571
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248

Total params: 4,080,317 (15.57 MB)  
Trainable params: 10,248 (40.03 KB)  
Non-trainable params: 4,049,571 (15.45 MB)  
Optimizer params: 20,498 (80.07 KB)

**Test Accuracy:** 0.1013

## Training Accuracy over Epochs:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)

**Image S1C. (E)**

### **Number of Classes: 8**

**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

**Class Weight**  
**Epochs: 20**

**Data Augmentation:** RandomFlip(horizontal), RandomRotation(0.1 radians), RandomZoom(0.1), RandomContrast(0.1), RandomBrightness(0.1)RandomTranslation(0.05, 0.05)

**Gaussian Noise STD: 0.05**

Salt-Pepper Noise Amount: 0.02

## Salt-Pepper No Train Size: 568

**Train Size:** 568  
**Validation Size:** 143

## Validation Size

**Comments:** Using EfficientNetB0, increased to 20 epochs

## Model Summary

Model: "sequential\_1"

Layer (type)	Output Shape	Param #
efficientnetb0 (Functional)	(None, 7, 7, 1280)	4,049,571
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248

Total params: 4,080,317 (15.57 MB)  
Trainable params: 10,248 (40.03 KB)  
Non-trainable params: 4,049,571 (15.45 MB)  
Optimizer params: 20,498 (80.07 KB)

**Test Accuracy:** 0.1139

## Training Accuracy over Epochs:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)

**Image S1C. (E)**

### **Number of Classes: 8**

**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

**Class Weight**  
**Epochs: 30**

**Data Augmentation:** RandomFlip(horizontal), RandomRotation(0.1 radians), RandomZoom(0.1), RandomContrast(0.1), RandomBrightness(0.1)RandomTranslation(0.05, 0.05)

**Gaussian Noise STD: 0.05**

Salt-Pepper Noise Amount: 0.02

## Salt-Pepper No Train Size: 568

**Train Size:** 568  
**Validation Size:** 143

## Validation Size

**Comments:** Using EfficientNetB0, increased to 30 epochs

## Model Summary

Model: "sequential\_1"

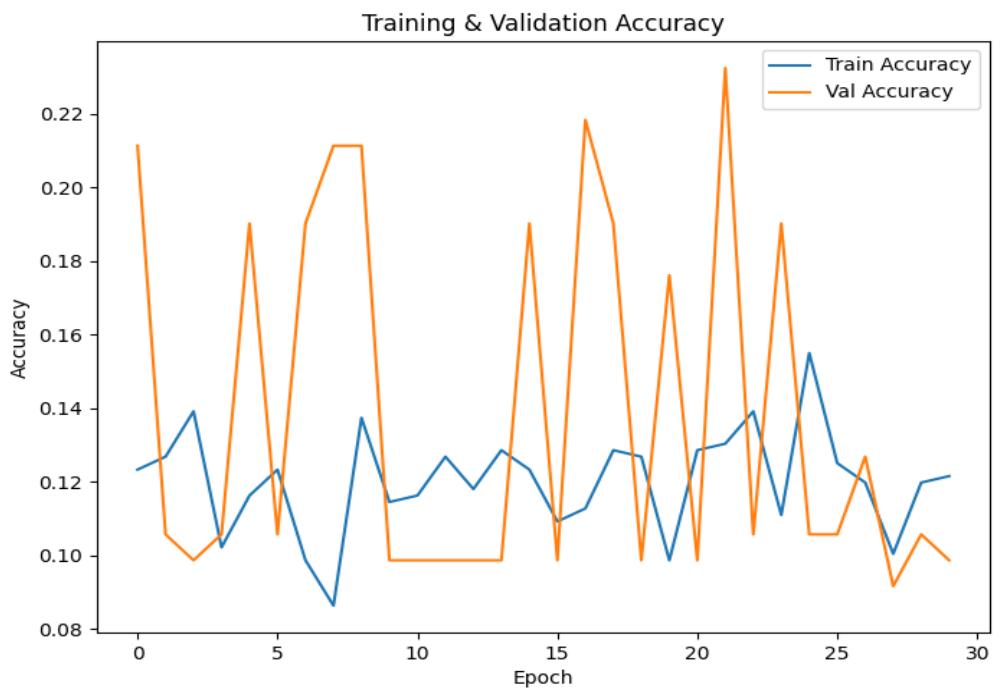
The figure is a horizontal bar chart representing the layers of the "sequential\_1" model. Each row corresponds to a layer, with its type, name, output shape, and parameter count displayed. The bars are composed of small black squares, with the length of each bar indicating the size of the layer's parameters or output. A legend at the top defines the symbols: a square for 'Layer (type)', a rectangle for 'Output Shape', and a circle for 'Param #'. The layers listed are: efficientnetb0 (Functional), global\_average\_pooling2d (GlobalAveragePooling2D), dropout (Dropout), and dense (Dense). The total parameters for the model are 4,080,317.

Layer (type)	Output Shape	Param #
efficientnetb0 (Functional)	(None, 7, 7, 1280)	4,049,571
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248

Total params: 4,080,317 (15.57 MB)  
Trainable params: 10,248 (40.03 KB)  
Non-trainable params: 4,049,571 (15.45 MB)  
Optimizer params: 20,498 (80.07 KB)

**Test Accuracy:** 0.0886

## Training Accuracy over Epochs:



# Model Training Report

## **Configuration and Parameters:**

**Image Size:** (224, 224)

**Batch Size:** 32

## Number of Classes: 8

**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

Epochs: 30

**Data Augmentation:** RandomFlip(horizontal), RandomRotation(0.1 radians), RandomZoom(0.1), RandomContrast(0.1), RandomBrightness(0.1)RandomTranslation(0.01, 0.01)

**Gaussian Noise STD:** 0.02

**Salt-Pepper Noise Amount: 0.02**

Train Size: 568

Validation Size: 142

**Test Size:** 79

**Comments:** Using EfficientNetB0, increased to 30 epochs, reduced gaussian

## Model Summary:

Model: "sequential\_1"

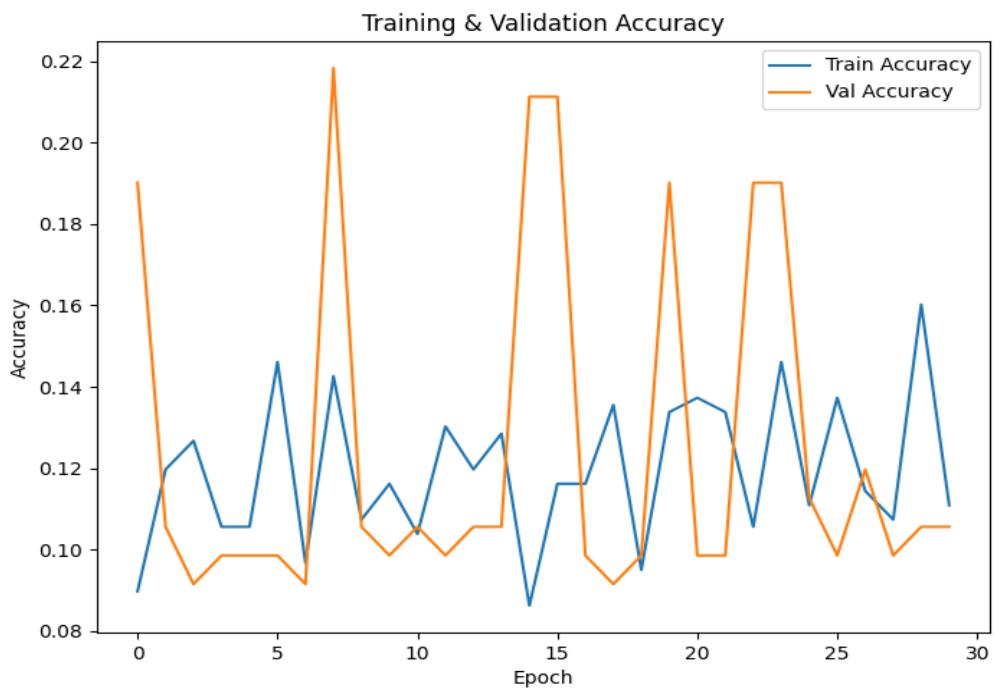
The diagram shows a Keras model structure with the following layers:

- Layer type: efficientnetb0 (Functional)
- Output Shape: (None, 7, 7, 1280)
- Param #: 4,049,571
- Layer type: global\_average\_pooling2d (GlobalAveragePooling2D)
- Output Shape: (None, 1280)
- Param #: 0
- Layer type: dropout (Dropout)
- Output Shape: (None, 1280)
- Param #: 0
- Layer type: dense (Dense)
- Output Shape: (None, 8)
- Param #: 10,248

Total params: 4,080,317 (15.57 MB)  
Trainable params: 10,248 (40.03 KB)  
Non-trainable params: 4,049,571 (15.45 MB)  
Optimizer params: 20,498 (80.07 KB)

**Test Accuracy:** 0.0759

## Training Accuracy over Epochs:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)

**Batch Size:** 32

**Number of Classes:** 8

**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

**Base Epochs:** 10

**Epochs:** 30

**Data Augmentation:** RandomFlip(horizontal), RandomRotation(0.1 radians), RandomZoom(0.1), RandomContrast(0.1), RandomBrightness(0.1)

**Gaussian Noise STD:** 0.05

**Salt-Pepper Noise Amount:** 0.02

**Train Size:** 568

**Validation Size:** 142

**Test Size:** 79

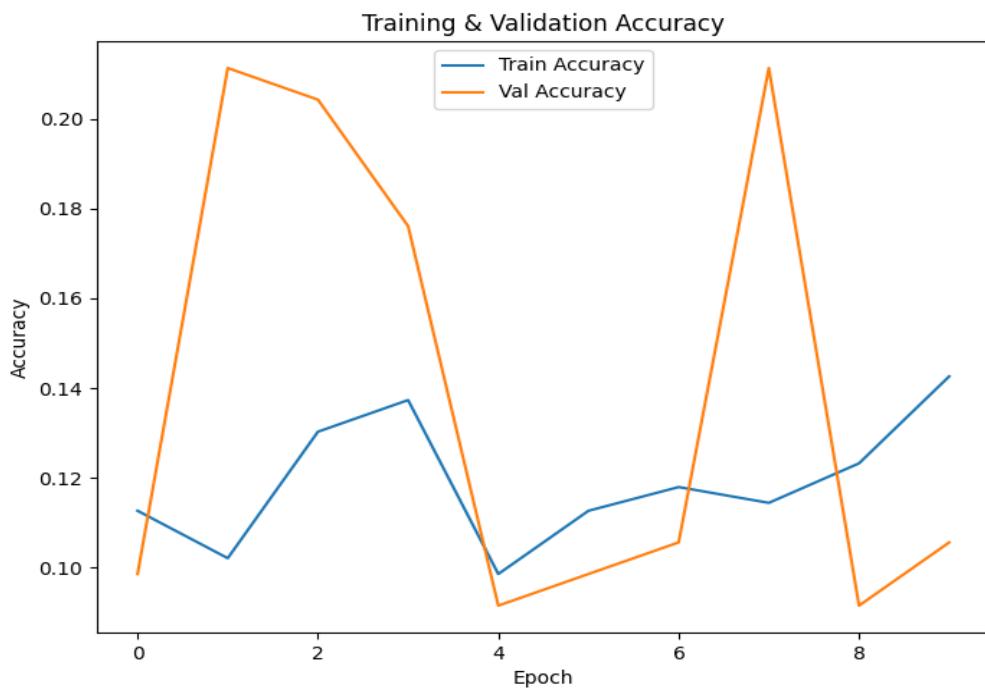
**Comments:** Using EfficientNetB0, train deeper layers

## Model Summary:

Model: "sequential_1"		
Layer (type)	Output Shape	Param #
efficientnetb0 (Functional)	(None, 7, 7, 1280)	4,049,571
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248
Total params: 12,095,413 (46.14 MB)		
Trainable params: 4,017,796 (15.33 MB)		
Non-trainable params: 42,023 (164.16 KB)		
Optimizer params: 8,035,594 (30.65 MB)		

**Test Accuracy:** 0.1266

## Training Accuracy over Epochs:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)

**Batch Size:** 32

**Number of Classes:** 8

**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

**Base Epochs:** 10

**Epochs:** 30

**Data Augmentation:** RandomFlip(horizontal), RandomRotation(0.1 radians), RandomZoom(0.1), RandomContrast(0.1), RandomBrightness(0.1)

**Gaussian Noise STD:** 0.05

**Salt-Pepper Noise Amount:** 0.02

**Train Size:** 568

**Validation Size:** 142

**Test Size:** 79

**Comments:** Using EfficientNetB0, train deeper layers, early stopping

## Model Summary:

Model: "sequential_1"		
Layer (type)	Output Shape	Param #
efficientnetb0 (Functional)	(None, 7, 7, 1280)	4,049,571
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248
Total params: 12,095,413 (46.14 MB)		
Trainable params: 4,017,796 (15.33 MB)		
Non-trainable params: 42,023 (164.16 KB)		
Optimizer params: 8,035,594 (30.65 MB)		

**Test Accuracy:** 0.2152

## Training Accuracy over Epochs:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)  
**Batch Size:** 32  
**Number of Classes:** 8  
**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}  
**Base Epochs:** 10  
**Epochs:** 30  
**Data Augmentation:** RandomFlip(none), RandomRotation(0.05 radians), RandomZoom(0.05), RandomContrast(0.05), RandomBrightness(0.05)  
**Gaussian Noise STD:** 0.01  
**Salt-Pepper Noise Amount:** 0.01  
**Train Size:** 568  
**Validation Size:** 142  
**Test Size:** 79  
**Comments:** Using EfficientNetB0, train deeper layers, early stopping, reduced aggressive augmentation

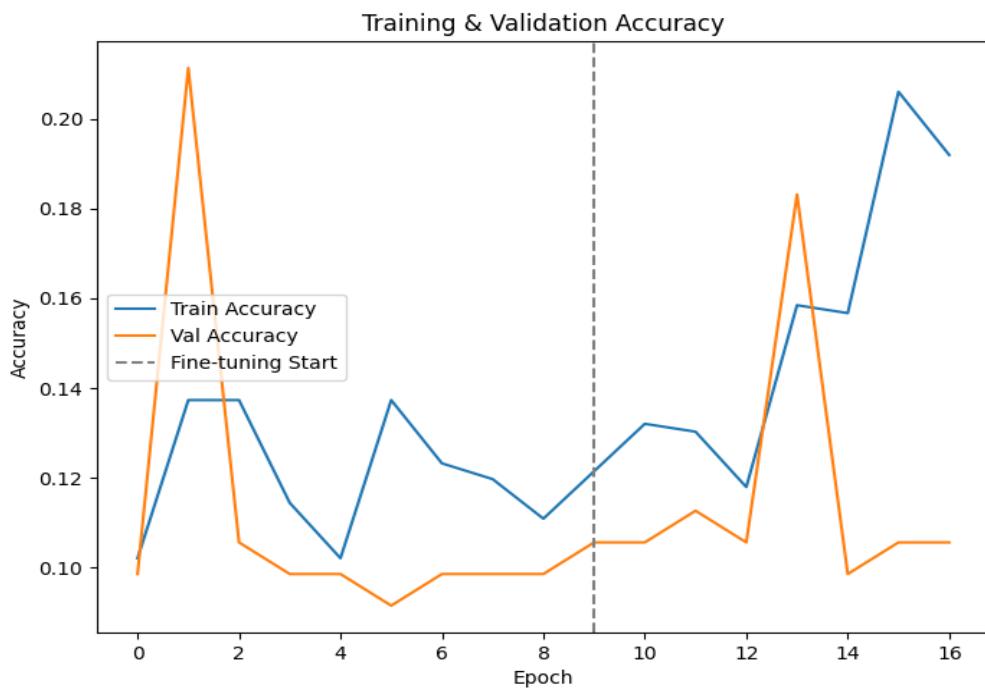
## Model Summary:

```
Model: "sequential_1"
[REDACTED]
[REDACTED]
■ Layer (type)           ■ Output Shape    ■ Param #
[REDACTED]
■ efficientnetb0 (Functional)   ■ (None, 7, 7, 1280) ■ 4,049,571 ■
[REDACTED]
[REDACTED]
■ global_average_pooling2d   ■ (None, 1280)    ■ 0 ■
■ (GlobalAveragePooling2D)
[REDACTED]
[REDACTED]
■ dropout (Dropout)        ■ (None, 1280)    ■ 0 ■
[REDACTED]
[REDACTED]
■ dense (Dense)           ■ (None, 8)      ■ 10,248 ■
[REDACTED]
[REDACTED]

Total params: 12,095,413 (46.14 MB)
Trainable params: 4,017,796 (15.33 MB)
Non-trainable params: 42,023 (164.16 KB)
Optimizer params: 8,035,594 (30.65 MB)
```

**Test Accuracy:** 0.1139

## Training Accuracy over Epochs:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)

**Image 3.26. (E)**

### **Number of Classes: 8**

**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

Class Weights: [1  
Base Epochs: 10

## Base Epoch Epochs: 30

**Data Augmentation:** RandomFlip(none), RandomRotation(0.05 radians), RandomZoom(0.05), RandomContrast(0.05), RandomBrightness(0.05)

Gaussian Noise STD: 0.0

Salt-Pepper Noise Amount: 0.0

Salt-L Pepper N  
Train Size: 568

**Train Size: 368**

**Test Size: 79**

Comments: I Ising

## Comments:

pepper

## Model Summary:

Model: "sequential\_1"

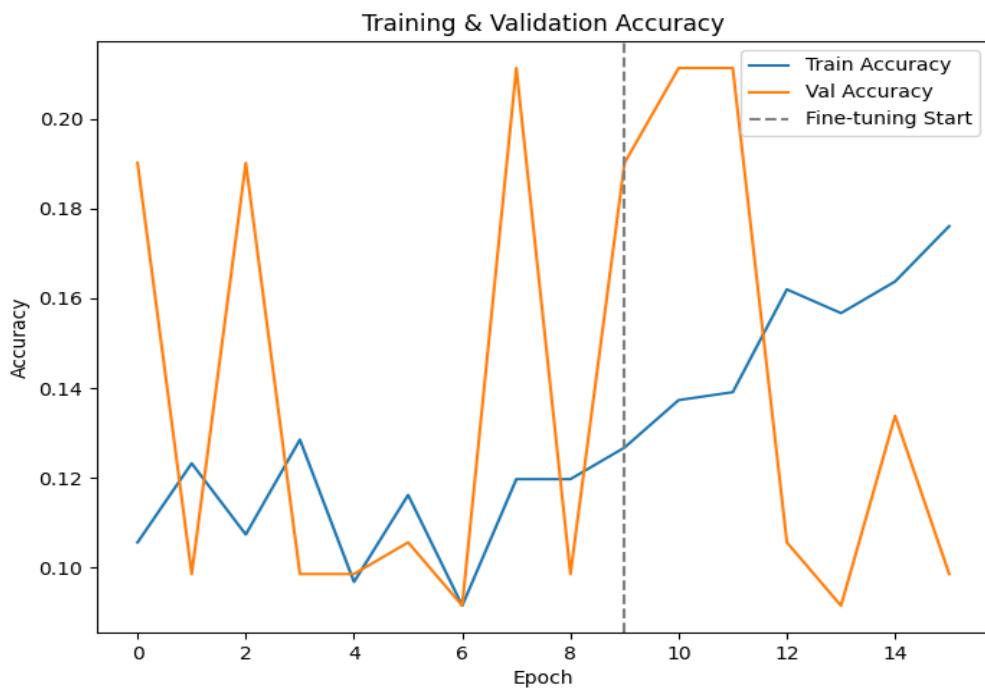
The diagram illustrates the sequential model structure. It shows the following layers from top to bottom:

- Layer type: efficientnetb0 (Functional), Output Shape: (None, 7, 7, 1280), Param #: 4,049,571
- Layer type: global\_average\_pooling2d (GlobalAveragePooling2D), Output Shape: (None, 1280), Param #: 0
- Layer type: dropout (Dropout), Output Shape: (None, 1280), Param #: 0
- Layer type: dense (Dense), Output Shape: (None, 8), Param #: 10,248

Total params: 12,095,413 (46.14 MB)  
Trainable params: 4,017,796 (15.33 MB)  
Non-trainable params: 42,023 (164.16 KB)  
Optimizer params: 8,035,594 (30.65 MB)

**Test Accuracy:** 0.2152

## Training Accuracy over Epochs:



# Model Training Report

## **Configuration and Parameters:**

**Image Size:** (224, 224)

**Batch Size:** 32

**Number of Classes:** 8

**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

Base Epochs: 10

**Base Epoch**

**Data Augmentation:** RandomFlip(none), RandomRotation(0.05 radians), RandomZoom(0.05), RandomContrast(0.05), RandomBrightness(0.05)

Gaussian Noise STD: 0.0

Salt-Pepper Noise Amount: 0.0

**Salt-I Pepper N**  
**Train Size: 568**

**Train Size: 368**

**Validation Size:** 14  
**Test Size:** 79

Comments: 11

### **Comments: Using § 87(2)(b)**

& pepper

## **Model Summary:**

Model: sequential\_1

The diagram shows a Keras model structure with the following layers:

- Layer (type): efficientnetb0 (Functional)
- Output Shape: (None, 7, 7, 1280)
- Param #: 4,049,571
- Layer (type): global\_average\_pooling2d (GlobalAveragePooling2D)
- Output Shape: (None, 1280)
- Param #: 0
- Layer (type): dropout (Dropout)
- Output Shape: (None, 1280)
- Param #: 0
- Layer (type): dense (Dense)
- Output Shape: (None, 8)
- Param #: 10,248

Total params: 6,782,237 (25.87 MB)  
Trainable params: 1,361,208 (5.19 MB)  
Non-trainable params: 2,698,611 (10.29 MB)  
Optimizer params: 2,722,418 (10.39 MB)

**Test Accuracy:** 0.0886

## Training Accuracy over Epochs:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)

**Batch Size:** 32

**Number of Classes:** 8

**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

**Base Epochs:** 10

**Epochs:** 30

**Data Augmentation:** RandomFlip(horizontal), RandomRotation(0.1 radians), RandomZoom(0.1), RandomContrast(0.1), RandomBrightness(0.1)

**Gaussian Noise STD:** 0.01

**Salt-Pepper Noise Amount:** 0.01

**Train Size:** 568

**Validation Size:** 142

**Test Size:** 79

**Comments:** Using EfficientNetB0, fine tune only the top 50 layers, increased augmentation

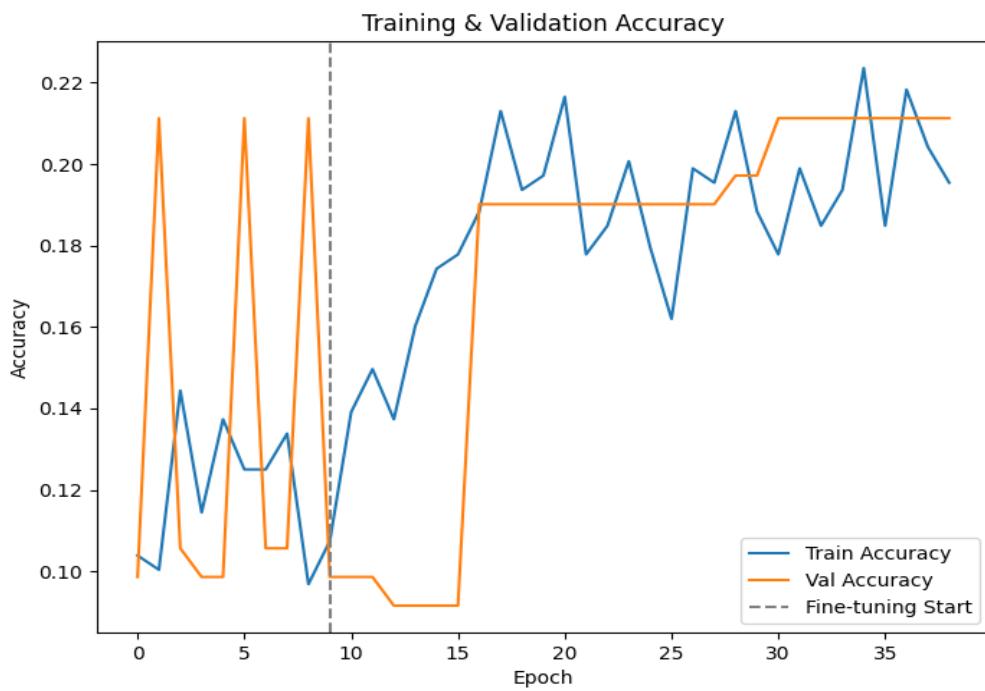
## Model Summary:

Layer (type)	Output Shape	Param #
efficientnetb0 (Functional)	(None, 7, 7, 1280)	4,049,571
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248

Total params: 9,134,045 (34.84 MB)  
Trainable params: 2,537,112 (9.68 MB)  
Non-trainable params: 1,522,707 (5.81 MB)  
Optimizer params: 5,074,226 (19.36 MB)

**Test Accuracy:** 0.2152

## Training Accuracy over Epochs:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)  
**Batch Size:** 32  
**Number of Classes:** 8  
**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}  
**Base Epochs:** 10  
**Epochs:** 30  
**Data Augmentation:** RandomFlip(horizontal), RandomRotation(0.1 radians), RandomZoom(0.1), RandomContrast(0.1), RandomBrightness(0.1)  
**Gaussian Noise STD:** 0  
**Salt-Pepper Noise Amount:** 0.0  
**Train Size:** 568  
**Validation Size:** 142  
**Test Size:** 79  
**Comments:** Using MobileNetV2

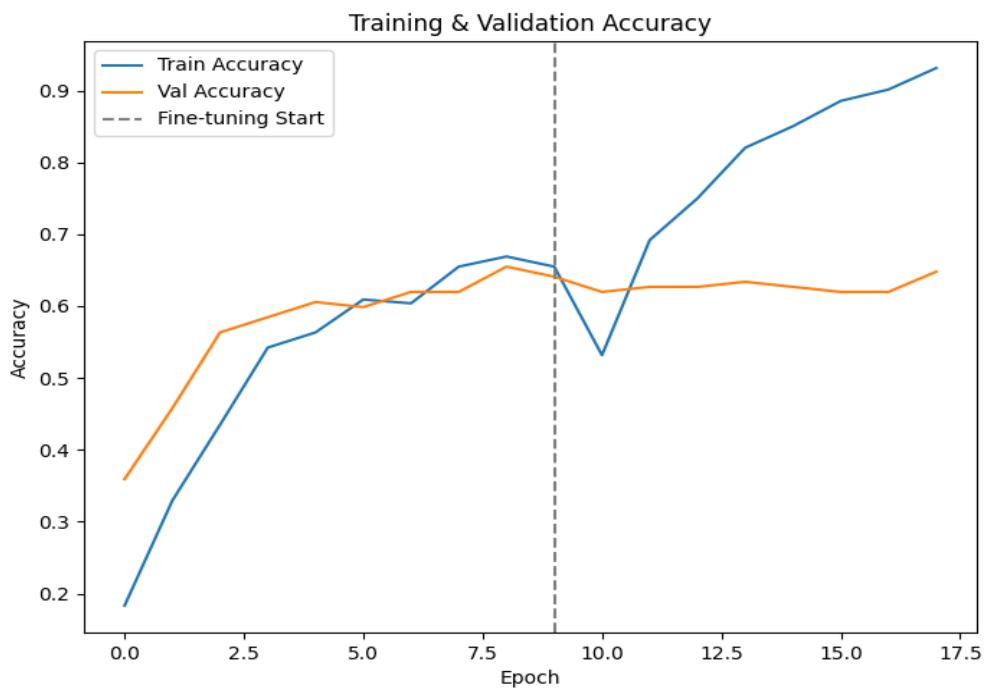
## Model Summary:

```
Model: "sequential_1"
[REDACTED]
[REDACTED]
■ Layer (type)           ■ Output Shape    ■ Param #
[REDACTED]
■ mobilenetv2_1.00_224 (Functional) ■ (None, 7, 7, 1280) ■ 2,257,984 ■
[REDACTED]
[REDACTED]
■ global_average_pooling2d   ■ (None, 1280)   ■ 0 ■
■ (GlobalAveragePooling2D)   ■                   ■
[REDACTED]
[REDACTED]
■ dropout (Dropout)        ■ (None, 1280)   ■ 0 ■
[REDACTED]
[REDACTED]
■ dense (Dense)           ■ (None, 8)      ■ 10,248 ■
[REDACTED]
[REDACTED]

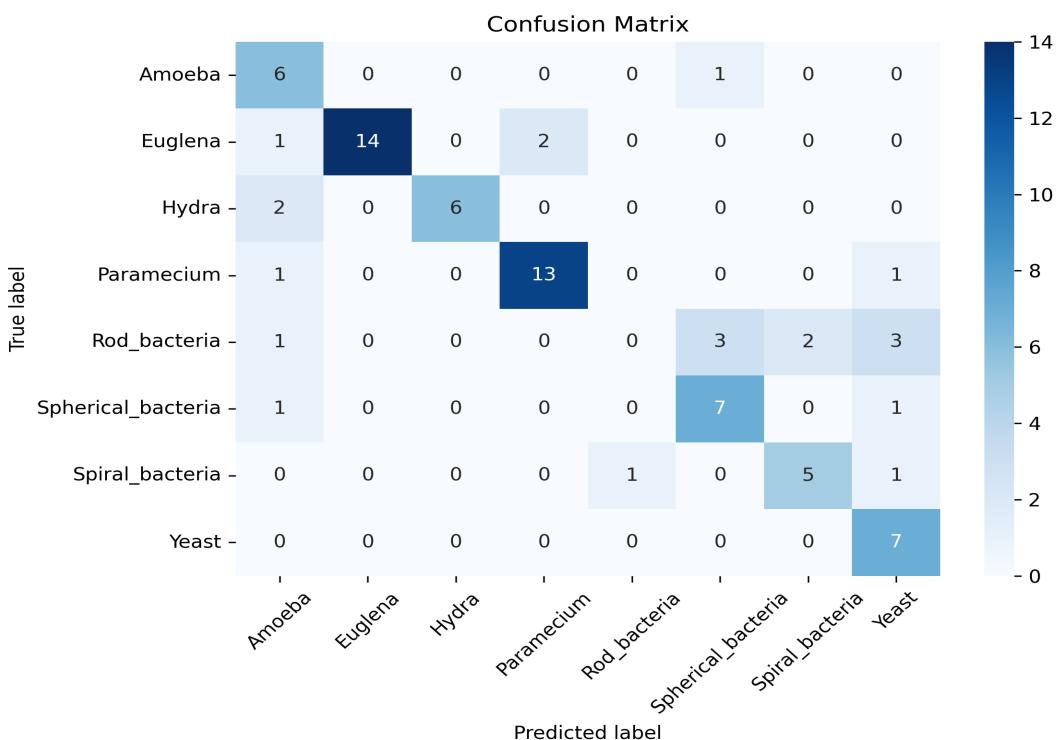
Total params: 5,998,937 (22.88 MB)
Trainable params: 1,865,352 (7.12 MB)
Non-trainable params: 402,880 (1.54 MB)
Optimizer params: 3,730,705 (14.23 MB)
```

**Test Accuracy:** 0.7342

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)

**Image 3.26. (E)**

### **Number of Classes: 8**

**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

**Class Weights:** [1  
**Base Epochs:** 10

## Base Epoch Epochs: 30

**Data Augmentation:** RandomFlip(horizontal), RandomRotation(0.1 radians), RandomZoom(0.1), RandomContrast(0.1), RandomBrightness(0.1)

**Gaussian Noise STD:** 0.01

Salt-Pepper Noise Amount: 0.01

## Salt-Pepper Noise

**Train Size:** 568  
**Validation Size:** 142

**Validation Size:** 14  
**Test Size:** 70

**Test Size: 79**

**Comments:** Using MobileNetV2, reintroduced salt and pepper + gaussian

## Model Summary:

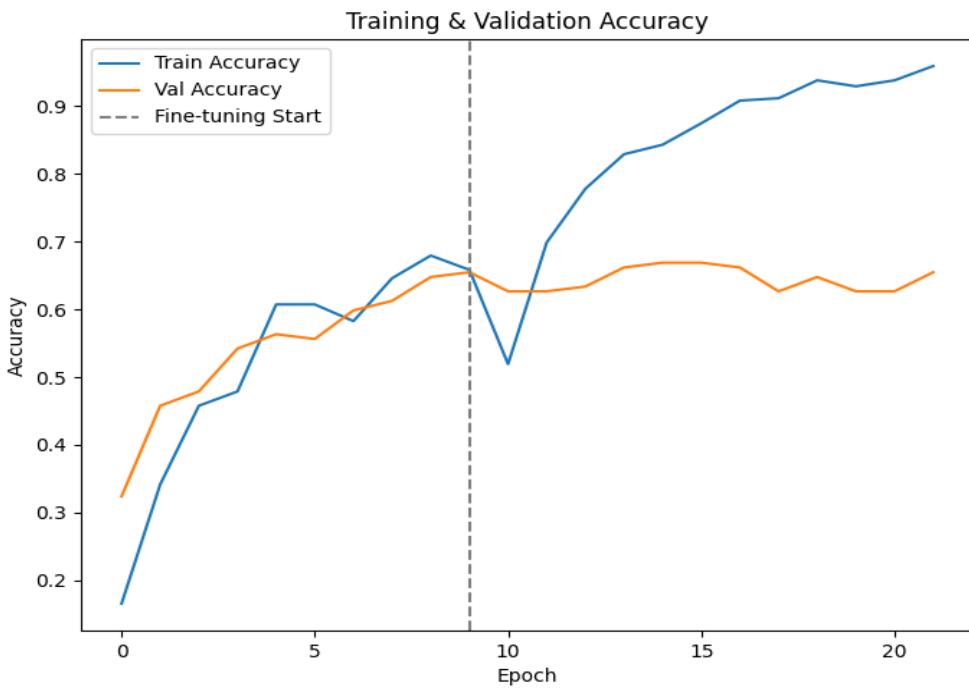
Model: "sequential\_1"

Layer (type)	Output Shape	Param #
mobilenetv2_1.00_224 (Functional)	(None, 7, 7, 1280)	2,257,984
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248

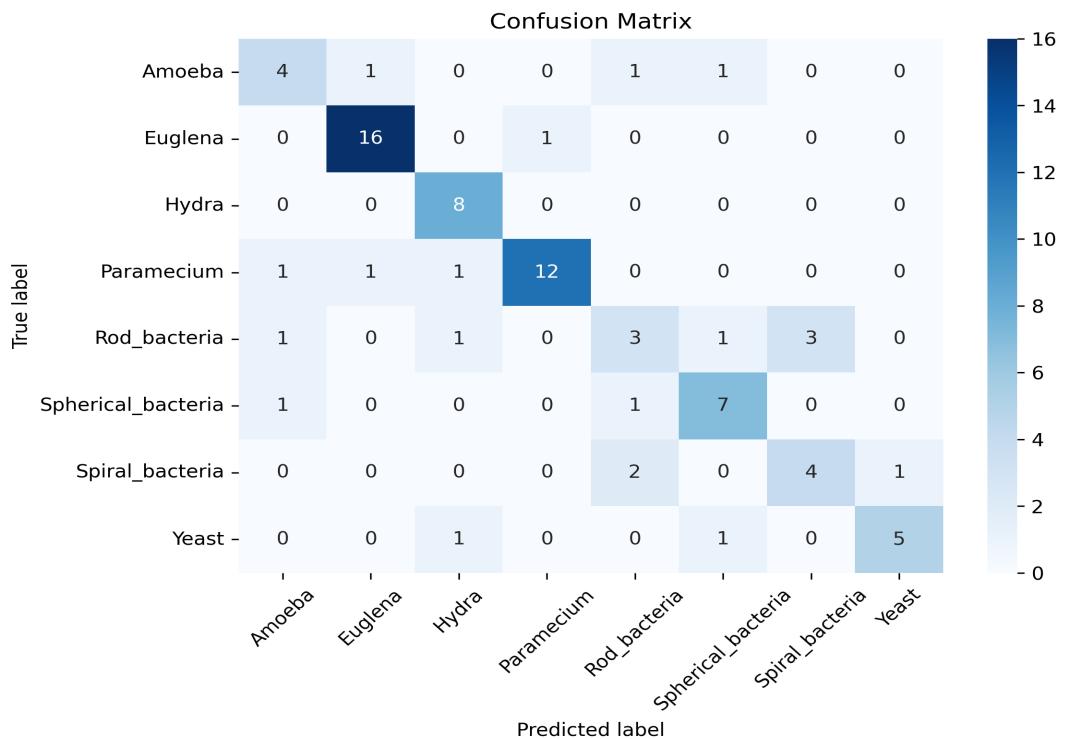
Total params: 5,998,937 (22.88 MB)  
Trainable params: 1,865,352 (7.12 MB)  
Non-trainable params: 402.880 (1.54 MB)  
Optimizer params: 3,730,705 (14.23 MB)

