Application for CompactDry®

ARTIFICIAL INTELLEGENCE

Bacterial Count Deep Learning System

powered by aws

January. 2024.

High-Speed @BactLAB™

Colony Counter Global Service

User's Manual

Shimadzu Diagnostics Corporation

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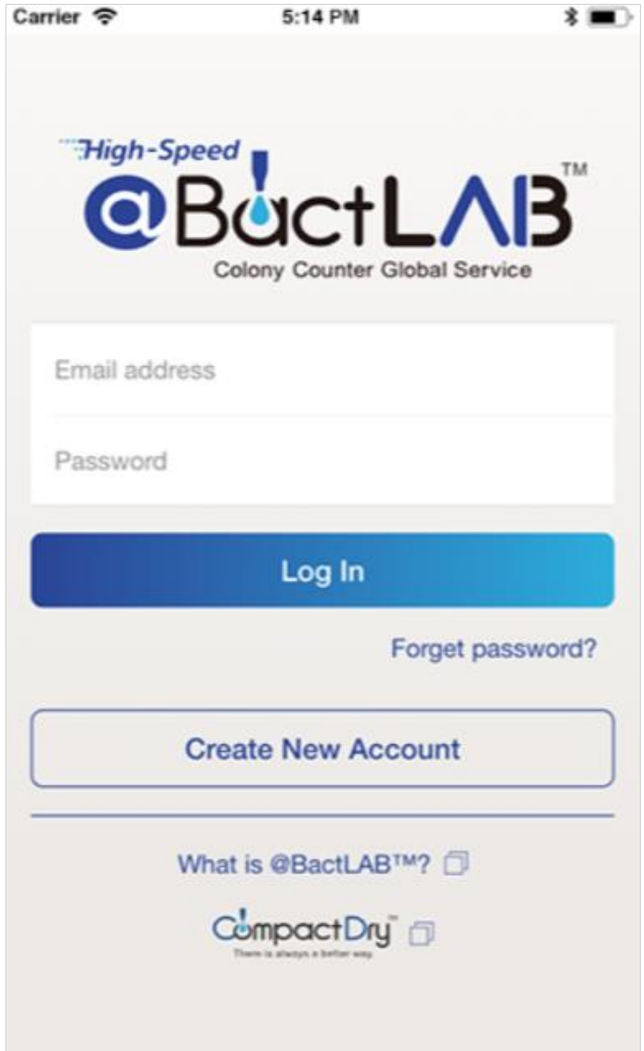
July. 2020.
Improved the image resizing process inside the smartphone.

About Hi-Speed@BactLAB®

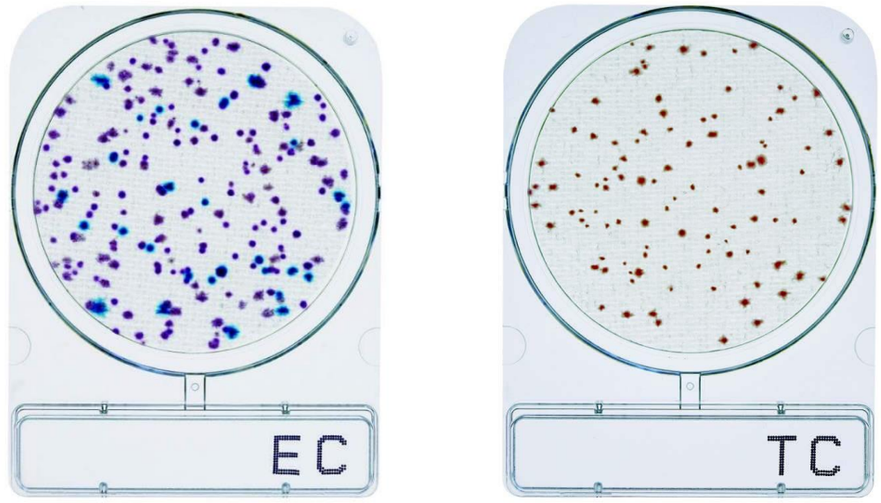
The safety and security of foods are important for humans to live. The examination of bacteria in foods and drinking water can be easily available to everyone. The product supports human life in any place and region. Making it easy bacterial counting, by using a familiar mobile device for everyone around the world, trying to promote operational efficiency using the global cloud and AI, adding value to CompactDry® to play a role in the improvement of the QOL, keeping these ideas in mind we have developed the application for everyone engaging on health and safety of food.
You can easily determine the bacterial (colony) count cultured in CompactDry® using your smartphone. It is an application that can support centralized management of headquarters and production line by utilizing the cloud.



- Easy bacterial counting using a familiar mobile device by everyone around the world.
- Trying to promote operational efficiency using the global cloud and AI.
- Adding value to CompactDry® to play a role in the improvement of the QOL.

About CompactDry®

CompactDry® is a ready-to-use test method which helps to reduce the labour hours needed to perform microbial testing. Therefore, it allows maximizing the productivity by increasing efficiency.



International Certifications

To ensure reliability, Shimadzu Diagnostics Corporation has gained certifications from the AOAC in the U.S. and MicroVal and NordVal in the EU. In Japan, our analytical approaches have been included in the Standard Methods of Analysis in Food Safety Regulation.

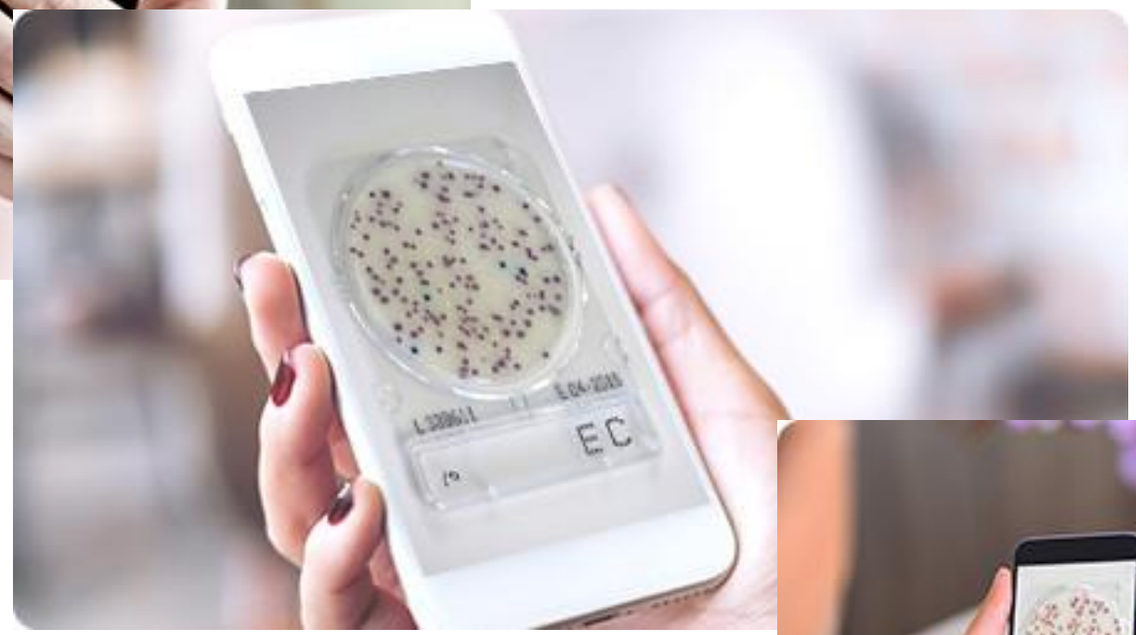
3 Step Flow

You can easily determine the bacterial (colony) count cultured in CompactDry® using your smartphone.

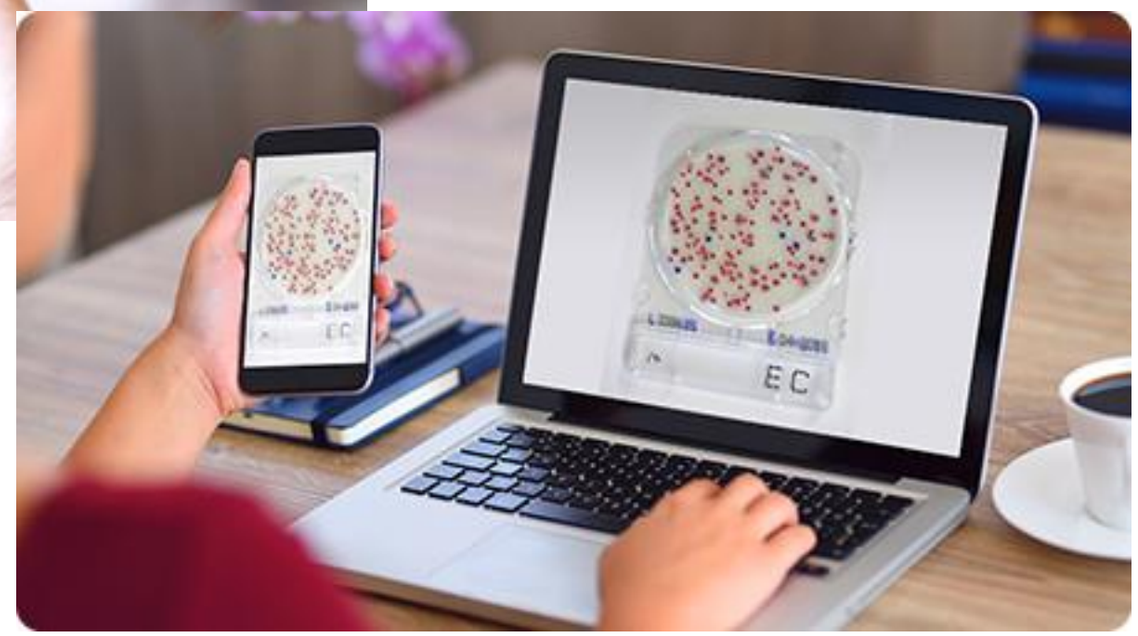
* This service is an application designed exclusively for CompactDry® customers.
* We recommend a Wi-Fi environment when using the smartphone app.

Step 1. Take a picture
(Smartphone / Digital camera)

Auto Count
3 sec. / plate



Step 2.
Upload the image
(Smartphone / PC)



Step 3. Colony counting
(Automatic calculation of colony number)

Application Targeted Products

CompactDry® App Targeted Products

CompactDry® TC・TCR (Total Viable Count)
CompactDry® EC (*E.coli* / Coliforms)
CompactDry® ECO (*E.coli*)
CompactDry® CF (Coliforms)
CompactDry® YM・YMR (Yeast / Mold)

Application for CompactDry®

For PC Online Service

Windows 11 (Edge, Firefox, Chrome)
Mac OS 13.2 or later
Mac with Apple M1 chip or later (Safari, Firefox, Chrome)

GET IT ON Google Play

Android 13.0 or later

Download on the App Store

iOS 16.3 or later

available at amazon appstore

Android 16.0 or later
Fire OS 8.3.1.2 or later

Precautions for descriptions and specifications of the service / List of trademarks

- Please note that the information in this document may be slightly different from the actual function since we sequentially offer new services.
- Please note that the specification or performance may be changed without notice.
- CompactDry® and the @BactLAB® logo are trademarks or the registered trademarks of Shimadzu Diagnostics Corporation.
- The cloud image recognition technology utilized in this service employs the artificial intelligence (AI) technology for image recognition system jointly developed by Shimadzu Diagnostics Corporation and Hitachi Solutions, Ltd.
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- Amazon and the Amazon Web Service logo are the trademarks or the registered trademarks of Amazon.com, Inc. or its affiliates.
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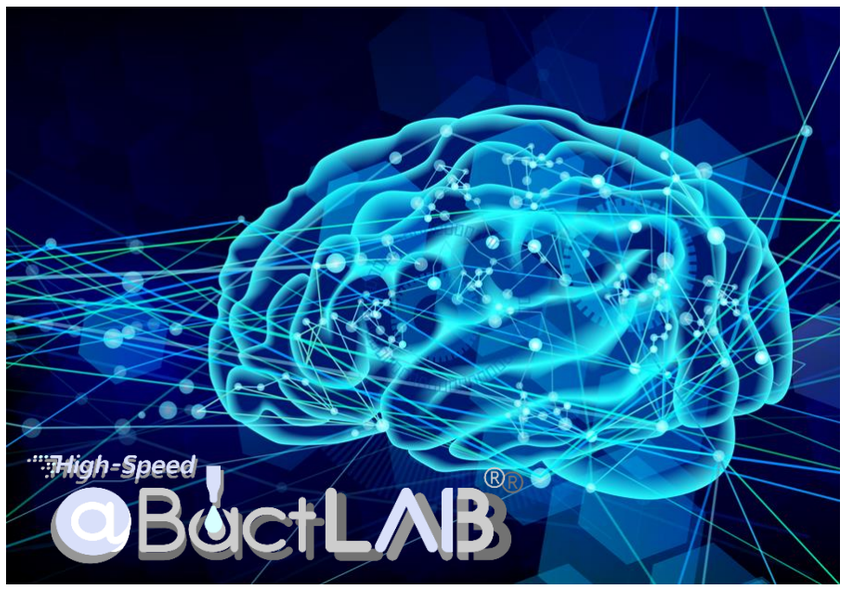
- Other company and product names are generally the trademarks or the registered trademarks of the companies.

Technology

Colony Count Image Processing Technology.　※ Joint Patent-Pending



Bacterial Count Deep Learning System

Artificial Intelligence.
Colony count image processing uses a count technology
that combines the existing image processing and the new technology
machine learning (deep learning).

* The count result of "0" does not mean a negative result.
* It may cause a count error of approximately 3% in some images.
* Shimadzu Diagnostics Corporation takes no responsibility for the analysis results provided by this service.

powered by aws

Amazon Web Services Cloud Security

The AWS(Amazon Web Service) infrastructure puts strong safeguards in place to help protect customer privacy. All data is stored in highly secure AWS data centers.

Technology

Colony Count Image Processing Technology.　※ Joint Patent-Pending

Regarding the colony counting process, the processing with the initial AI model released in August 2018 had implemented counting technology image processing that combines "image processing" and "machine learning (Deep Learning)" for colony position detection.
In the AI model released in July 2023, object detection AI network (machine learning model) [YOLOv4] that processes position (area) detection and class classification in one network is used as a backbone and implemented as a hard-tuning AI enabling business use by repeated inference verification tests specializing in colony detection (counting) .
The object detection AI network [YOLOv4], which is called a real-time object detection algorithm and stands for "You Only Look Once" have maximized the performance and contributed to the accuracy and processing speed of colony counting by utilizing the following characteristics,
“Single-shot object detection characteristics”
“Algorithm strong for real-time detection”
“Processing speed is a great advantage”

Please feel free to use it and experience it.

