

THE FORUM CIPPUS NEW ELEMENTS FROM THE LASER SCANNING

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PRESENTATION OF THE INSCRIPTION

The inscription is engraved on a cippus known as the Forum Cippus¹ (**fig. 1**), from which it takes its name. The Cippus has been mutilated and it is missing its upper part for an unknown extension. The actual measuring is: 90 cm high, 47.90 cm wide and 52 cm long. It is still *in situ* in the Roman Forum, *Comitium* area, covered sacral compound of the *Lapis Niger*. In the literature it is generally dated to \pm VI c. BC; in EDR the dating is more precise: 580 BC/551 BC.²

The inscription is arranged on the four sides of the Cippus and on the edge between the fourth and the first side, on a total of 16 lines, the *ductus* is boustrophedonic with the exception of l. 12 and l. 16; lines 8 and 9 are capsized but continue the boustrophedonic *ductus*. Words are generally divided by three aligned vertical dots; the two cases in which only two dots are incised find a justification in a lack of space for the midpoint.

Editio princeps: Boni 1899. Concordances: *CIL*, I², 1; *CIL*, VI, 36840; *ILLRP* 3; *ILS* 4913; EDR071720.

FOREWORD (GR)³

From the year of the discovery, in 1899, to this day the literature on the Forum inscription tallies to 240 publications, a great majority of which is concentrated in the first two years – a testimony to the importance of the discovery. The debate resumed after P. G. Goidanich⁴ published his work and then abated; from 1945 on, only a few articles on specific segments of the text were published and the inscription was inserted in some wide-ranging epigraphic works with an emphasis on its *ductus* and lettering.⁵ The inscription caught the interest of several scholars of different fields: the linguists dealt with the “language” and tried to fit the new data in the peculiar picture of the very archaic Latin; on the other hand, epigraphists, historians, jurists and religious historians took an active part in the debate about the *ductus*, that offers hints for

- 1 Sometimes it is also called *Lapis Niger* through a metonymic process: this name comes from the association with a passage by Festus (L185) where the *niger lapis in comitio* “black stone in the Comitium” is mentioned.
- 2 EDR = *Epigraphic Database Roma* available at the URL: [online] www.edr-edr.it (seen on 27/1/2023).
- 3 The sections labeled as GR were written by Giovanna Rocca, those labeled as GS were written by Giulia Sarullo. The paragraphs that are not labeled are the product of both the authors.
- 4 Goidanich 1943, 317-501.
- 5 More specifically, there are 50 articles on newspapers as notice of the discovery; 23 academic papers in 1899, 27 in 1900 and only 34 in the 1903-1940 span; 21 papers from 1943 (Goidanich) to 1970; 39 from 1971 to 2000 and, finally, 33 from 2001 to 2021.



Fig. 1. Forum Cippus in situ, shot of side A, the inscribed edge (side E) and, partly, of side D. Photo by M. Muscariello.

the reading technique, on the typology of the inscription (“law” or “laws” inside the legislative corpus of the Rome of the Kings preserved by the ancient sources) and on the religious issues connected to specific words or interpretations.

Two monographs, published in 2009 and in 2016⁶ respectively, did not add anything new. They simply offer an interpretation, selected among the several already proposed, and speculate on old data that the authors did not check in person.

It seems then that a scholar who would like to deal with this inscription could only provide a historiographic update that summarizes the epigraphic and interpretative *status quaestionis* with a comment and a revision due to the new epigraphic findings in the *Latium vetus* and to the new studies on the alphabets and the literacy of the archaic Latin.

One should also take into consideration the difficulty of an autopsy, essential in this kind of research, because the area of the *Comitium* has been closed to the public for several years now for safety reasons. The Soprintendenza, always very helpful and open to the requests

6 Battaglini 2009; Santoro 2016.

by the scholars, cannot obviate to the objective technical issues that make really difficult the observation of two of the sides of the Cippus, placed in an internal position and scarcely illuminated. The last scholar who had seen the Cippus in person was A. L. Prosdocimi in 2010. Most of the researchers who have studied the inscription have worked on the photographs and on the drawings which sometimes are highly dissimilar.

A new event reversed the situation.

THE *LAPIS NIGER* PROJECT (GR)

The progress in the use of the new technology in support to the study and preservation of the cultural heritage – that has recently attracted the attention of several Universities aiming at facing the study of the inscriptions in an innovative way – was actively adopted by the Soprintendenza Speciale per il Colosseo, il Museo Nazionale Romano e l'Area Archeologica di Roma. In the context of the program of protection and valorization of the Roman Forum and the Palatine, in 2015 the Soprintendenza started a plan for the acquisition of the scientific documentation using the most updated digital technologies in order to obtain the tridimensional volumetry with the laser scanner, the videophotographic documentation in high definition and the digital mapping of the area.

The intervention on the Forum inscription was part of this wide project directed by the archaeologist Patrizia Fortini and the architect Maddalena Scoccianti. In the future, the results will be used not only for research and preservative purposes, but also as a tool of touristic promotion of high cultural content. An example of this will be the augmented and virtual reality of the *Lapis Niger* area presented by means of a 3D model in high definition. This model will be used through a mobile app (one of the sections of the App of the Roman Forum known as “Imperial For a”) compatible with the last generation mobile phones. Also the Cippus will be tridimensionally observable from every angle: the 3D modeling represents a modern tool, scientifically valid and, at the same time, attractive for the public.

The digital acquisition of the inscription by the technicians took place on July 3rd, 2015 and it was presented to the press (*Il Messaggero*, July 4th, 2015) together with a development version of the mobile app; the participants had the possibility to test the virtual reality technology and to look at the tridimensional model of the Cippus.

