



## Latin Decoder

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## Latin Decoder

### Info

The *Latin Decoder* (<https://github.com/AlexandrosMichael/LatinDecoder>) is the first ever digital tool designed to process and integrate fragmentary Latin texts such as manuscripts and epigraphs. By simply typing a fragmentary Latin word or a group of words including missing letters (e.g., *pec---a*) in the search bar, users can look up all its possible textual integrations, as attested in a very large corpus of extant Latin literature and epigraphy.

Usually, it is reasonably easy to identify the number of characters of a fragmentary word in a manuscript or an inscription through the analysis of the handwriting and the space that extant characters occupy on the page or stone. However, it is difficult to think about the possible integrations that would match a specific series of letters and spaces in a fragmentary Latin text, especially when a non-native speaker of Latin looks for a so-called *lectio difficilior* (i.e., a more specific and less banal textual integration).

Addressing this need, the *Latin Decoder* leverages original algorithms and the data provided by the *Latin Diachronic Database* (<https://github.com/WizardOfMenlo/LatinDiachronicDatabase>; See [Spinelli 2021: 12–14](#)) to enable users to consider all the possible integrations for a fragmentary Latin word or group of words. Specifically, the programme processes a textual corpus yielding some 9,500,000 words, and covering the works of 307 authors (from the IV century BCE to the VI century CE) which was assembled using different open-source textual databases available online such as *Perseus*, the *PHI Database*, *Corpus Corporum* and the *Bibliotheca Augustana*. Moreover, thanks to the kind permission of Prof. Manfred Clauss, the *Latin Decoder Database* now includes the entire corpus of Latin epigraphs as recorded in the *Corpus Inscriptionum Latinarum*. When a fragmentary word is fed into the system, original algorithms parse the textual corpus in a few seconds and compile a list of attested word-forms that match the query before eliminating duplicates automatically. In so doing, the programme boosts the linguistic capabilities of the human mind by providing scholars with an accurate list of possible integrations that may also include very rare terms that are attested only a few times in extant Latin literature and epigraphs.

### Acknowledgements

The *Latin Decoder* was invented, designed and co-developed by Tommaso Spinelli (University of Manchester), with the technical assistance of Giacomo Fenzi (University of Zurich, ETH) for the development of the parsing and lemmatising technology, and Alexandros Michael (University of St Andrews) for the development of the web application.

The developers would like to express their gratitude to the University of Manchester for hosting this programme, and to Anja Le Blanc and Theresa Teng for facilitating the realisation of this project.

The Diachronic Latin Database

([https://risweb.st-andrews.ac.uk/portal/en/datasets/the-latin-diachronic-database-project\(05bf041f-9654-4173-8c8a-b93a2efa0926\).html](https://risweb.st-andrews.ac.uk/portal/en/datasets/the-latin-diachronic-database-project(05bf041f-9654-4173-8c8a-b93a2efa0926).html)) used by the *Latin Decoder* was developed by Tommaso Spinelli and Giacomo Fenzi within the *Latine Loquamur* project

(<https://github.com/latineLoquamur?tab=repositories>), which was awarded funding by the University of

St Andrews (22/03/2018; Grant 690039408), and perfected by Tommaso Spinelli during his Postdoctoral Fellowship at the *Pontificium Institutum Altioris Latinitatis* of the Salesian University of Rome.

### Original Source Code

<https://github.com/AlexandrosMichael/LatinDecoder/blob/master/LatinDecoderDAL/WordDataAccess.cs>

```
using System.Collections.Generic;
using System.IO;
using System.Linq;
using System.Text.RegularExpressions;
namespace LatinDecoderDAL
{
    public class WordDataAccess
    {
        // Attribute holding the words as loaded from the data file
        private readonly List<string> Words;
        public WordDataAccess()
        {
            Words = File.ReadAllLines("wwwroot/Dataset/forms.txt").ToList();
            // Remove duplicate words
            Words = Words.Distinct().ToList();
        }
        public WordDataAccess(string path)
        {
            Words = File.ReadAllLines(path).ToList();
            // Remove duplicate words
            Words = Words.Distinct().ToList();
        }
        // Solution which matches sentences in which words are separated with spaces
```

```

public List<string> GetWordListSentence(string WordFragment)
{
    // Turn word fragment into lower case
    WordFragment = WordFragment.ToLower();
    // Replace long dash with two single dashes
    WordFragment = WordFragment.Replace("\u2014", "--");
    // Get dataset
    List<string> WordList = new List<string>(Words);
    // Take care of placeholders
    string pattern = WordFragment.Replace('-', '.');
    // Word fragment turn into tokens (could be one or multiple)
    List<string> SentenceTokens = pattern.Split(' ').ToList();
    List<List<string>> ListOfTokenList = new List<List<string>>();
    // Get a list for each token of the sentence
    foreach (var Token in SentenceTokens)
    {
        List<string> ListForToken = new List<string>();
        string TokenRefined = $"^{Token}$";
        foreach (var Word in WordList)
        {
            if (Regex.IsMatch(Word, TokenRefined, RegexOptions.IgnoreCase))
            {
                ListForToken.Add(Word);
            }
        }
        ListOfTokenList.Add(ListForToken);
    }
    return GetAllPossibleCombos(ListOfTokenList);
}