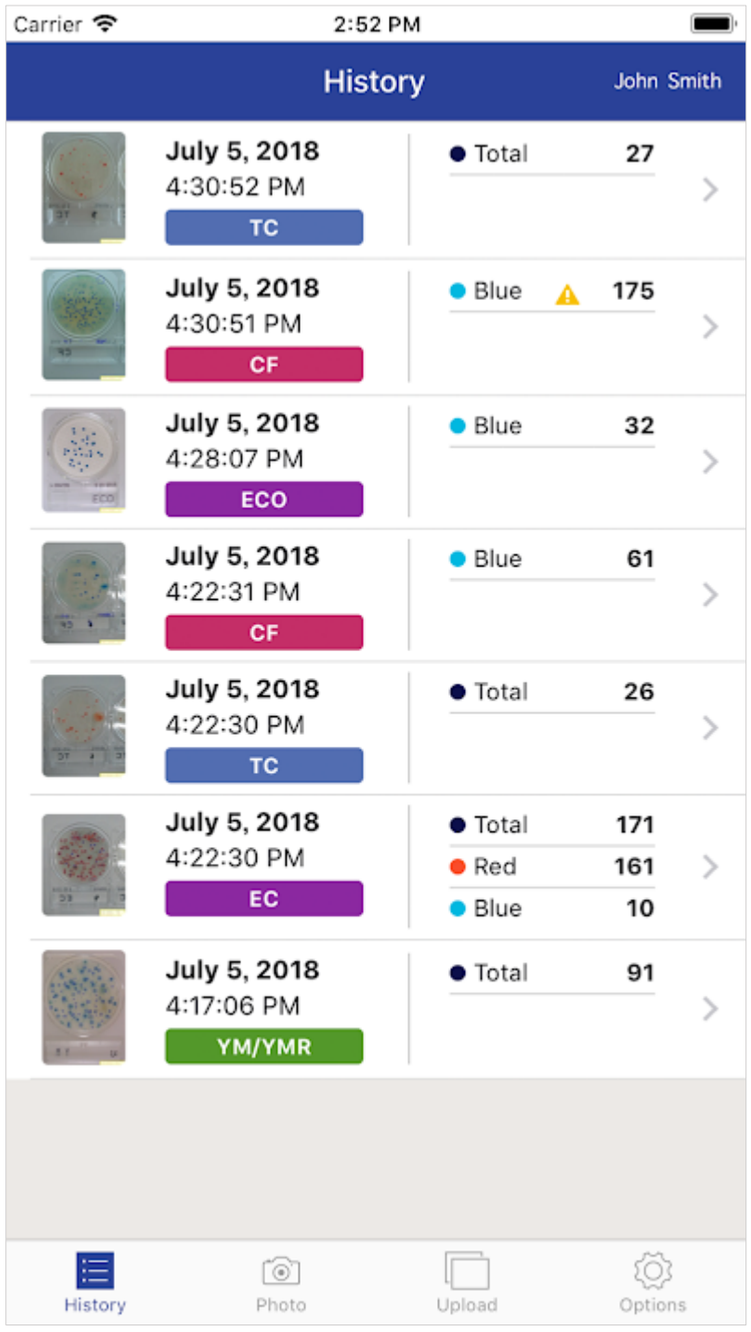
【Processing by object detection model】

Input image file　　Object detection network model　　Predict position and class

(* Colony inference by object detection model using deep learning)

Basic functions

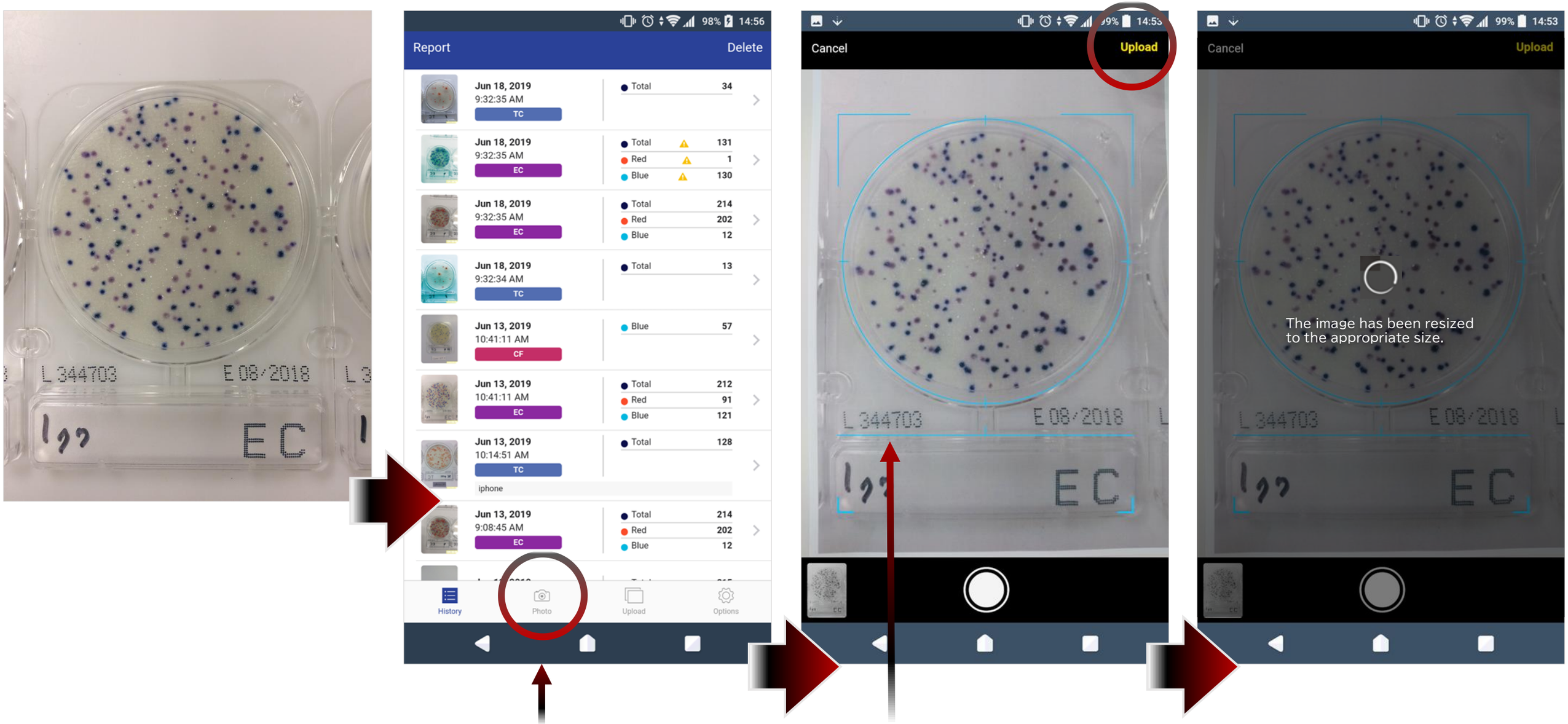
You can easily determine the bacterial (colony) count cultured in CompactDry® using your smartphone.



- **Member registration**
  Please sign up as a member on the new account registration screen to use the app.
  *The password is very important information for you.
  Please set a password that is difficult to guess by other people.
- **Login**
  You need to log in to the app to use.
  enter your registered e-mail address and password.
- **History of count**
  You can see the history of colony counts.
  *Any incorrect analysis triggers an error message.
  Please see the list of reasons for errors.
- **Photograph (for smartphone only)**
  A camera function to take a picture of colonies on CompactDry®.
- **Library**
  A function to count the number of colonies in saved images.
  *You can select a maximum of 10 images at once.
- **Report**
  Ability to report colony-counted images and results to specified email address in jpg file and csv file.
- **Delete**
  Function to delete saved colony-counted images data from cloud storage (aws).

How To Use Step 1. Take a picture

Step 1. Take a picture (Smartphone App)



Photo

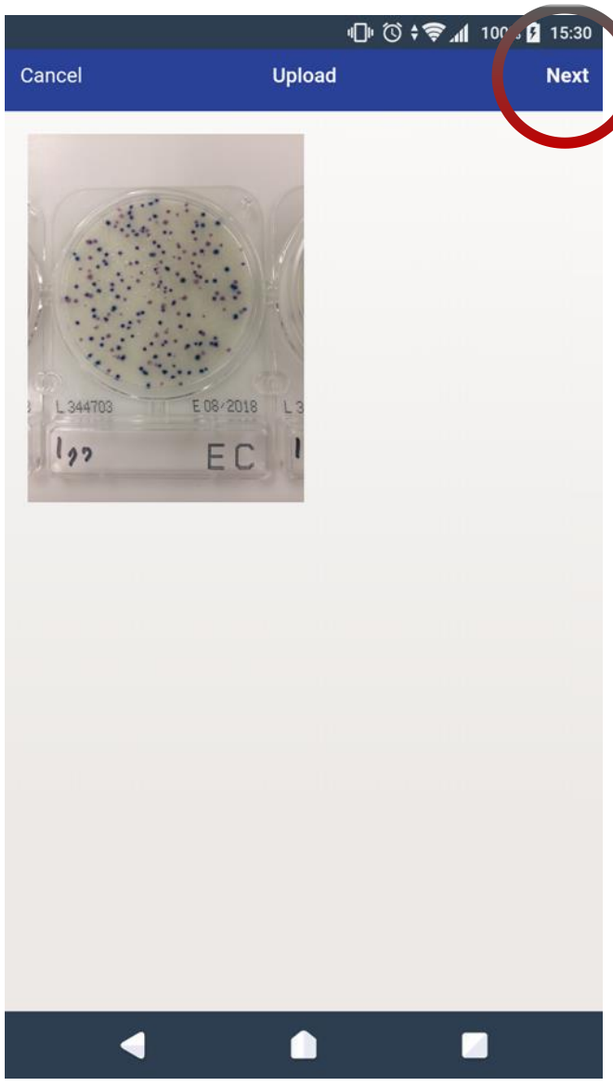
Touch the Photo button.

Match the blue frame to the shape of CompactDry® and shoot.

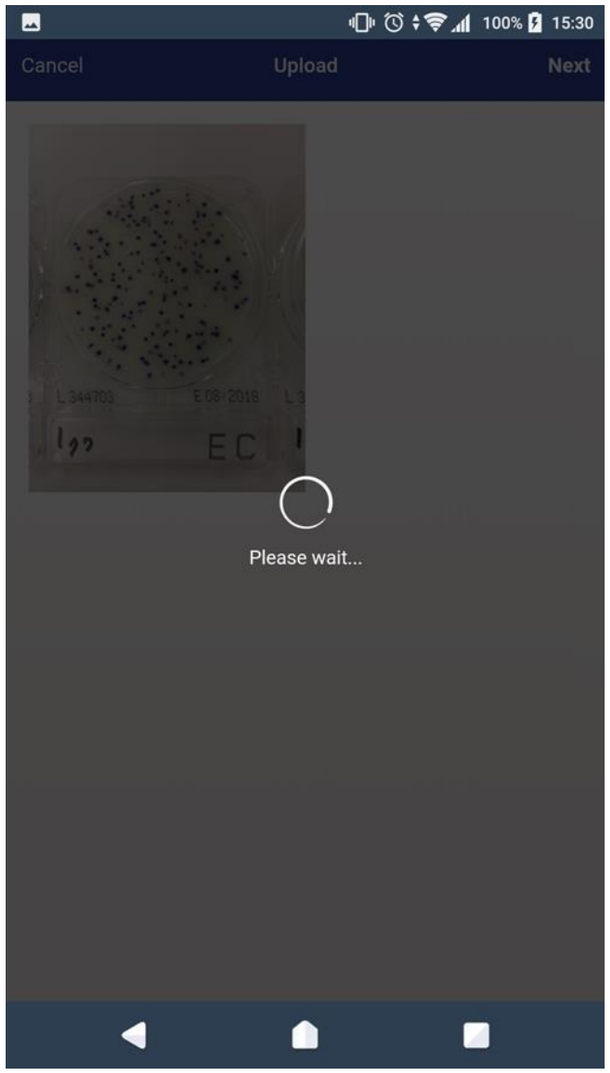
Touch the Upload button.

How To Use Step 2. Upload the image

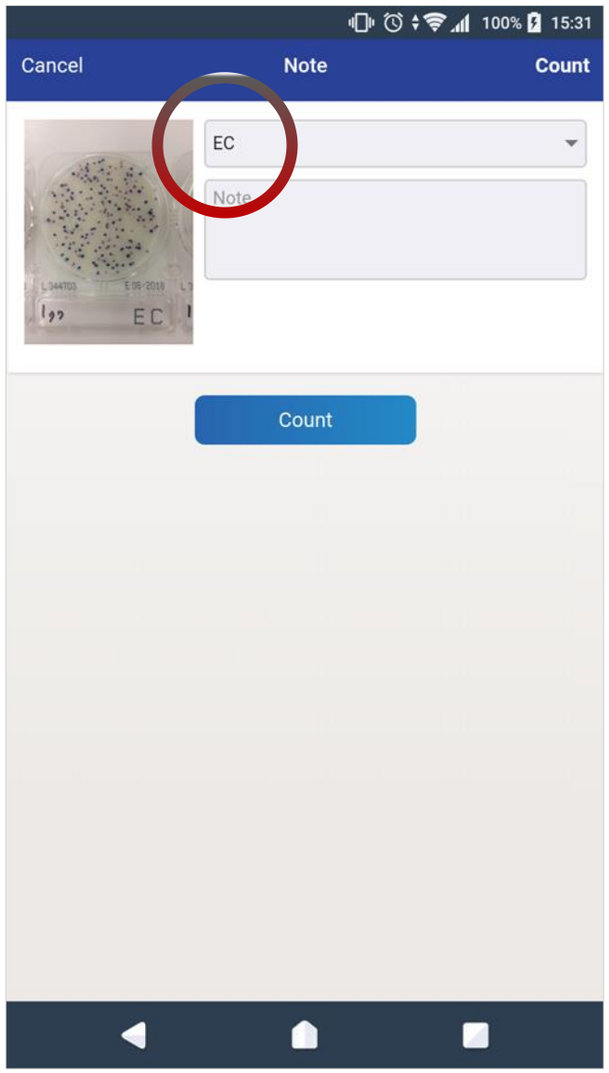
Step 2. Upload the image (Smartphone App)



Touch the Next button.



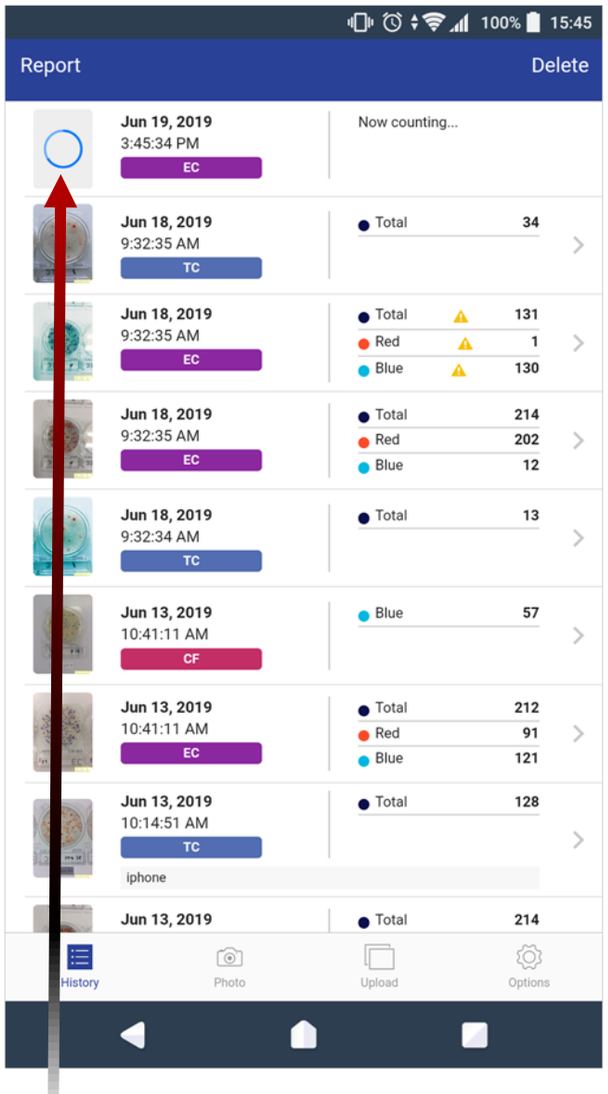
July. 2020.
Improved the image resizing process inside the smartphone.