For this project, the Soprintendenza availed itself of a collaboration with the VisivaLab S.L. society, who operated in partnership with FARO (world leader in the research on laser scanning⁷) as beta-tester of the most innovative products and with the Roman start-up Oniride s.r.l., that is specialized in the designing of cutting edge ways to access the cultural heritage, taking into consideration both the necessity to preserve it and access it as well as its gamification. The team was made up by the archaeologist Patrizia Fortini, at the time responsible for the Roman Forum area for the Soprintendenza Speciale per i Beni archeologici di Roma, by the group of linguists from the IULM University in Milan (G. Rocca, G. Sarullo and M. Muscariello) and by Riccardo Auci of VisivaLab S.L. who operated in collaboration with Oreste Adinolfi (who represented FARO) for the analysis commissioned by the Soprintendenza.

7 In the past, the Soprintendenza used the high-tech FARO devices in its excavation sites of the segment of the *Cloaca Maxima* comprised in the Roman Forum area, which was digitally acquired by means of FARO's laser scanner technology used together with a prototype of the automatized survey device called *Archeorobot*.

The analysis ended in the morning and the possibility to see the preliminary results of the laser scanning on a computer on site was very helpful in guiding the technicians on the most critical points; contextually, an autopsy of the Cippus was conducted with the help of a very powerful source of light.

The great amount of data resulting from the digital acquisition, besides the usual commitments of the Soprintendenza, including the emergency interventions in Rome, and the necessity of continuous checking and analysis of previous excavations, dilated the time of the publication of the comprehensive volume, entitled *Il Comizio dei Re*, soon to be published by L'“Erma” di Bretschneider.

THE LOCATION OF THE CIPPUS (GR)

The Forum Cippus is located below the *Lapis Niger*, a “platea lastricata di marmo nero” (a slab paved with black marble), in G. Boni's words, in a location that is still visible but difficult for archaeologists and researchers to access, such that it prevents study in detail.

The *Comitium* and the sacred area of *Lapis Niger* represent one of the fundamental sites in the history of Rome: frequented from ancient times,⁸ from the period of the monarchy to imperial times, it has always held a strong symbolic value. The team's archaeologists have reviewed the excavation records and compared old and new data to offer a more detailed view useful for the reinterpretation of the complex context of the area. This has yielded, among other results, a plan of the area from its origins to the Republican age.⁹ G. Boni meticulously reports in his “Excavation Diaries” and in his private correspondence with Minister Baccelli the results of his excavations: on Tuesday, January 30th, 1899, the *lapis niger*, resting on topsoil covering an esplanade holding two bases, was found; beyond the western one, behind a truncated cone, our Cippus was found on May 30th.¹⁰ Excavations in the area continued after a substantial interval due to the difficult situation in Europe at the turn of the two wars. They were conducted by P. Romanelli and M. Floriani Squarciapino between 1954 and 1961, and only the former published some data in an independently published pamphlet after thirty years.¹¹ I briefly summarize the events that characterized the period between the late VI and first half of the V c. BC, that concerns the presence of the Cippus, by drawing on the work of archaeologists:

- the arrangement of the area rises on the previous phase and constitutes the first monumental phase up until the end of VI/first half of V c. BC with a plaza bordered by terraces;
- the steps do not consist of a series of parallel steps but have a fan-shaped arrangement at the beginning of which the Cippus will be placed;
- in the second half of the VI c. BC the Cippus is placed on the part of the highest steps, but rests with the front portion of the base directly on the *Comitium* square, configuring itself as the fulcrum of the staircase arrangement;

8 The most ancient stratigraphic phase can be dated to the Iron Age (second Latial phase, IX-beginning of the VIII c. BC).

9 The news on the excavation of the *Comitium* and of the Curia will be published in *Il Comizio dei Re*, edited by A. Russo, published by L'“Erma” di Bretschneider.

10 The data were published in the following June, with four reports by G. Boni (archaeological context), G. Gamurrini (paleography), L. Ceci (interpretation of the text), G. Cortese (content of the inscription).

11 Romanelli 1984. The first systematization of the data resulting from the research by Maria Floriani Squarciapino and the first critical re-edition of P. Romanelli excavations can be found in Carafa 1998.

- ▶ the original base of the Cippus is at the same height as the highest step of the second royal steps;
- ▶ the layout of the square remains unchanged until the beginning of the Republican age, and even after the construction of the *Rostra* the Cippus will be visible; the new pavement will cover the lower part of it.

The dating within the VI c. BC remains confirmed: the junction of data between ancient tradition and modern analysis for the place where the Cippus is placed alludes to a chronological span in which the legal/religious ideology is significant and the position of the Cippus implies a strong motivation for the quality of the text written on it.

THE MATERIAL OF THE CIPPUS (GR)

G. Boni describes it simply as a tuff cippus. Tuff is the label currently employed in archaeology and geology in a way that is not entirely correct because the volcanological component of this pumice-rich material is left out.¹² Different designations exist in the literature starting with “lionate tuff” or “lithoid tuff”, often accompanied by color descriptions such as yellow or red brown lionate tuff, *tophus ruber*, *lapis pallens*.¹³ These characteristics derive from the typical tawny color of its most characteristic facies, but in fact brown, yellowish, and gray variants are also common. Lately there has been a return in the terminology to the classic “lionate tuff” version, which has supplanted the others.

The lithoid tuff of the Albani Hills Volcano is widely spread in the Roman area, especially south and southeast of Rome; initially quarried from the Capitoline Hill latomies and later from the quarries along the Aniene River, it is the material used for the construction of many monuments and it is excellent for its intrinsic characteristics: it is light, porous, insulating, easy to extract, and inexpensive, being locally available and, as a consequence, guaranteeing speed of extraction and economy of transport.

An analysis of some monuments between the Republican and Imperial ages has shown the use of large blocks (111-200 cm long; 52-90 cm wide; 52.5-67 cm wide¹⁴) that could offer a basis for comparison with the surviving measurements of the Cippus.