**Test Accuracy:** 0.7468

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)

**Batch Size:** 32

**Number of Classes:** 8

**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

**Base Epochs:** 10

**Epochs:** 30

**Data Augmentation:** RandomFlip(horizontal), RandomRotation(0.1 radians), RandomZoom(0.1), RandomContrast(0.1), RandomBrightness(0.1)

**Gaussian Noise STD:** 0.05

**Salt-Pepper Noise Amount:** 0.05

**Train Size:** 568

**Validation Size:** 142

**Test Size:** 79

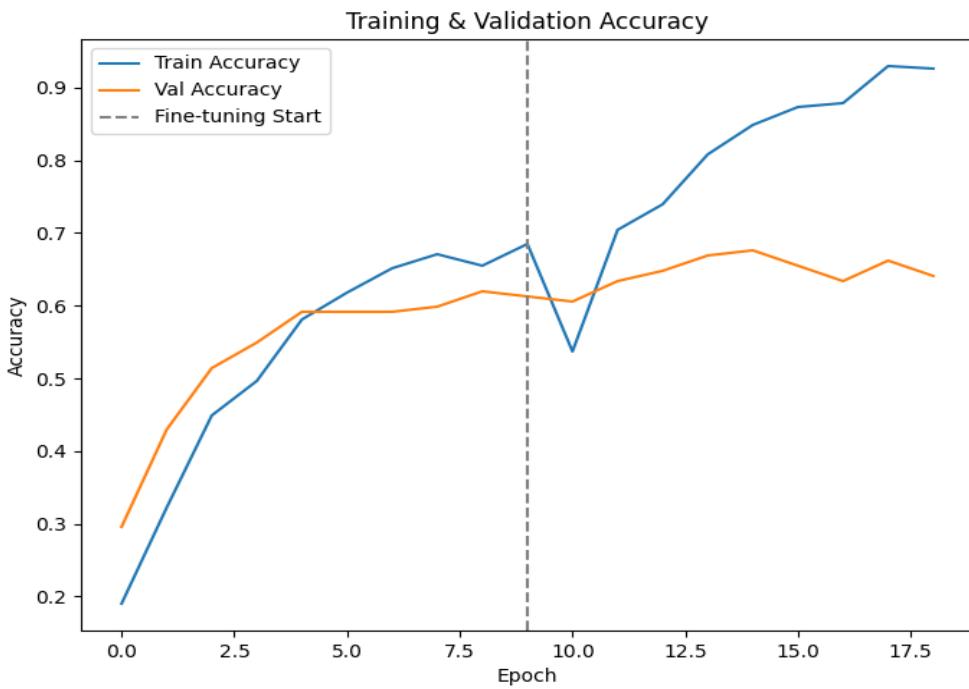
**Comments:** Using MobileNetV2, increased salt and pepper + gaussian

## Model Summary:

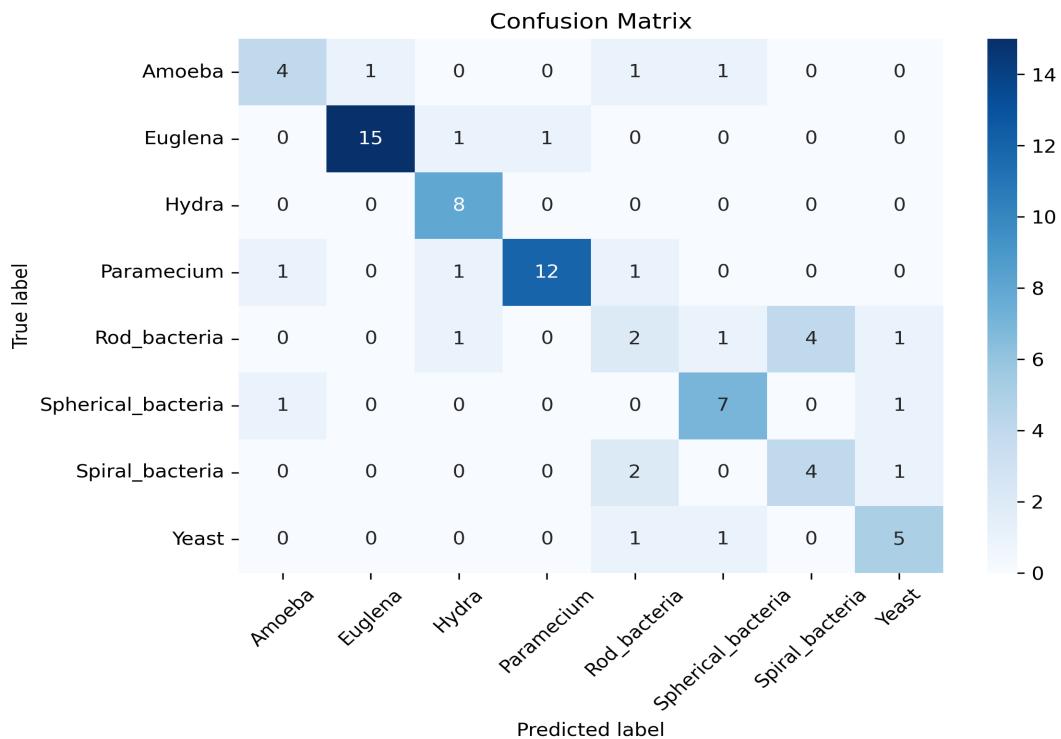
Model: "sequential_1"		
Layer (type)	Output Shape	Param #
mobilenetv2_1.00_224 (Functional)	(None, 7, 7, 1280)	2,257,984
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248
Total params: 5,998,937 (22.88 MB) Trainable params: 1,865,352 (7.12 MB) Non-trainable params: 402,880 (1.54 MB) Optimizer params: 3,730,705 (14.23 MB)		

**Test Accuracy:** 0.7215

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)  
**Batch Size:** 32  
**Number of Classes:** 8  
**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}  
**Base Epochs:** 10  
**Epochs:** 30  
**Data Augmentation:** RandomFlip({FLIP}), RandomRotation({ROTATION} radians),  
RandomZoom({ZOOM}), RandomContrast({CONTRAST}), RandomBrightness({LAMBDA})  
**Gaussian Noise STD:** 0.01  
**Salt-Pepper Noise Amount:** 0.01  
**Train Size:** 568  
**Validation Size:** 142  
**Test Size:** 79  
**Comments:** Using MobileNetV2, reduced salt and pepper + gaussian, increased brightness and contrast

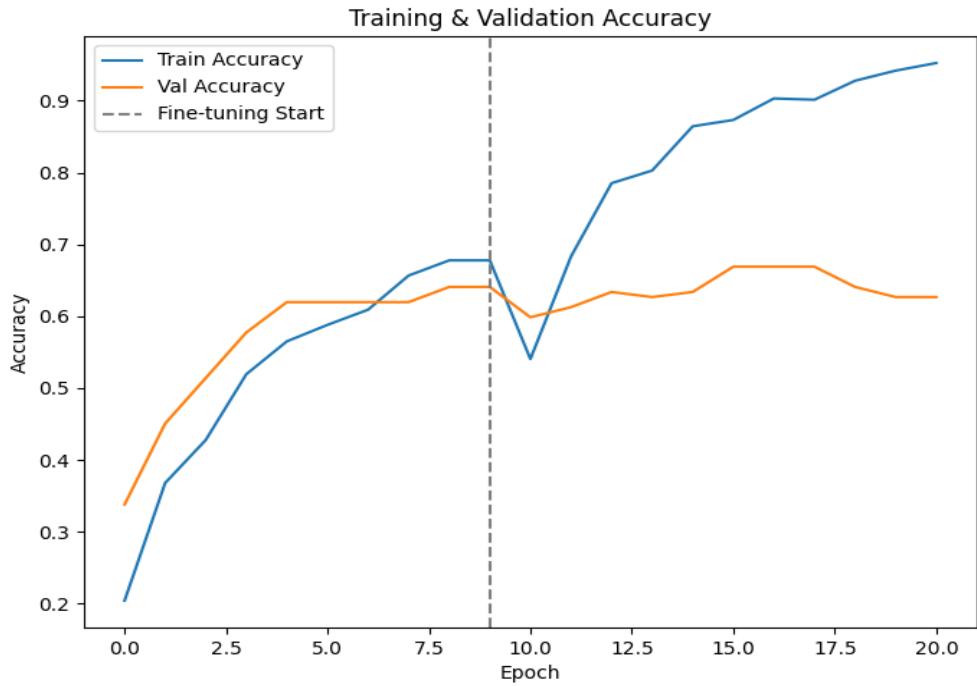
## Model Summary:

```
Model: "sequential_1"
[REDACTED]
[REDACTED]
■ Layer (type)           ■ Output Shape    ■ Param #
[REDACTED]
■ mobilenetv2_1.00_224 (Functional)   ■ (None, 7, 7, 1280)   ■ 2,257,984 ■
[REDACTED]
[REDACTED]
■ global_average_pooling2d   ■ (None, 1280)    ■ 0 ■
■ (GlobalAveragePooling2D)
[REDACTED]
[REDACTED]
■ dropout (Dropout)        ■ (None, 1280)    ■ 0 ■
[REDACTED]
[REDACTED]
■ dense (Dense)           ■ (None, 8)       ■ 10,248 ■
[REDACTED]
[REDACTED]

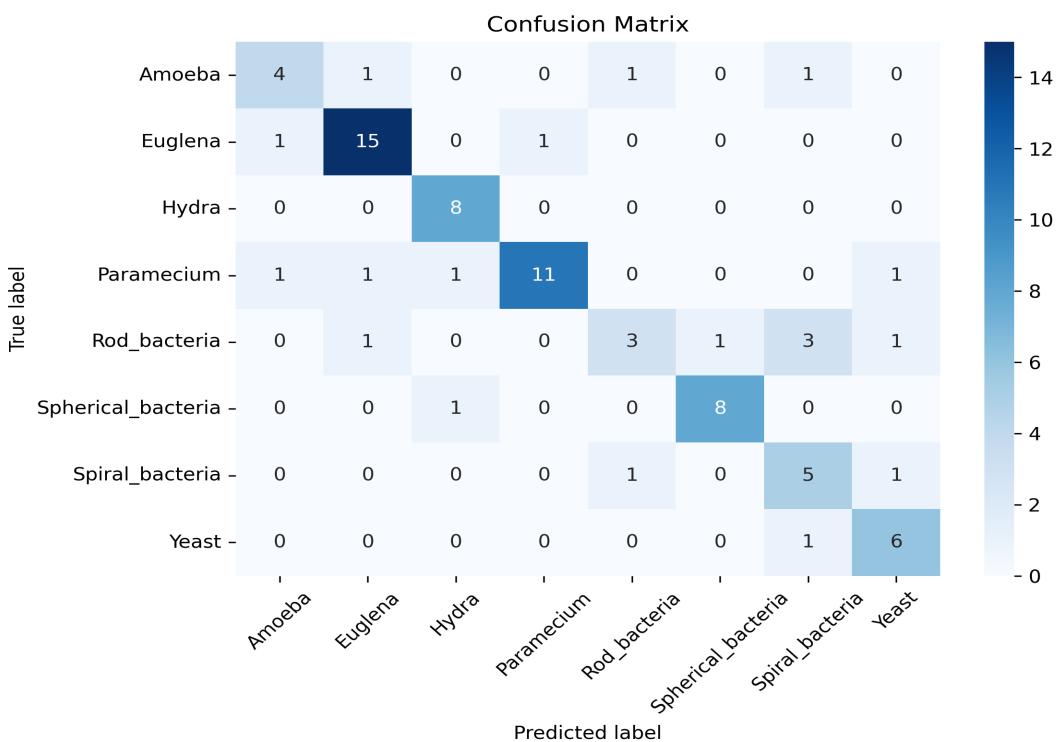
Total params: 5,998,937 (22.88 MB)
Trainable params: 1,865,352 (7.12 MB)
Non-trainable params: 402,880 (1.54 MB)
Optimizer params: 3,730,705 (14.23 MB)
```

**Test Accuracy:** 0.7595

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)

**Batch Size:** 32

**Number of Classes:** 8

**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

**Base Epochs:** 10

**Epochs:** 30

**Data Augmentation:** RandomFlip({FLIP}), RandomRotation({ROTATION} radians),  
RandomZoom({ZOOM}), RandomContrast({CONTRAST}), RandomBrightness({LAMBDA})

**Gaussian Noise STD:** 0.01

**Salt-Pepper Noise Amount:** 0.01

**Train Size:** 568

**Validation Size:** 142

**Test Size:** 79

**Comments:** Using MobileNetV2, stronger dropout

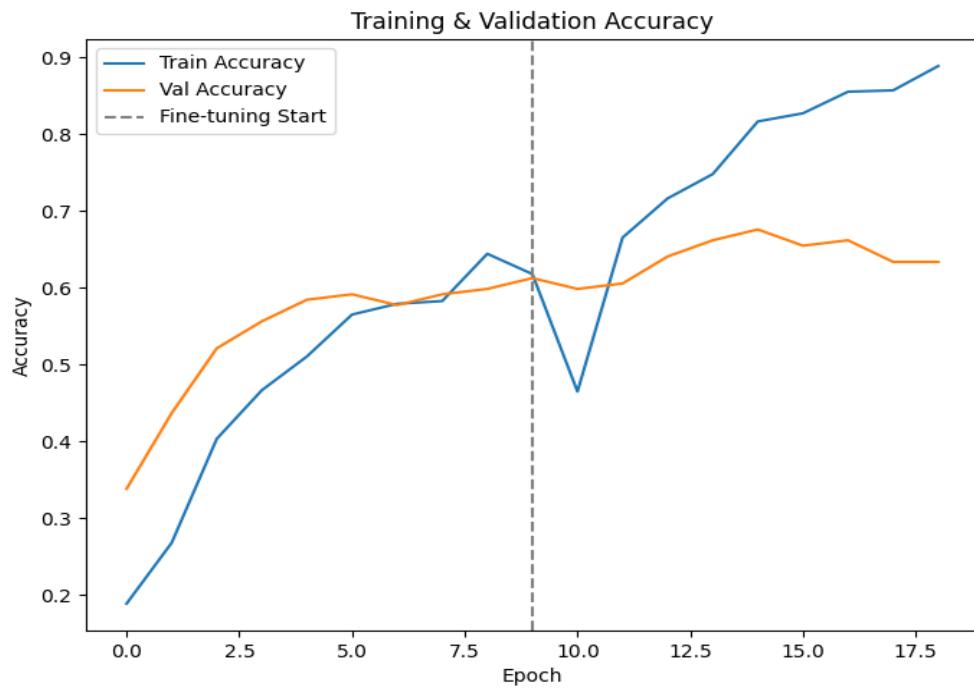
## Model Summary:

Layer (type)	Output Shape	Param #
mobilenetv2_1.00_224 (Functional)	(None, 7, 7, 1280)	2,257,984
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248

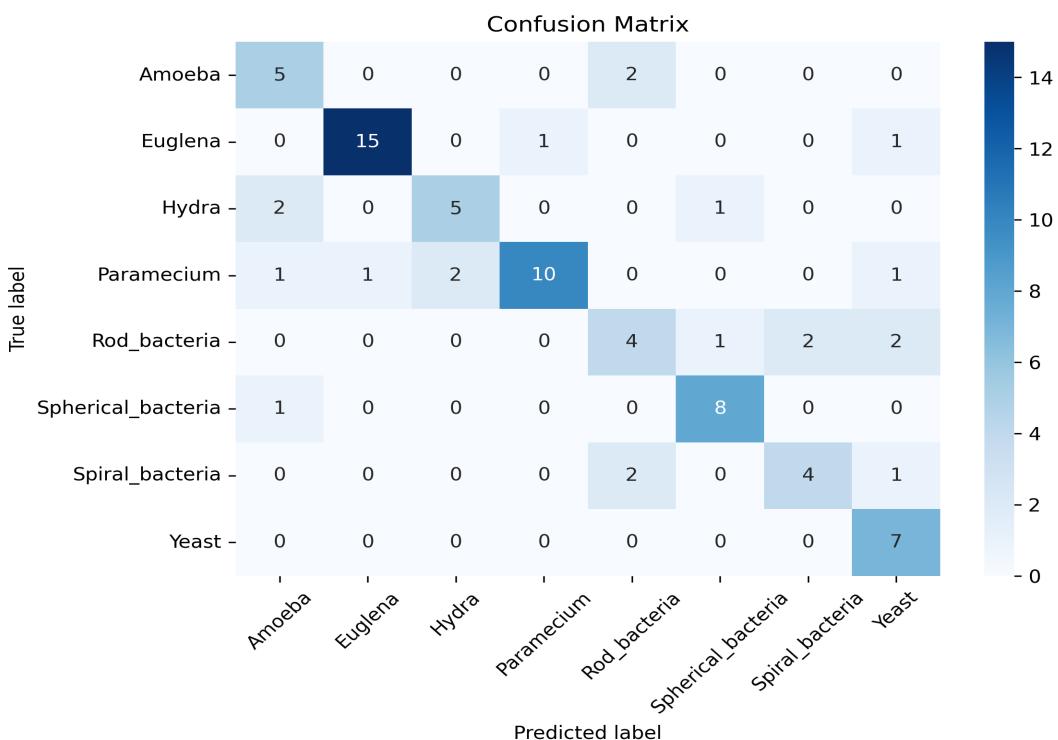
Total params: 5,998,937 (22.88 MB)  
Trainable params: 1,865,352 (7.12 MB)  
Non-trainable params: 402,880 (1.54 MB)  
Optimizer params: 3,730,705 (14.23 MB)

**Test Accuracy:** 0.7342

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)  
**Batch Size:** 32  
**Number of Classes:** 8  
**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}  
**Base Epochs:** 10  
**Epochs:** 30  
**Data Augmentation:** RandomFlip({FLIP}), RandomRotation({ROTATION} radians),  
RandomZoom({ZOOM}), RandomContrast({CONTRAST}), RandomBrightness({LAMBDA})  
**Gaussian Noise STD:** 0.01  
**Salt-Pepper Noise Amount:** 0.01  
**Train Size:** 568  
**Validation Size:** 142  
**Test Size:** 79  
**Comments:** Using MobileNetV2, increased zoom and rotation augmentation

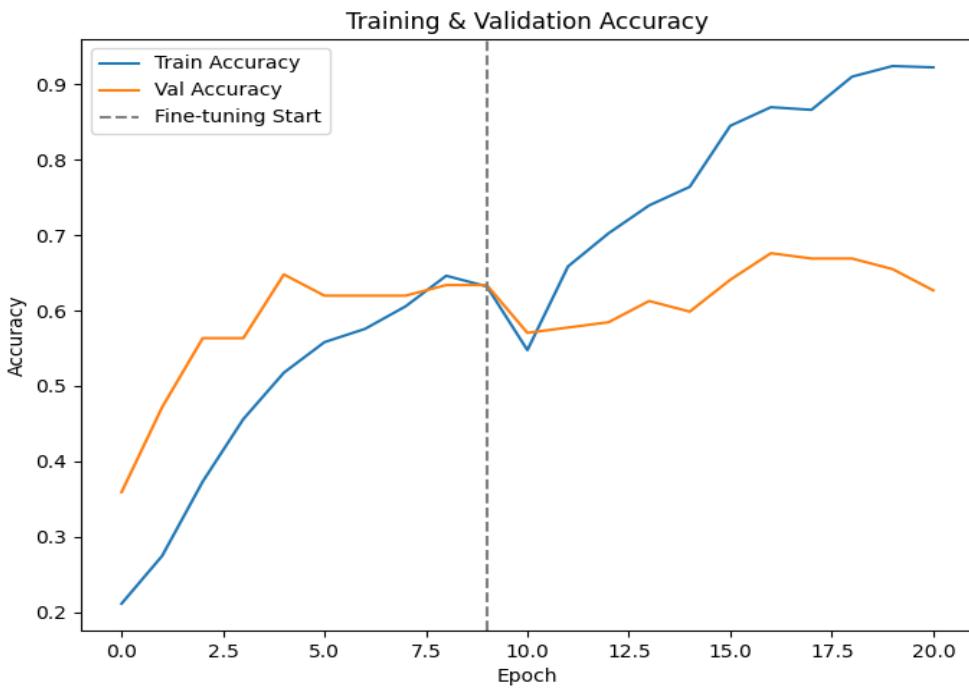
## Model Summary:

```
Model: "sequential_1"
[REDACTED]
[REDACTED]
■ Layer (type)           ■ Output Shape    ■ Param #
[REDACTED]
■ mobilenetv2_1.00_224 (Functional) ■ (None, 7, 7, 1280) ■ 2,257,984 ■
[REDACTED]
[REDACTED]
■ global_average_pooling2d   ■ (None, 1280)   ■ 0 ■
■ (GlobalAveragePooling2D)   ■                   ■
[REDACTED]
[REDACTED]
■ dropout (Dropout)        ■ (None, 1280)   ■ 0 ■
[REDACTED]
[REDACTED]
■ dense (Dense)           ■ (None, 8)      ■ 10,248 ■
[REDACTED]
[REDACTED]

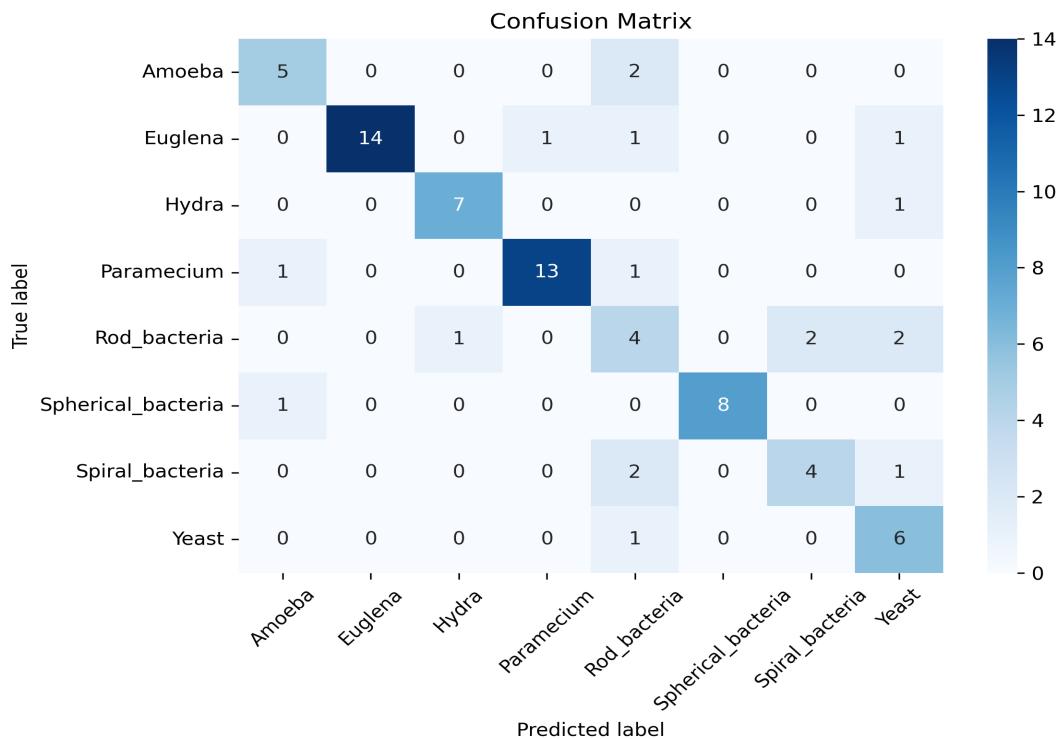
Total params: 5,998,937 (22.88 MB)
Trainable params: 1,865,352 (7.12 MB)
Non-trainable params: 402,880 (1.54 MB)
Optimizer params: 3,730,705 (14.23 MB)
```

**Test Accuracy:** 0.7722

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)  
**Batch Size:** 32  
**Number of Classes:** 8  
**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}  
**Base Epochs:** 10  
**Epochs:** 30  
**Data Augmentation:** RandomFlip({FLIP}), RandomRotation({ROTATION} radians),  
RandomZoom({ZOOM}), RandomContrast({CONTRAST}), RandomBrightness({LAMBDA})  
**Gaussian Noise STD:** 0.02  
**Salt-Pepper Noise Amount:** 0.02  
**Train Size:** 568  
**Validation Size:** 142  
**Test Size:** 79  
**Comments:** Using MobileNetV2, increased all augmentation

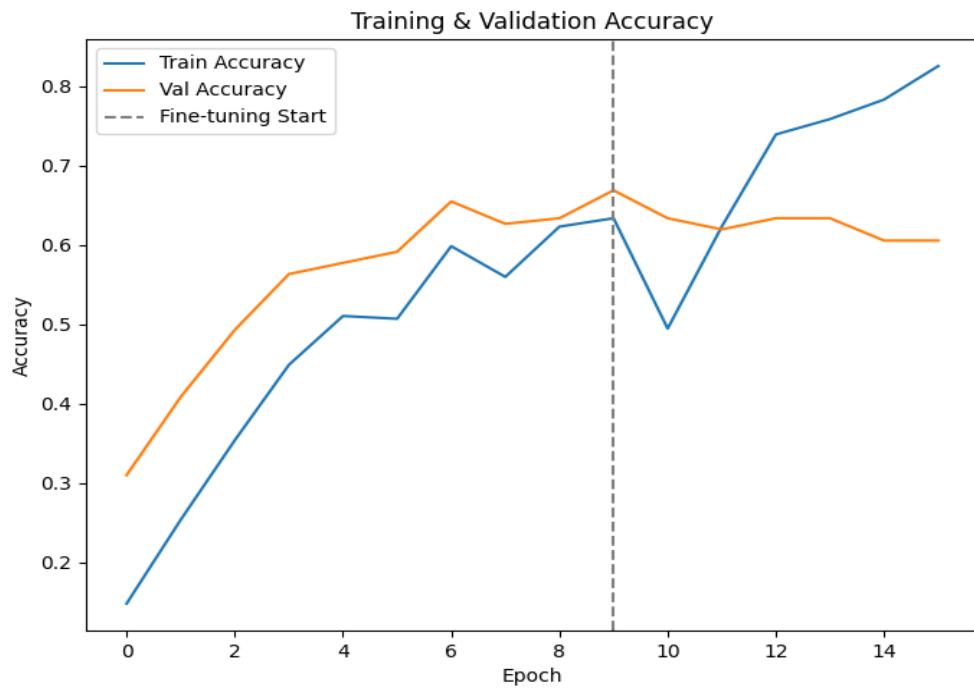
## Model Summary:

```
Model: "sequential_1"
[REDACTED]
[REDACTED]
■ Layer (type)           ■ Output Shape    ■ Param #
[REDACTED]
■ mobilenetv2_1.00_224 (Functional) ■ (None, 7, 7, 1280) ■ 2,257,984 ■
[REDACTED]
[REDACTED]
■ global_average_pooling2d   ■ (None, 1280)   ■ 0 ■
■ (GlobalAveragePooling2D)   ■                   ■
[REDACTED]
[REDACTED]
■ dropout (Dropout)        ■ (None, 1280)   ■ 0 ■
[REDACTED]
[REDACTED]
■ dense (Dense)           ■ (None, 8)      ■ 10,248 ■
[REDACTED]
[REDACTED]

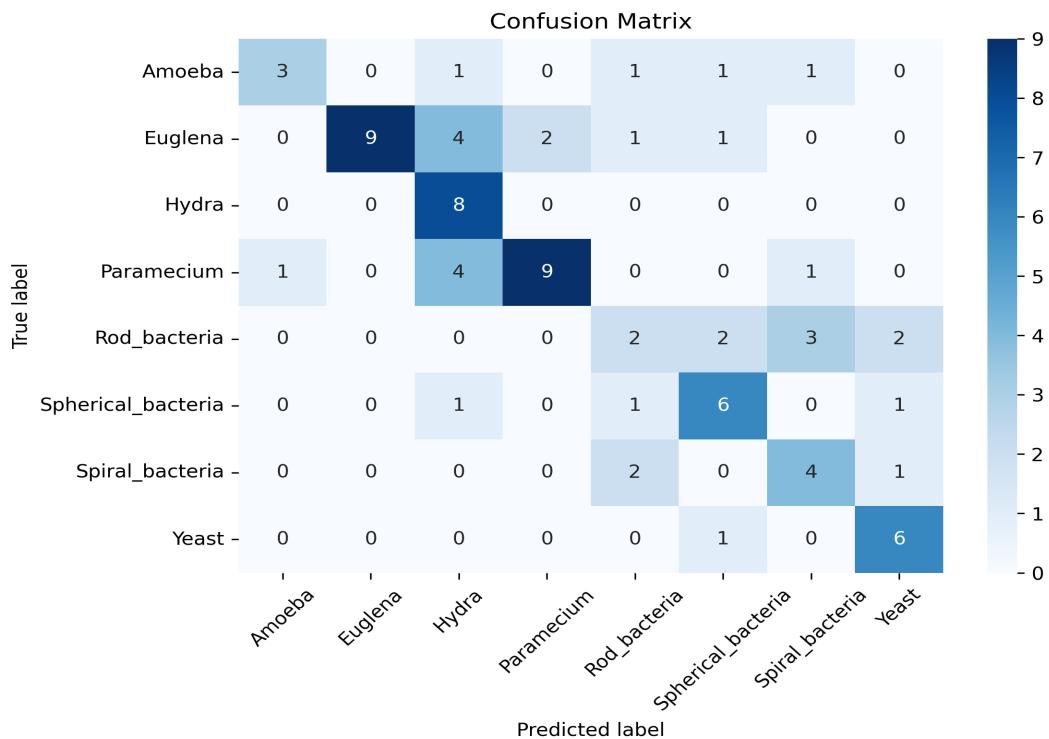
Total params: 5,998,937 (22.88 MB)
Trainable params: 1,865,352 (7.12 MB)
Non-trainable params: 402,880 (1.54 MB)
Optimizer params: 3,730,705 (14.23 MB)
```

**Test Accuracy:** 0.5949

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)  
**Batch Size:** 32  
**Number of Classes:** 8  
**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}  
**Base Epochs:** 10  
**Epochs:** 30  
**Data Augmentation:** RandomFlip({FLIP}), RandomRotation({ROTATION} radians),  
RandomZoom({ZOOM}), RandomContrast({CONTRAST}), RandomBrightness({LAMBDA})  
**Gaussian Noise STD:** 0.02  
**Salt-Pepper Noise Amount:** 0.02  
**Train Size:** 568  
**Validation Size:** 142  
**Test Size:** 79  
**Comments:** Using MobileNetV2, decreased zoom and rotation augmentation

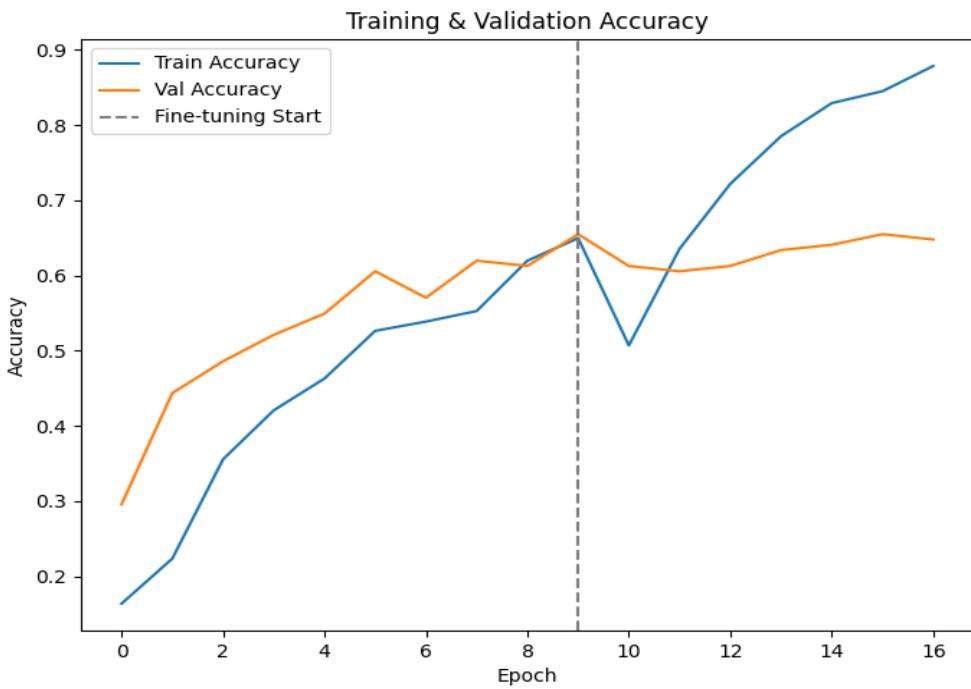
## Model Summary:

```
Model: "sequential_1"
[REDACTED]
[REDACTED]
■ Layer (type)           ■ Output Shape    ■ Param #
[REDACTED]
■ mobilenetv2_1.00_224 (Functional) ■ (None, 7, 7, 1280) ■ 2,257,984 ■
[REDACTED]
■ global_average_pooling2d   ■ (None, 1280)   ■ 0 ■
■ (GlobalAveragePooling2D)   ■                   ■
[REDACTED]
■ dropout (Dropout)        ■ (None, 1280)   ■ 0 ■
[REDACTED]
■ dense (Dense)           ■ (None, 8)      ■ 10,248 ■
[REDACTED]

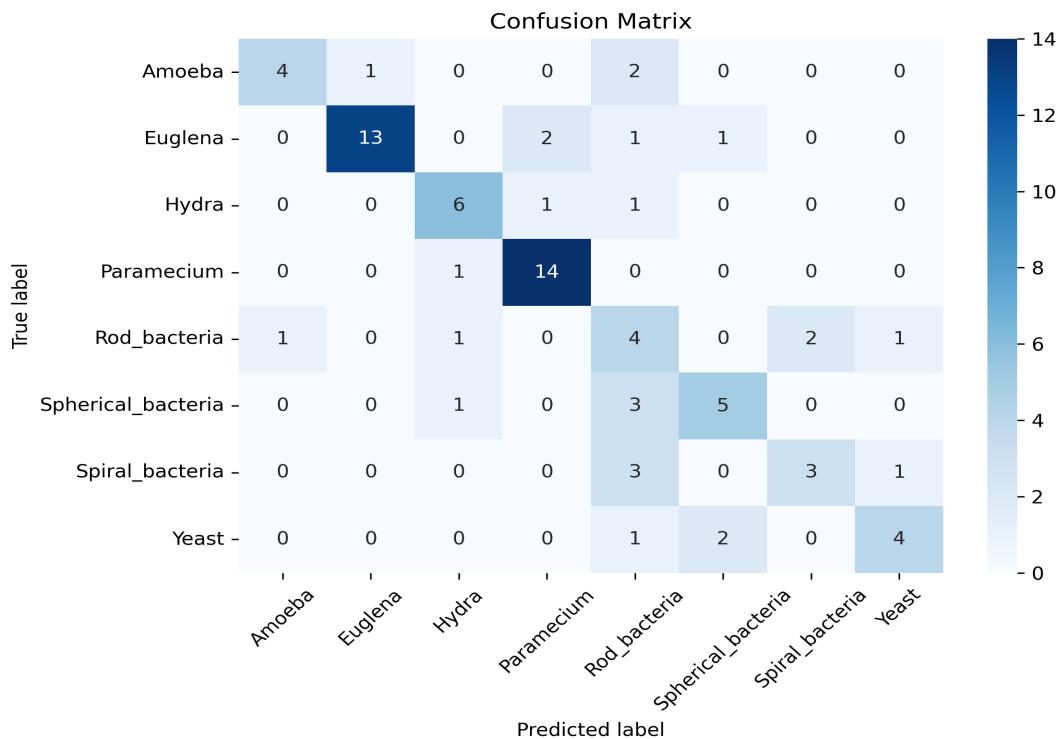
Total params: 5,998,937 (22.88 MB)
Trainable params: 1,865,352 (7.12 MB)
Non-trainable params: 402,880 (1.54 MB)
Optimizer params: 3,730,705 (14.23 MB)
```

