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Gunnar Brands | Hans Rupprecht Goette (Hrsg.)

SPÄTANTIKE IDEAL- UND PORTRAITPLASTIK: STILKRITIK, KONTEXTE, NATURWISSENSCHAFTLICHE UNTERSUCHUNGEN

Beiträge eines Workshops an der
Martin-Luther-Universität Halle-Wittenberg
13.–16. Juni 2018

Spätantike Skulptur ist seit den 1970er Jahren zunehmend zu einem wichtigen Thema der altertumswissenschaftlichen Forschung geworden. Seither ist ein deutliches Bemühen spürbar, Leitlinien für die Beurteilung spätantiker Porträt- und Idealplastik zu entwickeln. Wie zahlreiche Kontroversen beweisen, ist dies bislang nur in Teilbereichen gelungen. Nachdem gerade in den letzten beiden Jahrzehnten zahlreiche wichtige Studien zum Thema erschienen sind, schien eine Bestandsaufnahme nützlich. Diskussionsbedürftig sind einerseits Fragen der Stil- und Formanalyse, andererseits treten die verstärkte und anhand jüngerer Grabungen neu belebte Beachtung von Fundkontexten in den Blick. Zunehmende Bedeutung hat nicht zuletzt die naturwissenschaftliche Analyse der Materialien gewonnen, die entscheidende Hinweise für Werkstattfragen liefert und damit auch für den Marmorhandel und die kulturellen Verflechtungen quer durch den Mittelmeerraum. Antworten auf diese Fragenkomplexe bilden die Grundlage für die Bewertung der gesellschaftlichen, politischen und kulturellen Hintergründe für das Fortleben antiker Skulptur im 4. bis 6. Jh. n. Chr., insbesondere im Hinblick auf den Boom von klein- und großformatiger mythologischer Idealskulptur. Der Workshop, aus dem dieser Band hervorgegangen ist, wurde im Juni 2018 zusammen mit dem Deutschen Archäologischen Institut am Lehrstuhl für Christliche Archäologie und Byzantinische Kunstgeschichte der Universität Halle-Wittenberg veranstaltet.

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Vorwort: Neue Forschungen zur spätantiken Plastik

Für die Beschäftigung mit der Skulptur der Spätantike bedarf es heute keiner besonderen Begründung mehr. Allerdings ist es auch noch nicht lange her, daß spätantike Portraits als plump und flüchtig charakterisiert, die Existenz von Idealskulptur rundweg geleugnet und spätantike Plastik als aussterbende Gattung und verunglückter Versuch der Fortführung einer unerreichbaren Vergangenheit abgetan wurde, für die dem Zeitalter Wille und technische Möglichkeiten fehlten.

Unter solchen Vorbehalten litt zunächst auch das spätantike Portrait, mit dem die Beschäftigung mit der spätantiken Kunstgeschichte auf dem Gebiet der Rundskulptur begann. Seine »Expressivität« und »Abstraktion« wurden als Ausdruck einer Vergeistigung verstanden und die Spätantike insgesamt zu einem »Age of Spirituality«[1], das mangelnde Qualität, ja geradezu Häßlichkeit[2] zu einem Ausdrucksträger zu machen versuchte. Der Darstellung der inneren Verfaßtheit der Portraitierten würden häufig »Schönheit und Eleganz geopfert«, wie David Talbot Rice noch 1947 formulierte[3]. Durch die Arbeiten von Wilhelm von Sydow, Hans Georg Severin, Siri Sande und Marianne Bergmann[4], um hier nur einige Namen zu nennen, nahm seit den 1960er-Jahren eine konsistente Stilgeschichte des spätantiken Portraits allmählich Gestalt an[5]. Nicht zuletzt ist dadurch der Zusammenhang des spätantiken mit dem mittel- und hochkaiserzeitlichen Portrait deutlicher geworden, was wesentlich dazu beigetragen hat, das Augenmerk auf die gesellschaftliche, vor allem politische Bedeutung des Portraits und die veränderten Repräsentationsmechanismen in der Spätantike zu richten. Indes bleiben, wie richtungweisende jüngere Arbeiten zum Thema gezeigt haben, auf dem Gebiet des spätantiken Portraits zahlreiche Probleme bestehen[6].

Bis in die jüngere Vergangenheit galt als unvorstellbar, daß auch Idealskulptur in der Spätantike noch eine nennenswerte Rolle gespielt habe. Sie verlor, so das Diktum, mit der Christianisierung in konstantinischer Zeit rasch an Bedeutung, um in kürzester Zeit gänzlich von der Bildfläche zu verschwinden[7]. Diese Einstellung begann sich mit der Diskussion um die Esquilin-Skulpturen in Kopenhagen zu wandeln, die zu Anfang der 1980er-Jahre von Charlotte Roueché und Kenan Erim angestoßen worden war[8]. Der Versuch, eine genauere Vorstellung von den formalen Möglichkeiten der spätantiken Idealskulptur zu gewinnen, hat durch die Forschungen der letzten Jahrzehnte – Niels Hannestad, Marianne

1 So der häufig als Epochenbegriff verwendete Titel einer von Kurt Weitzmann initiierten Ausstellung in New York: K. Weitzmann (Hrsg.), Age of Spirituality. Late Antique and Early Christian Art. Third to Seventh Century. Catalogue of the Exhibition at the Metropolitan Museum of Art, November 19, 1977 Through February 12, 1978 (New York – Princeton 1977); K. Weitzmann (Hrsg.), Age of Spirituality. A Symposium (New York – Princeton 1980).

2 Zum geistes- und fachgeschichtlichen Hintergrund der Bewertung spätantiker Kunst seit dem ausgehenden 19. Jh. vgl. B. Kiilerich, What is Ugly? Art and Taste in Late Antiquity, Arte Medievale 6, 2007, 9–20.

3 D. Talbot Rice, The Beginnings of Christian Art (London 1947) 30: »There are many works in which idealism and illusion are absent and where elegance, charm or concern with the direct narrative have been given place to a distinct approach, characterised by a somewhat crude vigour, and where forcefulness replaces delicacy« (deutsche Übersetzung: Beginn und Entwicklung christlicher Kunst [Köln 1961] 23).

4 W. von Sydow, Zur Kunstgeschichte des spätantiken Porträts im 4. Jahrhundert n. Chr, Antiquitas III 8 (Bonn 1969); H. G. Severin, Zur Portraitplastik des 5. Jahrhunderts n. Chr., Miscellanea Byzantina Monacensia 13 (München 1972); M. Bergmann, Studien zum Porträt des 3. Jahrhunderts n. Chr., Antiquitas III 18 (Bonn 1977); S. Sande, Zur Porträtplastik des sechsten nachchristlichen Jahrhunderts, ActaAArtHist 6, 1975, 65–106.

5 Zuletzt M. Kovacs, Kaiser, Senatoren und Gelehrte. Untersuchungen zum spätantiken männlichen Privatporträt, Spätantike – Frühes Christentum – Byzanz. Kunst im ersten Jahrtausend Reihe B 40 (Wiesbaden 2014).

6 Vgl. zusammenfassend Kovacs a. O. (Anm. 5) 17–40.

7 F. W. Deichmann, Einführung in die christliche Archäologie (Darmstadt 1983), 290 gab den damaligen Status quo in der Forschung so wieder, wenn er resümierte: »Doch dürfte … feststehen, daß allgemein in der Spätantike die Bedeutung der Skulptur, vor allem der von der Architektur unabhängigen, gegenüber der vorausgehenden Zeit geringer, sie also weniger verbreitet war. In ganzen Gebieten oder selbst in wichtigen Zentren führte man manche Arten der figürlichen Plastik nicht mehr aus.«

8 C. Roueché – K. Erim, Sculptors from Aphrodisias. Some New Inscriptions, BSR 50, 1982, 102–115.

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Bergmann, Lea Stirling, Christiane Vorster, um auch hier wieder nur einige Namen zu nennen[9] – erheblich an Kontur gewonnen. Dennoch zeigt der anhaltende Streit um die Datierung der Statuen vom Esquilin[10] oder der Skulpturen von Silahtarağa[11] mehr als deutlich, daß kein Konsens herrscht. Demgegenüber wird die spätantike Datierung von zahlreichen Skulpturen, etwa der Ganymedgruppe in Tunis[12] oder der vor kurzem bekannt gemachten Dresdener Göttergruppe, weithin akzeptiert[13], und dasselbe gilt auch für zahlreiche andere kleinformatige Skulpturen, die mittlerweile aus fast allen Teilen des Imperium bekannt geworden sind[14].

Nicht selten, so unser Eindruck, ist die stilistische Beurteilung von Skulpturen zu einer Art von Glaubenssache geworden, vor der wissenschaftliche Methoden zu versagen scheinen; Meinungen ersetzen häufig begründete Ansichten[15]. Das Problem besteht, kurz gesagt, darin, daß zwischen Hochkaiserzeitlichem, den Skulpturen hadrianischer, antoninischer und severischer Zeit und der Plastik des 4. Jhs. oft genug nicht mit ausreichender Sicherheit unterschieden werden kann. Die Erklärungen dafür sind in verschiedener Richtung gesucht worden. Hannestad formulierte salopp, daß es bei einem Rückgriff eben genau darum gehe, das Vorbild so genau wie möglich zu treffen[16], und daß Ununterscheidbarkeit daher gewissermaßen in der Natur der Sache läge. Die Stilphänomene, die wir an sicher ins 4. Jh. zu datierenden Skulpturen beobachten, sind allerdings so vielfältig, daß man sich fragen (und bezweifeln) muß, ob »Rückgriff« das Phänomen der stilistischen Nähe wirklich zutreffend beschreibt. Der Stilpluralismus, den die spätantike Kunst des 4. und 5. Jhs. kennzeichnet, wird auf diese Weise marginalisiert[17]. In Zukunft wird es darauf ankommen, die Entwicklung der Skulptur zwischen dem 2. Jh. und dem ausgehenden 4./frühen 5. Jh. stärker prozessual und weniger als reinen Rückgriff der Spätantike auf die hohe Kaiserzeit zu verstehen. Dabei spielt, auch wenn das in Zeiten des Glaubens an die Objektivität des ›archäologischen Befundes‹ (womit zumeist der Grabungsbefund und Inschriften gemeint sind) wenig populär ist, die skeptisch beäugte Stilforschung eine entscheidende Rolle. Erst eine präzise Formanalyse wird die Grundlagen für das Verständnis von Traditionslinien zwischen hochkaiserzeitlicher und spätantiker Kunst und ihrer Eigenarten schaffen können – das gilt, auch wenn sich die Forschung in dieser Hinsicht auf sicherem Terrain zu bewegen meint, durchaus auch für die hochkaiserzeitliche Skulptur.

9 N. Hannestad, Tradition in Late Antiquity. Conservation, Modernization, Production, Acta Jutlandica 79, 2, Humanities Series 69 (Aarhus 1994); M. Bergmann, Chiragan, Aphrodias, Konstantinopel. Zur mythologischen Skulptur der Spätantike, Palilia 7 (Wiesbaden 1999); L. M. Stirling, The Learned Collector. Mythological Statuettes and Classical Taste in Late Antiquity (Ann Arbor 2005); C. Vorster, Spätantike Bildhauerwerkstätten in Rom. Beobachtungen zur Idealskulptur der nachkonstantinischen Zeit, JdI 127–128, 2012–2013, 393–497.

10 Zuletzt z. B. M. Moltesen, The Esquiline Group: Aphrodisian Statues in the Ny Carlsberg Glyptotek, AntPl 27 (München 2000) 111–131; C. Häuber, The Eastern Part of the Mons Oppius in Rome. The Sanctuary of Isis et Serapis in Regio III, the Temples of Minerva Medica, Fortuna Virgo and Dea Syria, and the Horti of Maecenas, BullCom Suppl. 22 (Rom 2014) 202–223 Figs. 67–73. Zu den schon 1990 von Häuber geäußerten Vorbehalten zuletzt Vorster a. O. (Anm. 9) 395–405.

11 Der zuerst von R. Fleischer (Rez. von N. de Chaisemartin – E. Örgen, Les documents sculptés de Silahtarağa, Editions Recherche sur les Civilisations, Mémoire 46 [Paris 1984], Gnomon 60, 1988, 61–65) vertretenen Datierung ins 4. Jh. folgen B. Kiilerich – H. Torp, Mythological Sculpture in the Fourth Century A.D. The Esquiline Group and the Silahtarağa Statues, IstMitt 44, 1994, 307–316; zurückhaltend Bergmann a. O. (Anm. 9) 18–20 (»Die Datierung der Skulpturen von Silahtarağa in die Spätantike ist deshalb eigentlich unsicher und gewinnt vor allem durch den Kontext des gesamten ›Kunstkreises‹ an Wahrscheinlichkeit.«).