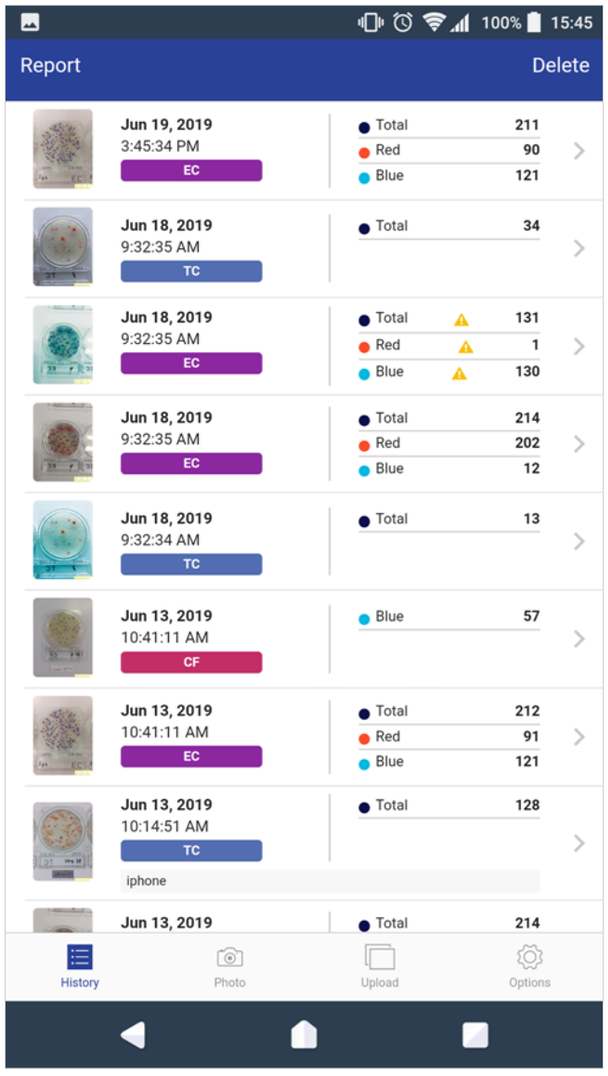
The type of CompactDry® is determined automatically. If different, please select from the pull-down items.
Touch the Count button.

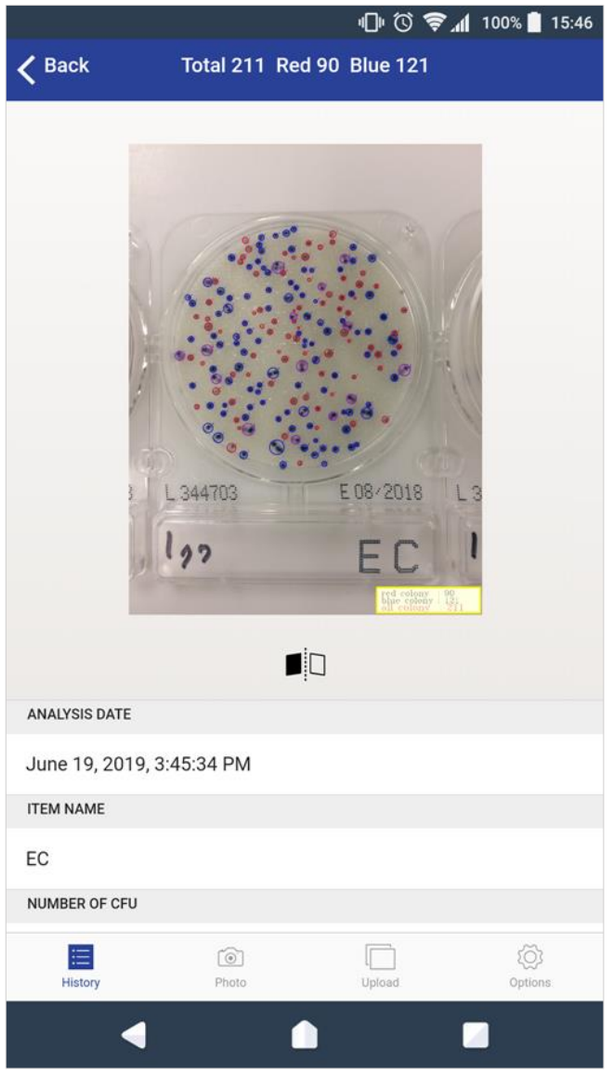
How To Use Step 3. Colony counting

Step 3. Colony counting [Automatic calculation of colony number] (Smartphone App)



Start to colony count.



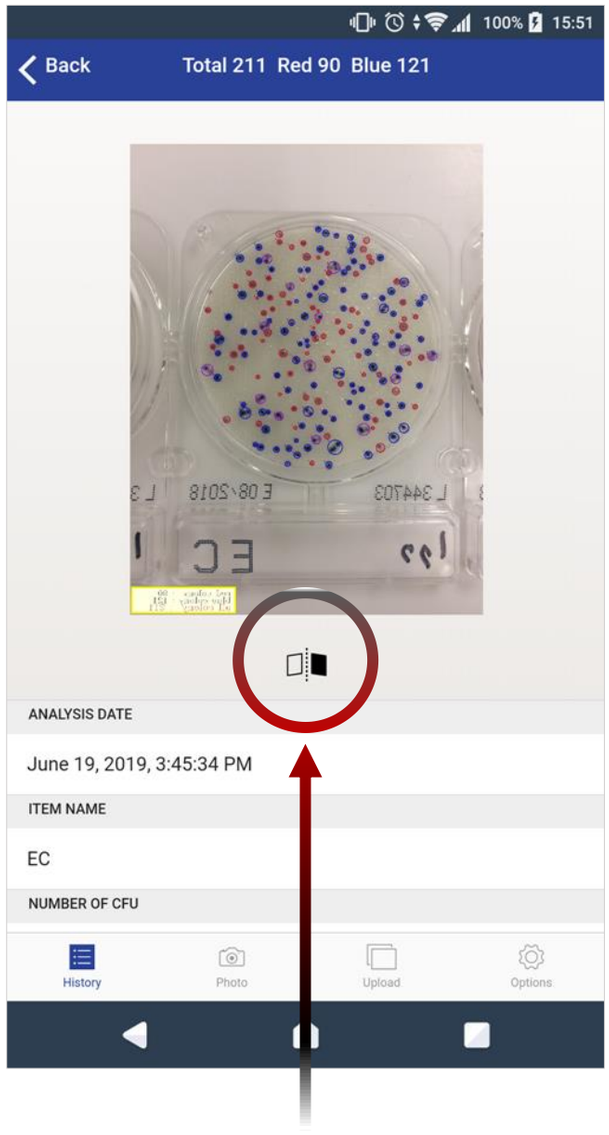


Click on the details screen.

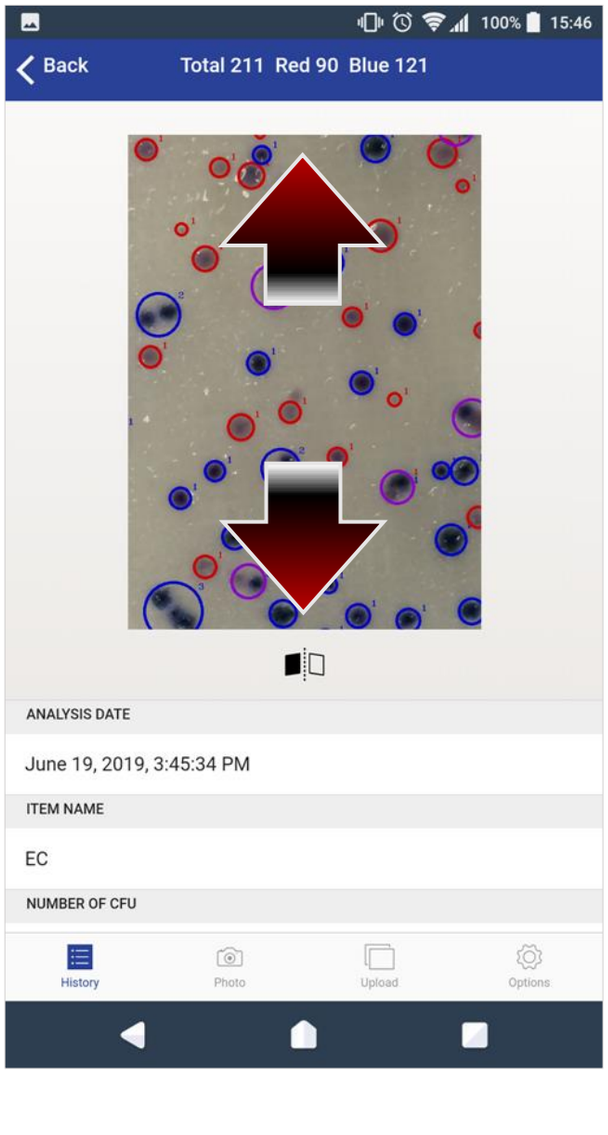
How To Use Useful Functions

- Invert count data / Swipe the image -

Invert count data / Swipe the image　　Function that can reverse the counted images and display the images in an enlarged manner.



You can invert count data.

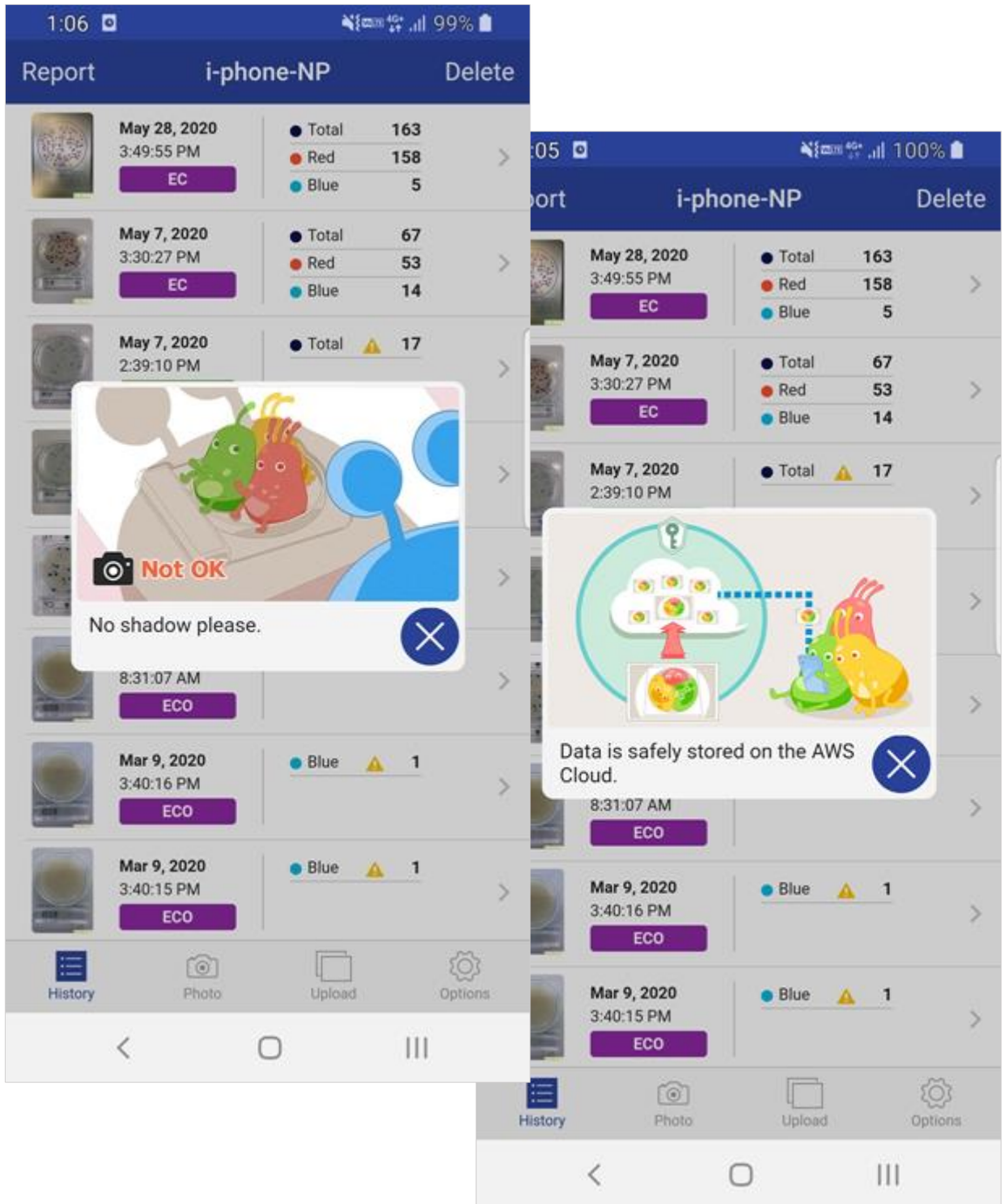


Swipe the image to enlarge it.

How To Use Useful Functions

- Random information display -

Random information display　Precautions when shooting applications are displayed when accessing.



→Please take a photo on white and plain place in a bright room.

→No shadow please.

→No reflection please.

→Data is safely stored on the AWS Cloud.

→@BactLAB® is the application exclusively for CompactDry ®.

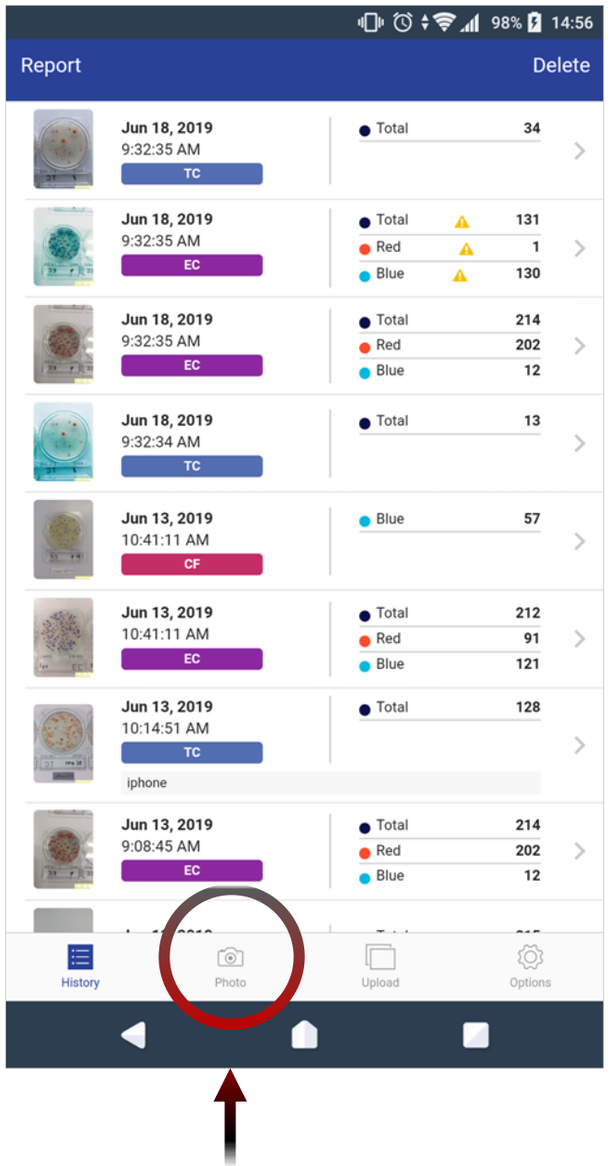
You can also watch a one-point animation movie on YouTube.

