

*To a distinguished colleague, with the authors' love,  
Hager*

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## AN ORDER FOR NAILS\*

P. Oxy. Inv. [29] 46/A (1-3) (a)

7.5 x 7.2 cm.

Late Third Century

This papyrus contains a virtually complete order for nails sent by Andromachos to Theon, on behalf of the *hydroparochos* Dioskoros. It is complete except for some holes in the blank left margin and a few small holes in the text. It can be dated by the handwriting to the late third century or perhaps slightly later.<sup>1</sup>

The form of the text is a straightforward order after the prescript. The text is much abbreviated, but can be restored without much difficulty. Andromachos requests Theon to provide the *hydroparochos* Dioskoros son of Philon with a half measure of ἤλοι κρικωτοί, "ringed" nails. These are to be used to repair the μηχανή, or waterwheel, of the *hydroparochos*.

There are several problems in understanding the text. One is the meaning of the adjective κρικωτ(ῶν), whose formation from κρίκος is easily seen but whose precise significance is uncertain. The word is found only once in published papyri, in a form read by the editor as κρικωτῶν.<sup>2</sup> This text is a listing of accounts which includes the price of 20 κρικωτοί paid to Horeion the τέκτων. We must understand a noun after κρικωτῶν here, since the word itself can hardly be one; it is not impossible that ἤλοι were meant here. It is interesting that shortly after this entry there is a reference to a μηχανή, a fact which led the editor, Varcl, to think that κρικωτ(οί) might be a "ringförmiger Bestandteil einer hölzerner (Bewässerungs-) Maschine."<sup>3</sup> In any case, Varcl's text does not advance our understanding of the term very much because of its obscurity of meaning. Nails and rings are found separately elsewhere from texts relating to waterwheels, even from the same text, but not in the form

\*I wish to thank P.J. Parsons, J.D. Thomas, and E.G. Turner for their help in preparing this text during the 1968 Summer Program in Papyrology in Philadelphia. I am grateful to the Egypt Exploration Society for permission to publish this papyrus, which will be republished with serial number in a future volume of the Oxyrhynchus Papyri.

1. Parallels may be roughly drawn to PGB 37b and 38a, dated to 274 and 314 and to Seider, *Pal. Gr. Pap.* Taf. 29, from 292/3.

2. SB 9408, 2.66

3. Originally published in *Listy Filologicke*, Eunomia, suppl. to vol. 80, 1957, p. 78 (Inv. No. 115 recto, Sp. IV).

of this document, with one adjectival and modifying the other.<sup>4</sup>

A possible solution for the phrase lies in the nails with ring heads which are known, if not common, from antiquity.<sup>5</sup> These consist of a regular nail which divides near the top into two prongs which form roughly a circle and then meet again; on some there is a further straight portion topped by a head. The possible use of these "ringed" nails will be considered below in the discussion of the functioning of a μηχανή.

The term μηχανή in the papyri generally means a piece of equipment used to facilitate irrigation. It is mentioned on a large number of documents, particularly on leases of land, mostly if not exclusively from the Roman period and after, with some as late as the seventh century. The μηχανή is nowhere described in the papyri, though if *P. Harr.* 80 were complete we might know more. Among the items involved in the μηχανή and mentioned in our texts are the ἄξων, the axle; τροχός, wheel; κρίκοι, probably ropes; ἥλοι; a κυλλὰ κυκλά, a "crooked wheel"; and ἐργάται, normally translated "capstans" or "windlasses." The nature of the functioning of the last two is quite uncertain. The μηχανή, from what evidence we have, seems to fit the description of the "Sakija" in use in modern Egypt.<sup>6</sup> This machine consists of a cogged horizontal wheel turning a vertical cogged wheel which is axially attached to a wheel with clay pots fastened onto it. The horizontal wheel is moved by an ox or buffalo attached to a pole, and its vertical axle kept steady by a cross-beam overhead fastened to piles of masonry on either side. The buckets scoop water up from the river and empty their contents into a trough which takes the water into irrigation ditches when the wheel turns.

It may be possible to identify the ἐργάται with the cogged wheels, and this may perhaps also be the meaning of κυλλὰ κυκλά. It seems less probable that they were the axles. Texts exist in which two of them have been received for use in one machine, in one instance both large, in the

4. Nails and rings are both mentioned in *P. Lond.* 1177 (Vol. III, p. 180, lines 231 and 233), a listing of expenditures by the water commissioners of the metropolis of the Arsinoite nome. *P. Oxy.* 147.2 mentions the receipt of a κρίκος to be used in the running of a μηχανή, and the same use appears in *P. Oxy.* 2015.3, 4; the meaning may be "rope."

5. See Daremberg-Saglio, *Dictionnaire des Antiquités*, vol. 1:2, p. 1240, fig. 1607-1610.

6. For a picture of this "Sakija" in modern Egypt, see Eliot Elisofon, *The Nile*, New York, 1964, p. 285. There are extensive drawings and description in J. Barois, *Irrigation in Egypt*, 1887, (English trans. Washington, 1889).

other one large and one small.<sup>7</sup>

It is hard to say what use the "ringed nails" might have had. It may be suggested that the ropes which held the necks and bases of the clay pots were attached to the ringed heads of these nails, which would be pounded into the surface of the waterwheel.

Finally, there is the question of the role of the *hydroparochos*. He appears to have been a specialized worker who supervised the operation of one or more waterwheels. In some instances he is clearly a private individual, paid for his services by his clients, cultivators of lands, either in currency or in kind. This private status would not prevent him from working for the public lands, of course, and *P. Oxy.* 2128.2 may indicate public employment for several *hydroparochoi*. In other instances, the *hydroparochos* himself acted as cultivator. Finally, in some texts, particularly later ones, the *hydroparochos* seems to have been in the full-time employ of the very large estates which came into existence in Byzantine Egypt. He still retains his specialized function, however.