```

```

// Method for creating the combination of words from the list of matched tokens
//
https://stackoverflow.com/questions/32571057/generate-all-combinations-from-multiple-n-lists/325716
53

public static List<string> GetAllPossibleCombos(List<List<string>> ListOfTokenList)
{
    IEnumerable<string> WordCombos = new[] { "" };
    foreach (var TokenList in ListOfTokenList)
    {
        WordCombos = WordCombos.SelectMany(r => TokenList.Select(x => !string.IsNullOrEmpty(r) ?
r.Trim(' ') + " " + x.Trim(' ') : x.Trim(' ')));
    }
    return WordCombos.ToList();
}
}
}

```

#### GitHub Repository for Expert Users

- <https://github.com/AlexandrosMichael/LatinDecoder>

#### Web Application

- <https://latindecoder.com/> (.NET Core 3.1 Blazor Server)

#### List of Authors and Texts Included in the Corpus

Ablabius (4 CE; Epigramma)

Aemilius Asper (2 CE; Commentarii in Terentium Sallustium Vergilium, Grammatica Vergiliana)

Aemilius Macer (1 BCE; Carmina)

Aemilius Sura (2 BCE; De Annis Populi Romani)

Albinovanus Pedo (1 CE; Carmina)

Albinus (?; De Metris, Rerum Romanarum)

Albius Tibullus (1 BCE; Carmina Tibulliana, Elegiae)

Ambrosius Mediolanensis (4 CE; Epistolarum Classis I et II, Expositio Psalmi CXVIII)

Ammianus Marcellinus (4 CE; Res Gestae)

Annius Florus (1 CE, 2CE; Carmina, Epitomae de Tito Livio Bellorum Omnium Annorum DCC, Ex Epistulis ad Divum Hadrianum, Vergilius Orator an Poeta)

Anonymi Comici et Tragici (?; Ribbeck's Scaenicae Romanorum Poesis Fragmenta)

Anonymi Epici et Lyrici (?; Morel's Fragmenta Poetarum Latinorum Epicorum et Lyricorum praeter Ennium et Lucilium)

Anonymi Fragmenta de Iure Fisci (2 CE, 3 CE)

Anonymi Grammatici (?; Funaioli's Grammaticae Romanae Fragmenta)

Anonymi de Differentiis (2 CE, Keil's De Differentiis)

Antonius Panurgus (?; Grammatica)

Appendix Vergiliana (1 CE; Aetna, Catalepton, Ciris, Copa, Culex, De Est et Non, De Institutione Viri Boni, De Rosis, Dirae, Elegiae in Maecenatem, Lydia, Moretum, Priapea, Priapeum)

Appius Claudius Caecus (4 BCE, 3 BCE; Sententiae)

Aprissius (2 BCE, 1 BCE; Fragmentum)

Apuleius Madaurensis (2 CE; Anechomenos, Apologia, Carmina, De Deo Socratis, De Mundo, De Platone, Florida, Fragmenta, Metamorphoses)

Aquilius (2 BCE, 1 BCE; Palliata)

Arbonius Silo (1 BCE; Carmen)

Argumenta Aeneidis et Tetrasticha in Vergilii Aeneida, Bucolica et Georgica (?)

Atilius (?; Palliatae)

Attius Labeo (1 CE; Versio Latina Iliados)

Aufidius Bassus (1 CE; Historiae)

Aufustius (1 BCE; Grammatica)

Augustinus Hipponensis (4 CE, 5 CE; Confessiones, De Civitate Dei, Epistulae, Laus Cerei)

Aulus Caecina (1 CE; Fragmentum)

Aulus Cascellius (1 BCE; Liber Bene Dictorum)

Aulus Cremutius Cordus (1 BCE, 1 CE; Annales)

Aulus Furius Antias (1 BCE; Carmina)

Aulus Gellius (2 CE; Noctes Atticae)

Aulus Hirtius (1 BCE; C. Iulii Caesaris Commentariorum de Bello Gallico Liber VIII, Epistulae)

Aulus Persius Flaccus (1 CE; Saturae)

Aulus Postumius Albinus (2 BCE, 1 BCE; Annales)

Aurelius Opillus (2 BCE, 1 BCE; Grammatica)

Balbus (1 CE; Expositio et Ratio Omnium Formarum)

Bellum Africum (1 BCE)

Bellum Alexandrinum (1 BCE)

Bellum Hispaniense (1 BCE)

Bruttedius Niger (1 CE; Historiae)

Bucolica Einsidlensia (?)

