

How to: An ELN+LIMS built in Notion + Airtable

This document provides more details on how to set up this sort of lab notebook. Check out the accompanying blog post: [An AI-ready lab notebook for life science doesn't need to be complex or expensive](#)

An awesome lab notebook for \$30/user/month



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Notion updates

We started with [ELeveNote's ELN template](#) and made customizations. Here's a couple we'd recommend to others:

The QC expression we use is a little different than the default one in ELeveNote

```
ifs(  
  empty( Aa Name ), "❌ no name specified",  
  empty( ↗ Linked Project ), "❌ no project specified",  
  empty( 👤 Experimenters ), "❌ no experimenters specified",  
  empty( ≡ Objective ), "❌ no objective specified",  
  empty( ≡ Measure of success ), "❌ no measure of success specified",  
  empty( ≡ Conclusions ), "⌚📝 no conclusions specified",  
  empty( 👤 Reviewer ), "❌ no reviewer specified",  
  "✅"  
)
```

Our current set of expanded status tags:

To-do

● Future experiment

● Deprioritized

● Design Phase

● 🧊 Icebox

● Blocked

In progress

● Back Burner

● In progress

● Pending close-out

● Needs review

Complete

● Completed























● Archived

Whalesync

Go to <https://www.whalesync.com/> and create an account.

To sync Notion → Airtable, first create a new Airtable database and enter all of the fields that you want to sync. You will need to properly select a reasonable field type for each one (you can see the icons in ours below). Once you've created the destination airtable, setting up Whalesync is pretty self-explanatory and the software will walk you through authenticating on both sides.

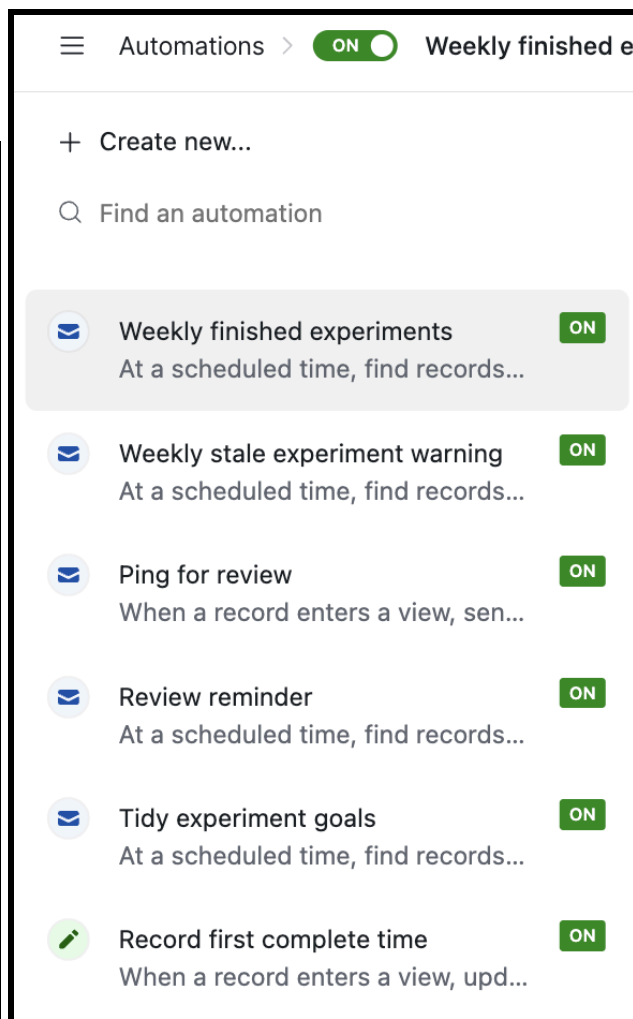
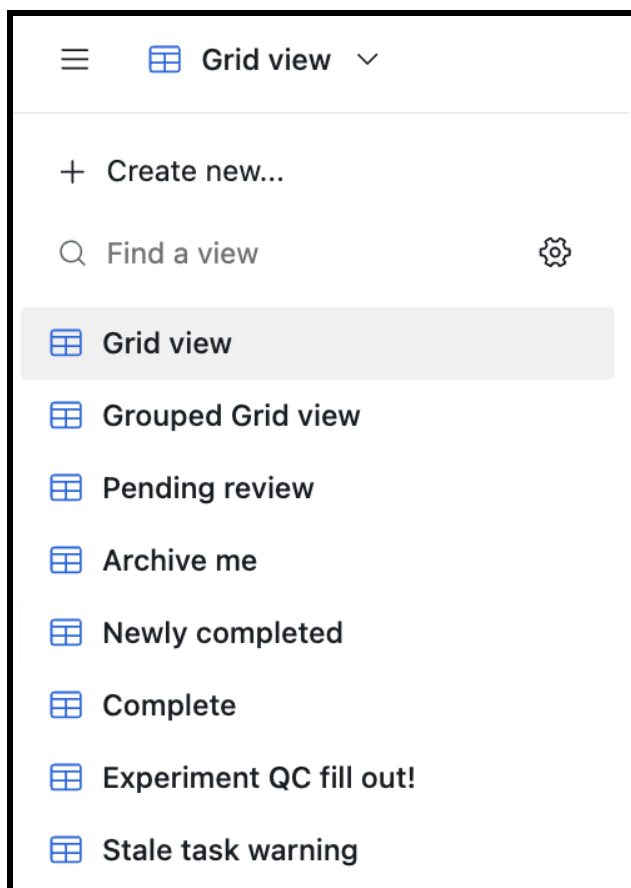
You'll end up with something that looks something like this:

 Table 1	←  Experiments DB
 Conclusions	←  Conclusions
 Experimenters	←  [read-only] Experimenters
 Formatted data	←  Formatted data
 Last edited time	←  [read-only] Last edited time
 Measure of success	←  Measure of success
Aa Name	← Aa Name
 Objective	←  Objective
 Project	←  [XX don't use me!] Project
 Raw data	←  Raw data
 Reviewer	←  [read-only] Reviewer
 Status	←  Status

NB: if you want to duplicate our entire setup, you're going to end up with TWO airtable bases. One is an airtable base of Experiments, linked with Whalesync, just for automated emails. The other is the LIMS (template provided [below](#)).

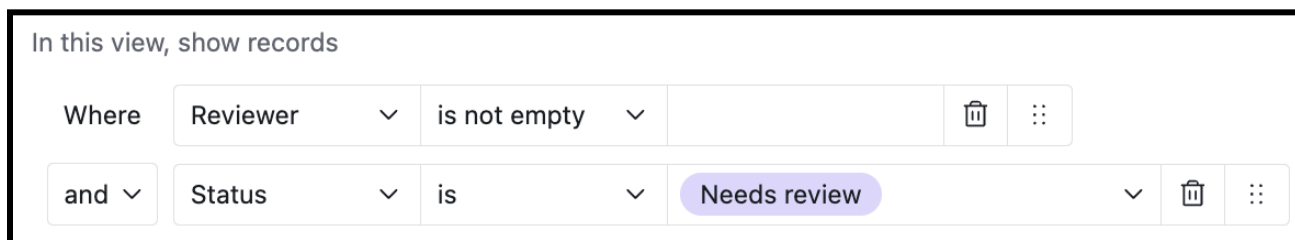
Airtable Automations for Experiments

To enable airtable automations, you'll be setting up a number of views and automations. Here are all the views and automations we have set up. We'll highlight just a few of them below, the others are pretty self-explanatory.



Ping for review

Begin by setting up a view called “Pending review” which is filtered by the status tag “Needs review.” Also ensure at least one reviewer is listed; this makes the automation robust to the order in which people change status and tag reviewers.



In our case, the usernames of each person are their email, so all this automation does is send an email to the reviewer.

TRIGGER

✓

ACTIONS

✓ Review test results

When a record enters a view

Pending review

Send an email

+ Add advanced logic or action

Action type

Send email

LABELS

Description

Enter a description

CONFIGURATION

Action will run...

Always

To

Reviewer

Show more options >

Subject

[Pioneer] Please review experiment

Message

Your review has been requested to close out the experiment, "

Name

". Please read through and make edits + ask clarifying questions before closing it out!

Stale task warnings

Begin by setting up a Stale task warning view. Filter out all of your statuses that indicate something is inactive.

In this view, show records

Where

Status

is none of

Design Phase

Archived

Con

and

Last edited t...

is before

one week ago

PDT

At a fixed time of week, query this view for all stale tasks.

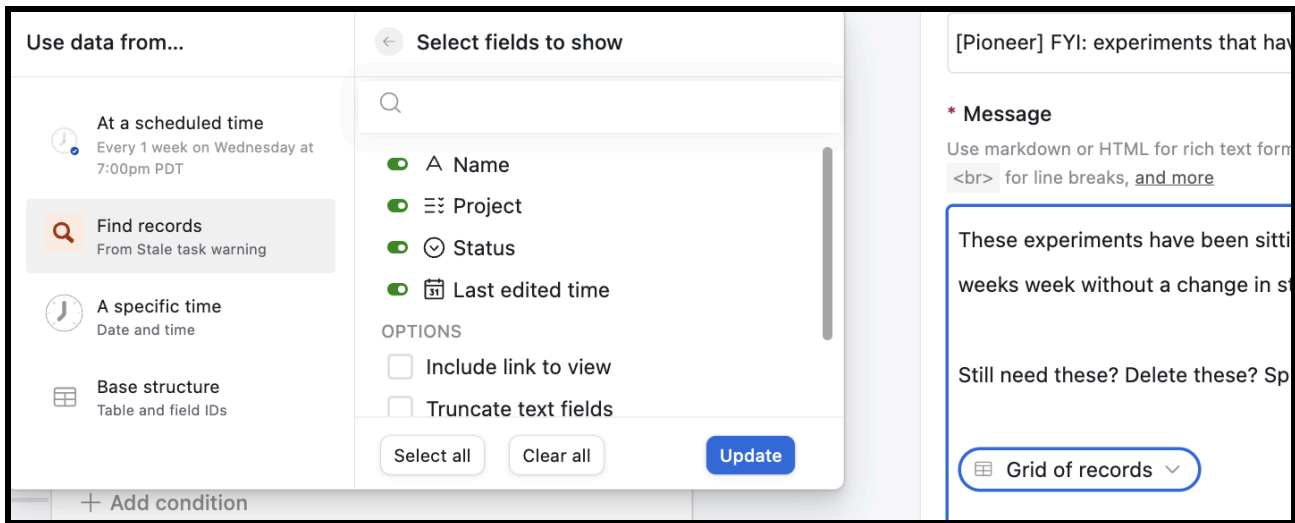
The screenshot displays a workflow configuration interface. On the left, a vertical timeline shows the workflow steps: a TRIGGER (At a scheduled time) and an ACTION (Find records). The trigger is set to "At a scheduled time" with a frequency of "Every 1 week on Wednesday at 7:00pm PDT". The action is "Find records" with the source "From Stale task warning". Below the action, there is a conditional step "If Records length > 0" which triggers a "Send an email" action. The email action is configured with a "To" field containing a placeholder email address. On the right, the CONFIGURATION panel shows settings for the "Find records" action. It includes a dropdown for "Table" (set to "Table 1"), a dropdown for "Find records based on" (set to "View"), a dropdown for "View" (set to "Stale task warning"), and a text input for "Maximum record limit" (set to "100"). Below the configuration panel, the TEST STEP section provides instructions: "Test this trigger to confirm its configuration is correct. The data from this test can be used in later steps. Test output is limited to 10 records."

To avoid sending blank emails if there are no stale tasks, wrap the send email in an `if` that checks for the existence of stale records.

The list of records can be sent with the email as a grid:

The screenshot shows an email configuration interface. The "Subject" field is labeled with a red asterisk and contains the text "[Pioneer] FYI: experiments that have been pending for some time". The "Message" field is also labeled with a red asterisk and contains the text "These experiments have been sitting on the pending tab for at least two weeks week without a change in status." and "Still need these? Delete these? Split them into smaller experiments?". Below the message field, there is a dropdown menu labeled "Grid of records" with a plus icon and a downward arrow.