**Test Accuracy:** 0.6709

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)  
**Batch Size:** 32  
**Number of Classes:** 8  
**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}  
**Base Epochs:** 10  
**Epochs:** 30  
**Data Augmentation:** RandomFlip({FLIP}), RandomRotation({ROTATION} radians),  
RandomZoom({ZOOM}), RandomContrast({CONTRAST}), RandomBrightness({LAMBDA})  
**Gaussian Noise STD:** 0.0  
**Salt-Pepper Noise Amount:** 0.0  
**Train Size:** 568  
**Validation Size:** 142  
**Test Size:** 79  
**Comments:** Using MobileNetV2, tweaked augmentation and removed gaussian + salt and pepper

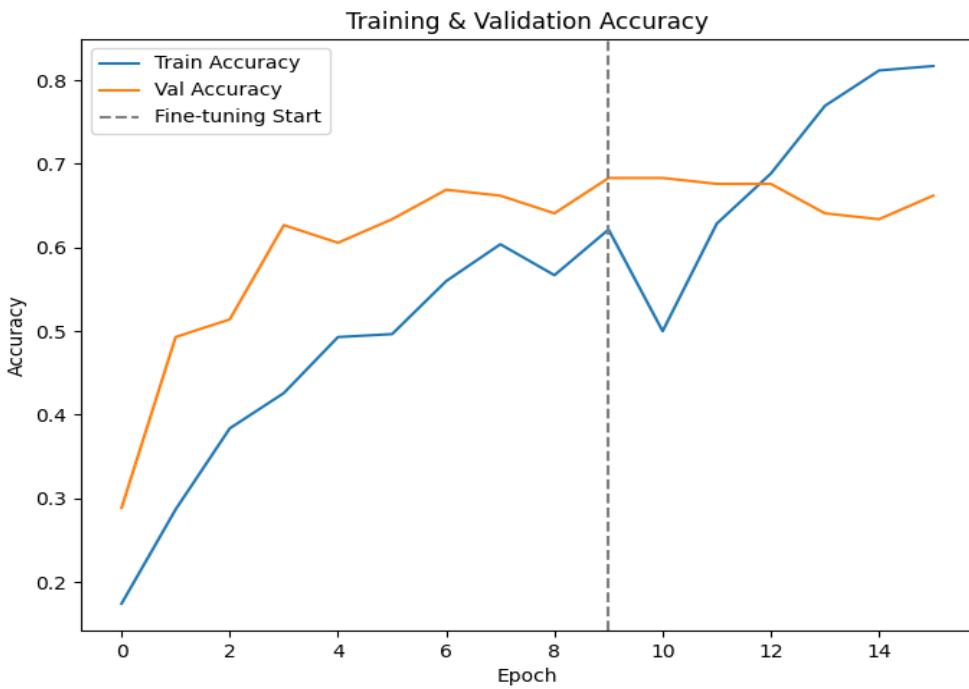
## Model Summary:

```
Model: "sequential_1"
[REDACTED]
[REDACTED]
■ Layer (type)           ■ Output Shape    ■ Param #
[REDACTED]
■ mobilenetv2_1.00_224 (Functional) ■ (None, 7, 7, 1280) ■ 2,257,984 ■
[REDACTED]
[REDACTED]
■ global_average_pooling2d   ■ (None, 1280)   ■ 0 ■
■ (GlobalAveragePooling2D)   ■                   ■
[REDACTED]
[REDACTED]
■ dropout (Dropout)        ■ (None, 1280)   ■ 0 ■
[REDACTED]
[REDACTED]
■ dense (Dense)           ■ (None, 8)      ■ 10,248 ■
[REDACTED]
[REDACTED]

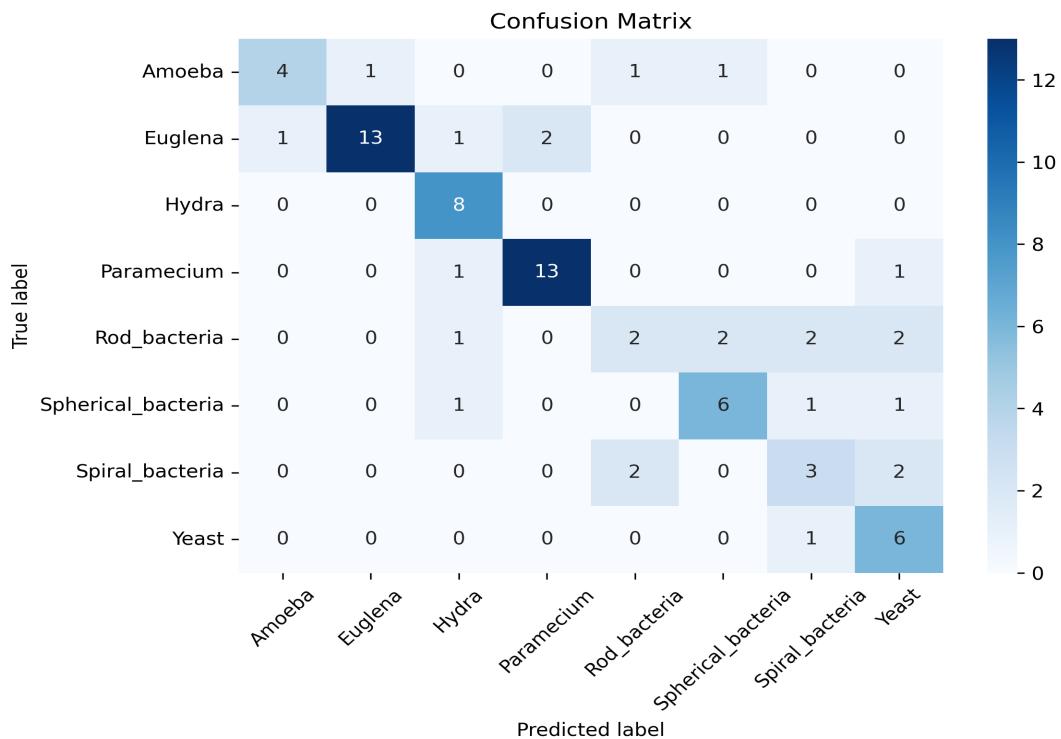
Total params: 5,998,937 (22.88 MB)
Trainable params: 1,865,352 (7.12 MB)
Non-trainable params: 402,880 (1.54 MB)
Optimizer params: 3,730,705 (14.23 MB)
```

**Test Accuracy:** 0.6962

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)  
**Batch Size:** 32  
**Number of Classes:** 8  
**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}  
**Base Epochs:** 10  
**Epochs:** 30  
**Data Augmentation:** RandomFlip({FLIP}), RandomRotation({ROTATION} radians),  
RandomZoom({ZOOM}), RandomContrast({CONTRAST}), RandomBrightness({LAMBDA})  
**Gaussian Noise STD:** 0.02  
**Salt-Pepper Noise Amount:** 0.05  
**Train Size:** 568  
**Validation Size:** 142  
**Test Size:** 79  
**Comments:** Using MobileNetV2, tweaked augmentation and increased gaussian + salt and pepper

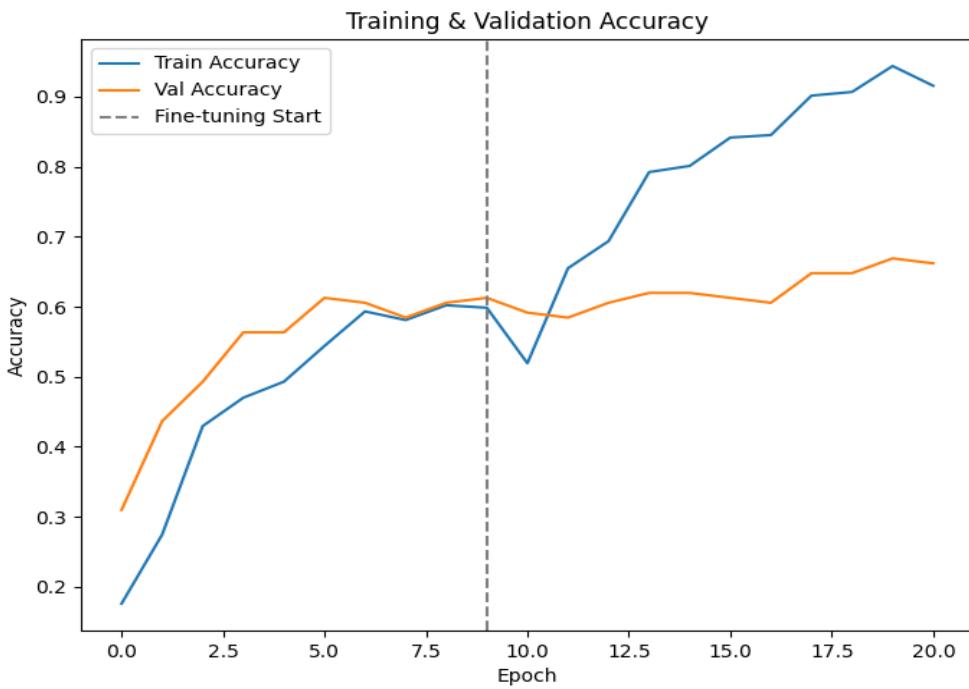
## Model Summary:

```
Model: "sequential_1"
[REDACTED]
[REDACTED]
■ Layer (type)           ■ Output Shape    ■ Param #
[REDACTED]
■ mobilenetv2_1.00_224 (Functional) ■ (None, 7, 7, 1280) ■ 2,257,984 ■
[REDACTED]
[REDACTED]
■ global_average_pooling2d   ■ (None, 1280)   ■ 0 ■
■ (GlobalAveragePooling2D)   ■                   ■
[REDACTED]
[REDACTED]
■ dropout (Dropout)        ■ (None, 1280)   ■ 0 ■
[REDACTED]
[REDACTED]
■ dense (Dense)           ■ (None, 8)      ■ 10,248 ■
[REDACTED]
[REDACTED]

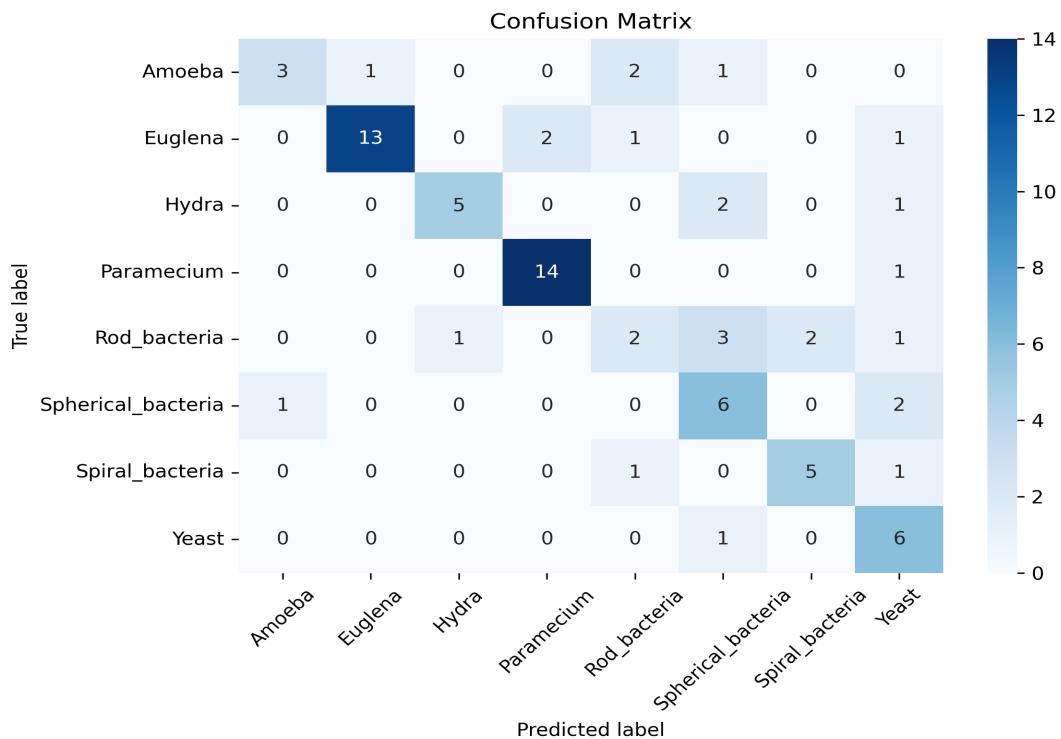
Total params: 5,998,937 (22.88 MB)
Trainable params: 1,865,352 (7.12 MB)
Non-trainable params: 402,880 (1.54 MB)
Optimizer params: 3,730,705 (14.23 MB)
```

**Test Accuracy:** 0.6835

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)  
**Batch Size:** 64  
**Number of Classes:** 8  
**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}  
**Base Epochs:** 10  
**Epochs:** 30  
**Data Augmentation:** RandomFlip({FLIP}), RandomRotation({ROTATION} radians),  
RandomZoom({ZOOM}), RandomContrast({CONTRAST}), RandomBrightness({LAMBDA})  
**Gaussian Noise STD:** 0.02  
**Salt-Pepper Noise Amount:** 0.05  
**Train Size:** 568  
**Validation Size:** 142  
**Test Size:** 79  
**Comments:** Using MobileNetV2, increased batch size

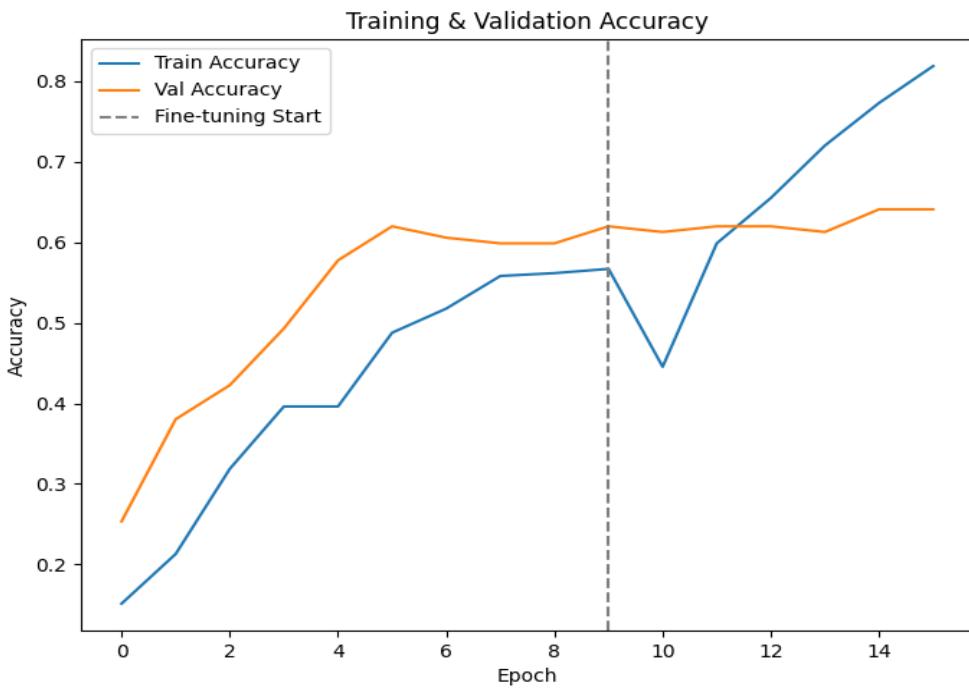
## Model Summary:

```
Model: "sequential_1"
[REDACTED]
[REDACTED]
■ Layer (type)           ■ Output Shape    ■ Param #
[REDACTED]
■ mobilenetv2_1.00_224 (Functional)   ■ (None, 7, 7, 1280)   ■ 2,257,984 ■
[REDACTED]
■ global_average_pooling2d   ■ (None, 1280)    ■ 0 ■
■ (GlobalAveragePooling2D)   ■                         ■
[REDACTED]
■ dropout (Dropout)        ■ (None, 1280)    ■ 0 ■
[REDACTED]
■ dense (Dense)           ■ (None, 8)       ■ 10,248 ■
[REDACTED]

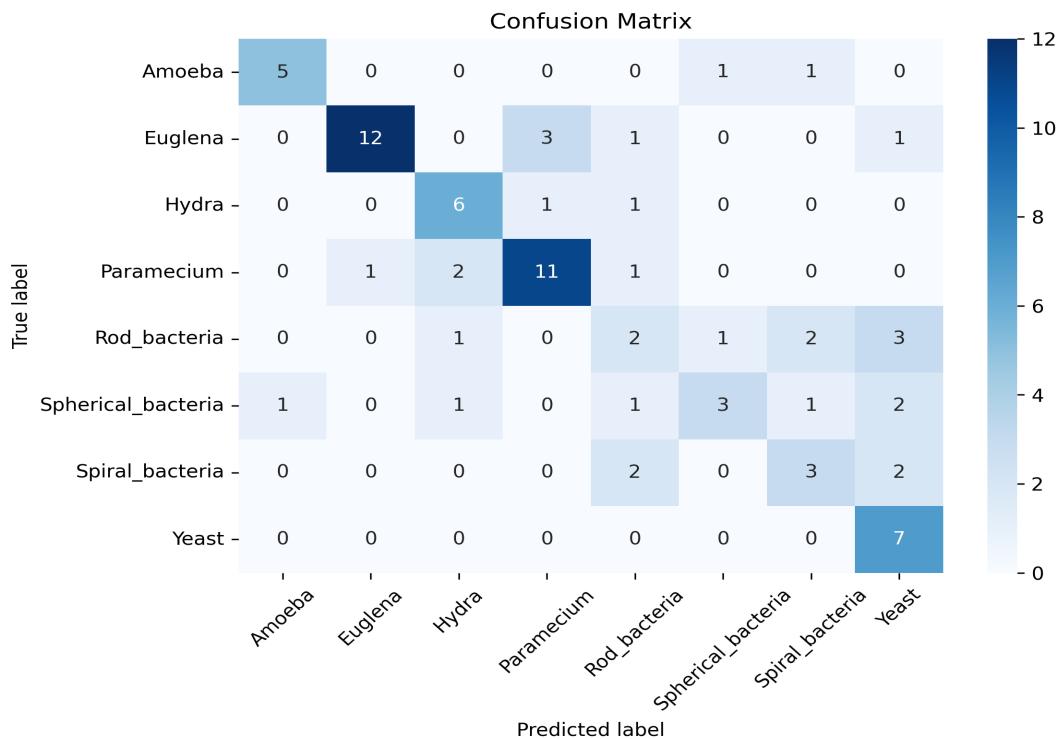
Total params: 5,998,937 (22.88 MB)
Trainable params: 1,865,352 (7.12 MB)
Non-trainable params: 402,880 (1.54 MB)
Optimizer params: 3,730,705 (14.23 MB)
```

**Test Accuracy:** 0.6203

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)

**Batch Size:** 16

**Number of Classes:** 8

**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

**Base Epochs:** 10

**Epochs:** 30

**Data Augmentation:** RandomFlip({FLIP}), RandomRotation({ROTATION} radians),  
RandomZoom({ZOOM}), RandomContrast({CONTRAST}), RandomBrightness({LAMBDA})

**Gaussian Noise STD:** 0.02

**Salt-Pepper Noise Amount:** 0.05

**Train Size:** 568

**Validation Size:** 142

**Test Size:** 79

**Comments:** Using MobileNetV2, reduced batch size

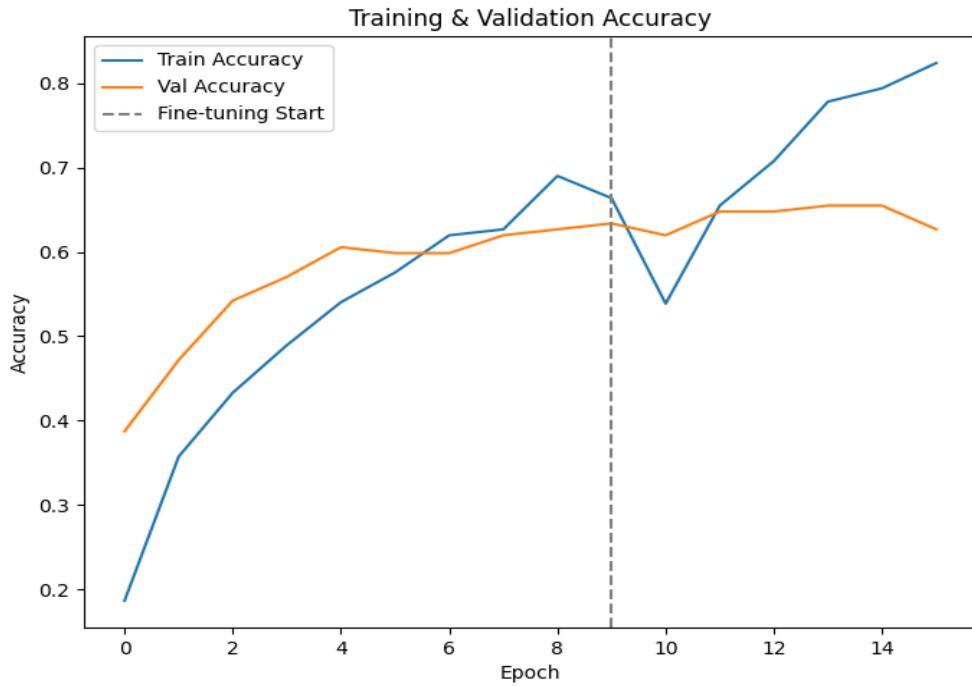
## Model Summary:

Layer (type)	Output Shape	Param #
mobilenetv2_1.00_224 (Functional)	(None, 7, 7, 1280)	2,257,984
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248

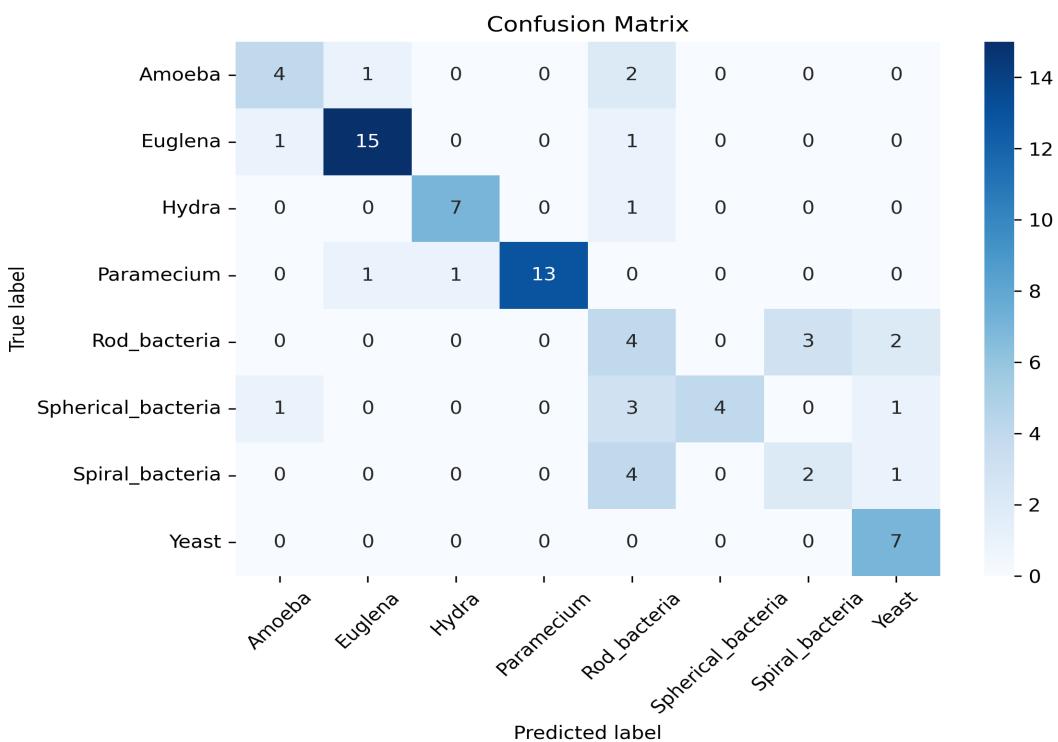
Total params: 5,998,937 (22.88 MB)  
Trainable params: 1,865,352 (7.12 MB)  
Non-trainable params: 402,880 (1.54 MB)  
Optimizer params: 3,730,705 (14.23 MB)

**Test Accuracy:** 0.7089

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)

**Batch Size:** 32

**Number of Classes:** 8

**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

**Base Epochs:** 10

**Fine-tune Epochs:** 30

**Data Augmentation:** random\_flip, random\_rotation, random\_zoom, random\_contrast, lambda

**RandomFlip Mode:** horizontal

**RandomRotation Factor:** 0.15

**RandomZoom Factor:** 0.15

**RandomContrast Factor:** 0.2

**RandomBrightness MaxDelta:** 0.2

**Gaussian Noise STD:** 0.02

**Train Size:** 568

**Validation Size:** 142

**Test Size:** 79

**Optimizer (Base):** Adam

**Optimizer (Fine-tune):** Adam with ExponentialDecay(initial\_lr=0.0001, decay\_rate=0.96)

**Early Stopping Patience:** 10

**Comments:** Using MobileNetV2, improved data pipeline and added noise to preprocessing

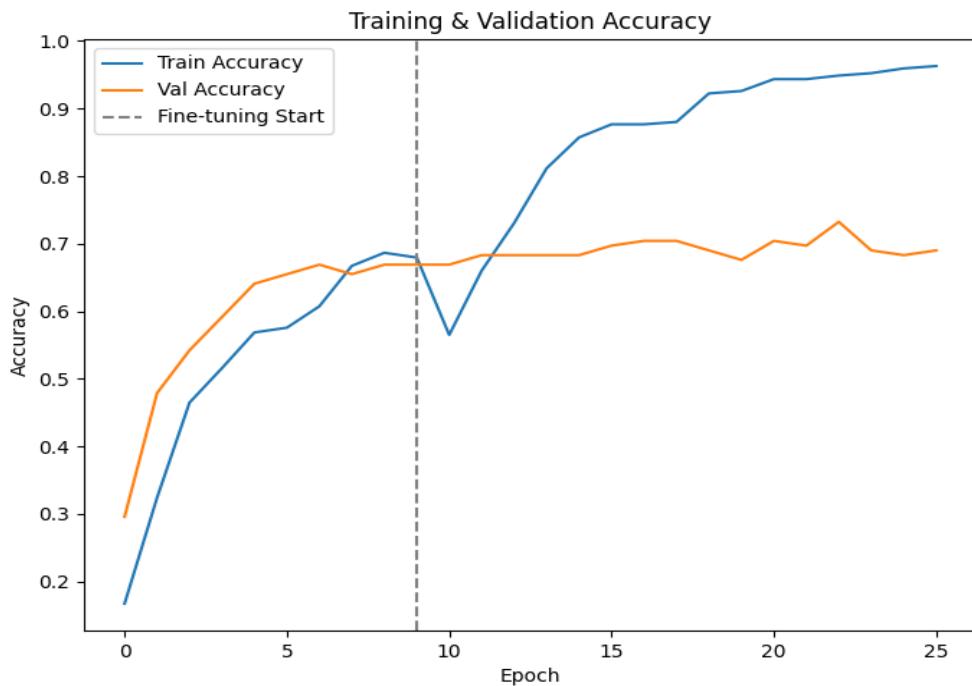
## Model Summary:

Layer (type)	Output Shape	Param #
mobilenetv2_1.00_224 (Functional)	(None, 7, 7, 1280)	2,257,984
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248

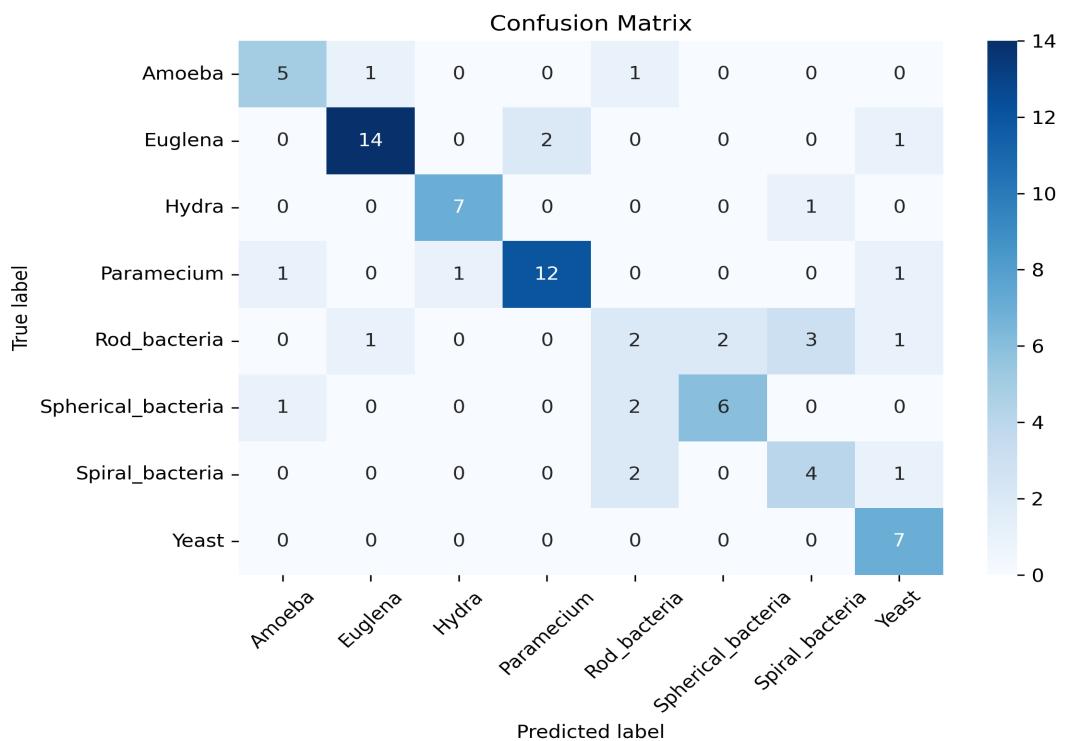
Total params: 5,998,937 (22.88 MB)  
Trainable params: 1,865,352 (7.12 MB)  
Non-trainable params: 402,880 (1.54 MB)  
Optimizer params: 3,730,705 (14.23 MB)

**Test Accuracy:** 0.7215

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)

**Batch Size:** 32

**Number of Classes:** 8

**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

**Base Epochs:** 20

**Fine-tune Epochs:** 30

**Data Augmentation:** random\_flip, random\_rotation, random\_zoom, random\_contrast, lambda

**RandomFlip Mode:** horizontal

**RandomRotation Factor:** 0.15

**RandomZoom Factor:** 0.15

**RandomContrast Factor:** 0.2

**RandomBrightness MaxDelta:** 0.2

**Gaussian Noise STD:** 0.02

**Train Size:** 568

**Validation Size:** 142

**Test Size:** 79

**Optimizer (Base):** Adam

**Optimizer (Fine-tune):** Adam with ExponentialDecay(initial\_lr=0.0001, decay\_rate=0.96)

**Early Stopping Patience:** 10

**Comments:** Using MobileNetV2, increased base epochs

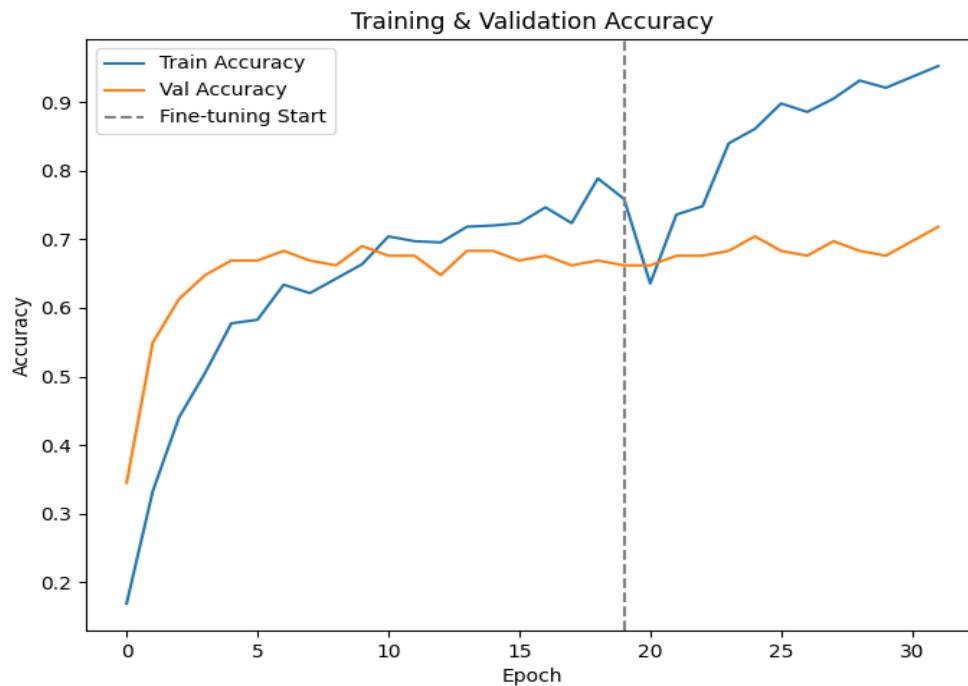
## Model Summary:

Layer (type)	Output Shape	Param #
mobilenetv2_1.00_224 (Functional)	(None, 7, 7, 1280)	2,257,984
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248