How is the material of the Cippus described from G. Boni onward? Scholars generally limit themselves only to observations about the ruin of the stone. F. Ribezzo, points out the particularities of the material:

Nel mezzo dei rigli i guasti provengono da contusioni o corrosioni naturali del tufo, nella parte superiore da decurtazione violenta o da riduzione necessaria dell'altezza della stele, ragione per cui i margini presentano scheggiature o sverzature più o meno estese e più o meno profonde. Appunto perciò nel costituire il testo bisogna guardarsi dal mettere in valore cavità o intacchi che risultino a un piano inferiore del fondo delle incisioni delle lettere. Di questi falsi piani calco e fotografie¹⁵ ne presentano parecchi [...].¹⁶

P. G. Goidanich, however, reopens the issue in a special chapter, entitled “Il materiale litico” (The Lithic Material), of his “almost” monograph, actually a nearly 200-page article, which is worth mentioning for some interesting points:

12 Of pyroclastic origin, that is, formed by the accumulation of fragments of volcanic materials.

13 A rich overview of the terminology used for description can be found in De Casa *et al.* 1999, 1, fn. 2.

14 Frank 1924 and Lugli 1957.

15 On this matter, see paragraph 5.

16 Ribezzo 1933, 63.

ò l'impressione che gli studiosi dell'iscrizione non si siano soffermati a considerare la natura geologica del materiale adoperato per la stele, o non l'abbiano fatto con sufficiente attenzione. Era utile il farlo perché da siffatto materiale sono provenute nel corso dei secoli certe alterazione della superficie che si vedono più o meno chiaramente anche sulle fotografie e che furono variamente e in definitiva non bene interpretate quali segni di lettere; taluno fu portato perfino a ritenere che l'iscrizione fosse un palinsesto, dato che tali segni anche strani non si comprendeva come fossero originati; inoltre si sono formati sulla superficie una gran quantità di buchi e bucherelli che pur si vedono chiaramente nelle fotografie. Esaminando direttamente la stele mi pareva che una parte di questi buchi si fossero otturati, dopo il seppellimento, con terriccio e pertanto fossero preesistiti all'iscrizione.¹⁷

The polemical and critical stance and a certain attitude of superiority toward those who proceeded him, a constant in his work, alongside an accomplished knowledge of the previous literature,¹⁸ emerges from the argumentation of his discourse. There he shows his astonishment that neither the autopsy nor the photographic analysis had raised questions about the stone. The consideration that the importance of the Cippus, placed in a relevant position in an equally relevant area, was not also followed by the choice of a quality material prompted him to ask for an analysis of the material. He turned for this to G. De Angelis D'Ossat, referred to him by a colleague for his excellent knowledge of the subsoil of Rome.

However, this is not an original procedure: in 1919 T. Frank had met A. Verri, who had been working on the geology of Latium for some time and who, at that moment, constituted an authority on the subject. A. Verri showed T. Frank his method conducted on chemical analysis and by means of microscopic images, to identify the provenance of the tuff of various monuments.

P. G. Goidanich reports:

ò appreso che il materiale della stele è una ben nota specie di tufo litoide in cui si trova commista molta pomice: al momento dell'estrazione dalle cave, in siffatto materiale litico il tufo e le pomici formano una massa compatta, come è visto in un esemplare didattico mostratomi; ma col volgere del tempo le pomici marciscono, assumendo un aspetto terroso, e quando cadono dan luogo a questi buchi e lacune.¹⁹

As T. Frank had done previously, so P. G. Goidanich takes advantage of a demonstration lecture. G. De Angelis d'Ossat, in 1950,²⁰ takes up the subject by publishing a more detailed analysis of the stone of the Cippus, believed until then, by the vulgate, to be yellow tuff from Grotta Oscura, coming to the conclusion that a more generic provenance, with no precise location, identified with the Veientina-Capenate area of eastern Sabazia, should be thought of.

A. L. Prodocimi, in a tight critique of Goidanich, whose *modus operandi* he disagrees with, addresses the issue of punctuation for which the scholar had warned "nell'attribuir valore di interpunzione, a bucolini che possono essere conseguenza della composizione geologica del masso." On the basis of an unspecified source, A. L. Prodocimi states that "è un tufo che, a differenza di altro tufo, è resistente al dilavamento: pertanto la pietra dovrebbe essere ben conservata rispetto alla data del rinvenimento", *i.e.*, in 1899 the surface was already deteriorated and the current conditions were not due to washouts occurred after the discovery.²¹ The two positions are not mutually exclusive.

A combination of factors may have contributed to the deterioration of the stone by altering its appearance, texture, and properties; mostly these are due to a combination of

17 Goidanich 1943, 387.

18 The palimpsest quote is taken from the reading by Leifer & Goldmann 1932 and Warren 1907, 376.

19 Goidanich 1943, 388.

20 De Angelis d'Ossat 1950.

21 Prodocimi 2010, 391.

external factors related to environmental conditions and internal factors related to physical and mechanical strength. The intensity and speed of these processes depend on the stone quality. It is often not easy to identify the causes and mechanisms of deterioration since they can be numerous and act in parallel, in different ways and with different timing.²² In this regard, the question posed by P. G. Goidanich whether the high level of quality required by a public document is matched by an equally happy choice of material to be used should be taken up. Indeed, the inadequate choice of stone and the method of quarrying, processing and finishing that can cause superficial microfractures are concomitant among the reasons for accelerating the natural process of decay. Moreover, lithoid tuff is a porous material of varying percentages, and porosity is a determining parameter for the possibility of water absorption, which is the main trigger of decay, and the *Lapis Niger* area was rich in water and springs. Therefore, it seems reasonable that the Cippus was found in the condition we know, then further aggravated by human intervention that caused the breakages it suffered after its discovery.

Further clarification will come from the results of the petrological analyses conducted by the team of geologists, that will be published in the volume dedicated to the *Comitium* edited by the Soprintendenza (see footnote 9).