12 E. K. Gazda, A Marble Group of Ganymede and the Eagle from the Age of Augustine, in: J. H. Humphrey (Hrsg.), Excavations at Carthage 1977 Conducted by the University of Michigan 6 (Ann Arbor 1981) 125–178; s. u. im Beitrag Attanasio – Prochaska Fig. 7.

13 C. Vorster, Spätantike Götterbilder, in: K. Knoll – C. Vorster – M. Woelk (Hrsg.), Skulpturensammlung Staatliche Kunstsammlungen Dresden, Katalog der antiken Bildwerke II. Idealskulptur der römischen Kaiserzeit 1 (München 2011) 604–626. s. auch hier den Beitrag von Attanasio – Prochaska, Anm. 34. Ob die Statuette des Mars, die aus anderem (wohl parischem) Marmor besteht und stilistisch etwas abweicht, zur Gruppe gehört, ist nicht klar.

14 Ein Kurzbericht während des Workshops galt den Skulpturenfunden aus den Villen von Valdetorres de Jarama und Quinta das Longas, die G. Brands und H. R. Goette 2018/2019 neu aufgenommen haben und die im Kontext anderer Skulpturenbefunde der Iberischen Halbinsel in Zusammenarbeit mit T. Nogales-Bassarate und A. Carvalho vorlegt werden sollen.

15 Symptomatisch für diese Haltung ist die Arbeit von J. van Voorhis, The Sculptor's Workshop, Aphrodisias 10 (Wiesbaden 2018). Vgl. dazu die nicht zuletzt methodisch erhellende Rezension von M. Kovacs, Gnomon 92, 2020, 641–648.

16 Hannestad a. O. (Anm. 9) 153 f. Anm. 261 (»If a pastiche shows similarity to the period it imitates, it should cause no surprise – that is the whole idea!«).

17 H. Brandenburg, Ein frühchristliches Relief in Berlin, RM 79, 1972, 135 hat das Richtige gesehen, wenn er formulierte, »daß wir in dieser Zeit, die sich so sehr an die klassischen Vorbilder anlehnt, damit rechnen müssen, daß verschiedene Möglichkeiten der Brechung und unterschiedliche Stufen klassischer Formgebung, je nach Art des Monuments, des Vorwurfs und auch der Fähigkeit und Schulung des Künstlers nebeneinander bestehen können.« s. dazu auch B. Kiilerich – H. Torp, Hic est: Hic Stilicho, JdI 104, 1989, 319–371, bes. 339–350.

Dazu gehört, beim Portrait ebenso wie auf dem Gebiet der Idealskulptur, eine intensivere Beschäftigung mit der – nicht erst in der Spätantike – weit verbreiteten Wiederverwendung und Umarbeitung von Skulptur[18].

Bei dem Versuch, konsistente und methodisch belastbare Kriterien für die Beurteilung spätantiker Idealskulptur zu entwickeln – und das in einem relativ kurzen Zeitraum von kaum einer Generation seit diese Forschungen in größerem Stil eingesetzt haben – sind Vereinfachungen oft unvermeidlich. Als einen solchen Topos könnte man die Neigung der Forschung ansehen, die gesamte Idealskulptur in die zweite Hälfte des 4. Jhs. oder das frühe 5. Jh. zu datieren; die konstantinische Jahrhunderthälfte bleibt gewissermaßen ein weißer Fleck. Ist eine solche Dichotomie sachgemäß oder war der formale Klassizismus, der für den Habitus der Skulptur der zweiten Jahrhunderthälfte (›theodosianische Renaissance‹) steht, bereits viel früher stärker ausgeprägt, als uns Portraitplastik und Sarkophagproduktion suggerieren[19]? Handelt es sich also um eine formale Dialektik von Gattungsgrenzen?

Erst eine Antwort auf diese und die stilanalytischen Fragen bildet die Grundlage für die Bewertung der gesellschaftlichen, politischen und kulturellen Hintergründe des Fortlebens antiker Skulptur, insbesondere im Hinblick auf den Boom von klein-, aber durchaus auch großformatiger (mythologischer) Idealskulptur, in die die Forschung bereits eingetreten ist[20].

Weitere Themen, die die Forschung zunehmend beschäftigen, sind die Fragen nach der Herkunft der in der Spätantike verwendeten Marmore, ihr Handel und ihre Verbreitung im Römischen Reich und den Werkstätten. Mittlerweile gewinnt man beinahe den Eindruck, daß aphrodisiensische Werkstattbetriebe den mittelmeerischen Markt völlig beherrscht hätten. Martin Kovacs fragte in seinem Vortrag folgerichtig »Alles Aphrodisias?« und versuchte die Frage mit einem Seitenblick auf Athen zu beantworten; die Situation im spätantiken Griechenland beschäftigte im Rahmen des Workshops auch andere Teilnehmer[21]. Nachdem erst vor kurzem die stadtrömische Produktion näher untersucht wurde[22], war es aus unserer Sicht folgerichtig, der Thematik von Herstellungsorten und Verbreitungswegen an weiteren Beispielen, etwa Südfrankreich, der Iberischen Halbinsel und Syrien, nachzugehen.

Einen wichtigen Hinweis zur Beantwortung der Frage nach den Werkstätten liefert die naturwissenschaftliche Analyse der Materialien und in der Folge die Bestimmung der Steinbrüche und somit indirekt der Werkstätten. Dabei ist der Beitrag der Archäometrie zur spätantiken Plastik noch längst nicht so umfangreich wie für die Werke der frühen und mittleren Kaiserzeit.

Der Workshop, aus dem dieser Band hervorgegangen ist, wurde im Juni 2018 zusammen mit dem Deutschen Archäologischen Institut am Lehrstuhl für Christliche Archäologie und Byzantinische Kunstgeschichte der Universität Halle-Wittenberg veranstaltet[23]. Unser Anliegen war es, die hier skizzierten Fragen in einem kleinen Kreis von einschlägigen Spezialisten zu diskutieren, neue Befunde und Forschungsprojekte zu erörtern sowie nach erfolgversprechenden Ansätzen Ausschau zu halten.

Als Diskussionsforum konzipiert, war eine Publikation nicht von vornherein vorgesehen. Die Entscheidung, doch einige Beiträge vorzulegen, war nicht leicht zu treffen, zumal von den 20 Vorträgen und Kurzberichten, die in den vier Tagen der halleschen Zusammenkunft gehalten wurden, nur etwa die Hälfte in die vorliegende Publikation aufgenommen werden konnte. Das hat mehrere Gründe. Nicht wenige Referate verstanden sich als Werkstatt- und Vorberichte umfangreicherer Vorhaben und mussten mit Rücksicht auf die noch andauernde Beschäftigung mit den Themen deshalb außen vor bleiben. Einige andere Vorträge, die uns während der Tagung als Folie für die Diskussion sehr nützlich waren, hät-

18 In Halle berichtete Cristina Murer über ihr mittlerweile abgeschlossenes Berliner Habilitationsprojekt (Transforming the Past: Tomb Plundering and the Reuse of Funerary Material in Late Antique Italy [in Druckvorbereitung]). Vgl. zum Thema auch die Beiträge von H. R. Goette – Á. M. Nagy und C. Vorster in diesem Band.

19 Der Vortrag von S. Feist »Ein Stil für jede Bildwelt? Spätantiker Stilpluralismus am Beispiel von Sarkophagen« erscheint unter dem Titel »Grenzen und Grenzüberschreitungen in der stilistischen Erforschung der spätantiken Sarkophagplastik«, in: M. Kovacs – M. Dorka Moreno (Hrsg.), Ästhetik versus Programmatik? Perspektiven der archäologischen Stilforschung, Kolloquium Tübingen 2019 (in Vorbereitung).

20 Vgl. N. Hannestad, Mythological Marble Sculpture from a Regional and Supra-Regional Perspective, in: I. Jacobs (Hrsg.), Production and Prosperity in the Theodosian Period, Interdisciplinary Studies in Ancient Culture and Religion 14 (Leuven – Walpole 2014) 215–249.

21 s. Anm. 22.

22 Richtungweisend C. Vorster, Spätantike Bildhauerwerkstätten in Rom. Beobachtungen zur Idealskulptur der nachkonstantinischen Zeit, JdI 127–128, 2012–2013, 393–497.

23 Die Tagung fand unter dem Titel »Neue Ansätze zur Erforschung spätantiker Ideal- und Portraitplastik: Stilkritik, Kontexte, naturwissenschaftliche Untersuchungen« statt.

ten wir ihrer Bedeutung wegen gern in einer Publikation gesehen; das gilt etwa für den Beitrag über spätantikes Silber und seine Beziehungen zur gleichzeitigen Skulptur. Leider erwies sich eine vertiefende Beschäftigung mit diesem wichtigen Themenbereich, ebenso wie in einigen anderen Fällen, in der Kürze der Zeit als nicht realisierbar. Schließlich waren einige Beiträge von vornherein – etwa wegen ihres monographischen Umfangs – für eine Veröffentlichung an anderer Stelle vorgesehen und liegen teilweise bereits vor[24]. So sehr man diese Fragmentierung bedauern mag, hoffen wir doch, daß die Studien, die in dem vorliegenden Band versammelt wurden, auch in dieser Auswahl von Nutzen sind. Sie spiegeln nach unserem Verständnis exemplarisch die Themenbereiche, die uns bei der Konzeption des Workshops besonders wichtig waren.

Die Finanzierung der Tagung verdanken wir der Fritz Thyssen Stiftung in Köln und dem Deutschen Archäologischen Institut in Berlin, das den Band in die neue Reihe der »Tagungen und Kongresse« aufgenommen hat. Allen, die die Durchführung des Workshops und den Druck des Bandes ermöglicht haben, gilt unser herzlicher Dank. Besonders verpflichtet fühlen wir uns Sabine Feist und Stefan Lehmann, die an der Planung und Durchführung der Tagung in Halle maßgeblich beteiligt waren, sowie dem Generalsekretär des Deutschen Archäologischen Instituts, Philipp von Rummel, für seine dauerhafte Unterstützung.

Berlin, im Dezember 2021
Gunnar Brands und Hans Rupprecht Goette

24 S. Bassett, Late Antique Art and Modernist Vision, in: C. Olovsdotter (Hrsg.), Envisioning Worlds in Late Antique Art. New Perspectives on Abstraction and Symbolism in Late-Roman and Early-Byzantine Visual Culture (c. 300–600) (Berlin 2019) 5–28; N. Hannestad, What Did the Sarcophagus of Symmachus Look Like? Late Antique Pagan Sarcophagi (Aarhus 2019); S. Katakis, Bemerkungen zur spätantiken Skulptur aus Aptera und West-Kreta. Alte und Neue Funde, in: Akten des 15. Internationalen Kolloquiums zum provinzialrömischen Kunstschaffen (Graz 2019) 210–223; A. Robertson Brown, Corinth in Late Antiquity. A Greek, Roman and Christian City (London 2018); N. Tsivikis, Messene and the Changing Urban Life and Material Culture of an Early Byzantine City in the Western Peloponnese (4th–7th Century), in: B. Böhlendorf-Arslan – R. Schick, Transformations of City and Countryside in the Byzantine Period, Byzanz zwischen Orient und Okzident 22 (Mainz 2020); C. Vorster, Skulpturen Cleveland mit Verschlingung des Jonas, Ausspeiung des Jonas und Jonas in der Kürbislaube, in: F. Rumscheid – S. Schrenk – K. Kressirer (Hrsg.), Göttliche Ungerechtigkeit? Strafen und Glaubensprüfungen als Themen antiker und frühchristlicher Kunst (Petersberg 2018) 298–306 ; G. Brands, Some Methodological Remarks on Late Antique Sculpture on the Iberian Peninsula, in: Actas de la X Reunión de Escultura Romana en Hispania, Faro y Mertola 27–29 octubre de 2022 (in Druckvorbereitung).

Studies on the Presence and Role of Göktepe Marbles in Late Antique Ideal Sculpture

Donato Attanasio – Walter Prochaska

Introduction

This article presents results of marble provenance studies carried out on a number of late antique ideal statues and statuettes and demonstrates that they were made using almost exclusively Asiatic marbles, mostly coming from the newly discovered quarries of Göktepe. This data usefully complements and details, with the support of scientific analyses, hypotheses and interpretations already put forward in the archaeological and art-historical literature on late antique sculpture, a field that in the last few decades has grown enormously.

