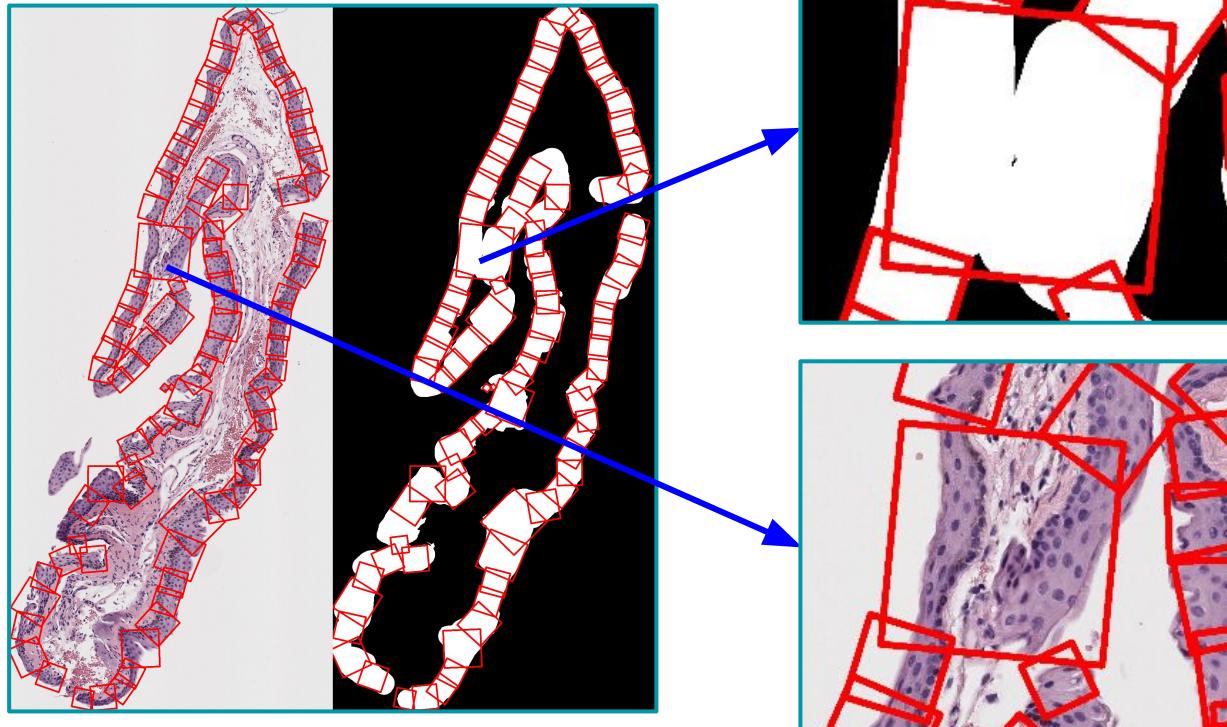


Patching Team Presentation 1

April 23, 2025

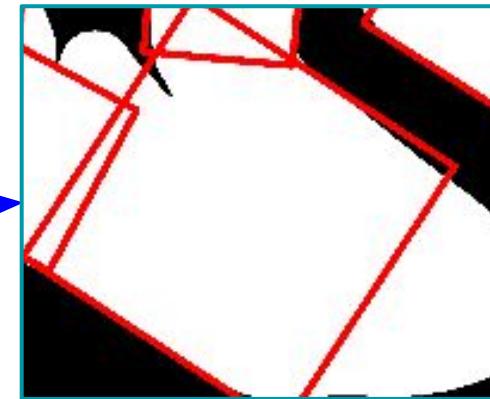
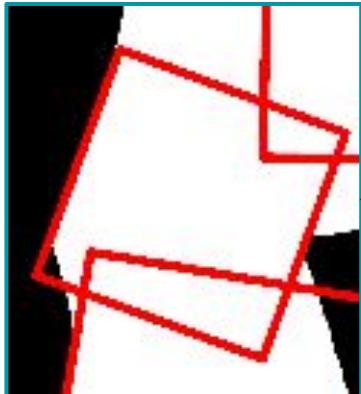
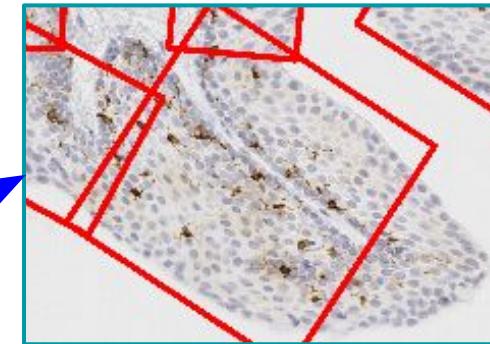
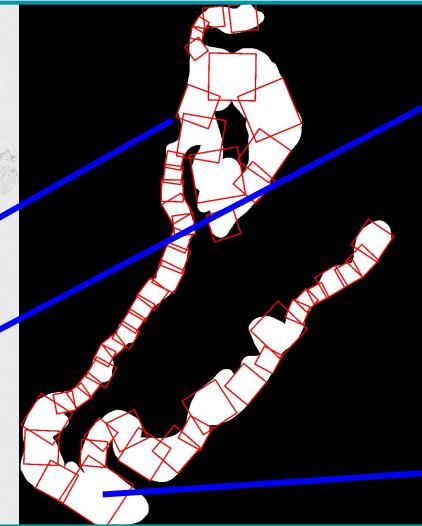
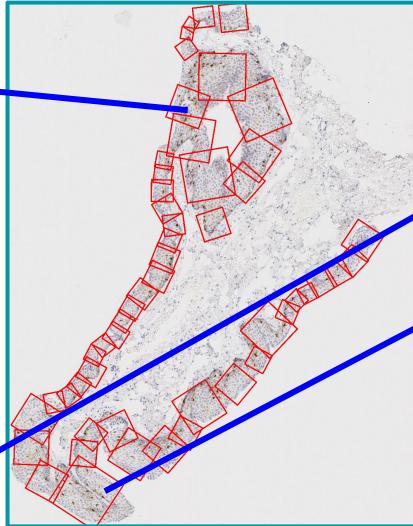
Mask Density-Related Issues

Some masks
are too dense,
leading to
patching issues
when parts of
the epithelium
overlap on
themselves



Case 28, Match 1 (h&e)