C. Iul. Caes. Augustus Octavianus (1 BCE, 1 CE; Malcovati's Imperatoris Caesaris Augusti Operum Fragmenta)

C. Plinius Caecilius Secundus (1 CE, 2 CE; Epistulae, Fragmenta, Panegyricus)

Caecilius Staius (3 BCE, 2 BCE; Palliatae)

Caelius Apicius (1 CE; Brevis Ciborum, Brevis Pimentorum, De Re Coquinaria)

Caelius Aurelianus (5 CE; E Parmenide De Natura)

Caesellius Vindex (2 CE; Grammatica)

Calpurnius Flaccus (2 CE; Declamationes)

Carmen Arvale (3 BCE)

Carmen Devotionis (?)Carmen Evocationis (?)

Carmen de Bello Aegyptiaco (1 CE)

Chalcidius (4 CE; Ex Graecis Conversiones)

Claudius Caesar Germanicus (1 CE; Aratea)

Cloatius Verus (1 BCE, 1 CE; Grammatica)

Cn. Arulenus Caelius Sabinus (1 CE; Iurisprudentia)

Cn. Cornel. Lentulus Gaetulicus (1 BCE; Carmen)

Cn. Cornel. Lentulus Marcellinus (1 BCE; Orationes)

Cornelia, mater Gracchorum (2 BCE; Epistula)

Cornelius Nepos (1 BCE; Fragmenta, Vitae)

Cornelius Severus (1 BCE, 1 CE; Carmina)

Cornelius Tacitus (1 CE, 2 CE; Annales, De Origine et Situ Germanorum, De Vita Iulii Agricolae, Dialogus de Oratoribus, Historiae)

Decimus Iunius Iuvenalis (1 CE, 2 CE; Saturae)

Decimus Iunius Silanus (1 BCE; Versio Latina Magonis)

Decimus Laberius (1 BCE; Mimi)

Didascaliae et Argumenta in Plautum (?)

Didascaliae in Terentium (?)

Domitius Marsus (1 BCE, 1 CE; Epigrammata ex Bobiensibus)

Dorcatius (1 BCE, 1 CE; Carmen)

Fabius Dossennus (?; Carmina)

Fabius Pictor (3 BCE; Annales, Iuris Pontificis Libri)

Favorinus (1 CE, 2 CE; Oratio)

Fenestella (1 BCE, 1 CE; Annales)

Flavius Caper (2 CE; De Orthographia, De Verbis Dubiis)



Gaius Aelius Gallus (1 BCE; De Verbis ad Ius Civile, Iurisprudentia)

Gaius Aquilius Gallus (1 BCE; Iurisprudentia)

Gaius Asinius Gallus (1 BCE, 1 CE; Carmen, Grammatica)

Gaius Asinius Pollio (1 BCE, 1 CE; Carmina, Grammatica, Historiae, Orationes)

Gaius Ateius Capito (1 BCE, 1 CE; Iurisprudentia)

Gaius Aurelius Cotta (2 BCE, 1 BCE; Oratio)

Gaius Caesius Bassus (1 CE; Breviatio Pedum, Carmen, De Metris, De Metris Horatii, De Compositionibus, Genera Versuum, Poeticae Species)

Gaius Calpurnius Piso (2 BCE, 1 BCE; Oratio)

Gaius Cassius Hemina (2 BCE; Annales)

Gaius Cilnius Maecenas (1 BCE; Carmina)

Gaius Cornelius Gallus (1 BCE; Elegiae)

Gaius Erucius (2 CE; Oratio)

Gaius Fannius (2 BCE, 1 BCE; Historiae, Orationes)

Gaius Helvius Cinna (1 BCE; Carmina)

Gaius Iulius Caesar (1 BCE; Anticatores, Bellum Civile, Carmina, De Analogia, De Bello Gallico, Epistulae ad Ciceronem, Epistulae ad Familiares, Orationes)

Gaius Iulius Caesar Strabo (2 BCE, 1 BCE; Orationes, Tragoediae)

Gaius Iulius Hyginus (1 BCE, 1 CE; Grammatica, Historiae)

Gaius Laelius Sapiens (2 BCE; Orationes)

Gaius Licinius Macer (1 BCE; Annales, Oratio)

Gaius Licinius Macer Calvus (1 BCE; Carmina, Orationes)

Gaius Licinius Mucianus (1 CE; Historiae)

Gaius Lucilius (2 BCE; Saturae)