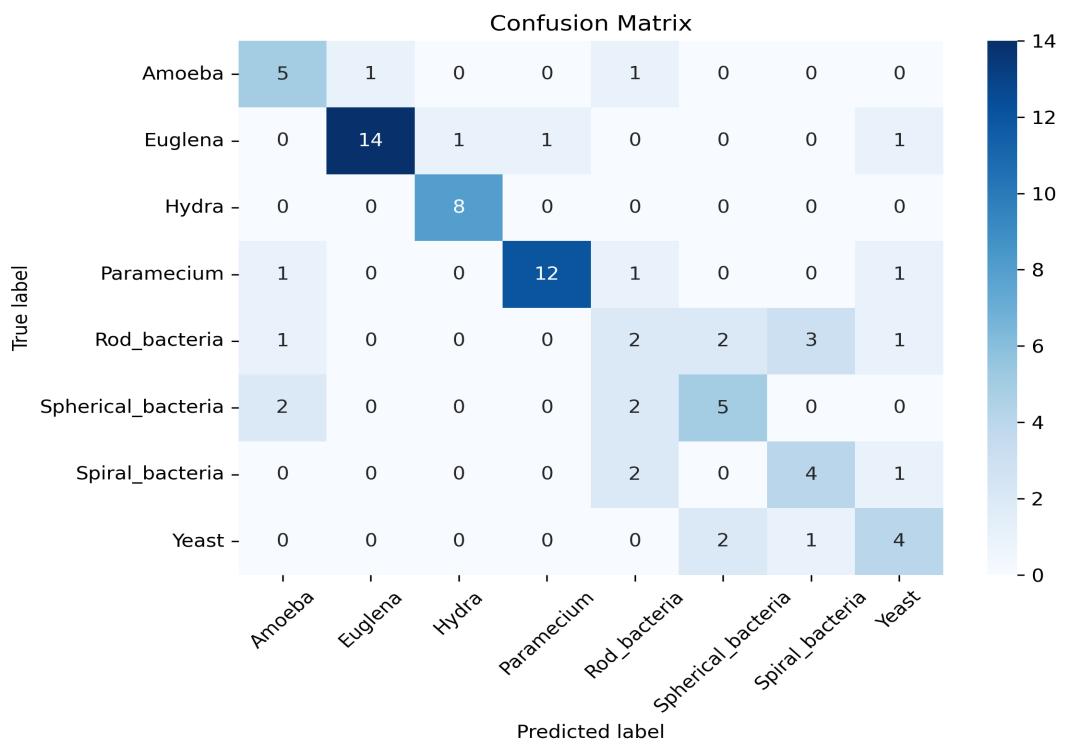
Total params: 5,998,937 (22.88 MB)  
Trainable params: 1,865,352 (7.12 MB)  
Non-trainable params: 402,880 (1.54 MB)  
Optimizer params: 3,730,705 (14.23 MB)

**Test Accuracy:** 0.6835

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)

**Batch Size:** 32

**Number of Classes:** 8

**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

**Base Epochs:** 20

**Fine-tune Epochs:** 30

**Data Augmentation:** random\_flip, random\_rotation, random\_zoom, random\_contrast, lambda

**RandomFlip Mode:** horizontal

**RandomRotation Factor:** 0.15

**RandomZoom Factor:** 0.15

**RandomContrast Factor:** 0.2

**RandomBrightness MaxDelta:** 0.2

**Gaussian Noise STD:** 0.02

**Train Size:** 568

**Validation Size:** 142

**Test Size:** 79

**Optimizer (Base):** Adam

**Optimizer (Fine-tune):** Adam with ExponentialDecay(initial\_lr=0.0001, decay\_rate=0.96)

**Early Stopping Patience:** 10

**Comments:** Using MobileNetV2, reduced dropout rate and fine tune layers

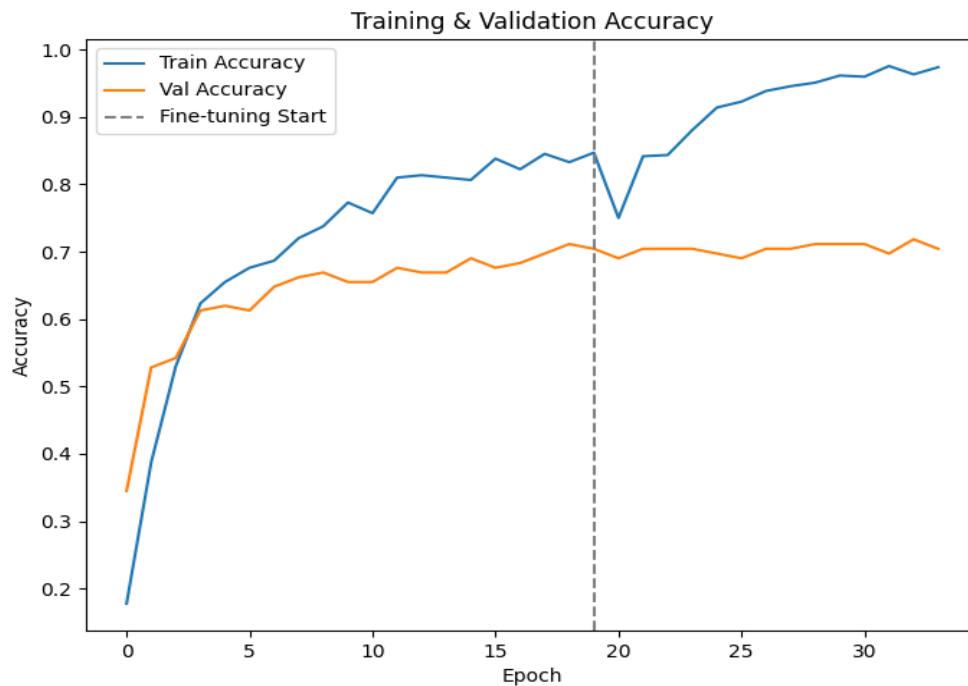
## Model Summary:

Layer (type)	Output Shape	Param #
mobilenetv2_1.00_224 (Functional)	(None, 7, 7, 1280)	2,257,984
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248

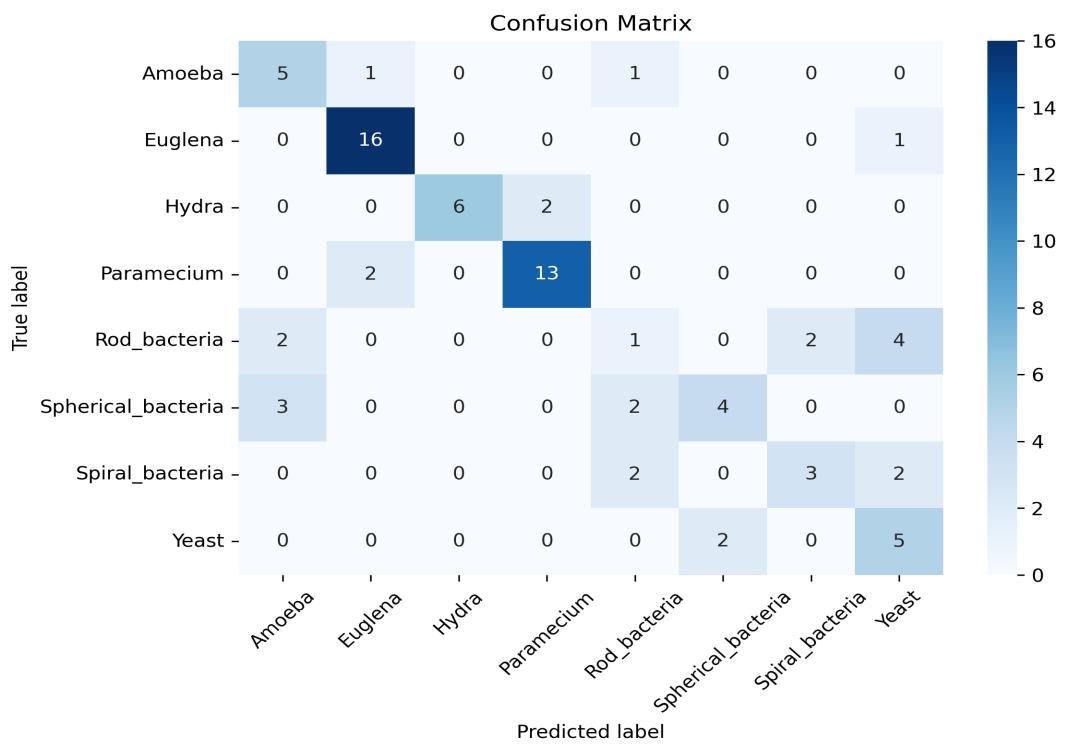
Total params: 4,700,889 (17.93 MB)  
Trainable params: 1,216,328 (4.64 MB)  
Non-trainable params: 1,051,904 (4.01 MB)  
Optimizer params: 2,432,657 (9.28 MB)

**Test Accuracy:** 0.6709

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)

**Batch Size:** 32

**Number of Classes:** 8

**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

**Base Epochs:** 20

**Fine-tune Epochs:** 30

**Data Augmentation:** random\_flip, random\_rotation, random\_zoom, random\_contrast, lambda

**RandomFlip Mode:** horizontal

**RandomRotation Factor:** 0.15

**RandomZoom Factor:** 0.15

**RandomContrast Factor:** 0.2

**RandomBrightness MaxDelta:** 0.2

**Gaussian Noise STD:** 0.02

**Train Size:** 568

**Validation Size:** 142

**Test Size:** 79

**Optimizer (Base):** Adam

**Optimizer (Fine-tune):** Adam with ExponentialDecay(initial\_lr=0.0001, decay\_rate=0.96)

**Early Stopping Patience:** 10

**Comments:** Using MobileNetV2, increased dropout rate

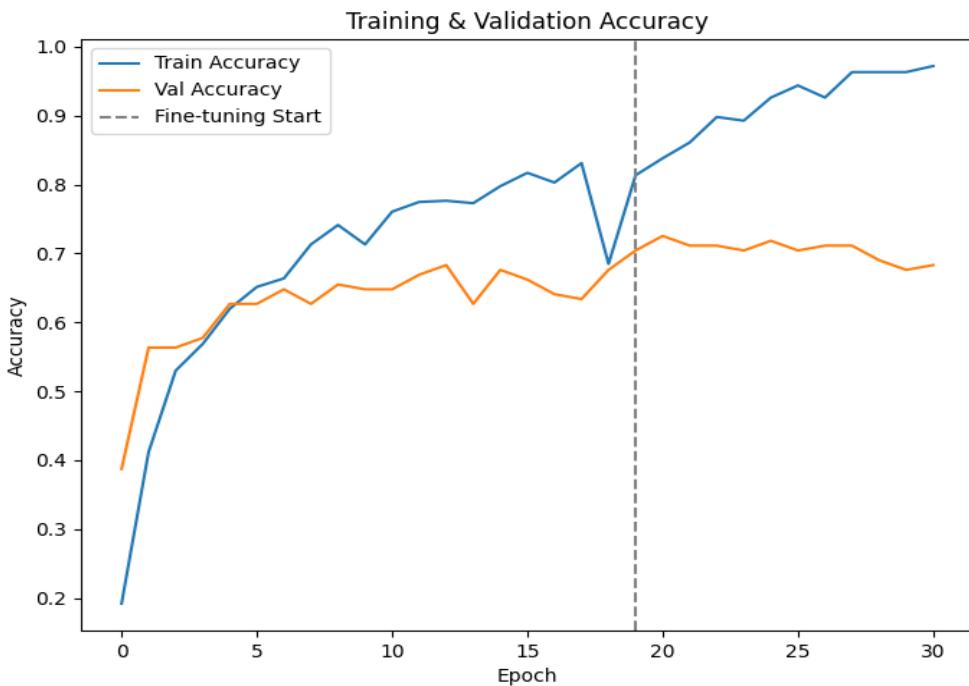
## Model Summary:

Layer (type)	Output Shape	Param #
mobilenetv2_1.00_224 (Functional)	(None, 7, 7, 1280)	2,257,984
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248

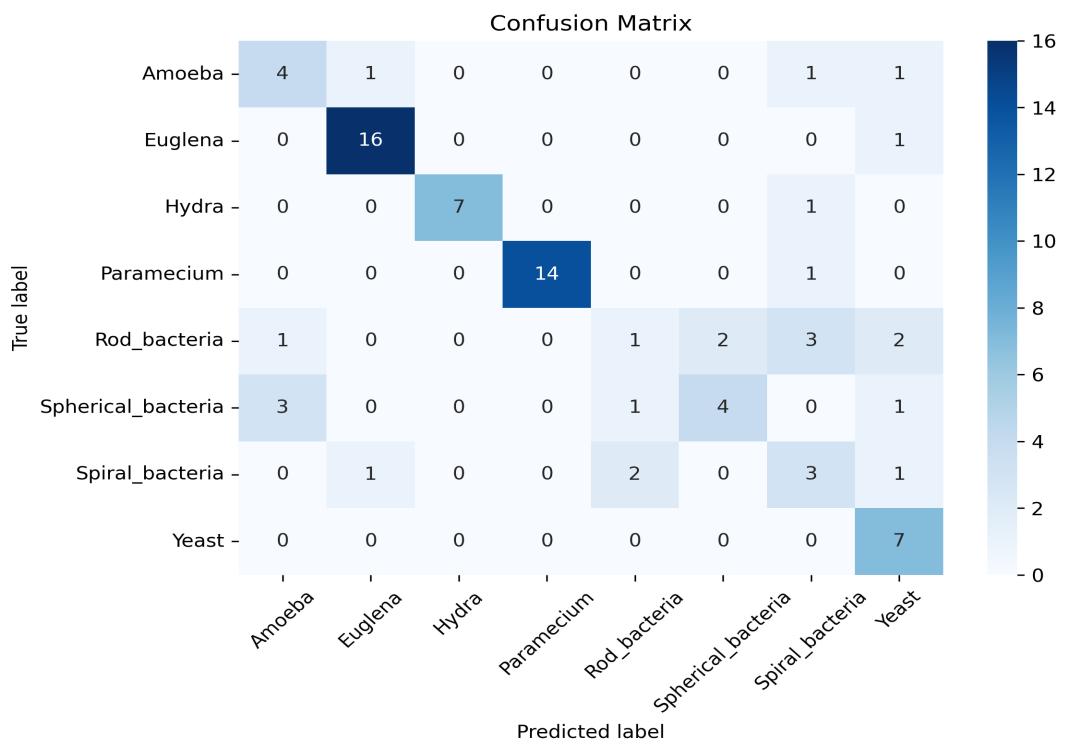
Total params: 4,700,889 (17.93 MB)  
Trainable params: 1,216,328 (4.64 MB)  
Non-trainable params: 1,051,904 (4.01 MB)  
Optimizer params: 2,432,657 (9.28 MB)

**Test Accuracy:** 0.7089

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)

**Batch Size:** 32

**Number of Classes:** 8

**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

**Base Epochs:** 20

**Fine-tune Epochs:** 30

**Data Augmentation:** random\_flip, random\_rotation, random\_zoom, random\_contrast, lambda

**RandomFlip Mode:** horizontal

**RandomRotation Factor:** 0.15

**RandomZoom Factor:** 0.15

**RandomContrast Factor:** 0.2

**RandomBrightness MaxDelta:** 0.2

**Gaussian Noise STD:** 0.02

**Train Size:** 568

**Validation Size:** 142

**Test Size:** 79

**Optimizer (Base):** Adam

**Optimizer (Fine-tune):** Adam with ExponentialDecay(initial\_lr=0.0001, decay\_rate=0.96)

**Early Stopping Patience:** 10

**Comments:** Using MobileNetV2, increased dropout rate

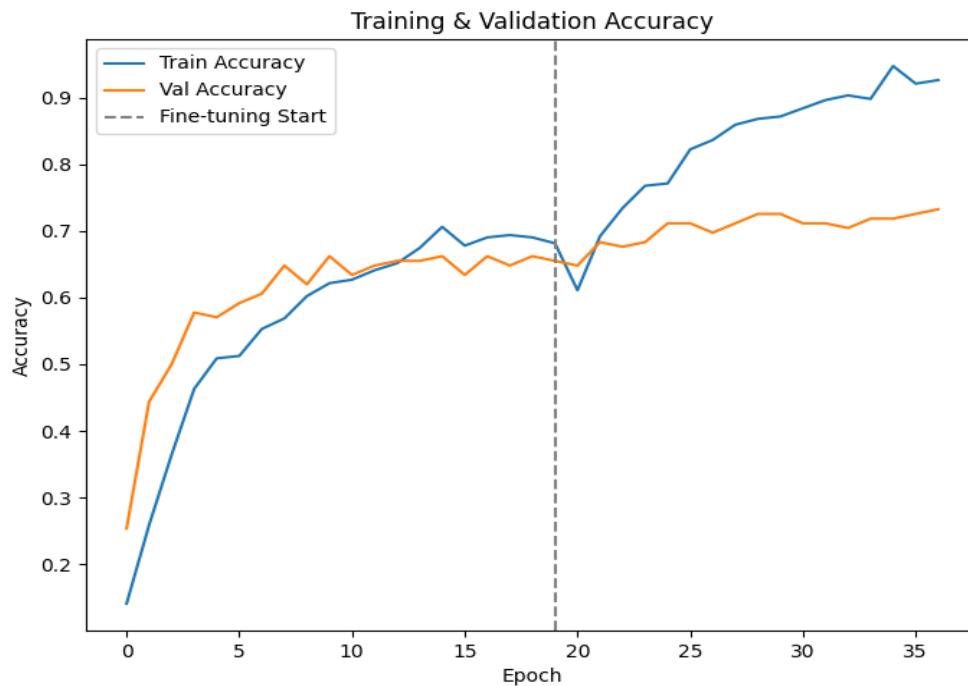
## Model Summary:

Layer (type)	Output Shape	Param #
mobilenetv2_1.00_224 (Functional)	(None, 7, 7, 1280)	2,257,984
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248

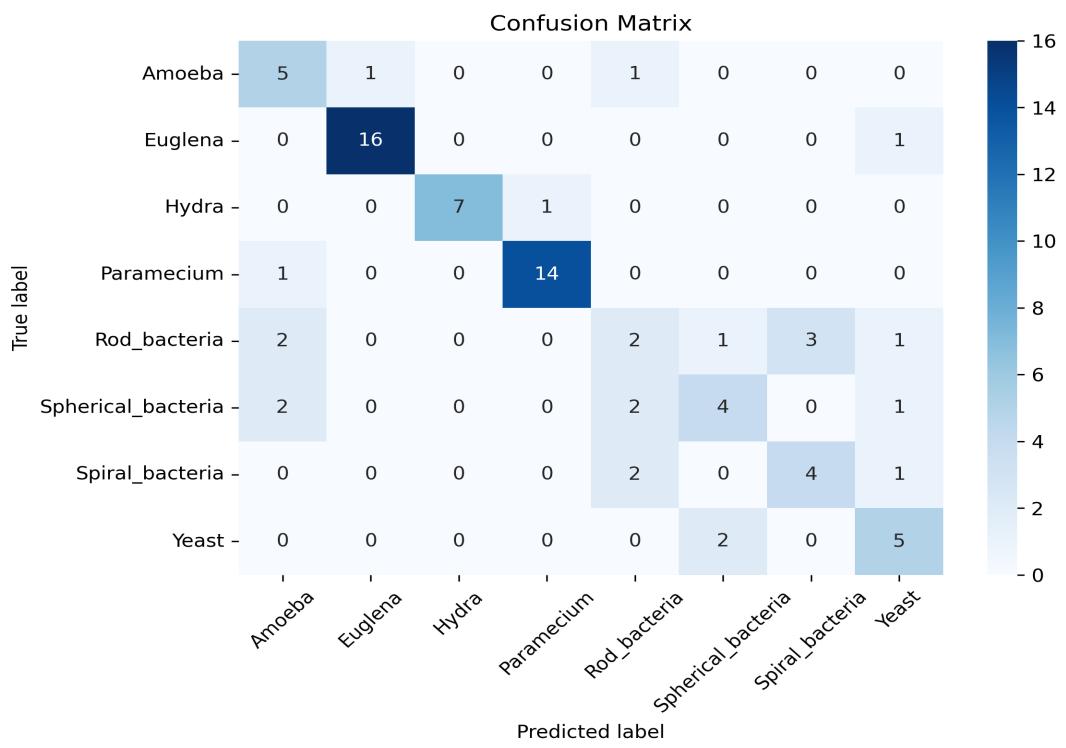
Total params: 4,700,889 (17.93 MB)  
Trainable params: 1,216,328 (4.64 MB)  
Non-trainable params: 1,051,904 (4.01 MB)  
Optimizer params: 2,432,657 (9.28 MB)

**Test Accuracy:** 0.7215

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)

**Batch Size:** 32

**Number of Classes:** 8

**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

**Base Epochs:** 20

**Fine-tune Epochs:** 30

**Data Augmentation:** random\_flip, random\_rotation, random\_zoom, random\_contrast, lambda

**RandomFlip Mode:** horizontal

**RandomRotation Factor:** 0.15

**RandomZoom Factor:** 0.15

**RandomContrast Factor:** 0.2

**RandomBrightness MaxDelta:** 0.2

**Gaussian Noise STD:** 0.02

**Train Size:** 568

**Validation Size:** 142

**Test Size:** 79

**Optimizer (Base):** Adam

**Optimizer (Fine-tune):** Adam with ExponentialDecay(initial\_lr=0.0001, decay\_rate=0.96)

**Early Stopping Patience:** 10

**Comments:** Using MobileNetV2, increased dropout rate

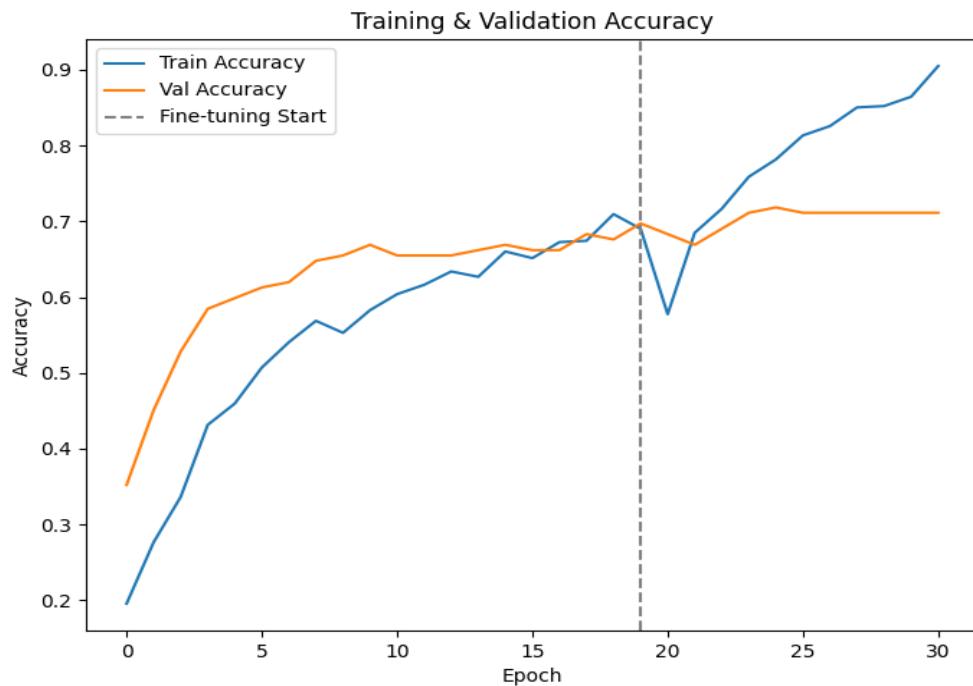
## Model Summary:

Layer (type)	Output Shape	Param #
mobilenetv2_1.00_224 (Functional)	(None, 7, 7, 1280)	2,257,984
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248

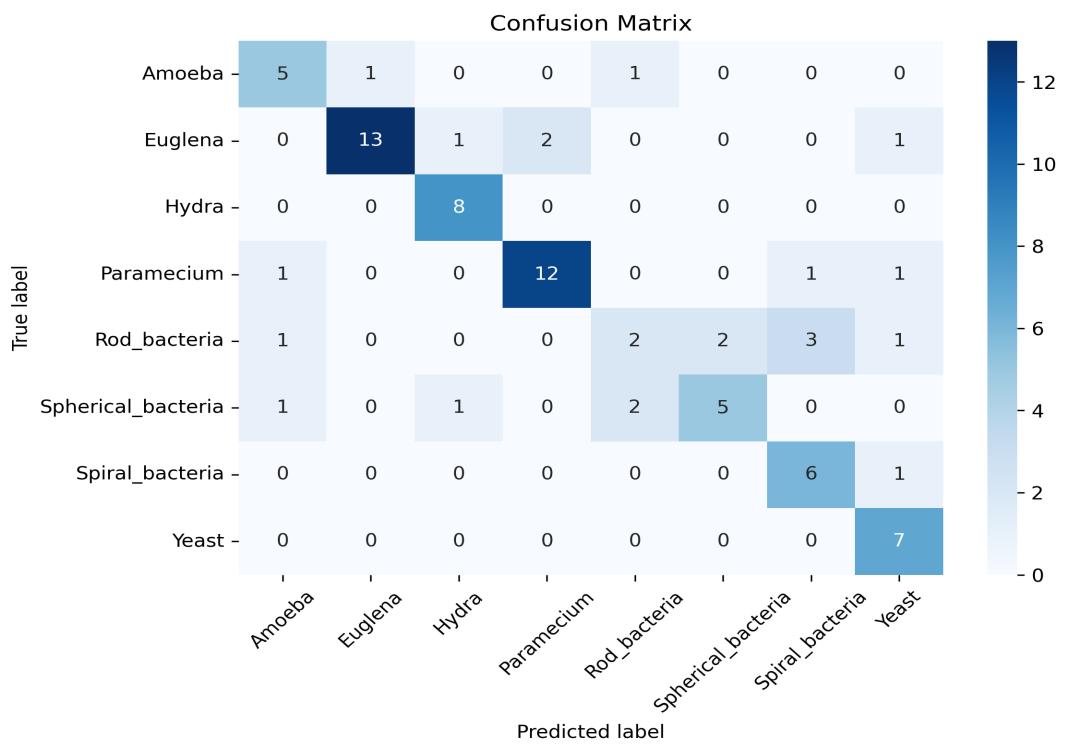
Total params: 4,700,889 (17.93 MB)  
Trainable params: 1,216,328 (4.64 MB)  
Non-trainable params: 1,051,904 (4.01 MB)  
Optimizer params: 2,432,657 (9.28 MB)

**Test Accuracy:** 0.7342

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)

**Batch Size:** 32

**Number of Classes:** 8

**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

**Base Epochs:** 20

**Fine-tune Epochs:** 30

**Data Augmentation:** random\_flip, random\_rotation, random\_zoom, random\_contrast, lambda

**RandomFlip Mode:** horizontal

**RandomRotation Factor:** 0.15

**RandomZoom Factor:** 0.15

**RandomContrast Factor:** 0.2

**RandomBrightness MaxDelta:** 0.2

**Gaussian Noise STD:** 0.02

**Train Size:** 568

**Validation Size:** 142

**Test Size:** 79

**Optimizer (Base):** Adam

**Optimizer (Fine-tune):** Adam with ExponentialDecay(initial\_lr=0.0001, decay\_rate=0.96)

**Early Stopping Patience:** 10

**Comments:** Using MobileNetV2, decrease fine-tuning layers

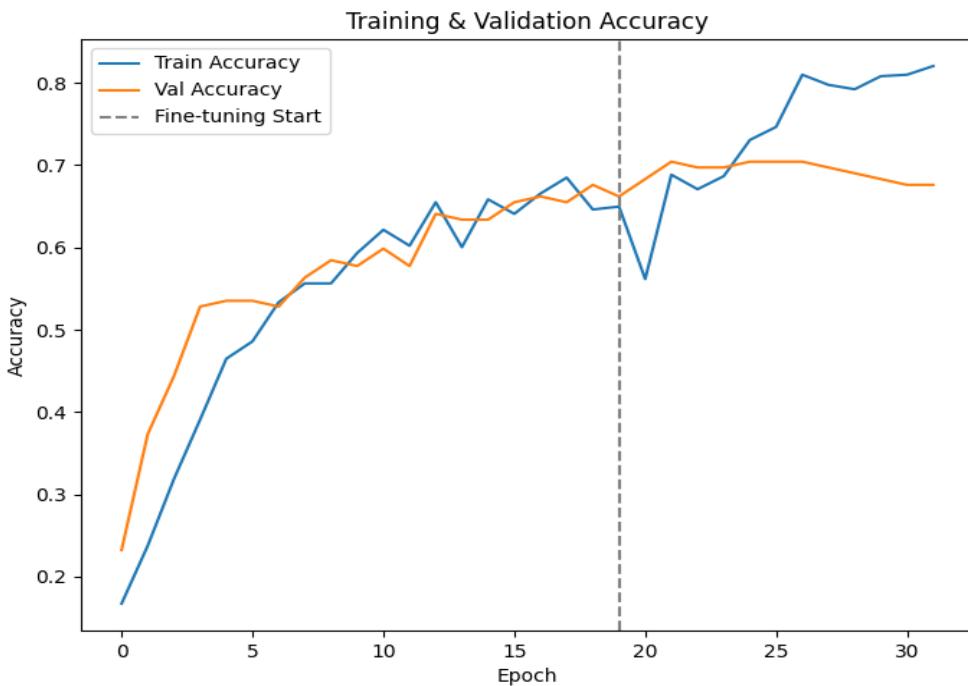
## Model Summary:

Layer (type)	Output Shape	Param #
mobilenetv2_1.00_224 (Functional)	(None, 7, 7, 1280)	2,257,984
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248

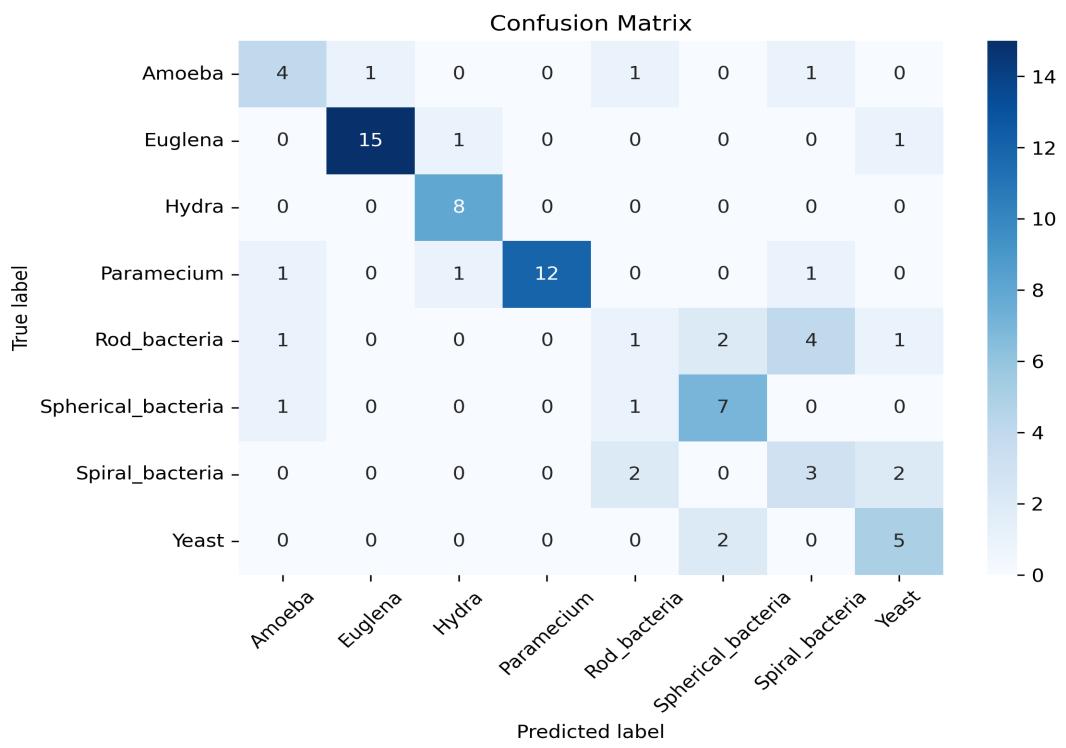
Total params: 3,753,689 (14.32 MB)  
Trainable params: 742,728 (2.83 MB)  
Non-trainable params: 1,525,504 (5.82 MB)  
Optimizer params: 1,485,457 (5.67 MB)

**Test Accuracy:** 0.6962

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)  
**Batch Size:** 32  
**Number of Classes:** 8  
**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}  
**Base Epochs:** 20  
**Fine-tune Epochs:** 30  
**Data Augmentation:** random\_flip, random\_rotation, random\_zoom, random\_contrast, lambda  
**RandomFlip Mode:** horizontal  
**RandomRotation Factor:** 0.15  
**RandomZoom Factor:** 0.15  
**RandomContrast Factor:** 0.2  
**RandomBrightness MaxDelta:** 0.2  
**Gaussian Noise STD:** 0.02  
**Train Size:** 568  
**Validation Size:** 142  
**Test Size:** 79  
**Optimizer (Base):** Adam  
**Optimizer (Fine-tune):** Adam with ExponentialDecay(initial\_lr=0.0001, decay\_rate=0.96)  
**Early Stopping Patience:** 10  
**Comments:** Using MobileNetV2, decrease dropout

## Model Summary:

Model: "sequential"

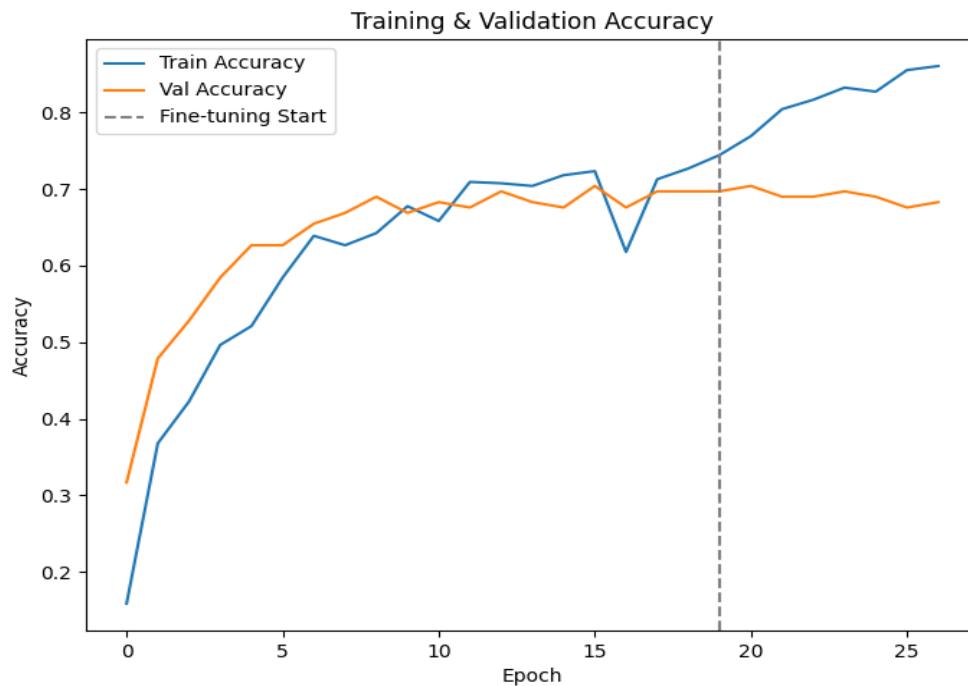
The diagram shows a Keras model summary with the following layers:

- Layer (type): mobilenetv2\_1.00\_224 (Functional) - Output Shape: (None, 7, 7, 1280) - Param #: 2,257,984
- Layer (type): global\_average\_pooling2d (GlobalAveragePooling2D) - Output Shape: (None, 1280) - Param #: 0
- Layer (type): dropout (Dropout) - Output Shape: (None, 1280) - Param #: 0
- Layer (type): dense (Dense) - Output Shape: (None, 8) - Param #: 10,248