TECHNOLOGY (GS)

The Soprintendenza chose to use the next-generation technology of the FARO's CAM2 ARM device for the laser scanning procedure. This device provided a very high-precision (0.051 mm) acquisition of the archaic Latin inscription engraved in boustrofedic *ductus* on the cippus below the *Lapis Niger* (fig. 2).

The CAM2 ARM was at that time a state-of-the-art instrument in the field of laser scanning acquisition, which allowed scanning 460 thousand points of the inscription in one second with a very high resolution. It consists of a mechanical arm that moves around the support detecting all data to the hundredth of a millimeter. The portable and easy-to-use CAM2 measuring arm enables highly accurate 3D measurements on large and small volumes as early as the production stages:

*Le ridotte dimensioni dello strumento (per un peso complessivo di circa 200 gr) e la presenza di sensori intelligenti integrati permettono di effettuare misurazioni precise in contesti ristretti, e con caratteristiche termiche variabili. La definizione del braccio è di 36 µm, precisione invisibile all'occhio umano, che permette dunque di individuare tracce archeologiche importanti (ad esempio direzione e profondità di segni di scalpellatura ormai erosa) non rilevabili con una normale strumentazione.*²³

The scanning activity was followed by a laborious phase of data processing, conducted by the VisivaLab team under the guidance of R. Auci, which led, on the one hand, to the development of the high-definition 3D model mentioned above in paragraph 1 and, on the other hand, to the

22 In a study that is highly valuable to non-geologists, some data obtained from constructions frequent from 143 B.C. to the imperial era are reported, the most relevant to us being the manifestations and causes of degradation such as, among the most frequent, micro-cracking, scaling, exfoliation followed by salt efflorescence and the presence of moss and lichen, cf. De Casa *et al.* 1999.

23 Information taken from the description of the "Lapis Niger. Acquisizione digitale dell'iscrizione sacra" Project, sponsored by the Soprintendenza Speciale per il Colosseo, il Museo Nazionale Romano e l'area archeologica di Roma, 3. The document is available online at the following address [online] <https://www.beniculturali.it/mibac/multimedia/MiBAC/documents/feed/pdf/Progetto-imported-51773.pdf> (seen on 24/01/2023).



Fig. 2. The laser scanning of the Forum Cippus (July 3rd, 2015) with the CAM2 ARM device by FARO. Photo by M. Muscariello.

production of images that highlight details invisible to the naked eye that were of great interest for the study of the execution of the inscription.

From the point cloud obtained with the laser scanning different types of images were processed, to which we had access thanks to our collaboration with the Soprintendenza, in particular with Dr. P. Fortini, head of the project, whom we would like to thank.

Specifically, for each of the sides of the Cippus (4 sides plus an inscribed edge) 5 different types of images were produced that offer different points of view of the inscribed surface: 3 rendering with a different degree of grazing resulted in images that are as close as possible to an actual grayscale photograph; in addition to these, a rendering with contour lines and another with the gradation of depth highlighted by a color scale were created.

Each of these types of images highlights in turn different peculiarities of the stone surface and, consequently, of the epigraphic signs: in some renderings, for example, the depths of the signs emerge more clearly, while in others the contours of the carvings are better outlined. In order to make the most of the laser scanning results and avoid the risk of a partial view an in-depth analysis was necessary with a continuous comparison of all digital rendering for each individual portion of the surface undergoing analysis.

PROBLEMS AND SOLUTIONS (GS)

As mentioned above, the location of the Cippus has played an important role in the history of studies of the inscription. It is, in fact, located under the floor of the *Lapis Niger* and surrounded by other ancient structures, as well as by the supports placed by archaeologists to prevent the collapse of the mentioned floor. There is less than a meter of height between the floor on which the Cippus rests and the floor above. The sum of these conditions indicates that the place where the Cippus is located is rather cramped and dark, factors that have significantly influenced not only the (rare) in-person examinations by scholars, but also the making of reproductions (photographs and apographs).

The issue of accessibility also involves a difficulty in arranging sufficient and valid lighting for the examination of such a heavily damaged inscription engraved on such an easily compromised surface. In the course of the laser scanning, a very powerful portable light source was used, which allowed the technicians to operate safely and, at the same time, allowed us linguists to examine in more detail some of the controversial points of the inscription (**fig. 3**).

The specific characteristics of the instrument chosen for scanning, the CAM2 ARM described above, allowed to overcome the difficulties posed by the narrow space.²⁴ Due to the position of the Cippus in relation to the surrounding structures, side C and, to a lesser extent, side D are significantly less accessible than sides A and B and edge E.²⁵ Thanks to the articulated arm of the instrument, which was positioned from time to time at precise points or manually maneuvered by the technician in charge of scanning, it was possible to digitize the entire surface of the Cippus.



Fig. 3. A moment of the autopsy of the Forum Cippus carried out with the help of a portable light source. Photo by M. Muscariello.

- 24 To get an idea of how complex it was to carry out the laser scanning of the Forum Cippus, you can view the video available at this link: [online] <https://vimeo.com/217805081> (seen on 27/1/2023).
- 25 It is not by chance that the photographer D. Anderson only took pictures of sides A and B. Cf. Sarullo 2023. Already D. Comparetti, immediately after the discovery, had posed the problem of the difficulty of taking photographs of the cippus.

The presence of a multidisciplinary team during the digitization operations led to a fruitful collaboration between linguists, epigraphists, archaeologists and technicians, which had as a happy outcome the possibility of contributing profitably, each for his or her part, to the realization of the scanning. The task of us linguists and epigraphists, who are well acquainted with the graphic and epigraphic peculiarities of the inscription and the difficulties posed by the tuffaceous surface, was to indicate the points that required more attention from the technicians operating the instrument and then to verify on the stone, with the help of a portable light source, the first tentative results that emerged from observing the images produced in real time by the scanner (**fig. 4**).

