

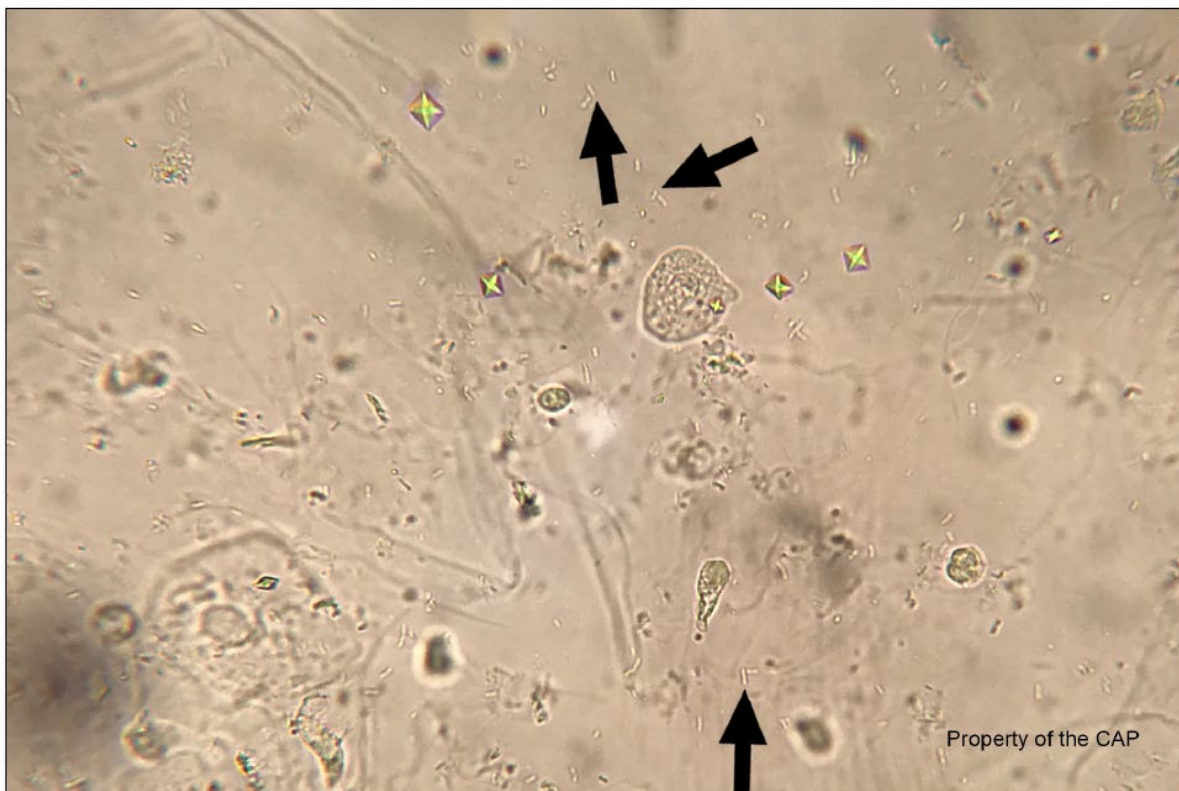
We missed one image identification on CM-B 2022 (urine survey). The following is the education for this missed image. Note that there was a non-consensus among participants, so it was not graded. However, CAP had an intended response, so it is a good reminder for us all. Note: I'm including all 3 images from the survey and will discuss the one we missed.