Important archaeological discoveries, such as the 1977 finding at Carthage of a statuette of Ganymede and the eagle (Fig. 7) later published by Gazda[1] or the 1982 article by Erim and Roueché that established the late antique chronology of the inscriptions of the Esquiline sculptures[2], and developments in scholarship have unquestionably demonstrated that production of sculptures in the round, though markedly declining in terms of quantities, did not cease in the middle or late 3rd century A.D. as traditionally thought, but continued to be actively pursued at least during the entire 4th and 5th centuries[3].

Thanks to the studies carried out by Elaine Gazda, Niels Hannestad, Bente Kiilerich, Marianne Bergmann, Lea Stirling, Julie van Voorhis, and many others[4] there is now general agreement on a large number of late antique sculptures, often, but not always small-sized that have been found all over the Roman empire though, most frequently in its eastern part. The style has been unanimously recognized as Asiatic and the most important production centres have been located in Asia Minor where cities such as Aphrodisias, Docimium or Ephesos were situated near big marble sites and had developed a long-standing sculptural tradition. Another most important production centre was certainly Constantinople that in the 4th century and later, during the so-called Theodosian renaissance, strongly attracted craftsmen and sculptors from all over Asia Minor to work on its buildings and decoration[5]. Gathering in the big city of artists belonging to different traditions favoured development of an Asiatic eclectic style that, according to most scholars, satisfactorily explains peculiar traits of late antique sculptures that would hardly be reconciled with any specific production centre. Bergmann identifies the workshop structure as an artistic circle (*Kunstkreis*) related to Aphrodisias but based in Constantinople and accordingly calls »Aphrodisias – Constantinople« its sculptural style[6] thus emphasizing the dominant role played by stylistic and technical features typical of Aphrodisias within a broader amalgam of different artistic traditions.

Probably the most controversial aspect of the picture briefly sketched above is the persisting difficulty to date reliably some late antique sculptures when independent archaeological or epigraphic evidence is missing. As a matter of fact, crucial pieces continue to be variously dated either as high imperial or late antique works. Following most scholars the main problem seems to be the strong retrospective or »classicizing« tendency of late antique sculptors who continued

1 Gazda 1981.
2 Erim – Roueché 1982.
3 Witschel 2015.
4 Besides the references already mentioned a brief and incomplete list of studies may include: Hannestad 1994, 2007; Kiilerich 1993; Bergmann 1999; Stirling 2005; 2007; Smith 1990; van Voorhis 2018. See also papers in Bauer – Witschel 2007; Kristensen – Poulsen 2012; Kristensen – Stirling 2016.
5 Kiilerich 1993.
6 Bergmann 2000, 170.

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to keep strong ties with earlier traditions and, similarly to artists belonging to the high imperial age, emulated the styles of classical Greek and Hellenistic periods[7].

The best-known example of this dating problems are certainly the sculptures of the so-called Esquiline group. Establishing unquestionably their chronology has proven to be hard even in the presence of sculptors' signatures reliably dated to the late antique period. At present most scholars agree on the late dating[8]. Others, however, are sceptical and use stylistic arguments to state that the Esquiline sculptures might be genuine 2nd century works signed in the early 4th century when they were reused and perhaps refurbished[9].

The so-called Young Togatus of Aphrodisias[10] (Fig. 10 b) is another highly controversial piece. In this case no independent information is available and dating is exclusively based on stylistic, typological and technical arguments. The widely differing opinions expressed by different scholars, however, demonstrate the intrinsic difficulties of such an approach. According to Smith the statue »should be dated no later than c. A. D. 120–140 and could conceivably be a little earlier«[11], whereas Hannestad and Bergmann consider it a clear example of late production »placing the piece in the context of male portraits in Asia Minor of A. D. 400–450 or even later«[12].

Other pieces, however, provide absolute and uncontested dates based on inscriptions explicitly mentioning the year of dedication. A famous example are three statuettes representing Mithras, Aion-Chronos and Hekate found in a Mithraeum in Sidon and now in the Louvre that, according to base inscriptions, were dedicated in A. D. 389[13]. The Sidon statuettes are crucial because stylistic analogies allow to extend the late antique chronology that for them is securely fixed by the inscriptions to many other related sculptures.

Setting aside important details that are outside the scope of this work as well as some persisting uncertainties it seems possible to state that late antique ideal sculptures are a relatively homogeneous group of artefacts closely related in terms of style, carving techniques, ethnic origin of the sculptors, and location of the workshops. If this is the case, marble studies become especially interesting because they may allow to verify whether or not marble use was similarly homogeneous, as expected, and which specific marble was predominantly used. In other words, the whole issue is an exemplary case study to verify once again and under clear and well-defined conditions, the already suggested tight connection existing between artists and the material they used, a link that makes possible to obtain relevant archaeological information by exploiting scientific data dealing with material culture.

Similar work has been attempted very rarely in the past, providing results that, in any case, must be taken very cautiously for the simple reason that until recently, existence of the Göktepe site was unknown or ignored and its high quality marbles were generally mistaken as Carrara. Therefore, beside presenting and discussing new data, this work tries to reconsider and in case to re-interpret previously published results, with the aim of exploiting a base of data as large as possible that may provide results of general value on the marbles used for late antique ideal statuary.

7 Bergmann 1999, 14–15. 61–66; Kiilerich 1993, 189–192; Stirling 2005, 3; Witschel 2015, 332.

8 Hannestad 1994; 2007; Kiilerich – Thorp 1994; Bergmann 1999, 14–17; Stirling 2007, 315 n. 64; Vorster 2012/2013, 395–405.

9 Moltesen 2000; Smith 2007, 214–215; van Voorhis 2012.

10 The Young Togatus (inv. 6167; 83–64) is an over life-size statue found in 1983 near the Agora Gate of Aphrodisias. It is the only Docimium marble statue identified in the Carian city within a selection of 86 white marble sculptures (Attanasio et al. 2014, 130, table 1, no. 3). The togatus is thought to be a portrait statue by Smith, whereas Hannestad and Bergmann follow the suggestion of Goette (1990, 50) of an ideal divinized personification (Genius).

11 Smith 2006, 108–112 n. 3.

12 Hannestad 1994, 160; Bergmann 1999, 41. 64.

13 Stirling 2005, 92–98.

Material and Methods

The total number of late antique sculptures dealt with in this paper is 87 including 80 white, two black and five bichrome items. Only 14, however, were analyzed purposely for this study, whereas 50 were tested and published previously[14] within the frame of research projects focused on different targets. Data for the remaining 23 sculptures were excerpted from existing literature with the aim of confirming or re-assessing their provenance with the help of updated marble data including the newly discovered Göktepe marbles. It should be added that the late antique chronology of some sculptures is controversial or uncertain. Details are given in Tables 1 and 2 where all samples are listed, together with analytical and provenance results. As already stated all this material was grouped together with the aim of obtaining, as far as possible, results of general value.

Samples for the newly measured sculptures were, as usual, tiny chips measuring a few mm³ or less in the case of small or fragmentary artefacts. They were drawn from hidden parts or existing fractures so as to avoid or to reduce any possible damage to a minimum. The chips were carefully cleaned of weathered material, patinas and crusts and then polished for measuring the grain size. Subsequently they were ground to fine powders to carry out EPR, isotopic and chemical analyses, following methods and procedures already described in detail[15]. In several instances, however, chemical analysis of trace metals was not performed because the amount of available material was too small or the high discriminant power of the strontium variable had not yet been recognized.

In this way a maximum of seven analytical variables was measured for each sample and the provenance was obtained by comparing, with the aid of linear discriminant function analysis[16], these values with a selection of possible provenance quarries. The quarry selection takes into account all known fine-grained marbles plus a few other sites that are relevant for geographical or analytical reasons. In total nine quarry sites, corresponding to 13 marble groups were included:

- Italy: Carrara
- France: St. Béat (2 groups)
- Greece: Mt. Hymettos; Mt. Pentelicon; Paros (three groups)
- Turkey: Aphrodisias; Docimium, İscehisar; Docimium, Altıntaş; Göktepe (two groups)

Using these quarry sites and the above analytical variables linear discriminant analysis provides a classification rule which can be used to calculate the most probable quarry of provenance of each unknown sample as a function of distance and probability parameters defined as follows:

- Distance. This is the distance of the datapoint under consideration from the centre of the ellipse that represents the probability field of a quarry. The central point of an ellipse expresses the average and hence the most characteristic values of a quarry. The closer the point is to the centre of an ellipse, the more likely it is to be made of that marble.
- Relative (posterior) probability. This is the probability that the sample belongs to some group within the assumption that it originates in any case from one of the groups in the selection. The threshold is 60%. Low values indicate that the sample is in doubt between two or more groups.
- Absolute (typical) probability. This is a distance-dependent parameter measuring the absolute probability that the sample belongs to the chosen group or, in other words, is a typical representative of the group properties. The threshold is 10%, corresponding to samples on the edge of the 90% probability ellipse. Low values indicate anomalous samples (outliers) or samples that may not belong to any group in the selection.

The unknown samples are assigned to the most probable quarries and the results are considered to be reliable if the probability values are above their threshold limits. Graphical presentation using the experimental data as such (e. g. isotopic plots) or after statistical analysis (discriminant plots) are used to illustrate the results.

14 Attanasio et al. 2014; Attanasio et al. 2015a; Attanasio et al. 2016.

15 See for instance Attanasio et al. 2006; Prochaska 2013.

16 Attanasio et al. 2006, 213–260 (chapter 3).

Considerations on the Archaeometry of Göktepe Marbles

Studies carried out mostly by our group during the last 15 years strongly suggest that Göktepe marbles can be almost always easily and safely identified owing to the peculiar and unique combination of properties that they exhibit[17].

Recently, however, new data have been published that seem to contradict previous results casting doubts on the provenancing procedures adopted so far and the results that they produced[18]. It can be shown, however, that such critical opinions mostly arise from wrong analyses and misleading considerations, and the reader is referred to specific publications for rebuttal[19]. Obviously, such technical debates are not much interesting nor easily understandable for the archaeological, art-historical community and simply contribute to increase mistrust and lack of interest for marble studies. Therefore, leaving aside technical issues, it seems useful to summarize, once again, the main reasons that make possible clear and safe identification of Göktepe marbles[20].

Typical white samples exhibit a peculiar combination of properties that can be summarized as follows:

- fine to very fine crystal grain size (distinctly finer than Carrara),
- carbon and oxygen isotopes mostly tightly grouped at values slightly but characteristically higher than Carrara,
- high concentrations of strontium, unparalleled by any other known white marble,
- low to very low concentrations of manganese that among fine-grained varieties are paralleled only by Hymettos marbles,
- low EPR intensities and characteristic EPR linewidth values, both associated with the low concentration of manganese mentioned above.

The general characteristics just mentioned, however, are not without exceptions, and there are Göktepe samples, either quarry or artefacts, that exhibit deviations, even large, from the above values, though ›atypicalities‹ are generally limited to one variable only. The consequence is that Göktepe provenance, that in the case of variables within the range is easily and unquestionably obtained, cannot be excluded for the atypical samples just mentioned. The examples briefly discussed below demonstrate that more careful data analysis is needed in these cases to obtain conclusive results.

Generally speaking, however, the set of variables listed above is redundant in the sense that Göktepe provenance can often be proven or strongly suggested using a reduced sub-set. From this point of view strontium concentration is certainly the most powerful indicator of provenance and is able by itself to identify Göktepe marbles (Fig. 1). Similarly fine-grained marbles exhibiting low levels of manganese as measured by chemical analysis or EPR intensity originate almost certainly from Göktepe. Fig. 2 a, however, seems to suggest that in this respect EPR spectroscopy is a more selective tool, in that it better differentiates Carrara from Göktepe and stresses the high intensity of the few atypical samples that were found in district 4 (Göktepe 4h)[21]. Based on manganese values (Fig. 2 b) the only possible alternative to Göktepe are Hymettos marbles that, however, exhibit low strontium concentrations and additionally were virtually never used in Roman sculpture.