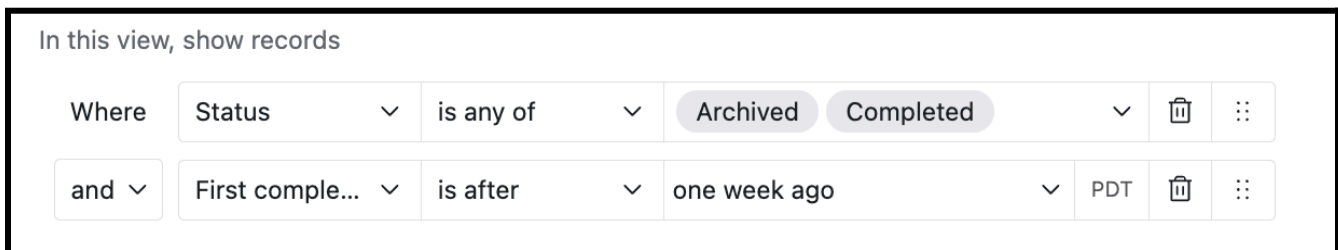
You can configure what information you want to display in the grid by "Edit token" on the "Grid of records".



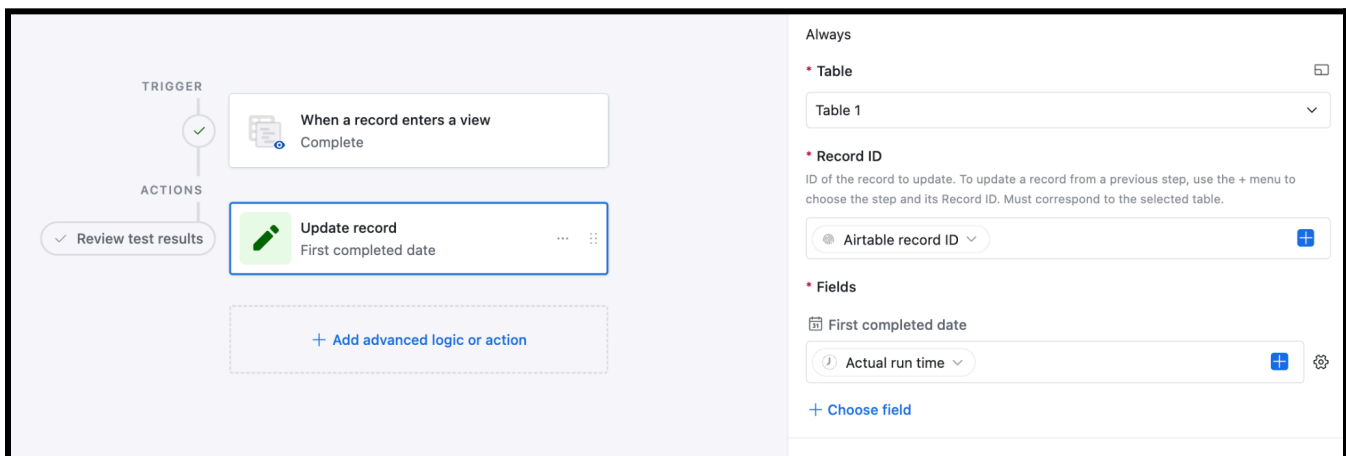
Record first complete time

In order to send out the ‘Weekly finished experiments’ email, we want to record the first time that an experiment is marked as complete. We used to use the ‘last edited by’ field, but sometimes experiments get edited after they’re completed or updated with retrospective notes, so this isn’t quite the same thing.

Add a column called ‘First complete date.’ To record the first complete time, set up a view called “Newly completed” that simply filters for complete experiments that have a recent ‘First complete date’.



Next, set up an automation that writes the date into the ‘First complete date’ field when a record enters the “Newly completed” view.



Weekly finished experiments email

Begin by setting up the “Record first complete time” automation above.