YouTube https://youtu.be/9439T3R6b50

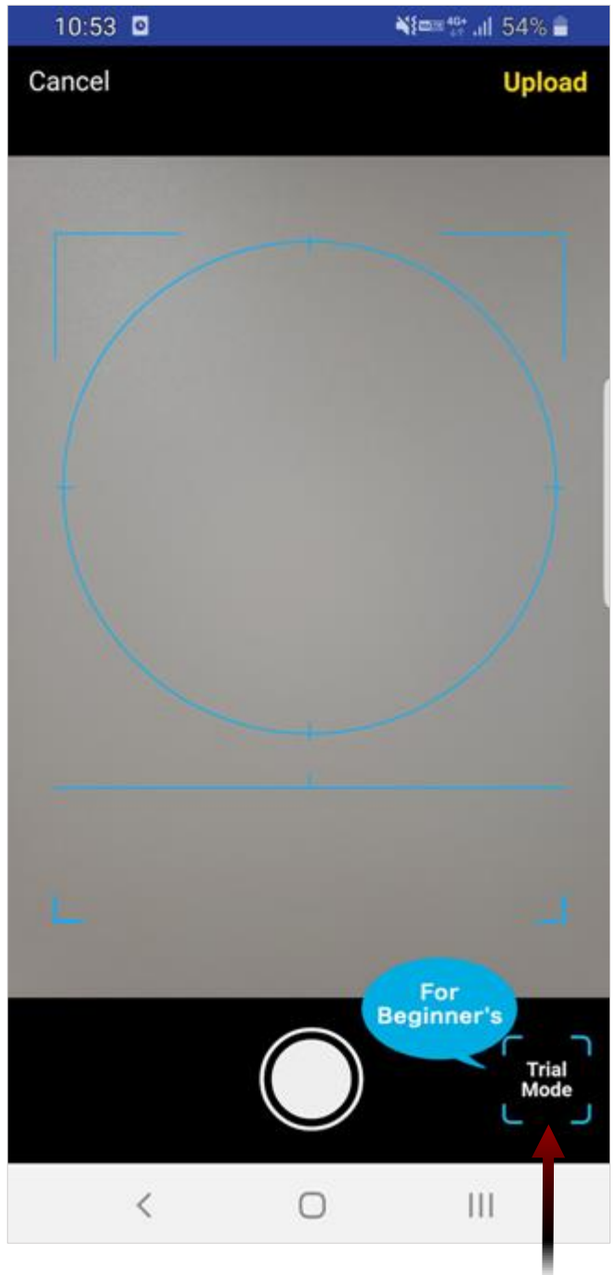
How To Use Useful Functions

- Trial Mode 1 -

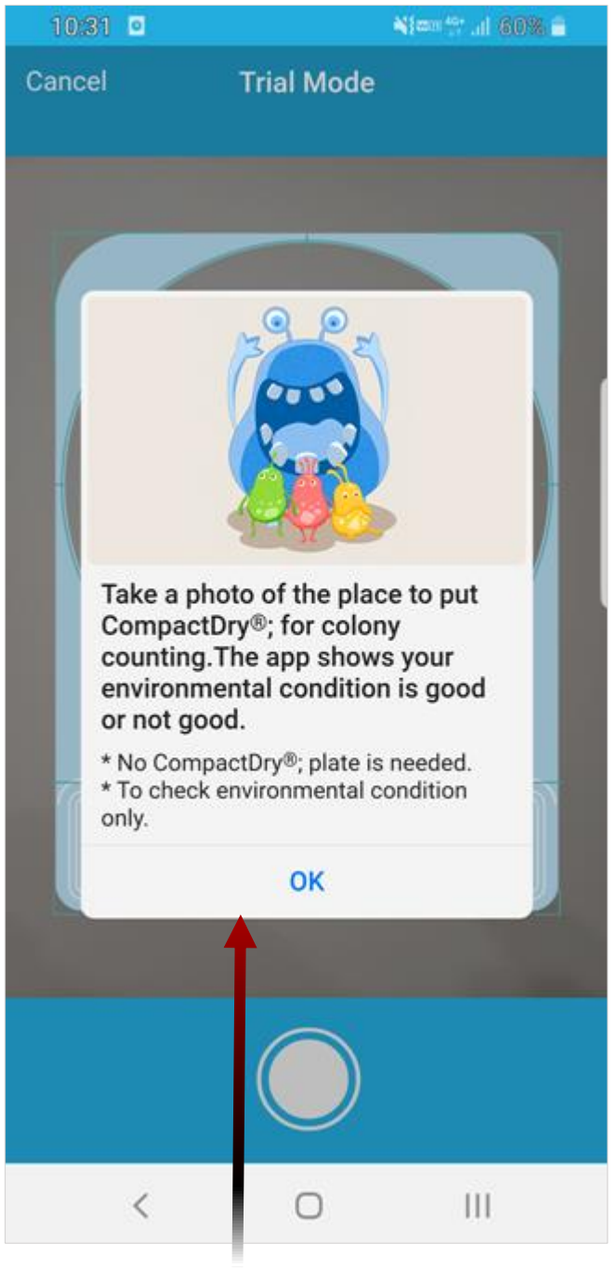
Trial Mode You can check whether the shooting environment of the application is appropriate.



Touch the Photo button.



TheTrial Mode section Please press.



Touch the OK button.

How To Use Useful Functions

- Trial Mode 2 -

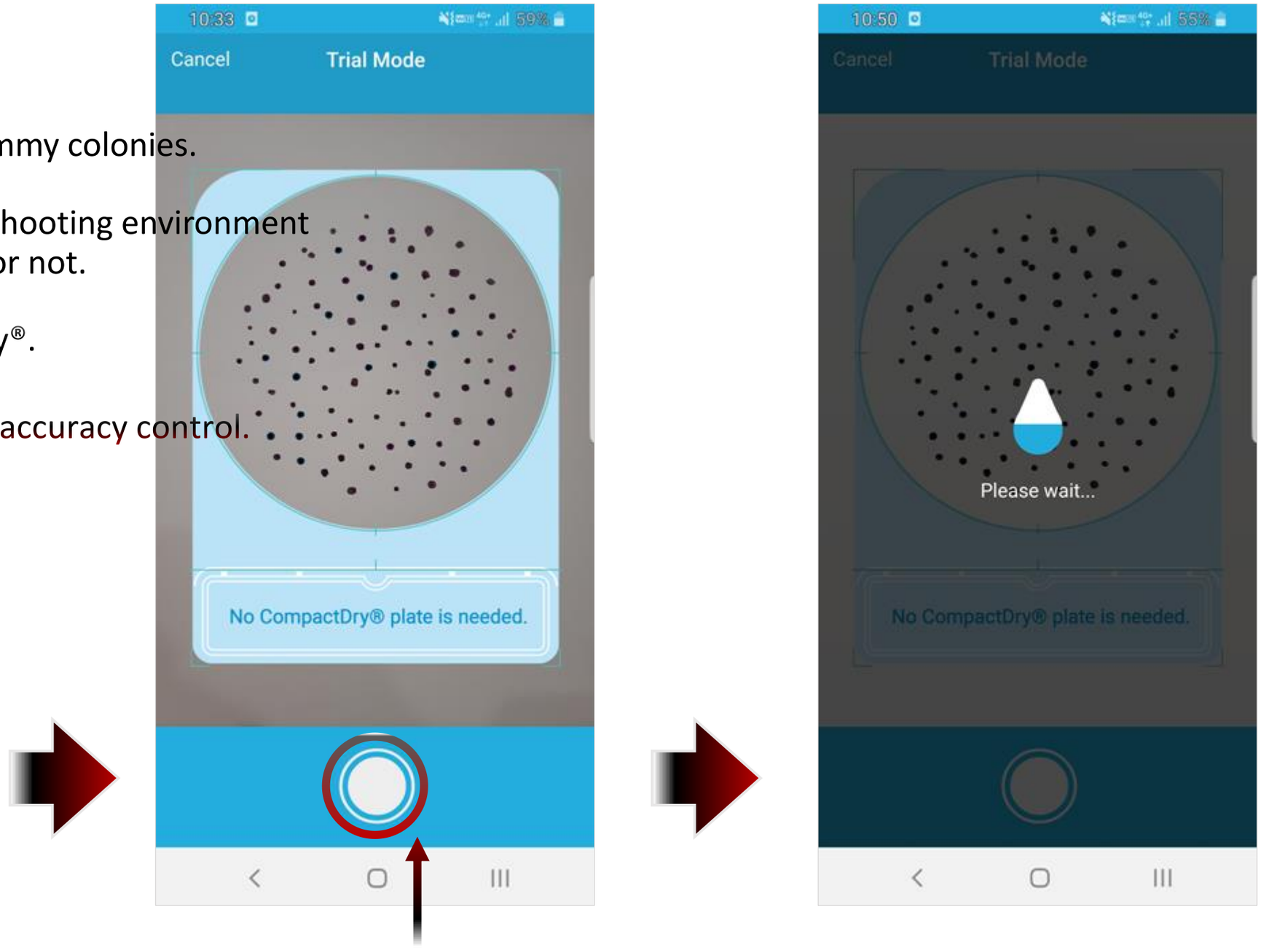
Trial Mode　You can check whether the shooting environment of the application is appropriate.

* You will see 100 red and blue dummy colonies.

* You can determine whether the shooting environment using @BactLAB® is appropriate or not.

* No need to lay down CompactDry®.

* Cannot be used for colony count accuracy control.

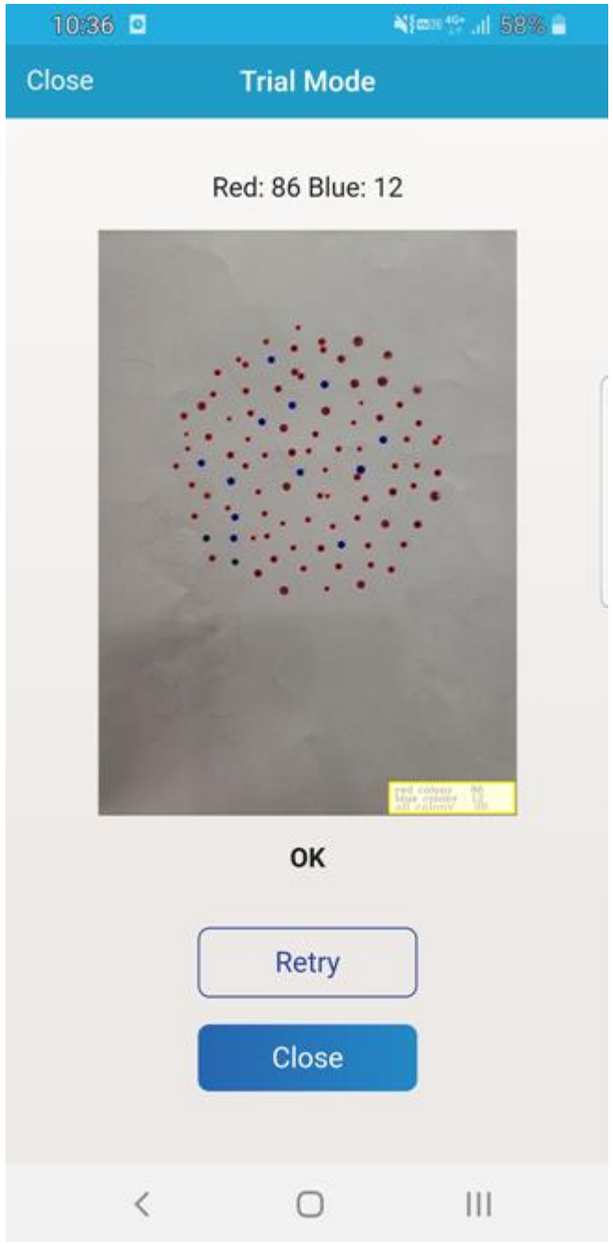


Press the button to start the inspection.

How To Use Useful Functions

- Trial Mode 3 -

Trial Mode　You can check whether the shooting environment of the application is appropriate.



If the result is OK,

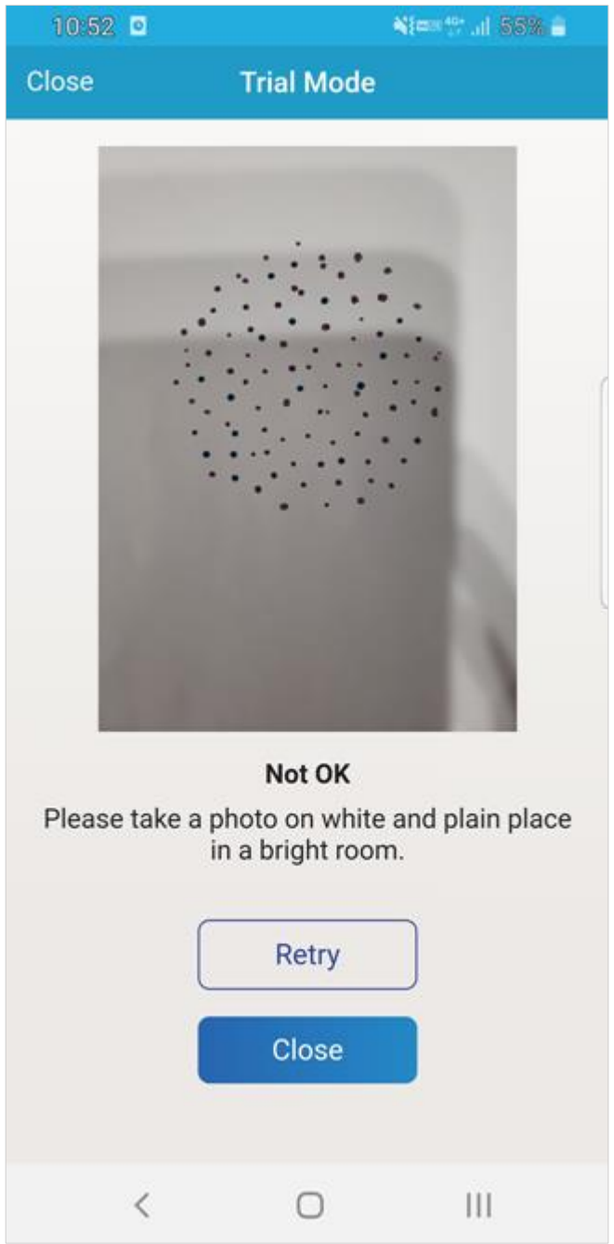
The current shooting location is suitable for the @BactLAB® shooting environment.

The result of AI counting the colonies is also displayed.

How To Use Useful Functions

- Trial Mode 4 -

Trial Mode　You can check whether the shooting environment of the application is appropriate.



If the result is Not OK,

The current location is not suitable for the @BactLAB® shooting environment.
The following reasons may apply:

- You may be shooting in a dark place.
- You may be shooting on something other than a white background.

Try shooting in a bright and white background location.

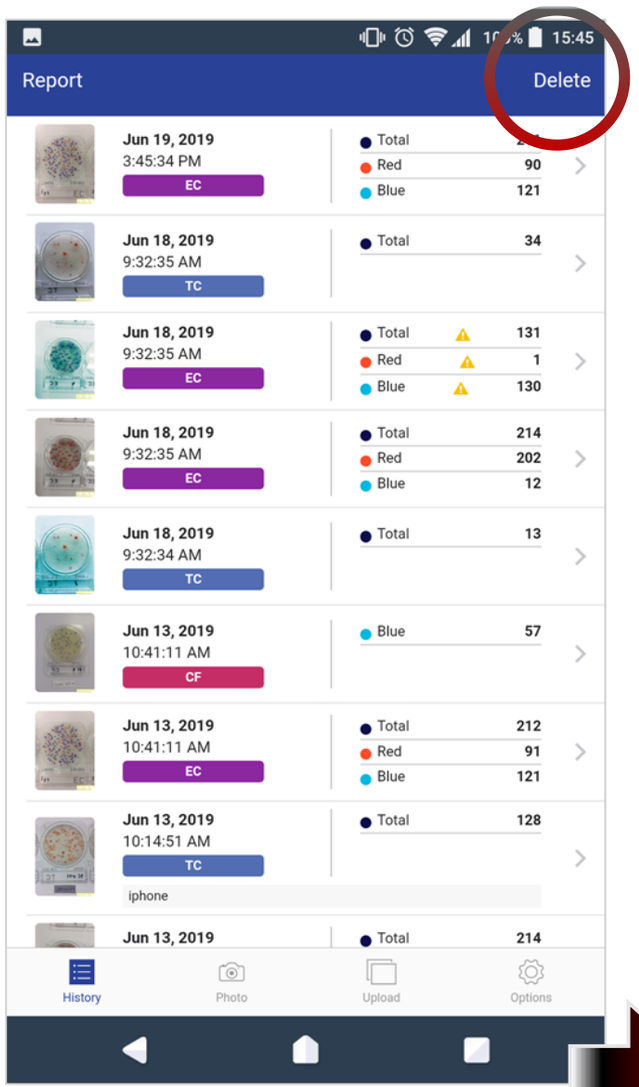
- Shadow may be reflected.

Please try not to see the black shadow.