The following list contains all references to the ὑδροπάροχος known to me, as well as some references to ὑδροπαροχία, irrigation, which does not always bear the technical meaning which the occupational designation does.

Date A.D.	Text	Comment
137	<i>P. Oxy.</i> 729.13	The H. paid by lessees of land from funds lent by lessor, for supplying water for 1 year, 2000 drachmai
II century	<i>P. Ryl.</i> 322a.3	Mention of ὑδροπαροχία in contract relating to irrigation of land
255	<i>BGU</i> 14, II.7; VI.7	H. supplied with wine and paid wages (?)
258	<i>Arch.</i> IV, pp. 115 ff, No. 1	In Col. I.12, ὑδροπαροχίας, coupled with supply of chaff; Col. II.3, probable reading of ὑδροπαροχίας
283/4	<i>P. Oxy.</i> 2241.12	H. (abbreviated as in this piece) also a cultivator on an estate

7. Two large ἐργάται: *P. Lond.* 774.12; one large, one small: *P. Lond.* 776.8. Both texts come from the estate of Flavius Apion and date from the last half of the sixth century. The μηχαναί are revealed by *P. Harr.* 80 to have been constructed from acacia wood, as is the case in Egypt today (v. Barois, *op. cit.*, p. 77).

Date A.D.	Text	Comment
345	<i>P. Wis.</i> 12.5	H. stands surety for a wine grower, to take over his work if he fails
IV century	<i>P. Oxy.</i> 1590.8	Postscript asks to pressure H. into leasing rights to vineyards which they water.
465 ca.	<i>P. Oxy.</i> 902.3	Man identifies self as H. and cultivator of a piece of land on an estate
512	SB 7369	H. to receive part of lessee's share of produce of land
552	<i>P. Lond.</i> 776.19 (III, p. 278)	Receipt for new parts for a μηχανή from archive of estate of Flavius Apion; mention of ὑδροπαροχία
584	<i>P. Oxy.</i> 137.22	As in <i>P. Lond.</i> 776.19
595	PSI 60.26	Another receipt from Flavius Apion archive for a μικρός ἐργάτης (ὑδροπαροχία)
VI century	<i>P. Lond.</i> 1044.25 (III, p. 259)	H. is mentioned in deed of gift of land, sense unclear
VI century	<i>P. Antin.</i> 105.8	Irrigation to be supplied by lessee
VI/VII century	<i>P. Iand.</i> 50.7	Another receipt for a part, badly preserved (ὑδροπαροχία)
Byzantine	BGU 900.24	H. restored by editor, but corrected by Wilcken ( <i>Arch.</i> IV, p. 121) to ὑδροπαροχίαν; in reference to an orchard
n.d.	<i>P. Herm.</i> 96.14	Mention of ὑδροπαροχία

ὑδροπαροχία is also mentioned in many other texts, such as *P. Oxy.* 1879, 1900, 1911, 1982, 1985, 1986, 1987, 1988, 1989, and 1991.

The question arises in this piece of the relationship of the sender of the letter, Andromachos, to Dioskoros. If the *hydroparochos* was paid for his services, he presumably took care of his own overhead expenses. This would make it unlikely that Andromachos is a landowner whom Dioskoros supplies. If Dioskoros were simply an employee of Andromachos, of course, this difficulty would not exist. Unfortunately, the text gives no

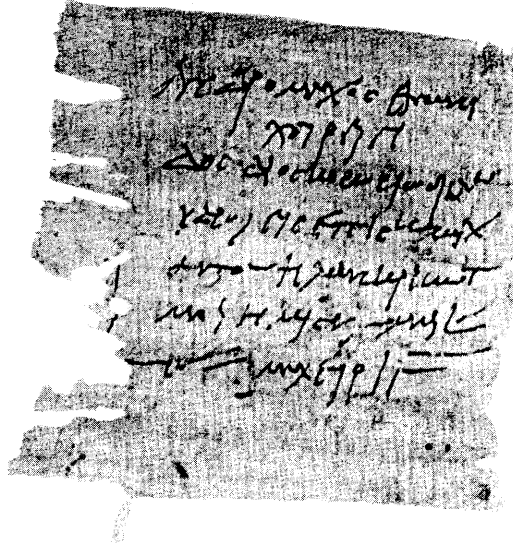
indication of who is paying for the nails, but it seems logical to expect it to be the person ordering them, Andromachos. Andromachos may also possibly have been a retailer sending an order to a nailsmith or an agent.

Ἀνδρόμαχος Θεῶνι  
 χαίρειν.  
 δὸς Διοσκόρω υἱῷ Φίλω(νος)  
 ὑδροπ(αρόχω) εἰς ἐπισκ(ετήν) μηχαν(αῆς)  
 5 αὐτοῦ ἥλων κρικωτ(ῶν)  
 μέ(τρον) ἡμισψ γ(ίνεται) μέ(τρον) (ἡμισψ) ν/ υ |  
 (Ἔτους) β= Μεχείρ ιγ

Andromachos to Theon, greetings. Give the hydroparochos Dioskoros, son of Philon, a half measure of ringed nails for repairing his waterwheel, that is,  $\frac{1}{2}$  measure. In the second year, the thirteen of Mecheir.

6. What the measure is the writer does not specify, but he may be referring to the μέτρον mentioned in *P. Oxy.* 9, v.8 as being the tenth part of an ἀρτάβη, and being itself four χοίνικες. This measure is apparently also referred to in *P. Mert.* 107.11-12.

7. The emperor's name is unfortunately omitted, and the numeral is too low for us to conjecture. The date is February 7.



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An Order for Nails