Antique hydraulic telegraph: tranmission rate in experiment

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Antique hydraulic telegraph is a device for communication which used in Ancient Greece in 4th centure BC. It is described in books of Polybius with reference on Aeneas Tacticus, according to him [1]: "… should procure two earthenware vessels of exactly the same width and depth, the depth being some three cubits and the width one. Then they should have corks made a little narrower than the mouths of the vessels and through the middle of each cork should pass a rod graduated in equal section of three finger-breadths, each clearly marked off from the next... Next, he tells us to bore holes in both vessels of exactly the same size, so that they allow exactly the same escape.

Then we are to fill the vessels with water and put on the corks with the rods in them and allow the water to flow through the two apertures. When this is done it is evident that, the conditions being precisely similar, in proportion as the water escapes the two corks will sink and the rods will disappear into the vessels… Now whenever any of the contingencies written on the rods occurs he tells us to raise a torch and to wait until the corresponding party raises another. When both the torches are clearly visible the signaler is to lower his torch and at once allow the water to escape through the aperture. Whenever, as the corks sink, the contingency you wish to communicate reaches the mouth of the vessel he tells the signaler to raise his torch and the receivers of the signal are to stop the aperture at once and to note which of the messages written on the rods is at the mouth of the vessel."

Hermann Alexander Diels presumed that tranmission rate of such device is about 20 signals per hour [2].

We wanted to prove it by experiment. We made 2 models of hydraulic telegraph and transferred signals form 1 to 24 randomly by them. The experiment was carried out in Malakhit and Elizarovo, Orekhovo-Zuevo province, Moscow region [3].

There are the following results:

- We transferred 100 signals for 2 hours and 2 minutes, i.e. transmission rate was about 50 signals per hour – much faster, than Hermann Alexander Diels presumed.
- 93 signals were corrrect and only 7 – incorrect.
- We worked out experience of transmission quite well, the last 30 signals were transferred without any mistake.

In addition we found options for acceleration of transmission for the antique hydraulic telegraph, and it is subject for the following articles.

Reference list:

1. Polybius. The Histories / Book X, 44-45.
2. Wikipedia: ru.wikipedia.org/wiki/Водяной_телеграф (observation date: 01.09.2016)
3. Куликова М.А. Античный водяной телеграф: экспериментальное исследование скорости передачи данных // Евразийский научный журнал. – 2016. – № 8.