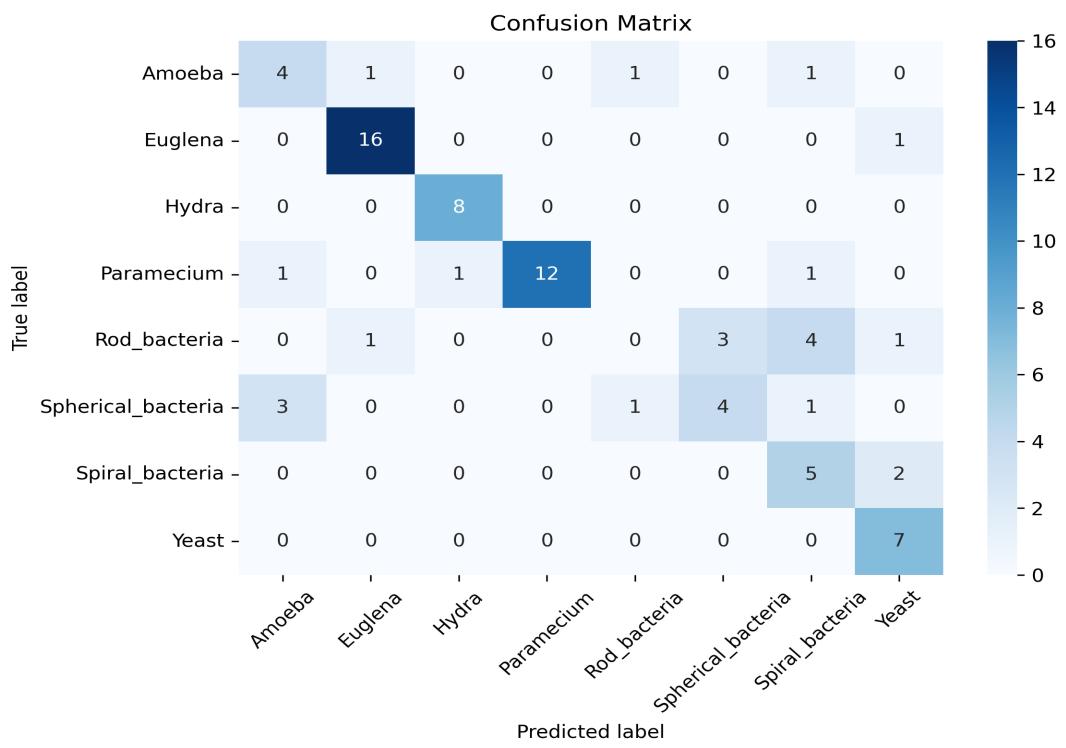
Total params: 3,753,689 (14.32 MB)  
Trainable params: 742,728 (2.83 MB)  
Non-trainable params: 1,525,504 (5.82 MB)  
Optimizer params: 1,485,457 (5.67 MB)

**Test Accuracy:** 0.7089

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)

**Batch Size:** 32

**Number of Classes:** 8

**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

**Base Epochs:** 20

**Fine-tune Epochs:** 30

**Data Augmentation:** random\_flip, random\_rotation, random\_zoom, random\_contrast, lambda

**RandomFlip Mode:** horizontal

**RandomRotation Factor:** 0.15

**RandomZoom Factor:** 0.15

**RandomContrast Factor:** 0.2

**RandomBrightness MaxDelta:** 0.2

**Gaussian Noise STD:** 0.005

**Train Size:** 568

**Validation Size:** 142

**Test Size:** 79

**Optimizer (Base):** Adam

**Optimizer (Fine-tune):** Adam with ExponentialDecay(initial\_lr=0.0001, decay\_rate=0.96)

**Early Stopping Patience:** 10

**Comments:** Using MobileNetV2, reduce gaussian std

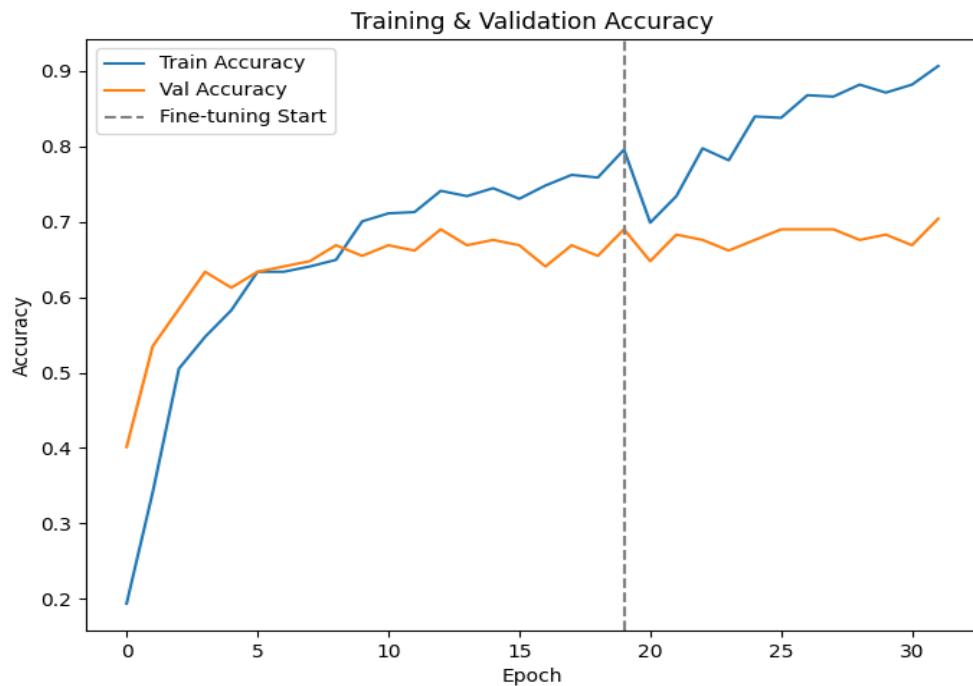
## Model Summary:

Layer (type)	Output Shape	Param #
mobilenetv2_1.00_224 (Functional)	(None, 7, 7, 1280)	2,257,984
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248

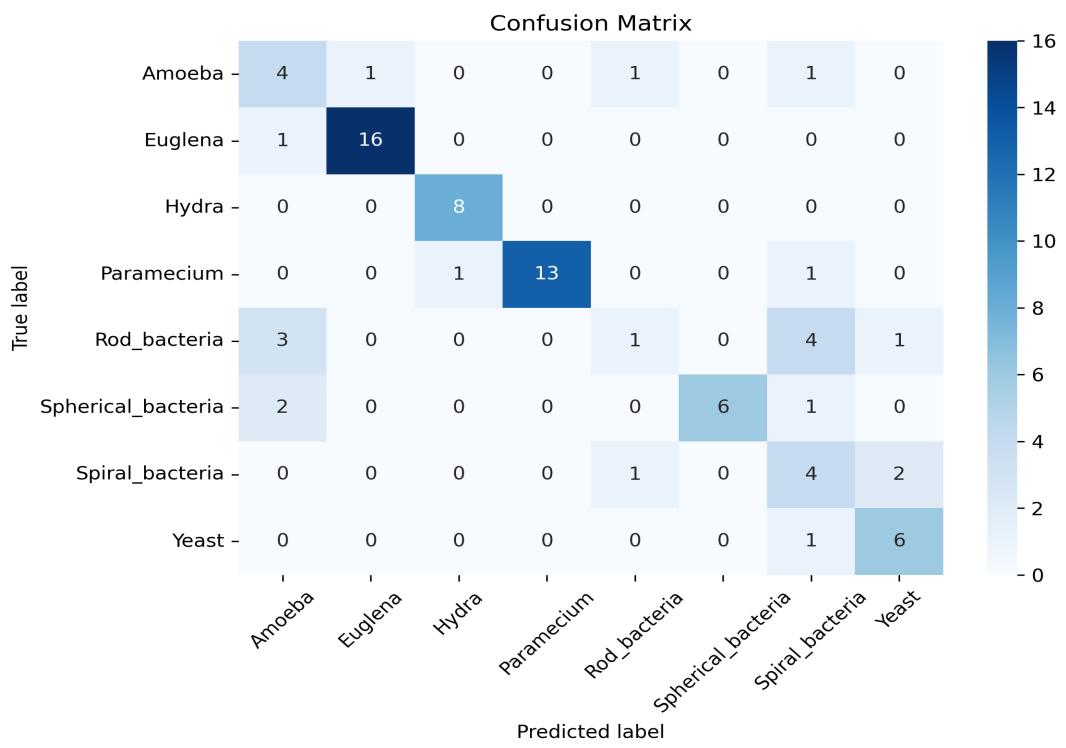
Total params: 3,753,689 (14.32 MB)  
Trainable params: 742,728 (2.83 MB)  
Non-trainable params: 1,525,504 (5.82 MB)  
Optimizer params: 1,485,457 (5.67 MB)

**Test Accuracy:** 0.7342

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## **Configuration and Parameters:**

**Image Size:** (224, 224)  
**Batch Size:** 32  
**Number of Classes:** 8  
**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}  
**Base Epochs:** 20  
**Fine-tune Epochs:** 30  
**Data Augmentation:** random\_flip, random\_rotation, random\_zoom, random\_contrast, lambda  
**RandomFlip Mode:** horizontal  
**RandomRotation Factor:** 0.15  
**RandomZoom Factor:** 0.15  
**RandomContrast Factor:** 0.2  
**RandomBrightness MaxDelta:** 0.2  
**Gaussian Noise STD:** 0.005  
**Train Size:** 568  
**Validation Size:** 142  
**Test Size:** 79  
**Optimizer (Base):** Adam  
**Optimizer (Fine-tune):** Adam with ExponentialDecay(initial\_lr=0.0001, decay\_rate=0.96)  
**Early Stopping Patience:** 10  
**Comments:** Using MobileNetV2, reduce gaussian std

## Model Summary:

Model: "sequential"

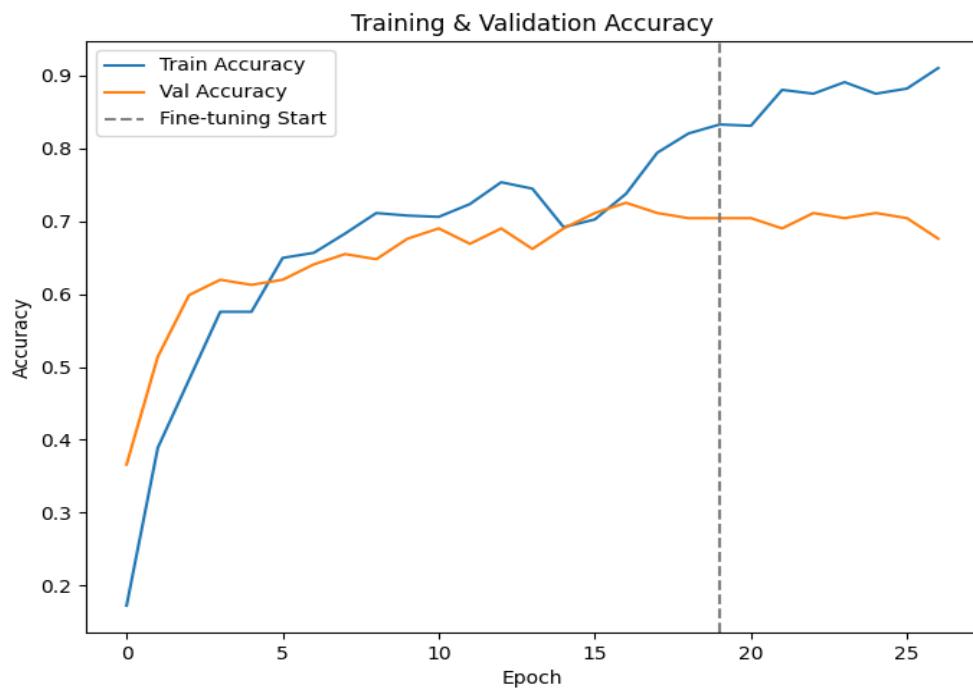
The diagram shows a Keras model summary with the following layers:

- Layer (type): mobilenetv2\_1.00\_224 (Functional)
- Output Shape: (None, 7, 7, 1280)
- Param #: 2,257,984
- Layer (type): global\_average\_pooling2d (GlobalAveragePooling2D)
- Output Shape: (None, 1280)
- Param #: 0
- Layer (type): dropout (Dropout)
- Output Shape: (None, 1280)
- Param #: 0
- Layer (type): dense (Dense)
- Output Shape: (None, 8)
- Param #: 10,248

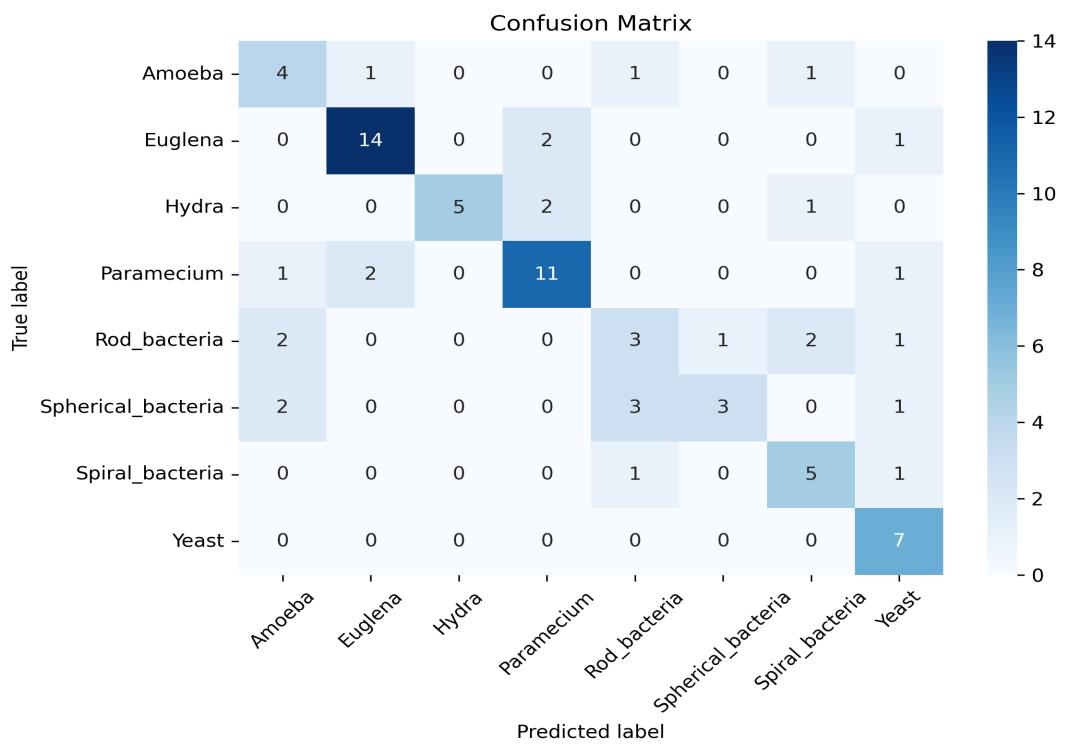
Total params: 3,753,689 (14.32 MB)  
Trainable params: 742,728 (2.83 MB)  
Non-trainable params: 1,525,504 (5.82 MB)  
Optimizer params: 1,485,457 (5.67 MB)

**Test Accuracy:** 0.6582

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)

**Batch Size:** 32

**Number of Classes:** 8

**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

**Base Epochs:** 20

**Fine-tune Epochs:** 30

**Data Augmentation:** random\_flip, random\_rotation, random\_zoom, random\_contrast, lambda

**RandomFlip Mode:** horizontal

**RandomRotation Factor:** 0.15

**RandomZoom Factor:** 0.15

**RandomContrast Factor:** 0.2

**RandomBrightness MaxDelta:** 0.2

**Gaussian Noise STD:** 0.005

**Train Size:** 568

**Validation Size:** 142

**Test Size:** 79

**Optimizer (Base):** Adam

**Optimizer (Fine-tune):** Adam with ExponentialDecay(initial\_lr=0.0001, decay\_rate=0.96)

**Early Stopping Patience:** 10

**Comments:** Using MobileNetV2, reduce gaussian std

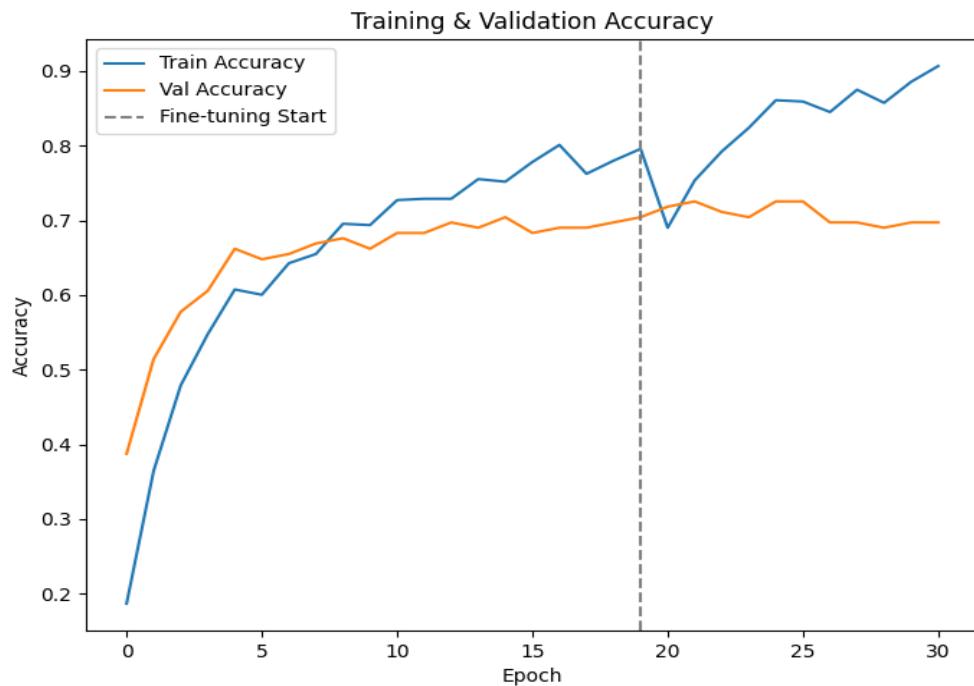
## Model Summary:

Layer (type)	Output Shape	Param #
mobilenetv2_1.00_224 (Functional)	(None, 7, 7, 1280)	2,257,984
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248

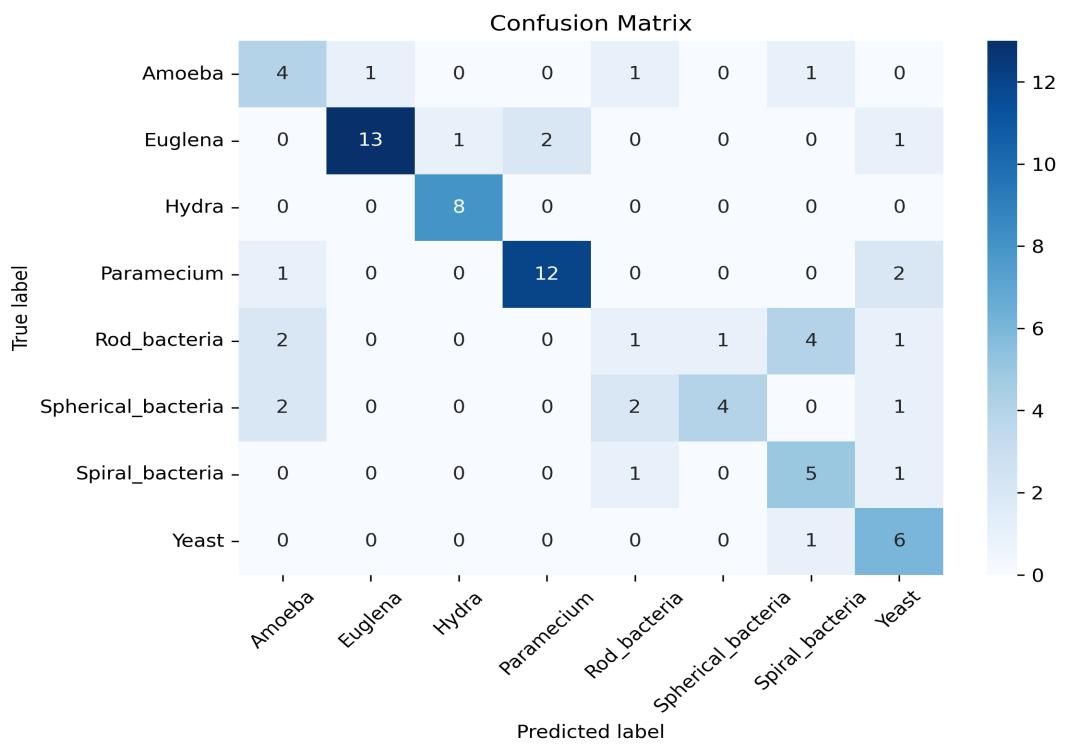
Total params: 3,753,689 (14.32 MB)  
Trainable params: 742,728 (2.83 MB)  
Non-trainable params: 1,525,504 (5.82 MB)  
Optimizer params: 1,485,457 (5.67 MB)

**Test Accuracy:** 0.6709

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)

**Batch Size:** 32

**Number of Classes:** 8

**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

**Base Epochs:** 20

**Fine-tune Epochs:** 30

**Data Augmentation:** random\_flip, random\_rotation, random\_zoom, random\_contrast, lambda

**RandomFlip Mode:** horizontal

**RandomRotation Factor:** 0.15

**RandomZoom Factor:** 0.15

**RandomContrast Factor:** 0.2

**RandomBrightness MaxDelta:** 0.2

**Gaussian Noise STD:** 0.0

**Train Size:** 568

**Validation Size:** 142

**Test Size:** 79

**Optimizer (Base):** Adam

**Optimizer (Fine-tune):** Adam with ExponentialDecay(initial\_lr=0.0001, decay\_rate=0.96)

**Early Stopping Patience:** 10

**Comments:** Using MobileNetV2, reduce gaussian std

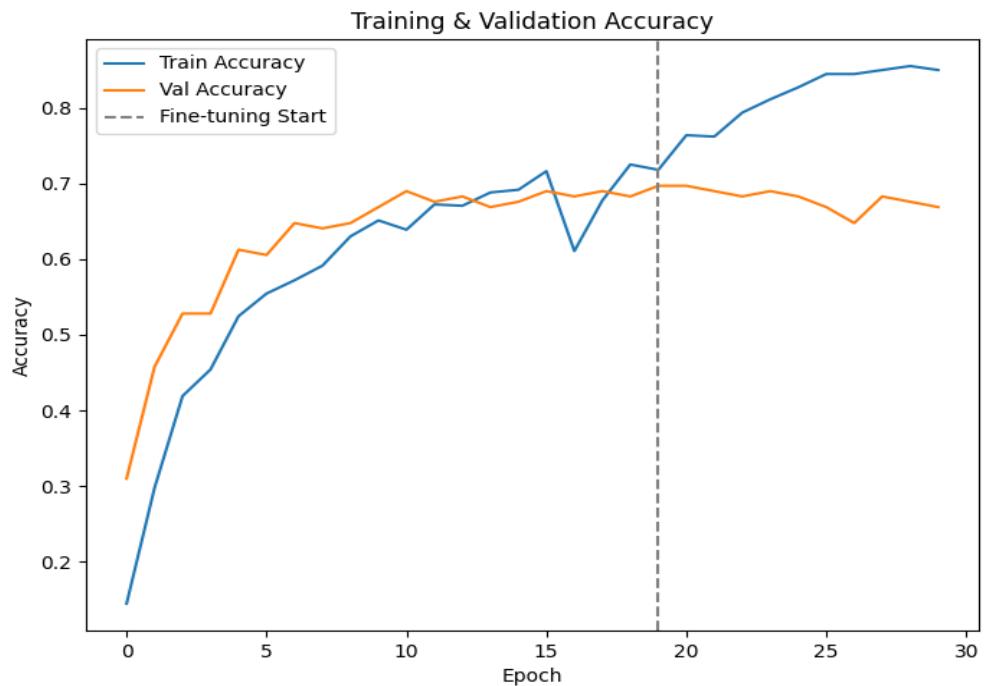
## Model Summary:

Layer (type)	Output Shape	Param #
mobilenetv2_1.00_224 (Functional)	(None, 7, 7, 1280)	2,257,984
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248

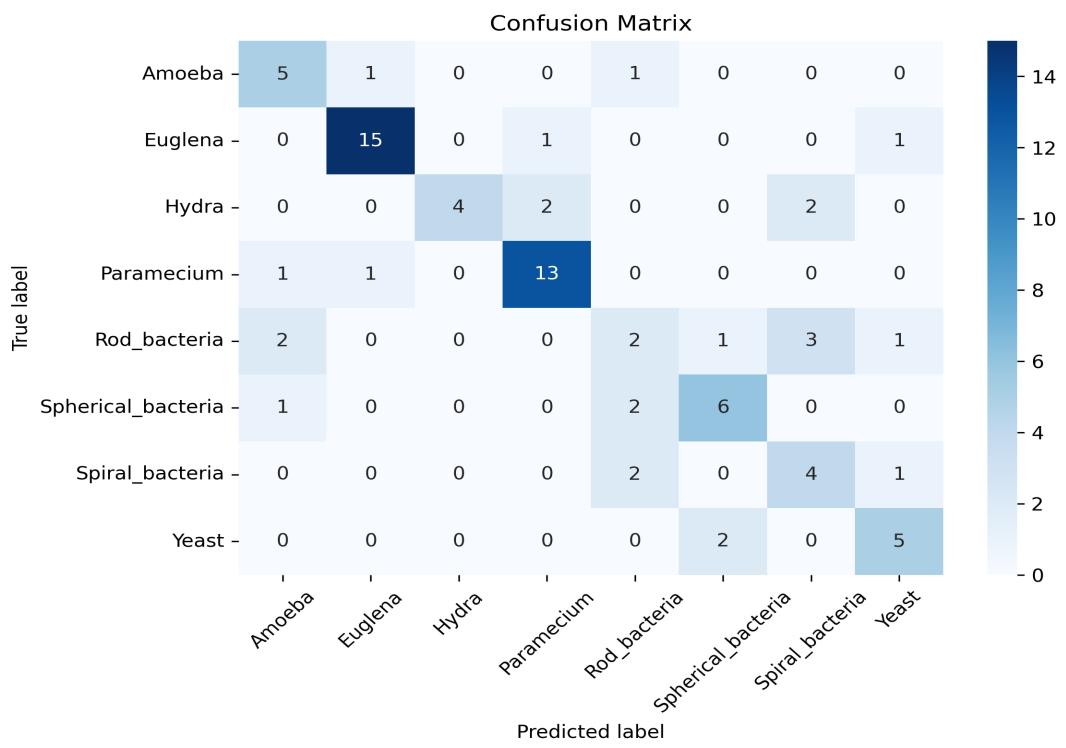
Total params: 3,753,689 (14.32 MB)  
Trainable params: 742,728 (2.83 MB)  
Non-trainable params: 1,525,504 (5.82 MB)  
Optimizer params: 1,485,457 (5.67 MB)

**Test Accuracy:** 0.6835

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)

**Batch Size:** 32

**Number of Classes:** 8

**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

**Base Epochs:** 20

**Fine-tune Epochs:** 30

**Data Augmentation:** random\_flip, random\_rotation, random\_zoom, random\_contrast, lambda

**RandomFlip Mode:** horizontal

**RandomRotation Factor:** 0.15

**RandomZoom Factor:** 0.15

**RandomContrast Factor:** 0.2

**RandomBrightness MaxDelta:** 0.2

**Gaussian Noise STD:** 0.005

**Train Size:** 568

**Validation Size:** 142

**Test Size:** 79

**Optimizer (Base):** Adam

**Optimizer (Fine-tune):** Adam with ExponentialDecay(initial\_lr=0.0001, decay\_rate=0.96)

**Early Stopping Patience:** 10

**Comments:** Using MobileNetV2, reduce gaussian std

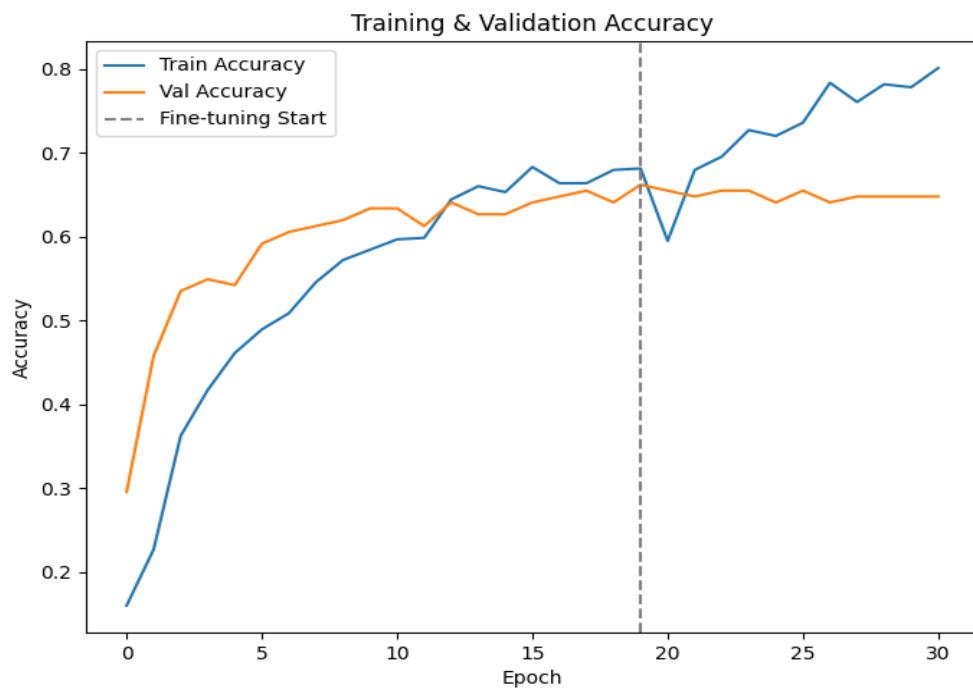
## Model Summary:

Layer (type)	Output Shape	Param #
mobilenetv2_1.00_224 (Functional)	(None, 7, 7, 1280)	2,257,984
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248

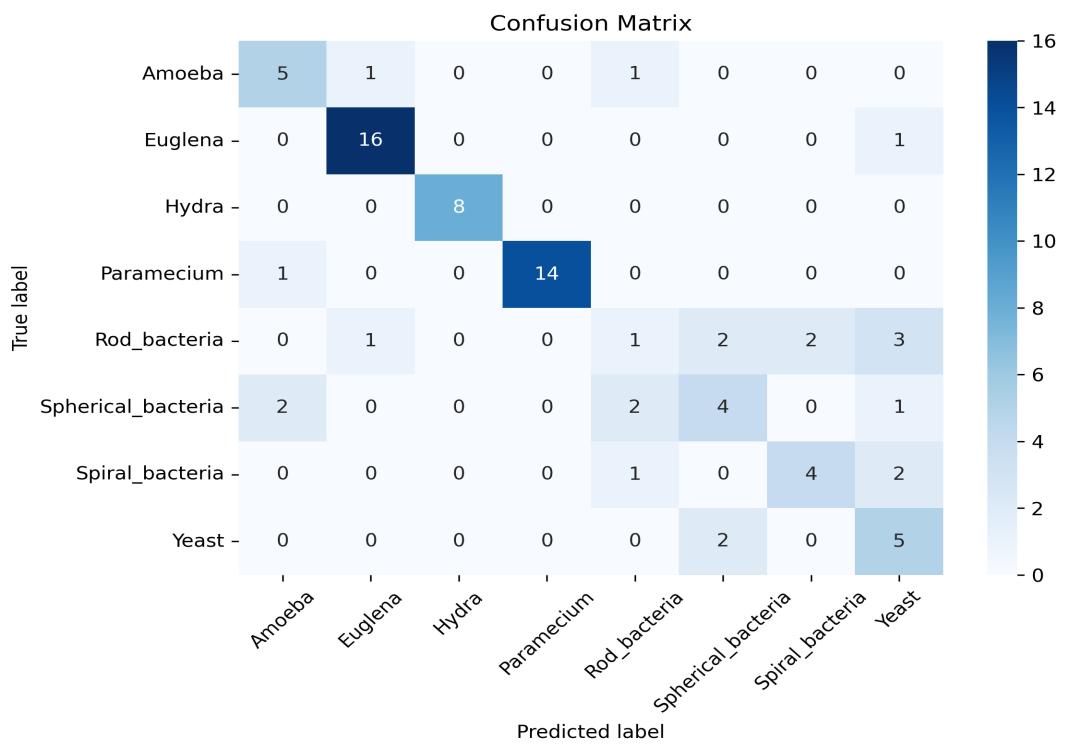
Total params: 3,753,689 (14.32 MB)  
Trainable params: 742,728 (2.83 MB)  
Non-trainable params: 1,525,504 (5.82 MB)  
Optimizer params: 1,485,457 (5.67 MB)

**Test Accuracy:** 0.7215

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (256, 256)

**Batch Size:** 32

**Number of Classes:** 8

**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

**Base Epochs:** 20

**Fine-tune Epochs:** 30

**Data Augmentation:** random\_flip, random\_rotation, random\_zoom, random\_contrast, lambda

**RandomFlip Mode:** horizontal

**RandomRotation Factor:** 0.15

**RandomZoom Factor:** 0.15

**RandomContrast Factor:** 0.2

**RandomBrightness MaxDelta:** 0.2

**Gaussian Noise STD:** 0.005

**Train Size:** 568

**Validation Size:** 142

**Test Size:** 79

**Optimizer (Base):** Adam

**Optimizer (Fine-tune):** Adam with ExponentialDecay(initial\_lr=0.0001, decay\_rate=0.96)

**Early Stopping Patience:** 10

**Comments:** Using MobileNetV2, increased image input resolution and decreased dropout

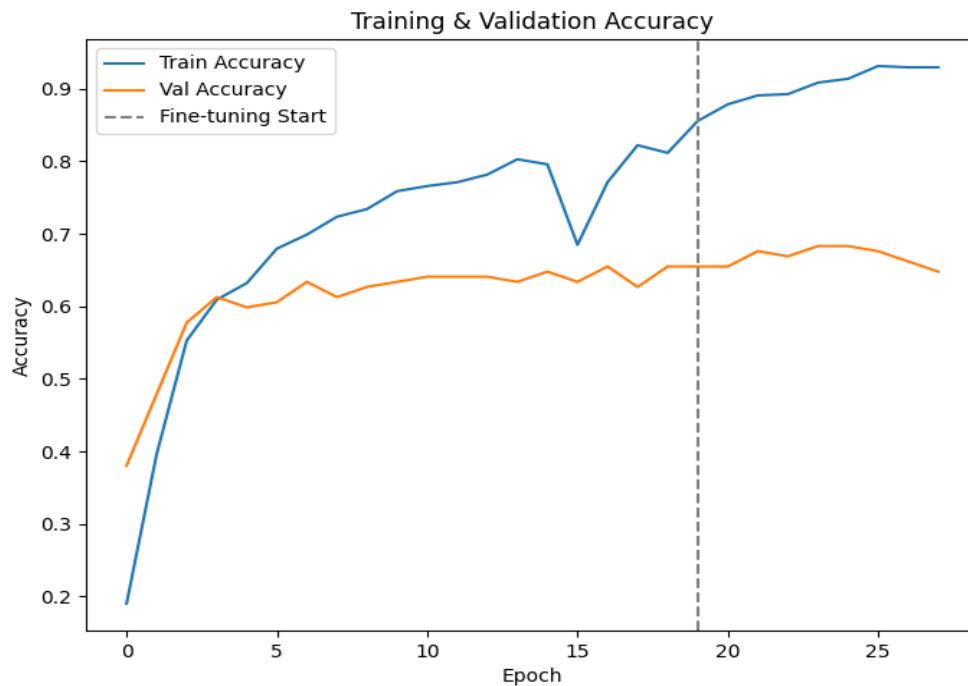
## Model Summary:

Layer (type)	Output Shape	Param #
mobilenetv2_1.00_224 (Functional)	(None, 8, 8, 1280)	2,257,984
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 8)	10,248