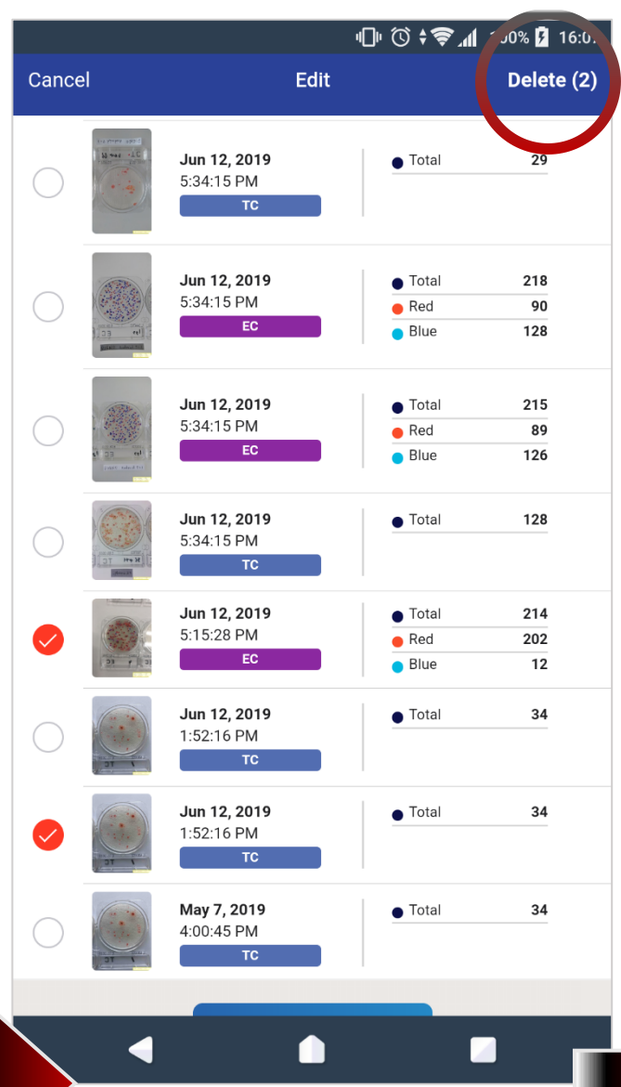
How To Use Useful Functions

- Delete -

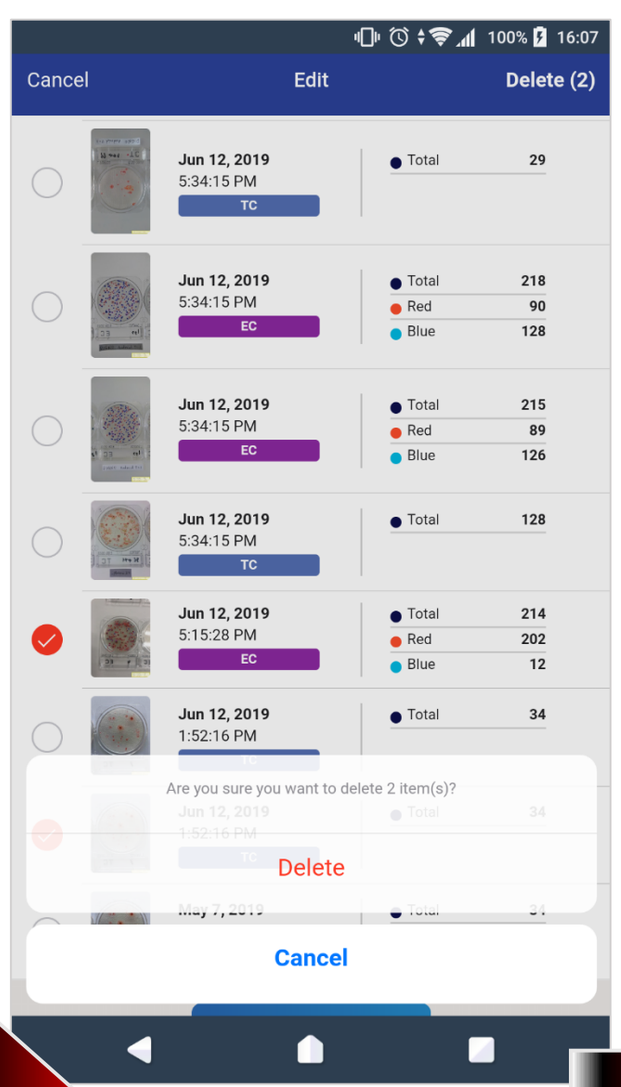
Delete Function to delete saved colony-counted images data from cloud storage (aws).



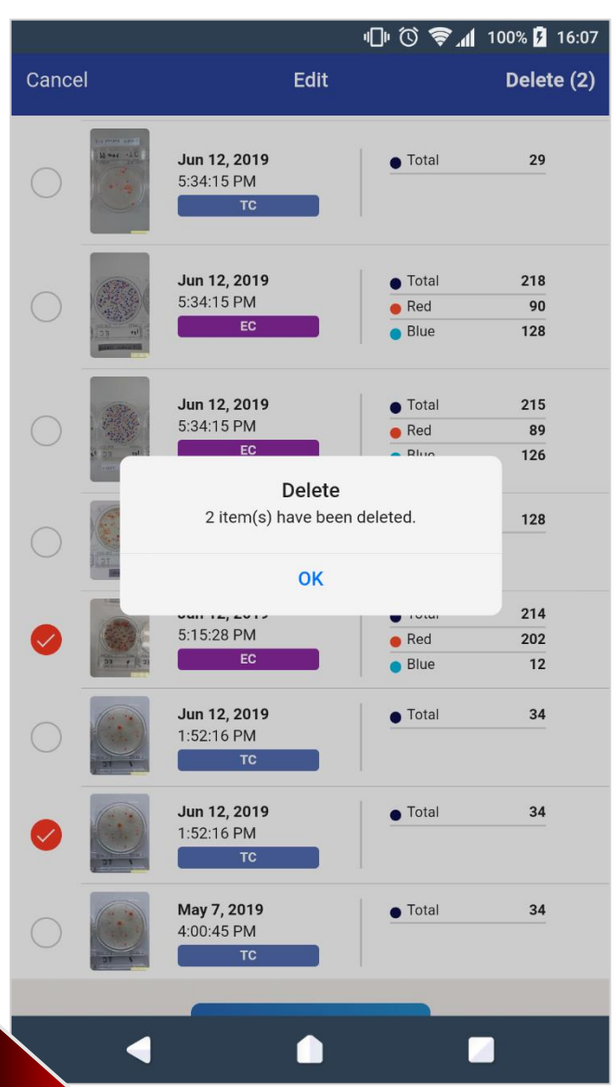
Touch the Delete button.



Select data to delete.



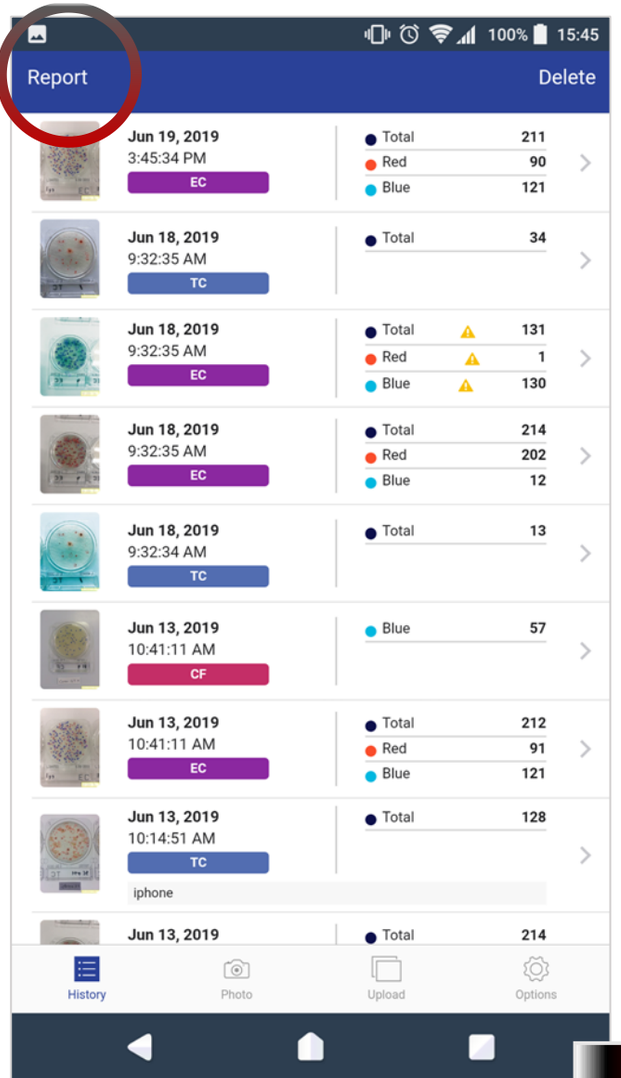
Touch the delete button to delete data from the cloud(AWS).



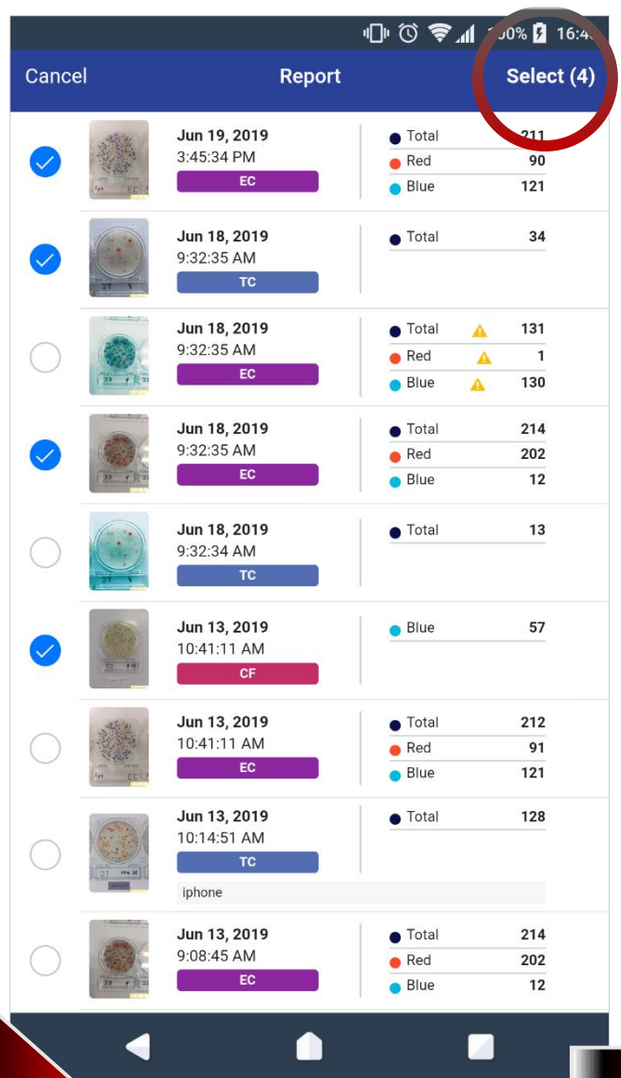
How To Use Useful Functions

- Report -

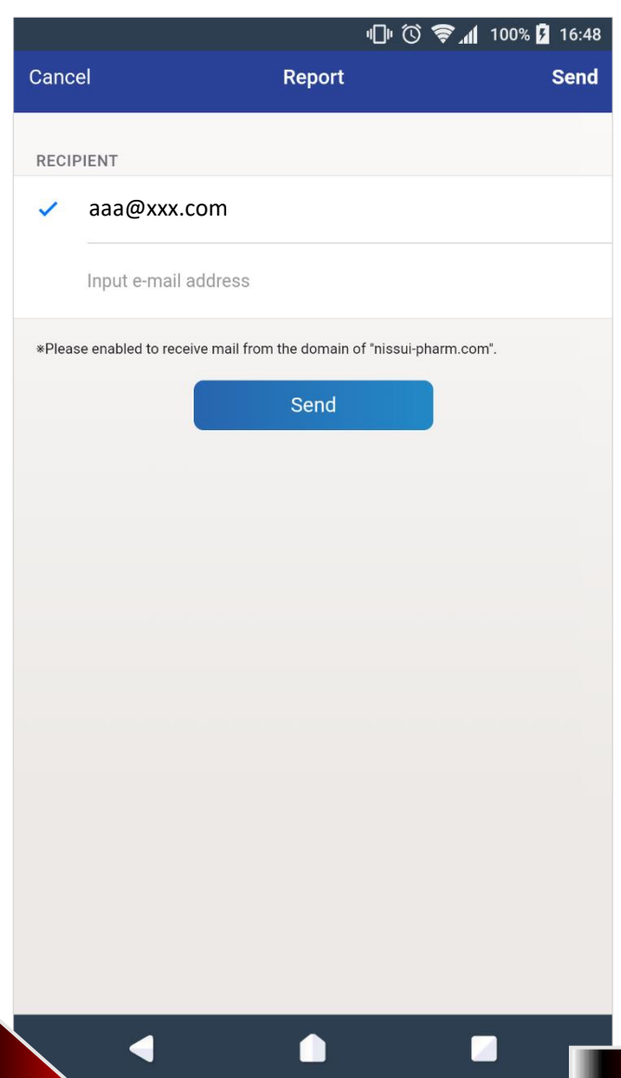
Report　Ability to report colony-counted images and results to specified email address in jpg file and csv file.



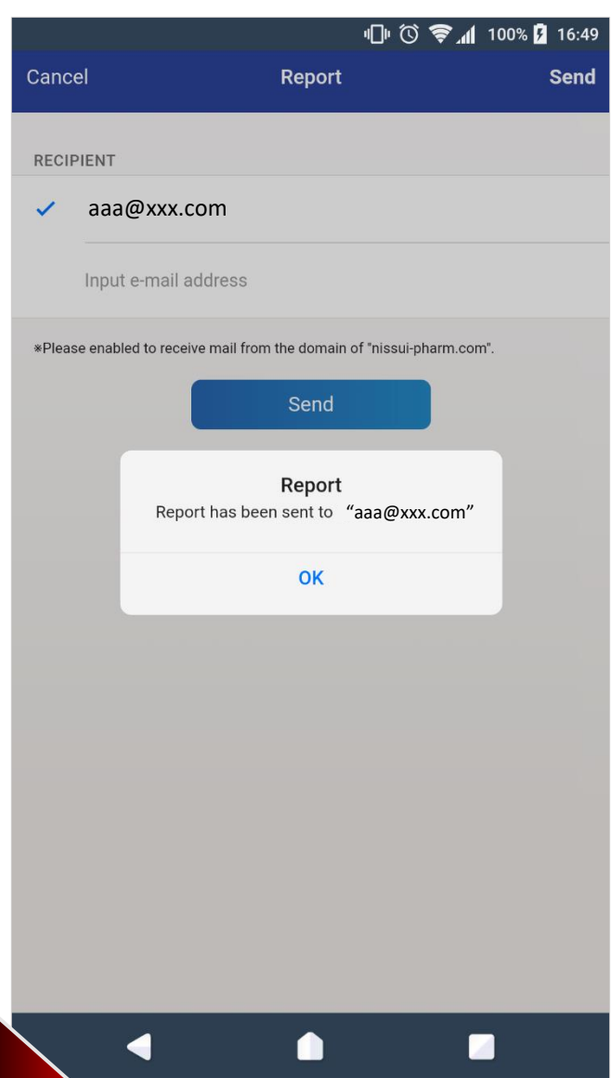
Touch the Report button.



Select data to report.



Specify the email address to deliver the report.
The URL to which report data can be downloaded is described at the specified email address.



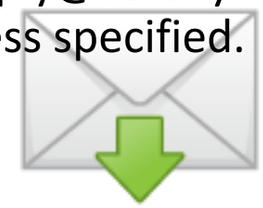
The URL is valid for 24 hours.
The original image, the counted image (jpg file), and the csv file are stored.

How To Use Useful Functions

- Report -

Report　Ability to report colony-counted images and results to specified email address in jpg file and csv file.