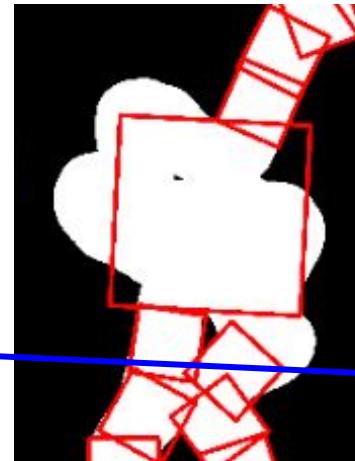
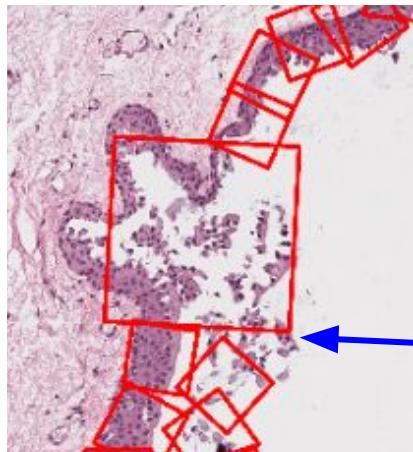
Mask Density-Related Issues



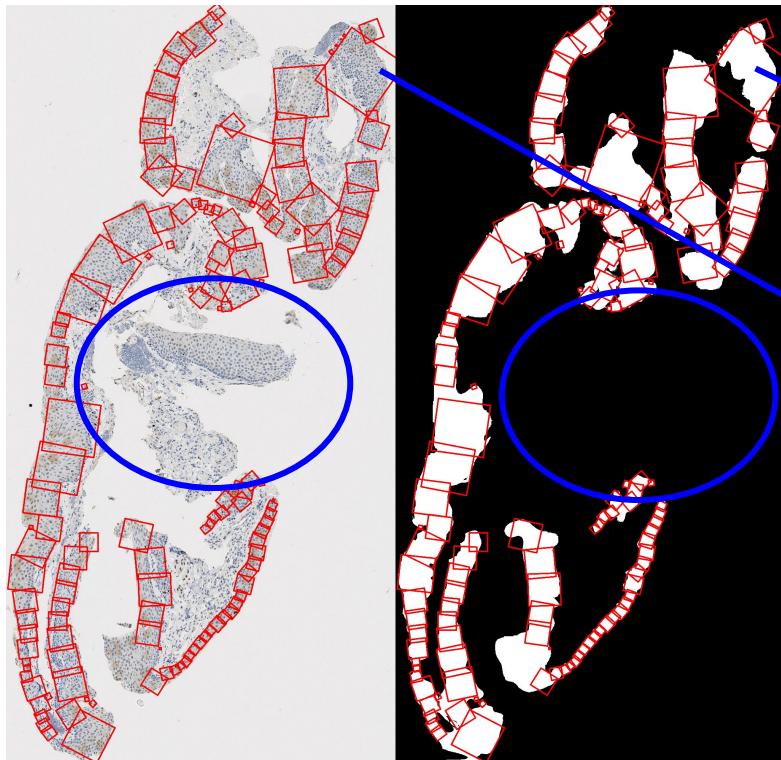
Case 34, Match 1 (melan)

Mask Density-Related Issues Cont.

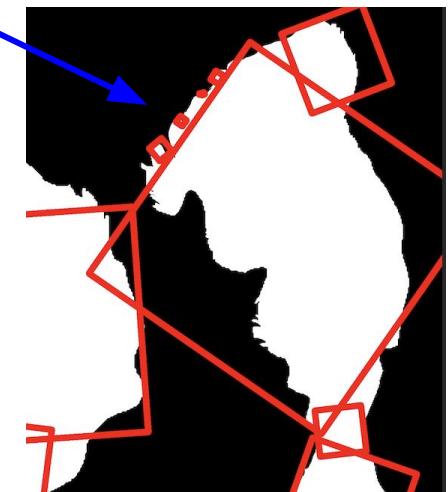
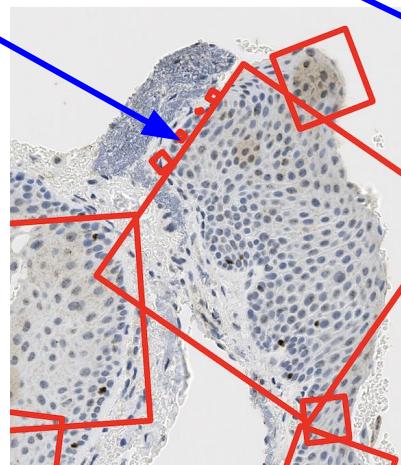
- this is also prevalent in the epithelium that form an M curve
 - as pictured in Case 52, Match 1 (h&e)



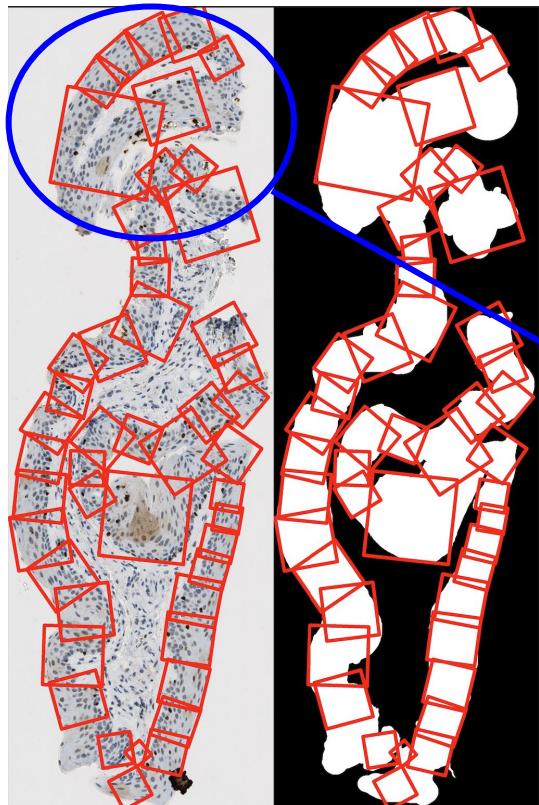
Mask Density-Related Issues Cont.