At a scheduled time each week, grab all the records in the “Newly completed” view and send them out in an email.

TRIGGER

At a scheduled time
Every 1 week on Saturday at 9:00am PDT

ACTIONS

Find records
From Newly completed

Review test results

Send an email
Experiments closed out last week

+ Add advanced logic or action

Show more options >

Subject

[Pioneer] Experiments closed out last week

Message

Use markdown or HTML for rich text formatting: **bold**, *italics*, # Headings, * Bullets,
 for line breaks, and more

Recently finished experiments!

Grid of records

And in more detail:

List of records

Airtable LIMS

We’ve prepared a [template of our airtable LIMS](#) that you can copy and modify. To use it, press Copy Base at the top.

Pioneer LIMS Template

Copy base

s Stocks | c Constructs | m DNA Preps | p Primers & gBlocks

Views | Grid view | 1 hidden field | Filter | Group | Sort

Find a view

Grid view

Stock number finalized

Selection Stocks

Working Stocks

Working Stocks copy

Grouped by Base Strain

	Stock	Base strain	Project
1	s.Ec.C.00185	E coli	C
2	s.Ec.C.00186	E coli	C
3	s.Ec.C.00187	E coli	C
4	s.Ec.C.00188	E coli	C
5	s.Ec.C.00189	E coli	C
6	s.Ec.C.00190	E coli	C
7	s.Ec.C.00191	E coli	C
8	s.Ec.C.00192	E coli	C
9	s.Ec.C.00193	E coli	C

To enable custom unique numbering, first create an autonumber field. Then have the primary key for the table be a formula. The formula can be customized to include human-readable letters etc based on other fields in your table.

For example, we wanted human-readable stocks with both the base strain and project code included in a short name.

<input type="checkbox"/>	Stock	Autonumber	Base strain	Project Code
1	s.Em.D.00320	320	E coli MFDpir	D
2	s.Em.D.00339	339	E coli MFDpir	D
3	s.Em.D.00340	340	E coli MFDpir	D
4	s.Em.D.00364	364	E coli MFDpir	D
5	s.Em.D.00365	365	E coli MFDpir	D
6	s.Em.D.00366	366	E coli MFDpir	D

Here is our Stock formula:

```

CONCATENATE("s.",
SWITCH(
{Base strain},
  "Selection", "Sl",
  "E coli", 'Ec',
  "S cerevisiae", 'SC',
  "S elongatus", "SE",
  "B subtilus", "BS",
  "C psychrerythraea", "CP",
  "D radiodurans", "DR",
  "R radiotolerans", "RR",
  "H elongata", "HE",
  "G obscurus", "GO",
  "P halocryophilus", "PH",
  "E coli WM6026", "Ed",
  "E coli K12", "Ek",
  "E coli K-12 MG1655", "Ek",
  "E coli MFDpir", "Em",
  "Cheese", "Ch",
  "Mold", "Mo",
  "K variicola", "Kv",
  "C necator", "Cn",
  "A oryzae", "Ao",
  "P stutzeri", "Ps",
  "P putida", "Pp",

```

```

        "D agitata","Da",
        "X autotrophicus","Xa",
        "A baylyi","Ab",
        "H campaniensis","Hc",
        " A ferrooxidans", "Af",
        "O polymorpha","Op",
        '*'
    ),
    ". ",
    {Project Code},
    ". ",
    RIGHT('00000' & Autonumber,5)
)

```

Similarly, we like for our constructs to have an optional 'short name' that make them more human readable. They end up looking like this:

f _x Construct	A Short name
c.00096.pORTMAGE-1	pORTMAGE-1
c.00097.pORTMAGE-2	pORTMAGE-2
c.00098.pORTMAGE-3	pORTMAGE-3
c.00099.pORTMAGE-4	pORTMAGE-4
c.00100.pZT247-pANS-RhamsfGFP	pZT247-pANS-RhamsfGFP
c.00101.pZT266-pANS-GFP	pZT266-pANS-GFP

And it's enabled by this formula:

```

CONCATENATE("c.", RIGHT('00000' & Autonumber,5), ". ", {Short name})

```