You will receive a report email from no-reply@colony-app.com email address specified.



no-reply@colony-app.com
aaa@xxx.com
2019/07/05 11:10:47
@BactLAB Download report

Thank you very much for using @BactLAB.
You can download a report through the link below.

https://colony-count-bucket.s3.ap-northeast-1.amazonaws.com/UserReport/f6920da6-57a2-4417-8ffb-73e207877cb9/report_20190705021013728.zip?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Date=20190705T021047Z&X-Amz-SignedHeaders=host&X-Amz-Expires=86400&X-Amz-Credential=AKIAJLCSIQFUYOFWR6WQ%2F20190705%2Fap-northeast-1%2Fs3%2Faws4_request&X-Amz-Signature=c5d66e0cc9d7b4b2c3e191f9fb93fd35eff589bb3c5a147e9a351678610ac8b7
* Download URL expires in 24 hours.

Please open the downloaded ZIP file to access the following image folder and CSV file.

- Image folder
Selected analyzed data is stored in each folder.

File content
0000000000000
|- xxxxxx.jpg, xxxxxx.png: Original image
+- xxxxxx_Result.jpg : Result image

- CSV
Selected all analyzed results are included.

Description of each item
exec_datetime: Execution date
product_name: Product name
red_colony_count: Number of red colonies
blue_colony_count: Number of blue colonies
total_colony_count: Total number of colonies
image_path: Path to original image
result_image_path: Path to result image
comment: Comment
AI version: version 2.1

You can download report data from the URL described in the email.

The original image, the counted image (jpg file), and the csv file are stored.

How To Use Useful Functions

- Report -

Report　Ability to report colony-counted images and results to specified email address in jpg file and csv file.

	A	B	C	D	E	F	G	H	I
1	exec_datetime	product_name	red_colony_count	blue_colony_count	total_colony_count	image_path	result_image_path	comment	ai_version
2	2021-06-22T04:37:33Z	CF	0	34	34	colony-count-	colony-count-bucket/f6920da6-57a2-		1.3
3	022-05-10T23:12:17Z	CF	0	85	85	colony-count-	colony-count-bucket/f6920da6-57a2-		1.3
4	022-10-05T11:00:07Z	YM	0	39	39	colony-count-	colony-count-bucket/f6920da6-57a2-		1.3
5	023-09-13T01:56:08Z	YM	0	1	1	colony-count-	colony-count-bucket/f6920da6-57a2-		2.1
6	2023-10-03T07:15:19Z	EC	257	393	650	colony-count-	colony-count-bucket/f6920da6-57a2-		2.1
7	2022-05-09T02:45:58Z	EC	339	0	339	colony-count-	colony-count-bucket/f6920da6-57a2-		1.3
8	2022-05-10T23:12:17Z	CF	0	84	84	colony-count-	colony-count-bucket/f6920da6-57a2-		1.3
9	2021-06-22T04:35:54Z	TC	109	0	109	colony-count-	colony-count-bucket/f6920da6-57a2-		1.3
10	2021-07-05T06:14:03Z	TC	6	0	6	colony-count-	colony-count-bucket/f6920da6-57a2-		1.3
11	2022-10-19T04:34:13Z	CF	0	98	98	colony-count-	colony-count-bucket/f6920da6-57a2-		1.3

About csv file (Items in csv file are also described in the email.)
Selected all analyzed results are included.

Description of each item
exec_datetime: **Execution date**
product_name: **Product name**
red_colony_count: **Number of red colonies**
blue_colony_count: **Number of blue colonies**
total_colony_count: **Total number of colonies**
image_path: **Path to original image**
result_image_path: **Path to result image**
comment: **Comment**
AI version: **version x.x**

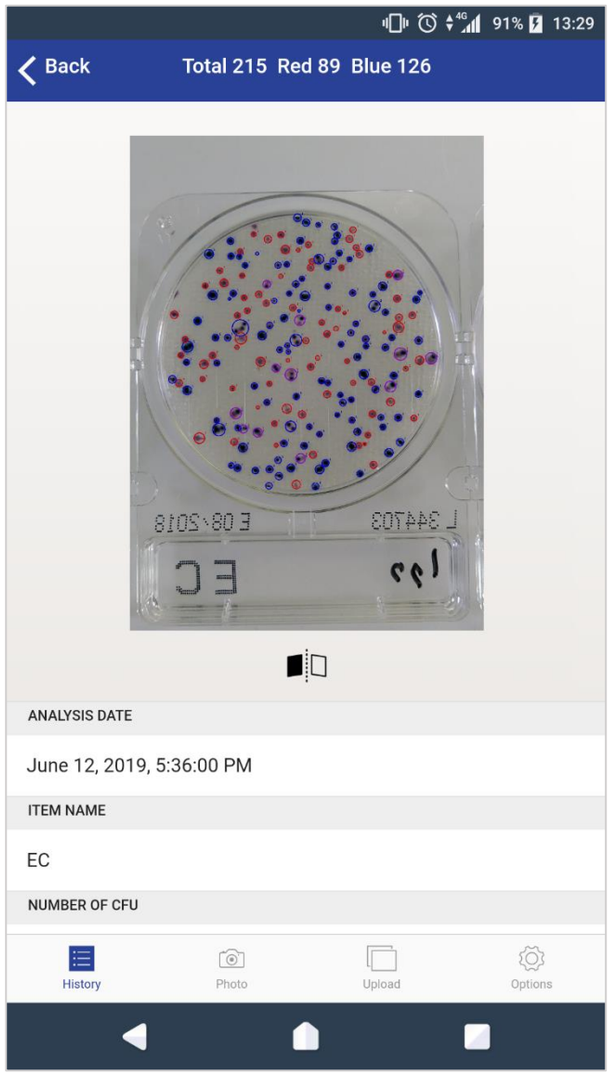
Image folder (colony-count-bucket)
Selected analyzed data is stored in each folder.

File content
colony-count-bucket
|
0000000000000
|- xxxxxx.jpg, xxxxxx.png: Original
|- xxxxxx_Result.jpg : Result image
|
0000000000001
|- xxxxxx.jpg, xxxxxx.png: Original
|- xxxxxx_Result.jpg : Result image

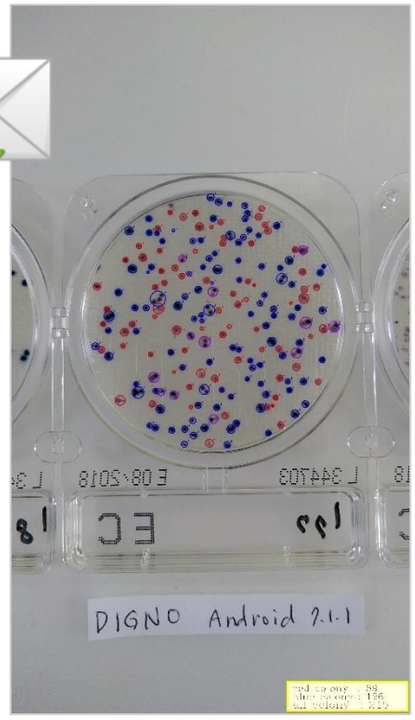
How To Use Useful Functions

- Report / Swipe the image -

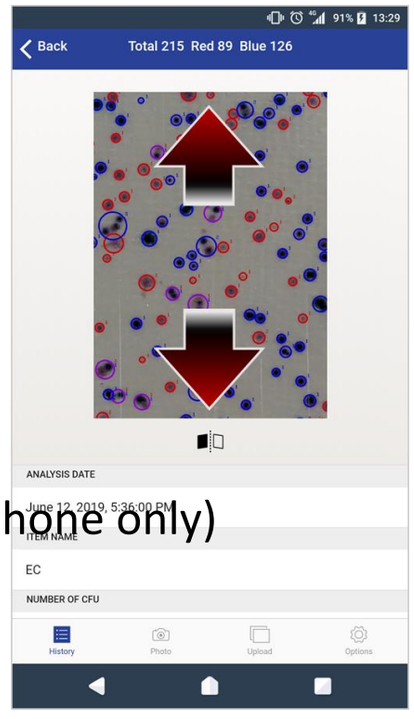
Report and Swipe(SmartPhone only)　About circle drawing of colony count and numbers.

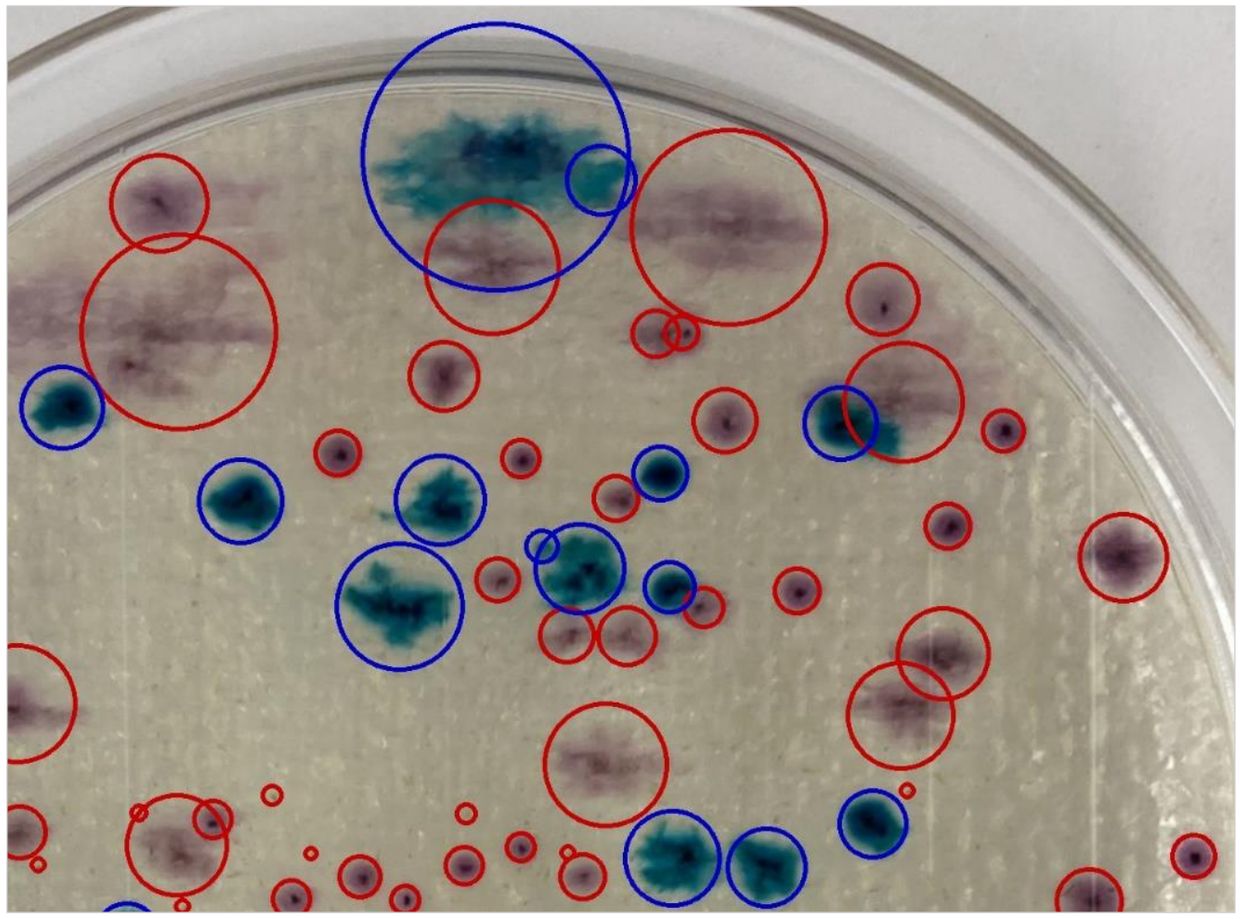


Report



Swipe
(SmartPhone only)





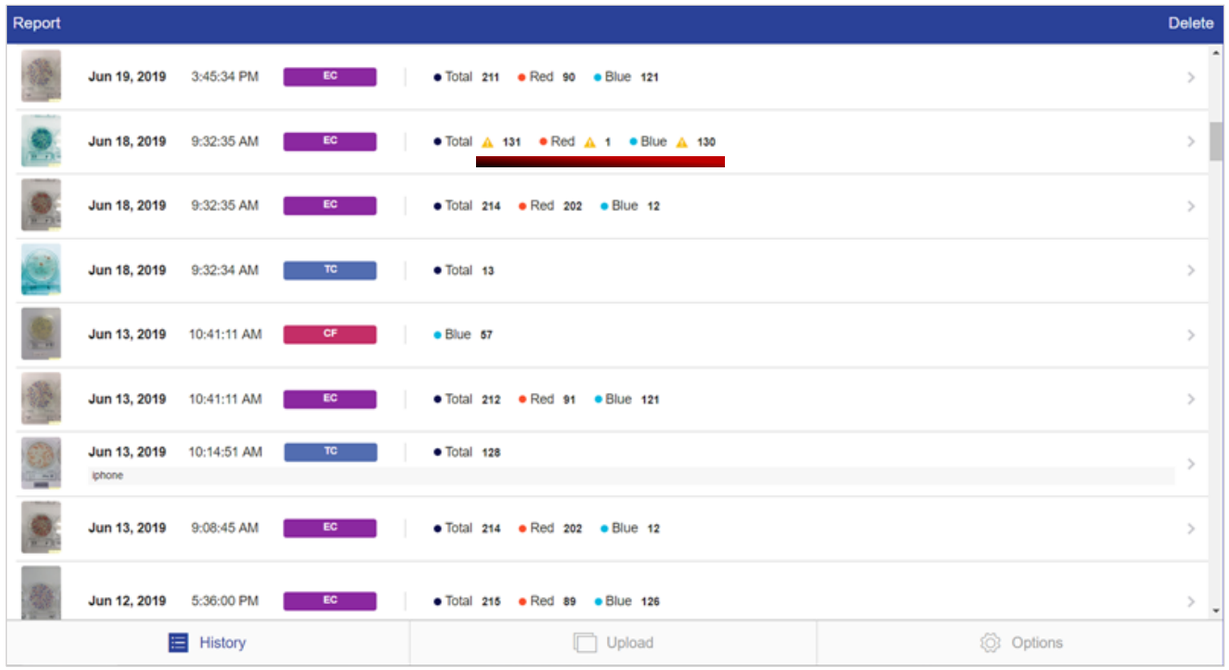
CompactDry® EC (*Escherichia coli* / Coliforms)
E.coli = Blue / Blue-Purple colonies
Coliforms = Red and/or Blue colonies

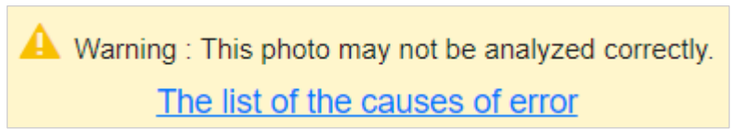
Blue circle drawing = *E.coli*
Red circle drawing = Coliforms except *E.coli*
Purple circle drawing = *E.coli* and Coliforms

How To Use

- [! Exclamation Mark] display after colony count -

[! Exclamation Mark] display after colony count.





About the count result that displayed this message
From image quality, shooting environment, CompactDry ® colony shape, etc.
The count result is displayed by AI processing of image quality information judgment, but the following message appears depending on the count image.

Warning: This photo may not be analyzed correctly.
The list of causes of error

How To Use

- [! Exclamation Mark] display after colony count -

[! Exclamation Mark] display after colony count.

* A colony count result of “0” does not indicate a negative result.
* Depending on the target image, there may be a counting error of up to 3%.
* Shimadzu Diagnostics Corporation takes no responsibility for the analysis results provided by this service.
* Detection range is between 1–250 cfu/plate.
* There are two types of misreads that can occur when using the @BactLAB®.
  - @BactLAB® Application did not detect all of the colonies specific to the CompactDry® plate.
  - The counter detected all the colonies but it categorized them incorrectly.

AI: Information judgment from image quality

Whether the captured image is appropriate for the counting process It is automatically judged by AI processing. The judgment result based on the image is displayed.