We will discuss some of these points in detail hereinafter. Here we would like to emphasize the interaction between different scientific fields. Methodologically speaking, any study of an epigraphic text cannot be separated from an autopsy of the support. This, of course, is strictly theoretical. We are well aware that an autopsy of the support is not always possible, for a wide variety of reasons (*e.g.* object dispersed or kept in unreachable storage or, as in our case, still *in situ* but not accessible), and this is why reproductions (plaster copies, photographs and apographs) are used. Unfortunately, these can sometimes be misleading and lead to erroneous readings. The case of the Forum Cippus, in this sense, is emblematic. Due to the monument's hypogeal location and the resulting poor lighting conditions, high-resolution photographs of the object with appropriate illumination have never been taken. Moreover, for some of the sides only shots that are more than 120 years old are available²⁶ and thus in a quality that is certainly not sufficient to allow an accurate reading of the most controversial points of the inscription; of the inscribed edge no photographs exist. The most recent shot of the Forum Cippus is 40 years old and depicts only face A and part of face B.²⁷

The plaster copies are certainly valuable witnesses to the state of preservation of the Cippus before the various breaks that further damaged the Cippus, which was already in poor condition at the time of discovery. However, they are not always trustworthy: the patinas covering the surface of the plaster, for example, make it very difficult to distinguish between punctuation and accidental holes. Finally, the apographs, due to the inaccessibility of the original Cippus, were often traced from the plaster copies and are therefore not always accurate.

From this account, it is clear that the autopsy of the Forum Cippus is crucial in order to settle some doubtful points about the reading of what remains of the inscription. Nonetheless, an autopsy can always be "flawed" by the eye of the beholder who may perhaps be looking on the stone for what he or she wants to see. An autopsy, however, that is supported by the images resulting from laser scanning, which returns a most accurate reconstruction of the stone surface, acquires greater objectivity and, consequently, greater authority and provides the basis for as faithful a reading as possible. In the words of R. Auci²⁸:

"survey in 3D of the 'Cippo del Foro' allows the documentation [...] of every single mark that may be drawn on the memorial. Research on the meaning of the text may thus avail itself of an instrument apt at facilitating its transcription and its reading."

26 These are R. Moscioni's shots, now in the Photography Archive of the American Academy in Rome, depicting all four faces inscribed but not the edge. The images are accompanied by the following caption: "Roman Forum (Rome, Italy), archaic stele with inscription, found under the Lapis niger. 4 photographic prints: black and white; 11x16 cm." In the copy available to us, the image of face C appears cropped at the left margin. A complete copy of the positive is available from the Istituto Centrale per la Grafica, [online] <https://www.calcografica.it/fotografie/inventario.php?id=F-P4273> (seen on 27/1/2023). Moscioni's four photographs were published, without attribution, in Diehl 1912, tav. 1. Cf. Sarullo 2023.

27 Gordon 1983.

28 Auci 2021, 268.



Fig. 4. A moment of the laser scanning. The articulated arm of the CAM2 ARM device is visible, as well as the computer that was showing the first results of the scanning. Photo by M. Muscariello.

A SYNERGIC APPROACH TO THE EXEGESIS OF THE INSCRIPTION (GS)

An epigraphic document of the complexity of the Forum inscription has several critical issues, ranging from the interpretation of lacunae or damaged signs to the identification of a punctuation system. The examination of the different types of images resulting from laser scanning allowed us to have a new, privileged point of view to try to give answers to some of these critical issues. Of course, scanning cannot give us back what has been irretrievably lost over time, but it allows us to work on the inscription almost as if we had the actual object in front of us. It should, however, be emphasized that, on more than one occasion, the autopsy examination of the stone surface was instrumental in dissolving some of the doubts that the observation of the different types of images could not resolve because the renderings returned partially discordant results.

We can therefore define our approach to the exegesis of the inscription as a synergic one, in that it involves the contextual recourse to all types of images derived from laser scanning (continually compared with each other) and in-person observations of the monument, as well as to reproductions (photographs, apographs, plaster copies) made in the past.

We will illustrate below some of the aspects of the reading and exegesis of the inscription of the Forum Cippus that have benefited from the possibility of making use of this synergic approach, thanks to which it has been possible to definitively set aside some past hypotheses and, above all, to advance new interpretative proposals.

Preparatory lines (GS)

Before we proceed to describe some important new features that have emerged in the reading of the text of the inscription, we would like to dwell on an epigraphic element present on the Cippus, which no scholar in the past had previously accounted for. On side D, between l. 14 and l. 15, more precisely between UQEN and the underlying OD:IO, the analysis of the images produced by the laser scanning have made it possible to identify a remnant of a line (fig. 5 and 6) that runs almost parallel to the lines of writing, slightly waning, and appears to be interrupted at the fourth letter from the left (N for l. 14 and O for l. 15). An even milder line, for which identification is therefore less certain, is perhaps detectable below l. 15,²⁹ particularly below the same O above which the upper line is interrupted. These lines, which are not perfectly horizontal and regular, appear to have been engraved freehand, without the aid of a specific tool. The most likely hypothesis is that they are a remnant of the tracing of preparatory lines executed on the sides of the Cippus in the *quadratura* stage to distribute the lines of writing in a more balanced and precise manner. The fact is definitely of some significance because it would document the use of this practice, which would later be the norm for most public inscriptions on Cippus and stelae, even in the early days of Roman epigraphy. The use of preparatory lines on the Forum Cippus, however, should not be interpreted in the same way as the guide lines were used in the inscriptions of the Republican and Imperial ages, in which these tracings are the reference point for the engraving of the letters, all of which start at the same height on the writing field. In our case this would more likely be an expedient to better distribute the lines of writing on the surface, as evidenced by the fact that the letters on the Forum Cippus, in most cases, are not aligned at the base.