Gaius Memmius (1 BCE; Carmina, Orationes)

Gaius Oppius (1 BCE; De Silvestribus Arboribus, Vitae)

Gaius Papirius Carbo (2 BCE; Oratio)

Gaius Papirius Carbo Arvina (2 BCE, 1 BCE; Oratio)

Gaius Plinius Secundus (1 CE; Dubius Sermo, Naturalis Historia)

Gaius Sallustius Crispus (1 BCE; Ad Caesarem de Re Publica, Bellum Iugurthinum, Catilinae Coniuratio, Historiae, Historiarum Fragmenta, In M. Tullium Ciceronem)

Gaius Scribonius Curio, avus (2 BCE, 1 BCE; Oratio)

Gaius Scribonius Curio (1 BCE; Orationes)

Gaius Sempronius Gracchus (2 BCE; Orationes)

Gaius Servilius Glaucia (2 BCE; Orationes)

Gaius Suetonius Tranquillus (1 CE, 2 CE; De Grammaticis et Rhetoribus, De Historicis, De Poetis, De Vita Caesarum, Fragmenta, Prata)

Gaius Titius (2 BCE; Oratio)

Gaius Trebatius Testa (1 BCE, 1 CE; Iurisprudentia)

Gaius Valerius Catullus (1 BCE; Carmina, Carminum Fragmenta)

Gaius Valerius Flaccus (1 CE; Argonautica)

Gaius Valgius Rufus (1 BCE; Carmina)

Gaius (2 CE; Fragmenta Aegyptia, Fragmenta Oxyrhynchitica, Gai Institutionum Epitome, Institutiones)

Gavius Bassus (1 BCE; De Origine Vocabulorum, Grammaticae Fragmentum)

Gnaeus Domitius Ahenobarbus (1 BCE, 1 CE; Oratio)

Gnaeus Gellius (2 BCE; Annales)

Gnaeus Marcius, vates (3 BCE; Praecepta)

Gnaeus Matius (1 BCE; Carmina)

Gnaeus Naevius (3 BCE; Alia Carmina Epica, Bellum Punicum, Carmina, Palliatae, Praetextae, Tragoediae, Versus in Metellos)

Gnaeus Tremelius Scrofa (1 BCE; De Re Rustica)

Granius Flaccus (1 BCE; Iurisprudentia)

Granius Licinianus (1 BCE; Annales)

Grattius (1 BCE, 1 CE; Cynegetica)

Hadrianus (1 CE, 2 CE; Carmina, Orationes)

Helvius Mancina (1 BCE; Oratio)

Hilarius Arelatensis (5 CE; Carmina)

Hieronymus Stridonensis (4 CE, 5 CE; Actus Apostolorum, Apocalypsis Ioannis, Canticum Canticorum, Commentaria in Ezechielem, Epistola Iacobi, Epistola Ioannis I, Epistola Ioannis II, Epistola Ioannis III, Epistola Iudae, Epistola Pauli ad Colossenses, Epistola Pauli ad Corinthios I, Epistola Pauli ad Corinthios II, Epistola Pauli ad Ephesios, Epistola Pauli ad Galatas, Epistola Pauli ad Hebraeos, Epistola Pauli ad Philemonem, Epistola Pauli ad Philippenses, Epistola Pauli ad Romanos, Epistola Pauli ad Thessalonicenses I, Epistola Pauli ad Thessalonicenses II, Epistola Pauli ad Timotheum I, Epistola Pauli ad Timotheum II, Epistola Pauli ad Titum, Epistola Petri I, Epistola Petri II, Epistolae, Evangelium secundum Ioannem, Evangelium secundum Lucam, Evangelium secundum Marcum, Evangelium secundum Matthaeum, Liber Danielis, Liber Deuteronomii, Liber Ecclesiastes, Liber Esther, Liber Exodi, Liber Ezechielis, Liber Ezrae, Liber Genesis, Liber Ieremiae, Liber Iob I, Liber Iob II, Liber Iosue, Liber Isaiae, Liber Iudicum, Liber Iudith, Liber Levitici, Liber Numerorum, Liber Proverbiorum, Liber Psalmorum, Liber Ruth, Liber Tobiae, Libri Samuelis et Malachim, Libri XII Prophetarum)

Homerus Latinus (1 CE; Ilias Latina)

Hostius (2 BCE; Bellum Histricum)

Hyginus (2 CE; Fabulae)

Hyginus Astronomus (2 CE; Astronomica)

Hyginus Gromaticus (2 CE; Constitutio Limitum, De Condicionibus Agrorum, De Generibus, De Limitibus, De Munitionibus Castrorum)

Iulius Africanus (2 CE, 3 CE; Oratio)

Iulius Montanus (1 BCE, 1 CE; Carmina)