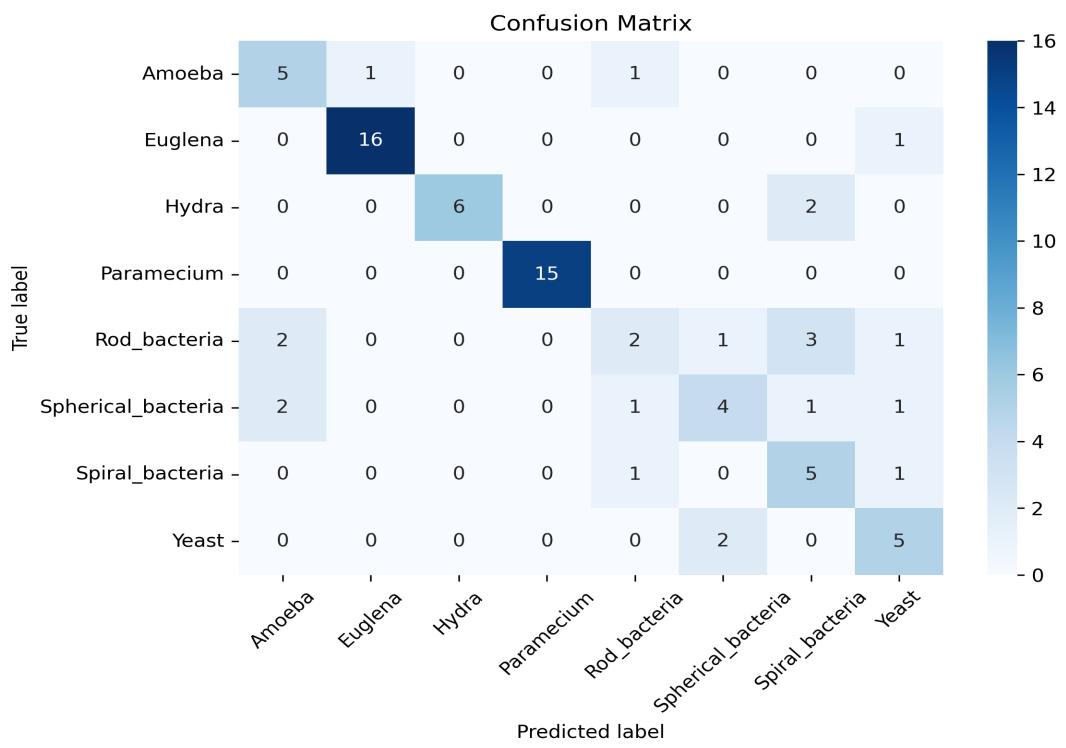
Total params: 3,753,689 (14.32 MB)  
Trainable params: 742,728 (2.83 MB)  
Non-trainable params: 1,525,504 (5.82 MB)  
Optimizer params: 1,485,457 (5.67 MB)

**Test Accuracy:** 0.7342

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (256, 256)  
**Batch Size:** 32  
**Number of Classes:** 8  
**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}  
**Base Epochs:** 20  
**Fine-tune Epochs:** 30  
**Data Augmentation:** random\_flip, random\_rotation, random\_zoom, random\_contrast, lambda  
**RandomFlip Mode:** horizontal  
**RandomRotation Factor:** 0.15  
**RandomZoom Factor:** 0.15  
**RandomContrast Factor:** 0.2  
**RandomBrightness MaxDelta:** 0.2  
**Gaussian Noise STD:** 0.005  
**Dropout:** 0.5  
**Train Size:** 568  
**Validation Size:** 142  
**Test Size:** 79  
**Optimizer (Base):** Adam  
**Optimizer (Fine-tune):** Adam with ExponentialDecay(initial\_lr=0.0001, decay\_rate=0.98)  
**Early Stopping Patience:** 10  
**Comments:** Using MobileNetV2, added regularization, increased decay rate and reduced fine tuning layers

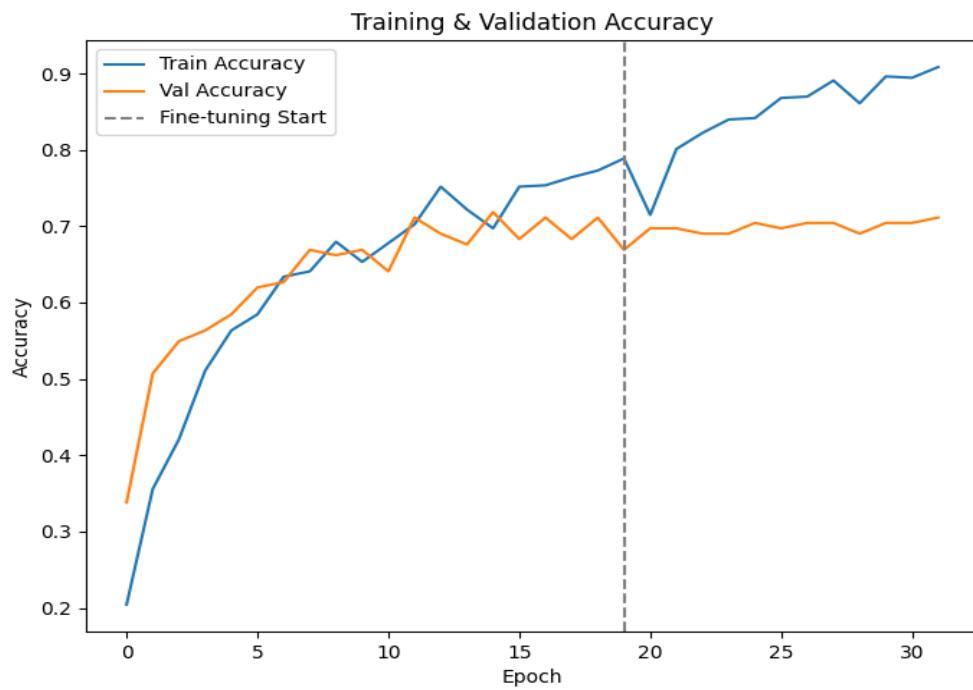
## Model Summary:

```
Model: "sequential"
[REDACTED]
[REDACTED]
■ Layer (type)           ■ Output Shape          ■ Param #
[REDACTED]
[REDACTED]
■ mobilenetv2_1.00_224 (Functional)   ■ (None, 8, 8, 1280)   ■ 2,257,984 ■
[REDACTED]
[REDACTED]
■ global_average_pooling2d      ■ (None, 1280)        ■ 0 ■
■ (GlobalAveragePooling2D)      ■                         ■
[REDACTED]
[REDACTED]
■ dropout (Dropout)           ■ (None, 1280)        ■ 0 ■
[REDACTED]
[REDACTED]
■ dense (Dense)              ■ (None, 8)           ■ 10,248 ■
[REDACTED]
[REDACTED]

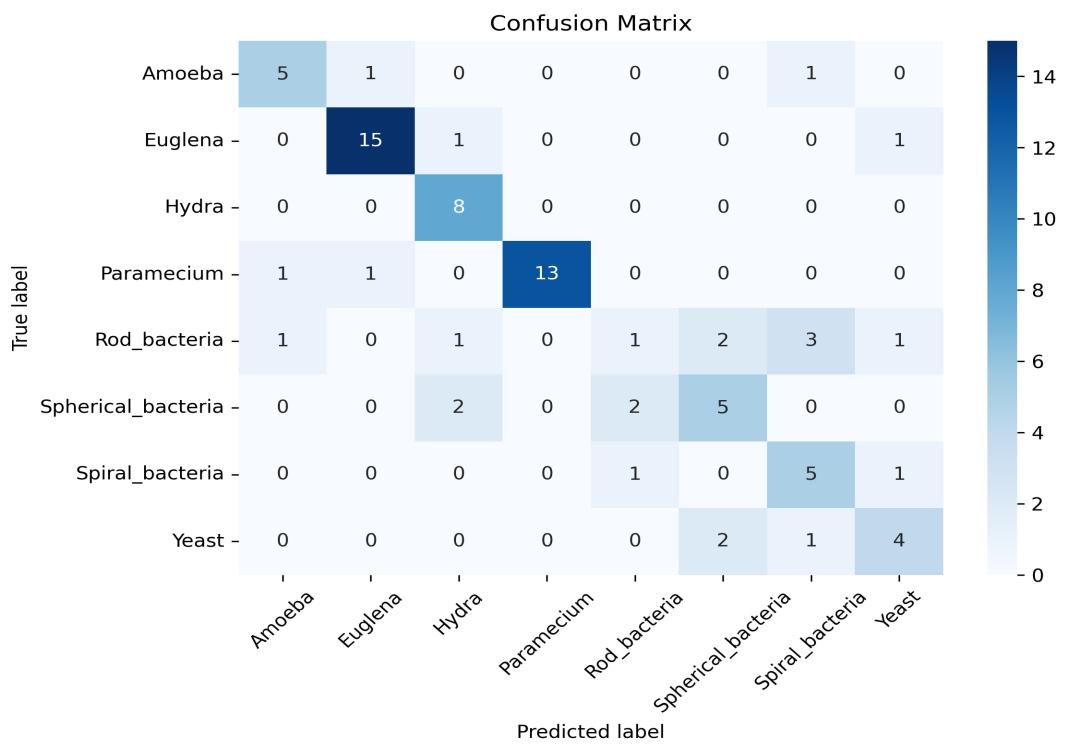
Total params: 3,728,729 (14.22 MB)
Trainable params: 730,248 (2.79 MB)
Non-trainable params: 1,537,984 (5.87 MB)
Optimizer params: 1,460,497 (5.57 MB)
```

**Test Accuracy:** 0.7089

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)  
**Batch Size:** 32  
**Number of Classes:** 8  
**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}  
**Base Epochs:** 20  
**Fine-tune Epochs:** 30  
**Data Augmentation:** random\_flip, random\_rotation, random\_zoom, random\_contrast, lambda  
**RandomFlip Mode:** horizontal  
**RandomRotation Factor:** 0.15  
**RandomZoom Factor:** 0.15  
**RandomContrast Factor:** 0.2  
**RandomBrightness MaxDelta:** 0.2  
**Gaussian Noise STD:** 0.005  
**Dropout:** 0.5  
**Train Size:** 568  
**Validation Size:** 142  
**Test Size:** 79  
**Optimizer (Base):** Adam  
**Optimizer (Fine-tune):** Adam with ExponentialDecay(initial\_lr=0.0001, decay\_rate=0.98)  
**Early Stopping Patience:** 10  
**Comments:** Using MobileNetV2, added regularization, increased decay rate and reduced fine tuning layers

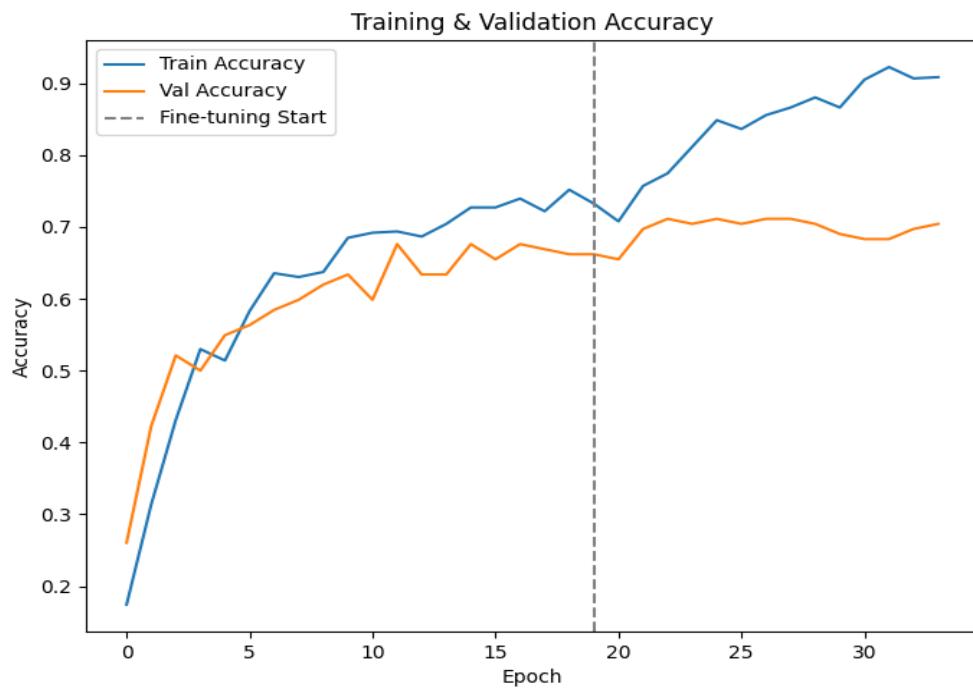
## Model Summary:

```
Model: "sequential"
[REDACTED]
[REDACTED]
■ Layer (type)           ■ Output Shape          ■ Param #
[REDACTED]
[REDACTED]
■ mobilenetv2_1.00_224 (Functional)   ■ (None, 7, 7, 1280)   ■ 2,257,984 ■
[REDACTED]
[REDACTED]
■ global_average_pooling2d      ■ (None, 1280)        ■ 0 ■
■ (GlobalAveragePooling2D)      ■                         ■
[REDACTED]
[REDACTED]
■ dropout (Dropout)          ■ (None, 1280)        ■ 0 ■
[REDACTED]
[REDACTED]
■ dense (Dense)             ■ (None, 8)          ■ 10,248 ■
[REDACTED]
[REDACTED]

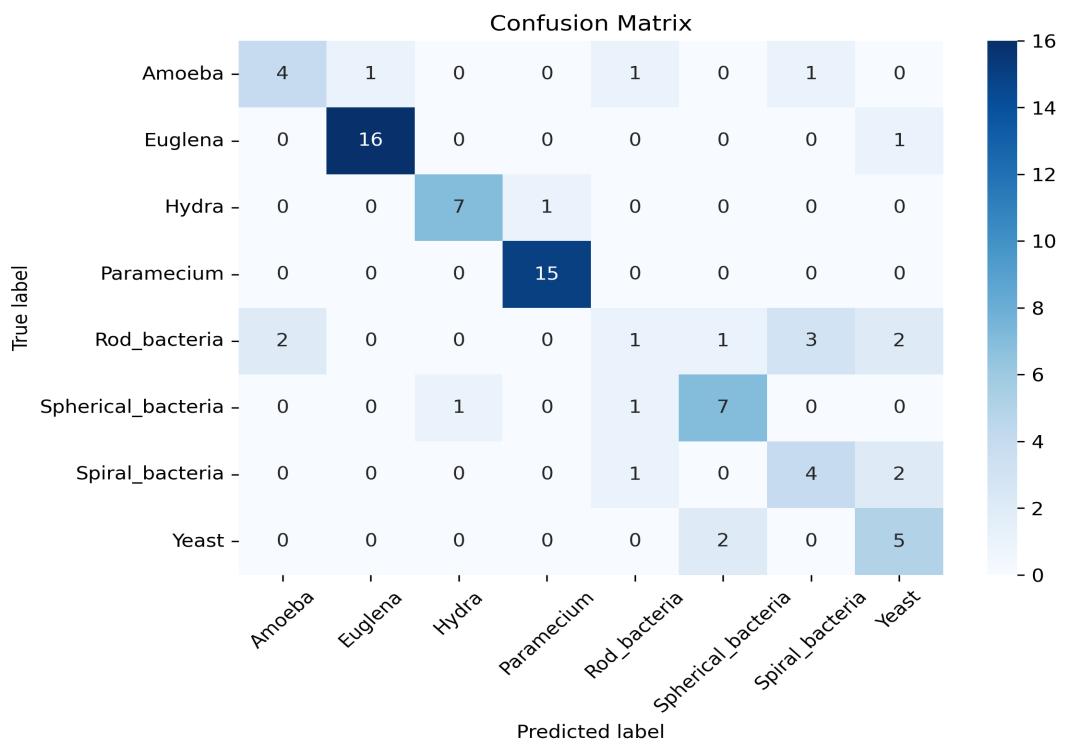
Total params: 3,728,729 (14.22 MB)
Trainable params: 730,248 (2.79 MB)
Non-trainable params: 1,537,984 (5.87 MB)
Optimizer params: 1,460,497 (5.57 MB)
```

**Test Accuracy:** 0.7468

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)  
**Batch Size:** 32  
**Number of Classes:** 8  
**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}  
**Base Epochs:** 20  
**Fine-tune Epochs:** 30  
**Data Augmentation:** random\_flip, random\_rotation, random\_zoom, random\_contrast, lambda  
**RandomFlip Mode:** horizontal  
**RandomRotation Factor:** 0.15  
**RandomZoom Factor:** 0.15  
**RandomContrast Factor:** 0.2  
**RandomBrightness MaxDelta:** 0.2  
**Gaussian Noise STD:** 0.005  
**Dropout:** 0.5  
**Train Size:** 568  
**Validation Size:** 142  
**Test Size:** 79  
**Optimizer (Base):** Adam  
**Optimizer (Fine-tune):** Adam with ExponentialDecay(initial\_lr=0.0001, decay\_rate=0.98)  
**Early Stopping Patience:** 10  
**Comments:** Using MobileNetV2, added regularization, increased decay rate and increased fine tuning layers

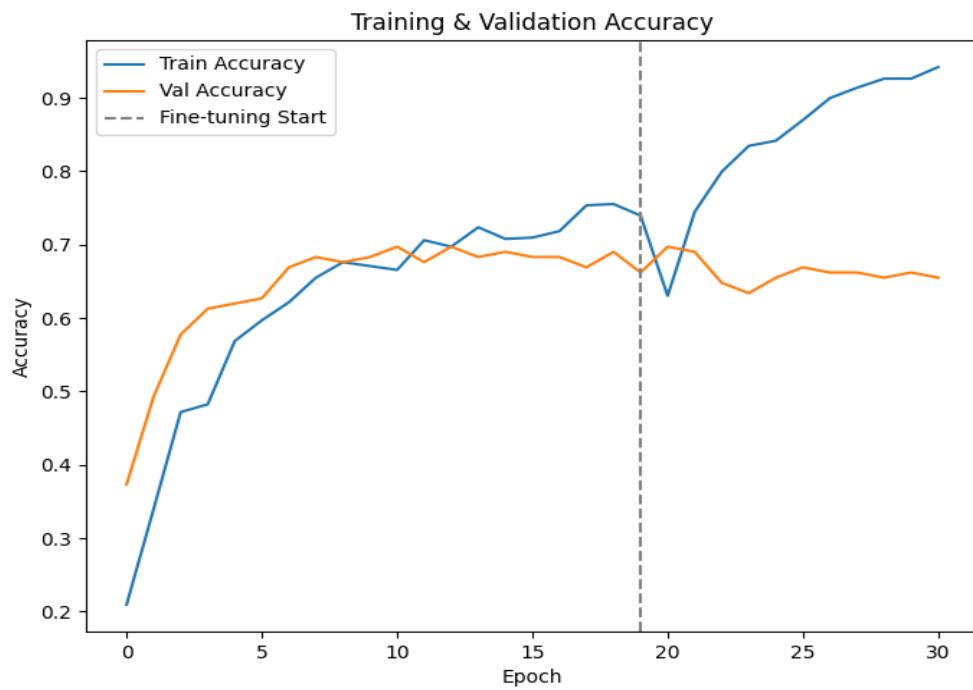
## Model Summary:

```
Model: "sequential"
[REDACTED]
[REDACTED]
■ Layer (type)           ■ Output Shape          ■ Param #
[REDACTED]
[REDACTED]
■ mobilenetv2_1.00_224 (Functional)   ■ (None, 7, 7, 1280)   ■ 2,257,984 ■
[REDACTED]
[REDACTED]
■ global_average_pooling2d      ■ (None, 1280)        ■ 0 ■
■ (GlobalAveragePooling2D)      ■                         ■
[REDACTED]
[REDACTED]
■ dropout (Dropout)          ■ (None, 1280)        ■ 0 ■
[REDACTED]
[REDACTED]
■ dense (Dense)             ■ (None, 8)          ■ 10,248 ■
[REDACTED]
[REDACTED]

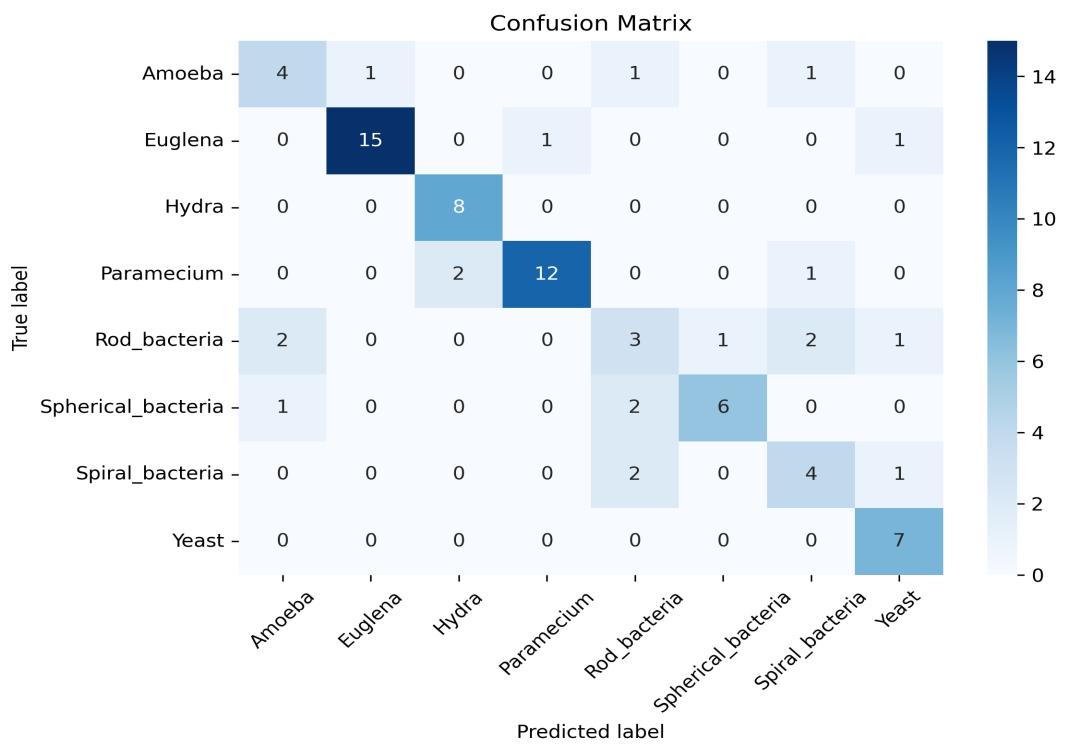
Total params: 5,998,937 (22.88 MB)
Trainable params: 1,865,352 (7.12 MB)
Non-trainable params: 402,880 (1.54 MB)
Optimizer params: 3,730,705 (14.23 MB)
```

**Test Accuracy:** 0.7468

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

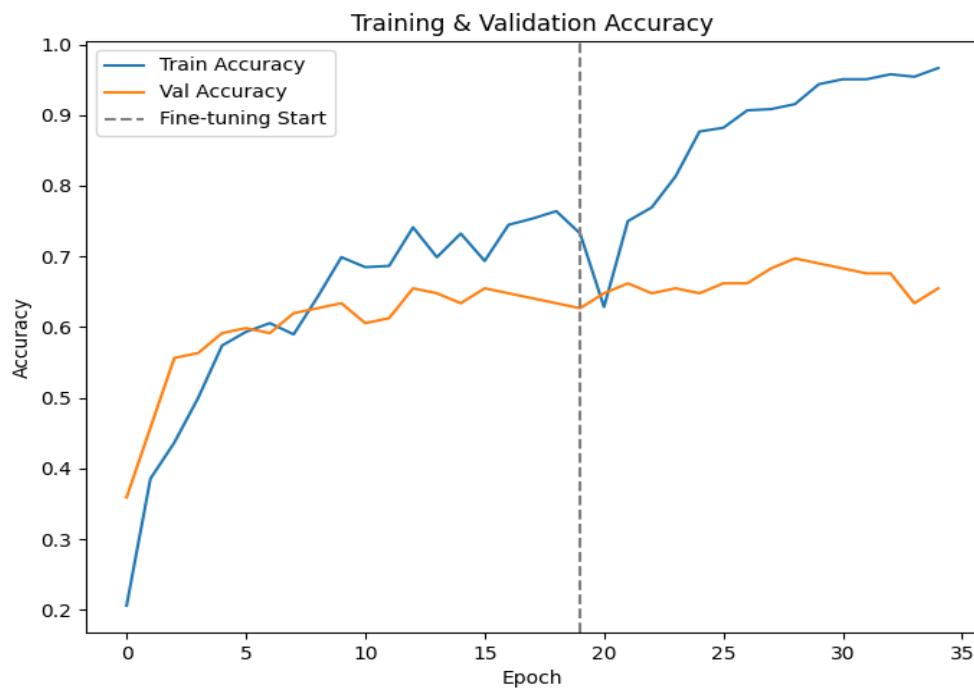
## **Configuration and Parameters:**

**Image Size:** (224, 224)  
**Batch Size:** 32  
**Number of Classes:** 8  
**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}  
**Base Epochs:** 20  
**Fine-tune Epochs:** 30  
**Data Augmentation:** random\_flip, random\_rotation, random\_zoom, random\_contrast, lambda  
**RandomFlip Mode:** horizontal  
**RandomRotation Factor:** 0.15  
**RandomZoom Factor:** 0.15  
**RandomContrast Factor:** 0.2  
**RandomBrightness MaxDelta:** 0.2  
**Gaussian Noise STD:** 0.005  
**Dropout:** 0.5  
**Train Size:** 568  
**Validation Size:** 142  
**Test Size:** 79  
**Optimizer (Base):** Adam  
**Optimizer (Fine-tune):** Adam with ExponentialDecay(initial\_lr=0.0001, decay\_rate=0.98)  
**Early Stopping Patience:** 10  
**Comments:** Using MobileNetV2

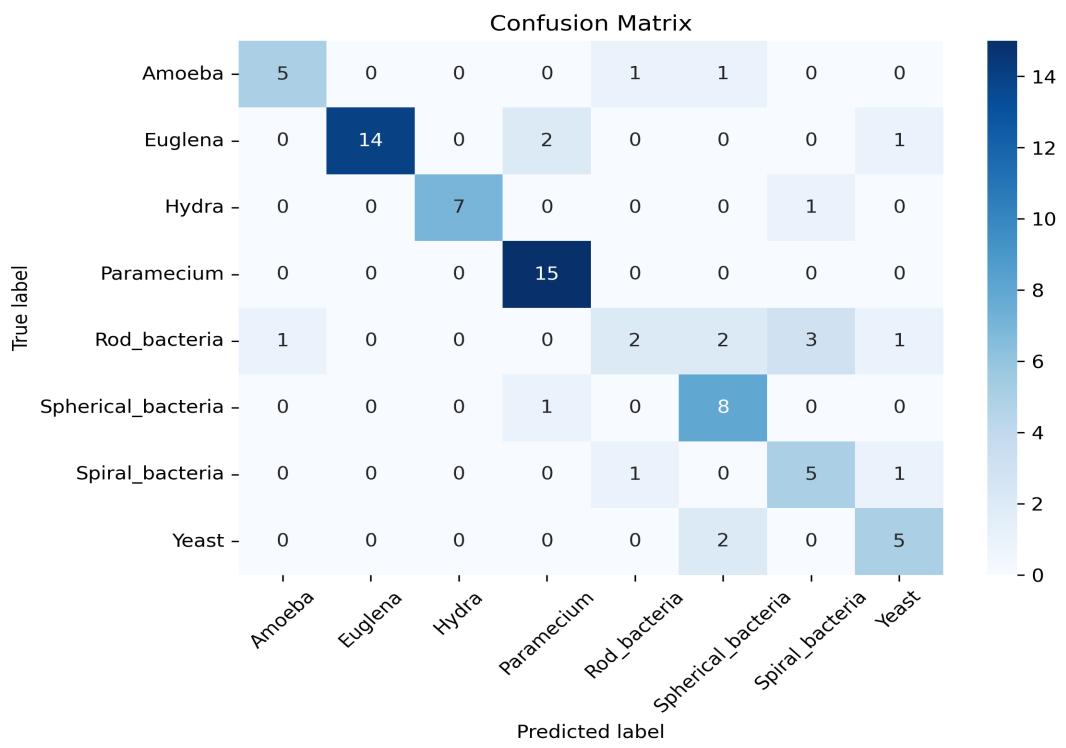
## Model Summary:

**Test Accuracy:** 0.7722

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)  
**Batch Size:** 32  
**Number of Classes:** 8  
**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}  
**Base Epochs:** 20  
**Fine-tune Epochs:** 30  
**Data Augmentation:** random\_flip, random\_rotation, random\_zoom, random\_contrast, lambda  
**RandomFlip Mode:** horizontal  
**RandomRotation Factor:** 0.15  
**RandomZoom Factor:** 0.15  
**RandomContrast Factor:** 0.2  
**RandomBrightness MaxDelta:** 0.2  
**Gaussian Noise STD:** 0.005  
**Dropout:** 0.6  
**Train Size:** 568  
**Validation Size:** 142  
**Test Size:** 79  
**Optimizer (Base):** Adam  
**Optimizer (Fine-tune):** Adam with ExponentialDecay(initial\_lr=0.0001, decay\_rate=0.98)  
**Early Stopping Patience:** 10  
**Comments:** Using MobileNetV2

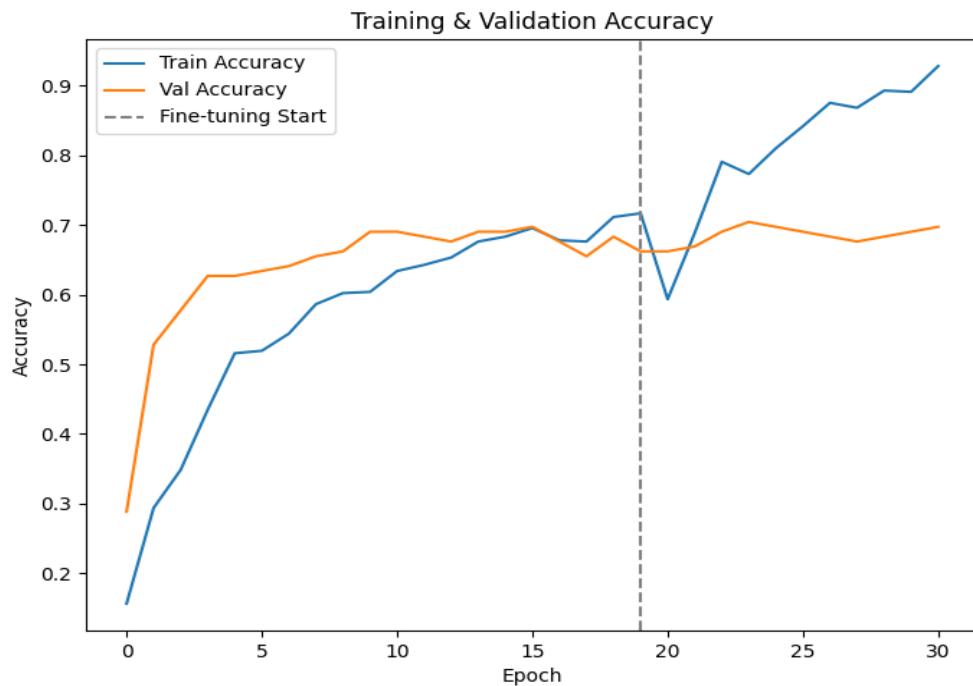
## Model Summary:

```
Model: "sequential"
[REDACTED]
    ■ Output      ■ Param ■
    ■ Layer (type) ■ Shape ■ # ■
[REDACTED]
■ mobilenetv2_1... ■ (None, 7, ■ 2,25... ■
■ (Functional) ■ 7, 1280) ■ ■
[REDACTED]
■ global_averag... ■ (None,      ■ 0 ■
■ (GlobalAverag... ■ 1280) ■ ■
[REDACTED]
■ dropout        ■ (None,      ■ 0 ■
■ (Dropout)     ■ 1280) ■ ■
[REDACTED]
■ dense (Dense) ■ (None, 8) ■ 10,2... ■
[REDACTED]

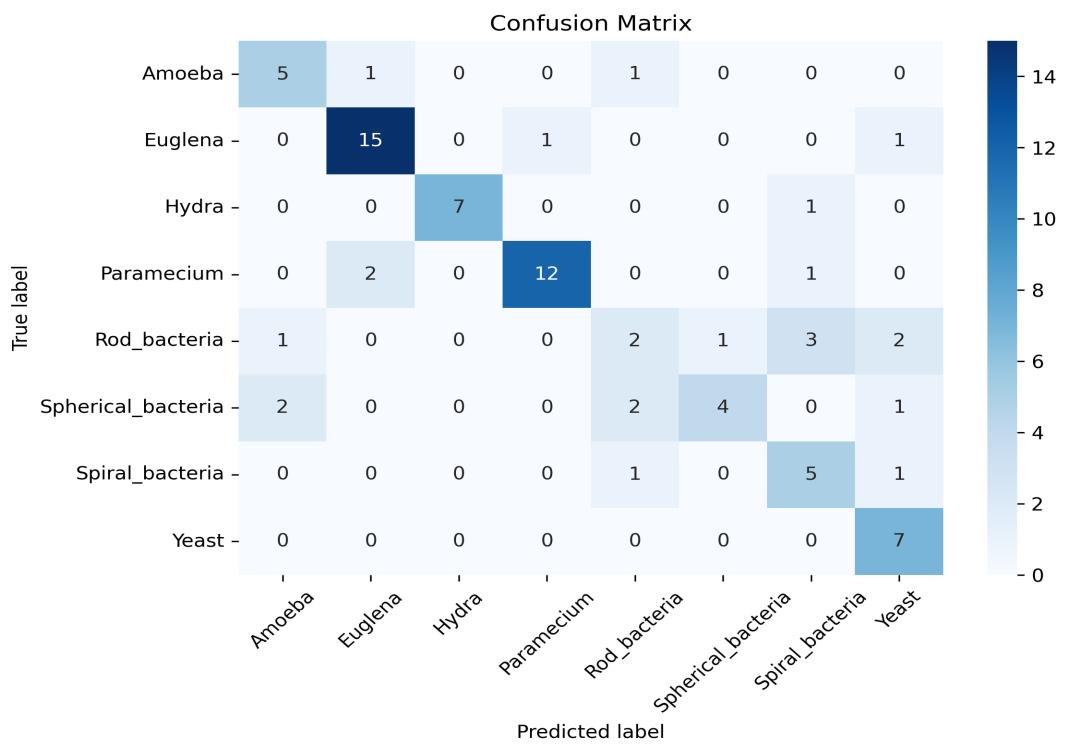
Total params: 5,998,937 (22.88 MB)
Trainable params: 1,865,352 (7.12 MB)
Non-trainable params: 402,880 (1.54 MB)
Optimizer params: 3,730,705 (14.23 MB)
```

**Test Accuracy:** 0.7215

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)