A hint of the possible presence of preparatory lines on this monument is already found in P. Graffunder, whose unpublished observations on the Forum inscription we only know through the account by F. Leifer.³⁰ Indeed, the scholar refers to the presence, alongside the axe blows responsible for the damage to the Cippus, of a *Vorzeichnungslinie* on side D:

*[Graffunder] verweist auf die an der Stele deutlich sichtbaren Spuren von Axtschlägen sowie auf eine Vorzeichnungslinie, die angeblich am jetzigen oberen Rand des Cippus z. T. durch die erhaltenen Buchstabenreste hindurchgeht*³¹.

Footnote 5 then specifies that *Diese Linie, teilweise den Duktus der eingehauenen Buchstaben folgend, ist unterhalb des oberen Randes der Seite D in der Tat bemerkbar*. It would seem that, according to P. Graffunder, this line ran below the upper edge of face D and not between the lines. To our knowledge, the scholar based his observations on images of the plaster copies circulating at the time and not on the original. It is then possible that the line he describes is in fact one of the cut lines³² that characterize the plaster copies. In any case, this element has never been given any relevance by later scholars, and F. Leifer himself seems to prefer the possibility of a “Steinpalimpsest”, already suggested at the time by M. Warren (1907, p. 376), that is, that the stone was reused and these marks are traces of an earlier inscription.

29 The tracing of the line between l. 14 and l. 15 is also clearly evident on the surviving plaster copies of the Cippus, particularly on the Viennese specimen, while there appears to be no line below l. 15. For a survey of the plaster copies, see Sarullo 2023.

30 Cf. Leifer & Goldmann 1932, 1, n. 5.

31 Leifer & Goldmann 1932, 15.

32 The plaster copies were fashioned from a cast made by applying a thick layer of clay to the surface of the Cippus; once dried, the cast was sectioned for removal and then reassembled by joining the individual sections together. At the areas where the clay cast was incised and then joined, lines, called cut lines, can be found on the plaster copies.



Fig. 5. Forum Cippus, side D, where the preparatory line can be seen between l. 14 and l. 15. Photo by M. Muscariello.



Fig. 6. Forum Cippus, detail of side D, rendering from the laser scanning where the preparatory line can be seen between l. 14 and l. 15. Soprintendenza di Roma.

An element similar to what we detected on side D had been identified by D. Comparetti³³ on side C between l. 9 and l. 10. This line ran above the OD:I segment, so close to the upper end of the graphs as to make the I look almost like a T. D. Comparetti³⁴ speculates that this was an expedient to mark the beginning of a new part of the inscription, a kind of *paragraphos*. Unfortunately, the surface on which this section subsisted was affected by a break³⁵ that led to the loss of a small portion of the tuff, and as a result, only the lower portion of the line identified by D. Comparetti remains on the original, barely visible above D:I in the renderings of the laser scans, while it is still well preserved on the plaster copies.

The fact that this line is at the same height as the one we identified on side D and shares its characteristics of length and thickness would seem to be further confirmation of the existence of preparatory lines on the Forum Cippus. This has important consequences for our knowledge of the preparatory stages that preceded the engraving and distribution of the text on the writing field.

Reading improvements (GS)

Our synergic approach to the exegesis of the inscription resulted in some significant improvements in the reading, particularly on sides A and B. Our attention focused mainly on the letters along the upper margin of the Cippus, those most damaged by the destructive intervention that occurred in antiquity and deteriorated by the smoothing of the surface caused by the washouts that have affected the Cippus over the centuries. This is the case, for example, of l. 2, where what appears to be the result of water runoff has practically obliterated the first surviving marks, in particular, the A of *ŞAKROS*, of which only the upper part of the two oblique strokes joining at the top remains (**fig. 7**). The laser scanning, on the other hand, allowed to identify the upper section of the S, given for certain in the text by almost all editors but actually to be marked as an uncertain letter because its actual condition on the stone makes it almost invisible to the naked eye (**fig. 8**).

On the same face, at l. 3, the letter nearest the upper margin has been the subject of numerous interpretations. What remains is a vertical stroke on which an oblique stroke is grafted at the vertex, variously read as A, D or M. Laser scanning images made it possible to rule out the possibility of a D because near the bottom of the vertical stroke there are no traces of the possible loop of the D. One can see, instead, a hint of a crossbar, ascending in the direction of writing, similar to the A of l. 13 (**fig. 8**).

Digital rendering analysis has made the most substantial contribution in the reading of side B, particularly for l. 4. This is the most battered row of what remains of the Cippus, with only 3 letters still clearly legible:]-a--as, around which the most daring and imaginative interpretations have been proposed, which we cannot go over here, for obvious reasons. Our approach was to start from what the stone preserved and what the digital images returned. First, we were able to identify as an isolated trait, and therefore not belonging to an epigraphic element, the oblique sign located at an intermediate height between l. 4 and l. 5. In the past, this stroke had been read as a lower portion of a three-stroke S or as another letter, an option that has to be ruled out now. Our attention then focused on l. 4, comparing what we had verified by autopsy and what the digital images allowed us to integrate. The sum of these two procedures led us to identify, to the left of the first A, a vertical stroke that curved to the right at the top.

33 Comparetti 1900, 9.

34 Comparetti 1900, 12.

35 On the breakings occurred after the discovery of the cippus, see Sarullo 2023.



Fig. 7. Forum Cippus, side A, where the corrosion of the stone is clearly visible between l. 2 and l. 3. Photo by M. Muscariello.