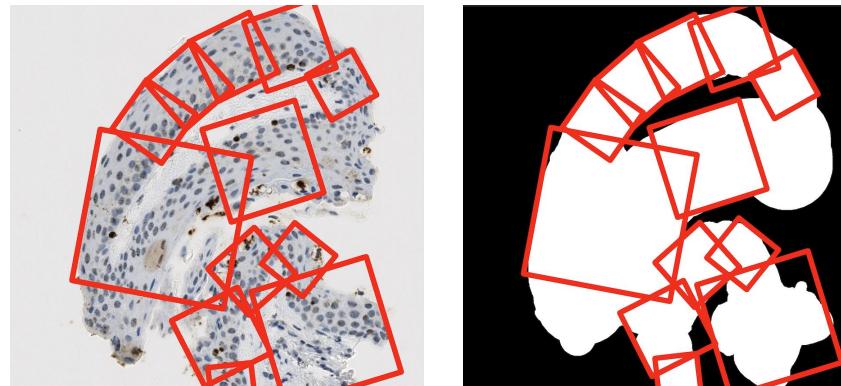
- Another case with a smaller M-curve and does not encompass the entire area
 - as pictured in Case 21, Match 1 (*sox10*)



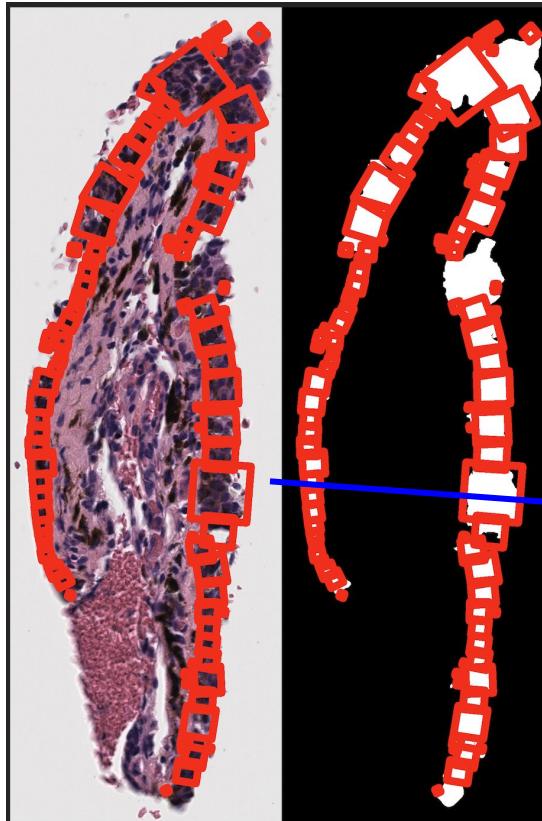
Mask Density-Related Issues Cont.



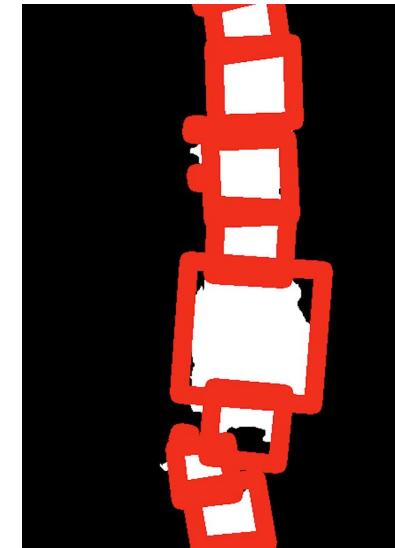
- Another case with a very dense mask that doesn't capture the split of the epithelium in the top left, leading to large patches
 - as pictured in Case 02, Match 1 (*sox10*)



Mask Density-Related Issues Cont.



- Mask not covering significant portions of the epithelium
 - as pictured in Case 12, Match 1 (*h&e*)



Mismatches Between Tissue and Mask Image Sizes

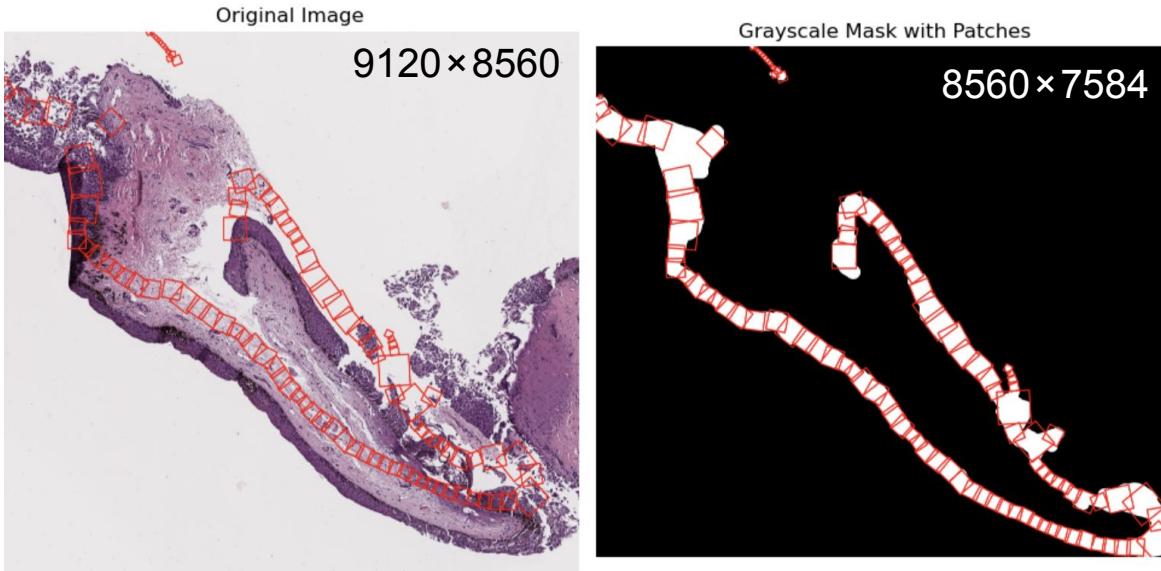
- Some of the cases had mismatching tissue and mask image sizes
- Sizes were different for all of H&E, Melan, and Sox for all cases
- Ex: Case 46

```
Mask: testing_slices/case_46_match_1_melan.png  shape=(10308, 3387, 3)
Slice: testing_slices/case_46_match_1_melan.tif  shape=(10914, 3689, 3)
```

```
Mask: testing_slices/case_46_match_1_soxy10.png  shape=(14293, 5823, 3)
Slice: testing_slices/case_46_match_1_soxy10.tif  shape=(15680, 6293, 3)
```