Iulius Valerius (3 CE, 4 CE; Carmina)

Iustinianus (5 CE, 6 CE; Digesta Iustiniani)

Iuventius, comoed. (1 BCE; Palliatae)

L. Aelius Praeconinus Stilo (2 BCE, 1 BCE; Grammatica)

L. Aemilius Paulus (2 BCE; Oratio)

L. Aurel. Avianus Symmachus (4 CE, 5 CE; Carmina)

L. Iunius Moderatus Columella (1 CE; De Arboribus, De Re Rustica)

Lactantius Placidus (4CE, 5 CE; In Statii Thebaida Commentum)

Laelius Felix (2 CE, Iurisprudentia)

Laevidius (2 BCE, 1 BCE; Carmina)

Laus Pisonis (1 CE)

Lentulus, mimus (1 CE; Mimus)

Licinius Imbrex (3 BCE, 2 BCE; Palliatae)

Lucilius minor (1 CE; Carmina)

Lucius Accius (2 BCE, 1 BCE; Carmina, Praetextae, Tragoediae)

Lucius Afranius (2 BCE, 1 BCE; Togatae)

Lucius Ampelius (3 CE, 4 CE; Liber Memorialis)

Lucius Annaeus Cornutus (1 CE; Grammatica)

Lucius Annaeus Seneca minor (1 CE; Agamemnon, Apocolocyntosis, De Beneficiis, De Clementia, De Vita Patris, Dialogi, E Cleanthe Versus, Epistulae Morales ad Lucilium, Hercules Furens, Hercules Oetaeus, Medea, Naturales Quaestiones, Octavia, Oedipus, Phaedra, Phoenissae, Thyestes, Troades)

Lucius Annaeus Seneca maior (1 BCE; Controversiae, Fragmenta, Suasoriae)

Lucius Arruntius (1 BCE, 1 CE; Historiae Belli Punici)

Lucius Ateius Praetextatus (1 BCE; Grammatica)

Lucius Calpurnius Piso Frugi (2 BCE; Annales)

Lucius Cincius (3 BCE, 2 BCE; Grammatica, Iurisprudentia)

Lucius Coelius Antipater (2 BCE; Annales)

Lucius Cornelius Sisenna (2 BCE, 1 BCE; Historiae, Milesiae)

Lucius Cornelius Sulla (2 BCE, 1 BCE; Commentarii Rerum Gestarum)

Lucius Iulius Caesar (2 BCE, 1 BCE; *Auspliciorum Liber*)

Lucius Licinius Crassus (2 BCE, 1 BCE; *Orationes*)

Lucius Livius Andronicus (3 BCE; *Odyssia, Palliatae, Tragoediae*)

Lucius Marcius Philippus (1 BCE; *Orationes*)

Lucius Neratius Priscus (1 CE, 2 CE; *Fragmenta Vaticana*)

Lucius Orbilius Pupillus (2 BCE, 1 BCE; *Grammatica*)

Lucius Pomponius Bononiensis (2 BCE, 1 BCE; *Atellanae*)

Lucius Quinctius (?; *Orationes*)

Lucius Varius Rufus (1 BCE; *Carmina, Tragoediae*)

Lucius Verginius Rufus (1 CE; *Epigramma*)

Lucius Volusius Maecianus (2 CE; *Assis Distributio*)

Luscus Lanuvinus (3 BCE, 2 BCE; *Palliatae*)

M. Aemilius Lepidus Porcina (2 BCE; *Orationes*)

M. Valerius Messalla Corvinus (1 BCE, 1 CE; *Commentarii de Bello Civili, Orationes*)

M. Valerius Messalla Rufus (1 BCE; *De Auspiciis, De Familiis Romanis*)

Manilius (1 CE; *Carmina*)

Manius Manilius (2 BCE; *Iurisprudentia*)

Marcus Aemilius Scaurus (2 BCE, 1 BCE; *De Vita Sua, Orationes*)

Marcus Annaeus Lucanus (1 CE; *Bellum Civile, Carmina*)

Marcus Antistius Labeo (1 BCE, 1 CE; *Iurisprudentia*)

Marcus Antonius (1 BCE; *Orationes*)

Marcus Aurelius (2 CE; *Carmen*)

Marcus Caelius Rufus (1 BCE; *Orationes*)

Marcus Calidius (1 BCE; *Oratio*)

Marcus Cornelius Fronto (2 CE; Ad Amicos, Ad Antoninum Pium, Ad M. Antoninum Imp., Ad M. Caesarem et Invicem, Ad Verum Imp., Additamentum Epist. Aceph., Arion, Carmina, De Bello Parthico, De Eloquentia, De Feriis Alsiensibus, De Nepote Amisso, De Orationibus, Fragmenta, Laudes Fumi et Pulveris, Laudes Neglegentiae, Principia Historiae)