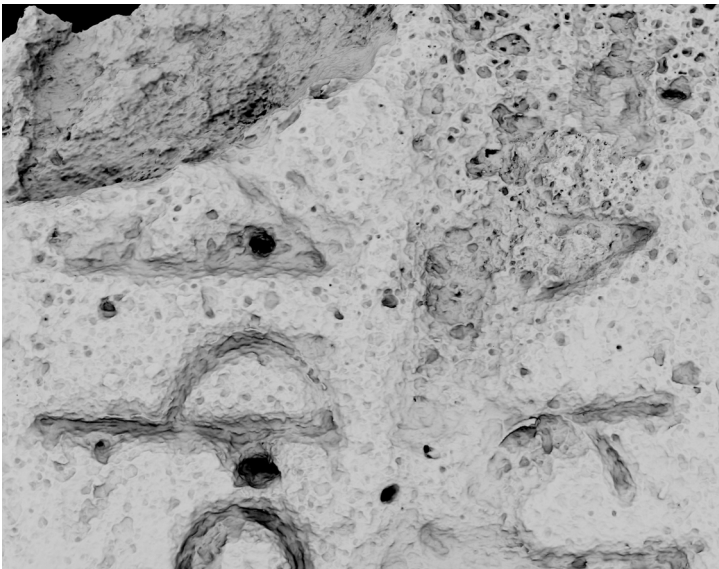


Fig. 8. Forum Cippus, detail of side A, rendering from the laser scanning showing the letters immediately under the upper margin. Soprintendenza di Roma.

The proximity to the next A and the slight curvature of the upper section led to the hypothesis that this letter was a P, a hypothesis later confirmed by superimposing on this unknown mark the only surviving P specimen on the Cippus, attested at l. 11, and obtaining an almost complete match. We then proceeded to observe the portion of the stone between the two A and were able to identify a semicircular outline that fits that of a C such as that found on the next l. 5. Then, color rendering, that shows the different depths of the carvings, allowed us to see that the vertical stroke preceding the second A, contrary to what had been thought in the past, is an isolated stroke that should therefore be interpreted as I. We thus read l. 4 as PACIAS (**fig. 9**).

Finally, at l. 6, the possibility of the D]EUAM restoration, so successful in the past, cannot be eliminated, but too many interpretive possibilities remain open to allow one to be selected at the expense of others.

Writing errors (GS)

The presence of errors in the execution of the inscription of the Forum Cippus had already been pointed out by early editors, as can be seen, for example, from Comparetti's apograph in which an error in the anticipation of Y over Q in l. 13 is evident (**fig. 10**). Another example can be discerned in the insertion of I after P in KAPIA at l. 11: the size of I seems to be a clear indication that this was the result of an intervention after the engraving of the later A. In the course of the autopsy that took place the day of the laser scanning we were able to observe another example of an error on this same line, and again it is an anticipatory error, here of T over O in DOTAU[(**fig. 11** and **12**). Some of the images of the laser scanning later confirmed this correction. It should be pointed out here that not in all digital renderings is this corrective intervention actually clearly visible; in this case, therefore, but it is definitely not the only one, the association of autopsy and digital image observation was decisive, further confirming that these are not mutually exclusive procedures but, on the contrary, gain much in authority and allow much more accurate results when both can be used.

Identification of punctuation marks (GS)³⁶

Throughout the inscription of the Forum Cippus there is a punctuation mark separating individual words. In the past, scholars have offered the most diverse explanations in an attempt to account for an alleged randomness in the distribution of the punctuation marks. The tuff of which the Cippus was made (for which see *supra*, at paragraph 3) has a rather irregular surface in which there is no shortage of holes of various sizes that can easily be mistaken for the holes intentionally incised by the stone mason as punctuation marks. To solve the punctuation puzzle on the Forum Cippus we have, once again, relied on laser scanning images, which, again, was decisive, but not without some difficulty. The extreme precision with which the laser scanner captures every minute detail of the stone surface has as an inevitable consequence that of returning images studded with significantly more holes than those visible to the naked eye. It was therefore necessary to establish precise criteria that would guide us in identifying the punctuation marks and allow us to distinguish them from accidental holes on the surface. We therefore identified three characteristics that could be distinctive:

36 We share here some remarks resulting from our team's observation of the inscription, within which the topic of punctuation was explored in depth by Marta Muscariello, who devoted to this topic an article now in print, see Muscariello forthcoming.



Fig. 9. Forum Cippus, detail of side B, rendering from the laser scanning showing l. 4 and 5. Soprintendenza di Roma.

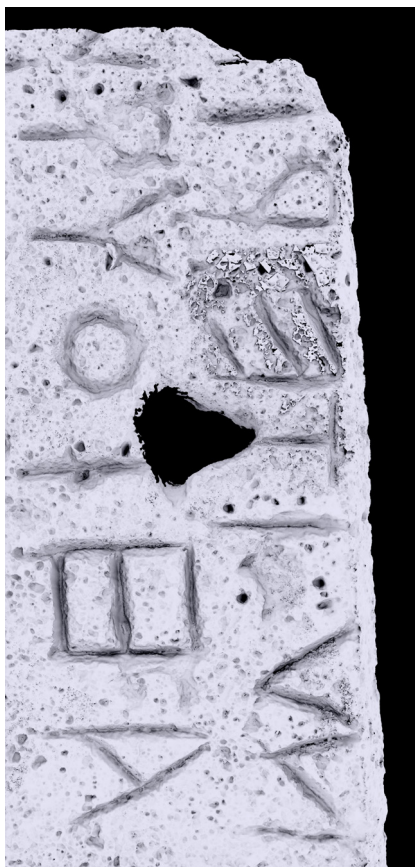


Fig. 10. Forum Cippus, detail of side D, rendering from the laser scanning showing l. 12 and l. 13. Soprintendenza di Roma.

- contour: it is more regular in punctuation marks while it is generally more jagged in accidental holes;
- depth of engraving: for this criterion we made use mainly of images with the gradation of depth highlighted by a color scale;
- alignment: holes that constitute a punctuation mark are generally well aligned vertically with each other, while accidental holes have a more random arrangement.

Following these guiding criteria, careful observation of the different types of images available to us was carried out, and it was possible to establish that the use of punctuation throughout the inscription is far from random and, in fact, follows a certain rigor. Indeed, the punctuation mark always consists of three vertically aligned dots except on two occasions when it presents itself with two dots, in l. 14 and l. 15. In both cases, the absence of the midpoint could be due to a lack of space. As a matter of fact, here, as elsewhere, the punctuation seems



Fig. 11. Forum Cippus, detail of side C, showing the anticipatory error on l. 11. Photo by M. Muscariello.