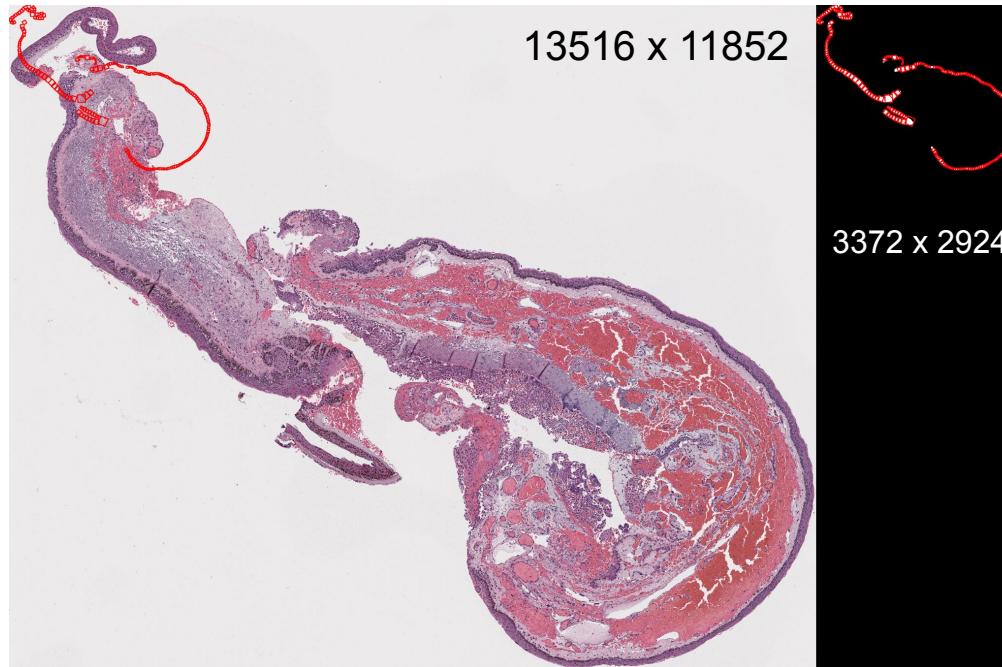
```
Mask: testing_slices/case_46_match_1_h&e.png    shape=(10040, 1769, 3)
Slice: testing_slices/case_46_match_1_h&e.tif    shape=(11522, 2662, 3)
```

Result of Size Mismatches



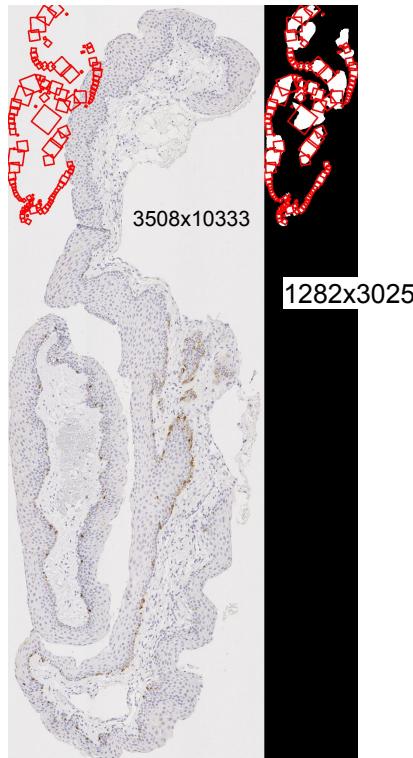
Case 97, Match 3 (h&e)

Result of Size Mismatches Cont.

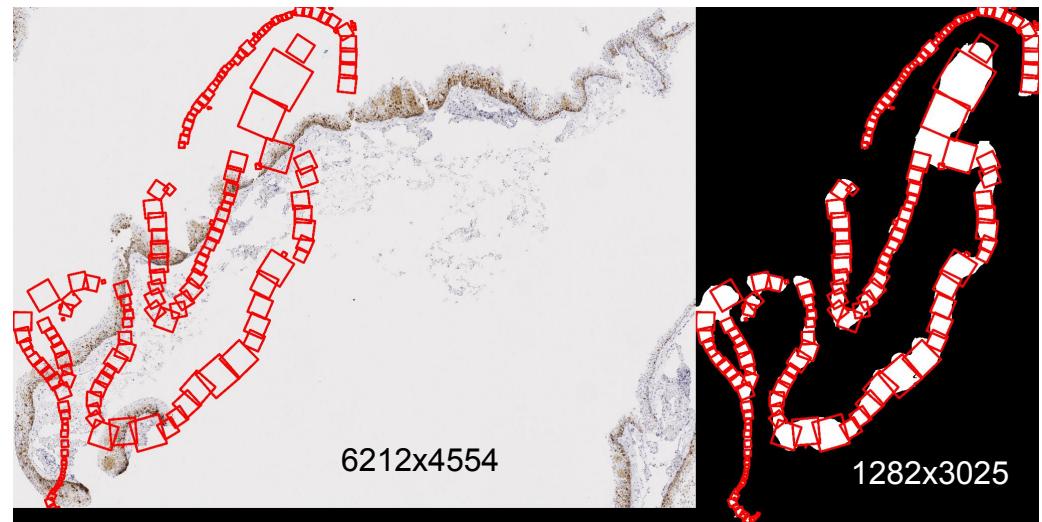


Case 98, Match 1 (h&e)

Result of Size Mismatches Cont.

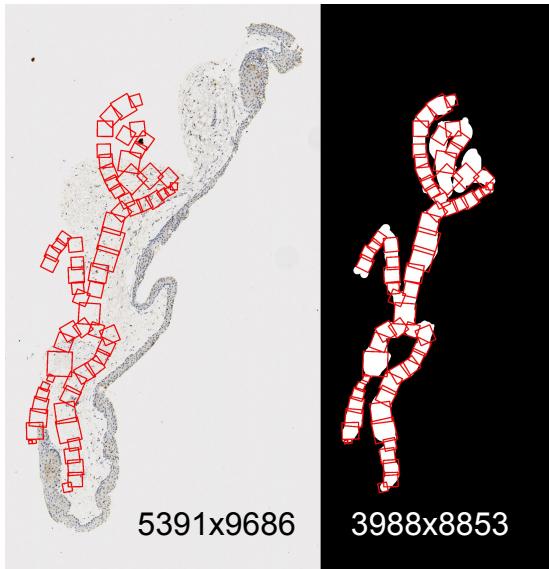


Case 21, Match 1 (melan)

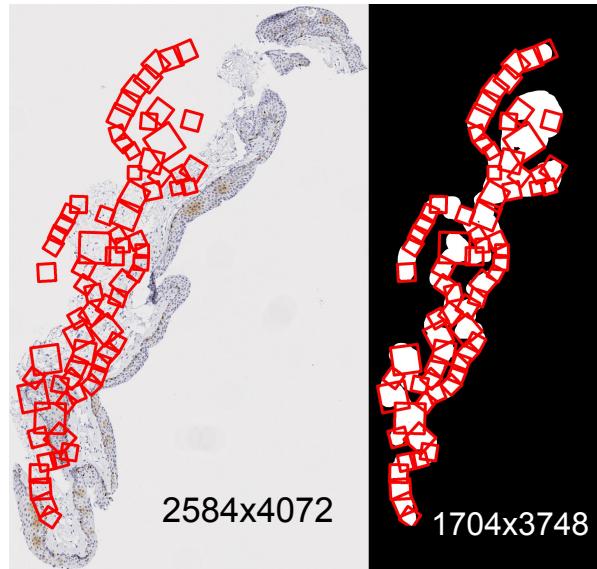


Case 22, Match 2 (melan)

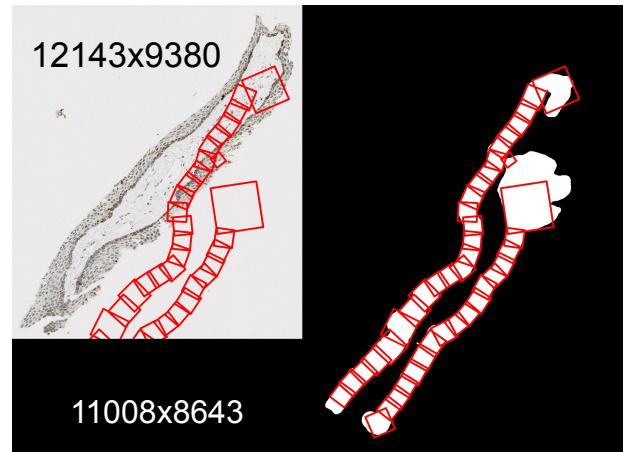
Result of Size Mismatches Cont.



Case 24, Match 1 (*sox10*)



Case 24, Match 1 (*melan*)

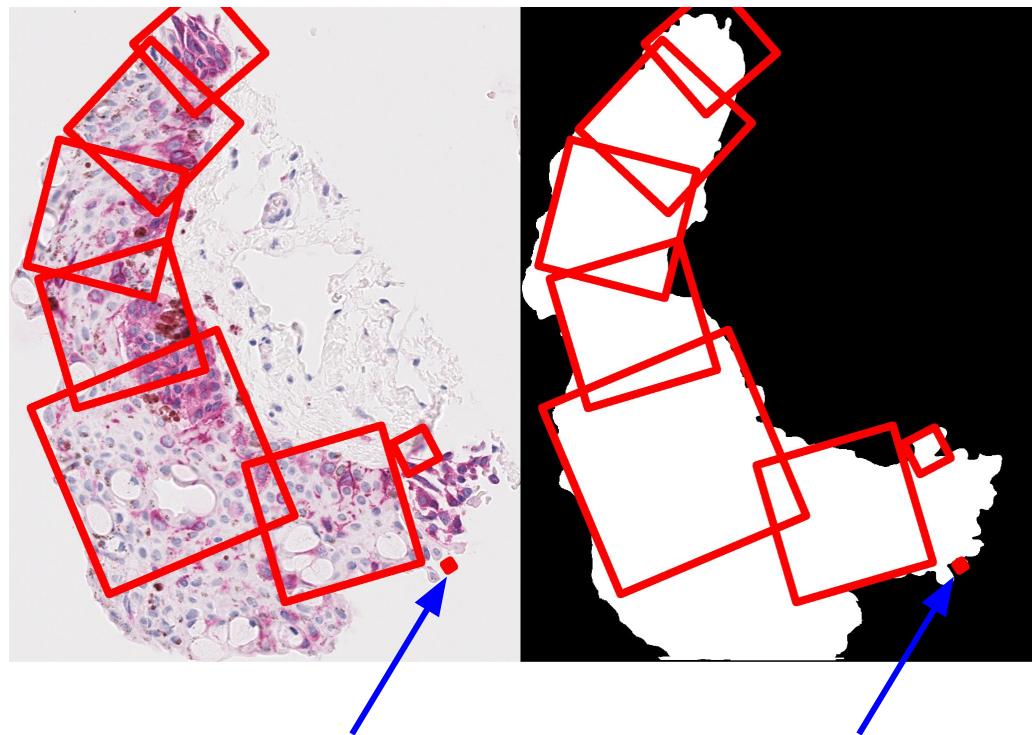


Case 23, Match 1 (*sox10*)

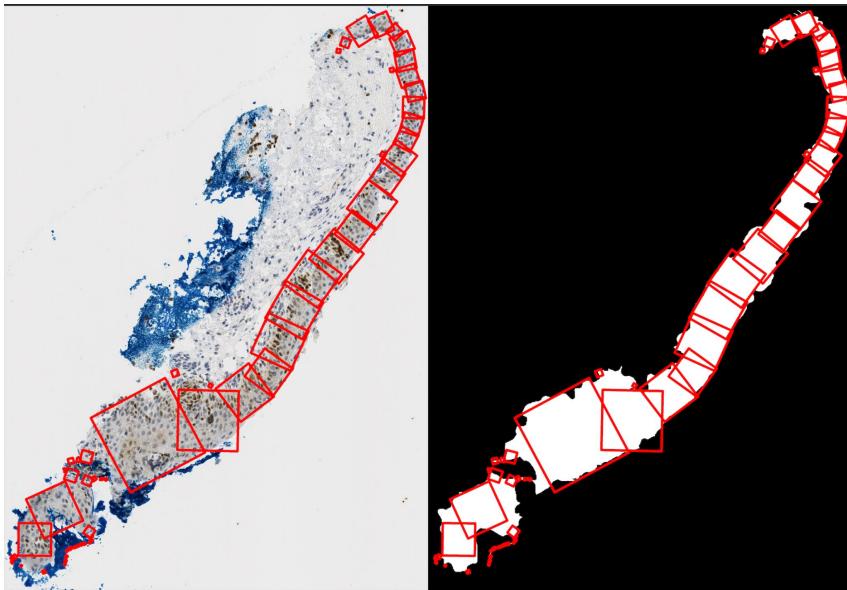
Isolated Small Patches

- looking at the `calculate_patch_corners` function and how it is used in `create_smarter_squares`
- tiny patch reflects a tiny isolated region in the mask that is being detected as an external contour
- potential solutions: absolute minimum size threshold, filtering tiny contours before processing

Case 63, Match 1 (melan)

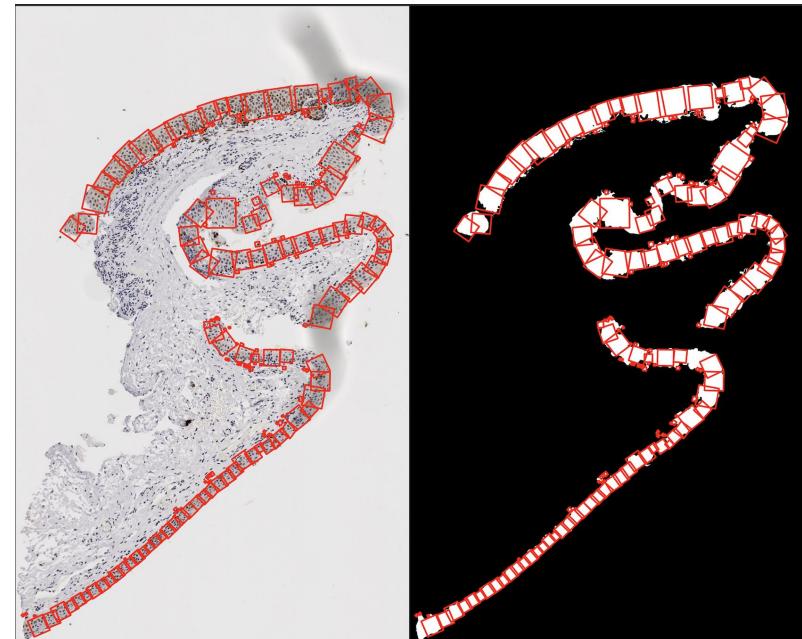


Isolated Small Patches Cont.



Case 09, Match 1 (sox10)

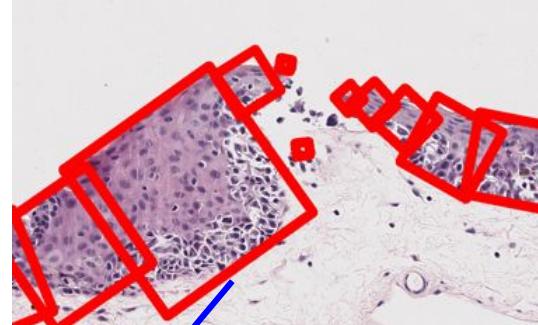
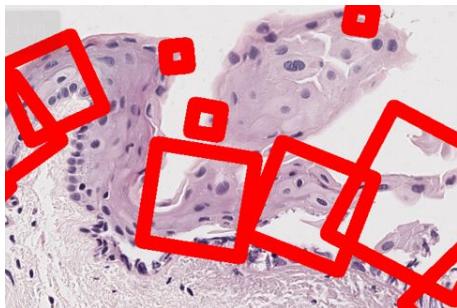
Seen in all 3 slices



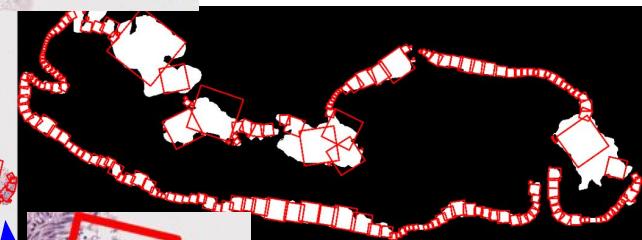
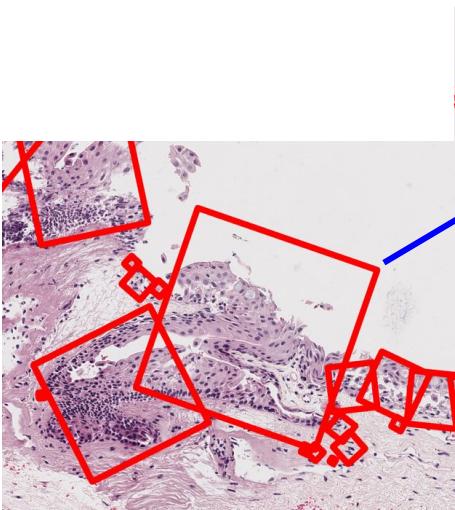
Case 15, Match 2 (sox10)

Seen in all 3 slices across both matches

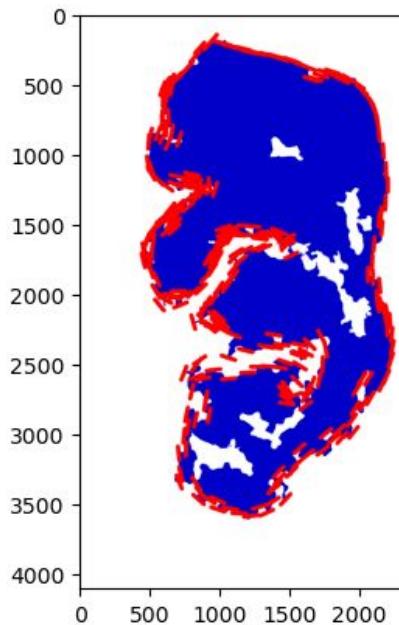
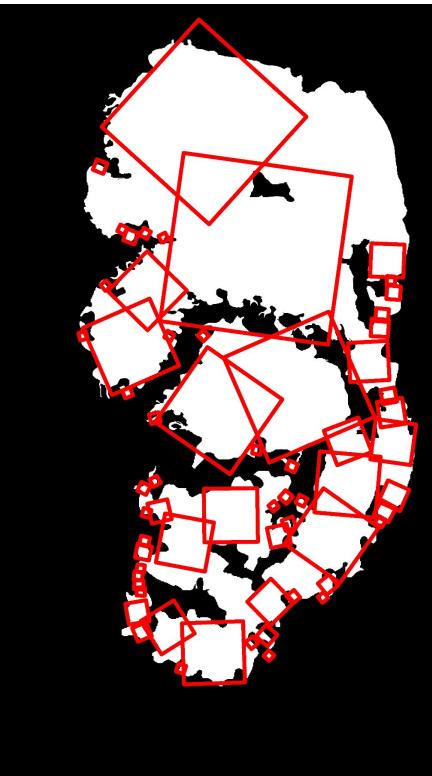
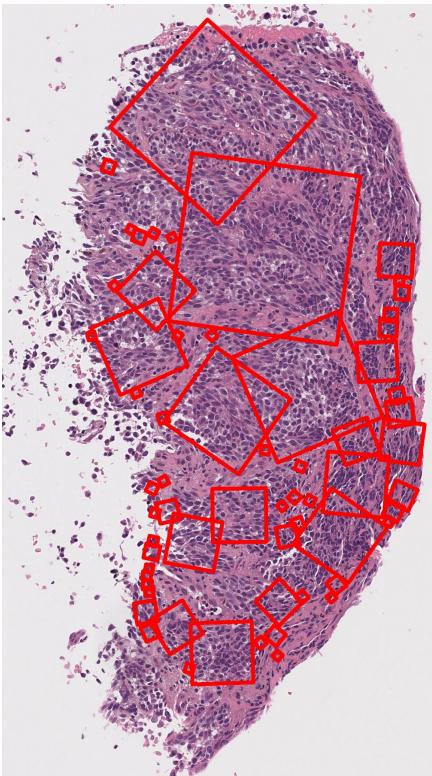
Isolated Small Patches Cont.



Case 84, Match 1
(h&e) [also
observed in other
stains]



Small patches where mask is not smooth



Patching does not seem to use Gaussian smoothed contour even though it's called in the process_contours function

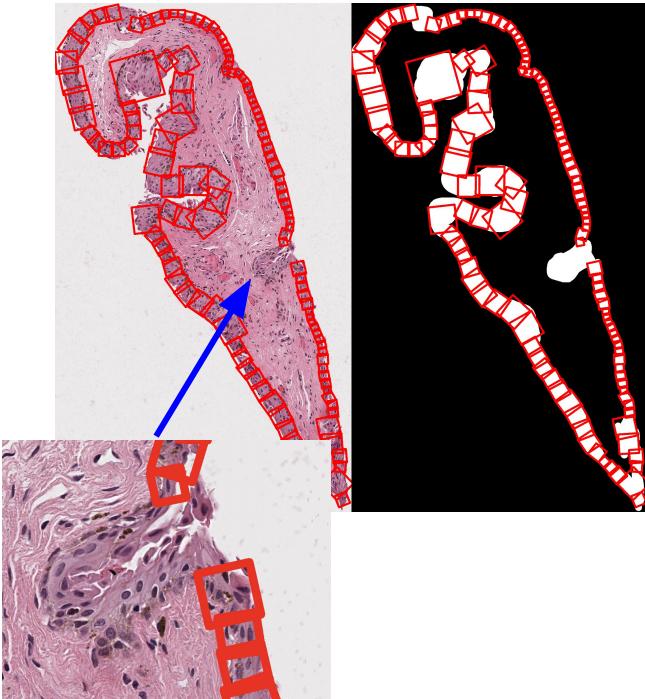


Case 66 Match 3 - h&e

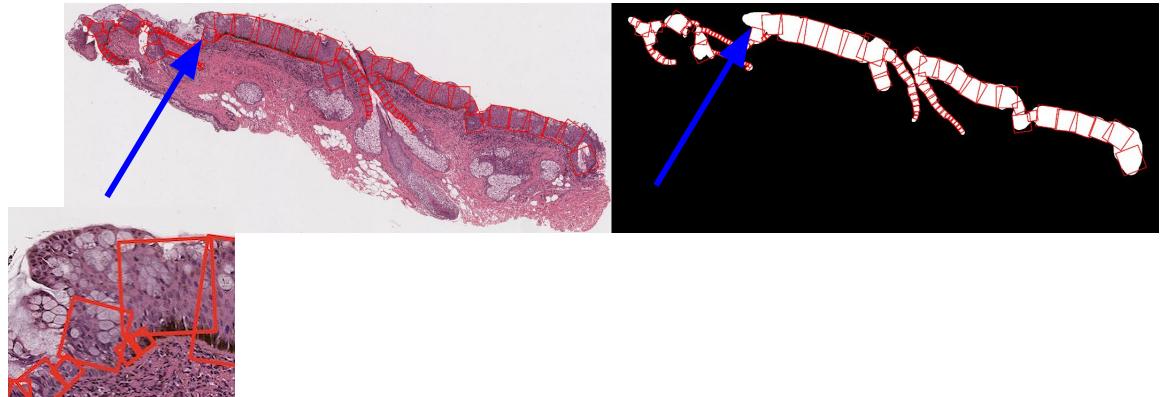
Case 79, Match 3 (sox10)

Missing Protrusions

Case 78, Match 1 (h&e)

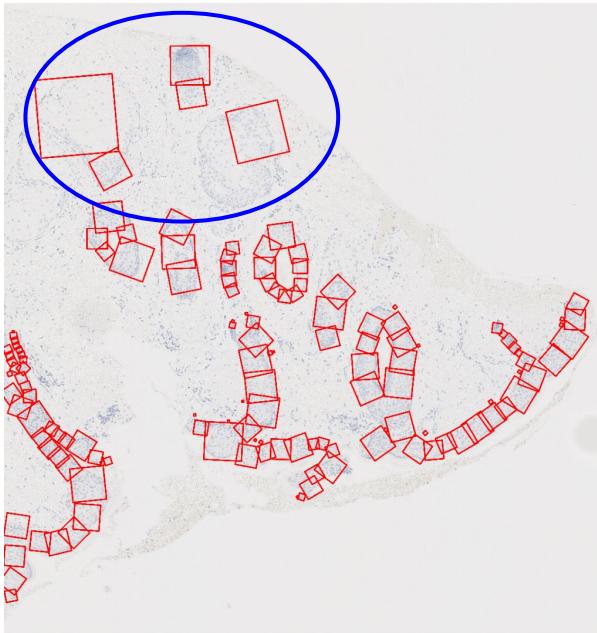


Case 90, Match 1 (h&e)



Patch coverage issues: epithelium “islands”

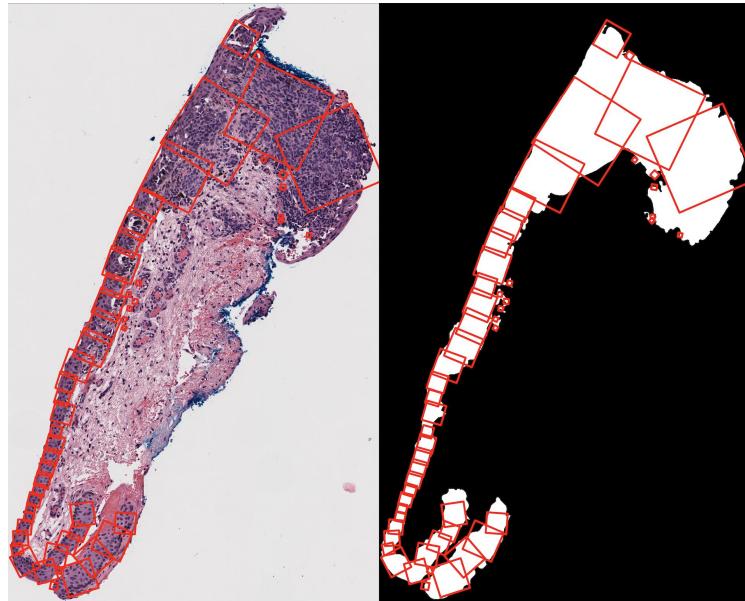
- Patches not covering full masked area when epithelium lacks interior/exterior contour and is round
 - as pictured in *Case 65, Match 10 (sox10)*



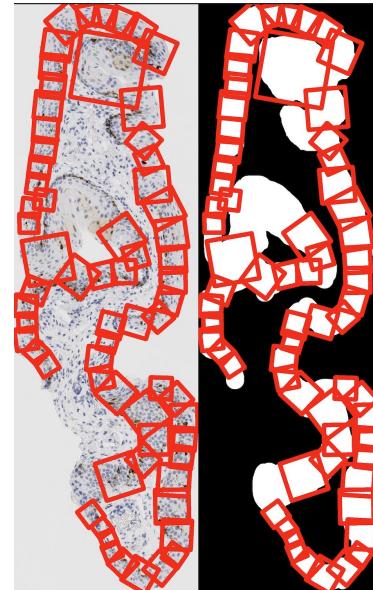
- Oblong islands (e.g. middle circled island) can be covered with multiple patches, but more circular islands have poor coverage
- Is the melanocyte distribution interpreted in the same way on “islands” versus “strips”?

Incomplete patch coverage for wider epithelium regions

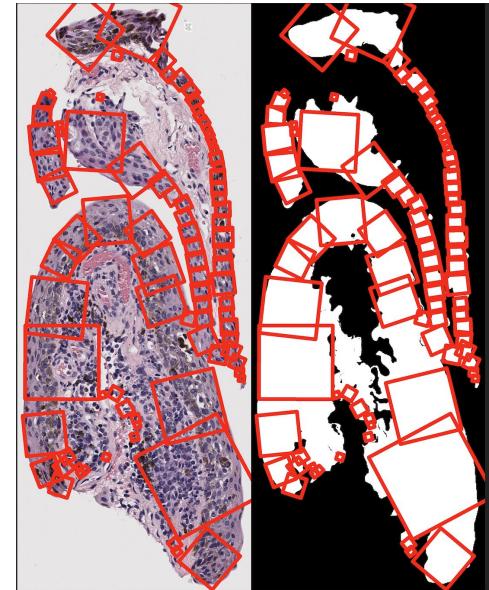
- Patches fail to cover entire masked region where epithelium is especially wide or curving



Case 09, Match 1 (h&e)



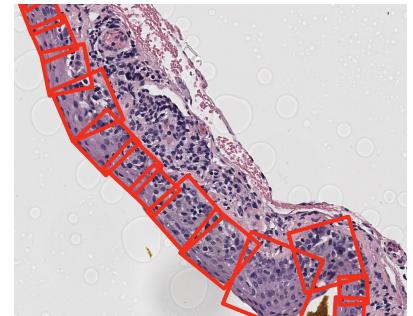
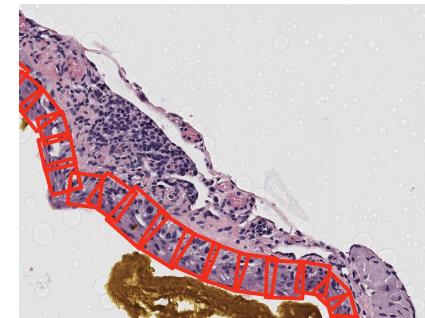
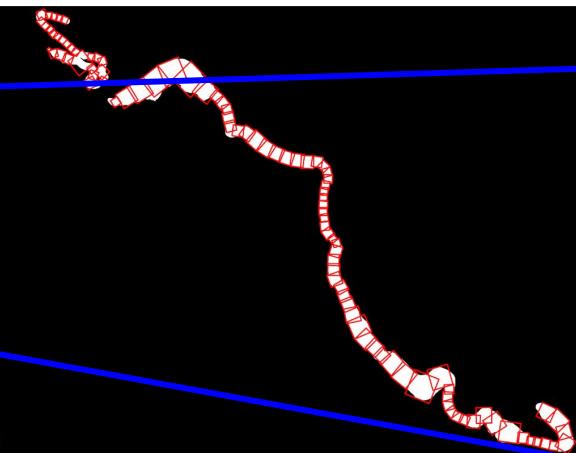
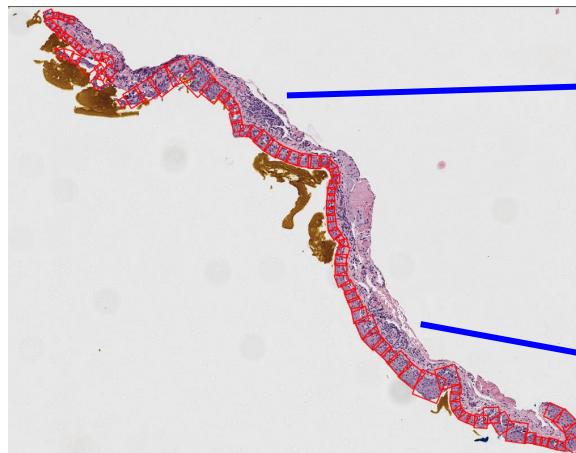
Case 02, Match
1 (melan)



Case 11, Match 1
(h&e)

High Density of Melanocytes Beyond Epithelium

- Initially thought the mask did not cover entire epithelium, but this is a special case of an infection, wherein we see a high density of melanocytes outside epithelium region
 - as pictured in Case 07, Match 1 (*h&e*)



Primary Takeaways

- Summary Statistics:
 - Percentage Mask-Related Issues: 38.27%
 - Percentage Patching-Related Issues: 44.44%
- Mask-Based Issues to Resolve:
 - High-density masks lose important complexity of slices
 - Mismatching tissue and mask image sizes
- Patching-Based Issues to Resolve:
 - Isolated small patches
 - Missing protrusions
 - Shape and width of epithelium