To my parents

TRAJAN'S COLUMN DOCUMENTARY VALUE FROM A FORESTRY VIEWPOINT (PART I)*

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In the studies devoted to Trajan's Column, the scarcity of forestrial information is discouraging. Although some scientists approach the study of the forest vegetation, they overlook its identification. [1] Others identify some species and list them either with certainty [2] or somehow reservedly. [3] When the species is not identifiable, generalizations are made. [4] Occasionally logical syntheses [5] are advanced but such interpretations, although suggesting the partial reconstitution of the Dacian forest vegetation, remain mere exceptions. Other researchers estimate correctly the general manner of tree representation [6], which, even if its realistical representation differs depending on the species group [7], suggests however univocally the magnificent Dacian forest [8]. Finally, the study of the forest vegetation is *a priori* skeptically [9] viewed given the impossibility of exact locations, although historians' evaluations are dramatically opposed in terms of the accuracy of the natural landscape[10].

Thus, the historiated artistically valuable basreliefs which confer the Column its fame have been investigated along the centuries from various viewpoints, but not from the forestry one. Subsequently, *the documentary value of the Trajan's Column, its importance and significance from the forestry viewpoint is the aim of the present research.*

For this purpose, an objective working method was devised and the consideration of some dendrometrical indices used in forest research [11]. Our investigations were carried out on copies of

* English version by Aurora Liiceanu, revised by Eleonora Bărbulescu.

[1] In this category is included K. Lehman — Hartleben, *Die Trajanssäule. Ein römisches Kulturwerk zu Beginn der Spätantike*, I + I, Berlin — Leipzig, 1926; the species identification is avoided in the chapter devoted to the tree vegetation.

[2] Thus, W. Froehner, *La Colonne Trajanne*, Paris, 1865, p. 130, finds out the existence of some oak trees: "Un corp d'auxiliaires... est occupé à abattre des chênes" and C. Cichorius, *Die Reliefs der Trajanssäule*, II, Berlin, 1896, p. 25, remarks "hinter den zwei Pappeln" or, *ibidem*, p. 44, "der linke deutlich eine Eiche mit Früchten ist", etc. (see to same, III, Berlin, 1900).

[3] Numerous details are due to C. Cichorius. Among them are "Zwei Bäume, anscheinend Eichen", *ibidem*, p. 24; "Bäume mit herabhängenden Zweigen, wie es scheint Nadelhölzern", *ibidem*, p. 87, etc.

[4] C. Cichorius, *op. cit.*, p. 64, "vor den Bäumen"; p. 146 "ein hoher schlanker Baum mit traubenartigen Bläterbüscheln"; p. 315 "Zwei schlanke Bäume mit büschelartigen Blättern".

[5] For example, W. Froehner, *op. cit.*, p. 139, "Plusieurs factionnaires s'abritent à l'ombre d'un massif d'arbres"; C. Cichorius, *op. cit.*, p. 105, "Durch fünf Bäume in Hintergrunde, links zwei Eichen, rechts drei Nadelhölzer, wird ein grosser Wald angedeutet"; R. Florescu, *Studiu și comentariu arheologic la I. Miclea: Columna*, Cluj, 1971, p. 24: "a group of Roman soldiers who work in a forest"; p. 31: "in the blackground a forest is represented"; p. 32: "on the left side, the forest...", etc., etc.; C. C. Giurescu, *Istoria pădurii românești din cele mai vechi timpuri pînă astăzi*, Bucureşti, 1975, p. 20: "The Column... expresses in several places the Dacians fighting close by a forest."

[6] C. Daicoviciu, H. Daicoviciu, *Columna lui Traian*, Bucureşti, 1968, p. 16—17, consider that "the tree representation is very expressive and geographically documented."

[7] Thus, M. Gramatopol, *Arta imperială a epocii lui Traian*, Bucureşti, 1984, p. 193, distinguishes a "correct stylization of the foliaceous and not of the coniferous species".

[8] Relevant is forest scientist I. I. Florescu's appreciation, *Pădurile vorbesc*, Bucureşti, 1971, p. 103, according to which the representation modality of Trajan's Column trees is "an additional evidence of the giant forests which have impressed the artist so much that he could not find anything more representative for the scene division than the tree trunk".

[9] Al. Borza, *Vegetația Banatului în timpul Romanilor*, Buletinul Grădinii Botanice și a Muzeului Botanic Cluj, XXIII, 1943, nos 3—4, p. 122, considers circumspect that "the study of the vegetation expressed on Trajan's Column basreliefs did not promise so satisfactory results for the scene location was doubtfull in spite of the archeologists' ingenious interpretation (Cichorius, Petersen, Patsch, Zagorit and others)".

[10] See E. Cizek's prodigious work *Epoca lui Traian*, Bucureşti, 1980, p. 53, "the fighters and the landscape appear attentively and minutely expressed". Similar appreciations are in Th. Antonescu, "*Columna Traiană studiată din punct de vedere arheologic, geografic și artistic*", Iași, 1910, I, p. 262, "...we remember how tenacious the artist renders to the tiniest detail everything in its peculiar surrounding".

[11] E. Assmann, *Waldertragskunde*, München-Bonn-Wien, 1960; Cr. D. Stoiculescu, *Cercetări biometrice asupra chiparosului de baltă — Taxodium distichum (L.) Rich.*, Doctoral Thesis, Bucureşti, 1979.

DACIA, N.S., TOME XXIX, 1—2, 1985, P. 81—98, BUCAREST

Trajan's Column exposed in the History Museum of Socialist Republic Romania, Bucureşti [12] and on a group of secular trees in two natural stands in Romania, in the Southern Carpathians.

To state the ligneous species represented on the Column, imprints were drawn of some leaves estimated as representative as well as of some whole trees. Similar measurements were done using an equal sample of secular oak trees *(Quercus robur* L.) in Dolj (Forest district Amaradia, section VI Balota, compartment 237) and of fir trees *(Abies alba* Mill.) in Prahova (Forest district Sinaia, section V Sinaia, compartments 25—26), randomly selected from natural stands considered as being representative for the Romanian forest.

The scene ordering and the epic frieze division into partitions were done according to C. Cichorius' classical monograph [13]. By this procedure, the division of the Carpathian-Pontic-Danubian space and its limitrophe into zones as expressed in Table 1 was possible.

Table 1

Zoning the geographic space represented on Trajan's Column concerning the regions covered by the Roman legions according to C. Cichorius [29]

Reference space		The scenes contained in the partitions
Carpathian-Pontic-Danubian and limitrophe		I — CLV
Dacian	Total, of which	V — XXXII; XLVII — LXXVIII; XC — CLV
	the zone covered in first Dacian war	V — XXXII; XLVII — LXXVIII
	the zone covered in second Dacian War	XC — CLV
Extra-Dacian	Total, of which	I — IV; XXXIII — XLVI; LXXIX — LXXXIX
	the zone covered in the Moesic campaign	XXXIII — XLVI
	limitrophe, covered from Italy to Dacian border	I — IV; LXXIX — LXXXIX

With the view of an analytical interpretation, in the study here presented, the scene median length measured in Cichorius' boards was used as elementary reference unit and as other forest information graphically represented (Annex 1).

The processing of the obtained information led to the formulation of statements related to: 1) the plastic language decoding concerning the forest vegetation; 2) the Dacian dendroflora; 3) the hypsography of the Dacian forest space; 4) the ecological variability of the Dacian forest space; 5) the extent of the Dacian forest and of the main storeys of the forest vegetation; 6) the Dacian forest composition; 7) the compactness of the Dacian forest; 8) the biometry of the Dacian trees; 9) the tree quality in the Dacian forest; 10) the tree-image reconstitution of the Dacian forest; 11) conclusions. Further below the first four sub-sections are shown.

1. PLASTIC LANGUAGE DECODING CONCERNING FOREST VEGETATION

From the very outset, with the exception of the 2500 human figures represented on the Column frize, the 224 trees identified and analyzed in the present study and constituting the more frequent and probably not accidental element, impressed us. They represent the main forest symbol used in information coding and transmitting or, otherwise stated, they are "*the letters that have been used*". These are condensedly expressed observing the life proportions with relative care, not merely by reducing them to "*the right scale*", but by selective observation of relationships among the main biometrical characteristics as we shall demonstrate further below. This procedure confers the Column trees not only a distinct expressive force but also an unparalleled grace throughout the centuries, inducing a strong artistical feeling. The representation of the forest vegetation in the reduced space of the Column could not be achieved without condensation and schematism. The trees are stylizedly rendered, without taking into account their life proportions either concerning the environment or their components. To decode the possible information, a re-translation of the graphic images into words is needed, namely to proceed conversely

[12] The author espresses his gratitude to prof. Fl. Georgescu, former director of the History Museum of the S.R. Romania, Bucharest, for allowing to study Trajan's Column.

[13] C. Cichorius, *op. cit.*

than did the ancient sculptors. This attempt leads us to new results which are listed further below.

We consider that in such a language a tree could express a forest and a group of trees could suggest a forest mass. As to the ligneous species represented on a scene, the forest is made of pure or mixed stands. Thus, the exclusive presence of resinous species could suggest the spruce (*Picea excelsa* -Lam. -Link.) subzone and implicitly, within the climatic fluctuations of the last

Fig. 1. In the most beautiful ancient square of Imperial Rome, sculptured in the white marble of the Trajan's Column, there is one of the oldest forestrial chronicle dedicated to the Dacian forest.