Even isotopes and grain size, despite their similarity with Carrara values that in the past led to extensive misclassification of the still unknown Göktepe marbles, exhibit high diagnostic power, if taken together. The point is that most Göktepe samples (ca. 82%) exhibit highly homogeneous isotopes tightly grouped in a narrow area centred at c. $\delta^{18}O \approx -2.9‰$ and $\delta^{13}C \approx 2.6‰$, whereas Carrara marbles, also quite homogeneous, exhibit values mostly around $\delta^{18}O \approx -2.0‰$ and $\delta^{13}C \approx 2.0‰$ or below (Fig. 3). The consequence is that fine-grained Carrara and Göktepe marbles can be almost always discriminated simply on isotopic grounds, although additional analyses are certainly useful to obtain conclusive evidence.

Obviously, depending on the specific problem investigated and the analytical methods actually avail-

17 See Attanasio et al. 2015b for the study of quarry marbles; Attanasio et al. 2019 and references therein for archaeological artefacts.

18 Brilli et al. 2018; Wielgosz-Rondolino et al. 2020.

19 Attanasio et al. 2020, published together with reply by Brilli and co-workers (Brilli et al. 2020). Another paper countering the arguments presented in Wielgosz-Rondolino et al. 2020 is in preparation and will be published in due course

20 The discussion is focused on white Göktepe marbles that account for most of the sculptures presented in this study. In the case of black and bichrome marbles the approach is slightly different and is discussed in detail in Attanasio et al. 2015b; 2017.

21 This higher selectivity is probably due to the fact the EPR spectroscopy detects only manganese that substitutes calcium into the calcite lattice and is insensitive to any interstitial manganese impurity.

able different provenancing strategies can be used and the variables discussed so far can be combined in various ways and used as such or after statistical elaboration with the aim of providing satisfactory results. Fig. 4 a–d illustrates in graphic form some possible approaches.

To the above collection of provenancing methods and procedures Wielgosz-Rondolino and co-workers add the isotopic analysis of strontium, claiming that the new variable is crucial especially for discriminating Göktepe from Carrara that otherwise may be problematic[22]. This conclusion, however, seems to be highly overstated. The above results clearly demonstrate that strontium isotopes, interesting and important as they may be, are certainly not necessary for the purpose of Göktepe identification and discrimination from Carrara[23].

To conclude this section it must be added that identification of atypical Göktepe samples is also a relevant issue because these marbles were occasionally used for the manufacture of prized and famous artefacts. Pertinent examples are a high manganese black marble vase in the store-rooms of the Aphrodisias Museum[24], a portrait head of Caracalla in the Capitoline Museums (inv. 464) exhibiting unusual, highly negative isotopic values[25], and finally the low strontium Göktepe marble sculptures of the Esquiline group[26]. In all cases the problem could be satisfactorily solved using statistical processing of multiple analytical data. The point is that deviations due to a single variable can be successfully counterbalanced by other variables that are at the same time typical of Göktepe and incompatible with other possible provenances. In this way the Göktepe marbles used for the black vase and the head of Caracalla could be reliably identified. The problem of the marble used for the Esquiline sculptures, however, proved to be more difficult and required additional field work to map in detail strontium distribution within and outside the ancient quarries. Details of the study are given in the original paper. Clearly additional variables, such as strontium isotopes, may further confirm the provenance of these atypical Göktepe marbles.

No.	Artefact	Present/Original location	Inv.	MGS (mm)	$\delta^{18}O$ (‰)	$\delta^{13}C$ (‰)	EPR Intensity Linewidth (%)	Sr; Mn; Fe (ppm)	Marble Rel. Prob. Abs. Prob. (%)
1	Alcibiades tondo	Aphrodisias	81-36 82-225	1.1	-2.17	1.69	17.0; 66.2	–	Aphrodisias 74; 21
2	Alexander tondo	Aphrodisias	81-101	1.4	-1.85	1.96	11.1; 48.1	–	Aphrodisias 53; 35
3	Old philosopher tondo	Aphrodisias	81-112	1.6	-2.31	1.60	28.1; 62.3	–	Aphrodisias 82; 76
4	Pindar tondo	Aphrodisias	81-115	1.1	-3.19	1.61	55.4; 64.2	–	Aphrodisias 69; 85
5	Pythagoras tondo	Aphrodisias	68-468 81-135 82-254	0.70	-1.92	1.86	21.2; 58.3	–	Aphrodisias 82; 79
6	Socrates tondo	Aphrodisias	81-103	1.2	-2.11	2.19	21.7; 56.2	–	Aphrodisias 52; 65
7	Herakles Farnese type statuette	Aphrodisias	10.232	0.40	-2.61	2.50	2.7; 64.2	–	Göktepe 3 99; 73
8	›Young Togatus‹ statue	Aphrodisias	6167	0.90	-4.36	0.24	54.3; 43.3	–	Docimium 77; 48

22 Wielgosz-Rondolino et al. 2020, 12.

23 It may be interesting to add that strontium isotopic analysis is a rather expensive technique (prices are in the range of a few hundred dollars per sample) not commonly available in all geosciences labs. Also for these reasons the method has never become widespread and the trend is not expected to change in the future.

24 Attanasio et al. 2014, 135 table 1, no. 91.

25 Attanasio et al. 2019, 209, 234 catalogue table, no. 69.

26 Attanasio et al. 2015a.

No.	Artefact	Present/Original location	Inv.	MGS (mm)	$\delta^{18}O$ (‰)	$\delta^{13}C$ (‰)	EPR Intensity Linewidth (%)	Sr; Mn; Fe (ppm)	Marble Rel. Prob. Abs. Prob. (%)
9	Giant black statue	Aphrodisias	5924	0.35	-2.92	2.87	3.2; 57.1	–	Göktepe 99; 58
10a	Seated Aphrodite bichrome statuette, white sample	Aphrodisias	674	0.65	-2.44	2.85	80.2; 54.8	–	Göktepe 4 44; 51
10b	Seated Aphrodite bichrome statuette, black sample	Aphrodisias	674	0.30	-2.91	2.61	50.5; 51.0	–	Göktepe 75; 30
11a	Eros, bichrome statuette, white sample	Aphrodisias	56	0.40	-2.75	2.73	16.0; 54.8	–	Göktepe 4 63; 28
11b	Eros, bichrome statuette, black sample	Aphrodisias	56	0.10	-7.84	1.93	8.3; 49.3	–	Göktepe 100; 27
12a	Europa on the bull bichrome statuette, white sample	Aphrodisias	79/23/673 69-171	0.90	-2.44	2.98	1.3; 54.8	–	Göktepe 3 100; 32
12b	Europa on the bull bichrome statuette, black sample	Aphrodisias	79/23/673 69-171	0.30	-3.16	2.72	2.9; 61.5	–	Göktepe 57; 23
13	Aphrodite statuette[27]	Athens	1795	–	-2.75	2.79	–	–	Göktepe
14	Hygeia statuette	Athens	1794	0.60	-2.43	2.86	1.1; 62.6	–	Göktepe 3 73; 28
15	Young hero, bichrome statuette, white sample	Boston/ Istanbul	1974.581	0.50	-2.40	2.60	10.2; 47.5	560; 16; 19	Göktepe 4 81; 62
16	Left knee or elbow, bichrome statuette, white sample	Boston/ Greek islands or W Asia Minor	18.444	0.40	-2.30	2.40	15.6; 48.5	–	Göktepe 4 71; 81
17	Helios statue, Esquiline group	Copenhagen/ Rome	623	0.40	-2.23	2.64	4.5; 64.4	157; -	Göktepe 2C 100; 21
18	Herakles statue, Esquiline group	Copenhagen/ Rome	621	0.35	-1.60	2.54	6.4; 59.1	128; 71; 13	Göktepe 2C 99; 38
19	Inscribed plinth, Esquiline group	Copenhagen/ Rome	623a	0.25	-1.72	2.21	6.5; 65.0	183; 331; 19	Göktepe 2C 100; 28
20	Plinth with left foot, Esquiline group	Copenhagen/ Rome	539	0.35	-1.52	2.46	6.9; 61.0	118; 57; 14	Göktepe 2C 100; 29
21	Poseidon statue, Esquiline group	Copenhagen/ Rome	622	0.40	-1.07	2.38	6.3; 58.2	127; 60; 11	Göktepe 2C 97; 27
22	Right leg, Esquiline group	Copenhagen/ Rome	623b	0.40	-1.65	2.26	6.6; 60.9	235; 610; 38	Göktepe 2C 98; 23
23	Satyr with infant Dionysos statue, Esquiline group	Copenhagen/ Rome	619	0.30	-2.29	2.51	6.7; 68.4	178; 62; 12	Göktepe 2C 100; 41
24	Zeus statue, Esquiline group	Copenhagen/ Rome	620	0.35	-1.52	2.23	6.8; 66.3	119; 76; 15	Göktepe 2C 100; 32

27 Isotopic data generously provided by Yannis Maniatis whom we gratefully acknowledge.

No.	Artefact	Present/Original location	Inv.	MGS (mm)	$\delta^{18}O$ (‰)	$\delta^{13}C$ (‰)	EPR Intensity Linewidth (%)	Sr; Mn; Fe (ppm)	Marble Rel. Prob. Abs. Prob. (%)
25	Muse statue, signed by Atticianus	Florence/ Uncertain	269	0.9	-2.25	2.04	23.5; 64.3	-	Carrara 73; 75
26	Hygeia statuette	Montréal-du-Gers/Séviac	M46	0.55	-2.5	2.8	5.9; 51.4	768; 25; 35	Göktepe 3 64; 46
27	Late antique portrait	Montréal-du-Gers/Séviac	M47	1.1	-4.7	0.4	37.4; 41.7	–	Docimium 50; 10
28	Fragment of a boot	Montréal-du-Gers/Séviac	–	1.2	-4.5	0.0	74.8; 43.3	–	Docimium 94; 12
29	Wing	Montréal-du-Gers/Séviac	S39-1	0.9	-4.8	1.0	55.4; 42.6	–	Docimium 69; 51
30	Torso of male statuette	Montréal-du-Gers/Séviac	–	1.2	-4.6	1.2	39.3; 43.6	–	Docimium 63; 45
31	Cupid and Psyche statuette	Ostia	180	Very fine	-2.38	2.88	2.3; 59.0	422; 18; 188	Göktepe 87; 48
32	Asklepios tondo	Rome, Palazzo Caetani	–	0.40	-2.64	2.80	8.8; 45.6	–	Göktepe 4 60; 55
33	Tyche tondo	Rome, Palazzo Caetani	–	0.35	-2.44	2.81	3.9; 53.6	–	Göktepe 3 68; 37
34	Cristo docente, statue sample	Rome/ Lanuvio (?)	61565	0.40	-1.92	2.86	2.6; 40.5	313; 13; 49	Göktepe 3 64; 27
35	Cristo docente, seat sample	Rome/ Lanuvio (?)	61565	2.5	-2.59	1.98	50.5; 50.2	152; 27; 213	Aphrodisias 60; 5.1
36-47	Herakles' reliefs, 12 samples	Toulouse/ Chiragan	Ra28a – Ra 28l	For details see Attanasio et al. 2016					St. Béat 1
48	Athena, fragmentary relief	Toulouse/ Chiragan	Ra30	1.4	-1.91	4.06	23.4; 43.2	–	St. Béat 1 78; 48
49	Bull's foot, fragmentary relief	Toulouse/ Chiragan	Ra139c	1.1	-2.21	2.74	112.0; 53.6	–	St. Béat 1 53; 71
50–58	Mythological tondos, 9 samples	Toulouse/ Chiragan	For details see Attanasio et al. 2016						St. Béat 1
59	Asklepios statuette	Toulouse/ Chiragan	Ra41	0.6	-4.50	2.29	96.8; 62.4	–	Docimium 63; 51
60	Athena statuette	Toulouse/ Chiragan	Ra113	0.6	-2.51	2.72	3.7; 47.9	364; 33; 16	Göktepe 3 83; 68
61	Dionysos statuette	Toulouse/ Chiragan	Ra134-137	0.30	-2.76	2.85	8.3; 56.5	635; 19; 14	Göktepe 3 57; 18
62	Faun, head	Toulouse/ Chiragan	Ra131	0.55	-2.40	2.68	4.2; 52.6	–	Göktepe 3 90; 72
63	Heracles statuette	Toulouse/ Chiragan	Ra115	0.50	-2.50	2.79	2.9; 44.3	377; 32; 15	Göktepe 3 64; 30
64	Old Fisherman black statuette	Toulouse/ Chiragan	Ra46	0.20	-3.00	3.20	3.2; 59.2	–	Göktepe 56; 24

Table 1 Attanasio et al. 2015a; Attanasio et al. 2016. For the sake of brevity results for the St. Béat marble sculptures of Chiragan are given collectively, and the reader is referred to the original publication for details. The relative and absolute probabilities associated with provenance results are defined in section »Materials and Methods« of that publication.

