

Aug 21st Advises shipment of Water, Aug 21st CCXXXII.

Aug 23rd Promised to send Saline Water from Little Rock LXXXII.

Anxious to forward waters speaks of their undergoing
remarkable changes. CCCX. In that from the spring
at Helena.

XLIX. Aug. Promised to forward pos' of Mississippi River
water.

Oct 14th CCCCCXXIV. Wishes to be advised of the analysis, & of
their safe arrival.

Oct 15th As to the waters you will find notes of them.
The waters were sent from Memphis.

Oct 20 A cloud of apparently organized matter like "Mother
in Vinegar" is forming, and although clear when
bottled there is a dense deposit. In that of the Ark's
wine to Fort Smith it is perfectly black.

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Copy of Original Notes addendum to
Report on water made by Dr. Gauthierman before
U. S. San. Comd. Camp Shaeffer on Stoner River
near Mifflinburg Penn. May 19th 1863.

Sir.

While you were here last you requested me to report to you the results of a microscopic examination I was making of the water of Stoner River in a sanitary point of view. Without any apology for the meanness of this report I will give as briefly as possible the revelations of the instrument & the deductions, ^{which} I have ~~made~~ drawn from them. The specimens of the water examined have been taken from the main channel where the water was deepest in order that the observations may not be biased by shore influences. Observations of the water made at different times of the day give very different results, from the fact that through the day thousands of men are bathing and washing their clothes in the River & more than 15,000 horses & mules are watered & washed there, while in the night the water is undisturbed. In the early morn the water is clear & comparatively free from filth while in the after part of the day, not a drop can be put on the field of the instrument that does not show flakes of soap ends - the water runs over lime-stone rock, & is what is called hairy scales of epidermis & cuticle of man & beast & particles of excrementitious matter.

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At one time I was surprised to find the water full of hairs & a close examination convinced me that they were those of horses & mules, & tracing up the stream for some distance, I found above the camp a number of bodies of mules & horses in the river. Representing the matter to our Med. Director of Dist. Surgeon Griffiths, he had them immediately removed, & since that no more have been found than would result from watering the animals in the river.

The stream is very low & the water loaded with debris of animal & vegetable matter & we should expect to find a very large amount of ~~as~~ amalacules. This we found to be the case specimens taken from the deepest pools in the stream are literally alive with these organisms. the water being nearly as much filled with them as a way side ditch. Not a drop has been examined that has not shown the slime, or microscopic rust (I have no books with me & can not give names of organisms) beautifully showing its jointed character, & modes of reproduction by egestation. The water of Stone's river is as good as that of any other small stream when low & having as many causes of contamination but when I first came to this camp I was surprised to find so many cases of diarrhoea among the troops, & after searching in vain for the cause was led to an examination of the water used for drink-

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ing. None but river water being then used, & I was convinced that this was the true cause.

In these examinations I have been aided by Asst. Surgeon Hanson of the 43rd Ill. Inf'y - & Asst. Surgeons Brown & Collins of my own regiment, & we all came to the conclusion that the water of the river must be a fruitful cause of disease. After showing the water & the instrument to the Commanding officers of these regiments & the Medical officers of some others a change was made, & springs of remarkable purity have been found sufficient for the wants of the Brigade. Since this change the cases of diarrhoea have nearly disappeared confirming our theory of the causes. It may be that in other portions of the army the same conditions may be found to obtain, & examination of the water though apparently clear & good may reveal the same causes of disease. I will state further that the improved health of the Brigade has been a cause of remark at Head Quarters.

Notes on Water.

All new troops when using the water of the Mississippi river, suffer from diarrhoea particularly when the river is high & the water loaded with deposits. The effect is greatly lessened by either filtering or boiling the water. leading to the belief that it is the earthy and vegetable matters suspended in the water that irritate the mucous membrane. I have on several occasions when making autopsies found the rugae and villi of the stomach & intestines covered with a dense deposit which on a microscopic examination proved to be the mud of the river water. This must act as an irritant, The same is true of all the offshoots of the Mississippi when at flood lights. During the fall & winter of '61 & '2, while stationed at Cairo, Ill., and Birds Point Mo. I had a very large number of cases of Diarrhoea & ~~typhus~~ malarial fever under my charge & the patients all complained that the river water increased the diarrhoea. I had filters made from old barrels with charcoal & gravel. The water thus filtered was found to agree much better with the men, & many cases of diarrhoea recovered without any medication. In April '62. when the army went up the Tennessee River, which was very high the men on the transports all suffered from diarrhoea. and as the water could not be filtered, the men were encouraged to boil all the water they used. this wa-

* But very unhealthy. Encamped in July 1862 on a branch
of the Nasconbin River the water of which was cl.