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WARNINGS, ALERTS AND SIGNAL-SAFETY SOUNDS AND LIGHTS USED BY THE ROMAN ARMY OF THE DANUBE

Abstract: Din cele mai vechi timpuri Dunărea a fost considerată ca fiind o graniţă naturală pe care şi-au asumat-o ca atare, începând de la Alexandru cel Mare, trei imperii: Roman, Bizantin şi Otoman. Începând cu domnia lui Augustus, Dunărea a căpătat o importanţă deosebită pentru Imperiul Roman, forţele militare ale acestuia luând în stăpânire ţărmul de sud al fluviului, inclusiv Dobrogea, şi trecând Dunărea sub controlul absolut al flotei, de la izvoare până la vărsarea în mare. Prezenţa romanilor la Dunăre s-a concretizat prin punerea la punct a unui sistem eficient de alertă timpurie şi control bazat pe o rapidă comunicare între unităţile staţionate în fortificaţiile construite de-a lungul fluviului. Sistemul de alertă şi comunicaţii roman a beneficiat de toate resursele de gândire şi experienţă militară acumulate de societăţile antice, în special de cea greacă şi de cea latină, la care s-au adăugat invenţii, idei şi moduri de acţiune preluate din lumea orientală. Conştienţi de faptul că o rapidă şi eficientă circulaţie a informaţiei este crucială pentru câştigarea oricărei confruntări militare, romanii au introdus în propria armată un înalt grad de gestionare a informaţiei şi de profesionalism în transmiterea ei aproape în timp real. Adoptarea codului lui Polybios, aşa numitul «*cod patrulater*», bazat pe o grilă de formă pătrată, alfa-numerică, cu al cărei ajutor puteau fi transmise codat informaţii prin folosirea sunetelor, steguleţelor, semnalelor cu fum, torţelor, oglinzilor sau lanternelor, a dat armatei romane un avantaj deosebit asupra oricăror inamici potenţiali. Sistemul de alertă timpurie era funcţional, similar şi standardizat în toată armata romană, ceea ce face ca sursele de informare de care dispunem - fie că acestea sunt literare, artistice sau informaţii de ordin arheologic - să se coreleze şi să se coroboreze în mod fericit pentru a recrea sistemul de comunicare şi avertizare roman pe timp de pace şi pe timp de război. Mijloacele utilizate de armata romană au fost perfecţionate prin eficientizare, fiind totodată menţinute la nivelul de simplitate operaţională care putea oferi aproape oricărui soldat, cât de cât instruit, posibilitatea să le folosească în parametrii ceruţi de nevoile armatei şi ale civililor. Misiunile flotei, ca şi misiunile armatei terstre, înglobau sarcini de comunicare ce aveau scopul de a preîntâmpina, întârzia şi stăvili orice atac, de a salva, în ultimă instanţă, vieţi ale militarilor şi civililor precum şi cât mai multe bunuri materiale. Textele antice prezintă informaţii disparate despre sistemul de comunicare, avertizare şi alertă timpurie utilizat de armata romană, fie datorită unei treceri cu vederea a acestor aspecte pe care anticii care le trimit în subsidiarul naraţiunii pentru a se concentra asupra problemelor politice, fie având conştinţa, ca Vegetius, că trebuie să le treacă sub tăcere pentru a nu dezvălui secrete inamicilor. Monumentele artistice ale antichităţii au şi ele mari lacune în redarea unor amănunte ale existenţei cotidiene, a căror importanţă le scapă, sau pe care nu le pot reda datorită constrângerilor artistice de spaţiu. Cu toate acestea, încercarea de a reface un *puzzle* din *teserae* disparate, cum sunt

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informaţiile despre semnalele de alertă şi siguranţă, avertizările acustice şi vizuale utilizate de armata romană de la Dunăre, este nu numai posibilă, dar şi necesară.
Keywords: warnings, alerts, army, roman.

The potential of the Danube as a natural border - where the navy played a decisive role and had demonstrated a huge potential on hostile and alien soil - was emphasized by Alexander the Great during his Thracian campaign of 335[1].

The attack of the Macedonians across the Danube had the constitutive elements of speed and surprise. In this respect is obvious that the Getes of the north bank were not advertised of the Macedonians' intentions, nor of their capacity to cross the river with their pedestrians and part of cavalry mounted on boats[2]. According to the same text Alexander was supported by some ships which arrived in theatre via Black Sea. He also found on the shores of the Danube enough boats to transport over the river a part of his army and to realize the element of surprise. The rapid crossing of the river allowed him to advance unharmed in the north bank territory and to march against the Getes who opposed him an army of about 10.000 pedestrians and 4000 cavalry men.

The ancient literary sources are giving some details about the time of the day when the river was crossed by the Macedonian army. The crossing of the Danube took place in the summer time, when the boats were used at large by the indigenous population for fishing and commercial activities. The numerous boats left by the Getes ashore indicates that the Macedonian military action started sometime during the night or in the very early morning when was still dark, a fact confirmed by the ancient sources. The entirely action was coordinated and successfully finalized, presuming the existence of a well done embarking, cross and debarking of the troops and - by consequence - the existance of a good system of communication based perhaps on a silent light advertising signals.

The total absence of surveillance of the river and the absence of an alert system deprived the Getes to prepare a better resistance at the crossing point and allowed the Macedonians to march through the rich crops until they were discovered by the enemies in the open field, not very far from their earthen wave fortified settlement, perhaps today Zimnicea[3].

From this episode we can take two conclusions:

1. the south and north banks of the Danube were not guarded by the Getes during night time because the river was not perceived like a border;

2. the north bank Getes did not establish a system of early alert which presume the establishment of advanced observation points and a system of communication with light and sound signals.

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[1] Marianna Koromila & alii, *The Greeks in the Black Sea from the Bronze Age to the Early Twentieth Century*, ed. Panorama, Athens, 1991, p. 99.
[2] Arrian, Anabasis I, 4,1.
[3] For this identification see A. D. Alexandrescu, *Autur des fouilles de Zimnicea*, in *Thracia*, no. 3, 1974.

Alexander returned to the south bank after he vanquished the Getes, taking the Danube till the north branch of the delta as a border of his conquest and claiming all the territories of the south bank as part of his empire, including Scythia Minor with the autonomous Greek colonies and *emporia*.

In fact, Alexander defined at that moment the natural border for three consecutive empires: the Roman, the Byzantine and the Ottoman.

During the reign of Burebista, the Danube becomes an internal river of his *archè* - empire. It is obvious that during Burebista's reign the river was undisputed controlled by the Geto-Dacian army. Better equipped, better organized and with an alert system more elevated, different from that of Alexander's time, having an efficient apparatus of information formed by spies and informers, Burebista's army could manage all the strategic situations on the Danube. Even after the death of the Dacian king, in 44 B.C., the Danube remained under an effective control of the barbarians, who were "*masters of the land and river*"[4]. For exercising their authority on the river at the end of the first century B.C, the barbarians had to be not only in control of the Danube's shores, but as well in control of the navigation along the river and inside the delta where the Bastarns probably had the potential of navigation enough developed to intercept the fishing boats and even the commercial ships belonging to the Greeks of the Black Sea.