Marcus Duronius (2 BCE, 1 BCE; Oratio)

Marcus Fabius Quintilianus (1 CE; Declamationes Maiores, Declamationes Minores, Institutio Oratoria)

Marcus Furius Bibaculus (1 BCE; Carmina)

Marcus Iuventius Laterensis (1 BCE; Oratio)

Marcus Manilius (1 CE; Astronomica)

Marcus Pacuvius (3 BCE, 2 BCE; Praetextae, Tragoediae)

Marcus Porcius Cato (3 BCE, 2 BCE; Carmen De Moribus, De Agri Cultura, De Medicina, De Re Militari, De Rhetorica, Dicta Memorabilia, Epistulae, Incertorum Librorum Fragmenta, Iurisprudencia, Orationes, Origines)

Marcus Porcius Cato Uticensis (1 BCE; Orationes)

Marcus Terentius Varro (2 BCE, 1 BCE; Annales, Antiquitates Rerum Divinarum, Antiquitates Rerum Humanarum, Carmina, De Gente Populi Romani, De Lingua Latina, De Vita Populi Romani, Epistulae, Grammaticae Fragmenta, Logistorici, Menippeae, Res Rusticae, Res Urbanae)

Marcus Tullius Cicero (1 BCE; Academica, Arati Phaenomena, Arati Prognostica, Brutus, Carmina, Cato Maior de Senectute, Commentarii Causarum, De Divinatione, De Domo Sua, De Fato, De Finibus, De Haruspicum, De Inventione, De Iure, De Lege Agraria, De Legibus, De Natura Deorum, De Officiis, De Optimo Genere Oratorum, De Oratore, De Partitione Oratoria, De Provinciis Consularibus, De Republica, Epistula ad Octavianum, Epistulae ad Atticum, Epistulae ad Brutum, Epistulae ad Familiares, Epistulae ad Quintum Fratrem, Epistulae, Facete Dicta, Hortensius, In Catilinam, In Pisonem, In Q. Caecilium, In Sallustium, In Vatinius, In Verrem, Laelius de Amicitia, Orationum Incertarum Fragmenta, Incertorum Librorum Fragmenta, Lucullus, Orator, Paradoxa Stoicorum, Philippicae, Philosophicorum Librorum, Post Reditum ad Populum, Post Reditum in Senatu, Pro Archia, Pro Balbo, Pro Caecina, Pro Caelio, Pro Cluentio, Pro Flacco, Pro Fonteio, Pro Lege Manilia, Pro Ligario, Pro Marcello, Pro Milone, Pro Murena, Pro Plancio, Pro Q. Roscio, Pro Quinctio, Pro Rabirio Perduellionis Reo, Pro Rabirio Postumo, Pro Rege Deiotaro, Pro Roscio Amerino, Pro Scauro, Pro Sestio, Pro Sulla, Pro Tullio, Rhetorica ad Herennium, Timaeus, Topica, Tusculanae Disputationes)

Marcus Tullius Tiro (1 BCE; Grammatica)

Marcus Ulpius Traianus (1 CE, 2 CE; Dacica)

Marcus Valerius Martialis (1 CE, 2 CE; Epigrammata, Liber de Spectaculis)

Marcus Valerius Probus (1 CE, 2 CE; De Notis Iuris, Fragmenta, Vita Persii)

Marcus Verrius Flaccus (1 BCE, 1 CE; Etruscarum Rerum Libri, Grammatica)

Maurus Servius Honoratus (4 CE, 5 CE; Commentarius in Artem Donati, De Centum Metris, De Finalibus, De Metris Horatianis, In Vergilii Aeneidos Libros, In Vergilii Bucolicum Librum, In Vergilii Georgicon Libros)

Mimi Poetarum Incertorum (?; Bonaria's Mimi Poetarum Incertorum)

Mummius (2 BCE; Atellanae)

Naevius (?; Cypria Ilias)

Nero (1 CE; Carmina)

Ninnius Crassus (1 BCE; Ilias)

Novius (1 BCE; Atellanae)

P. Cornel. Scipio Aem. Afr. (2 BCE; Orationes)

P. Cornel. Scipio Afr. ma. (3 BCE, 2 BCE; Oratio)

P. Cornel. Scipio Nasica (3 BCE, 2 BCE; Orationes)

P. Terentius Varro Atacinus (1 BCE; Carmina)

Parthenius Presbyter (4 CE; Carmina)

Passienus Crispus (1 CE; Oratio)

Paulus Quaestor (4 CE; Carmina)

Petronius (1 CE; Fragmenta, Satyrica)

Phaedrus (1 BCE, 1 CE; Fabulae Aesopiae, Fabularum Appendix)

Pompeius Trogus (1 BCE, 1 CE; De Animalibus, Historiae Philippicae)

Pomponius Mela (1 CE; De Chorographia)

Pomponius Porphyrio (2 CE, 3 CE; Commentum in Horatium, Vita Horati)

Porcius Licinus (2 BCE, 1 BCE; Carmina)

Precatio Omnium Herbarum (?)