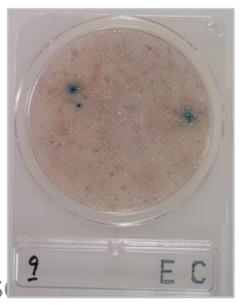
About the image corresponding to the [! Exclamation Mark]

* Images that may have low counting accuracy

1. Image resolution of less than 800 pix x 1200 pix.

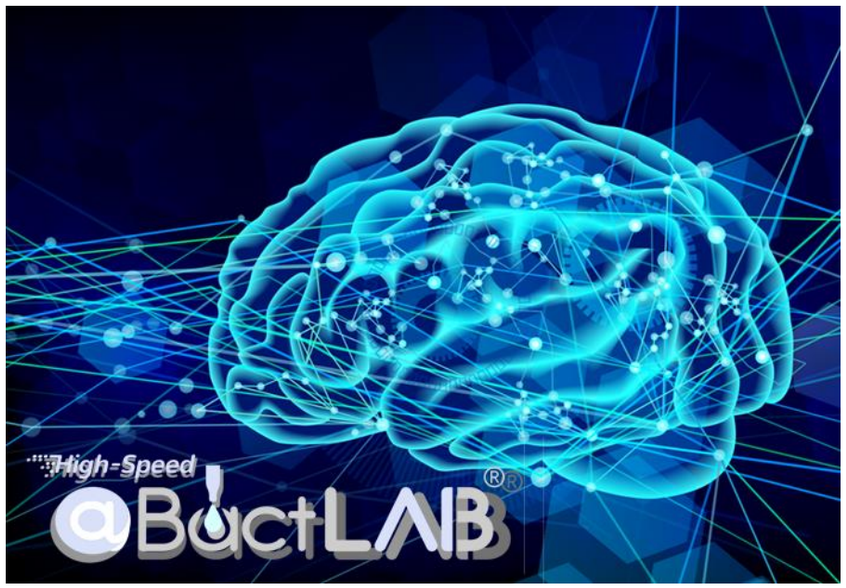
2. The background color is not white.

3. Colored medium.



How To Use

[! Exclamation Mark] display after colony count.



AI: Information judgment from image quality

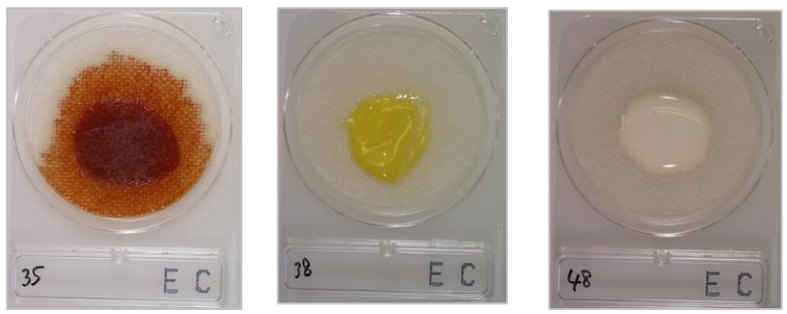
Whether the captured image is appropriate for the counting process It is automatically judged by AI processing. The judgment result based on the image is displayed.

- [! Exclamation Mark] display after colony count -

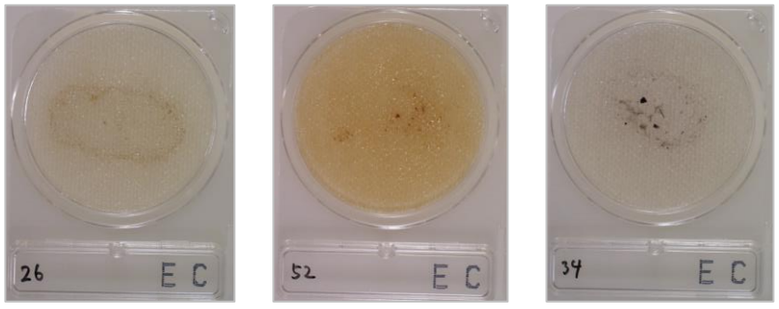
About the image corresponding to the [! Exclamation Mark]

* Images that may have low counting accuracy

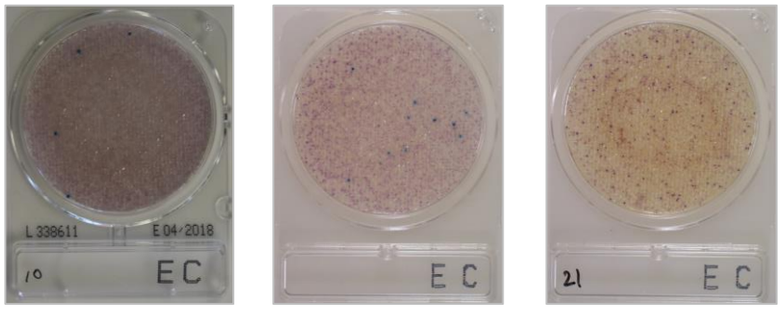
4. A viscous sample is added.



5. Food residues are contained.



6. Highly concentrated colonies.



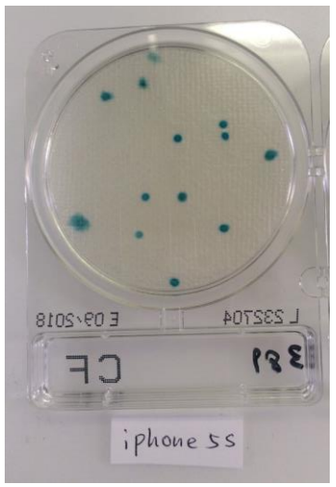
How To Use

- Plate pattern and Target image -

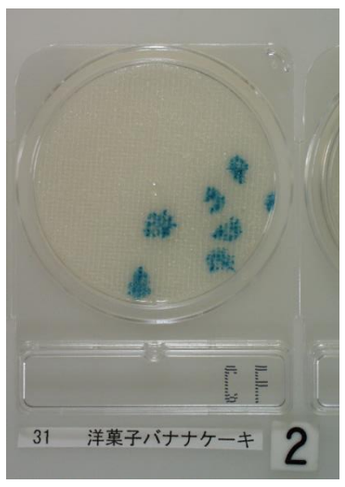
Image of target for counting colonies.

#	Plate pattern	@BactLAB®
1	Normal colonies	OK
2	Spreading colonies	OK
3	Spreading colonies (High viscosity)	OK
4	Colored thin colonies	OK
5	More than 300 colonies visually	OK
6	Colored medium	not OK
7	High viscosity sample	not OK

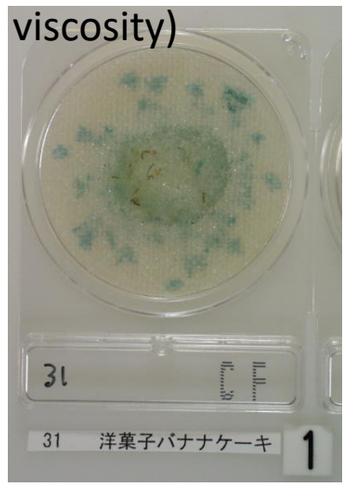
#1.
Normal colonies



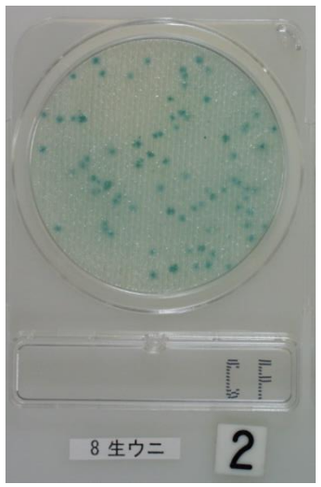
#2.
Spreading colonies



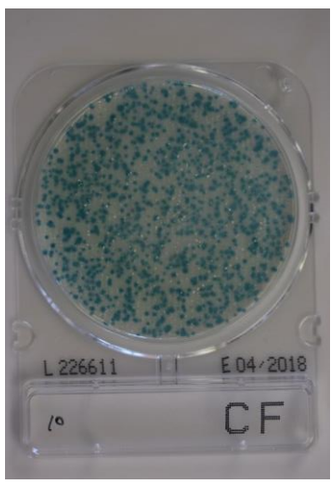
#3.
Spreading colonies (High viscosity)



#4.

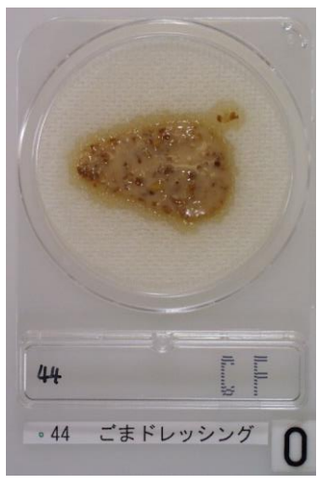


#5.
More than 300 colonies visually



#6.
Colored medium

#7.
High viscosity sample



High-Speed @BactLAB®
Colony Counter Global Service

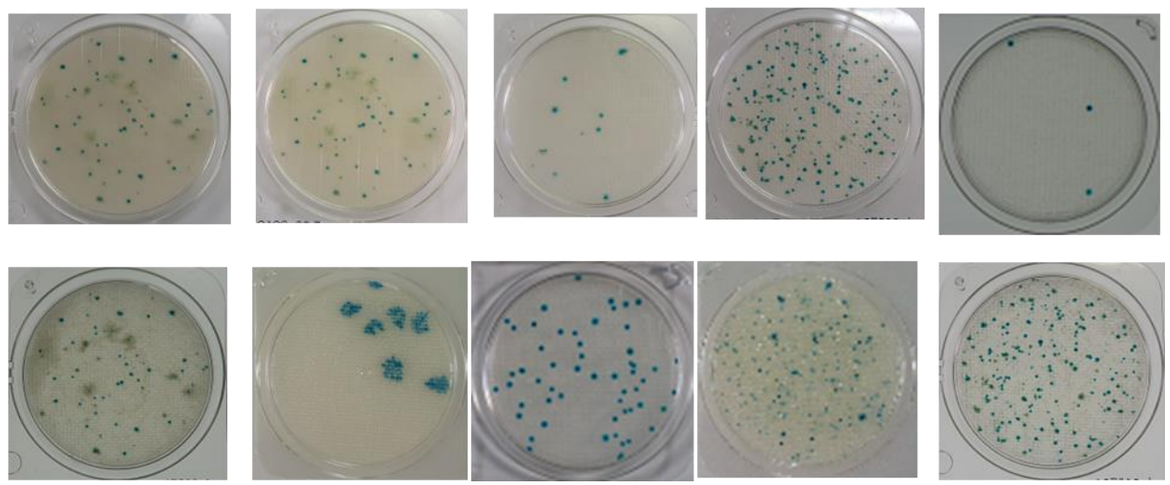
How To Use

- Plate pattern and Target image -

Image of target for counting colonies.

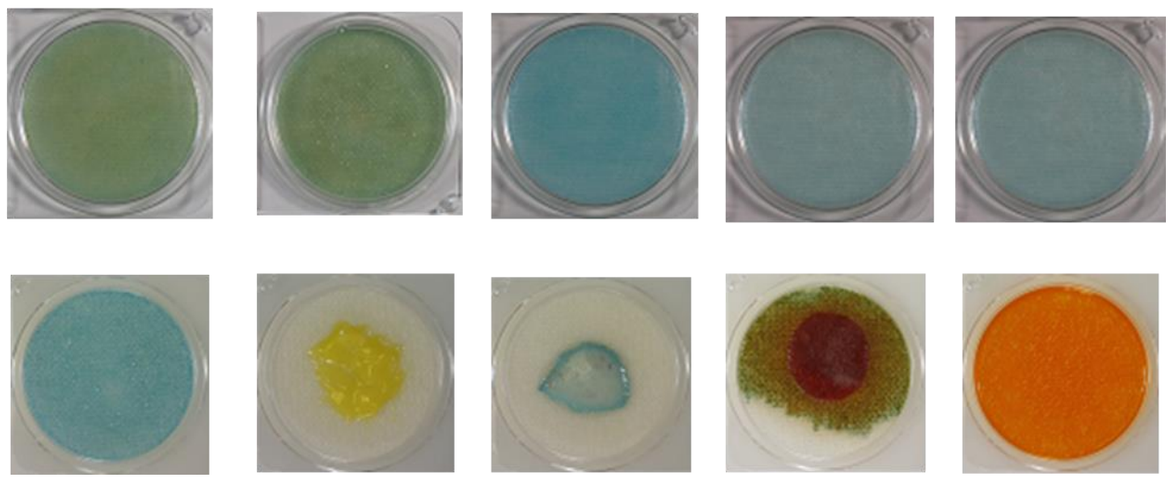
OK

Image of target for counting colonies.



not OK

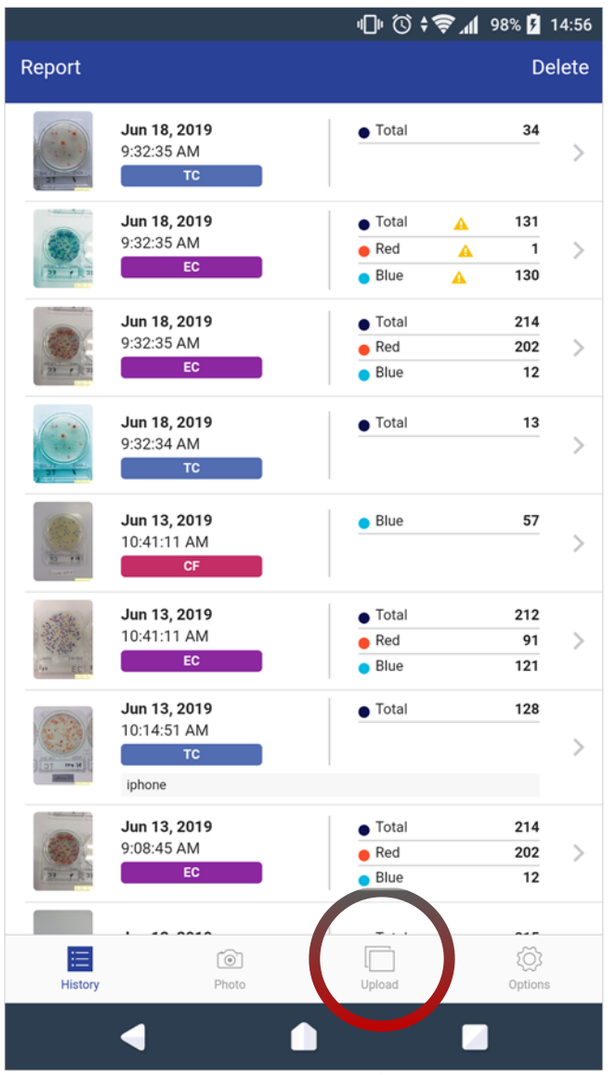
Images not subject to colony counting.



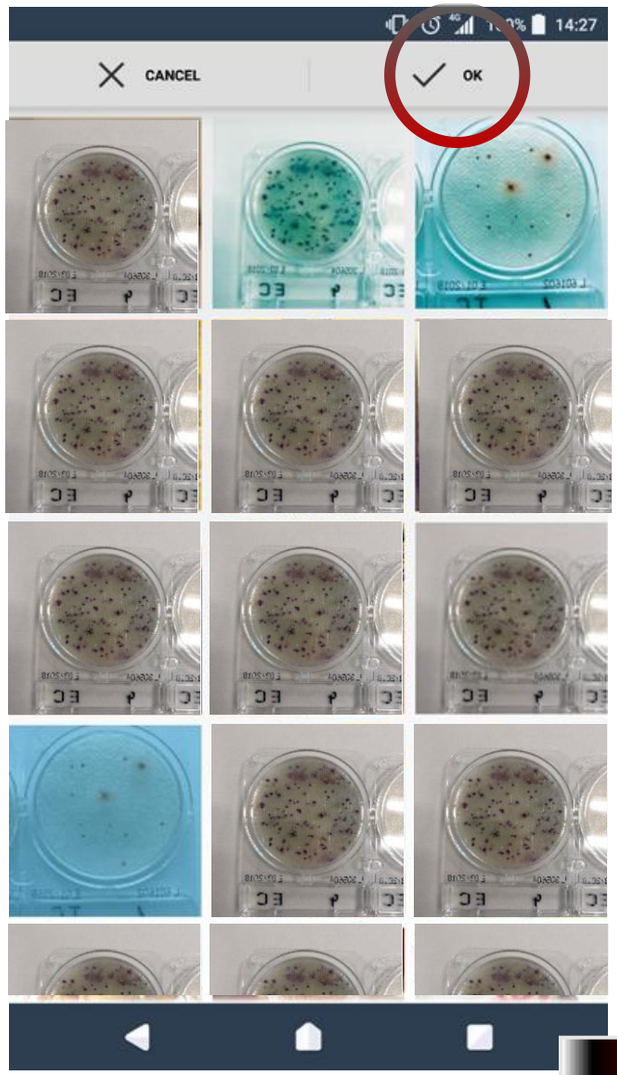
How To Use

- Import and count images　SmartPhone -

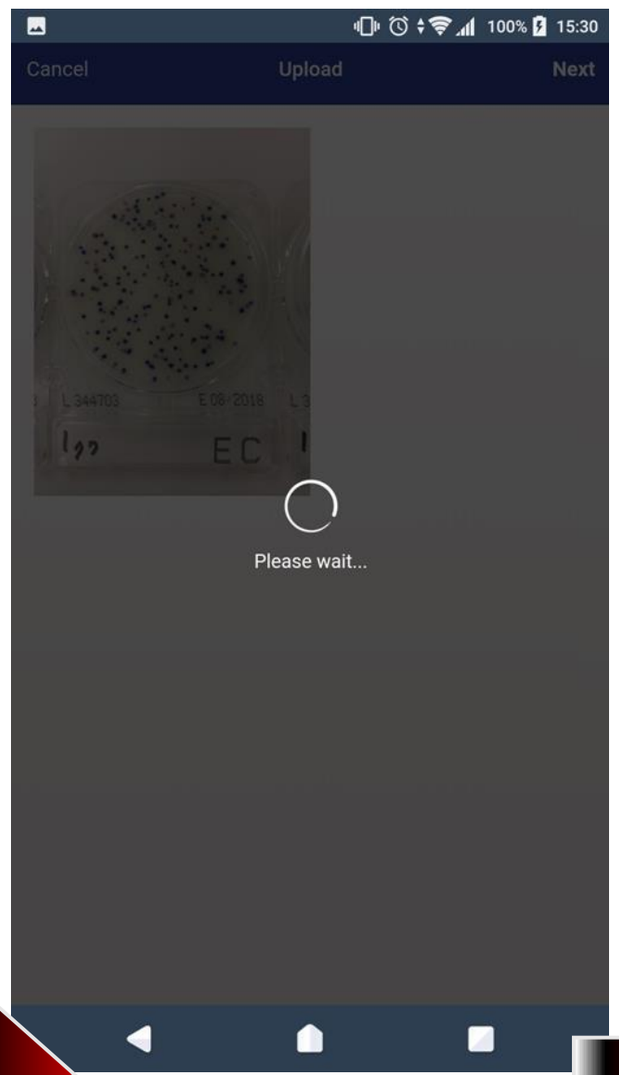
Import and count images (SmartPhone).



Touch the Upload button.



Images you want to count with CompactDry ® Select. Up to 10 files batch counting is possible.



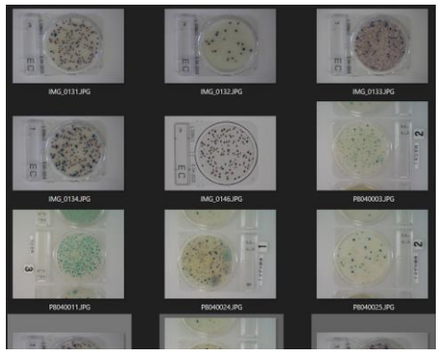
Touch the OK button.

Click Next, Countable with the same flow as the camera function.

How To Use

- Import and count images　PC -

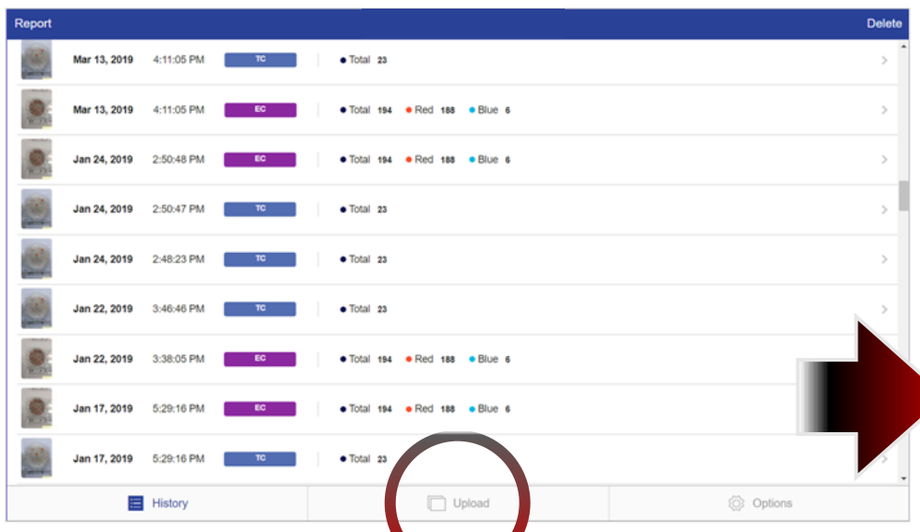
Import and count images (PC).



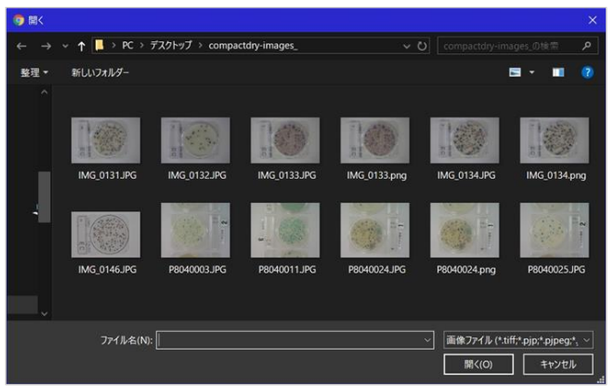
Move the captured image to the PC in advance.

Digital Camera → PC

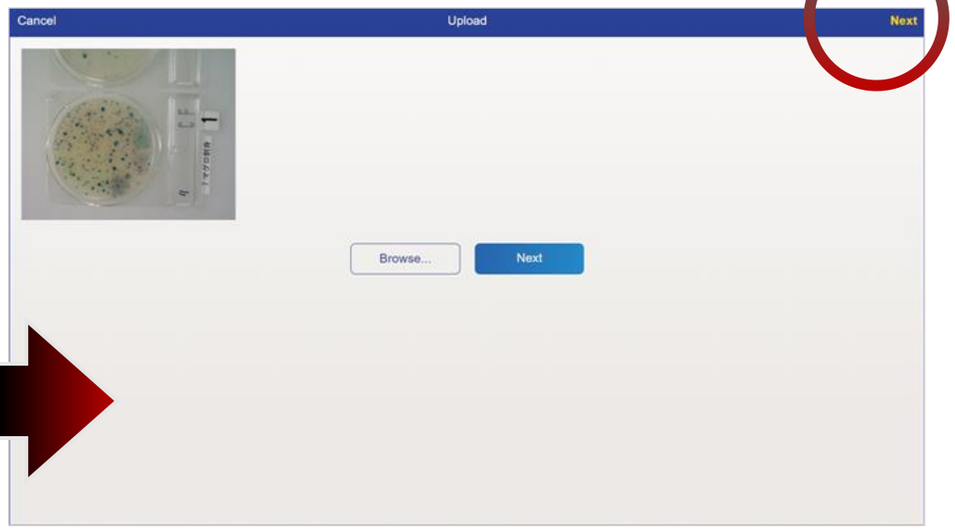
Online Service（for PC）URL: https://bactlab.colony-app.com/



Touch the Upload button.



Select an image.
jpg and png format files can be counted.
Up to 10 files batch counting is possible.



The selected image is displayed.
Click Next,
Countable with the same flow as the camera function.

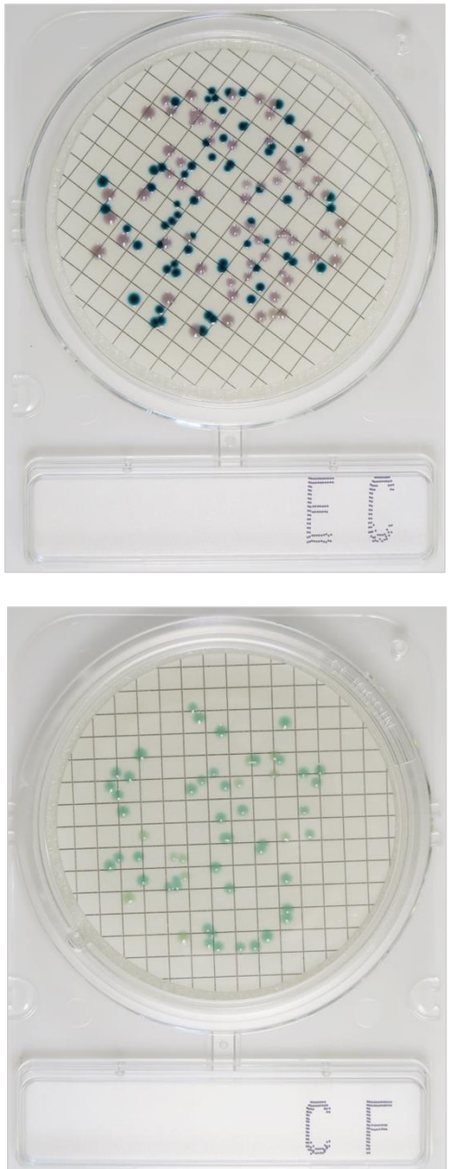
How To Use

- Colony counting by membrane filter method -

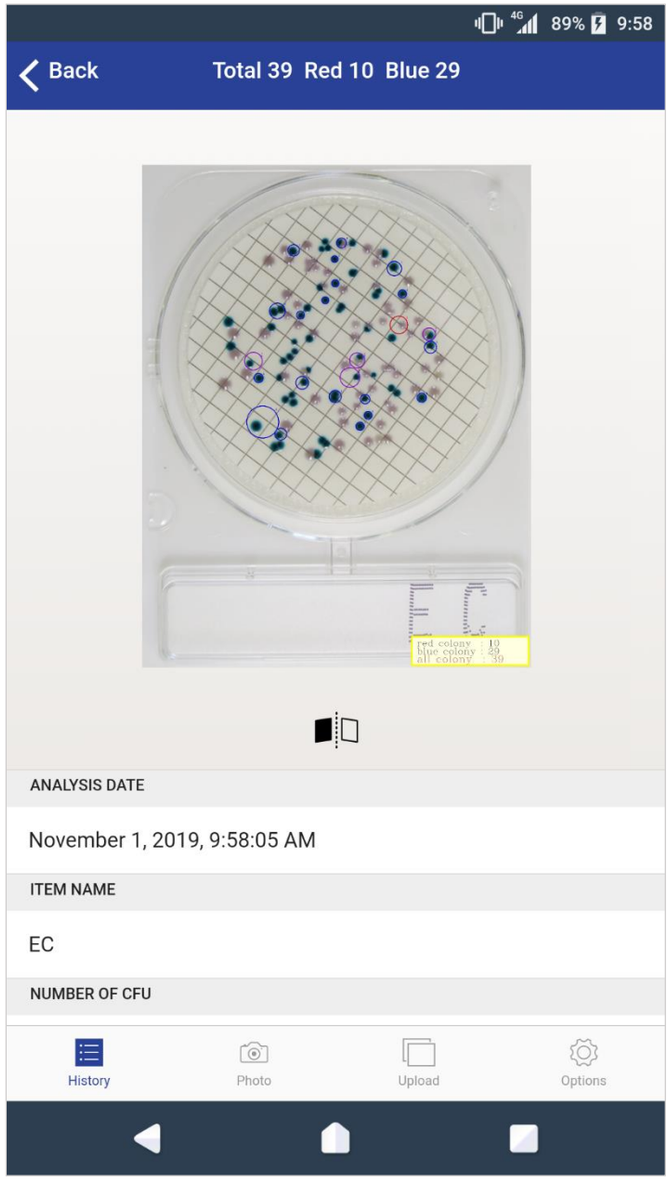
Colony counting images inspected by the membrane filter method.

* Please be careful. The accuracy of the count will be low.

CompactDry®



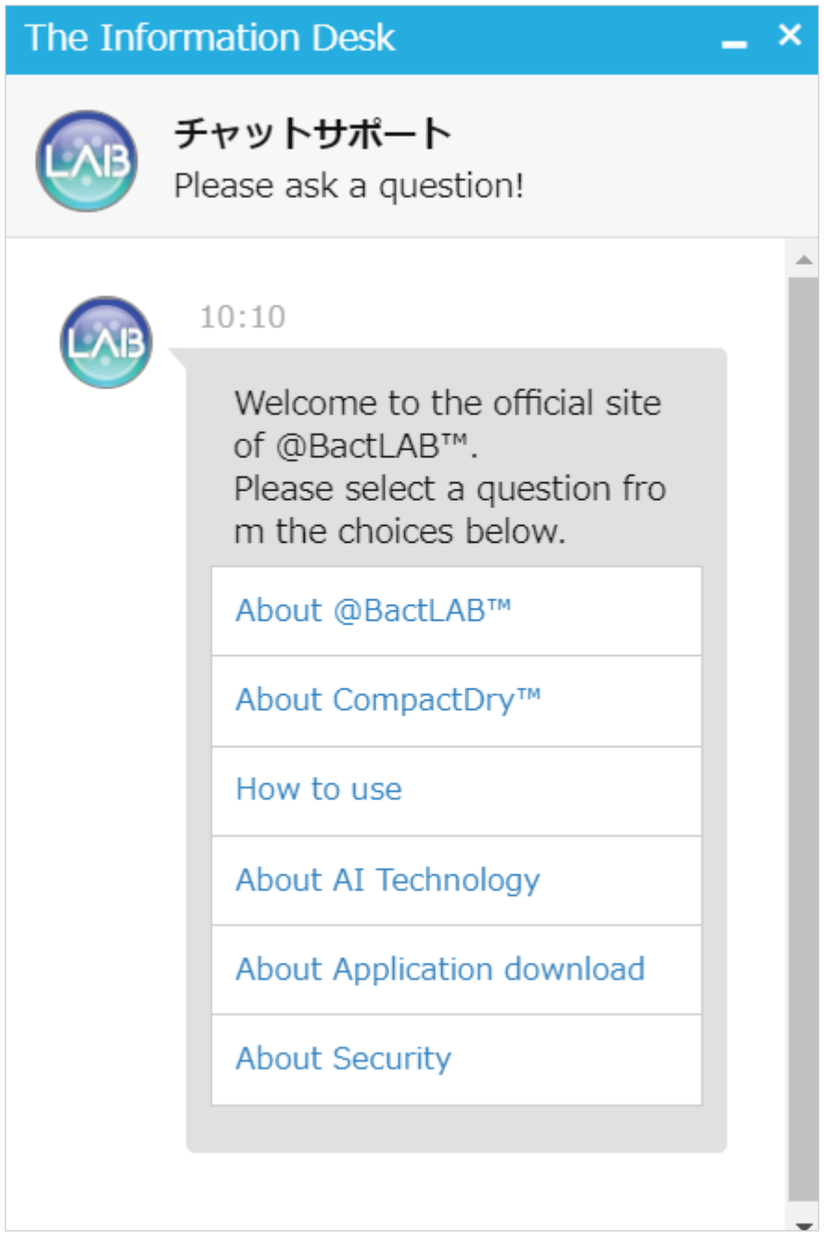
@BactLAB®



How To Use

- Support -

Support



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Q & A support is available on the official website.

https://corp.sdc.shimadzu.co.jp/english/products/global/bactlab/

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