Till Augustus, the Romans did not take into consideration the Danube as a border. Starting with the period of Augustus the Danube become one of the main targets of the Roman Empire's strategy and the main element, in fact the main road, structuring the so called *Danubian limes*[5]. Pushing the border to the Danube, the Romans pushed the system of defense to the new border of the Empire. They built up on the south bank *castrae*, *castelae* and *vigillarium*[6] and started the effective control of the river with the direct support of the fleet.

Immediately after the great rebellion of Dalmatia and Pannonia against Romans (6-9 A.D.) came to an end, the entirely Danube, from the origin to the delta entered under control of the Romans. In 9 A.D. was established *classis Pannonica* as patrol force with an area of competence between *Castra Regina* (Regensburg) and *Singidunum* (Belgrad)[7]. The activity of *classis Pannonica* completed the activity of the Danubian fleet established earlier[8], which patroled the

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[4] As states the decree of Aristagoras, son of Apaturios - AEM, VI, 1882, P.36, No.78=Syll.3, 708, r. 44-46 - emitted by the Greek colony of Histria.

[5] The definition of *Roman limes* gave by Giovani Forni, in E de Ruggiero, *Dizzionario Epigrafico di antichita Romane*, IV, fasc, 34, Roma, 1959, p.1086, is concise, clear and is covering all aspects of this problem:"*the limes is a road, or a network of roads, guarded by the troops which are marching on it, assuring the link between different military units*…"

[6] *Vigillarium* or *specula* are the Latin denominations of the watching towers.

[7] H.D.L.Viereck, *Die Romische Flotte, Classis Romana*, MBH, Herford, 1975, p.255.

[8] Probably in 15 B.C., but is possible that the Danubian fleet was made in 29 B.C., after Geto-Dacian kings Dapyx and Zyraxes were defeated. For this discussion see Cristian Matei, *Raportul dintre Classis Flavia Moesica si fortificatiile limesului*, in *Pontica*, XXIV, Constanta, 1991, p. 144 and ref. 4.

Danube between Singidunum and delta as well as the West and North of the Black Sea.

In the late first century A.D., the *limes* was reinforced in the territories of the south bank and on the right side of the river, in Scythia Minor, with numerous strongholds, towers and fortifications in order to ensure a viable defense for the settlements under the Roman rule and to give the possibility to the Roman army to initiate operations against the Dacians[9].

In the fourth and fifth centuries A.D. the Danubian fleet was still representing an important tactical asset of the landward defenses[10]. The ancient Vegetius speaking about the missions of *lusoriae navis* on the Danube is using the expression "*reticendum put*o[11]", leaving the impression that he knew more about the missions of the Danubian fleet but his silence was determined by reluctance to discuss publicly details of the operations lest such information could reach an enemy outside the frontier[12].

From the very beginning this system of defense - articulated by the river as the main road of the region - was associated with the patrol activity of the Roman fleet on the Danube as well as with its capacity of military intervention against any force which could challenge the Roman Empire in its possessions over the Danube border. As we can learn from the ancient sources, the missions of the fleet were reaching a large diversity and contributed to preserve the political and economical development of the Danubian region.

The naval units were charged at peace and at war with several consistent missions:

- patroling the river during the navigation time[13] in order to observe any suspect concentration of military forces made by potential enemies;
- spying out conflicts or an opportunity for enemies' expeditions in the Roman territories[14];
- signaling to the Roman forces settled in the fortifications of the *limes* any attempt of potential enemies to cross the Danube border;

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[9] For the main fortifications of the Danubian *limes* in Scythia Minor and their relations with *Classis Flavia Moesica* see Cristian Matei, *op. cit*., pp.147-158.

[10] As we can understand from the Vegetiu's discussion about the Danubian fleet, book IV, XLVI.

[11] *Ibidem*.

[12] P. D. Emanuele, *Vegetius on the Roman army: Translation and commentary*, Book Four, 31-46, Bachelor of Arts paper, British Columbia University, November, 1974, p. 109.

[13] The navigation season on the Danube started in the early spring, March or the beginning of April, and was ended according to the weather conditions sometime in the late fall, in October. Cristian Matei, *op.cit.*, p.145. See also the seasons of maritime navigation mentioned by Vegetius, *De Re Militari*, book IV, XXVIIII. According to the specific weather conditions the Romans used to sail even in the winter time. In this respect J. Rouge, *La navigation hivernale sous l'empire romaine*, in *Revue des Etudes Anciennes*, no. 54 (1952), pp.316-325.

[14] *Codex Theodosianus*, 7, 17.

- making the first contact with the enemies who might attempt to cross the Danube with any boats and/or floating crafts[15];
- transporting military supplies and carrying troops in any troubled area[16] along the Danube;
- transporting members of the *officia*, *exploratores*[17], to the points of call;
- preventing the civilians in due time of an imminent attack in order to save their lives and goods[18];
- carrying military written and verbal orders and civilian correspondence;
- checking, controling and calling for custom the commercial ships on the Danube[19];
- transporting medical supplies and/or *immunes*[20] when and where they were needed;
- transporting officials of the Roman Empire or ensuring the escort for their ships.

In the war time the Romans used to be more precautious than at peace in terms of troops' readiness for enemy engagement. The Danube - as main part of the Dobroudgea *limes* - was the main obstacle facing the barbarians. In war time the mission of the fleet was at high in order to create the first alignment of battle and the first heavy armed obstacle to confront the invasion started from the territories over the Danube.

The first and the most efficient measure adopted in such circumstances consisted in the establishment of a no-sail zone for any other vessels, excepting those under the Roman rule or command. The naval units were alerted on the whole course of the river and were in service day and night.

The establishment of such a zone required a persistent surveillance of the river, on each segment between the strongholds and fortresses of the limes,

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[15] For other methods of sailing in crossing a river, including rafts sustained by empty clay recipients, or leather filled with air or other lights materials, see Arrian, *Anabasis,* I, 4,1; Plinius, VII, 57, 15; Caesar, *De Bello Gallicum*, VI, 35; Vegetius, *De Re Militari*, book II; Ashmolean Museum, catalogue, Oxford, pl. XXVI, n. 262.

[16] Tacitus, *Annales*, 13,53; Trajan's Column, scene II.

[17] For the activity related with *exploratio* see N.J.E. Austin and N.B. Rankov, *Exploratio. Military and Political Intelligence in the Roman World from the Second Punic War to the Battle of Adrianople*, New York, Routledge, 1995.

[18] Vegetius, book IV, XLVI: "*I think I ought to say nothing about the* ***lusoriae navis*** *on the Danube that protect the farmlands with daily patrol".*

[19] At Capidava, where the port installation has been entirely excavated (see Cristian Matei, in Cultură şi Civilizaţie la Dunărea de Jos (CCDJ), Călăraşi, 1988, no. 3-4, pp. 95-101 and LXI-LXVIII; *idem*, CCDJ, no.9, Călăraşi, 1991, pp121-141; *idem*, Pontica XXIV, pp.150 - 152) for the 3rd century A.D. are atested a custom office (ISM V, no.10) and a *statio* of *beneficiarii consularis* (Gr. Florescu & alii, *Capidava I,* 1958, pp.107-108., no 29).

[20] *Immunes* were trained specialists (surgeons, engineers, architects, *exploratores*) and legionary soldiers and they were exempt from camp labour and dangerous tasks. See D.A. art. *Immunes*.

enabling capabilities and an interception capability to visual identify violating boats and/or any floating crafts which could be used by the enemy to cross the Danube. Response to violation could escalate from verbal and visual warning to use of force, depending upon the rules of engagement.