Precatio Terrae (?)

Priapea (1 CE, 2 CE; Vollmer's Poetae Latini Minores)

Pseudo-Varro (?; Sententiae)

Publilius Optatianus Porfyrius (3 CE, 4 CE; Epistola ad Constantinum, Panegyricus)

Publilius Syrus (1 BCE; Mimi, Sententiae)

Publius Alfenus Varus (1 BCE; Iurisprudentia)

Publius Aufidius Namusa (1 BCE; Iurisprudentia)

Publius Cannutius (1 BCE; Oratio)

Publius Clodius Pulcher (1 BCE; Orationes)

Publius Ovidius Naso (1 BCE, 1 CE; Ars Amatoria, Carmina, Epicedion Drusi, Heroides, Epistulae ex Ponto, Fasti, Halieutica, Ibis, Medea, Medicamina Faciei Femineae, Metamorphoses, Nux, Remedia Amoris, Tristia)

Publius Papinius Statius (1 CE; Achilleis, Belli Germanici Fragmenta, Silvae, Thebais)

Publius Pomponius Secundus (1 CE; Praetextae, Tragoediae)

Publius Rutilius Lupus (1 CE; Schemata Lexeos)

Publius Terentius Afer (2 BCE; Adelphoe, Andria, Eunuchus, Heauton Timorumenos, Hecyra, Phormio)

Publius Vergilius Maro (1 BCE; Aeneis, Eclogae, Georgica)

Pupius (?; Fragmenta)

Q. Aurelius Symmachus (4 CE, 5 CE; Carmina)

Q. Caecilius Metellus Macedonicus (2 BCE; Oratio)

Q. Caecilius Metellus Numidicus (2 BCE, 1 BCE; Orationes)

Q. Fabius Maximus Servilianus (2 BCE; Annales)

Q. Lutatius Catulus minor (2 BCE, 1 BCE; Oratio)

Q. Mucius Scaevola, pontifex (2 BCE, 1 BCE; Iurisprudentia)

Q. Pompeius Rufus (2 BCE, 1 BCE; Orationes)

Quintus Aelius Tubero (1 BCE; Historiae)



Quintus Asconius Pedianus (1 CE; In Senatu, In Toga, Pro Cornelio, Pro Milone, Pro Scauro)

Quintus Claudius Quadrigarius (1 BCE; Annales)

Quintus Cornificius (1 BCE; Carmina)

Quintus Curtius Rufus (1 CE, 2 CE; Historiae Alexandri Magni)

Quintus Ennius (3 BCE, 2 BCE; Annales, Fragmenta, Palliatae, Praetextae, Saturae, Tragoediae)

Quintus Horatius Flaccus (1 BCE; Ars Poetica, Carmina, Epistulae, Epodi, Sermones, Carmen Saeculare)

Quintus Hortensius Hortalus (2 BCE, 1 BCE; Carmina, Orationes)

Quintus Lutatius Catulus (2 BCE, 1 BCE; Communes Historiae, Epigrammata)

Quintus Remmius Palaemon (1 CE; Ars Grammatica)

Quintus Serenus Sammonicus (2 CE, 3 CE; Liber Medicinalis)

Quintus Servilius Caepio (2 BCE, 1 BCE; Oratio)

Quintus Terentius Scaurus (2 CE; De Adverbio, De Ordinatione Partium Orationis, De Orthographia)

Quintus Tullius Cicero (1 BCE; Carmina, Commentariolum Petitionis)

Quintus Valerius Soranus (2 BCE, 1 BCE; Carmina)

Rabirius (1 BCE, 1 CE; Carmina)

Santra (1 BCE; Grammatica, Tragoediae)

Saserna (1 BCE; De Agri Cultura)

Scaevus Memor (1 CE; Tragoediae)

Scribonius Largus (1 CE; Compositiones)

Scriptores Historiae Augustae (4 CE; Hohl's Scriptores Historiae Augustae)

Sempronius Asellio (2 BCE, 1 BCE; Rerum Gestarum Libri)

Sentius Augurinus (1 CE; Carmen)

Servius Clodius (1 BCE; Grammatica)

Sevius Nicanor (2 BCE, 1 BCE; Carmen)

Sextilius Ena (1 BCE; Carmen)