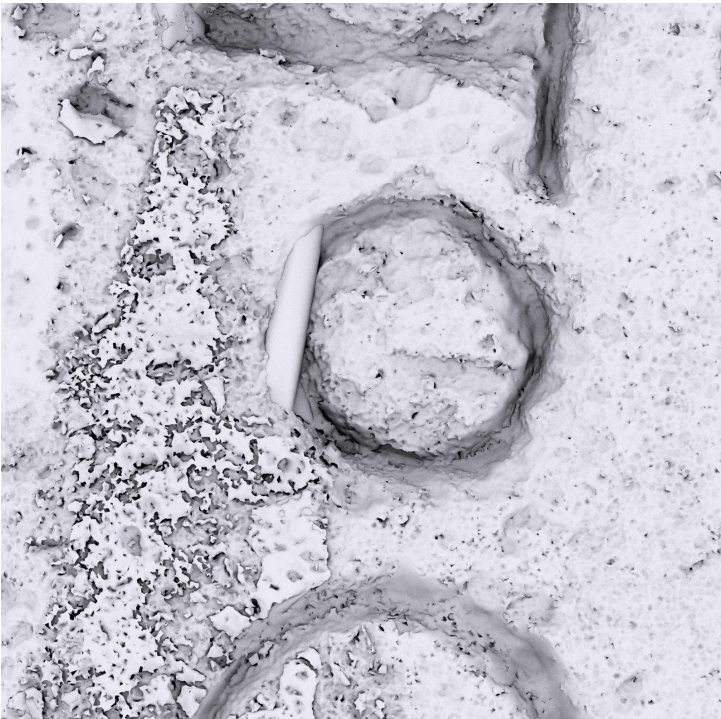


Fig. 12. Forum Cippus, detail of side C, rendering from the laser scanning, where the anticipatory error on l. 11 is barely visible. Soprintendenza di Roma.

to have been added at a later time than the incision of the letters,³⁷ and the prominent loop of the D, which on both occasions is the letter preceding the punctuation, may have resulted in the impossibility of the incision of the midpoint. A further case could perhaps also be found on the inscribed edge, side E, where the laser scans revealed the presence of a dot at the bottom after the last remaining letter. It is possible that on the edge, too, the stone mason opted for the two dots because of the available surface area, not much because of the proximity of the preceding letter, which is at some distance, but because of the reduced height of the line carved on the edge.

We note that the regularity of the use of punctuation concerns all the sides of the inscription, including side A, which in the literature has always been considered without punctuation and thus an exception to the rest of the inscription. During the autopsy, thanks to the use of strong grazing light, it was possible to identify the three-dots dividing form in two occurrences, specifically at l. 2 and l. 3 (**fig. 13**). The identification of these punctuation marks was later confirmed by examination of the digital images.

A survey work on the text by autopsy and a laborious comparison with digital rendering then led to a new possible segmentation of l. 12, MITERI (fig. 10). In this portion of the stone the surface is studded with accidental holes, compounded by the presence of a large hole that occurred after the inscription was carved and resulted in the loss of the lower portion of the



Fig. 13. A moment of the autopsy of the Forum Cippus when the punctuation mark on side A was identified. Photo by M. Muscariello.

37 The most striking example in our view is at l. 11, between TA and KAPIA, where the midpoint is slightly misaligned from the other two because of the left oblique stroke of the preceding A. But throughout the inscription the punctuation marks often lie close to the letters they separate and sometimes follow their slant. It therefore seems to be safe to assume that punctuation was not intended when the letters were carved and that the space for the dots was not considered. Is it possible that punctuation was added to facilitate the reading of a monumental boustrophedonic text?

first l. Because of the “pockmarked”³⁸ aspect of the stone, this line was variously segmented by the different editors who, in some cases, elected a few accidental holes as punctuation marks in order to make the text on the stone collimate with the interpretation they had in mind. This portion of the stone is currently the object of further digital analyses that will hopefully give us a clearer picture of the punctuation on this line.

In addition to determining which holes were accidental and which were intentional, examination of the digital images revealed a slight difference in the manner in which the dots were incised: in some cases (e.g., on side A), they appear to have been engraved more weakly, perhaps with a tool of smaller diameter than that used for engraving the letters.

Finally, the absence of punctuation in the QUOIHO (l. 1) and QUOIHA (l. 13) segments is confirmed, a peculiarity that could find justification in the interpretation of these elements as sequences of relative pronoun *quoi* + clitic (*ho-* at l. 1 and *ha = haud* at l. 13).³⁹ The dividing form is also missing when the end of the word coincides with the end of the line, probably because it is considered superfluous, the separation between words being already sufficiently guaranteed by the transition to the next line of writing.

CONCLUSIONS

The working methodology that has guided our research clearly emerges from what we have outlined so far. The images obtained from laser scanning of the Cippus proved more than valuable both for the recognition of some uncertain letters and for the identification of the consistent use of the punctuation system throughout the inscription. In our case, in which we were able to witness the digitization operations live, they also “guided” us during the autopsy of the monument, allowing us to identify with a higher degree of precision the areas to be examined more carefully. Finally, they constituted a fundamental support for the research work that followed the time of the autopsy, ensuring that we could “revisit” the object whenever we needed to in order to recheck the most critical points of the inscription.

This is certainly not intended to claim that this will solve all the many interpretive problems still posed by the inscription on the Forum Cippus more than 120 years after its discovery. However, a reading that rests on this foundation can certainly be a new starting point for future hermeneutic paths.

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38 P. G. Goidanich (1943, 426) uses the word “butterate” (pockmarked) to describe the irregular conditions of the surface of the Cippus.

39 For a more detailed discussion of these forms, see Rocca forthcoming.

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