Selected Provenance Results

Discussing in detail marble results for all tested sculptures is not possible within the limits of a general article, and therefore attention will be focused on the most significant newly measured artefacts as well as re-appraisal of data and identifications proposed in the past, whereas the reader is referred to the already mentioned original publications for additional results and discussions.

Among all results presented in this study the statuette of ›Cristo docente‹ (Fig. 5; Table 1 nos. 34–35) is perhaps the clearest and most instructive example. The sculpture probably carved in Theodosian times (A. D. 379–395) is closely related to several other late antique works of eastern production and is therefore ascribed to Asiatic, most likely Aphrodisian workshops[28]. The fine-grained marble of the statue is clearly different from the coarse variety used for the seat, and traditionally the former has been identified as Carrara, whereas the latter is generically assumed to be Greek or Asiatic. If these hypotheses were true it would be necessary to conclude, once again, that the group was made in Italy by migrant or itinerant Aphrodisian sculptors.

Results of the analyses, however, tell a very different story. Only Asiatic marbles from the region of Aphrodisias were used, selecting the prized statuary marble of Göktepe for the statue, and the more ordinary coarse-grained marble of the Aphrodisias city quarries for the seat. The probability parameters of Table 1 and the graph of Fig. 6, that discriminates relevant quarries using the approach of Fig. 4 b, leave little doubts. The Göktepe marble of the statue is unmistakable, and the Aphrodisias provenance of the seat marble is also quite clear because the data point falls right in the middle of the corresponding quarry field and is external or very marginal with respect to Paros ellipses. The statuette of ›Cristo docente‹ (Fig. 5) is therefore a fully coherent late antique example of Asiatic/Aphrodisian workmanship, style and material. Of course this is not enough to claim safely where the artefact was made. It must be stressed, however, that many related sculptures are found all over across the empire and, according to most scholars, were mostly made in the workshops of Constantinople or other cities of Asia Minor. Within this context it is difficult to believe that pieces found in Rome followed a different path and were produced locally by migrant or itinerant sculptors. It seems much more reasonable to assume that the ›Cristo docente‹ like most other late antique sculptures was made in Asia Minor where, besides being used locally, these statuettes gave rise to lively trade and export activities.

The group of Ganymede and the eagle discovered at Carthage (Fig. 7) is another crucial piece that, when published, marked a turning point in the history of studies in late antique sculpture. Therefore reliable information on its marble, that Gazda describes as »pure white, fine-grained marble cut so thinly in some places that the stone is translucent«[29] would be extremely important. Based on careful stylistic and typological analysis as well as multiple parallels with several related works the group was dated by Gazda to the early 5th century suggesting that it was made in an Ephesian or more probably Aphrodisian workshop.

Quite unusually for the time neutron activation trace analysis was carried out and the results compared with the few quarry data then available[30], suggesting Ephesos as a possible, though tentative, provenance. Gazda, however, remained doubtful and thought that new analyses were needed. As a matter of fact identification of the fine-grained, translucent marble of the Ganymede with the medium to coarse-grained Ephesos variety is quite surprising. Unfortunately, strontium concentration, that would have been crucial, was not reported. In spite of this, comparison of Ganymede data with the more detailed marble databases available today (Fig. 8) seems to rule out any possible Ephesian provenance suggesting, at the same time, that the marble of the statuette is fully compatible with Göktepe provenance. It must be pointed out that in the absence of additional analyses such indication cannot be considered unquestionable. Nevertheless, it is certainly quite strong and is further supported by the fact that the Ganymede marble is hardly compatible not only with Ephesos but also with Docimium that was another possibility suggested in the past.

Additional examples of newly measured late antique Göktepe sculptures include two bichrome pieces (Table 1, nos. 15–16) probably from Istanbul or

28 Close parallels have been established with many late antique works of eastern origin including the so-called Sarıgüzel sarcophagus in Istanbul (Kollwitz 1963, 222), the relief of an angel found in Sultanhamet (Dresken-Weiland 1991, pls. 191–192), the Ganymede group from Carthage (Gazda 1981, 145; see Fig. 7), the Esquiline sculptures (Kiilerich – Thorp 1994, 312), the statuettes from Saint Georges-de-Montagne (Bergmann 1999, 50 pls. 42, 3; 57; Stirling 2005, 116–117) and others.

29 Gazda 1981, 125.

30 Davis 1981.

Western Asia Minor, now in the Boston Museum of Fine Arts, a group of Cupid and Psyche from Ostia (Table 1, no. 31), two statuettes representing Hygeia and Aphrodite (Table 1, nos. 13–14) discovered at Athens in a late antique villa and finally two late antique tondos representing Asklepios and Tyche perhaps from a villa on the Esquiline and now at Palazzo Caetani in Rome (Figs. 9 a–b; Table 1, nos. 32–33)[31]. Mythological tondos represented a favourite sculptural genre of late antique Aphrodisias and are found also at Silahtarağa near Istanbul, Rome and nearby, Chiragan, and northern Italy. Marble data, when available, confirm the pattern of use already verified: marble from the Aphrodisias city quarries was used for local works, whereas export artefacts were frequently made selecting the more prized Göktepe marble. At Chiragan, however, where marble import was logistically difficult the local St. Béat marble, macroscopically reminiscent of the marble of the Aphrodisias city quarries, was used (Table 1, nos. 50–58).

No.	Description	Analytical data	Literature identification	Reassessment
1	Ganymede and the eagle[32]	Trace values Fe = 79.1 ppm Mn = 22.3 ppm	Ephesos (tentative)	Because of its coarser grain size Ephesos seems to be a rather unlikely choice. Göktepe fits the Ganymede trace values much better than Ephesos and is the most probable source also for its very fine crystal grain.
2–8	Jonah group, Cleveland[33] 3 pairs of miniature busts 4 statuettes representing the legend of Jonah 1 Good shepherd	$\delta^{18}O$; $\delta^{13}C$ 2. Jonah 237: -4.75; 1.29 3. Jonah 238: -4.75; 0.97 4. Jonah 239: -4.75; 1.24 5. Jonah 240: -4.90; 0.70 6. Good shepherd 241: -4.10; 1.14 7. Female bust 244: -4.63; 1.65 8. Male bust 245: -4.65; 0.77	Docimium	The Docimium provenance proposed by N. Herz appears to be unquestionable
9–20	Walbrook Mithraeum[34] Initially built as a Mithraeum the temple was renovated in the early 4th century probably as a Bacchus sanctuary. The twelve pieces that were analyzed span the two phases of construction	$\delta^{18}O$; $\delta^{13}C$ 9. Water deity A16931: -1.63; 2.18 10. Mithras relief A16933: -2.29; 1.83 11. Mithras hand 18492: -1.73; 2.35 12. Base of Mercury 18695: -2.11; 2.13 13. Bacchus torso 18015: -2.69; 2.61 14. Mercury 18493: -2.81; 2.63 15. Minerva 18491: -2.98; 2.64 16. Genius A16932: -3.20; 2.47 17. Bacchus torso 18495: -3.25; 2.37 18. Serapis 18494: -3.26; 2.54 19. Mithras 20005: -3.49; 2.19 20. Bacchic group 18496: -3.98;1.75	Samples 9–11 Carrara Samples 10–12 Carrara or Docimium Samples 13–20 Docimium	Only the Bacchic group no. 20 and perhaps a few other artefacts are late antique. Samples 9–12 exhibit typical Carrara values. In particular samples 10 and 12 for which a possible Docimium provenance is suggested are marginal with respect to the source ellipse of this marble. The four samples are, almost certainly, all Carrara marbles. No sample exhibits typical Docimium isotopes. Values reported for samples 13–20 are very typical of Göktepe and this is, very probably, the true provenance of their marble.

31 Bergmann 1999, 45–47 pl. 33; Taglietti 2010.

32 Trace data were reported by Davis (1981), who tentatively suggested a possible Ephesian provenance. Unfortunately the concentration of strontium was not reported.

33 Hannestad 2007, 284–286; 2012, 77–79 and references therein. Isotopes were measured by Norman Herz in 1998. We are much indebted to Stephen Fliegel, curator of Medieval Art at The Cleveland Museum of Art, who generously shared with us the report written by Herz in 1998 and then updated in 2006.

34 Shepherd 1998, 49–97 (chapter 4); Stirling 2005, 193–195. Analytical data were published by Matthews – Bowman 1998 and commented by Walker 1998.

No.	Description	Analytical data	Literature identification	Reassessment
21–23	Dresden statuettes[35]	$\delta^{18}O$; $\delta^{13}C$	Carrara or Göktepe	Very typical isotopic values make Göktepe provenance quite likely and rule out Carrara. No exceptions to this simple isotopic provenance criterion are known. The three statuettes are clearly made of the same marble, and Göktepe provenance is assumed also for Artemis, in which case no isotopes were reported.
	Demeter, Hm 265	-2.84; 2.56		
	Artemis, Hm 270	–		
	Apollon, Hm 250	-2.56; 2.73		

Table 2 Literature analytical data and reassessment of marble provenances proposed in the past for four groups of sculptures (23 artefacts). New suggested identifications are based on the updated marble database including Göktepe marble data.

Göktepe marble seems to be relatively frequent also among the 23 items evaluated from published data and listed in Table 2. Besides the Ganymede group (Fig. 7) already discussed, in fact, eight of the twelve sculptures tested in the Walbrook Mithraeum exhibit typical Göktepe isotopes and originate most probably from this marble site, whereas the remaining four are almost certainly Carrara marbles. Originally assumed by Toynbee to be all Carrara marbles[36], the Walbrook sculptures were later isotopically tested by Matthews and Bowman who identified them as an assortment of Carrara and Docimium marbles[37], despite the opinion of Susan Walker who stated that none of the sculptures macroscopically resembled Docimium marbles[38]. Now this archaeometric puzzle can be satisfactorily solved by acknowledging Göktepe provenance. Within the context of late antique sculpture, however, relevance of the Walbrook statuary is limited. The chronology of several pieces is uncertain because it is not fully clear whether they belong to the middle imperial building phase of the complex or to its late antique renovation. In fact, the only artefact that seems to be unquestionably late antique is the Göktepe Bacchic group inv. 18396 (Table 2, no. 20). More interesting are perhaps three certainly late antique statuettes from Rome and now in Dresden representing Demeter, Artemis, and Apollon (Table 2, nos. 21–23). Incoherently classified in recent years as Carrara, then Göktepe and finally as marbles of uncertain provenance[39] they are undoubtedly all Göktepe marbles and demonstrate once again that the Göktepe/Carrara problem can be usefully addressed by careful assessment of isotopic and grain size data.

Leaving aside for the moment the problem of St. Béat marbles, which will be briefly resumed in the next section, the second most widespread marble after Göktepe (41 samples, 47%), within the 87 artefacts considered here, is Docimium (17 samples, 19.5%). Examples include eleven statuettes in the Cleveland Museum of Art (six miniature busts, four statuettes [Fig. 10 a] and one sculpture of the good shepherd), seven of which (Table 2, nos. 2–8) were tested and correctly identified several years ago by N. Herz[40]. It has been suggested, however, that the sculptures were found buried in a large pithos not far from Docimium making unsurprising the choice of marble.

More interesting is certainly the white Docimium marble of so-called ›Young Togatus‹ (Fig. 10 b; Table 1, no. 8) discovered at Aphrodisias where this sculpture is the only known example of this marble[41]. The Docimium list includes also a statuette of Asklepios at Chiragan (Fig. 10 c; Table 1, no. 59), where other ideal statuettes were invariably made of Göktepe marble

35 Vorster 2012/2013. Isotopes are reported by Sinn et al. 2017, 54, Table 1. The provenance of these clearly Göktepe artefacts was investigated by Lazzarini and first stated to be Carrara (Vorster 2012/2013, 93 n. 89) then Göktepe (Sinn et al. 2017, 54, Table 1) and finally considered to be uncertain in a very recent study co-authored by the same scholar (Wielgosz-Rondolino et al. 2020, section 5.3). Results were based on isotopic and petrographic analyses.

36 Toynbee 1986.

37 Matthews – Bowman 1998.

38 Walker 1998.

39 Vorster 2012/2013 (analyses by L. Lazzarini); Sinn et al. 2017; Wielogosz-Rondolino et al. 2020.

40 See n. 19.

41 Attanasio et al. 2014, 130 table 1 no. 3, Fig. 19.

(Table 1, nos. 60–64), and four fragmentary sculptures sampled in the Roman villa of Séviac (Table 1, nos. 27–30), where, however, another statuette representing Hygieia (Table 1, no. 26) proved to be Göktepe marble. These results are interesting because they seem to reflect a reversed use of Göktepe and Docimium marbles in two late antique villas of southern Gaul that may be accidental, but may also be due to different aesthetic and/or economic choices made by the owners. According to Bergmann, however, the Chiragan Asklepios (Fig. 10 b) is not late antique[42], and also chronologies of the Séviac sculptures are uncertain or controversial[43] and greatly reduce the relevance of these results within the present context.

To complete this brief overview seven more artefacts identified as marbles of the Aphrodisias city quarries must be mentioned. With the exception of the throne of ›Cristo docente‹ already discussed they were all found in Aphrodisias, and therefore the choice of the marble is quite predictable and not much significant. The last sculpture in the list is the statue of a Muse signed by the Aphrodisian sculptor Atticianus and now in Florence (Table 1, no. 25). This is the only example of a late antique Carrara marble sculpture that we could identify, strongly suggesting that a marble, previously thought to be widespread, was, in fact, very rarely used by late antique sculptors. It may be added that this statue differs from other late antique sculptures signed by Aphrodisian artists not only for the marble but also for its mediocre quality and the unusual Latin signature. Among Aphrodisian works of much higher standard the Muse of Atticianus represents a sort of anomaly, and the unusual marble choice made by the sculptor is certainly interesting but also of limited relevance.

Overall Marble Distribution and Concluding Remarks

Table 3 shows that a considerable fraction of the late antique sculptures discussed here were made using the locally relevant marble quarried at St. Béat in the central Pyrenees. Obviously this result does not provide any pertinent information on the general distribution of late antique sculptural marbles but is simply due to the large number of sculptures that were sampled and tested at Chiragan (29 samples, 33.3%). The site of the villa is not directly connected with the Mediterranean, and therefore the choice of marble, especially in the case of large scale items, was strongly constrained by logistic reasons that made import of foreign marbles difficult and expensive[44]. It is for this reason that the large renovation and decoration project that, following Bergmann[45], was carried out by itinerant Aphrodisian sculptors in the second half of the 4th century made exclusive use of the local marble of St. Béat, a good quality stone vaguely similar for its macroscopic and carving properties to the marbles extracted from the city quarries of Aphrodisias[46].

Marble Site	No. of samples	% (a)	% (b)
Göktepe	39	44.8	61
St. Béat	23	26.4	–
Docimium	17	19.5	26.6
Aphrodisias	7	8.1	10.9
Carrara	1	1.2	1.5
Total	87	100	100

Table 3: Marble distribution results given as absolute numbers or percentages, calculated including (a) or excluding (b) St. Béat marbles.

The crucial point is that marble studies are strongly affected by the selection of artefacts used for investigating specific problems. In most instances, however, such selection cannot be properly planned but is simply determined by the kind of artefacts that are actually available for sampling. The large number of

42 Bergmann 1999, 68–71.

43 Stirling 2005, 69–70.

44 This is further demonstrated by the fact that famous coloured marbles such as ***africano***, ***giallo antico***, ***cipollino*** and others are relatively common at Aix-en-Provence, Vienne, Lyon, and other cities that are easily connected to the Mediterranean by the Rhone, whereas they are virtually absent from the region of Toulouse where they are replaced by local coloured stones.

45 Bergmann 1999, 26–43.

46 Recently, however, stylistic arguments and the results of marble analyses have been used to suggest that the reliefs and other St. Béat marble sculptures of Chiragan were made by a local workshop (Beckmann 2020). The clear Aphrodisian traits of the sculptures seem to include also stylistic peculiarities that, in the opinion of Beckmann, would be better explained in terms of local sculptors familiar with the Asiatic tradition and perhaps trained abroad.

sculptures that were tested at Chiragan is perfectly suitable for detailed description of marble use in the villa but obviously introduces strong bias if the same samples are used to outline the distribution of late antique sculptural marbles in general.

If this point is properly understood and the St. Béat marbles are momentarily set aside it turns out that late antique mythological sculptures were manufactured using almost exclusively Asiatic marbles (98.5%) and particularly marbles from the Göktepe quarries (61%). The same marbles were used also at Chiragan when import of raw marbles or, most probably, finished artefacts was made possible by the small size of the sculptures. Five white and one black marble statuettes were tested in the villa (Table 1, nos. 59–64), and they all proved to be Göktepe marbles with the exception of the statuette of Asklepios that is likely to be earlier and was made using white Docimium.

Further support to the pervasive use of Asiatic, largely Göktepe marbles in late antique sculpture comes from very recent results that demonstrate extensive use of this marble for the sculptures discovered at Valdetorres de Jarama[47] and Quinta das Longas[48]. The panorama, in fact, is even wider because white Göktepe marbles were very probably used also at Silahtarağa and Saint-Georges-de-Montaigne as suggested by the macroscopic aspect of the fine grain varieties, the frequent presence of black marbles characteristic of Göktepe, and the repeated use of themes and styles typical of Aphrodisias. Waiting for the indispensable analytical verifications likely hypotheses can go even further suggesting that the Asiatic sculptors much preferred, whenever possible, to use a fully coherent suite of familiar white and coloured marbles mostly originating from Caria. Besides fine-grained white marbles, in fact, the sculptural collections just mentioned frequently include medium to coarse-grained varieties, black marbles and, at least in one instance, a red sculptural fragment[49]. Apart from the black stones and the fine-grained white marbles whose Göktepe origin is now hardly questionable the provenance of other varieties has not yet been fully tested and is still uncertain. Due to stylistic but also obvious geographical reasons de Chaisemartin identified as Aphrodisian all the marbles discovered at Silahtarağa. In many other instances, however, and especially for sculptures found in the west, medium to coarse-grained white marbles were considered to be Greek Aegean or, more precisely, Parian, though a possible Aphrodisian origin is never clearly excluded. Similarly, the black marble sculptures and the red fragment discovered at Valdetorres were tentatively associated with the *bigio morato* and *rosso antico* quarries of Cape Tainaron in southern Peloponnese[50]. Very recently, however, analytical data have unquestionably proven the Göktepe origin of the black marble of Valdetorres, and careful macroscopic inspection has shown that the red fragment is certainly not rosso antico marble from Cape Tainaron[51]. It should be added, however, that western provenances, though certainly possible, would be totally at variance with the Asiatic style of the sculptures, the ethnic origin of the artists, and the recurring choice of Göktepe. Within this context the use of coarse-grained white marbles of the Aphrodisias city quarries, that can be easily misclassified as Paros II, and red stone from Iasos or Milas also in Caria[52] appears to be much more likely. The example of ›Cristo docente‹, in which case use of different Asiatic marbles from Göktepe and Aphrodisias has been unequivocally proven, strongly supports the above hypotheses and suggests that similar combinations of white and coloured Carian marbles might have been used for most, if not all, the sculptural assemblages mentioned above. In Valdetorres a coarse-grained white marble is used for profiled bases in which the Göktepe sculptures had been set in. In this case analyses are still under way but preliminary results are fully coherent with the hypothesis suggested above.

This remarkable and tightly coherent use of marble is a peculiar feature of late antique ideal sculpture and it seems to be a direct consequence of the model of a single, highly organized production centre located by most scholars at Constantinople where art-

47 Brands – Goette by communication.

48 Lapuente by communication.

49 This is the case for the sculptures discovered at Silahtarağa (de Chaisemartin – Orgen 1984) and Valdetorres de Jarama (Puerta et al. 1994) where the red fragment was found. Similarly, the Dresden statuettes (›Dresdner Götterquartett‹) include three fine- (Apollon, Artemis, Demeter, inv. 250, 270, 265) and one coarse-grained (cuirass statue, inv. 341) artefact (Vorster 2012/2013; Sinn et al. 2017). Different is the case of Quinta das Longas where apparently only fine-grained white marble statuettes were found (Nogales-Basarrate et al. 2004).

50 Only red marble, ***rosso antico*** quarries are present at Cape Tainaron, whereas the belief that also black ***bigio morato*** marbles may come from the same place, due to a statement by Pliny (nat. 36, 29, 43) probably misunderstood, has been definitely ruled out. For a detailed discussion see Attanasio et al. 2017.

51 Brands – Goette by communication.

52 Puerta et al. 1994, 195 n. 50, speak of a possible Greek or Asiatic origin of the red marble fragment. Based on existing marble literature, however, the Asiatic provenance is associated with the city quarries of Aphrodisias where appreciable amounts of red marbles were never produced.

ists from all over Asia Minor came together. The prevailing use of marbles, such as Göktepe or Aphrodisias, clearly identifies the ethnicity of the leading group of sculptors operating in the eastern capital. Obviously, such close connection is not easily extended to other late antique sculptural genres, in which case Carian artists and materials probably retained a primary role but also faced several alternatives. While this work was in preparation two honorific statues known as the young and old magistrate from the Nymphaeum of the Licinian Gardens and now at the Centrale Montemartini in Rome were tested as possible examples of Aphrodisian marble provenance. Results of the analyses, however, clearly indicate that in this case Paros II marble was used by the late antique sculptor[53]. Additional examples include five recently published imperial portraits, four of which proved to be Göktepe marble, whereas the last one is Carrara[54]. Two of the portraits, however, are certainly reworked, whereas this possibility is less clear but difficult to exclude for the other three artefacts. It must be admitted that, in the case of late antique portraiture, conclusions of general value are difficult to draw because the available data set is quite limited and not easy to expand, partly due to the common problem of re-working.

In this sense late antique ideal sculptures represent a rather uncommon example of a well-defined, relatively large and homogeneous group of artefacts especially suitable for performing marble analyses and verifying their ability to provide relevant information. Based on existing art-historical results, the frequent use of Asiatic marbles for this category of sculptures was, to some extent, predictable. Their almost exclusive use and the specific choice of Göktepe and other Carian varieties, however, is quite striking and unexpected. If marbles were selected merely on the basis of economy and/or logistics, sculptors working at Constantinople would have probably chosen marbles such as Proconnesos that, despite its inferior carving properties, had the great advantage of being quarried a few kilometres away or perhaps other varieties suitable for sea transport. The use of marbles from distant inland locations such Aphrodisias or sometimes Afyon demonstrates once again that the choice of marble was never made by chance and that, apart from the few exceptions already discussed, artist-material connections were usually stronger than practical constraints. Results of this study suggest that late antique ideal sculpture is probably the clearest and most coherent example of this phenomenon available to date.

Abstract

The study reviews the results of marble provenance analyses performed on 87 late antique ideal sculptures found at Aphrodisias, Rome, Athens, Gaul, North Africa and other Mediterranean locations. Discussion includes 14 newly measured artefacts but also 50 sculptures already measured by us in the frame of different research projects as well as 23 literature examples in which case earlier provenance indications are reconsidered and sometimes modified using the more complete set of quarry data available to date. With the exception of Chiragan where a large-scale decoration program, most likely carried out by Aphrodisian sculptors, made use of the local St. Béat marble, other late antique ideal artefacts use almost exclusively Asiatic marbles (98%) mostly originating from the Göktepe marble quarries (61%). Typical and instructive examples of this behaviour are the statuette of ›Cristo docente‹ at Palazzo Massimo in Rome, made of a combination of marbles from Göktepe and Aphrodisias city quarries, or the statuette of Ganymede and the eagle from Carthage, in which case the few existing data make it possible to exclude the Ephesian provenance previously suggested and strongly indicate the marble's probable origin in Göktepe. The overall provenance distribution fully confirms the opinion already expressed on art-historical grounds that late antique ideal sculptures are a relatively homogeneous group of artefacts mostly made in the workshops of Constantinople and other marble-rich microasiatic cities by Asiatic sculptors using their most prized marble varieties and following Asiatic stylistic and technical features. The com-

53 Analytical and provenance data are as follows. Young magistrate (inv. MC0895): MGS= 1.4 mm; $\delta 1^8O$ = -2.50‰; $\delta^{13}C$ = 2.06‰; EPR intensity = 4.2%; EPR linewidth = 49.2%; Marble: Paros II Marathi. Old magistrate (inv. MC0896): MGS = 1.3 mm; $\delta^{18}O$ = -2.98‰; $\delta^{13}C$ = 1.48‰; EPR intensity = 6.6%; EPR linewidth = 55.7%; Marble: Paros II Marathi.

54 Attanasio et al. 2019, 213–217 cat. 28. 76–79.

mon use of Aphrodisian marbles clearly identifies the origin of the leading group of sculptors. The large number of different and distant locations where ideal late antique sculptures have been found demonstrates that this statuary production, besides being used locally, gave rise to lively trade and export activities.

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Illustration credits

Figs. 1–4. 6. 8. 9. 10 b. 11 Donato Attanasio
Fig. 5 Museo Nazionale Romano, D-DAI-ROM-73.1764
Fig. 7 Photo EKG10bis_LR, University of Chicago, Oriental Institute, durch freundliche Vermittlung von J. Humphrey (Journal of Roman Archaeology). Photo: F. Anderegg, Kelsey Museum.
Fig. 10 a Photograph Courtesy of New York University Excavations at Aphrodisias
Fig. 10 b Cleveland Museum of Art

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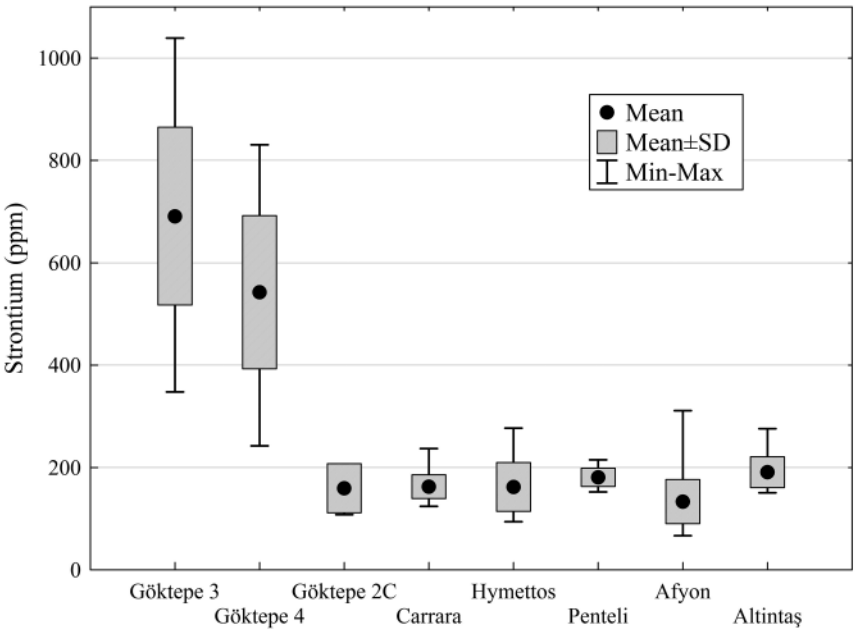
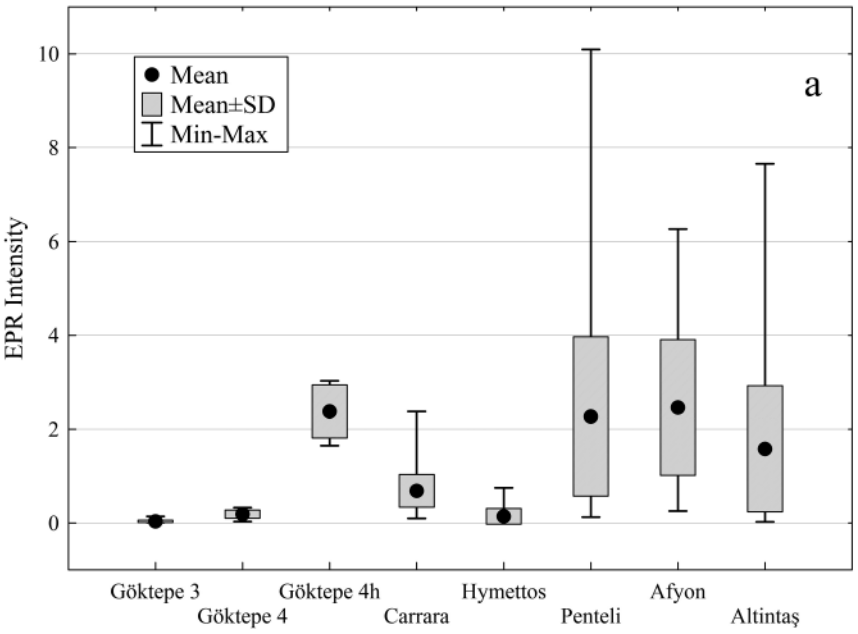
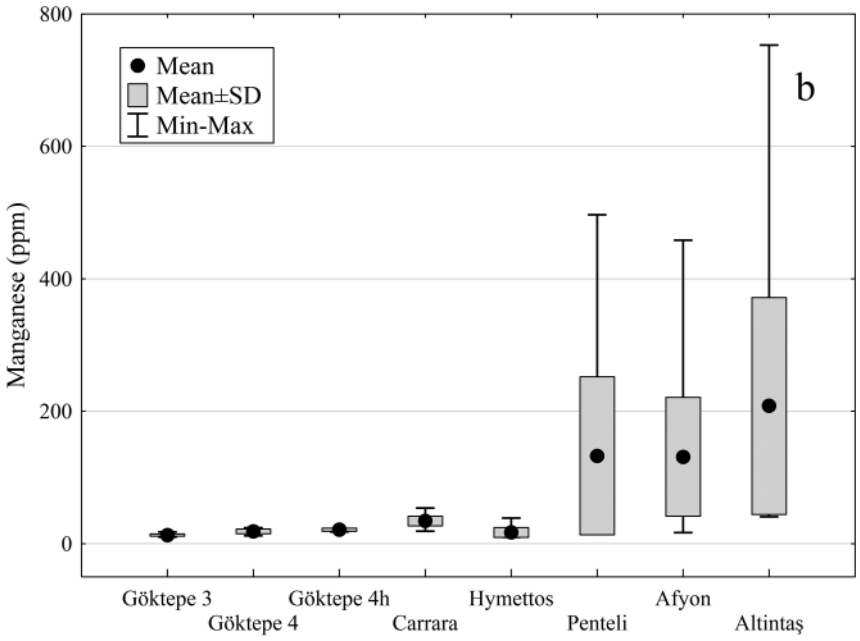


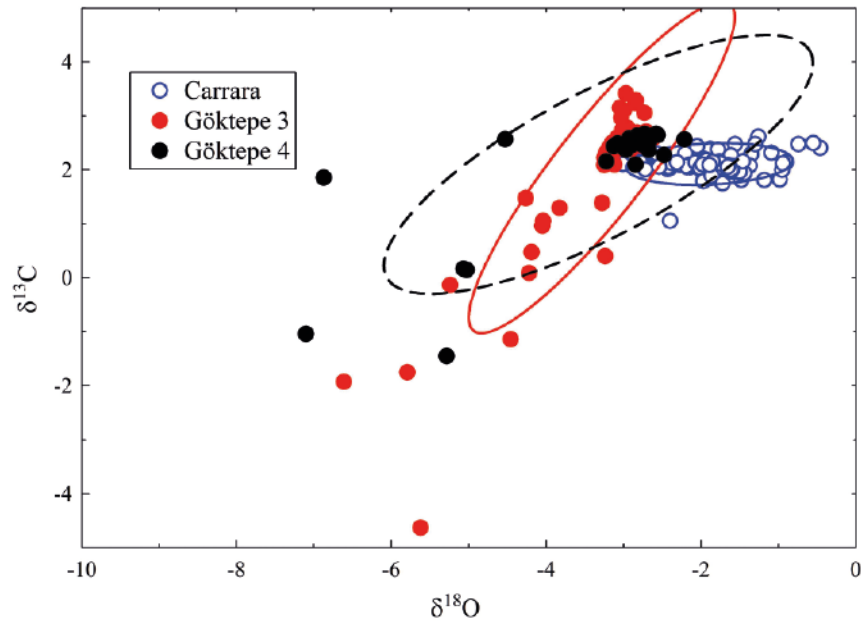
1 Box plot of Sr concentrations measured for fine-grained marbles, demonstrating the peculiarity of Göktepe. Göktepe 2C refers to the few low-strontium samples of quarry 2C (Attanasio et al. 2015a).



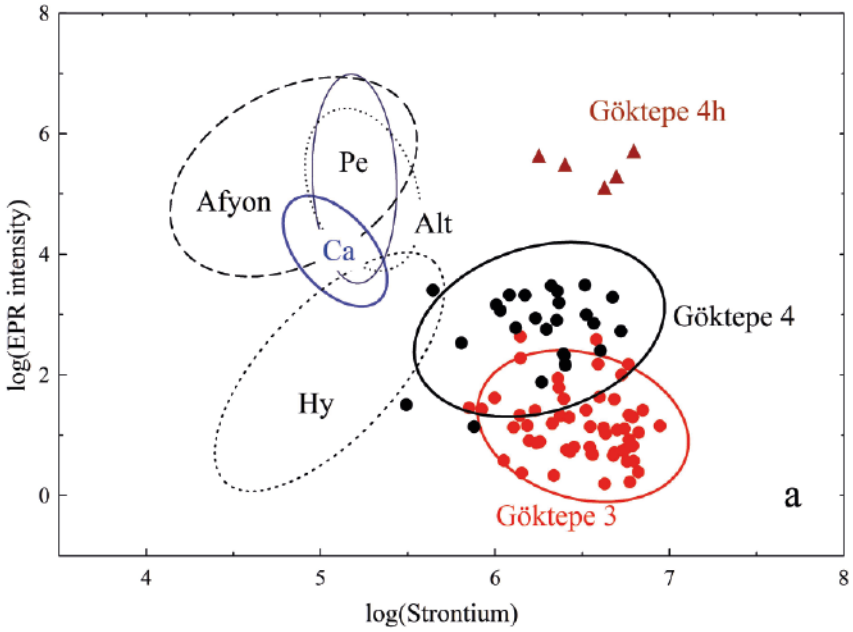
2 a Box plot of manganese concentrations of fine-grained marbles as measured by EPR spectroscopy. In comparison with the results of chemical analysis (Fig. 2 b) EPR data seem to be more selective in that they emphasize Carrara/Göktepe differences and reveal the existence of a few high-intensity samples in district 4.



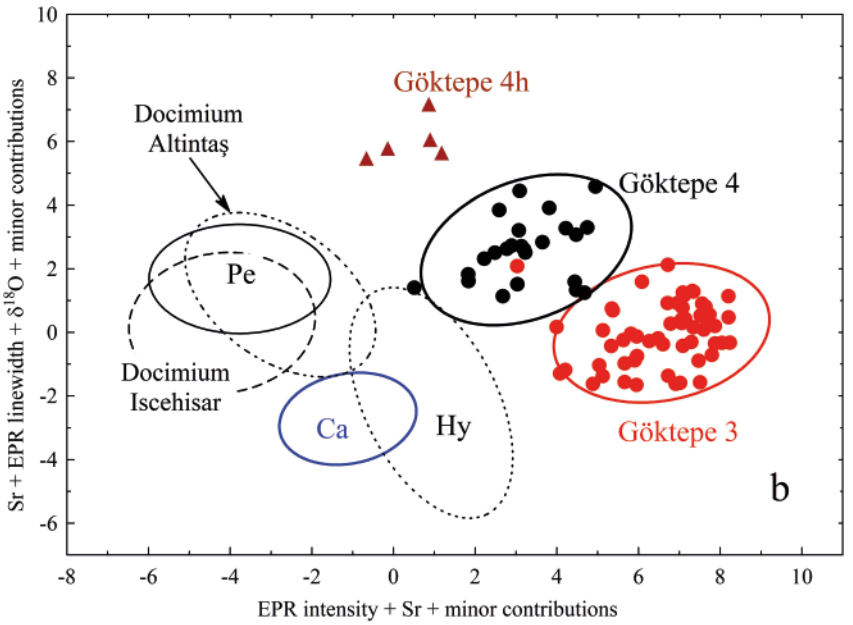
2 b Box plot of manganese concentrations of fine-grained marbles as measured by chemical analysis. Atypical high manganese samples (Göktepe 4h) are included.