19 centuries, the probable upper mountain level until the subalpine one, peculiar to this vegetation subzone. The simultaneous presence of the resinous and foliaceous species within the same scene can suggest the mixture subzone (composed by *Picea excelsa* -Lam.-Link., *Abies alba* Mill., *Fagus sylvatica* L. and *Acer* species) located at a lower altitude, probably specific to the upper through to the middle mountain level. Also, the exclusive representation of the foliaceous species can suggest the subzone of beech (*Fagus sylvatica* L.), sessile oak (*Quercus petraea* — Matt.-Liebl., *Q. polycarpa* Schur and *Q. dalechampii* Ten.), Turkey — Hungarian oaks (*Q. cerris* L. and *Q. frainetto* Ten.), oak (*Q. robur* L.) and the forest-steppe subzone too, the last being composed of xerophyte oaks (*Q. pubescens* Wild. and *Q. pedunculiflora* Koch). These subzones are located at more lower altitude, probably corresponding to the middle mountain level down to the lowland. Certainly, these are main wood species of the Romanian forest. But the vegetation subzones contain many other species too, part of them often represented on the Column. For

example *Sorbus torminalis* (L.) Cr. "disseminated in the foliaceous forest from the lowland up to the mountain level" [14].

The exclusive representation of all of the trees, covered with foliage, of the unfrozen waters and the absence of snow, icicles and other winter phenomena in a geographic space notorious for its climatic harshness in ancient times, eloquently suggest the vegetation season corresponding to the warm period of the year.

A half of its height prunned bole characterizes, in the case of old trees, the forest habit, specific to forest threes (Figs. 2 and 3). But, the hollows so visible at the trunk basis and often along it, as well as the knots of the crown branches express beyond doubt just the advanced age of the forest (Fig. 2).

Although resinous species did not lack in the Dacian forest landscape crowded with Roman legions as it clearly results from the Column reliefs, they are cut (for example, in scene LXVII; Figure 3). Indeed, they grow as pure stands or mixed with foliaceous species, either at high altitudes where the Roman cavalry penetrated only exceptionally in short pursuit expedition or at lower altitudes, on inaccessible abrupt slopes of some Carpathian gorges. The priority cutting of the foliaceous trees suggests the preponderent waging of the two Dacian wars just in this vegetation-zone type, where resinous trees existed only sporadically. In this zone and therefore nowhere else become necessary sapper works which required in their turn tree cuttings, so clearly represented on the Column. This circumstances demonstrate why the resinous species stood aside from the edge of the Roman hatchets.

The image of the trees represented in dense groups with interpenetrated crowns suggests the darkness and the compactness of the Dacian forest consisting of virgin natural stands, dense hardly penetrable and manystoreyed, the upper storey of which was made up of multicentury-old huge trees, covering most of the Carpathian-Pontic-Danubian space. By its majestic, wild and

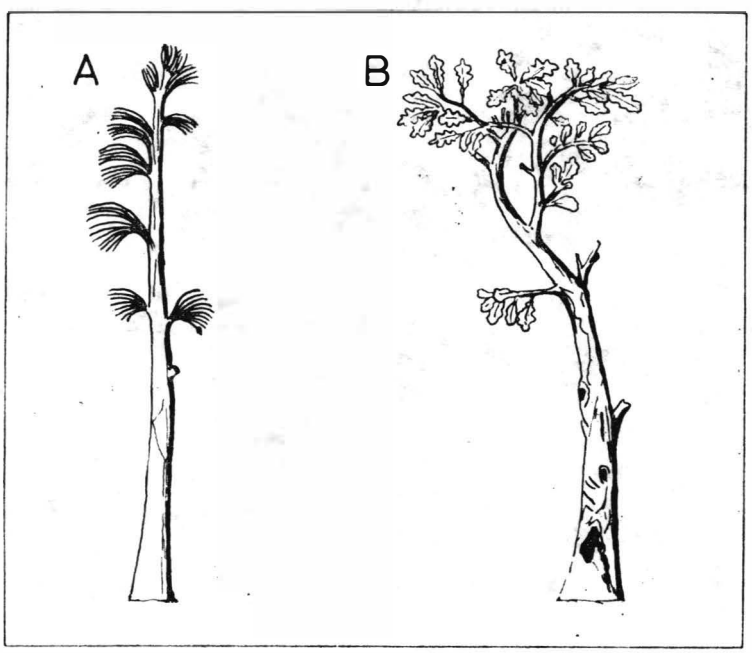


Fig. 2. Tree with forest habit: A — resinous species (scene CII), B — foliaceous species (scene CXVII).

Fig. 3. The exceptional cutting of a coniferous tree (scene LXVII).

unhospitable aspect, the Dacian forest inspired anxiety, uncertainty and intimidated the Mediterranean invader called to fight under the Roman Aquila, coming from the penetrable, lighted and strongly anthropizated forests, characteristic of the meridional space. The written sources recorded the information according to which the Roman legions commanded by Caius Scribonius Curion reaching Dacia in 75 B.C. were frightened by the forest darkness *tenebras saltuum expauit* [15]. Fifteen decades before Dacian wars ... Thousand years later it did not

[14] I. Dumitriu-Tătăranu, *Arbori şi arbuşti forestieri şi ornamentali cultivaţi în R. P. Română*, Bucureşti, 1960, p. 697.

[15] Florus, *Bellum Thracicum*, I, 39 (III, 4), 1, cf. *Izvoare privind istoria României* (IPIR), Bucureşti, 1964, I, p. 522.

change. As Ioan Kinnamos, the secretary of Emperor Manuel I Comnen reported *de visu* that when accompanying in 1148 the Basileus in a punishment expedition to the Northern Danube after a military engagement, the Cumans lost themselves in "the richness of the upper levelend vegetation ("το τῶν ὀρων ... λάσιον"; meaning a rich forest, our note) ... spreading largely out in this country" [16].

2. THE DACIAN DENDROFLORA

From the analysis of the 224 trees represented on the Column, six unidetifiable trees are excluded[17]. The other 218 trees were divided into two species groups: resinous and foliaceous ones. The last group was divided into six subgroups, one of them according to the crown shape and five according to the form of the leaves. Thirty-seven types of species were identified within both species groups: 9 resinous species and 28 foliaceous ones (Table 1). The difference is more obvious between the species groups than between the species types, and within the last ones, it is even more obvious between the resinous species types than between the foliaceous ones (Figs. 4 and 5). The species groups are suggestively represented in their specific forestrial habit: the resinous trees — with their monopodial, errect trunk prunned, more than half on its height, faultless, with a narrow, conic-columnary crown, with a few branches, agglomerated to the top and often with fascicles needles directly inserted in the stem, with diversely stylizided needles and of obvious exotic aspect (Fig. 2, 3 and 4); the foliaceous trees — with sinuous, ramified trunks, full of imperfections, prunned to more than the half of the height, with a fluting, hollow and loose trunk basis, having an umbelliform or obovate crown, consisting of vigorous branches ± laterally expanded, with leaves and fruits, never defoliated or blooming and with a vigorous realistic expression.

In the case of the foliaceous trees, the division of the species types is often difficult to be done. Such a case is illustrated in Fig. 6 for a tree belonging to the species subgroup E, represented on the left side of scene CXXXV. Here, the form "b" was taken into consideration, estimated as representative, borrowed in this example even for the species type 26 (Fig. 5).

The tree distribution on these "systematic units" is illustrated in Table 2. Thus, the following division of the trees into *species groups* is ascertained: resinous trees: 35 (15,6%), foliaceous trees: 189 (84.4%) and into *species subgroups:* A — subgroup: 35 (15.6 %), B — subgroup: 2 (0.9 %),

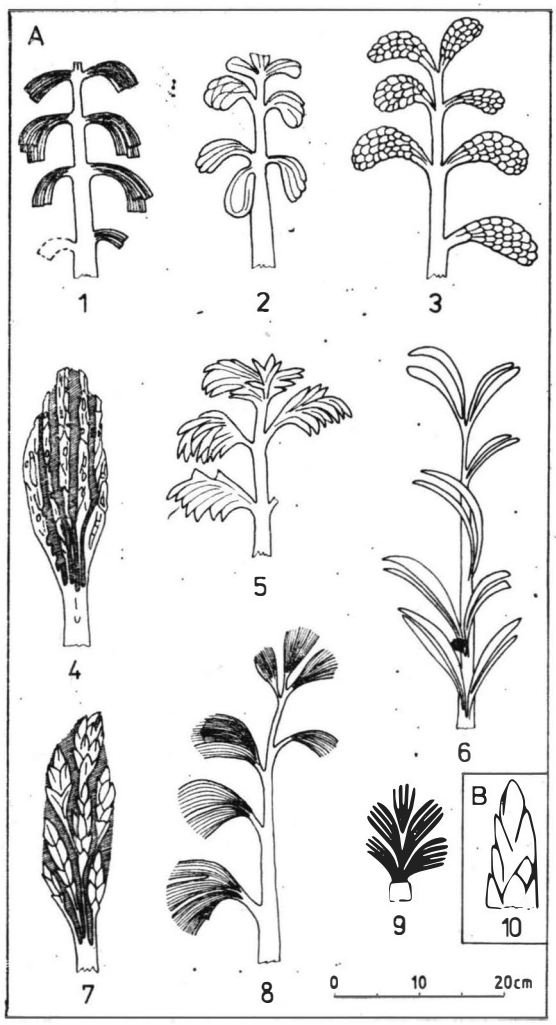
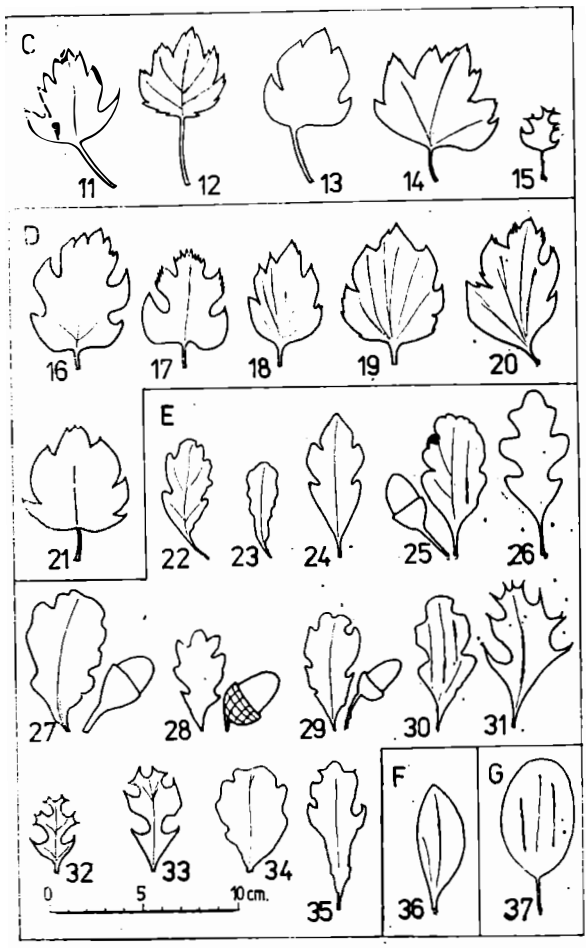


Fig. 4. Resinous species types included in the A and B species subgroup according to the crown and needle forms. *Columnary crown: type 1* — long and pendent needles; *type 2* — revolute, semilanceolate needles; *type 3* — short and scaly needles; *type 5* — needles grouped in pendent fascicles; *type 6* — slightly revolute, lanceolate, big needles; *type 7* — scaly and oblong needles; *Pyramidal crown: type 10* (suggesting a primitive form of the actual pyramidal black poplar— *Populus nigra* L. cv. *Italica* — or the cypress — *Cupressus sempervirens* L.) *Semipyramidal crown: type 8* — needles grouped in short fascicles; *Rhomboidal crown: type 4* — long and scaly needles, catenary disposed; *Ovate crown: type 9* — erect, fanned, exclusively disposed at the tree top.

[16] P. S. Năsturel, *A propos de Tenou Orman (Teleorman) de Kinnamos*, Geographica Byzantina, serie Byzantina-Sorbonensia 3, Université de Paris, 1981, p. 82; cf. Kinnamos, ed. Corpus, Bonn, p. 95.

[17] From these six trees, five could be included in foliaceous and one in resinous species because of the lack of possibilities to research the details. Thus, in scene III, on the upper left side, a foliaceous species appears clearly, with leaves represented in profile. This scene is exposed in the History Museum of the S. R. Romania, Bucharest, in a place making difficult to closely investigate this tree. In scene LXXVIII, two trunks cut up to a man's height and used as a trophy holder are seen. They are foliaceous species if we consider the form and the appearance of their trunks and apparent deficiencies of the wood (knots and hollows). In the partially degraded scene CXLVII, three trees appear: one on the left side and two on the right side. Taking into account the partially visible details and the reconstituted appearance of the leaves and the stem outline, the right trees can be foliaceous species and the left ones are probably resinous species.

C — subgroup : 22 (9.8%), D — subgroup : 87 (38.9%), E — subgroup : 70 (31.3%), F — subgroup : 2 (0.9%) and G — subgroup 1 (0.4%). As far as the *species types* are concerned, the following types prevail among the resinous trees : 2, respectively 7 with 8 (3.7%), respectively 7 trees (3.1%) and the following types prevail among foliaceous trees : 17, with 25 trees (11.3%);



← Fig. 5. Foliaceous species types divided in five subgroups according to their form of leaves : C — pentapalmary lobate leaves (suggesting *Acer* genus), D — broadly ovate leaves, with 3—5 triangular lobes slowly decreasing to the top (suggesting *Sorbus torminalis* L.), E — unregularly obovate and pennate-lobate leaves (suggesting *Quercus* genus), F — oblong leaves (suggesting *Prunus* genus?), G — elliptic leaves (suggesting *Fagus* genus).

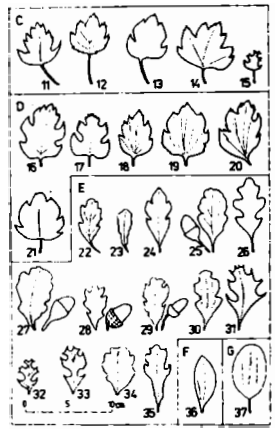


Fig. 5a. Fig. 5, on the same scale with the fig. 4.

16, with 21 trees (9.4%); 21, with 18 trees (8.0%), 23 and 29, with 15 trees (6.8%) and 22, with 13 trees (2.8%)[18].

These 37 species types could also be classified according to the original geographic space. Thus, 36 are apparently autochthonous and only one is apparently exotic. The last one, represented by the species type 10, suggests to the same extent two essences, rustic for the Roman world but exotic for the Dacian space : either the pyramidal black poplar *(Populus nigra* L. cv. Italica*)*

[18] By analyzing the Figs 4, 5 and 6, the forest scientist Viorel Grapini has found out some data pertinent to those here presented and confirming them. Thus, if the sculptors were seduced by imagination when expressing the resinous species producing real difficulties of the identification of species, the situation of illustrating the foliaceous species is diametrically opposed. The accuity of the observation required by the representation of the typical features is very impressive. Of course, the sculptors have probably grasped the foliaceous polymorphism proper to oaktreés, illustrated in the figure 6. Thus, in the same figure the following findings can be observed :

— the form "a" partially suggests *Quercus aegilops* leaf, cf. Th. Kotschy, *Die Eichen Europa's und des Orient's*, Wien und Olmüz, 1862, "native of the Eastern Mediterranean basin" (A. Camus, *Les chênes, monographie du genre Quercus*, II+II, Paris, 1933—1936);

— the forms "b" and "c" suggest the leaf of *Quercus dalechampii* Ten. a species with a Southern European areal;

— the form "d" suggests the leaf of *Quercus polycarpa* Schur, with a characteristically reduced lobation, identified by Schur in Transylvania as a native essence of Southern East-Europe.

But, all these forms of the previously mentioned leaves are naturally found on the hybrid x *Quercus rosácea* Bechst. Sylvan (1813) = *robur* × *petraea* (cf. Al. Beldie, *Genul Quercus*, in *Flora R. P. Române*, Bucureşti, 1952, I, p. 254, "being frequently in the vegetation area common to the parents (Iberian, Italian, Balkan Peninsula, Central and Western Europe)".

Also, Fig. 5 expresses the realistic aspect of the oak-tree *(Quercus robur* L.), with European great areal (types 25, 27 and 29) and *Quercus dalechampii* Ten. (type 28) when, the leaf is shortly-petiolate-sessile and the long pedunculate fruit, as in the first case, and the leaf has a triangular base and the acorn cup has a short-peduncul, as clearly appears in the second case.

or the cypress *(Cupressus sempervirens* L.). Ovid pleads in the favor of the first hypothesis when writing about a poplar higher than the other species : *Illa dolet fieri longos sua braccia ramos*, namely "that suffer because its arms become long branches" [19].

For the second hypothesis pleads the fact that the cypress, as a Mediterranean species, could only exceptionally grow on the Moesic Danubian side in the province of Banat, sheltered by walls as it happened in the analyzed case because of the climatic harshness specific to the Dacian space [20] (Fig. 7). However, be it either a primitive form of the actual pyramidal black poplar or the cypress, it does not appear anywhere in the Dacian space ; so, we are induced to accept the fact that its representation only here cannot be accidental.

This profusion of species types found on the Column frieze, which is excessive at first glance, actually reflects the dendrofloristic richness typical both of the Dacian forest and of the present natural one. Indeed, nowhere in the Carpathian-Pontic-Danubian space can there be seen such a diversity dendrofloristic as in its Southern part, which coincides exactly with the theatre of Trajan's Dacian wars. Obviously, the vegetation division into zones — at least in its essential outlines — did not change too much over the last 19 centuries [21].

Of course, the artist-designer was not a dendrologist. He expressed the nature through his artistical vision. If the presumptive Appollodorus, in his two-fold official capacity as architect and builder, accompanied his imperial friend in the Dacian wars as did the Roman topometrist Balbus [22], the physician Criton [23], the vegetation represented on the Column could be roughly that seen by Trajan. Afterwards, the sculptors — the artists who actually made it — were obviously influenced by the Mediterranean flora, specific to their native places or to occasional fashionable models. If we were to consider the species represented on the Column, the D-species subgroup prevails, suggesting the genus *Sorbus*. In a decreasing ordere there follow : the species subgroup E, suggesting the *Quercus*-species; the subgroup A, suggesting the resinous species; the subgroup C, suggesting the *Acer*-species; and, finally, three species subgroups very scarcely represented — the subgroup B, suggesting either the pyramidal black poplar or the cypress; the subgroup F, probably suggesting the plum *(Prunus* sp.) and the subgroup G which can suggest

[19] Ovid, *Les Métamorphoses*, Paris, 1930, I, 2, 352.

[20] The ancient writers' reports are numerous and conclusive as further below : "Puppibus illa prius, patulis nune hospita palustris; / aeroque dessiliunt vulgo, vestesque rigescunt / indutae, caeduntque securibus humida vina, / et totae solidam in glaciem vertere lacunae, / stiriaque impexis induruit horriba barbis. / Interea toto non setius aere ningit" (Where, before, the ships floaded, the large chariots are travelling / There, anywhere, copper things crack by frost and the clothes freeze on the body / The wine, till recently liquid, is cut there with the hatched and lakes change in deepness into compacted iceblocks / Repugnant nose mucus from the uncombed beard freezes and changes into icecles / And meanwhile it is snowing) — Virgilius, *Georgice*, III, 362—367, according to IPIR, p. 202 : "Et solet in multis bima manere locis / ... Nudaque, consistunt formam servantia testae / vina, nec hausta mari, sed data frusta bibunt./ Quid loquar, ut vincti concrescant frigore rivi, / dequc lacu fragiles effodiantur? / Ipse, papyrifero qui non angustior amne / miscetur vasto multa per ora freto, / caeruleos ventis latices durantibus, Hister/ congelat et tectis in mare serpit aquis / Quaque rates ierant, pedibus nunc itur, et undas / frigore concretas ungula pulsat equi ; / ... Vidimus ingentem glacie consistere pontum / lubricaque inmotas testa premebat aquas / ... inclusaequae gelu stabunt in marmore puppes / nec poterit rigidas findere remus aquas" (And usually, in many places, the snow lasts one year after another one / ... The wine takes the vase shape and keeps solid on taking it off... / here it is not drunk as a pure wine, but in pieces which they pass each other / what can I say more? / How the rivers solidify when the frost joints their shores / freezing their waters / and how when the ice is broken, the lake waters emerge like blocks? / Even the Istrus which is not narrower than the papyrus producing river / and which mixes its waters with the large sea through several mouths/ because the winds make solid the blue waves of the sea / freezes itself aud flows into the sea with covered waters / ... Where ships have floaded, you step now / and the horse's hoof strikes the unmoving frozen waves / I have seen how the sea as large as it is, is unmoving by frost / and how slippery roof presses its waters which no longer ean move / the ships cought by frost are like marble / and .. ean no more rip the unmoving waters) — Ovidius, *Tristia*, III, 10, 16 then 23—32, 37—38 and 47—48, according to IPIR, p. 282—284; ... "concretus gelu Danuvius inunxerat ripas" (The frozen Danube joints its shores) — Florus, *Bellum Dacicum*, II, 28, [IV, 12], 18, according to IPIR, p. 524; "Nihil praeter nives pruinasque et silvas habent" (They have nothing else than snow, frost and forests) — Florus, *Bellum sarmaticum*, II, 29 [IV, 12], 20, according to IPIR, p. 526;... Ἴστρον μέν γε καὶ Ῥῆνον, ἔτι δὲ Ὑπανίν τε καὶ Βορυσθένην καὶ ὅσων ἄλσων ἐν ὥρᾳ χειμῶνος τὰ ῥεύματα πήγνυται, τούτους μὲν χειμερίους κατὰ ἐμὴν δόξαν ὀρθῶς ὀνομάσαι, τις ἄν. Οἱ ῥέουσι μὲν διὰ γῆς τὸ πολὺ τοῦ χρόνου νειφομένης, ἀναπτέως δὲ κρυμνῶ καὶ ὁ περὶ αὐτούς ἐστιν ἀήρ. (The Istrus, Rhine, Hypanis, Boristene and other rivers, whose waters froze in winter, can be called in my opinion — and trully speaking — "winter rivers". They cross lands covered by snow in most time, and the air is very cold, there) — Pausanias, ερίηγησις τῆς Ἑλλάδο, VIII, 28, 2.

Obviously, although snow and frost are winter phenomena proper to the Dacian space, however, freezing of the sea and of the Danube are mere accidental phenomena.

[21] E. Pop, *Pădurile şi destinul nostru naţional*, Buletinul Comisiei Monumenteler naturii, Bucureşti, 9, 1941, 1—4, p. 11, states that "The research on the history of vegetation has established that when the Romanian People was at his origins, our forests had about the same zonal structure and were composed of the same species as now".

[22] One of the most important Roman topographists who conducted different sapper works and measurement operations carried out in Dacia. After the end of the war, he wrote a topography or geometry book of which only some fragments are preserved.

[23] Roman military physician. Experiencing Trajan's Dacian wars as a participant, he had rich information which was reported in his writing ; some fragments happened to be preserved proving its value.

Table 2

The frequency of the trees represented on Trajan's Column
(groups, subgroups and types of species according to the forestrial habit and to the form of leaves)

Species group

Resinous species	Follaceous species	TOTAL
35	189	224
15.6	84.4	100%

Species subgroup

A		B	C	D	E	F	G	—	TOTAL
34	1	2	22	87	70	2	1	5	224
15.2	0.4	0.9	9.8	38.9	31.3	0.9	0.4	2.2	100%

Species type

1	2	3	4	5	6	7	8	9	n*	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	N*	TOTAL
4	8	1	2	5	2	7	4	1	1	2	4	4	6	5	3	21	26	5	13	5	17	13	15	2	4	2	1	4	15	4	5	1	2	1	1	2	1	5	224
1.8	3.7	0.4	0.9	2.2	0.9	3.1	1.8	0.4	0.4	0.9	1.8	1.8	2.7	2.2	1.3	9.4	11.7	2.2	5.8	2.2	7.6	5.8	6.8	0.9	1.8	0.9	0.4	1.8	6.8	1.8	2.2	0.4	0.9	0.4	0.4	0.9	0.4	2.2	100.0%

* Unidentifiable trees: "n" for resinous species and "N" for foliaceous species.

the beech (*Fagus sylvatica* L.). Also, acorns and fruits of *Sorbus domestica* L. [23 bis] are represented on the Column.

By analyzing the types of species represented on the Column, two apparent contradictions arise : the almóst complete absence of the beech as a native species and the presence of the pyramidal black poplar or the cypress as exotic species.

The absence of the beech from the Dacian forest is doubtlessly unquestionable [24]. The beech was much too common to be represented on the Column even if its leaves were easier to reproduce. Certainly, the conquerors wanted to impress the outlooker with the richness of the new conquered province of the Empire whose conquest was otherwise very expensively paid for and the beech was too common to be represented on a monument immortalizing a conquest pretending to be memorable. That it so happened results from the Latin denomination itself — "*fagus*" ("*fag*" in Romanian — which survived unaltered down to our days alongside of the continuity of the Dacian-Roman population in the Carpathian-Pontic-Danubian space, thus certifying the presence of this species in the Dacian forest at the time of its romanization [25]. Moreover, this period of 19 centuries coincides with the culmination of the postboreal expansion of the beech toward the North, which started 3 000 years ago[26], and also with its dominant penetration in the Southern Carpathians, which the Romans mostly covered.

The surprising absence of the beech from the Column tallies with the default of the species diagnosis by the reknowned naturalists of the Antiquity : it was also ignored by being too common [27]. Other common plants as widely known as the beech, whose description also lacks are in the same situation. The apple tree, the pear tree, the blackberry, the corn, the oat, etc. are among them [28]. *The very absence of the beech from the Column confirms its large spread in the Dacian forest.* But, the absence of the beech from the Column could have another explanation, too. It is well known that the hardly accessible mountainous zone of the Appenines has always been a refuge for the beech. In this place, the species survived, being considered to be common by mountains inhabitants and scientists, but maybe unknown to the sculptors of the Column. Probably, the lack of the beech on the Column is also due to this reason. Considering the large extension of the beech in the Dacian forest as compared to the Italian one — even if this did not detain the actual spread specific to the natural Romanian forest, induced by the mentioned spread emphasized by E. Pop — *the absence of the beech from the Column demonstrates that the ancient sculptors did not follow Trajan to Dacia, nor did they wander through the Dacian forest or tread on the Carpathian paths.* This supposition borders certainty when analyzing the forest flora of the realistically rendered foliaceous trees on the Column. Thus, all the types of foliaceous trees are without exception characteristic to the submediterranean forests, too : *Sorbus torminalis* (L.) Cr. (6 types) and genera : *Acer* (5 types), *Quercus* (14 types), *Prunus ?* (1 type), *Fagus ?* (1 type) — Fig. 5.

However, whereas the species types are rendered by sculptors according to their "dendrological" knowledge, determined by the "ecological niche" known by them, the great diversity of the ligneous essences, specific to the Southern Dacian forest, is a true reality. Certainly, Trajan as a connoisseur of nature and a subtle observer spending much of his life-time in campaign, did not omit this fact in his imperial "Comments". Nor did the Column artist-designer, even if he did not personally take part in the Dacian wars; but he must have seen the official writing, beside possible partial sketches done on the spot. His drawings were probably transposed by the Column sculptors into basreliefs and could not have been aberrant.

Among the apparently exotic species represented on the Column (scene III) two of them, either a black pyramidal poplar or a cypress, are represented in a single urban setting identified by the Column exegetes as Viminacium on the Moesic Danubian bank. In no image intended to

[23 bis] The last, according to I. Dumitriu-Tătăranu, *Op. cit.*, p. 696 : "Spontaneously, in the Southern and Western part of Romania, rarely in Moldavia. Sporadically cultivated in wine-growing region". Like chesnut-tree, *Sorbus* culture perpetuated till now in Romania could be due to "quiet penetration of the Roman element preceding the action of the Roman legions and administration in Dacia" (A. Oţetea, *Romanitatea orientală*, in : Scrieri istorice alese, Bucureşti, 1980, p. 189).

[24] See also, Al. Borza, *Op. cit.*, p. 125 : "The beech forests from Banat have surely been during Roman period as vigorous as now, when the giant forests overwhelm all the vegetation storeys, from the hills of the lower Nera and Danube untill the upper mountalneous level".

[25] See M. Drăcea, *Consideraţiuni asupra domeniului forestier al României*, Bucureşti, 1938 : "if the Slavic linguistic element were deeper expressed in our forestry terminology and in Romanian toponymy, Romania would be now an immense Bucovina (in Slavic language : buc = beech). But Romania is an immense "beech forest" and could be named "The country of the beech trees (in Romanian : Făgăraş = the name of the Beech Mountains, Beech Town, etc., etc.), because nothing else is more Latin in Romanian than the name of the trees".

[26] E. Pop, *Mlaştinile de turbă din R. P. Română*, Bucureşti, 1960, p. 42.

[27] Teofrast, the third century B. C., Dioscorides, first century B. C., Plinius the Old, first century A.C., show that "Differentia vero notior quam ut indicari deceat" (the plant features were too much known for being necessary their reproduction) according to C. Vaczy, *Fagul în botanica prelinneană*, in *Făgetele carpatine*, Cluj-Napoca, 1982, p. 28.

[28] According to C. Vaczy, *op. cit.*, p. 28.

illustrate the Dacian localities, not even in the chiselled one, in the under-extramural part of the same scene III, are there represented essences other than the apparently native ones (Fig. 7). By illustrating the ligneous species specific to the Roman world, the artist strongly emphasizes — by this element too — *the romanization of the Moesic landscape up to the fortifications on the Danu-*

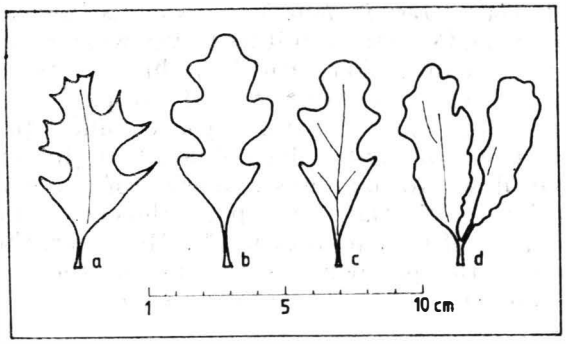
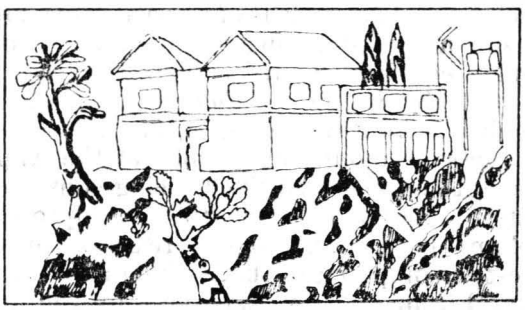


Fig. 6. Foliage polymorphism of a tree of the E species subgroup (scene CXXXV).

Fig. 7. The unique exotic species, specific to the Roman world (*type 10*, figure 5) — the primitive form of the actual pyramidal black poplar (*Populus nigra* L. cv. *Italica*) or cypress (*Cupressus sempervirens* L.) is represented by two trees inside of a fortification from the extra-Dacian space (scene III).



bian border, a space that had been for six decades under Roman administration. The so suggestive representation of the pyramidal black poplar (the cypress) is probably due to the deliberate mention of the species in the imperial *Commentarii* as well as to the artists' knowledge of it.

3. HYPSOGRAPHY OF THE DACIAN FOREST SPACE

An attempt to decode the Column basreliefs resulted from the frieze division into partitions, as was previously shown, allowed us to emphasize some new spacial characteristics. Thus, according to the measurements carried out on Cichorius' boards [29] (Table 3), the total length of the Column frieze is of 3174.0 cm (100%). The partition reserved to the Dacian space, consisting of 126 scenes, is of 2507.8 cm (79.01%) and that devoted to the extra-Dacian space, consisting of 29 scenes is of 666.2 cm (20.99%). Related to the average length of all the scenes (20.48 cm; 0.65%) and especially to the average length of the scenes devoted to the extra-Dacian space (22.97 cm; 0.72%), the average length of the Dacian space scenes is considerably reduced to 19.90 cm (0.63%).

Table 3

The variability of some spacial characteristics, specific to the geographic space represented on Trajan's Column established according to C. Cichorius' boards [29]

Reference space		Scenes nr./%	Scene length	
			total cm./%	average cm./%
The Column as a whole		155 100.00	3174.0 100.00	20.48 0.65
Of which	Dacian space	126 81.29	2507.8 79.01	19.90 0.63
	Extra-Dacian space	29 18.71	666.2 20.99	22.97 0.72

[29] C. Cichorius, *Op. cit.*

This fact due to the greater density and variability of the representations related to the number of scenes and to the length unity of the scenes dedicated to this space, emphasizes, in our opinion, a greater heterogeneity of the natural setting, a finding also suggested by the representation manner of the forest vegetation.

That this is true is proved by the data given in Table 4. Thus, if we take into account only the scenes of ligneous vegetation, respectively the forest space, it results that for the partition devoted to both Dacian wars, the average length of the scenes is somewhat close: 21.24 cm for the Dacian campaign of the first Dacian war, and 20.34 cm for the second Dacian war. This characteristic is considerably more obvious for the extra-Dacian forest space (26.64 cm) and within this space, the average scenic length devoted to the Moesia campaign is strongly superior (28.08 cm). This hierarchy of the average scenic length related to the geographic zone of the events cannot be ignored. It suggests the correlation between the carved image and the different dynamics of the ground relief. Thus, the steeper the ground relief, the more reduced is its image in terms of the scenic average length, while the infinite horizon of the plain is expressed by a maximal average length of the scene.

The supposition was verified by taking into account the maximal energy map of the Romanian [30] relief upon which the possible itinerary of the Roman armies in Dacia was traced [31]. The loaded mean obtained between the isoenergetical elementary lengths and the relief-corresponding maximal energy allows to establish reference values related to the geographical zones, as is shown in the two last columns of the Table 4. As compared to them [32], the data obtained by decoding the information from the Column — the first two columns of the table — are conversely correlated. Thus, in comparison to the average scene value of the whole forest space

Table 4

The hypsographic variability specific to the different forestrial zones of the Carpathian-Pontic-Danubian and limitrophe space suggested by the Trajan's Column and compared to the real one

Reference forestrial space		Average Value			
		provided by the Column		real	
		cm	%	m	%
Carpathian-Pontic-Danubian and limitrophe		21.33	100	168	100
Dacian	Total, of which	20.81	98	210	125
	the zone covered in the first Dacian war	21.24	100	.	.
	the zone covered in the second Dacian war	20.34	95	.	.
Extra-Dacian	Total, of which	26.64	125	87	52
	the zone covered in the Moesic campaign	28.08	132	68	40
	limitrophe covered from Italy to Dacian border	18.00	84		

represented on the Column (21.33 cm), taken as standard (100%), the Dacian forest space illustrated by the artist by the smallest scenic average length (20.81 cm; 98%), corresponds to the greater average value of the maximal energy of the ground relief (210 m; 125%). At the antipode is the Moesic forest space characterized by the milder relief of the ground. To this space, to whom the ancient artist assigned the greatest scenic average length (28.08 cm; 132%) corresponds the smallest average value of the maximal energy of the ground relief (68 m; 40%). Between the both extremes is the partition devoted to the whole extra-Dacian forest space. It is

[30] Elaborated by T. Moraru on 1 : 1,500,000 scale. See: *Monografia geografică a R. P. Române*, Bucureşti, 1960, I, annex 5.

[31] Proposed by P. MacKendrick, *The Dacian stones speak*, The University of North Carolina Press, 1975 (Romanian edition, Bucureşti, 1978, p. 64, fig. 9).

[32] Taking into account that the maximal energy of the relief has the upper value for the Dacian space, the lower value for the Moesic-Pontic-Danubian space and a mean value for the extra-Dacian space, any other route assigned to the Dacian campaigns lead to the establishment of some real hypsographic values having an identical hierarchy.

characterized by a scenic average length of 26.64 cm (125 %) and to the afferent space corresponds the maximal average energy of the ground relief of 87 m (52 %).

These results have three meanings. First of all, they prove the realistic manner of information coding in the suggestive graphic language used in decorating the Column. Secondly, they prove, on the basis of hypsography, both the realistic modality of the Column frize division into partitions proposed by Cichorius and the generally correct overall reconstitution of the Roman army itinerary in Dacia proposed by P. MacKendrick. Thirdly, these results demonstrate the accuracy of the geographical knowledge recorded by Trajan in his report *(Commentarii)*. These results are also ecologically validated as we shall demonstrate below.

However, these results suggest further suppositions, too. Thus, by hypothesizing a land itinerary of the Roman legions between their Italian departure base and the Dacian border, and on the basis of the hypsographical characteristics previously mentioned, we can suppose that this route crossed an extremely abrupt forest zone, figured out by the ancient artist in the same language as the smallest scenic average length : 18.00 cm (84 %).

4. ECOLOGICAL VARIABILITY OF THE DACIAN FOREST SPACE

By continuing to decode the Column frieze, the distribution variability of the wood species types is stated, in the scenes. The representation of a different number of species types on the scene related to the frieze partitions under consideration suggests a hypothetical emphasis of the general ecological conditions of the different zones proper to the Northern-West Euxine and Danubian lower basin. Thus, as it results from Table 5, on the 78 scenes of the Column frieze representing the ligneous species and the partition related to the Dacian space too, the number of species types afferent to a scene is : 1, 2, 3, 4 and 7. In the partition devoted to the Dacian

Table 5

The frequency of the scenes related to the number of the species types represented on Trajan's Column

Reference space		The number of the species types afferent to a scene							Total
		1	2	3	4	5	6	7	
		Scenes number/% Column total scenes/% Dacian space							
Column total		37 47.5	24 30.7	13 16.7	3 3.8	—	—	1 1.3	78 100.0
Dacian	*Total,* of which	33 42.3 46.5	23 29.4 32.4	11 14.1 15.5	3 3.9 4.2	—	—	1 1.3 1.4	71 91.0 100.0
	the first war	15 19.2 21.1	14 17.9 19.7	7 9.0 9.9	—	—	—	1 1.3 1.4	37 47.4 52.1
	the second war	18 23.1 25.4	9 11.5 12.7	4 5.1 5.6	3 3.8 4.2	—	—	—	34 43.6 47.9
Extra-Dacian	*Total,* of which	4.1 5.1	1 1.3	2 2.6	—	—	—	—	7 9.0
	Moesic Campaing	4 5.1	1 1.3	1 1.3	—	—	—	—	6 7.7

campaign of the first Dacian war, the number of species types pertaining to a scene, is : 1, 2, 3 and 7. It results from the same Table that in the partition devoted to the second Dacian war, the distribution amplitude of the number of species types pertaining to a scene is reduced between 1 and 4 ; in the extra-Dacian partition and in the partition of the Moesia campaign that amplitude is reduced between 1 and 3.

A general characteristic of the scene distribution in connection with the number of the forest species types pertaining to a species consists in their exponential distribution (Fig. 8). This distribution is very interesting because it is generally proper to natural unevenly aged forests in the temperate zone where anthropic intervention manifested by preferential extraction has not

yet been perceptible. This fact suggests *the virgin character of the Dacian forest, obvious through this modality of the Column basreliefs decoding.*

The representation of various forest species types pertaining to a scene suggests the ecological variability [33] specific to different zones of the Carpathian-Pontic-Danubian space on the itinerary of the Roman army. This characteristic is expressed by the "ecological variability index" (EVI), considered as a loaded average between the number of the forest species types pertaining to a scene and their frequency (shown in Table 5 and synthetizated in the first two columns of Table 6). The comparison was based on De Martonne's aridity index (I_a) [34] calculated for 40 meteorological stations and the results are presented in the last two columns of Table 6.

Table 6

The ecological variability specific to the different forestrial zones of the Carpathian-Pontic-Danubian space and limitrophe suggested by Trajan's Column (EVI) and compared to that real (I_a)

Reference forestrial space		Values of			
		EVI		I_a	
		$\bar{x}$	%	$\bar{x}$	%
Carpathian-Pontic-Danubian and limitrophe		1.83	100	29	100
Dacian	Total, of which	1.85	101	32	110
	the zone covered in the first Dacian war	1.92	105	.	.
	the zone covered in the second Dacian war	1.76	96	.	.
Extra-Dacian	Total, of which	1.71	93	22	76
	the zone covered in the Moesic campaign	1.50	82	21	72
	limitrophe covered from Italy to Dacian border	3.00	164	.	

The data presented in Table 6 prove the direct correlation between EVI- and I_a-values. Thus, the EVI-average value of 1.83 and I_a-average value of 29 correspond to the whole forest space expressed on the Column and taken as a standard (100%), while the greatest average value of EVI (1.85 ; 101 %) and of I_a (32 ; 110%) correspond to the Dacian forest space. The smallest average value of EVI (1.50 ; 82 %) and of I_a (21 ; 72 %) are characteristic to the Moesic forest space. The whole extra-Dacian forest space is characterized by interpolated average values of both indexes: EVI — 1.7 ; 93% and I_a — 22 ; 76%.

Taking into account that the diversity of the ecological factors is expressed by the increase in species number and considering the EVI-synthetical values, we observe that the Column basreliefs suggest a different ecological zone variability with maximal values for the Dacian space, moderate ones for the extra-Dacian space and minimal values for the Moesic space. Knowing the large altitudinal amplitude of the Dacian forest space [35], where almost all the forest vegetation formations are found, and the more reduced altitudinal amplitude of the Moesic space [36], the forest ecological variability represented on the Column prove its authenticity.

The parallel dynamics of EVI- and I_a-values (Table 6) is implicit and correlated with the altitude [37]. This fact suggests the different altitudinal disposition of the forest spaces represented

[33] This is in agreement with the biocenotic fundamental principles formulated by A. Thienemann, *Grundzüge einer allgemeinen Ökologie*, ArchHydrobiol, 1939, 35, p. 267—285, according to which: "1 — the more variable life conditions of a biotope, the greater the species number from the corresponding biocenosis; 2 — the greater deviancy of the biotope life conditions from the normal — and from the optimal for most beings — the poorer in species number becomes the biocenosis, the more characteristic shall it be and the greater the richness in individuals of the single species" (according to B. Stugren, *Bazele ecologiei generale*, Bucureşti, 1982, p. 149).

[34] $I_a = P : t + 10$, where : P is annual precipitation sum and t is average annual temperature, according to T. Bălănică, *Meteorologie şi climatologie forestieră*, in Manualul inginerului forestier, Bucureşti, 1955, 80, p. 96. In the Carpathian-Pontic-Danubian space, the value of the de Martonne's aridity index increases with increasing altitude and decreases the number of forest species included in the forest composition. The maximal number of wood species, specific to the mixed foliage forest in the alluvial plain, decreases gradually as we approach the alpine zone.

[35] From about 30 m in Sucidava, about 1200 m in the zone Sarmizegetusa Regia and until "2133 m on Virful lui Pătru (Peter's Topmountain), where the vestiges of an earthen Roman camp could be certainly ascertained" (according to C. Daicoviciu, H. Daicoviciu, *Sarmizegetusa, cetăţile şi aşezările dacice din munţii Orăştiei*, Bucureşti, 1962, p. 37).

[36] Characterized by an altitudinal difference of just 467 m (between Tomis and Virful Tuţulatul — a top-mountain of the Pricopan Mountains).

[37] Between De Martonne's aridity index (I_a) and the altitude (alt) of the 40 meteorologic stations investigated (Fig. 9) there is a direct and close correlation (r = 0.882) expressed by the regression :

$$I_a = 9.6112064 \log alt + 8.025237 \quad (1)$$

on the Column, which could be revealed thanks to the frieze division into the distinct partitions proposed by Cichorius. The greater average values of EVI and of I_a suggest higher average altitudes and, as we shall see below, the growing share of the forest in the Dacian space, confronted to their decrease in the extra-Dacian forest space. These information provided by the

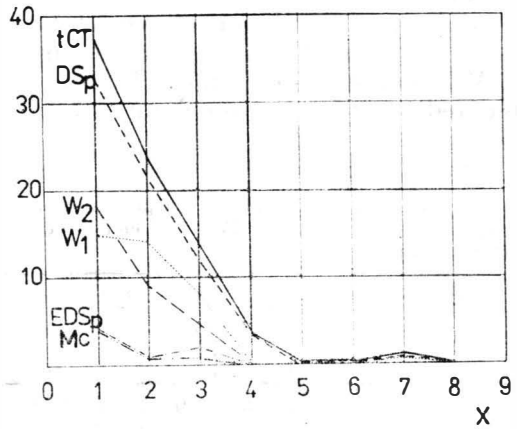


Fig. 8. The scenes frequency (Y) related to the number of the wood species types represented on the scene (X) and to the considered partition of the Column frieze, where : tCT — the total number of scenes including wood species ; Dsp — as above, for the Dacian space ; W_1 and W_2 — for the partition expressing the first and respectively the second Dacian war ; EDsp — for the partition expressing the extra-Dacian space ; Mc — for the partition concerning the Moesic campaign during the first Dacian war.

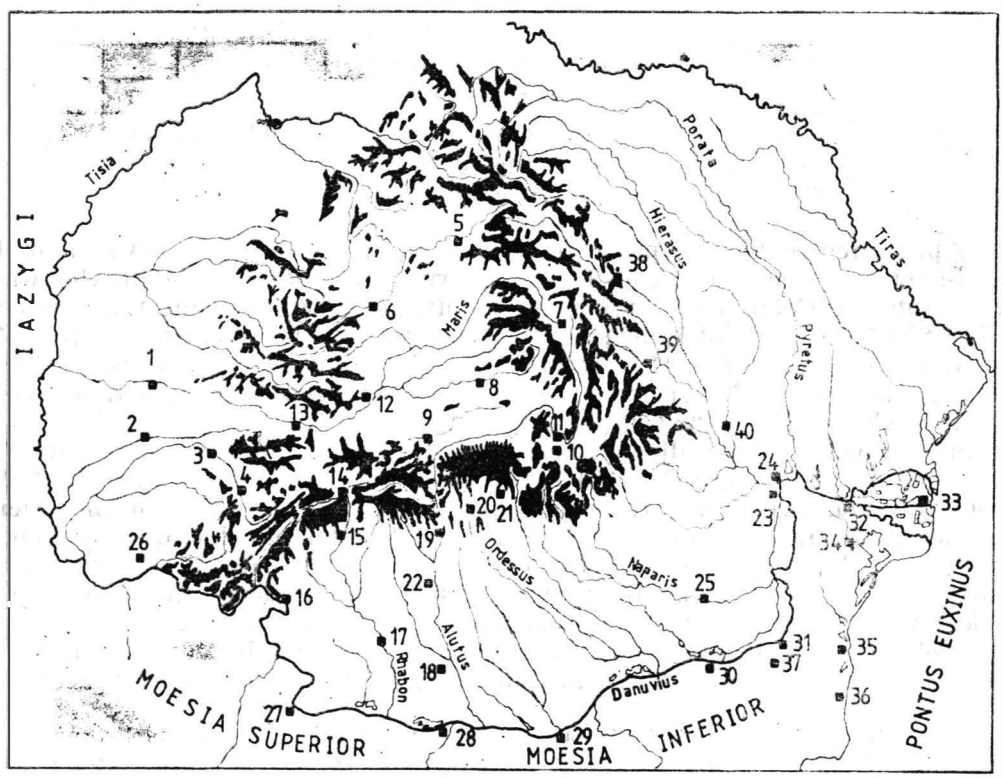


Fig. 9. The distribution of the meteorologic stations considered in the Carpathian-Pontic-Danubian space. A — *The Dacian space (Carpathian-Danubian)* ; 1 Arad, 2 Timişoara, 3 Lugoj, 4 Caransebeş, 5 Bistriţa, 6 Cluj, 7 Gheorghieni, 8 Sighişoara, 9 Sibiu, 10 Braşov, 11 Bod, 12 Alba Iulia, 13 Deva, 14 Petroşani, 15 Tg. Jiu, 16 Drobeta-Tr. Severin, 17 Craiova, 18 Caracal, 19 Rm. Vilcea, 20 Curtea de Argeş, 21 Cîmpulung, 22 Drăgăşani, 23 Brăila, 24 Galaţi, 25 Mărculeşti, 38 Piatra Neamţ, 39 Tg. Ocna, 40 Tecuci ; B — *Moesic campaign space* : 28 Oescus (assimilated to Tr. Măgurele), 29 Novae (assimilated to Zimnicea), 30 Durostorum (assimilated to Călăraşi), 31 Cernavodă, 35 Constanţa, 36 Mangalia, 37 Adamclisi ; C — *Extra-Dacian space* : the meteorological stations 28—31 and 35—37, and also : 26 Lederata (assimilated to Deliblat), 27 Ratiaria (assimilated to Calafat), 32 Tulcea, 33 Sulina, 34 Babadag.

Column basreliefs, in our interpretation, are also authentic and confirm the results presented in the previous chapter of this work.

At the same time, the EVI-average value, higher in the space reserved to the first Dacian war (1.92) than to the second Dacian war (1.76) suggests that *the routes of the Roman legions in*

the two Dacian campaigns, except for the Moesic diversion, are not at all identical. According to these values and to the hypothesis of the landscape representativeness of the scenes, *the forest zones covered during the first war were located at higher average altitudes than those covered during the second war.* This suggests that *the routes of the Roman legions during the two Dacian wars, except for the Moesia campaign, crossed zones somewhat distinct ecologically from each other* [38]. This conclusion is particularly important because, in the context of the absence of literary sources, the information suggested by decoding the basreliefs on the Column becomes most important as it offers, on a genuine sylvicultural basis, the posibility of the correct reconstitution.

*

It results from the previously described reserches, that *the historiated frieze of Trajan's Column contains a large variety of authentic sylvo-geographical information.* It is worth recapitulating :

1. the correct recording of the dendrofloristical profusion specific to the Carpathian-Ponto-Danubian space, represented by 37 forest species types, among which 9 (10) are needlewood species. That abundance of woodspecies, excessive apparently, shows in fact the dendrofloristic diversity, a characteristic of the Dacian forest and of the existing natural Romanian forest too;

2. the obviousness of the fact that among themain Romanian forest species, the beech had in ancient times the same destiny in respect to its botanical description and its representation on the Column : being too common, it was ignored;

3. the distinction between the autochthonous Dacian trees and the exotic trees specific to the Roman world;

4. the recording of ecological characteristics specific to the different geographic zones of the Carpathian-Ponto-Danubian space and of the limitrophe space too;

5. the obviousness of the fact that the Dacian wars occurred only during the vegetation season, no winter landscape being represented in any of the 155 scenes on the Columnn. Everywere the trees are figurated with leaves, the waters always unfrozen, snow, icicles and other winter phenomena are absolutely lacking, in a geographical space reputed in the ancient times for its climatic bitterness;

6. the suggestion of the important idea that the itinerary of the Roman army in the two Dacian wars, except for the Moesian campaign, was somewhat different, given the slight difference between the respective covered ecological zones;

7. given the lack of literary sources, the information suggested by decoding the reliefs on Trajan's Column acquires a particular value for the study of the Dacian campaigns, offering, on authentic forestry basis, the means for their correct reconstitution.

In conclusion, the forestry and eco-geographical information on Trajan's Column is correct and prove its realistic character upon transposition into the graphical language. For these reasons, the author of this study considers that despite of several contradictions issued in other fields, *the Column is an authentic forestry document, ignored by scientists. It affords the first artistical image of amplitude of the Dacian forest. For the Romanians, the Column is of particular importance because few peoples can invoke the privilege to have a forestry chronicle older than theirs.* If the images on the Column were substituted by the text of Trajan's Imperial *Commentarii*, which is lost now, we should have an historical source of unique value regarding the Dacian wars carried on by Optimus Princeps, at the risk of being deprived of one of the Antiquity's masterpieces, handed intactly to the modern times, in the memory of Dacian entering in the Roman world.

[38] This result obtained by sylvicultural decoding of the Column basrelief here proposed concords with the results of other investigations based on another criteria. Thus, V. Pârvan, *Getica*, Bucureşti, 1926 (re-edited, annotated, with comments and a postscript by R. Florescu, 1982), p. 117, considers that "Trajan's first Dacian war began from the West. He used Caesar and Augustus' previous plans attacking the Dacians having Dalmatia and Panonia as bases... he repeats, even in his strategies, the same movements excutated 12 years before him by Tettius Iulianus : and the main battle was in Tapae, too... During the second war, the main military base is Oescus (in the front of Olt river confluence), the main offensive occurred on the left side of Danube and along the Olt Valley." *Ibidem*, p. 118 (according to G.A.T. Davies, JRS, 7, 1917, p. 74—97), "The battles during Trajan's second war were fighted on the entire Danube until the Sea". *Ibidem*, p. 122.

The reconstitution of the Roman army itinerary during the two Dacian wars proves that the routes were distinct each other or only partially overlapped. See also : C. C. Giurescu, *Istoria Românilor*, Bucureşti, 1942, I, p. 74—81; H. Daicoviciu, *Dacii*, Bucureşti, 1968, p. 249—266; H. Daicoviciu, *Dacia de la Burebista la cucerirea romană*, Cluj, 1972, p. 287—341; L. Rossi, *Trajan's Column and the Dacian Wars*, London, 1971, p. 30—31, fig. III; W. Gauer, *Untersuchungen zur Trajanssäule*, Berlin, 1977, p. 51, fig. 2; D. Tudor, *Oltenia Romană*, Bucureşti, 1978, p. 30—34; P. MacKendrick, *ibidem*, p. 64, fig. 9; R. Florescu, *Studiu şi comentarii la I. Miclea : Decebal şi Traian*, Bucureşti, 1980, p. 35—47; G. Romanescu, *Marile bătălii ale românilor*, Bucureşti, 1982; E. Cizek, *op. cit.*, p. 267—303.

It is worth noting that of the Trajan's report *Commentarii* a sole sentence was preserved : "Inde Berzobim, deinde Aizi processimus" (from there we advanced towards Berzovis, then towards Aizizis), according to Priscian, VI, 13, p. 205, according to IPIR, p. 484. On this sentence could be reconstituted, partly, only the direction of the first Dacian war. All other suggested itineraries of the Roman army in Dacia remain, until their possible confirmation, mere hypotheses.

Annex 1

Scene lengths and distribution of trees on scenes and on species types and groups, on Trajan's Column reliefs

Relief no.[1]	Scene No.	Scene Median length[2], cm	Tree no.	Wood species type	No. of wood species types	Species group: Resinous	Species group: Mixed (resinous and foliaceous)	Species group: Foliaceous
0	1	2	3	4	5	6	7	8
1.2	I	71.5						
3	II	24.5						
4	III	18.0	1	N	3			●
			2	31				
			3	10				
			4	10				
5	IV	23.0						
	V	27.0						
6	VI	11.2						
7	VII	19.0	1	19	2			●
			2	25				
8	VIII	31.0						
	IX	11.2	1	18	1			●
9	X	17.5						
	XI	17.0						
10	XII	22.0	1	25	2			●
			2	19				
	XIII	14.1	1	25	1			●
11	XIV	9.0						
	XV	20.0	1	12	2			●
			2	12				
			3	12				
			4	24				
12	XVI	10.0						
	XVII	8.0						
	XVIII	22,5	1	1	1	●		
13			2	1				
14	XIX	7.5	1	2	1	●		
	XX	14.0	1	2	2		●	
15			2	16				
16	XXI	27.5	1	22	2			●
			2	19				
	XXII	19.0	1	19	2		●	
			2	19				
			3	2				
			4	2				
			5	2				

0	1	2	3	4	5	6	7	8
17	XXIII	13.5	1	19	3			●
			2	17				
			3	31				
			4	31				
	XXIV	64.0	1	36	3		●	
18			2	18				
19			3	5				
			4	5				
	XXV	21.0	1	5	3		●	
			2	16				
20			3	20				
	XXVI	15.5	1	17	1			●
21	XXVII	16.0	1	37	1			●
	XXVIII	12.0						
	XXIX	16.5	1	1	1	●		
22	XXX	6.0	1	3	1	●		
23	XXXI	22.5	1	5	1	●		
24	XXXII	23.5						
25	XXXIII	25.5						
25, 26	XXXIV	28.3						
	XXXV	11.0						
27	XXXVI	22.0	1	19	2			●
			2	14				
	XXXVII	31.8	1	36	3			●
28			2	34				
			3	25				
29	XXXVIII	29.5						
30, 31	XXXIX	19.7	1	30	1			●
32, 33	XL	66.0	1	20	1			●
33	XLI	10.5	1	29	1			●
34	XLII	18.5	1	28	1			●
	XLIII	14.5						
35	XLIV	12.5						
	XLV	6.5						
36	XLVI	16.5						
	XLVII	10.0						
37	XLVIII	14.0						
	XLIX	25.5						
38	L	13.5	1	21	1			●
	LI	17.0	1	21	2			●
			2	21				
			3	23				
39	LII	18.0	1	22	1			●
			2	22				
			3	22				
			4	22				
40	LIII	28.8						
41	LIV	11.5						
42	LV	6.0	1	17	1			●
	LVI	22.5	1	19	3			●
			2	22				
			3	17				
			4	17				

Annex 1 (continued)

0	1	2	3	4	5	6	7	8
43	LVII	13.5						
	LVIII	13.5	1	32	2			●
			2	16				
44	LIX	9.0	1	33	2			●
			2	33				
			3	24				
	LX	16.0						
45	LXI	14.0						
46	LXII	37.5	1	17	3		●	
			2	23				
47			3	7				
			4	7				
			5	23				
			6	7				
			7	23				
48	LXIII	15.5	1	7	2		●	
			2	23				
49	LXIV	39.5	1	23	3			●
50			2	31				
			3	31				
51			4	15				
	LXV	24.0	1	4	2		●	
			2	15				
			3	15				
52	LXVI	55.1	1	13	7		●	
			2	13				
53			3	13				
			4	28				
			5	28				
			6	7				
			7	7				
54			8	27				
			9	28				
			10	29				
			11	23				
			12	23				
			13	23				
			14	19				
			15	23				
			16	23				
	LXVII	17.3	1	18	2		●	
			2	18				
			3	6				
			4	6				
55	LXVIII	16.0	1	17	1			●
			2	17				
			3	17				
			4	17				
	LXIX	19.0	1	17	2		●	
			2	17				
			3	17				
			4	17				
56			5	17				
			6	2				
			7	2				
			8	2				

0	1	2	3	4	5	6	7	8
57	LXX	25.5	1	5	1	●		
	LXXI	19.3						
58	LXXII	45.3	1	20	2			●
			2	20				
			3	20				
59			4	29				
			5	29				
			6	29				
60	LXXIII	20.3	1	7	3		●	
			2	17				
			3	9				
61	LXXIV	8.5						
61—63	LXXV	58.7						
64	LXXVI	19.5	1	4	1	●		
65	LXXVII	13.5						
66	LXXVIII[3]	25.7	1	N	1			○
67			2	N				
68	LXXIX	31.6						
	LXXX	20.8						
69	LXXXI	19.0						
70	LXXXII	7.8						
	LXXXIII	8.2						
71	LXXXIV	17.3						
72	LXXXV	30.0						
73	LXXXI	30.5						
73, 74	LXXXVII	20.7						
75	LXXXVIII	12.5						
76	LXXXIX	18.0						
77	XC	19.2						
78	XCI	27.5	1	29	1			●
			2	29				
	XCII	28.3	1	29	4			●
			2	29				
79			3	13				
			4	21				
80			5	30				
			6	29				
			7	29				
			8	29				
			9	29				
			10	29				
81, 82	XCIII	34.1						
82, 83	XCIV	24.7						
83	XCV	9.0						
84	XCVI	15.5						
84	XCVII	20.0	1	16	2			●
			2	21				
			3	16				
85	XCVIII	14.2	1	16	1			●
	XCIX	15.5						
86	C	27.7						
87	CI	20.5						
87, 88	CII	34.3	1	8	1	●		
	CIII	23.5	1	1	1	●		

Annex 1 (continued)

0	1	2	3	4	5	6	7	8
89	CIV	35.5						
90	CV	12.0						
	CVI	34.5						
91	CVII	11.2						
91, 92	CVIII	27.5						
92	CIX	13.8						
93	CX	16.0						
	CXI	25.5	1	8	1	●		
			2	8				
			3	8				
94	CXII	22.0	1	30	1			●
95, 96	CXIII	41.5	1	11	1			●
96, 97	CXIV	25.6	1	22	1			●
97, 98	CXV	35.0						
98	CXVI	16.0						
99	CXVII	28.0	1	17	3			●
			2	17				
			3	30				
			4	22				
100	CXVIII	20.5	1	22	1			●
			2	22				
	CXIX	20.5	1	11	2			●
			2	11				
101			3	12				
	CXX	28.3						
102	CXXI	8.0						
103	CXXII	25.0						
	CXXIII	29.0	1	17	3			●
104			2	35				
			3	21				
			4	21				
			5	21				
104, 105	CXXIV	13.7						
105	CXXV	16.5						
106	CXXVI	11.1						
	CXXVII	19.0	1	16	1			●
			2	16				
107	CXXVIII	11.0						
	CXXIX	11.0						
107, 108	CXXX	7.7						
108	CXXXI	23.5						
109	CXXXII	15.5	1	16	1			●
			2	16				
	CXXXIII	10.5	1	16	1			●
110	CXXXIV	22.0						
	CXXXV	6.3	1	26	2			●
			2	16				
111	CXXXVI	18.0	1	16	3			●
			2	26				
			3	29				
	CXXXVII	15.3	1	21	1			●

0	1	2	3	4	5	6	7	8
112	CXXXVIII	10.5	1	21	1			●
			2	21				
			3	21				
			4	21				
			5	21				
	CXXXIX	13.4	1	21	1			●
			2	21				
			3	21				
113	CXL	18.5	1	16	1			●
			2	16				
			3	16				
114	CXLI	20.1						
115	CXLII	16.5	1	19	2			●
			2	22				
	CXLIII	13.3	1	16	3			●
			2	18				
			3	14				
	CXLIV	18.4	1	22	2			●
			2	16				
116	CXLV	24.8	1	11	4			●
			2	22				
			3	13				
			4	23				
117	CXLVI	16.0	1	14	2			●
			2	14				
			3	16				
118	CXLVII	18.6	1	n	2		●	
			2	N			?	
			3	N				
119	CXLVIII	21.5	1	16	2			●
120			2	17				
	CXLIX	6.5	1	17	1			●
			2	17				
			3	17				
121	CL	6.3	1	17	4			●
			2	13				
			3	17				
			4	17				
			5	14				
			6	23				
121, 122	CLI	14.5						
122	CLII	8.0	1	16	2			●
			2	23				
			3	23				
122, 123	CLIII	10.0						
123	CLIV	15.0						
124, 125	CLV	54.4	1	19	1			●
			2	19				
			3	19				

[1] Trajan's Column in the History Museum of the Romania, Bucharest.

[2] Measured on the C. Cichorius' boards.

[3] The represented trees do not suggest the forest landscape. They are represented as trophy holder. Except for Table 2, in this working out of the information, these trees were not taken into account.