Once in force, a no-sail zone could endure for a lengthy period of time until military means established a lasting settlement through the enemy's crushing, or until the imminent peril disappeared.

Another mission of the Roman army, including the fleet, was that of protecting the civilians and – as possible - their goods. Usually, the civilians are trying to move away from the dangerous battle fields, or to ask for sanctuary inside the military fortresses and strongholds in their proximity. For that, they have to be prevented in due time of the imminence of an attack in order to organize their escape from the dangerous area or to have organized entrance and temporary settlement inside the walls of the military fortifications. In both cases time is playing a crucial role and their salvation depends of the fast circulation of information.

In the fleets, as in any legions, does exist a number of *exploratores*[21] and *beneficiarii* with missions of intelligence. As the ancient sources are stating, *exploratores* used to deliver information directly to *officia* (to the governor of the province) but they were charged also with the mission to inform by any means the military units about any potential attack or revolt[22] in their area of activity. As revealed by some literary sources, they used to sent visual signals and warnings when the situation could not permit some other way of communication.

The Roman defense system on the Danube *limes* was articulated, consistent, efficient and interrelated, including all military terestrial and naval units sharing responsibilities for the protection of the south bank provinces. In this respect the communication between the components of the system were essential and used all means of alert and all visual and sound signals and warnings the classical Greek and Roman antiquity invented to transmit information at distance:

1. *sound warnings* including: verbal warnings, whistles, horns and drums;

2. *visual signals* using: coloured flags, crafts reflecting natural and artificial light, lamps, open fire and smoke;

The combined sound and visual warnings, as well as the signal-safety lights, were transmitted from terrestrial military unit to terrestrial military unit, from naval unit to naval unit, from naval units to shore's fortifications and from shore's fortifications and settlements to naval units. After reception, the signals and warnings were retransmitted to the unavertised military units and/or settlements locations on the same shore, across the river or to the settlements and military units inland.

Among the sources of information which are permitting to recreate - even partially and hypothetically - an image of the temporary alert system and military

[21] Above reference no. 17.
[22] *Ibidem*.

communication used by the Roman army on the Danube is Trajan's Column which can be correlated with ancient texts and information offered by the monuments of classical and late antiquity.

Sound warnings and signals are part of the elementary system of Roman's army communication. For communicating at distance, or during the battle, the Roman army used the military trumpets, *cornu* or *bucina*[23], *tuba*[24] and li*tuus*[25]. Buccinatores are represented also on the Trajan's Column playing a preeminent role in the artistic composition[26].

When describing the maneuver of the ships the poetical texts are speaking about pilot's use of *tuba* (*cornu*), but this instrument was merely involved in sacred ceremonies. On board the ships were used *buccina navalis*. According to the ancient sources[27], the military trumpets were present at large in the Roman army which created two *centuriates* of *tubicines* (*cornicines*). At 203 in a legion were no less than 39 *tubicines*[28] serving the infantry (36) and cavalry (3). The trumpets usually gave the order for the attack, retreat, change of sentinels, soldiers executions, lunch time, religious ceremonies, but were also used to advertise of an imminent danger or of the maneuver of the ships when sailing, when calling another ship for custom, entering to the docks or charging the enemy. For each kind of action the coded signal was different and well known by the trained soldiers or by the people in the civilian settlements who were day by day in their proximity[29]. The ancient music's historians are mentioning that a collection of 43 signals are evident by 200 A.D.[30]. The ancient musicians, specialized in signals, were an integral part of military organization and were called *aenatores*[31].

Each large military unit had its own *aenatores* so it could communicate signals and warnings in preventing and advertising the citizens habiting the closest settlement of an imminent attack, or the soldiers in mission outside the fortifications, or alerting some other military units which were not in the area of a visual signal. The advantage of sound warnings and alerts was that of their instantaneous possibility to produce effects. By the experiments made in our time, the use of two or more trumpets together could produce enough noise to clearly alert in dangerous situations the people in an area of 5 up to 10 kilometers in

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[23] D.A. art. *Cornu* and art. *Bucina. Cornu* had a deep loud sound and was blown to give the signal for basic battle formation. *Bucina* told soldiers when lunch breaks were happening.

[24] D.A. art. *Tuba*. The instrument looks like a trumpet and gave precise orders in the battle. It was a signal instrument by excellence.

[25] C. Daremberg, E. Saglio, E.Pottier, *Dictionnaire des antiquités grecques et romaines* (D.A.), Paris, 1877-1919, art. *Lituus*.

[26] See Plate VI.

[27] Titus Liviu, I,43; III, 1. In fact, since the Republic, in the Roman army there were two *centuriates* (160 musicians) of *aenatores*, using different trumpets.

[28] CIL , VII, 2568-2569.

[29] R. Meucci, *Roman Military Instruments and the Litu*us', in GSJ, XIII (1989), pp.85-97.

[30] Richard Riehn, *Strike up the Band,* in *Campaign*, Journaux-Collections.com, Paris, 1983, no. 49, p.13.

[31] Ammianus, 16,12,36.

diameter - or more in the open field - or to transmit coded signals and information at the same distance. Even nowadays the shepherds are communicating so from hill to hill.

The whistles were used daily by the military comanders to signal actions in the battle field or to change the speed level of an action. In the fleets, together with the drumms, the whistles could give the rithm of oaring but were less used in coordinating actions of different ships in the battle.

For increasing the efficiency of sound signals and warnings the Roman army used at large the visual warnings, safety-signals and alert system they created along the Danube.

Polybios invented by 150 B.C. an amazing code of communication with torches, the so called *Polybios square*[32], which stands at the base of cryptography, stenography, Morse code, telegraphy and even the "knock code", system of communication used in today prisons. For the first time in history Polybios suggested in writing the signals could be transmitted by holding up pairs of torches, flashing lamps, waving flags, emitting intermittent sounds or smoke signals. As any useful invention for strengthening the force of the army, the Polybios' *square code* was adopted by the Romans.

A similar code for flags communication, based on that of Polybios, has been discovered imprinted on the Hadrian's wall. This flags code was used both for transmitting information and orders on land and to communicate from land to the ships and vice versa. It might be possible that for different actions or type of information were used different colors of flags but this fact is less important as far as the code was based on number of waves made with the flag. The visual signals of this type had the advantage that were silent and information could be intercepted only by the possessor of the code, and only in his visual range.

In the sunny days were used mirrors which could reflect the light offering to the signals the advantage to be seen at distance[33]. On the Danube the light signals made with mirrors could be easily transmitted between fortifications and naval units in patrol and retransmitted from ships in patrol to some other fortifications or watching points of the shore. Assuming that the distance between fortifications is about 20 km. or less, and that on the hills in the vicinity could be placed posts of guardian-observers without having fortified constructions but only small shelters for the night, the signals could circulate very fast from a point of emission to a point of reception and could be then after retransmitted farther with maximum benefits in terms of troop's readiness and preparation for an imminent attack or danger.

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[32] Polybios, Hist., X, 45.6.

[33] Recent experiments shown that a mirror flash may be seen 48 km. with naked eye. The first record of this kind of signalling was in 404 B.C. when the Greeks signalled with polished shields. The most notorious example of using mirrors for signalling is that of Alexandria light house. According to Abou Haggag Al-Andaloussi, an Arab traveller of 1166 (cited by L. Sprague de Camp, *Great Cities of the Ancient World*, New York, Dorset Press, 1972), he saw the mirror of the Alexandria light-house which was still in function.

According to Vegetius, at least in the late Roman time the ships were using dark colours for the wooden body, for sails - painted in blue - and even for the uniforms of the mariners, *"so that not only at night, but even in the day time, they more easily remain unseen…"*[34]. If in the daylight the ships could be seen by a medium distance, in the dark nights the camouflage of the dark colors painted ships could ensure their anonymity and discreet movement in any action.

For the daytime navigation were used flags for emitting visual signals in the mentioned code. By night, situation was different. It is well known that ancient ships, made of wood and smeared with wax, pitch and resin, were highly vulnerable to open fires. That is way the using of torches aboard was not encouraged, excepting the situations of battle when open fires, including torches, were used in order to attack other ships or floating crafts. The torches were used only to give signals in night time following the rules established for flags' signals in day time[35].

The literary sourcess and artistic monuments of the antiquity are mentioning and depicting another kind of light used by the ships by night, *lanterna* or *laterna*. Roman *lanterna* – which had the specific quality to protect the fire against the wind - played multiple roles, from portable lights to be used by night for walking in the streets[36], sources of light for different rich houses and public places, to position lights in navigation and instruments for signaling actions or information in a commonly agreed code.

As described from the visual art of the antiquity, as well as from the discoveries of such artifacts in ancient sites[37], a Roman *lanterna* could be pretty large and visible from the distance. The *lanternae* which appears on the ancient monuments, including Trajan's Column[38], associated with battle ships seems to have the same system of construction as the *lanternae* discovered in Herculaneum and Pompeii. In fact, the *lanternae* were made in the same manner and with the same materials as the lamps generaly used by all ships in the Middle Age, and even in the modern time. *Lantern* of Pompeii (see fig. 1,1) was made of two circles of

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[34] Vegetius, *De Re Militari*, book IV, XXXVII. This is the unique description of camouflaging used for the ships which exists in the ancient literature.

[35] On a 2nd to 3rd century relief of a sarcophagus coming from Ostia, appears a torch at the back side of a ship, but that may be only an artistic license for the position light. See L Basch, *Le musée imaginaire de la marine antique*, Institute Hellenique pour la préservation de la tradition nautique, Athénes 1987, p.479, fig. 1082.

[36] Ancient representations of Eros on different monuments are depicting the god of mysterious love walking with a *lanterna.* The ancient texts are also abundant in information about use of lanterna carried by slaves or domestic servants to enlighten the road for their masters.

[37] Among the first *lanternae* discovered there are two artifacts made of bronze which were found in Herculaneum and Pompeii. See D.A., art. *Lanterna* ou *Laterna*. One of them here in Plate I, no.1 (drawing after D.A.).

[38] Conrad Cichorius, *Die Reliefs der Traianssäule*, Berlin-Leipzig 1896-1900, LXXIX-LXXX. See here plate II. Another ships' *lanternae* in Plate I, no. 4 (this representation is a spheric one) and no.5.

bronze (the bottom one as a full base), a coverlid and two vertical metal reinforcements. On many monuments of ancient art it appears with a square form[39]. The lid was supported with chains of bronze hanged from a T form piece of bronze and tight with vertical reinforcement metal pieces. We can not exclude the possibility that many chains of bronze attributed by the archaeologist to chandeliers to be at origin parts of *lanternae.* The bottom has a support for the candle or a support for the bronze or clay recipient designated to burn the fuel. The coverlid of the lantern was hemispheric and it permitted the smoke resulted from the combustion of the candle or fuel to be released in the air. The fuel was of vegetal or animal origin and was placed in a special recipient made of bronze or clay. Were also used large candles placed in recipients with bronze frame. The walls of lanterna were made first of thin horn and were replaced in time with glass ensuring the protection against the wind and a higher luminosity[40].

Ancient written sources are speaking about *lanterna* used by the *pretoria navis* to signal their position by night and to keep the fleets together[41]. From the same text we found out that the *pretoria navis* was at the head of the naval formation leading the other battle ships. Dio Cassius was not a practicing sailor and maybe he noted only that the flagship was signaling its position with the *lanterna* hanged on the *aplustre*[42]*,* placed at *pupis,* to be followed by the other naval units. The ancient text is not speaking about the color of the flagships' *lanternae* or about the lights carried by other ships, but there is the possibility that all battle ships were carrying *lanternae* to be identified in the dark and that the flagship had a distinct color for its own *lanterna* in order to be individualized inside the battleships formation. As stated above, *lanterna* is appearing on sculptural monuments of the classical antiquity associated with battle ships and is giving a clear ideea that it was associated with the military communication system by night[43].

There are not many representations of ancient ships carrying a *lanterna*, but this fact is not reducing the importance of this accessory for ancient navigation. As we learned from Trajan's Column's case[44] analysis made in the last decades of the twentieth century on this artifact revealed that a lot of elements (weapons, pieces of uniform and costume, etc.) belonging to the composition were not sculpted in stone

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[39] See plate I, no. 2 and no. 3.

[40] D.A. art. *Lanterna.*

[41] Dio Cassius, XLIX, 17.

[42] The *aplustre* (Lat.), *aphlaston* (Gr.), is usually described as being an ornament fixed at the back side of the ship. The *aplustre* wasn't only an ornament which could create an artistic equilibrium with the *akrostolion* - the ornament over the prow - but as we can judge from the representations of ancient ships on ancient monuments, it had also a precise function permitting the *lanterna* to be fixed on its arms (three or five, reinforced with metal bands between them). For the limited role of *aplustre* see J. Schefferi Argentoratensis, *De Militia navali veterum*, Upsala, 1654, p.156 and 157: "*Aplustre tabulatum ad decorandum superficiem navis ad positum, alii dicunt rostra navis ornamentum pupis*."

[43] See here Plate I, no. 4 and 5; Plate II.

[44] Trajan's Column was investigated in the ninth decade of the twentieth century with X rays revealing the information that the monument was entirely painted.

but painted. The ancient monuments are suffering both conventions and distortions due to the limited space in which the ancient ships were figurate[45] and due to that, many crafts used in navigation were not properly or at all represented. Even in these conditions the appearance of the *lanternae* on certain ancient monuments depicting ships, including Trajan's Column, is a strong argument to determine the assumption that this object was an important one on ancient ships' board and was helping for a more sure navigation and for transmitting signals from ship to ship and from ships to land.

Lanterna was superior to a torch because it could be used in the windy conditions and could be covered with intermittence with a screen or a piece of cloth to form the words and signals of the code in which the information were circulated. The power of light could also be increased with the help of a miror placed beside the *lanterna*.

The legendary light house of Alexandria is famous and well known as one of the wonders of the ancient world being in its time the tallest and the largest construction of this type. Light houses were used at large in all Roman world and we can rightly presume that every sea-port had a light house which was signaling the position of the harbor entrance by night. For the river and lakes ports the general rules were followed. Light houses across the time have more functions than signaling the position of a harbor. They are signaling the distance to the shore or the possibility to accommodate a new ship at the docks, and can transmit messages in a known code of intermittent light to the ships sailing at sea or sailing on the rivers and lakes. Its guardians also can observe with preeminence enemy ships and alert terrestrial or naval units of the army when an external invader was targeting the shore. We may presume that the screens used for a relatively small *lanterna* could be used as well for obstructing with intermittence the lights of the big fires made in the towers improvised as light houses, in order to transmit signals to the ships. Till now, traces of such light houses on the rivers sailed by the Romans were not found, but there are good evidences that they exists in some other forms than constructions dedicated to that purpose.

The best proof of using the light and smoke signals by the Roman army of the Danube remains the Trajan's Column.

From the beginning of the Column's story, the first and the second scene of the monument are revealing, schematic and contracted, the entirely system of watch and warning used by the Roman army of the Danube. According to Cichorius[46] and some other authors[47], the fortifications and watching towers

[45] Lucien Basch, *op. cit*, p.37.
[46] Above, note no. 25.
[47] Frank Lepper and Sheppard Frere, *Trajan's Column. A new edition of the Cichorius plates*, Alan Sutton Publishing Limited, 1988, p. 48.

depicted in these scenes are situated on the south bank of the Danube, in Roman possessions[48].

The system of watching towers has been established under Domitian along the Gask ridge in Scotland and in Upper Germany[49] and perhaps during the war against the Dacians on the south bank of the Danube[50]. As we can see from the Column's scenes I and II[51], these constructions appears to be made of stone or most probably of clay bricks - a rough material which is not resistant in time and more, not resistant to the river's erosion, but which could serve for the purpose of erecting light constructions fortified with wooden palisades in a friendly territory. In time, many fortifications of the *limes* which started likewise were replaced with solid constructions made of stone[52]. That it might be the explanation of the lack of archaeological evidences concerning the first fortifications of the Danubian *limes* represented on Trajan's Column.

In the scenes mentioned above appear seven fortifications followed by a larger settlement. The first two and the last two fortifications represented in these scenes have the aspect of stockade block houses, playing the role of army supply deposits, fact proved also by the presence at their docks of three ships of *linter* or *carabus* type[53] loaded with barrels and ballots to be unloaded here. The first two deposits appears to lay in an area without military activity, in the up-stream of the Danube. We have to observe that the activity of the fleet occurs only in the last two deposits which were closer to the designated invasion crossing point of the river.

Aelius Spartianus is mentioning the fact that "*during this period* (Hadrian's time), *and frequently at other times, in a great many places where the barbarians are separated off not by the rivers but by frontier-barriers, he* (Hadrian) *set them apart by great stakes driven deep into the ground and fastened together in a manner of a palisade*"[54]. The ancient author is mentioning here two specific

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[48] This is a realistic approach assuming that the war started in the moment when the Roman army is crossing the river from this bank to the north bank inhabited and protected by the Dacian army.

[49] For Gask Ridge see: David J. Breeze, *The Northen Frontier of Roman Britain*, London, 1993, chapter 3; S. Frere, *Britannia*, London, 3rd ed., 1987, p. 215.

[50] F.Leper and S.Frere, *op.cit.* p. 48, are considering that these scenes *"are merely imaginative and are aiming to convey the concept of "frontier*". Their supposition is based on the fact that till they wrote the book there were not archaeological evidences of this system along the Danube, the evidences being related with stone constructions of a later period of time.

[51] Here below the plates III, IV and V.

[52] To mention a single case we know very well, we would like to remind that at Capidava, established during Trajan, the lower level of initial Roman fortification – which was mainly made of wood and clay - wasn't evidenced yet. More, in Dacia Hadrian authorised a bieffing-up of defenses along the line of the Olt, in order to contain the Roxolani on the opposite bank. Later the initial timber forts of the Olt were replaced in stone.

[53] Cristian Matei, *Flota romană în războaiele dacice*, in *Peuce* X, Tulcea, 1991, vol. I, p. 91.

[54] Vita Hadriani, XII, IV.

systems of defence: one which was based on the rivers as frontiers, with elements of fortifications near the river placed at a certain distance one from the other, and the land frontier which generated the long walss of defense. From this point of view we may say that the Column is respecting the real situation in the field supporting in images the ancient text.

The other three constructions are watching and signaling towers, *vigillarium*, encircled by tight wooden palisades and guarded by the soldiers in arms. These are taller than the deposits and have at least two floors and a gallery-passage at the last floor which permitted soldiers to step around and to observe the whole environment and in special the Danube river and its north bank. On any gallery-passage of the towers there are long torches in flames signaling the position of watching towers and serving for signals by night. Each torch is placed on the river side of the tower signaling - as a light house - its position to the Danubian fleet which patroled the river and participated in transporting supplies and weapons near the starting point of the invasion. With the help of torches soldiers could also alert the inland units in case of a surprise attack which could come from the north bank.

Near the first tower are another two important elements which are part of Roman's army alert signaling and advertising system: a tall and well done log pile ready to ignite by night and two straw-piles which were ussualy used to transmit smoke signals by day[55]. Smoke signals were used at large in this time to transmit news, to signal danger, or gather troops for a certain area.

Between Column's watching towers and the archaeological discoveries made in Roman Britain are many similitude. The watching towers excavated at Westerton[56] or Roper Castle[57], are confirming the Column's images. In Westerton, for example, G.Friell and W.S. Hanson discovered in 1980 a circular enclosure of 14 meters in diameter. At the center of the enclosure there were traces of a rectangular timber tower of 3.5 x 2.5 meters. Almost the same situation was revealed at Roper Castle were the enclosure has the same circular or ovoid form containing inside the traces of a timber tower. From field evidences we can have the conclusion that the watching towers were not erected as solid constructions in stone. These were not fortifications to stand against an attack but just cheap and replaceable constructions with a limited functions: to facilitate the surveillance of the border, to permit the early alert of the troops in the main fortifications of the limes and to gather the troops where they were needed.

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[55] Vegetius, book III, V, is speaking about the smoke-alert signals made with straw-piles. For a brief history of smoke signals used in Roman world see Michael Woods and Mary Wodds, *Ancient Communication Technology. From Hieroglyphics to Scrolls*, Lerper Publishing Group, 2011, p.68 and ff.

[56] W.S. Hanson, J.G.P. Friel, *Westerton A Roman Watch Tower on the Gask Frontier*, in Proceedings of the Society of Antiquaries in Scotland, no.125, 1995, pp.499-519; *Britania* XII, (1981), p.319; J.K.St. Joseph, *Air Reconnaissance of North Britain*, in Journal of Roman Studies, XLI (1951).

[57] R. Farrar, *Roman Military North Project*, RCHME, 1971-1985, published by English Heritage 2010 (access at http://www.pastscope.org.uk).

In the first scenes of the Trajan's Column the artists did not represent anything else but fortifications and soldiers. This is giving a strict military zone aspect to the Danube's shore in the proximity of the invasion's starting point. So these elements are revealing not only the means used by the Roman army to communicate at distance but also the military units' level of alert in the period preceding the armed conflict with the Dacians. In fact, the preparations for the invasion were seen as a status of war even this was not declared yet and the three towers are marking the area of a maximum military activity signaling that the control on this segment of the river and the Roman no sail zone was in force.

After the conquest of Dacia the line of the Danube has been reinforced permanently. The 4th century A.D. started with a new program of constructions, in special in Scythia Minor. The old fortifications of timber and clay were replaced by solid fortifications in stone in order to ensure a better system of alert and first defense.

As we could see above, the ancient authors of the 4th and 5th century are speaking about the same system of early alert played by the fortified area of the Danube since it was formed and about an improved mission of the Roman fleet on the river and the Black Sea.

As far as the Empire could afford to maintain in function the army's basic education and discipline, the cohesion of the troops, the trust of the civilians - who were backing soldiers with their daily activity - in the temporary alert system and the soldiers' *know-how* to manage it, the Danubian *limes* played its role designated from the very beginning: to be the first contact battle line with potential invaders and to protect the lives and goods of the civilians inhabiting the Roman provinces.

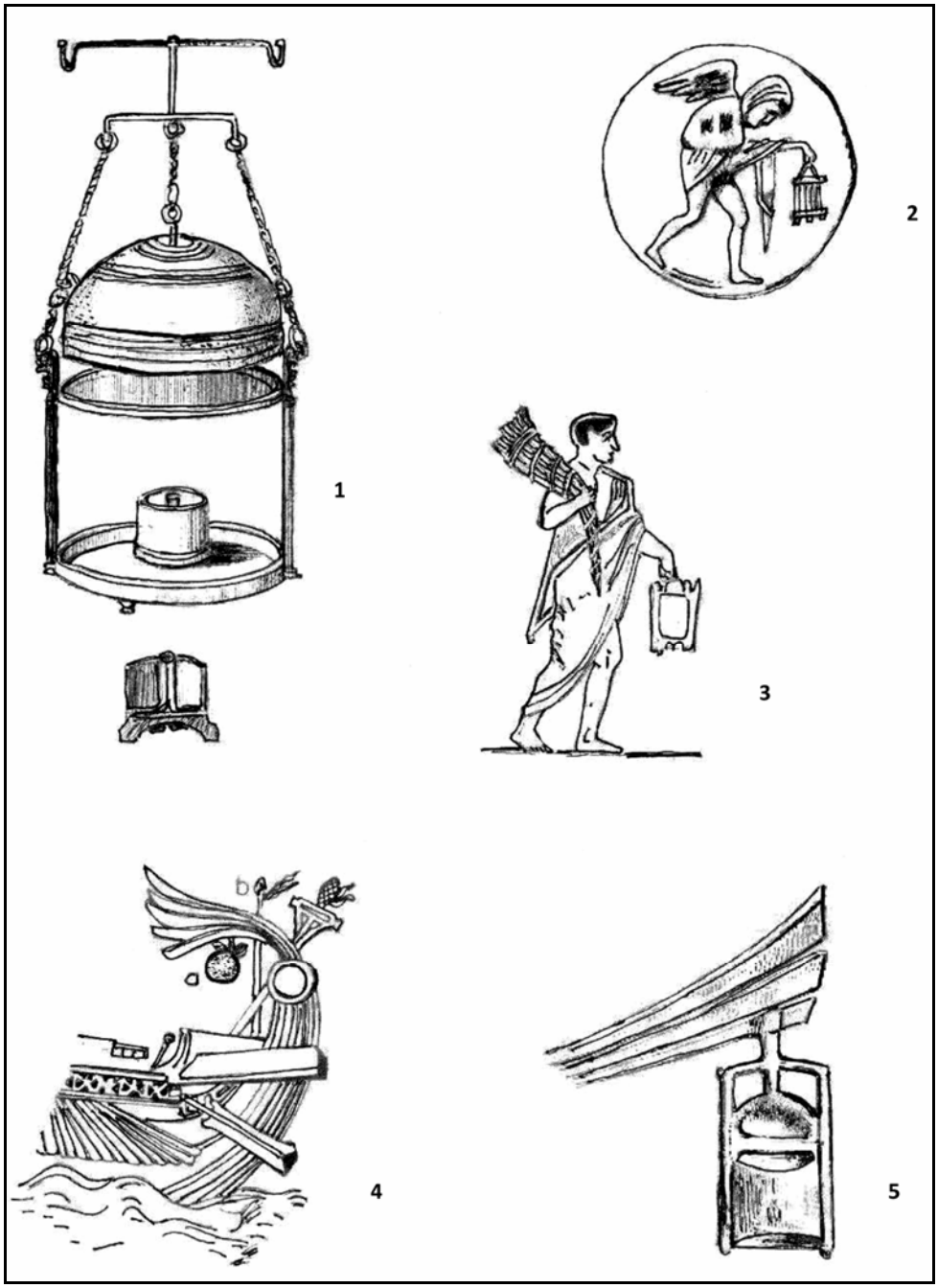

PLATE I

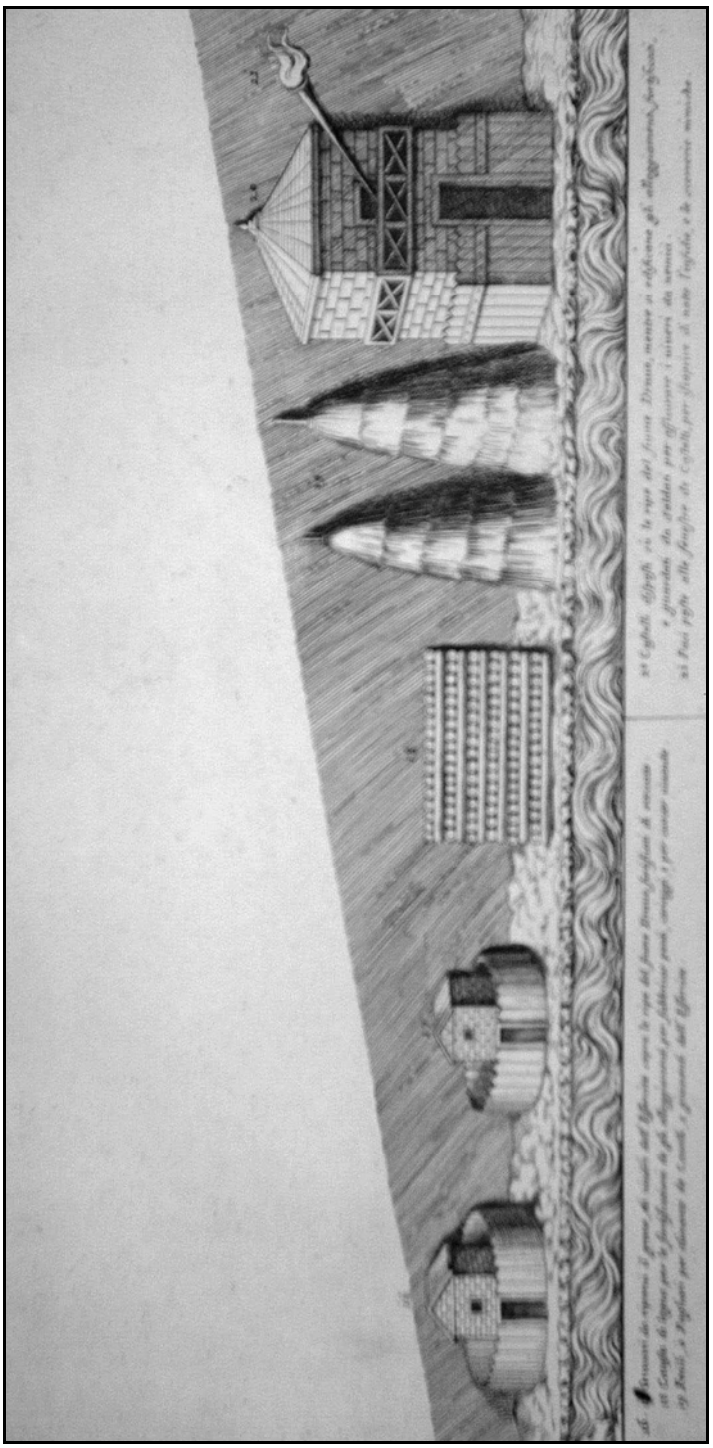

PLATE II

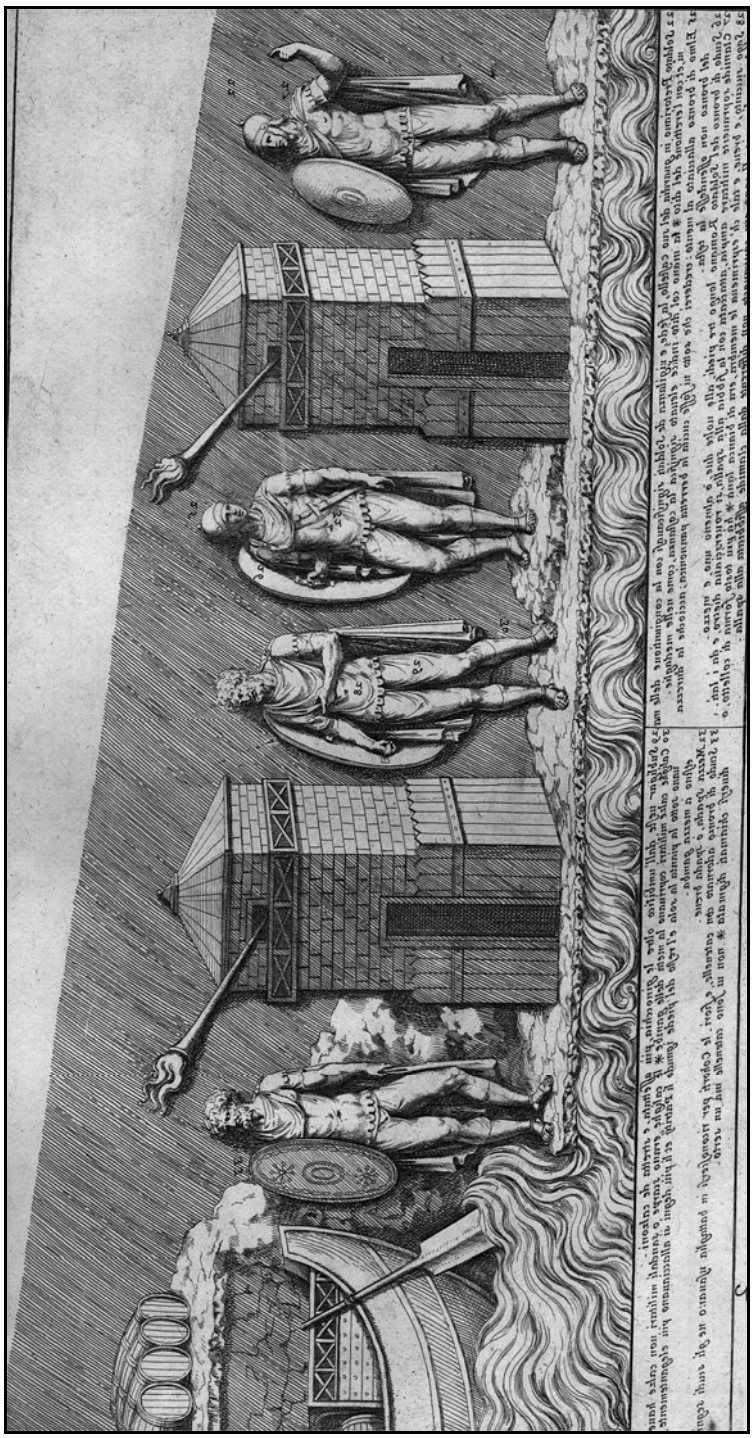

PLATE III

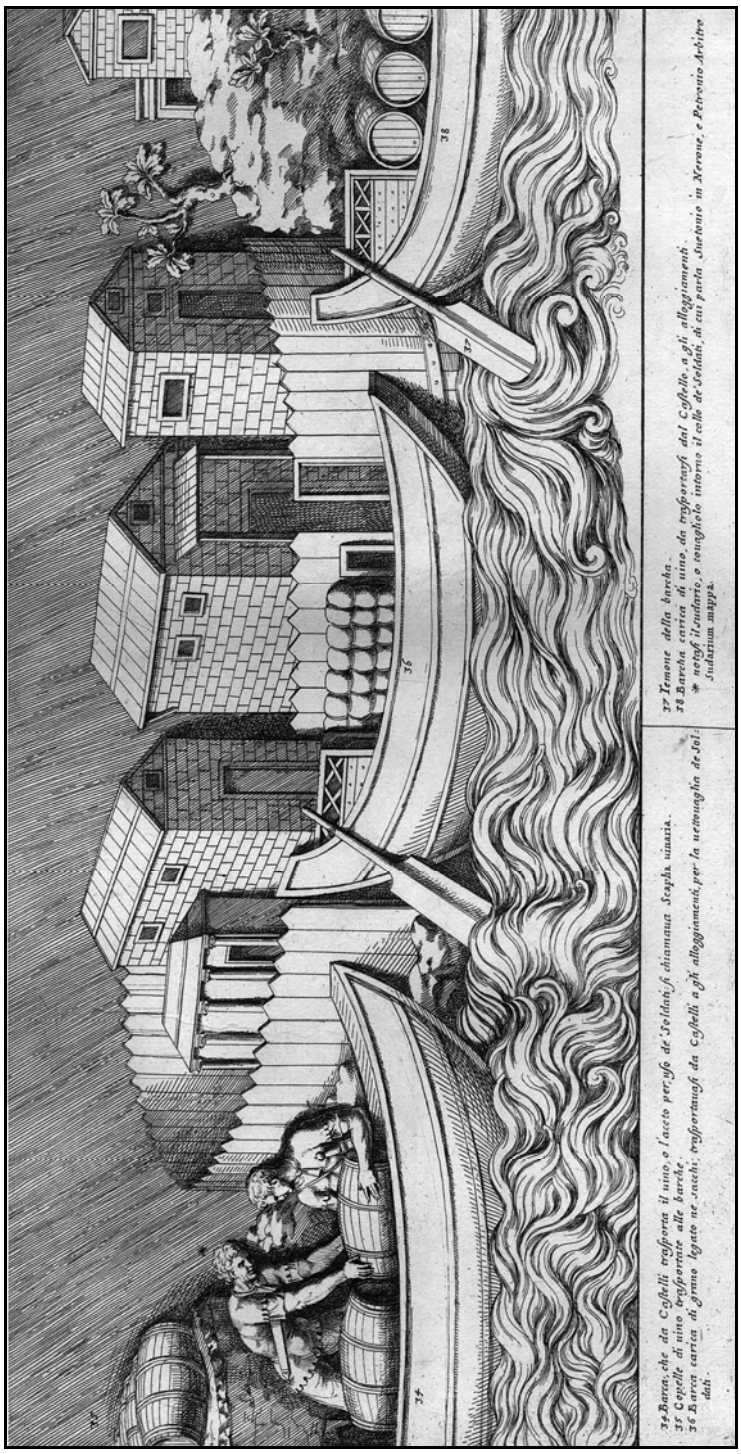

PLATE IV

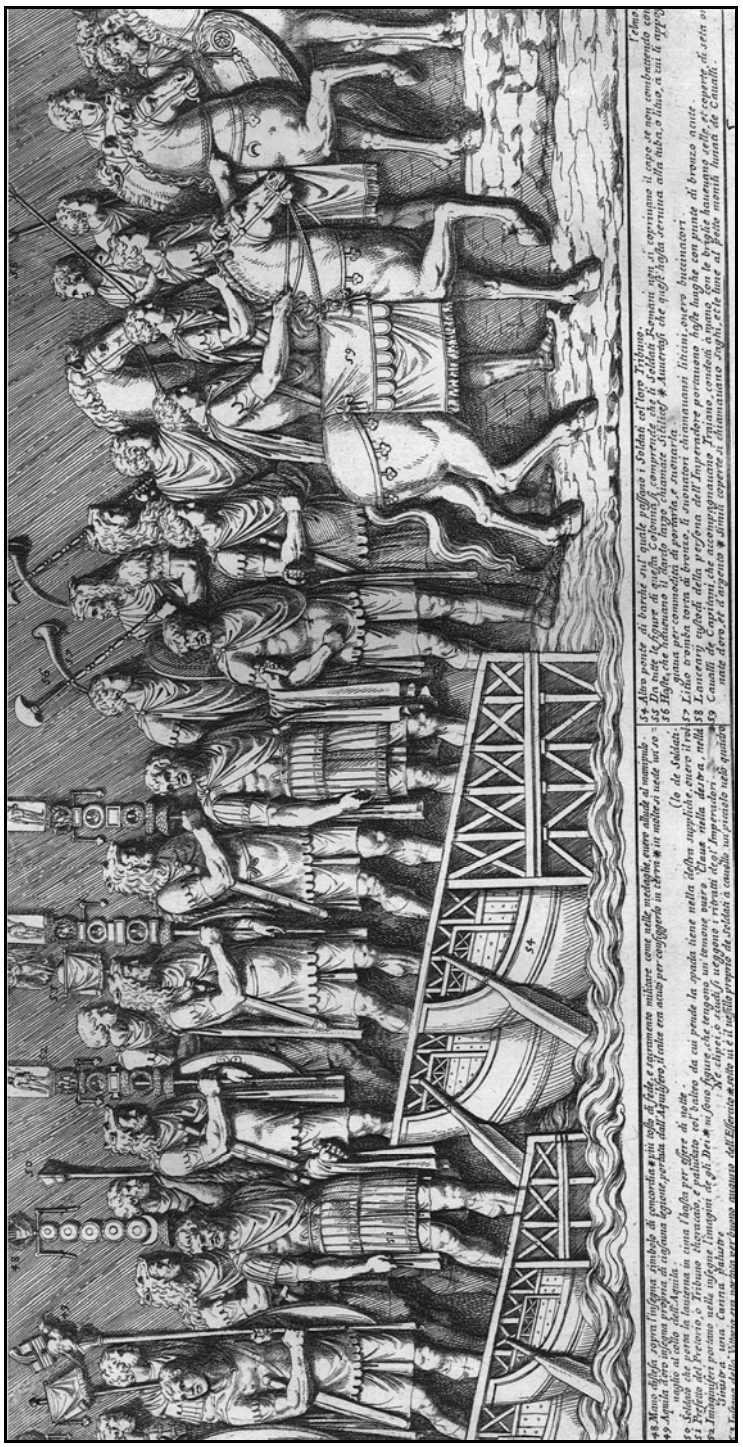

PLATE V

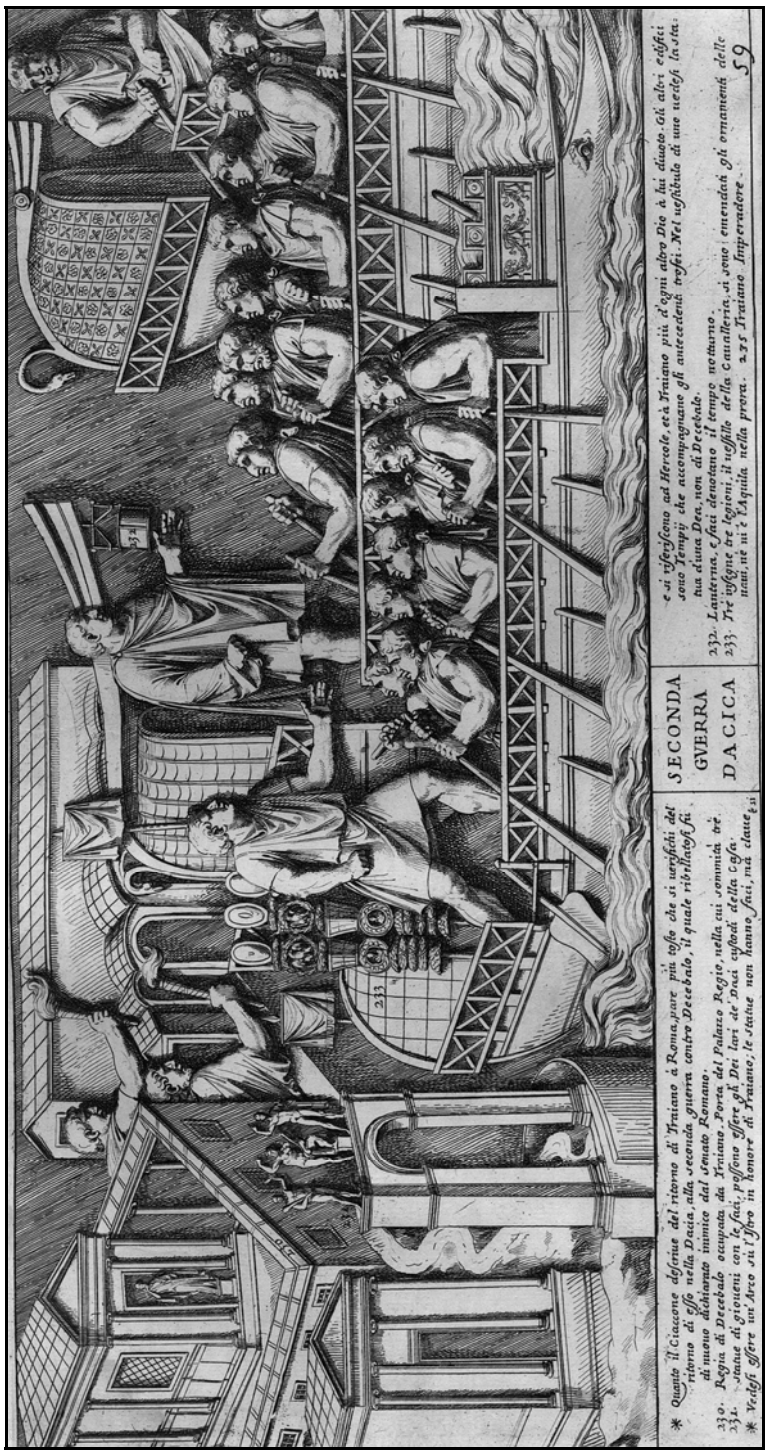

PLATE VI