Sextus Iulius Frontinus (1 CE; De Agrorum Qualitate, De Aquis Urbis Romae, De Arte Mensoria, De Controversiis, De Limitibus, Strategemata)

Sextus Pompeius Festus (2 CE; De Verborum Significatione)

Sextus Pomponius (2 CE; Liber Regularum)

Sextus Propertius (1 BCE; Elegiae)

Sextus Turpilius (2 BCE; Palliatae)

Siculus Flaccus (?; De Conditionibus Agrorum)

Silius Italicus (1 CE; Punica)

Sinnius Capito (1 BCE; Grammatica)

Staberius Eros (1 BCE; Grammatica)

Sueius (1 BCE; Carmina)

Sulpicia, Caleni uxor (1 CE; Carmen, De Statu Rei Publicae)

Tarquitius Priscus (1 BCE; De Disciplina Etrusca)

Terentianus Maurus (2 CE, 3 CE; De Litteris Syllabis et Metris Horatii)

Tertullianus (2 CE, 3 CE; Ad Marcionem, De Anima, De Carnis Resurrectione)

Ticidas (1 BCE; Carmina)

Titinius (2 BCE; Togatae)

Titus Annius Luscus (2 BCE; Oratio)

Titus Calpurnius Siculus (1 CE; Eclogae)

Titus Labienus (1 BCE; Oratio)

Titus Livius (1 BCE, 1 CE; Ab Urbe Condita, Periochae)

Titus Lucretius Carus (1 BCE; De Rerum Natura)

Titus Maccius Plautus (3 BCE, 2 BCE; Amphitruo, Asinaria, Aulularia, Bacchides, Captivi, Casina, Cistellaria, Curculio, Epidicus, Fragmenta, Menaechmi, Mercator, Miles Gloriosus, Mostellaria, Persa, Poenulus, Pseudolus, Rudens, Stichus, Trinummus, Truculentus, Vidularia)

Titus Quinctius Atta (2 BCE, 1 BCE; Epigramma, Togatae)

Tullius Laurea (1 BCE; Epigramma in Ciceronis Obitu)

Vagellius (1 CE; Carmen)

Valerius Aedituus (2 BCE, 1 BCE; Epigrammata)

Valerius Antias (1 BCE; Annales)

Valerius Maximus (1 CE; Facta et Dicta Memorabilia)

Velius Longus (2 CE; De Orthographia)

Velleius Paterculus (1 BCE, 1 CE; Historia Romana)

Veranius (1 CE; Libri de Rebus Sacris)

Vibius Crispus (1 CE; Orationes)

Vita Iuvenalis (?)

Vitruvius (1 BCE; De Architectura)

Volcacius Sedigitus (2 BCE, 1 BCE; Liber De Poetis)

Zeno Veronensis (4 CE; Tractatus)


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## Latin Decoder

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## Latin Decoder



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## Latin Decoder

The *Latin Decoder* (<https://github.com/AlexandrosMichael/LatinDecoder>) is the first ever digital tool designed to process and integrate fragmentary Latin texts such as manuscripts and epigraphs. By simply typing a fragmentary Latin word or a group of words including missing letters (e.g., pec---a) in the search bar, users can look up all its possible textual integrations, as attested in the entire corpus of extant Latin literature and epigraphy.

Usually, it is reasonably easy to identify the number of characters of a fragmentary word in a manuscript or an inscription through the analysis of the handwriting and the space that extant characters occupy on the page or stone. However, it is difficult to think about the possible integrations that would match a specific series of letters and spaces in a fragmentary Latin text, especially when a non-native speaker of Latin looks for a so-called *lectio difficilior* (i.e., a more specific and less banal textual integration).

Addressing this need, the *Latin Decoder* leverages original algorithms and the data provided by the *Latin Diachronic Database* (<https://github.com/WizardOfMenlo/LatinDiachronicDatabase>; See Spinelli 2021: 12–14) to enable users to consider all the possible integrations for a fragmentary Latin word or group of words. Specifically, the programme processes a large textual corpus yielding some 9,500,000 words, and covering the works of 307 authors (from the IV century BCE to the VI century CE) which was assembled using different opensource textual databases available online such as *Perseus*, the *PHI Database*, *Corpus Corporum* and the *Bibliotheca Augustana*. Moreover, thanks to the kind permission of Prof. Manfred Clauss, the *Latin Decoder Database* now includes the entire corpus of Latin epigraphs as recorded in the *Corpus Inscriptionum Latinarum*. When a fragmentary word is fed into the system, original algorithms parse the textual corpus in a few seconds and compile a list of attested word-forms that match the query before eliminating duplicates automatically. In so doing, the programme boosts the linguistic capabilities of the human mind by providing scholars with an accurate list of possible integrations that may also include very rare terms that are attested only a few times in extant Latin literature and epigraphs.

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