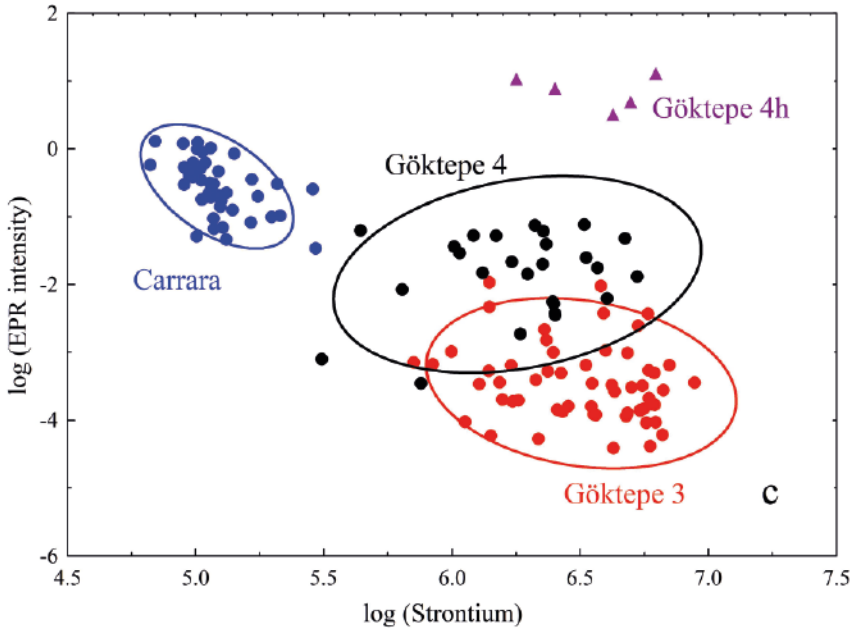
3 Isotopic graph of Carrara and Göktepe marbles. Ca. 82% of 107 white Göktepe samples are grouped in the core region centred at ca. $\delta^{18}O \approx -2.9$ and $\delta^{13}C \approx 2.6‰$.



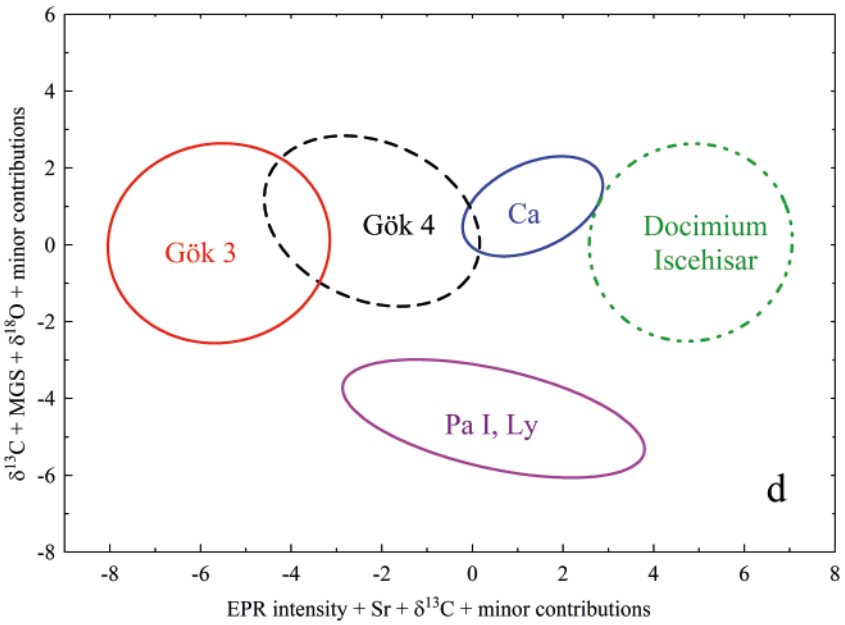
4 a Examples of graphical Göktepe discrimination: trace metal discrimination of fine-grained marbles using Sr and Mn values



4 b Examples of graphical Göktepe discrimination: statistical all-variable discrimination of fine-grained marbles (graphs [a] and [b] are similar because most discrimination is due to Sr and Mn trace data).

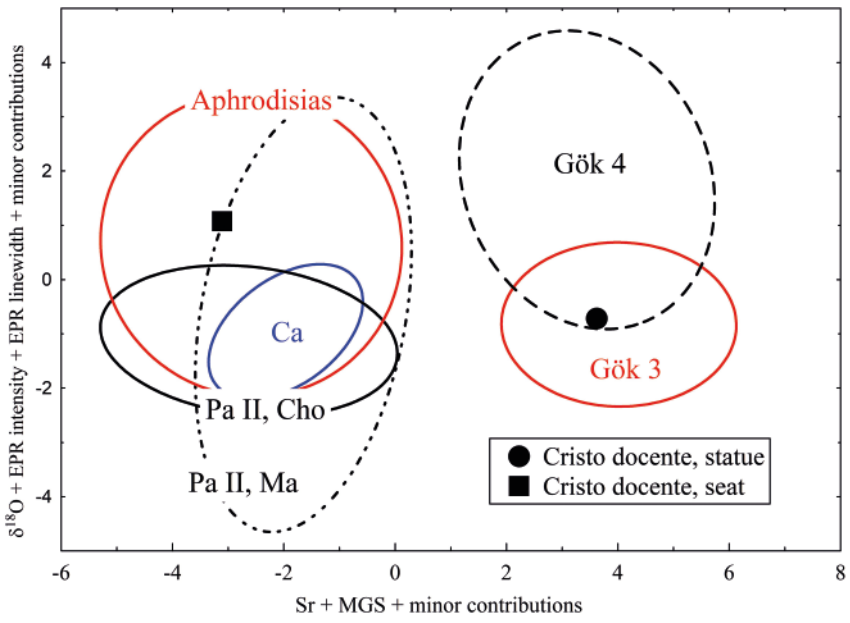


4 c Examples of graphical Göktepe discrimination: trace metal discrimination of Carrara and Göktepe marbles



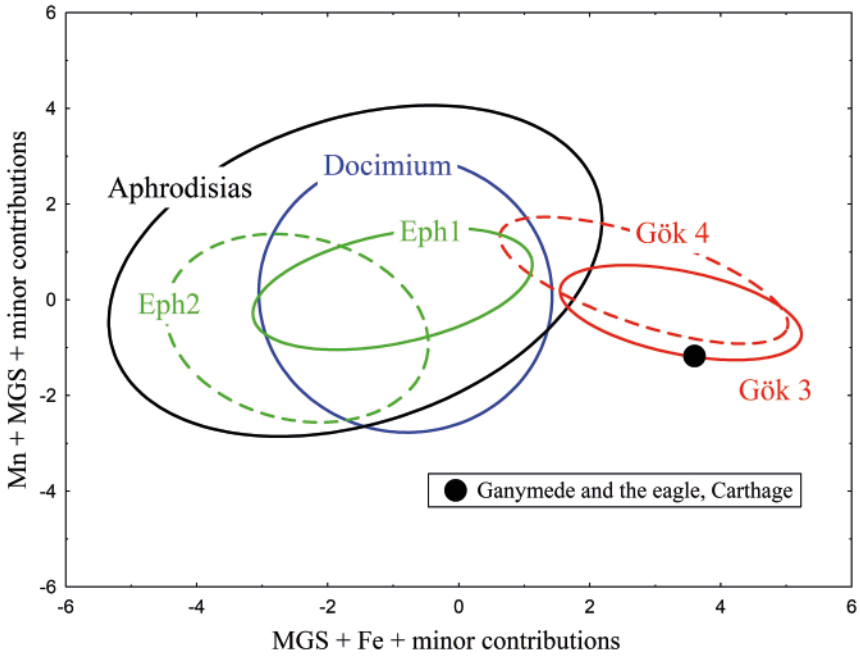
4 d Examples of graphical Göktepe discrimination: statistical discrimination of the four marbles most widely used for high quality sculpture in Roman times

5 Rome, Mus. Naz. Romano, Palazzo Massimo inv. 61565: ›Cristo docente‹ (height: 72 cm)



6 Statistical marble provenance graph of the statuette of ›Cristo docente‹

7 Carthage, Musée paléo-chrétien: Ganymede and the eagle (height: 49 cm)



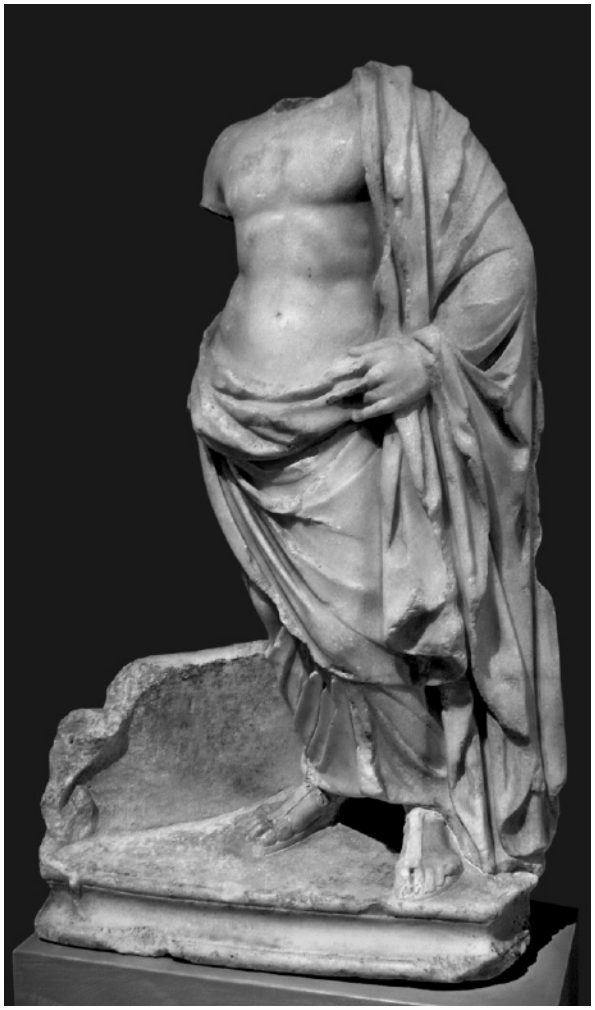
8 Statistical provenance plot of the marble of the Ganymede statuette

9 a Rome, Palazzo Caetani: Göktepe marble tondo relief of Asklepios

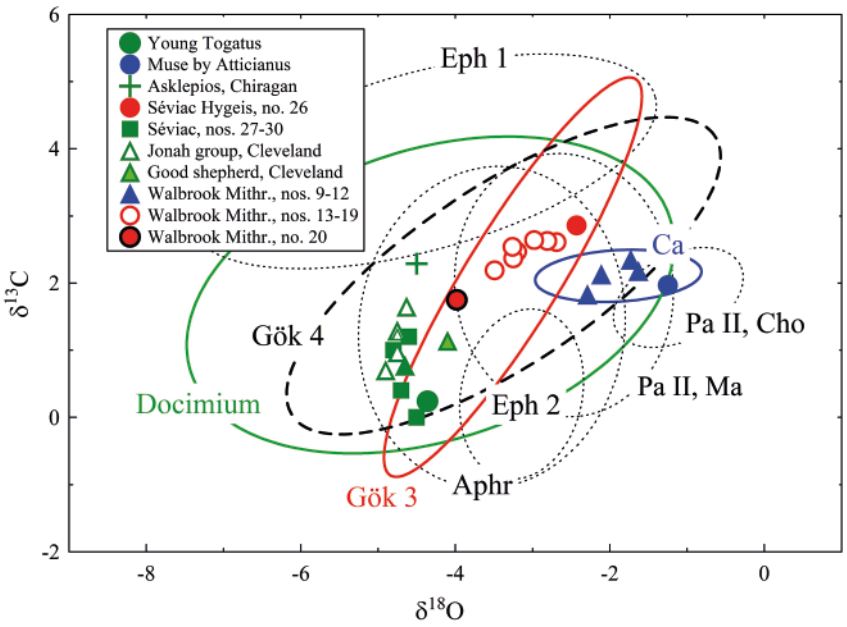
9 b Rome, Palazzo Caetani: Göktepe marble tondo relief of Tyche

10 a Cleveland Museum of Art: Docimium marble statuette of Jonah cast up (Table 2, no. 3; h. ca. 42 cm)

10 b Aphrodisias, Arch. Mus.: Docimium marble ›Young Togatus‹ (Table 1, no. 8; h. ca. 200 cm).



10 c Toulouse, Musée Martes-Tolosanes: Docimium marble statuette of Asklepios from Chiragan (Table 1, no. 59; h. 69 cm)



11 Isotopic graph of Docimium marble sculptures and other related artefacts. No additional analyses were available for literature samples and therefore a simple isotopic presentation is used. Despite extensive overlap, most samples exhibit values highly typical of their provenance values and are easily identified as Docimium, Carrara, or Göktepe marbles. The Walbrook sample no. 20 (Bacchic group) and the Cleveland Good Sheperd are tentatively assigned as Göktepe and Docimium marble, respectively, but would require additional analyses.