**Batch Size:** 32

**Number of Classes:** 8

**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

**Base Epochs:** 20

**Fine-tune Epochs:** 30

**Data Augmentation:** random\_flip, random\_rotation, random\_zoom, random\_contrast, lambda

**RandomFlip Mode:** horizontal

**RandomRotation Factor:** 0.15

**RandomZoom Factor:** 0.15

**RandomContrast Factor:** 0.2

**RandomBrightness MaxDelta:** 0.2

**Gaussian Noise STD:** 0.005

**Dropout:** 0.6

**Train Size:** 568

**Validation Size:** 142

**Test Size:** 79

**Optimizer (Base):** Adam

**Optimizer (Fine-tune):** Adam with ExponentialDecay(initial\_lr=0.0001, decay\_rate=0.98)

**Early Stopping Patience:** 10

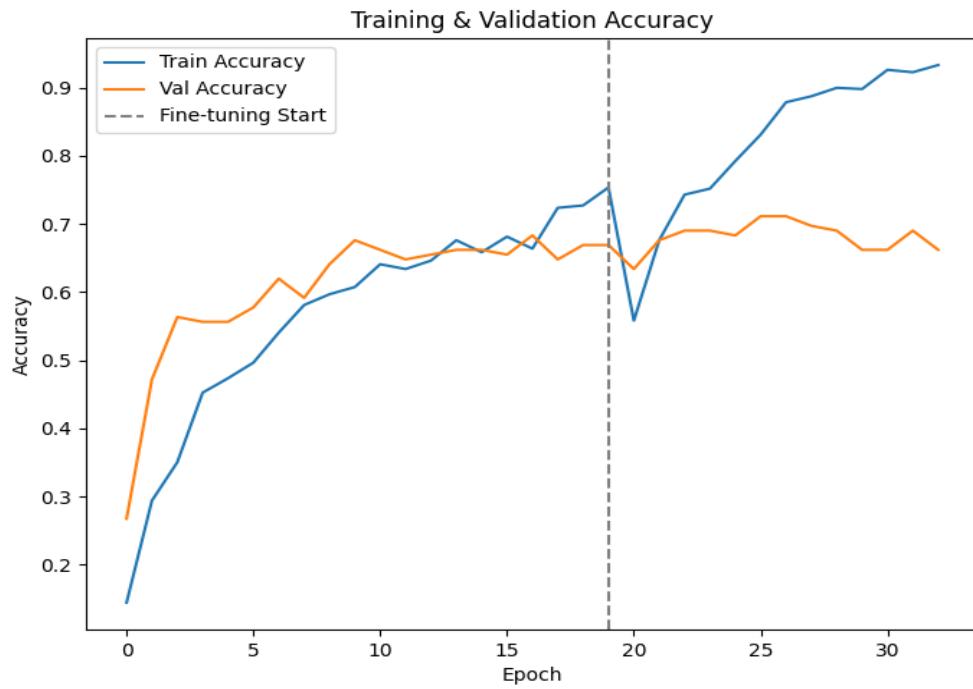
**Comments:** Using MobileNetV2, fine tune more layers with higher dropout

## Model Summary:

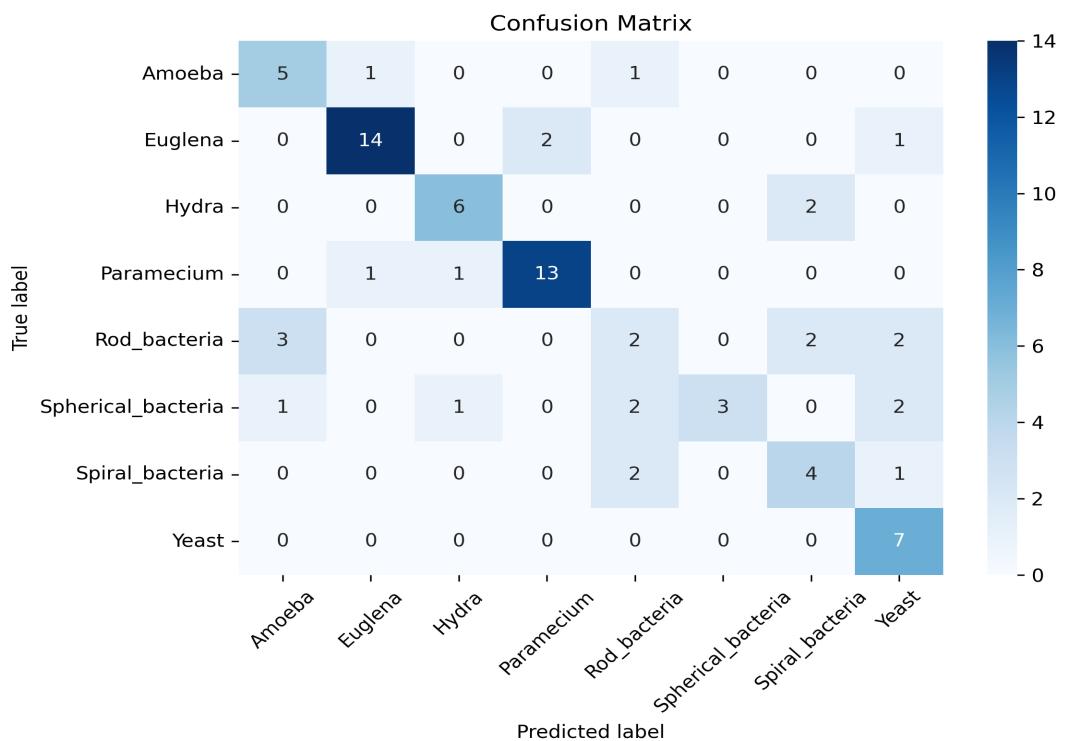
Model: "sequential"			
Layer (type)	Output Shape	Param #	
mobilenetv2_1.00_224 (Functional)	(None, 7, 7, 1280)	2,257,984	
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0	
dropout (Dropout)	(None, 1280)	0	
dense (Dense)	(None, 8)	10,248	
Total params: 6,625,497 (25.27 MB)			
Trainable params: 2,178,632 (8.31 MB)			
Non-trainable params: 89,600 (350.00 KB)			
Optimizer params: 4,357,265 (16.62 MB)			

**Test Accuracy:** 0.6835

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)  
**Batch Size:** 32  
**Number of Classes:** 8  
**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}  
**Base Epochs:** 20  
**Fine-tune Epochs:** 30  
**Data Augmentation:** random\_flip, random\_rotation, random\_zoom, random\_contrast, lambda  
**RandomFlip Mode:** horizontal  
**RandomRotation Factor:** 0.15  
**RandomZoom Factor:** 0.15  
**RandomContrast Factor:** 0.2  
**RandomBrightness MaxDelta:** 0.2  
**Gaussian Noise STD:** 0.005  
**Dropout:** 0.6  
**Train Size:** 568  
**Validation Size:** 142  
**Test Size:** 79  
**Optimizer (Base):** Adam  
**Optimizer (Fine-tune):** Adam with ExponentialDecay(initial\_lr=0.0001, decay\_rate=0.98)  
**Early Stopping Patience:** 10  
**Comments:** Using MobileNetV2, fine tune more layers with higher dropout, added a dense layer before final output

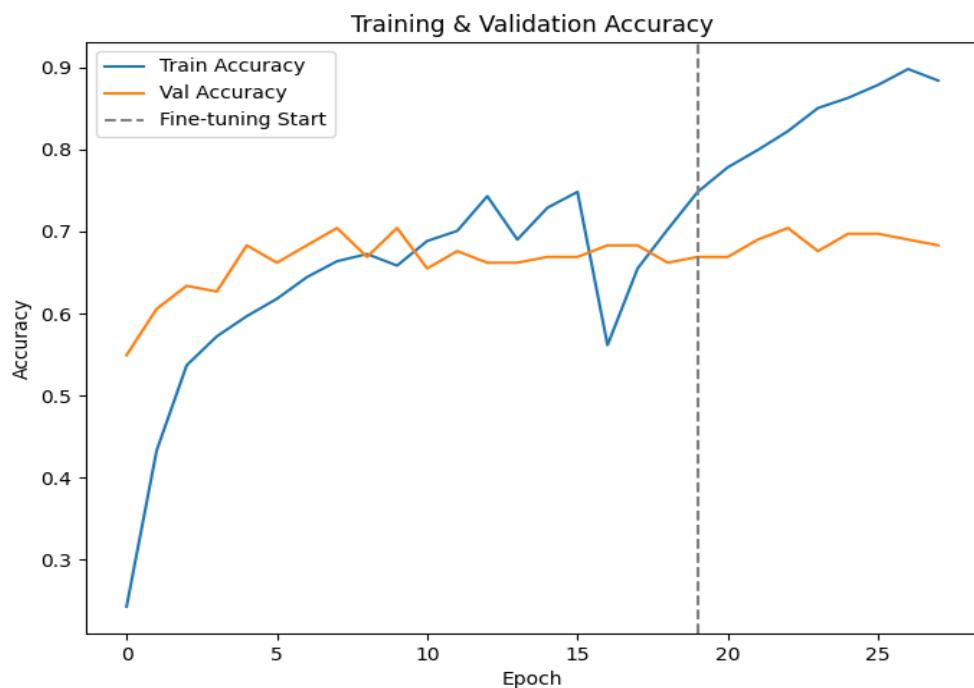
## Model Summary:

Model: "sequential"	Layer (type)	Output Shape	Param #
	mobilenetv2_1.00_224 (Functional)	(None, 7, 7, 1280)	2,257,984
	global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
	dropout (Dropout)	(None, 1280)	0
	dense (Dense)	(None, 256)	327,936
	dropout_1 (Dropout)	(None, 256)	0
	dense_1 (Dense)	(None, 8)	2,056

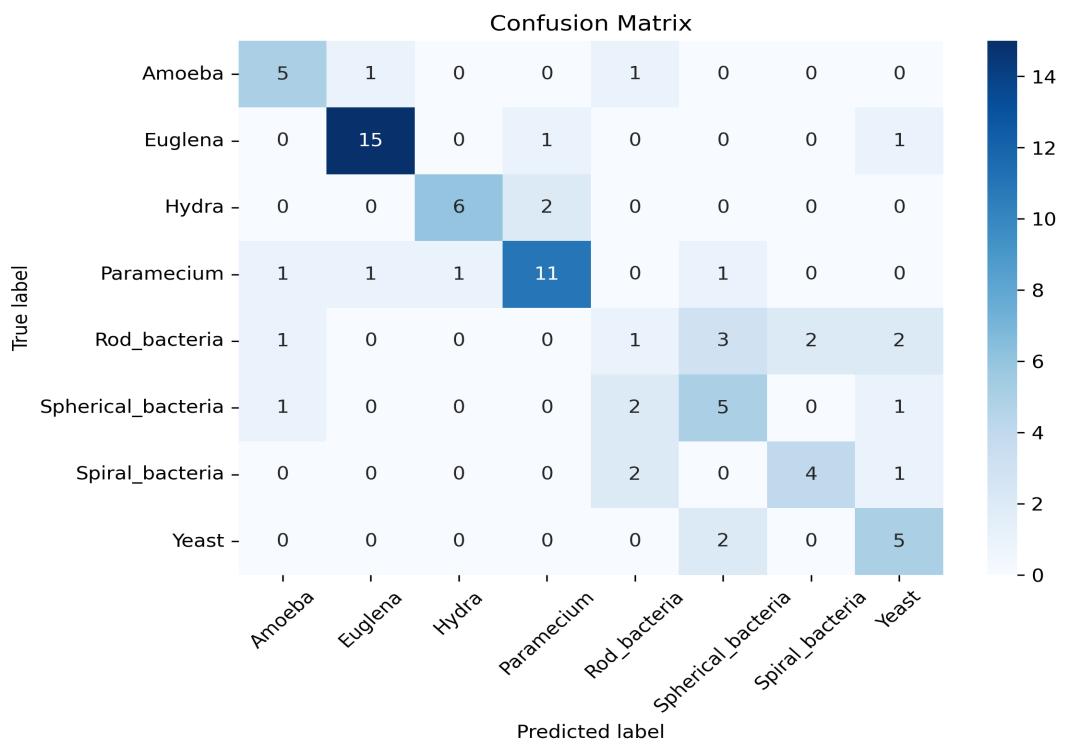
```
[  
Total params: 7,584,729 (28.93 MB)  
Trainable params: 2,498,376 (9.53 MB)  
Non-trainable params: 89,600 (350.00 KB)  
Optimizer params: 4,996,753 (19.06 MB)
```

**Test Accuracy:** 0.6582

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)

**Batch Size:** 32

**Number of Classes:** 8

**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

**Base Epochs:** 20

**Fine-tune Epochs:** 30

**Data Augmentation:** random\_flip, random\_rotation, random\_zoom, random\_contrast, lambda

**RandomFlip Mode:** horizontal

**RandomRotation Factor:** 0.15

**RandomZoom Factor:** 0.15

**RandomContrast Factor:** 0.2

**RandomBrightness MaxDelta:** 0.2

**Gaussian Noise STD:** 0.005

**Dropout:** 0.6

**Train Size:** 568

**Validation Size:** 142

**Test Size:** 79

**Optimizer (Base):** Adam

**Optimizer (Fine-tune):** Adam with ExponentialDecay(initial\_lr=0.0001, decay\_rate=0.98)

**Early Stopping Patience:** 10

**Comments:** Using MobileNetV2, fine tune more layers

## Model Summary:

Model: "sequential"

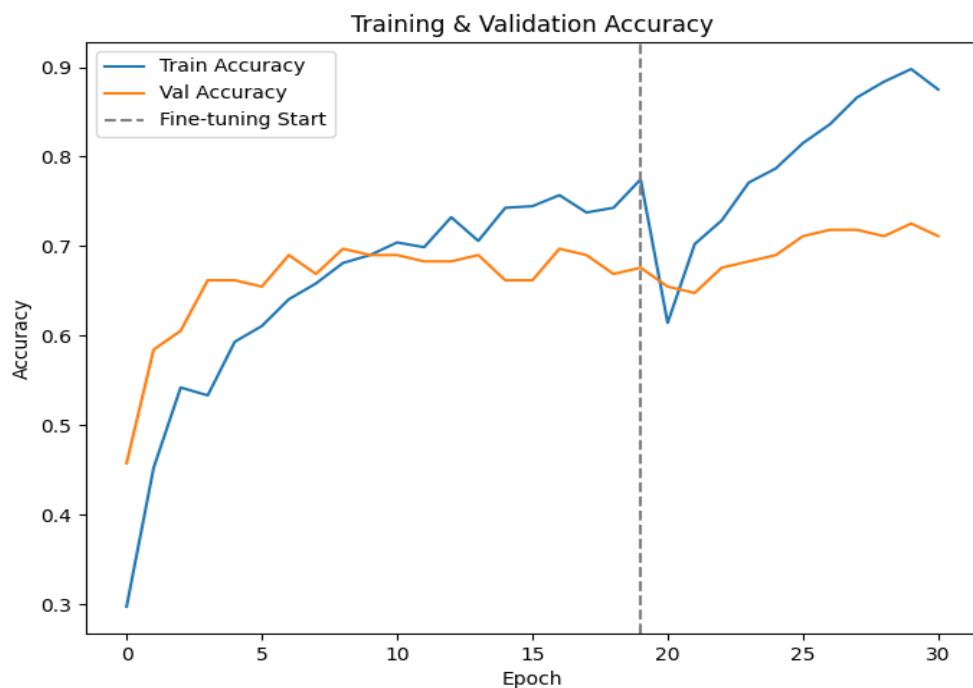
Layer (type)	Output Shape	Param #
mobilenetv2_1.00_224 (Functional)	(None, 7, 7, 1280)	2,257,984
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 256)	327,936
dropout_1 (Dropout)	(None, 256)	0
dense_1 (Dense)	(None, 8)	2,056

Total params: 6,970,841 (26.59 MB)

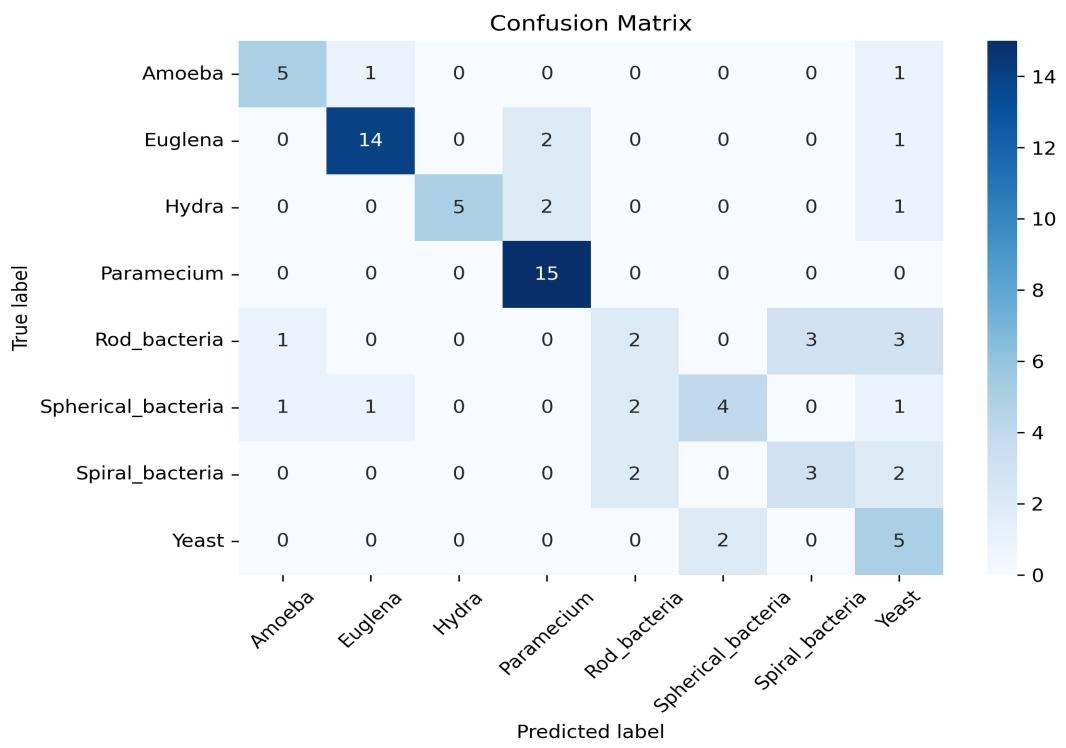
Trainable params: 2,191,432 (8.36 MB)  
Non-trainable params: 396,544 (1.51 MB)  
Optimizer params: 4,382,865 (16.72 MB)

**Test Accuracy:** 0.6709

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)  
**Batch Size:** 32  
**Number of Classes:** 8  
**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}  
**Base Epochs:** 20  
**Fine-tune Epochs:** 30  
**Data Augmentation:** random\_flip, random\_rotation, random\_zoom, random\_contrast, lambda  
**RandomFlip Mode:** horizontal  
**RandomRotation Factor:** 0.2  
**RandomZoom Factor:** 0.2  
**RandomContrast Factor:** 0.2  
**RandomBrightness MaxDelta:** 0.2  
**Gaussian Noise STD:** 0.01  
**Dropout:** 0.6  
**Train Size:** 568  
**Validation Size:** 142  
**Test Size:** 79  
**Optimizer (Base):** Adam  
**Optimizer (Fine-tune):** Adam with ExponentialDecay(initial\_lr=0.0001, decay\_rate=0.98)  
**Early Stopping Patience:** 10  
**Comments:** Using MobileNetV2, fine tune more layers, increase augmentation

## Model Summary:

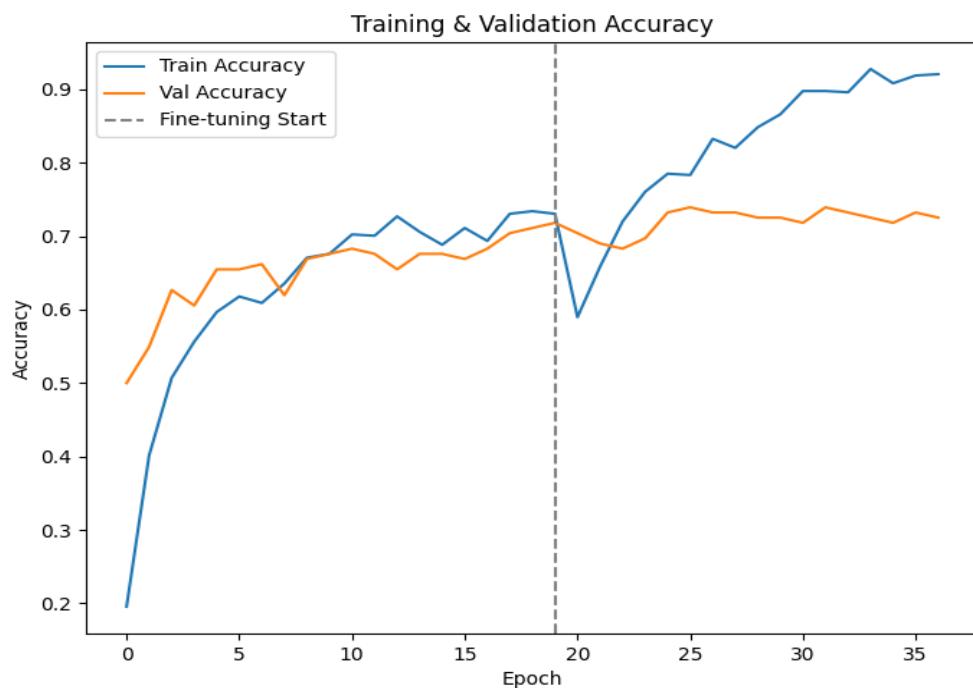
Model: "sequential"			
Layer (type)	Output Shape	Param #	
mobilenetv2_1.00_224 (Functional)	(None, 7, 7, 1280)	2,257,984	
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0	
dropout (Dropout)	(None, 1280)	0	
dense (Dense)	(None, 256)	327,936	
dropout_1 (Dropout)	(None, 256)	0	
dense_1 (Dense)	(None, 8)	2,056	

Total params: 6,970,841 (26.59 MB)

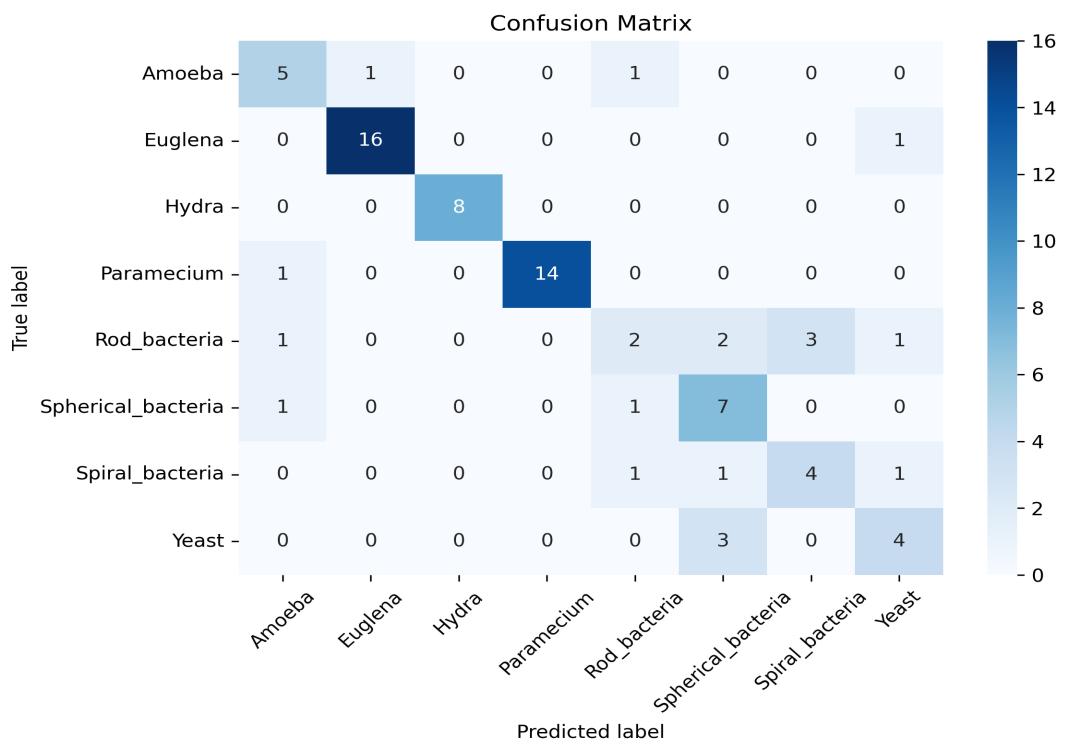
Trainable params: 2,191,432 (8.36 MB)  
Non-trainable params: 396,544 (1.51 MB)  
Optimizer params: 4,382,865 (16.72 MB)

**Test Accuracy:** 0.7595

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)

**Batch Size:** 32

**Number of Classes:** 8

**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

**Base Epochs:** 20

**Fine-tune Epochs:** 30

**Data Augmentation:** random\_flip, random\_rotation, random\_zoom, random\_contrast, lambda

**RandomFlip Mode:** horizontal

**RandomRotation Factor:** 0.2

**RandomZoom Factor:** 0.2

**RandomContrast Factor:** 0.2

**RandomBrightness MaxDelta:** 0.2

**Gaussian Noise STD:** 0.05

**Dropout:** 0.6

**Train Size:** 568

**Validation Size:** 142

**Test Size:** 79

**Optimizer (Base):** Adam

**Optimizer (Fine-tune):** Adam with ExponentialDecay(initial\_lr=0.0001, decay\_rate=0.98)

**Early Stopping Patience:** 10

**Comments:** Using MobileNetV2, fine tune more layers, increase gaussian

## Model Summary:

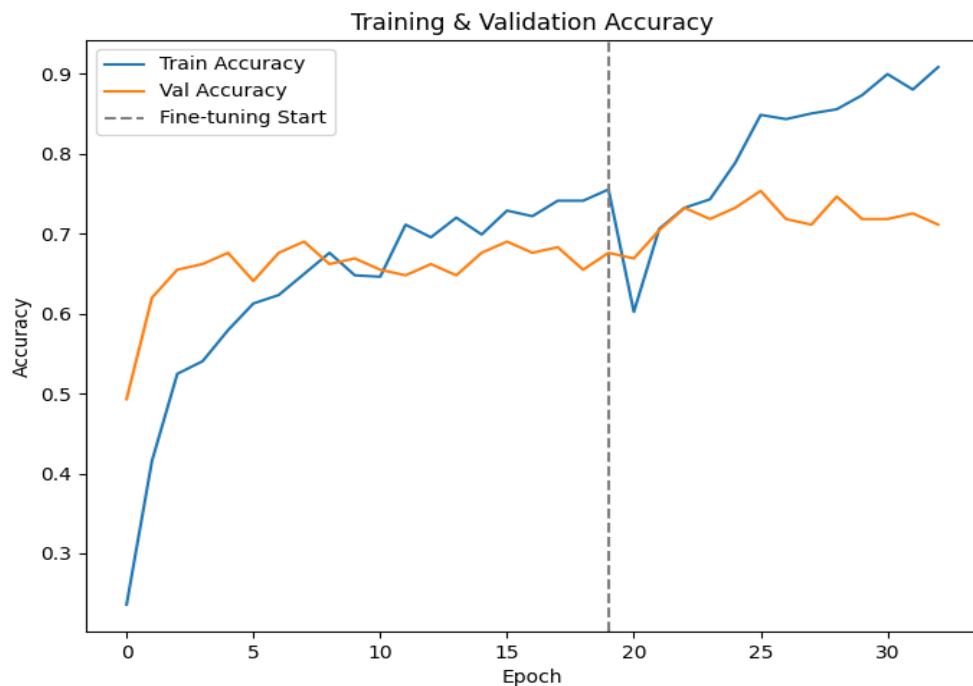
Model: "sequential"			
Layer (type)	Output Shape	Param #	
mobilenetv2_1.00_224 (Functional)	(None, 7, 7, 1280)	2,257,984	
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0	
dropout (Dropout)	(None, 1280)	0	
dense (Dense)	(None, 256)	327,936	
dropout_1 (Dropout)	(None, 256)	0	
dense_1 (Dense)	(None, 8)	2,056	

Total params: 6,970,841 (26.59 MB)

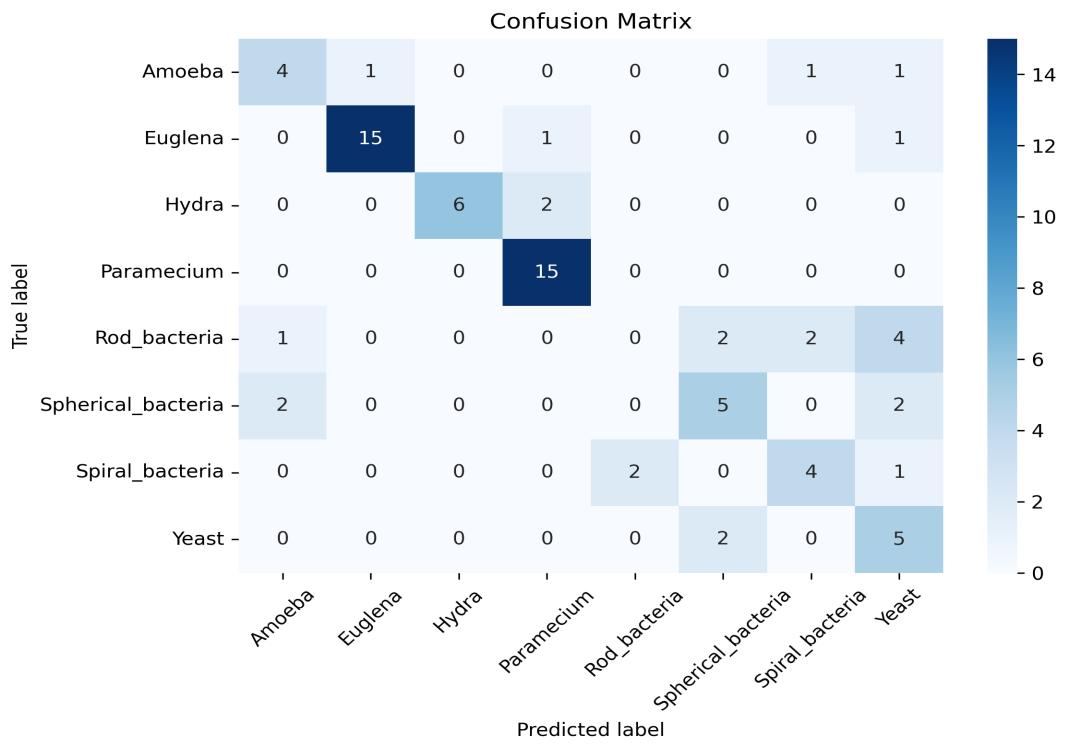
Trainable params: 2,191,432 (8.36 MB)  
Non-trainable params: 396,544 (1.51 MB)  
Optimizer params: 4,382,865 (16.72 MB)

**Test Accuracy:** 0.6835

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)  
**Batch Size:** 32  
**Number of Classes:** 8  
**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}  
**Base Epochs:** 20  
**Fine-tune Epochs:** 30  
**Data Augmentation:** random\_flip, random\_rotation, random\_zoom, random\_contrast, lambda  
**RandomFlip Mode:** horizontal  
**RandomRotation Factor:** 0.2  
**RandomZoom Factor:** 0.2  
**RandomContrast Factor:** 0.2  
**RandomBrightness MaxDelta:** 0.2  
**Gaussian Noise STD:** 0.01  
**Dropout:** 0.6  
**Train Size:** 568  
**Validation Size:** 142  
**Test Size:** 79  
**Optimizer (Base):** Adam  
**Optimizer (Fine-tune):** Adam with ExponentialDecay(initial\_lr=0.0001, decay\_rate=0.98)  
**Early Stopping Patience:** 10  
**Comments:** Using MobileNetV2, fine tune more layers

## Model Summary:

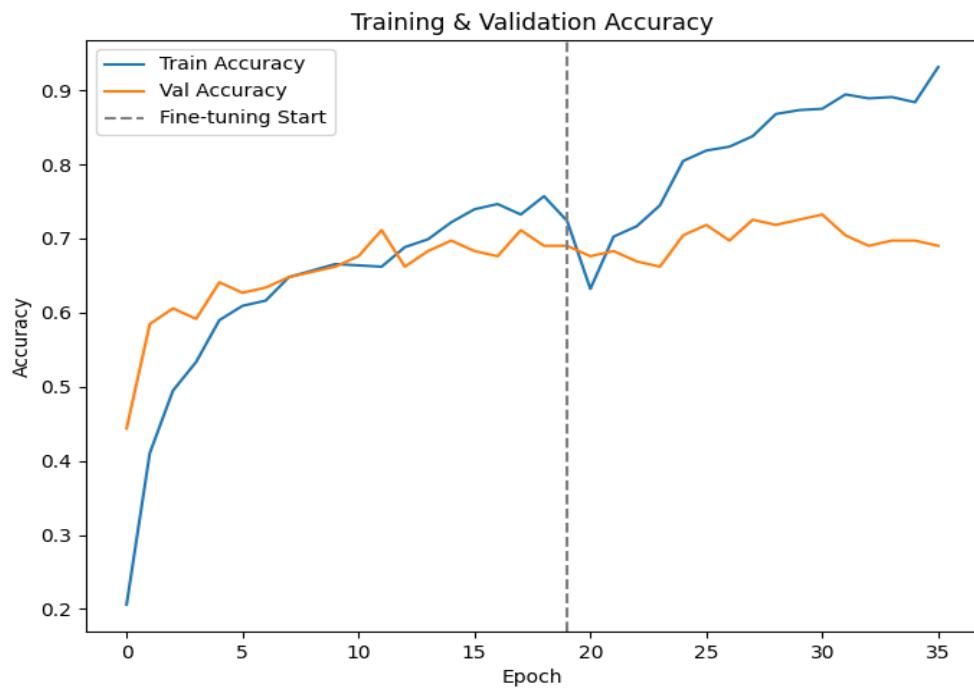
Model: "sequential"			
Layer (type)	Output Shape	Param #	
mobilenetv2_1.00_224 (Functional)	(None, 7, 7, 1280)	2,257,984	
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0	
dropout (Dropout)	(None, 1280)	0	
dense (Dense)	(None, 256)	327,936	
dropout_1 (Dropout)	(None, 256)	0	
dense_1 (Dense)	(None, 8)	2,056	

Total params: 6,970,841 (26.59 MB)

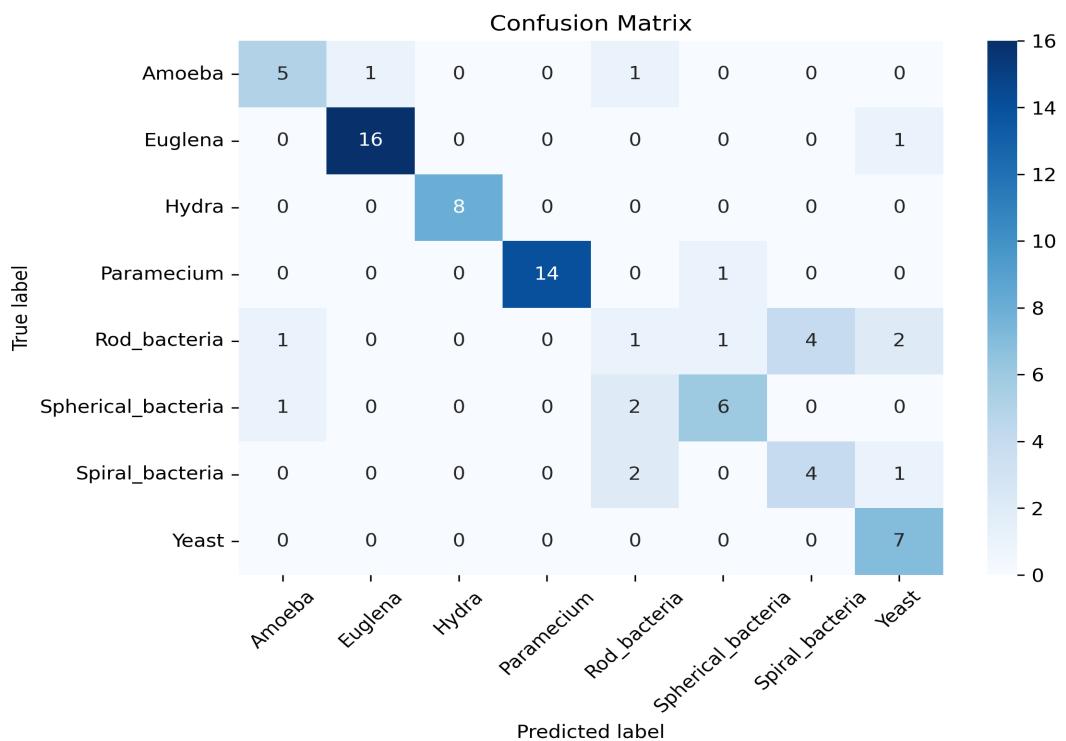
Trainable params: 2,191,432 (8.36 MB)  
Non-trainable params: 396,544 (1.51 MB)  
Optimizer params: 4,382,865 (16.72 MB)