## CASE HISTORY – IDENTIFY THE ARROWED OBJECTS

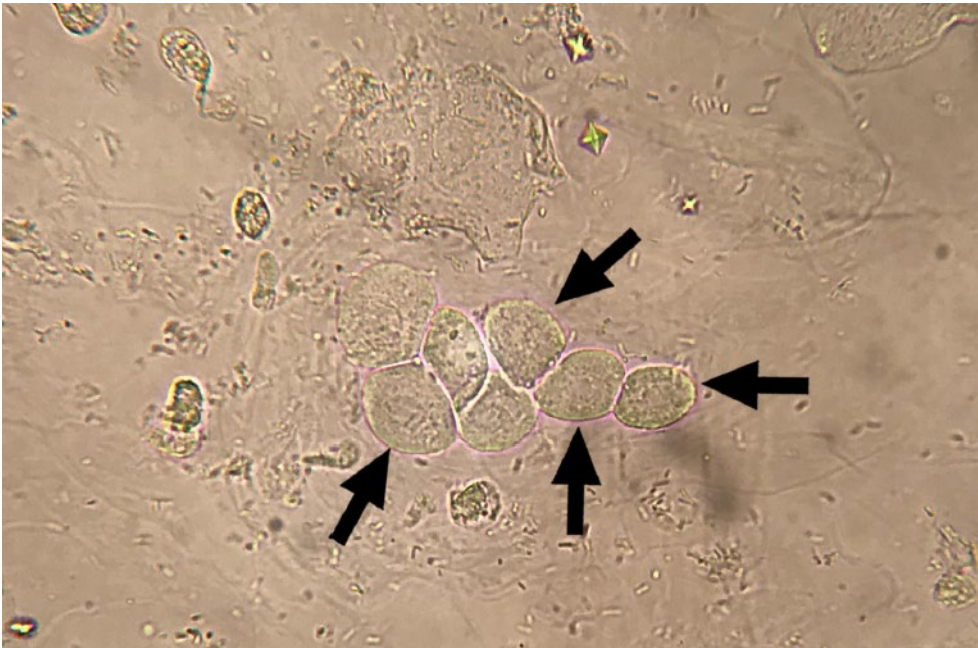
### Case History CMP-13 through CMP-15

This urine sample is obtained from a 55-year-old woman after removal of a urine catheter. Laboratory data include: specific gravity = 1.025; pH = 6.0; protein and leukocyte esterase = positive; glucose, ketones, blood, and nitrite = negative. Identify the arrowed object(s) on each image.

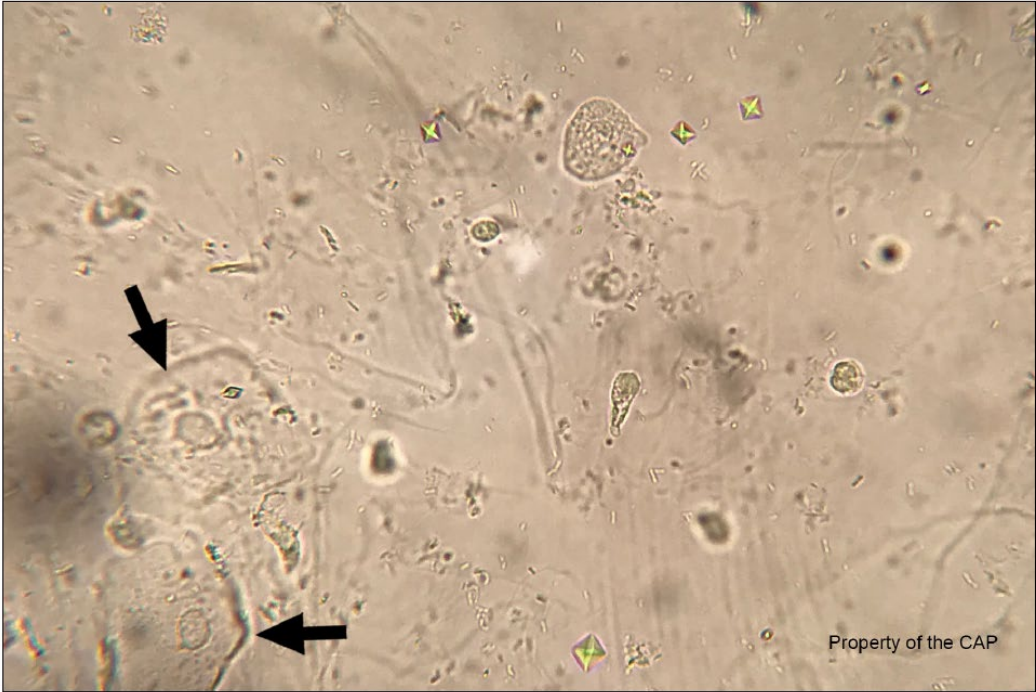
#### CMP-13



CMP-14 (this image blown up slightly)



CMP-15



What were your opinions?

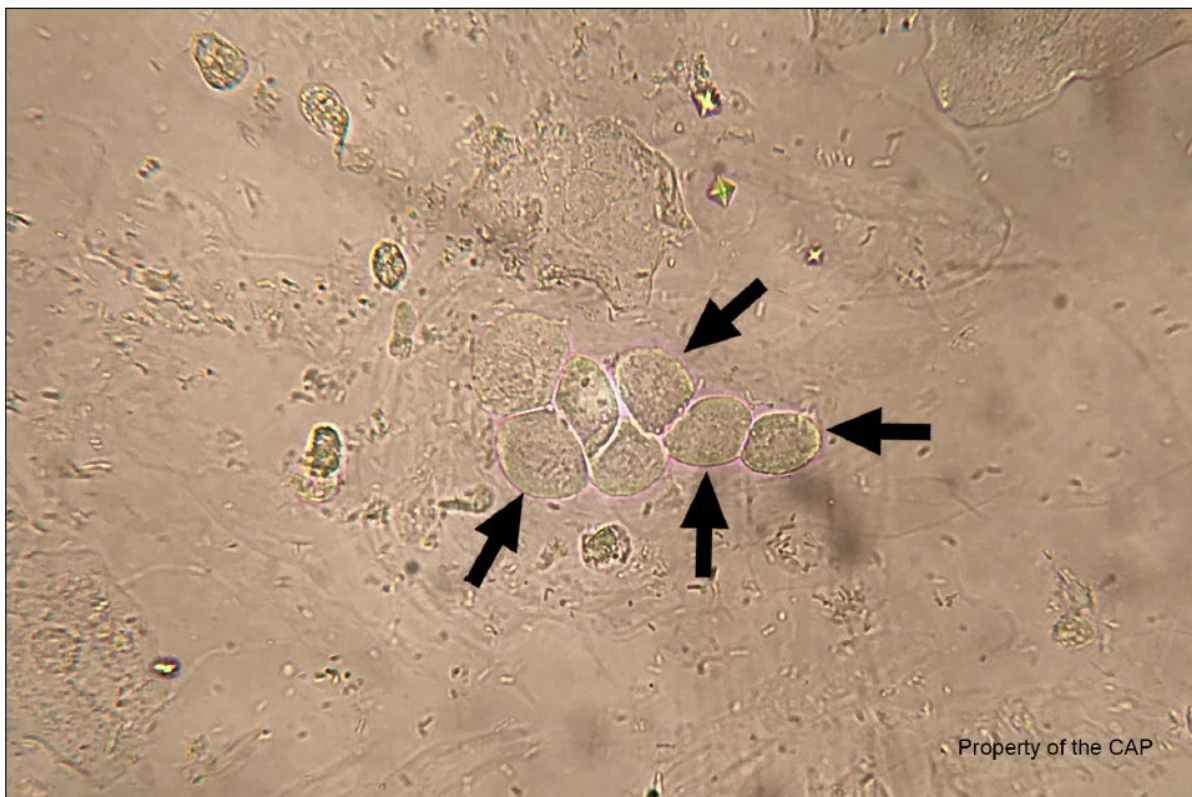
CMP-13 was identified as Bacteria.

CMP-14 was supposed to be Transitional Epithelial Cells

CMP-15 was identified as Squamous Epithelial Cells

We were part of the 25% of participants (and 23% of referees) that identified CMP-14 as Renal Epithelial Cells. What did you say and why? Here is the image unaltered (was enlarged some above for easier viewing). The primary reason CAP identifies these cells as Transitional Epi's is the fact that these cells are in a "cluster" or "sheet." Transitional cells are more likely to come off in clusters or sheets from the ureteral walls.

**CMP-14**





We were torn between the two choices (transitional vs. RTE), but went with RTE due to the sizes of the nuclei (fairly large) compared with the overall size of the cell (fairly small). The protein was also positive from the dipstick results (though it doesn't say how large). Both of these are more expected with RTE cells.

The cluster of cells, and the slightly odd shape of the cells are the largest clues that these should be identified as Transitional Epithelial Cells. Also, any urine involving a catheter (this one collected while removing catheter) is FAR more likely to contain transitional epithelial cells due to the tubing scraping the inside of the urethra.

Please review the pages from the CAP participant summary document (following). Then, take the 1 question test to confirm you have reviewed this document. We will not test on images at this time, but I will be reviewing random urines that have transitional or RTE cells documented for a couple months. If necessary, we will do further education at that time so that we equilibrate our resulting determinations.

If you want further images, please consult the urinalysis books within the lab. It is very difficult to find good RTE images on the internet.

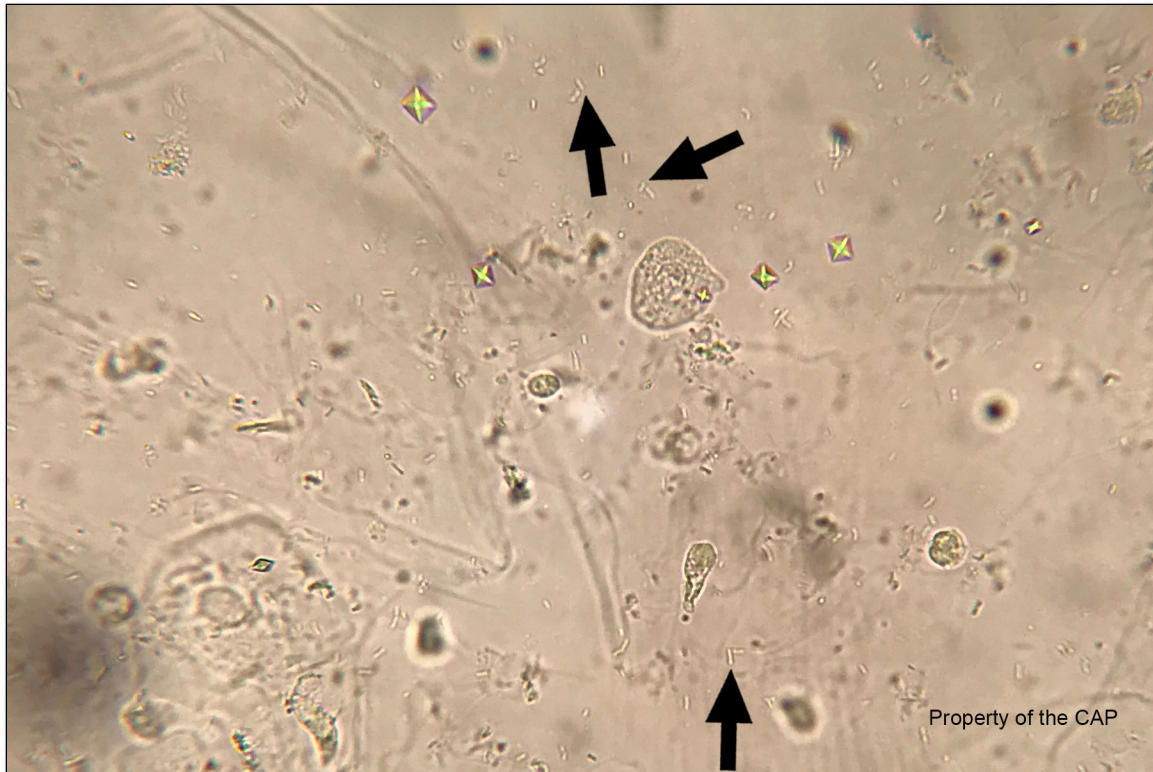
## Urine Sediment Photographs

### Case History CMP-13 through CMP-15

This urine sample is obtained from a 55-year-old woman after removal of a urine catheter. Laboratory data include: specific gravity = 1.025; pH = 6.0; protein and leukocyte esterase = positive; glucose, ketones, blood, and nitrite = negative. Identify the arrowed object(s) on each image.

(URINE, UNSTAINED, HIGH POWER)

#### CMP-13



Identification	Participants		Evaluation
	Freq	%	
Bacteria	6133	99.6	Good

The encircled arrowed organisms are bacteria, as correctly identified by 99.6% of participants. The rod shape of the small sized organisms can be seen and are typical of gram-negative enteric bacilli that are the most common cause of urinary tract infections. The concomitant presence of white blood cells and leukocyte-positivity are also consistent with a urinary tract infection and may be used to reflex a urine culture analysis in some laboratories. Although nitrite-positivity is associated with gram negative bacteria, urine samples are often negative for nitrite in patients with clinically significant urinary tract infection with culture-confirmed pathogenic gram-negative bacilli as happened in this case. This is because urine must be in the bladder for a few hours with sufficient nitrate from dietary vegetables for the conversion reaction to nitrites to take place. Therefore, negative nitrites should never be used to exclude a urinary tract infection.

## Urine Sediment Photographs

### CMP-14



Identification	Referees		Participants		Evaluation
	Freq	%	Freq	%	
Transitional epithelial cell (Urothelial cell)	37	72.5	4585	74.5	Non-consensus
Renal tubular epithelial (RTE) cell	12	23.5	1304	21.2	Non-consensus

This challenge will not be graded as neither referees nor participant responses reached 80% consensus.

The arrowed cluster of cells are transitional epithelial cells, as correctly identified by 74.5% of participants and 72.5% of referees. The cells are identified as medium-sized (20 - 30  $\mu\text{m}$ ) round epithelial cells with well-defined cell borders and round well-defined central nuclei. Transitional epithelial cells are also referred to as urothelial cells because they line the urinary tract from the renal pelvis to the distal part of the urethra in the male, and to the base of the bladder in the female. Clusters or sheets of transitional epithelial cells are seen with catheterization, bladder washings, or urinary tract infections.

The arrowed cells were incorrectly identified by 21.2% of participants and 23.5% of the referees as renal tubular epithelial (RTE) cells. Compared to transitional epithelial cells, RTE cells have a higher nuclear-to-cytoplasm ratio, more angular/flat cell borders, more granular cytoplasm, and may have polarized features such as an eccentric nuclei or microvillus border. The cytoplasmic and nuclear borders of RTE cells are less distinctive. Transitional epithelial cells are more likely to cluster, as seen in this image, than RTE cells. Since these features are variable and overlap to some degree, distinguishing RTE from

## **CMP-14, Cont'd**

transitional epithelial cells can be challenging as shown by the results of this survey. Since RTE cells are associated with acute tubular necrosis while transitional epithelial cells are not, there is clinical value in learning how to accurately identify these cells in urine.

The arrowed cells were incorrectly identified by 1.7% of participants and 2.0% of the referees as leukocytes. Leukocytes are substantially smaller with a lower nuclear-to-cytoplasm ratio.

Squamous cells (directly above the arrowed cluster and in the lower right corner) can be seen in the image for comparison. The squamous cells are larger, have a small condensed nucleus, cytoplasmic granulation, and have a cell membrane with curled or folded edges.



## Urine Sediment Photographs

CMP-15



Identification	Participants		Evaluation
	Freq	%	
Squamous epithelial cell	6061	98.4	Good

The arrowed cells are squamous epithelial cells, as correctly identified by 98.4% of participants. They are identified as being large (50  $\mu\text{m}$ ), flat cells with well-defined cell membranes bearing folded edges, cytoplasmic granulation, and a single small, condensed, oval central nucleus about the size of a small lymphocyte. A few squamous cells are seen in most normal urine samples. Their presence has little clinical significance.