**Test Accuracy:** 0.7722

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)  
**Batch Size:** 32  
**Number of Classes:** 8  
**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}  
**Base Epochs:** 20  
**Fine-tune Epochs:** 30  
**Data Augmentation:** random\_flip, random\_rotation, random\_zoom, random\_contrast, lambda  
**RandomFlip Mode:** horizontal  
**RandomRotation Factor:** 0.2  
**RandomZoom Factor:** 0.2  
**RandomContrast Factor:** 0.2  
**RandomBrightness MaxDelta:** 0.2  
**Gaussian Noise STD:** 0.01  
**Dropout:** 0.6  
**Train Size:** 568  
**Validation Size:** 142  
**Test Size:** 79  
**Optimizer (Base):** Adam  
**Optimizer (Fine-tune):** Adam with ExponentialDecay(initial\_lr=0.0001, decay\_rate=0.98)  
**Early Stopping Patience:** 10  
**Comments:** Using EfficientNetB0, fine tune more layers

## Model Summary:

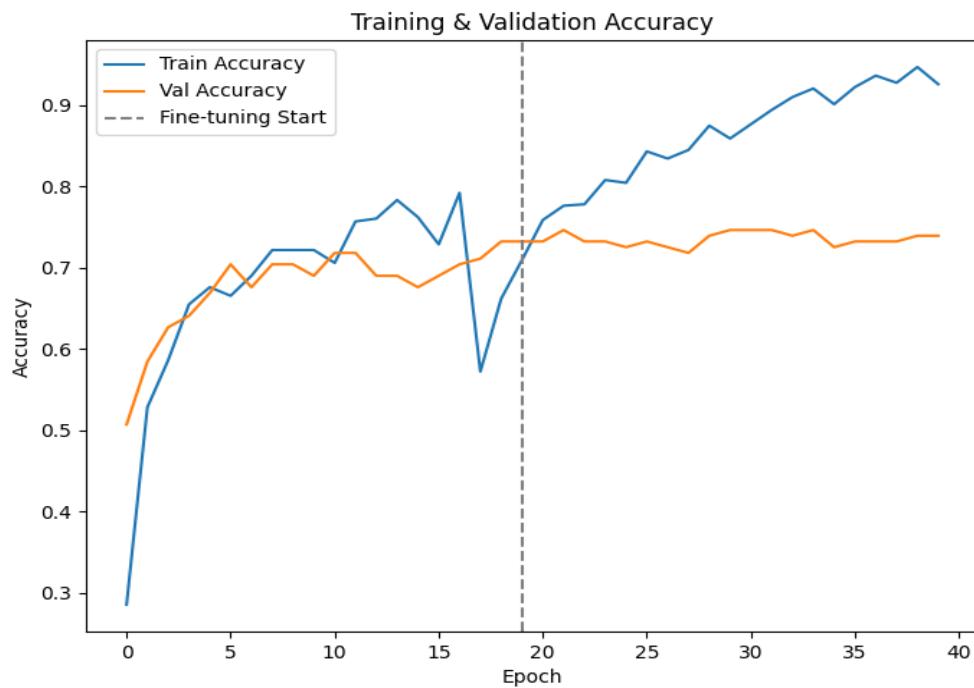
Model: "sequential"			
Layer (type)	Output Shape	Param #	
efficientnetb0 (Functional)	(None, 7, 7, 1280)	4,049,571	
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0	
dropout (Dropout)	(None, 1280)	0	
dense (Dense)	(None, 256)	327,936	
dropout_1 (Dropout)	(None, 256)	0	
dense_1 (Dense)	(None, 8)	2,056	

Total params: 12,720,244 (48.52 MB)

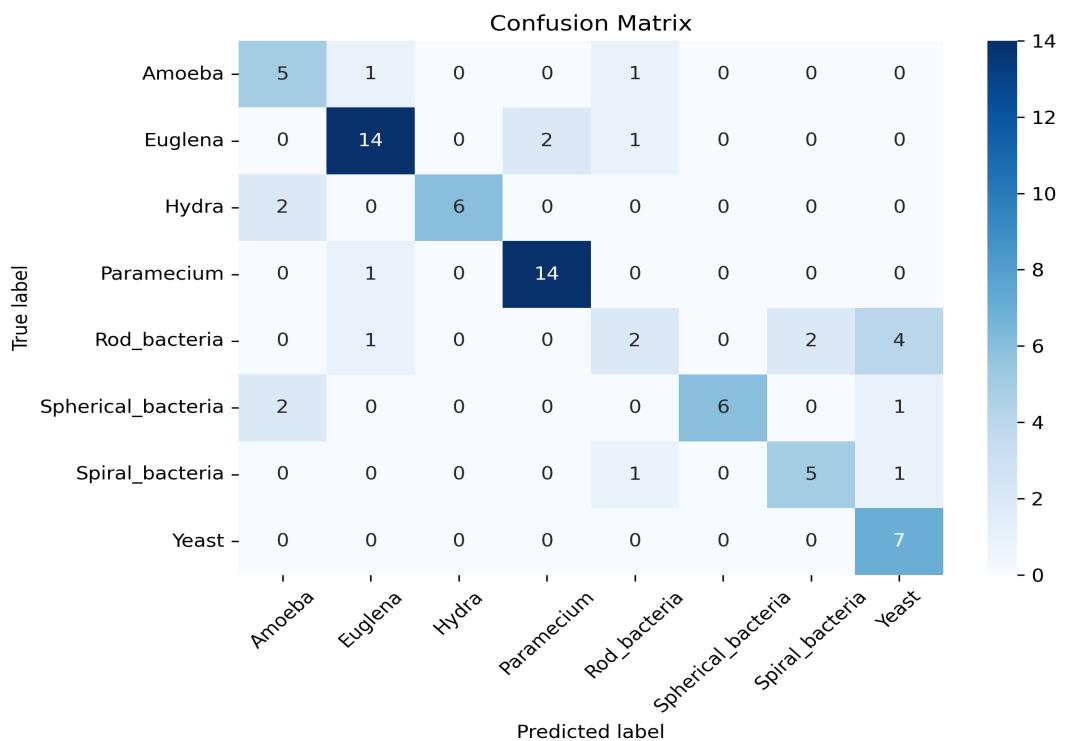
Trainable params: 4,170,340 (15.91 MB)  
Non-trainable params: 209,223 (817.28 KB)  
Optimizer params: 8,340,681 (31.82 MB)

**Test Accuracy:** 0.7468

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)  
**Batch Size:** 32  
**Number of Classes:** 8  
**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}  
**Base Epochs:** 20  
**Fine-tune Epochs:** 30  
**Data Augmentation:** random\_flip, random\_rotation, random\_zoom, random\_contrast, lambda  
**RandomFlip Mode:** horizontal  
**RandomRotation Factor:** 0.2  
**RandomZoom Factor:** 0.2  
**RandomContrast Factor:** 0.2  
**RandomBrightness MaxDelta:** 0.2  
**Gaussian Noise STD:** 0.01  
**Dropout:** 0.6  
**Train Size:** 568  
**Validation Size:** 142  
**Test Size:** 79  
**Optimizer (Base):** Adam  
**Optimizer (Fine-tune):** Adam with ExponentialDecay(initial\_lr=0.0001, decay\_rate=0.98)  
**Early Stopping Patience:** 10  
**Comments:** Removed base model

## Model Summary:

Model: "sequential"			
Layer (type)	Output Shape	Param #	
conv2d (Conv2D)	(None, 222, 222, 32)	896	
max_pooling2d (MaxPooling2D)	(None, 111, 111, 32)	0	
conv2d_1 (Conv2D)	(None, 109, 109, 64)	18,496	
max_pooling2d_1 (MaxPooling2D)	(None, 54, 54, 64)	0	
conv2d_2 (Conv2D)	(None, 52, 52, 128)	73,856	
global_average_pooling2d (GlobalAveragePooling2D)	(None, 128)	0	
dense (Dense)	(None, 128)	16,512	

```

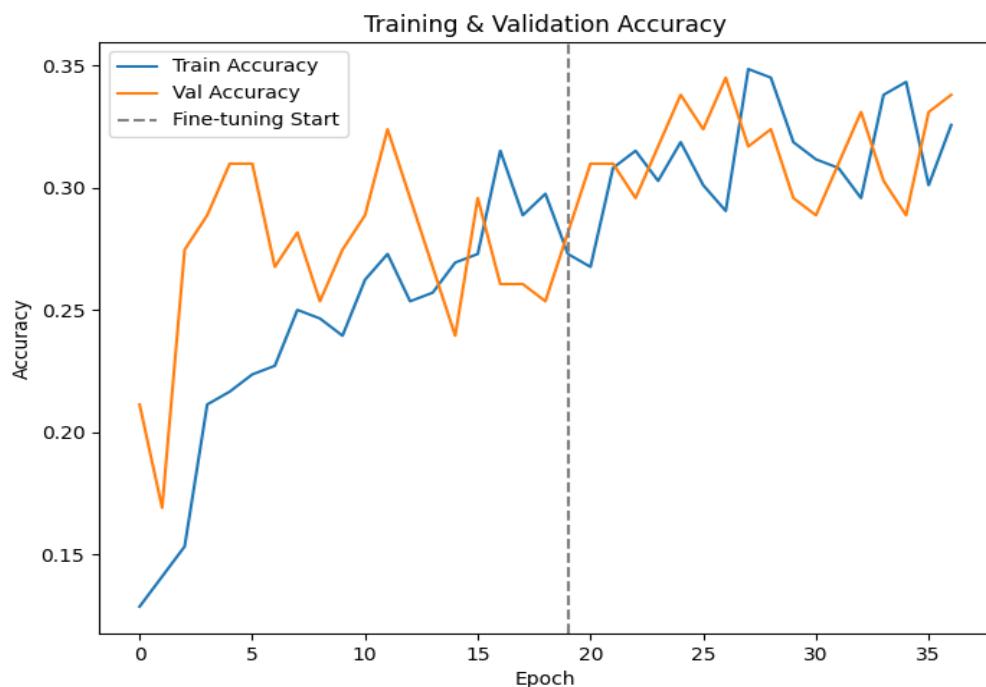
dropout (Dropout)      (None, 128) 0
dense_1 (Dense)        (None, 8)    1,032

Total params: 332,377 (1.27 MB)
Trainable params: 110,792 (432.78 KB)
Non-trainable params: 0 (0.00 B)
Optimizer params: 221,585 (865.57 KB)

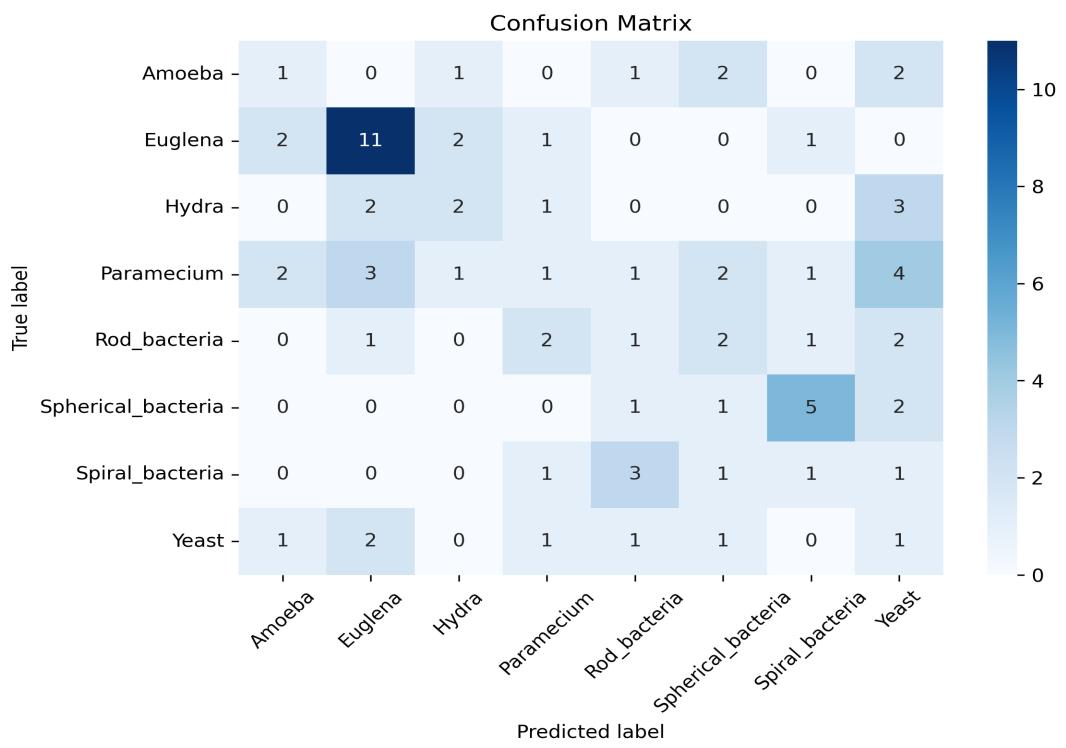
```

**Test Accuracy:** 0.2405

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)

**Batch Size:** 32

**Number of Classes:** 8

**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

**Base Epochs:** 20

**Fine-tune Epochs:** 30

**Data Augmentation:** random\_flip, random\_rotation, random\_zoom, random\_contrast, lambda

**RandomFlip Mode:** horizontal

**RandomRotation Factor:** 0.2

**RandomZoom Factor:** 0.2

**RandomContrast Factor:** 0.2

**RandomBrightness MaxDelta:** 0.2

**Gaussian Noise STD:** 0.01

**Dropout:** 0.6

**Train Size:** 568

**Validation Size:** 142

**Test Size:** 79

**Optimizer (Base):** Adam

**Optimizer (Fine-tune):** Adam with ExponentialDecay(initial\_lr=0.0001, decay\_rate=0.98)

**Early Stopping Patience:** 10

**Comments:** Using MobileNetV2, fine tune more layers

## Model Summary:

Model: "sequential"

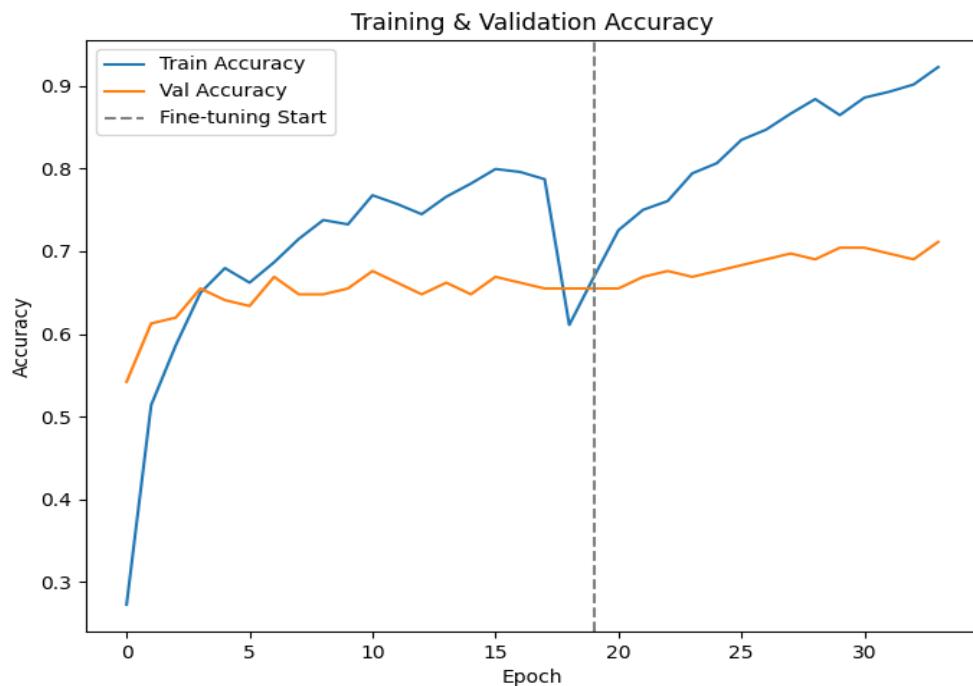
Layer (type)	Output Shape	Param #
efficientnetb0 (Functional)	(None, 7, 7, 1280)	4,049,571
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 256)	327,936
dropout_1 (Dropout)	(None, 256)	0
dense_1 (Dense)	(None, 8)	2,056

Total params: 12,720,244 (48.52 MB)

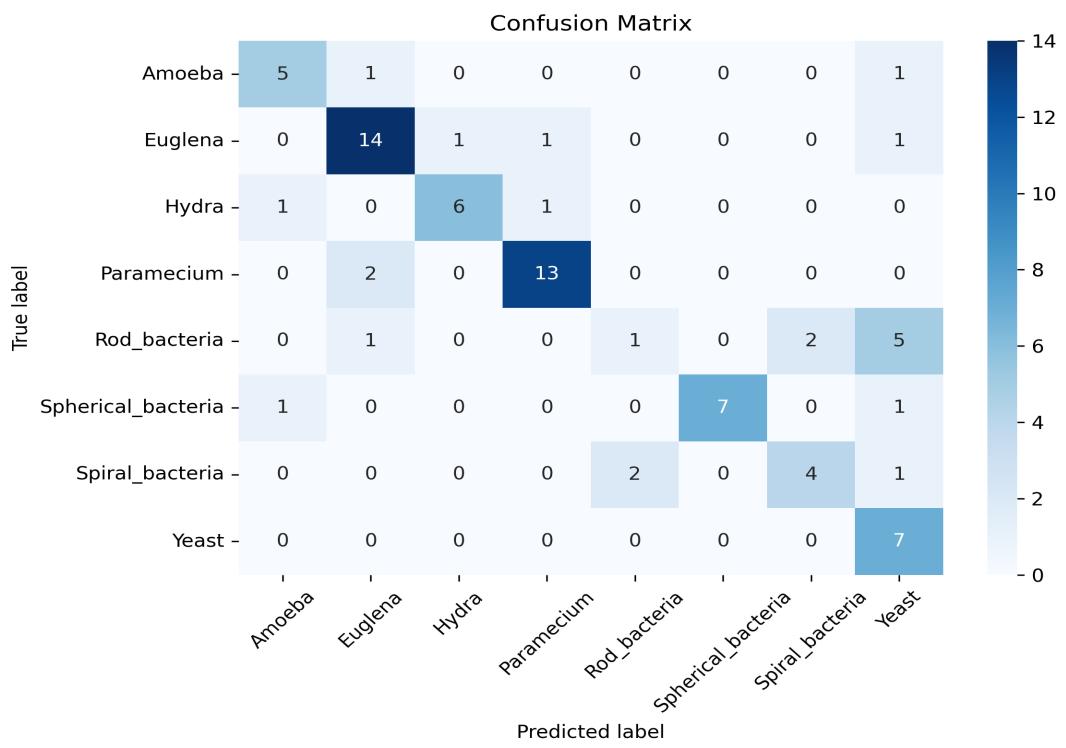
Trainable params: 4,170,340 (15.91 MB)  
Non-trainable params: 209,223 (817.28 KB)  
Optimizer params: 8,340,681 (31.82 MB)

**Test Accuracy:** 0.7215

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)

**Batch Size:** 32

**Number of Classes:** 8

**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

**Base Epochs:** 20

**Fine-tune Epochs:** 30

**Data Augmentation:** random\_flip, random\_rotation, random\_zoom, random\_contrast, lambda

**RandomFlip Mode:** horizontal

**RandomRotation Factor:** 0.2

**RandomZoom Factor:** 0.2

**RandomContrast Factor:** 0.2

**RandomBrightness MaxDelta:** 0.2

**Gaussian Noise STD:** 0.01

**Dropout:** 0.6

**Train Size:** 568

**Validation Size:** 142

**Test Size:** 79

**Optimizer (Base):** Adam

**Optimizer (Fine-tune):** Adam with ExponentialDecay(initial\_lr=0.0001, decay\_rate=0.98)

**Early Stopping Patience:** 10

**Comments:** Using MobileNetV2, fine tune more layers

## Model Summary:

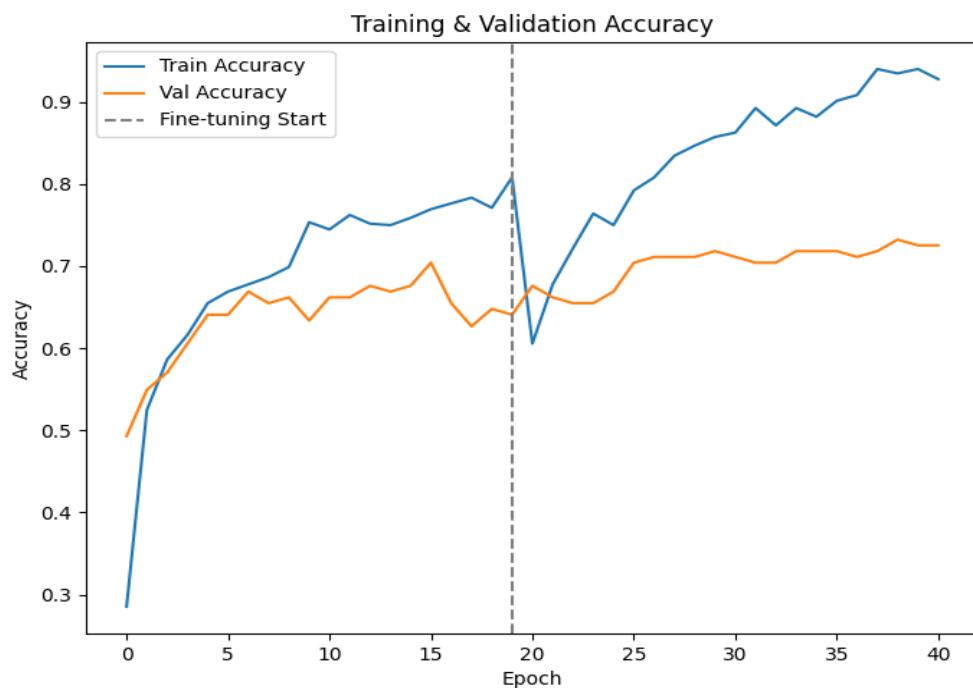
Model: "sequential"			
Layer (type)	Output Shape	Param #	
efficientnetb0 (Functional)	(None, 7, 7, 1280)	4,049,571	
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0	
dropout (Dropout)	(None, 1280)	0	
dense (Dense)	(None, 256)	327,936	
dropout_1 (Dropout)	(None, 256)	0	
dense_1 (Dense)	(None, 8)	2,056	

Total params: 12,720,244 (48.52 MB)

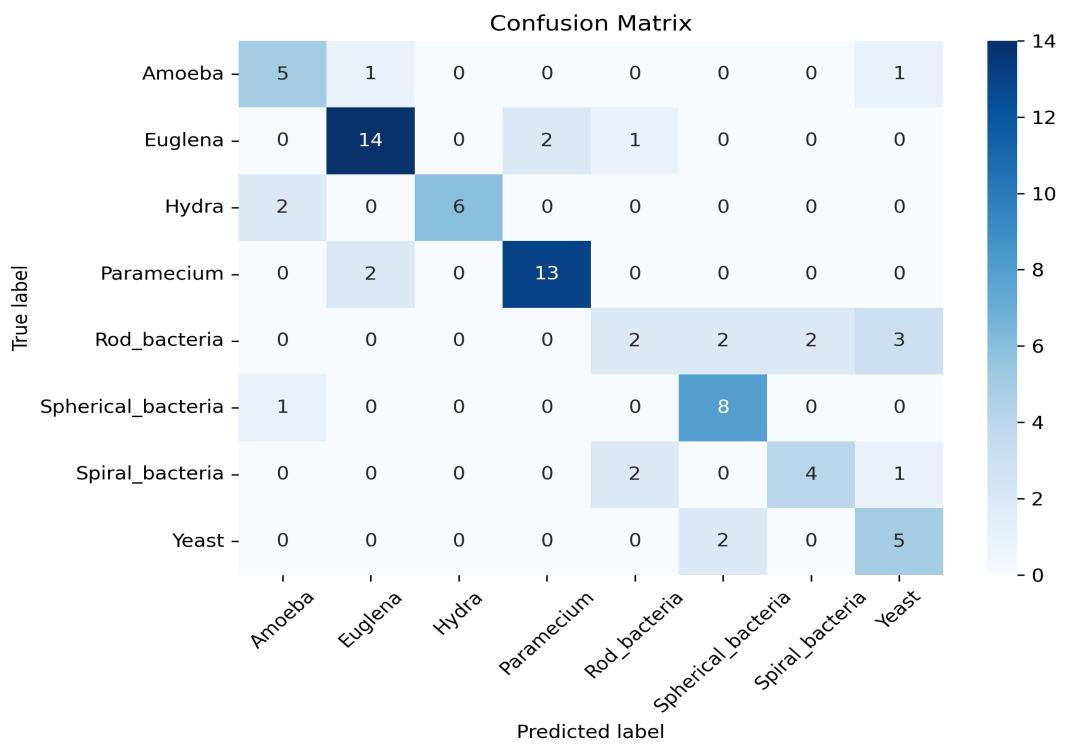
Trainable params: 4,170,340 (15.91 MB)  
Non-trainable params: 209,223 (817.28 KB)  
Optimizer params: 8,340,681 (31.82 MB)

**Test Accuracy:** 0.7215

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)

**Batch Size:** 32

**Number of Classes:** 8

**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

**Base Epochs:** 20

**Fine-tune Epochs:** 30

**Data Augmentation:** random\_flip, random\_rotation, random\_zoom, random\_contrast, lambda, random\_crop, random\_translation, lambda\_1, lambda\_2

**RandomFlip Mode:** horizontal

**RandomRotation Factor:** 0.2

**RandomZoom Factor:** 0.2

**RandomContrast Factor:** 0.2

**RandomBrightness MaxDelta:** 0.2

**RandomHue Factor:** 0.05

**RandomSaturation Range:** 0.6–1.4

**RandomTranslation Factor:** 0.1

**RandomCrop Applied:** True

**Gaussian Noise STD:** 0.01

**Dropout:** 0.6

**Train Size:** 568

**Validation Size:** 142

**Test Size:** 79

**Optimizer (Base):** Adam

**Optimizer (Fine-tune):** Adam with ExponentialDecay(initial\_lr=0.0001, decay\_rate=0.98)

**Early Stopping Patience:** 10

**Comments:** Using MobileNetV2, added to augmentation pipeline

## Model Summary:

Layer (type)	Output Shape	Param #
efficientnetb0 (Functional)	(None, 7, 7, 1280)	4,049,571
global_average_pooling2d (GlobalAveragePooling2D)	(None, 1280)	0
dropout (Dropout)	(None, 1280)	0
dense (Dense)	(None, 256)	327,936
dropout_1 (Dropout)	(None, 256)	0

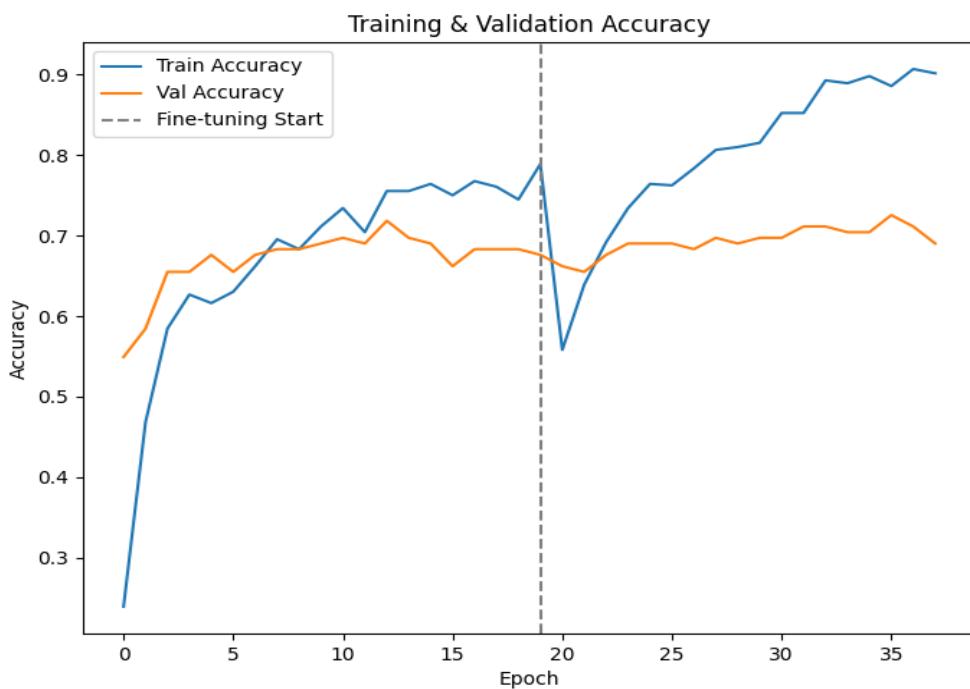
```

dense_1 (Dense)      (None, 8)      2,056
Total params: 12,720,244 (48.52 MB)
Trainable params: 4,170,340 (15.91 MB)
Non-trainable params: 209,223 (817.28 KB)
Optimizer params: 8,340,681 (31.82 MB)

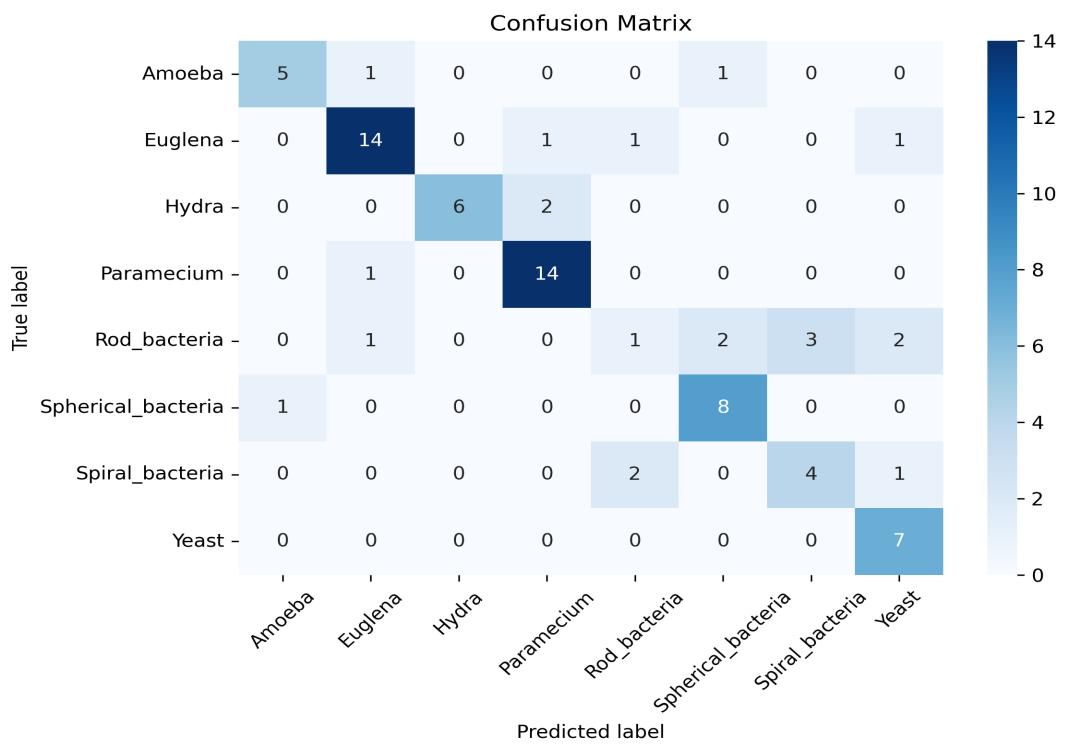
```

**Test Accuracy:** 0.7468

## Training Accuracy over Epochs:



## Confusion Matrix:



# Model Training Report

## Configuration and Parameters:

**Image Size:** (224, 224)

**Batch Size:** 32

**Number of Classes:** 8

**Class Weights:** {0: 1.365, 1: 0.587, 2: 1.315, 3: 0.645, 4: 1.164, 5: 1.145, 6: 1.315, 7: 1.315}

**Base Epochs:** 20

**Fine-tune Epochs:** 30

**Data Augmentation:** random\_flip, random\_rotation, random\_zoom, random\_contrast, lambda, random\_crop, random\_translation, lambda\_1, lambda\_2

**RandomFlip Mode:** horizontal

**RandomRotation Factor:** 0.2

**RandomZoom Factor:** 0.2

**RandomContrast Factor:** 0.2

**RandomBrightness MaxDelta:** 0.2

**RandomHue Factor:** 0.01

**RandomSaturation Range:** 0.8–1.2

**RandomTranslation Factor:** 0.05

**RandomCrop Applied:** True

**Gaussian Noise STD:** 0.01

**Dropout:** 0.6

**Train Size:** 568

**Validation Size:** 142

**Test Size:** 79

**Optimizer (Base):** Adam

**Optimizer (Fine-tune):** Adam with ExponentialDecay(initial\_lr=0.0001, decay\_rate=0.98)

**Early Stopping Patience:** 10

**Comments:** Using EfficientNetB3, added to augmentation pipeline,tweaked factors

## Model Summary:

Model: "sequential"	Layer (type)	Output Shape	Param #
	efficientnetb3 (Functional)	(None, 7, 7, 1536)	10,783,535
	global_average_pooling2d (GlobalAveragePooling2D)	(None, 1536)	0
	dropout (Dropout)	(None, 1536)	0
	dense (Dense)	(None, 256)	393,472
	dropout_1 (Dropout)	(None, 256)	0

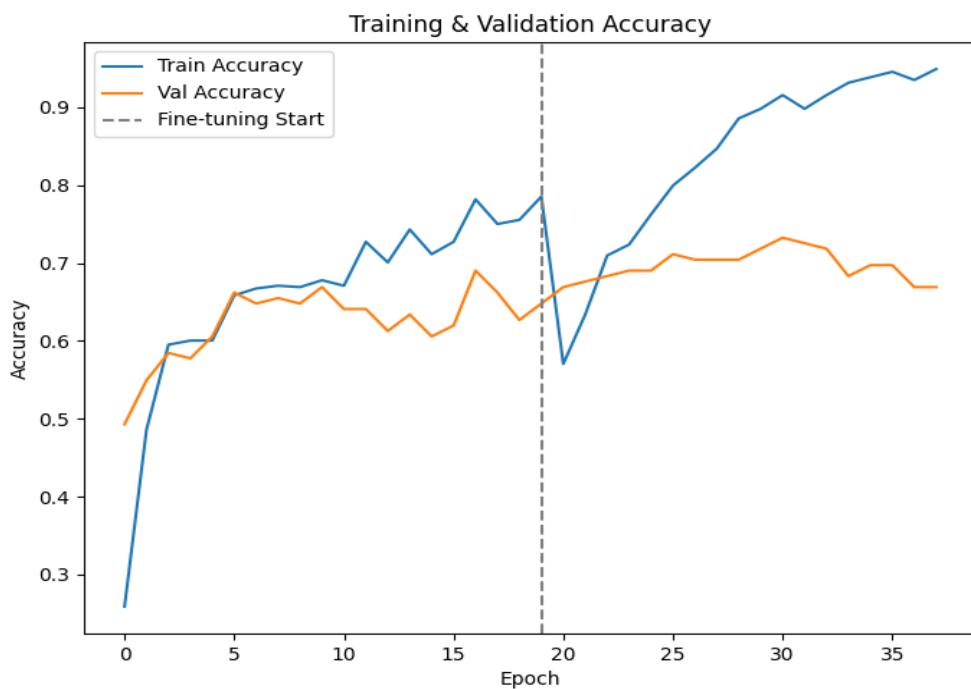
```

dense_1 (Dense)      (None, 8)      2,056
Total params: 33,122,004 (126.35 MB)
Trainable params: 10,971,470 (41.85 MB)
Non-trainable params: 207,593 (810.91 KB)
Optimizer params: 21,942,941 (83.71 MB)

```

**Test Accuracy:** 0.7468

## Training Accuracy over Epochs:



## Confusion Matrix:

