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Keywords
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Abstract

This research introduces a novel interdisciplinary method for the botanical identification of medicinal plants in Amirdovlat' Amasiac'i's fifteenth-century Armenian medical text, Angitac' Anpēt, offering insights into historical pharmaceutical and potentially veterinary practices. By combining linguistic, philological, ethnobotanical, and pharmacognostic analyses, the study develops a 20-point scoring system to assess the identifiability of historical materia medica. Applying this framework to metaphorical plant names like "bull's tongue," the research demonstrates its value in clarifying historical drug origins. For example, names such as the Armenian gaṛnalezu ("lamb's tongue") or Garṇadmakik ("little lamb-tail") can denote a plant drug (e.g., Plantago spp.) or, significantly for veterinary history, an animal product like the fat from a fat-tailed sheep (a common pharmaceutical excipient in hippiatric texts). This inherent ambiguity underscores the necessity of interdisciplinary engagement across philological and natural sciences, significantly benefiting medical and veterinary history, alongside Armenology and lexicography.

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I. Medieval Armenian Medicinal Drug Terminology

A. Vision and Scope of the Study

The recovery and classification of historical medicinal knowledge is a key concern in the fields of medical history, philology, and ethnopharmacology. Medieval and early modern medical texts contain thousands of plant-based substances, often described in vernacular or hybridized names that are no longer in use today. The central aim of this study is to develop a structured and interdisciplinary framework that enables the botanical identification of these historical substances in a linguistically and scientifically consistent way.

Amirdovlat' Amasiac'i's (1420/5-1496) Angitac' Anpēt "Useless for ignorants," compiled in the fifteenth century, is a prime source for such research.[1] Written in (Late) Middle Armenian and organized alphabetically, it catalogues more than 3,700 *materia medica* entries. These include substances of plant, animal, and mineral origin, each presented with synonyms from various linguistic traditions (Arabic, Persian, Greek, Latin, and Turkic) and accompanied by descriptions of their uses and physical properties.

The multilingual structure of the text reflects its position within a broader medical landscape shared across the Islamic and Byzantine worlds. However, the text's botanical identifications have remained understudied. This study seeks to overcome the fragmentary and ad hoc approaches of previous scholarship by creating a reproducible and transparent scoring system for the identifiability of plant-based substances in historical texts.

The following goals define the scope of the work:

- To construct a standardized philological-botanical evaluation system that quantifies the identifiability of historical plant names and their modern equivalents.
- To apply this framework to a controlled thematic subset of entries: substances related to "tongues", a group rich in metaphorical naming and semantic complexity.
- To integrate textual, iconographic, and linguistic sources to assess the reliability and visual transmission of medicinal knowledge.

[1] For general research on Amirdovlat' Amasiac'i' see Stella Vardanyan, Ara Der Marderosian, *Amirdovlat Amasiatsi: A Fifteenth-Century Armenian Natural Historian and Physician* (New York: Caravan Books, 1999). Stella Vardanyan, "Miǰnadaryan Hayastani bnakan gitut'yunneri hanragitaran' Amirdovlat' Amasiac'u ‚Angitac' Anpēt' girk'ĕ" [The biological, medieval Armenian lexion of Amirdovlat' Amasiac'is "Useless for ignorants"], *Hayastani kensabanakan handes* 40 (11): 963-969.

- To establish a digital structure for future corpus-wide evaluations of Angitac' Anpēt.

By focusing on a thematic group and building from a linguistically rigorous base, this study aims to contribute lasting tools to the disciplines of historical lexicography, pharmacognosy, and cultural botany.

B. Methodology: Developing a Botanical Identification Framework

Interdisciplinary Premises

The proposed methodology rests on the assumption that botanical identification in premodern texts requires a triangulated assessment integrating:

- Philological-Linguistic Data: Historical naming conventions, multilingual cognates, and semantic structures.
- Botanical-Morphological Description: Leaf, flower, root, and habitat data that correspond to recognizable taxa.
- Medical and Ethnobotanical Use: Continuity of application in traditional medicine.
- Visual Evidence: Iconography in manuscripts such as MS M 6594[2], and comparison with contemporary herbals.

Corpus Design

The dataset consists of over 3,700 entries from Angitac' Anpēt, encoded in transliterated Armenian using Hübschmann's transliteration system. Each entry includes internal synonyms, glosses in Arabic, Persian, Greek, Latin, or Turkic, a description of medicinal effects, and often morphological characteristics.

A digital table was constructed for all entries, with categories for:

Primary lemma and variants
- Cross-linguistic synonyms
- Morphological descriptors
- Medicinal function
- Suggested botanical identity
- Illustrative evidence (if present)

[2] Matendaran M 6594, Pharmaceutical dictionary, eighteenth century. Vardanian, Stella. "Investigation of 'Illustrated Pharmaceutical Dictionary' (MS 6594 of Mashtots Matenadaran)," *Biolog. zhurn. Armenii* 3-4 (53) (2001): 334-337.

- Confidence score (0–20)

The Scoring System

The scoring model is organized into five categories with point allocations (see Table 1) and describes a descending scale of certainty (see Table 2 and Figure 1).

Table 1. Scoring System

Category	Scoring System	
	Max. Points	***Description***
A. Philological-Linguistic Correlation[3]	6	Multilingual coherence, historical attestations, folk usage
B. Botanical Description & Diagnosis	6	Morphological clarity, taxonomic alignment
C. Visual or Textual Illustration	2	Historical imagery
D. Medical-Pharmacological Plausibility	3	Application consistency, traditional therapeutic use
E. Ethnobotanical-Geographic Evidence	3	Ecological plausibility, cultural continuity
Total maximum	20	

[3] *Linguistic Reconstruction:* Lexemes were analysed using historical lexica: Greppin's Armenian-Arabic Botanical Dictionary, Bedevian's Arabic-English Plant Lexicon, and the works of Ibn Baytar and Dioscorides. Derivational patterns, loanword transformations, and semantic shifts were charted. Typical reconstruction includes root identification, morphophonological adaptation, transliteration correlation, regional variants in Ottoman Turkish, Syriac, or Persian.

Table 2. Scoring System

Point Scale	Certainty
17-20	High certainty
13-16	Probable
9-12	Possible
5-8	Low certainty
0-4	Unidentifiable

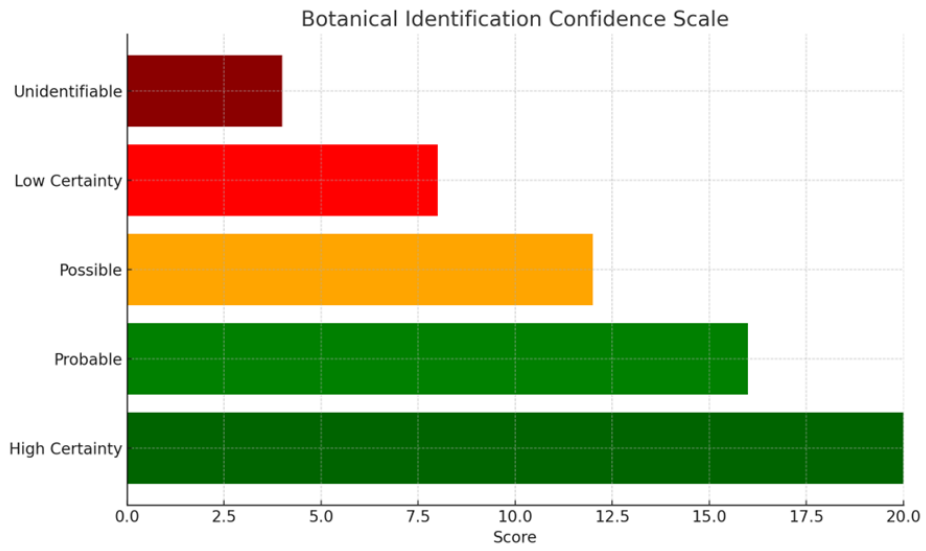

Fig. 1. Botanical Identification Confidence Scale

Botanical Alignment

Morphological details from Angitac' Anpēt were aligned with binomial nomenclature using a combination of regional, international, and multilingual botanical references.[4]

[4] Flora Iranica: for taxonomic identification across the Irano-Turanian floristic region. Plants of the World Online (Kew): to validate nomenclature and distribution, WHO Monographs on Medicinal Plants and HMPC (Herbal Medicinal Product Committee) Monographs of the European Medicines Agency (EMA): to assess modern pharmacological uses and safety, Tamar Galstyan's A Field Guide to the Plants of Armenia: to ensure consistency with native and cultivated Armenian flora, Bedevian, A.K. (1936).

Leaf morphology, inflorescence structure, root and fruit characteristics, and growth forms were all compared against these sources. Only taxa whose traits, ecological range, and historical accessibility matched the text's descriptions were accepted as high-confidence identifications.

Application and Database Design

Currently, the identified terms are being extracted and primarily processed using text editing tools. A crucial next step towards more in-depth research involves the systematic integration of metadata. The creation of a structured database with metadata fields covering languages (e.g., Armenian, Arabic, and Persian), plant usage (e.g., plant parts, medical applications), veterinary use, dosage, citations, sources, illustrations, and confidence ratings for identification is intended. This aims to support systematic research and data analysis in pharmacobotany and digital humanities.

C. Case Study: Medicinal substances named after "tongues"

This section presents a focused application of the botanical identification methodology to a lexically and semantically rich group of entries from Amirdovlatʼ Amasiacʻi's Angitacʼ Anpēt (AAAA) – those containing the component "tongue" (*lezu* in Armenian, *lisān* in Arabic). These entries represent a particularly fertile domain for philological and morphological analysis due to their high frequency, visual metaphor potential, and multilingual attestations.

We analyse eight representative entries that range from high to low identifiability scores. Each is evaluated based on linguistic correlation, morphological description, manuscript illustration (where available), medical function, and geographic plausibility.

Overview of the dataset "tongue"

From the corpus, 12 entries were found to contain the word "tongue" or one of its analogues in Armenian or Arabic, often modified by an animal referent (e.g., dog, bull, lamb, bird). These were categorized into three major groups:

Illustrated Polyglottic Dictionary of Plant Names: for cross-referencing plant names across Latin, Arabic, Armenian, English, French, German, Italian, and Turkish, Ɫewond Ališan, Haybusak kam haykakan busabanutʿiwn (1895): for native Armenian folk botanical nomenclature and historical usage, Phytogeographical data from PlantNet (https://identify.plantnet.org): to support image-based verification and species presence.

- Literal tongues: references to actual animal organs or metaphorical tongue-like substances.
- Leaf-mimicking plants: plant leaves likened in shape or texture to animal tongues.
- Ambiguous or symbolic names: cases where naming is metaphorical or culturally symbolic.

Entry analysis and identification scores

Each of the following entries is presented with:
- Transliteration and translation
- Synonymy and etymological discussion
- Morphological description
- Botanical candidates (with Latin binomial)
- Score and discussion
- Visual comparison with MS M 6594 if available.

a) animal tongues

Lisan, lisān

Reference-No.	AAAA 1017
Entry:	*lisan*, originally Arabic *lisān*
Translation:	tongue
Synonyms:	[Armenian] *lezu*), [Iranian] *zuan*
Morphology:	Amirdovlat' describes the mouthfeel and nutritional value.
Function:	food, nutriment
Botanical Candidate:	none, animal product

Description (Translation)
"Lisan, which is the tongue (the Persian says *zuan*, which is tongue). It is easily digestible and dissolves and is a good meal."

Pharmaceutical Commentary
High certainty for describing cooked animal tongue (most probably beef tongue) as meal.

b) plant "tongues"

Lisan ĕl Sahp ?

Reference-No.	AAAA 1019
Entry:	(*Lisan ĕl Sahp*), origin unclear, probably technical term.
Translation:	"tongue of the companions" or "blade-shaped tongue"?
Synonyms:	*L[isan] ēs-Sēbu*, probably from Arab. *lisān as-subaḥ* "tongue of the glorification," [Turkic] (*irt'ičilar tili*)
Morphology:	Grows two cubits tall, purple flower, long leaf Amirdovlat' equates it with Arabic *L[isan] ēs-Sēbu* (?) and Turkic *irt'ičilar dili* (?)
Function:	medical drug, diuretic for nephrolithiasis

Botanical Candidate: *Anchusa sp.*, Boraginaceae

Description (Translation)
Lisan ĕl Sahp, (A[rabic.] *Es-Sebu*), to which the Turk says "irtidjilar dili." It is an herb whose leaves are long, and it grows upright 2 cubits high from the ground. The peak is large and full. The flower is purple. It grows in spring and summer. If one boils it and drinks its water, it dissolves stones.

Pharmaceutical Commentary
The plant in question most likely corresponds to the species that is designated as *lisān al-kalb* by Baytar. This name appears to lack continuity. The designation itself seems to have significantly changed since Baytar's time, leading to a considerable divergence in terminology.

The name *Lisan ĕl Sahp* could be the Armenian rendering of an Arabic *Lisan al-Ṣahp* which could literally be composed of "tongue" (*Lisan*) and "blade" or "sharp-edged" (*Ṣahp*). Thus, the name could figuratively mean "tongue of the blade" or "blade-shaped tongue," alluding to the leaf form. Compare also Baytar's remarks on *Anchusa* species, where in the Arabic text he compares the leaves to "files" and describes leaf margins as "saw-toothed." Following the evaluation of the name and the parallel passages in Baytar, the described plant appears primarily to be *lisān al-subaḥ.*

The designation *Ēs-Sēbu* presents a significant enigma and can probably be resolved as *[Lisan] ēs-Sēbu*, which then in context seems to be a corrupted reflection of *lisān al-subaḥ.*

The supposed Turkish name offers practically no points of connection. Literally, the term could be translated as "tongue of the apostates" or "tongue of the rebels" - Read metaphorically, this rebellious tongue suggests a body turning against itself—a mutiny within the flesh. In that sense, the name

might echo the torment of kidney colic, where pain surges like an insurrection, twisting the body in betrayal of its own harmony.

From a botanical perspective, the described plant is clearly an *Anchusa* species from the family Boraginaceae. It could potentially be *Anchusa officinalis* L. or even *Anchusa azurea* Mill., syn. *Anchusa italica* Retz. Both species have blue to violet-blue flowers, which can appear purple in the evening sun. However, it is also possible that it is an entirely different *Anchusa* species that has not yet been extensively studied in medical literature.

Parallel passage / Reference
Ibn al-Bayṭār, *Kitāb al-Jāmiʿ li-Mufradāt al-Adwiya wa-l-Aghdhiya*[5]
Possibility of Botanical Identification
Probable Identification, for details see Table 3.

Lisan ěl K'alp, *lisān el-kalb*

Reference-No.	AAAA 1020
Entry:	*Lisan ěl K'alp*, from Arabic *lisān el-kalb* "tongue of the dog"
Translation:	"tongue of the dog"
Synonyms:	*Šan lezu* "tongue of the dog"
Morphology:	Broad leaves, coarse surface, red to blue flowers
Function:	medical drug, wounds, treating spleen and mouth ulcers
Botanical Candidate:	*Cynoglossum officinale* L., Boraginaceae

Description (Translation)
Lisan ēl K'alp, which the Turk calls dog's tongue. It is an herb whose leaves are similar to those of the oxtongue (*Anchusa* sp., literally lamb's tongue) or those of broadleaf plantain (*Plantago major,* [literally nerve plant, presumably due to the prominent leaf veins on the underside of the leaf]). It grows approximately two cubits high and thrives in places where there is some water or near moist [~swampy] springs. The flowers are blue, and the root is white. When applied to fresh wounds, it is helpful. If one drinks the water, it resolves indurations of the spleen and expels them. This has been proven.

[5] Cf. Sontheimer, *Große Zusammenstellung über die Kräfte der bekannten einfachen Heil- und Nahrungsmittel von Abu Mohammed Abdallah ben Ahmed aus Malaga, bekannt unter dem Namen Ebn Baitar*, 1840, Band I, 96.

Pharmaceutical Commentary
The plant can be identified with reasonable certainty as *Cynoglossum* or houndstongue. Evidence suggests that the plant designation *lisān al-kalb* has consistently been asserted in Arabic medical literature as the equivalent of the Greek *Cynoglossum*. Furthermore, a comparison of corresponding parallel passages in Baytar reveals that the term is rooted in the tradition of the Greek *Kynoglossos*. The description of the plant aligns well with a *Boraginaceae*, and the flower colour corresponds to that of houndstongue. The identification of the plant species is therefore relatively secure. The botanical houndstongue should not be confused with the literal canine tongue described in Smbat's horse book M 10975, where it was burned and combined with vitriol in what appears to be a quasi-homeopathic formulation for treating animal bites in horses.[6]

Parallel passage / Reference
Ibn al-Bayṭār, *Kitāb al-Jāmiʿ li-Mufradāt al-Adwiya wa-l-Aghdhiya*, cf. Sontheimer, *Große Zusammenstellung über die Kräfte der bekannten einfachen Heil- und Nahrungsmittel von Abu Mohammed Abdallah ben Ahmed aus Malaga, bekannt unter dem Namen Ebn Baitar*, 1842, Band II, p. 439.

Possibility of Botanical Identification
High Certainty, for detailed evaluation of Botanical Identifiability see Table 4.

Lisan, *lisān*

Reference-No.	AAAA 1021
Entry:	Lisan, from Arabic *lisān* "tongue"
Translation:	[the] "tongue"
Synonyms:	(*Paxru akanǰ*) "ox' ear"
Morphology:	Broad leaves, coarse surface, red to blue flowers

Amirdovlat' equates it with *Paxru akanǰ*

Function:	medical drug, cough, stomach ache and mouth ulcers

Botanical Candidate: *Echium plantagineum* L., Boraginaceae

Description (Translation)
There is another plant similar to it, but which smells of cucumber. It is called *Eznalezu* (ox' tongue). A stem with a flower at the apex grows from the centre. If one cooks and eats the flower, it helps against coughs, stomach pain, and

[6] Cf. Jasmine Dum-Tragut, *Das Kilikische Heilbuch für Pferde. Übersetzung-Kommentar* (Hildesheim: Olms, 2005), 190, 261.

wounds in the mouth. Placing a piece of pomegranate on the tongue also helps. (The root of this plant is called *Hawā ǧīwā* (alkanet)).

Pharmaceutical Commentary

The plant discussed in this paragraph can be specified as *Alkanna tinctoria* (L.) Tausch, also referred to as alkanet or dyer's alkanet. The author's reference to the root as drug called *Havā ǧīwā* provides additional support for identification. In addition, the morphological characteristics – particularly the centrally ascending stem and the terminal flower – are closer to *Alkanna tinctoria* than they are to *Echium plantagineum*. Whereas the previous scholarly tradition has been to equate the "tongue" (lisān) with *Echium plantagineum* or related Boraginaceae, the contextual hints provided by Amirdovlat' make this identification less likely here. The direct association of the plant with the name "tongue" with the root *Havā ǧīwā* (alkanet) suggests that Amirdovlat's description is aimed primarily at *Alkanna tinctoria*, whose reddish root-yielding dye was of established medicinal and cosmetic use. The description of the smell corresponds to that of various *Boraginaceae* and does not appear to carry diagnostic significance. Unlike in Arabic sources, the phrase referring to "putting a pomegranate kernel on the tongue" appears to be either a mistranslation or a misplacement due to text transmission from Arabic into Middle Armenian. Further comparative interdisciplinary research is required before a conclusive identification can be established.

Parallel passage / Reference

Ibn al-Bayṭār, Kitāb al-Jāmiʿ li-Mufradāt al-Adwiya wa-l-Aghdhiya, cf. Sontheimer, *Große Zusammenstellung über die Kräfte der bekannten einfachen Heil- und Nahrungsmittel von Abu Mohammed Abdallah ben Ahmed aus Malaga, bekannt unter dem Namen Ebn Baitar,* 1842, Band II, p. 439.

Possibility of Botanical Identification

Probable Identification, for detailed evaluation of Botanical Identifiability see Table 3.

Lisan ěl Yasfur, *lisān al-ʻaṣfur*

Reference-No.	AAAA 1022
Entry:	*Lisan ěl Yasfur*, from Arabic *lisān al-ʻaṣfur*
Translation:	"tongue of the sparrow"
Synonyms:	[Arabic] *l[isan] ēl-asafir*, [Armenian] *tartarin ptuł*, [Iranian] *ahr*, [iranian?] *Zupani K'unčušk*), [mixed] *Jagu*

	lezu, [mixed] *Čnčłki lezu*, [Armenian dendronym] *Hac'i p'ayt* "Ash tree."
Morphology:	It is the fruit of tree, Armenians call it chick's tongue or sparrow's tongue
Function:	medical drug, libido, eyes
Botanical Candidate:	*Fraxinus excelsior* L., Oleaceae
Drug:	*Fructus fraxini excelsior*

Description (Translation)

Lisan ĕl Yasfur (Lisan ĕl Yasfur). And it is the fruit of the Tartar (*Eldardār*). It is hot in the second degree and dry in the third degree. It increases libido. The branch imparts a sheen to the moisture of the eyes, it helps with palpitations, and it strengthens the heart, and it increases semen production and libido. The bark of the tree dissolves phlegm. And its leaves contain astringents. And it dries secretions from wounds. And its dose is half a *mithqāl*[7]. And it is harmful to the kidneys. Its pungency can be mitigated by gourd. And the substitute drug is walnut and red sandalwood. P'tin says that it is a fruit, to which the Persians say "ahr" and which is also called "zupani k'unčušk." Its nature is hot and mucilaginous [?]. And the leaves of the tree are astringent. DS [?] says that the substitute drug regarding libido is the shelled walnut [freed from the seed coat]. And the Armenian drug [?] is red clove and red *pahman* [?]. And the Armenians call this *chick's tongue* or *sparrow's tongue*. And the tree is called "wood of bread" (ash tree).

Pharmaceutical Commentary

Amirdovlat's description and the accompanying commentaries by Ibn al-Bayṭār and Leclerc offer insight into the historical identification of the ash tree fruit (*Fraxinus excelsior*), known as *Lisān al-'aṣāfīr* (sparrow's tongue). Pharmaco-historically, the entry underscores the significance of descriptive nomenclature in early pharmacopoeias, where the fruit's shape inspired its common name. The text highlights the traditional understanding of its properties within the Galenic framework, classifying it as hot and dry.

Notably, Leclerc's commentary addresses the confusion arising from the shared designation *Dardār* for both ash and elm (*Ulmus sp.*) in different geographical regions. This exemplifies the challenges inherent in historical plant identification due to linguistic ambiguities and potential morphological similarities. The Armenian vernacular names, "chick's tongue" and

[7] Mithqāl from Arabic *miṯqāl* is a unit of mass equal to 4.25 grams (or 0.137 ozt).

"sparrow's tongue," further illustrate the descriptive naming conventions based on perceived resemblance.

An illustration, likely dating approximately two centuries later, depicts a small tree with elongated, pendulous reddish structures and the Arabic inscription *wa-l-bāqī al-ʾaṣfūr*. This visual evidence, while potentially stylized, corroborates the textual emphasis on the elongated form of the ash fruit and its association with the "sparrow's tongue" moniker. The image serves as a supplementary visual reference in tracing the historical comprehension *of Lisān al-ʾaṣāfīr.*

In essence, the textual and visual data reveal a historical understanding of the ash fruit rooted in its distinctive morphology and perceived energetic qualities. The complexities arising from shared plant names across regions underscore the critical role of detailed descriptions and comparative analysis in historical pharmacobotany. The continued use of descriptive vernacular names highlights the enduring influence of visual characteristics in the identification and categorization of medicinal plants.

Parallel passage / Reference
Ibn al-Bayṭār, *Kitāb al-Jāmiʿ li-Mufradāt al-Adwiya wa-l-Aghdhiya*[8]
Possibility of Botanical Identification
Possible Identification, for detailed evaluation of Botanical Identifiability see Table 3.

Lisani sēvr, ?

Reference-No.	AAAA 1023
Entry:	*Lisani sēvr*, origin unclear
Translation:	"tongue of the companions" or "blade-shaped tongue"?
Synonyms:	[Armenian] Eznalezu, [Iranian] Kawzupan, from Persian "cow's tongue"
Morphology:	Grows two cubits tall, purple flower, long leaf Amirdovlat' equates it with Arabic *L[isan] ēs-Sēbu* (?) and Turkish. *irt'ičilar dili* (?)

[8] Cf. No. 1247; Lucien Leclerc, *Traité des simples par Ibn el-Beïthar, traduit de l'arabe, analysé et accompagné de notices critiques*, vol. 2 (Paris: Ernest Leroux, 1881), 301. No. 2025; Leclerc, *Traité des simples par Ibn el-Beïthar 3, 237.* No. 2101; Leclerc, *Traité des simples par Ibn el-Beïthar 3. 297.* Sontheimer, *Große Zusammenstellung* II, 438. Sontheimer, *Große Zusammenstellung* II, 496.

Function: medical drug, diuretic for urolithiasis and nephrolithiasis
Botanical Candidate: *Anchusa italic* L., Boraginaceae or *Borago officinalis* L., Boraginaceae

Description (Translation)
Lisani Sēvr, which is ox-tongue. And good is that whose leaves are thick. It is temperate. It expels humidity. And it itself [acts as] gladdening/exhilarating. And it is beneficial for the mouth. And if you wash the head with its juice, it dispels dandruff (pityriasis) from the head. And its ash helps with ear pain (otalgia). And to the heart it gives joy and strength. And it helps with palpitations (cardiac arrhythmia) and with the pains of melancholia. It cleanses cough and the chest. It dispels hard ulcers. And it dissolves bile. And it purifies [?] the spleen. And the quantity to be taken (dose) is 2 dram[9]. And its substitute drug is the rose (*Rosa sp.*) or silk (?). P'tin says that in Persian it is called "guzupan." And he said that it belongs to the family of groundsel (likely *Senecio genus*). And of good quality is that from Damascus or Khorasan, whose leaves are heavy and on which there is "zin zin" [?]. And its nature is hot and mucilaginous. And he also said that it is harmful to the spleen. And its sharpness can be mitigated by red sandalwood [?]. Its substitute drug is "č'k'awk'n apršumn," which should be burned, or also lemon balm (*Melissa officinalis*), or also "hndupan" [unidentified], or also [substance] nourished with myrobalans [?], or also [substance] nourished with amla [?]."

Pharmaceutical Commentary
Amirdovlat's entries offer valuable insights into the historical identification of *Lisani sēvr* and its connection to *eznalezu* (ox-tongue). While the later working Basmajian and Bedevian identify Lisani sēvr as *Anchusa italica* Retz (syn. *A. azurea* Mill.), the potential transcription error from "t'' to "s" raises the possibility of a link to *lisān al-ṯawr* (bull;s tongue), a name often associated with *Borago officinalis*. Amirdovlat's inclusion of the Persian *Kawzupan* (likely derived from *gāv-zabān*, traditionally referring to borage) further complicates the picture, suggesting a potential overlap in vernacular names based on shared leaf morphology.

The Arabic synonyms provided for *eznalezu* (including *lisān al-ṯawr*) support the Anchusa identification, although the presence of *lisān al-ḥamal*

[9] 1 Dram as a unit of weight for goods has various sizes, but an average standard weight of 3.125 grams can be assumed. This average is derived from historical metrological analyses and comparisons with similar ancient Near Eastern weight systems.

(plantain) indicates potential broader usage of the "tongue" descriptor. Amirdovlat's detailed descriptions of the plant's properties align with traditional uses attributed to Anchusa species.

Baytar describes also to *Kāwazwān* which he describes as *Borago officinalis*, referring to Ibn Sina (cf. Sontheimer, p. 339) and as interpreted by Sontheimer. Leclerc identifies *Kāwzouān* as Buglosse, concentrating on the etymology and the literal meaning of the Arabic term.

An illustration from the later manuscript (MS 6594) depicts a plant with distinctly 5-lobed, blue flowers, strongly resembling *Borago officinalis*, with the comment "lisān al-ṭawr." While this visual evidence could suggest a different plant being referred to under a similar vernacular name, or historical confusion, it currently leans the interpretation towards *Borago officinalis* due to the prominent floral characteristics.

Despite the valuable clarifications offered by Amirdovlat', a definitive botanical determination remains challenging at this stage. However, further research, particularly into historical linguistic variations and regional applications of plant names, holds the potential to resolve these ambiguities. Considering the current textual evidence and the supplementary visual information, a tentative inclination towards *Borago officinalis* exists, warranting further investigation to reconcile the textual and visual clues.

Parallel passage / Reference
Ibn al-Bayṭār, *Kitāb al-Jāmiʿ li-Mufradāt al-Adwiya wa-l-Aghdhiya*[10]

Possibility of Botanical Identification
High Certainty, for detailed evaluation of Botanical Identifiability see Table 3.

Lisan ĕl Hamal*, Lisān al-ḥamal*

Reference-No.	AAAA 1024 (main entry AAAA 593)
Entry:	*Lisan ĕl Hamal*, from Arabic *Lisān al-ḥamal*
Translation:	"lamb's tongue"
Synonyms:	[Armenian] *garṇalezu* "lamb's tongue," [Armenian] Garṇadmakik, "little lamb-tail"
Morphology	no morphological description given
Function:	medical drug, anti-inflammatory, diarrhoea, fever, dog's bite

[10] Cf. Sontheimer, *Große Zusammenstellung* II, 339, 351, 437, 524. No. 1871; Leclerc, *Traité des simples par Ibn el-Beïthar* 3, 146.

Botanical Candidate: *Plantago media* L. or *Plantago major* var. *asiatica* L., Plantaginaceae later maybe also used for *Plantago psyllium (*syn. *Plantago afra,* Plantaginaceae*)*, cf. MS M 6594

Description (Translation)
Lisān al-ḥamal, which is the "lamb's tongue"; it is also called "lamb's tail." It has been described.

Pharmaceutical Commentary
The medieval Armenian text describes surely a plant of the genus *Plantago*, identified as *Lisan al-Hamal* (lamb's tongue). These medical use (AAAA 593) includes treatments for otic swelling, styptic properties, relief from diarrhoea, styptic effects across various sites, benefits for kidney and bladder ailments, management of epistaxis, alleviation of liver and spleen congestion, control of seminal discharge, treatment of inflammatory conditions (hot swellings, arthralgia, paralysis, burns, ophthalmic inflammation, fever), healing of purulent ulcers, digestive aid, remedy for acute fever, and even application to dog bites. Notably, the text also mentions potential neurotoxic effects at higher doses.

The later illustration accompanying this textual description (MS M 6594) depicts a cluster of broad-lanceolate leaves emerging from a central point, along with a partially legible inscription in Arabic script. Based on the visual characteristics, the illustration is consistent with the general leaf morphology of various Plantago species. The lanceolate shape and basal arrangement are characteristic of this genus.

The Arabic inscription in MS M 6594, appears to contain the term "baḏr qaṭūnā." This phrase translates to "fleawort seed" or "psyllium seed," referring to species within the genus Plantago, particularly *Plantago psyllium* (syn. *Plantago afra*). These species are well-known for their mucilaginous seeds used medicinally as bulk-forming laxatives and for other applications.

The inclusion of "fleawort seed" in Arabic alongside the illustration of plantain leaves suggests a potential association or even conflation of different Plantago species in the historical understanding of *Garnalezu* / *Lisan ĕl Hamal*. While the primary Armenian text focuses on the broader plant and its diverse uses, the Arabic annotation points towards a specific application or a related species valued for its seeds.

This integration of textual and visual evidence indicates a nuanced understanding of "lamb's tongue," encompassing various Plantago species and their distinct medicinal properties. The Armenian text provides a broad

spectrum of traditional uses for the plantain, while the Arabic annotation highlights the specific value of psyllium seeds within the same broader botanical category. Further investigation into the historical co-occurrence and differentiation of these Plantago species in medieval medical texts would be beneficial.

Parallel passage / Reference
Ibn al-Bayṭār, *Kitāb al-Jāmiʿ li-Mufradāt al-Adwiya wa-l-Aghdhiya*[11]

Possibility of Botanical Identification
High Certainty, for detailed evaluation of Botanical Identifiability see Table 3.

c) "Tongues" in a figurative sense

Lisan ĕl Pahr, lisān al-baḥr

Reference-No.	AAAA 1018
Entry:	*Lisan ĕl Pahr*, originally [Arabic] *lisān al-baḥr*
Translation:	tongue
Synonyms:	sipeay, from Greek σηπίᾱ (*sēpíā*) "cuttlefish"
Morphology	Amirdovlat' equates it with Sepia.
Function:	medical drug
Botanical Candidate:	none, animal product

Description (Translation)
Lisan ĕl Pahr, which is Sepia. Its number is mentioned.

Pharmaceutical Commentary
High certainty for describing *Os sepium*, Cuttlebone, also known as cuttlefish bone.

Parallel passage / Reference
Ibn al-Bayṭār, *Kitāb al-Jāmiʿ li-Mufradāt al-Adwiya wa-l-Aghdhiya*[12]

[11] Cf. Sontheimer, *Große Zusammenstellung* II, 351, 435-36. No. 1892; Leclerc, *Traité des simples par Ibn el-Beïthar,* 3, 147.No. 2022; Leclerc, *Traité des simples par Ibn el-Beïthar 3*, 235.
[12] Cf. Sontheimer, *Große Zusammenstellung* II, 439.

D. Observations from MS M 6594

The Armenian "Illustrated Pharmaceutical Dictionary" (MS M 6594) is a collection of about 1320 entries documenting Armenia's medicinal resources of the fifteenth-seventeenth centuries. The most important part of MS M 6594 is that it shows continuity of using Amirdovlat' Amasiac'i's Angitac' Anpēt as a fundamental medical and pharmacobotanical resource. Moreover, its 315 coloured illustrations of medicinal substances hold value for studying medieval Armenian scientific book art and of course for morphological studies on the *materiae medicae*.

The illustrated manuscript MS M 6594 offers a potentially helpful visual dimension to the identification of several plant species named after different animal-tongues. As we have observed, at least three entries in MS 6594 include illustrations that appear to align well with their linguistic and botanical identifications. These feature what seems to be *Cynoglossum officinale* labelled in Arabic as *Lisān al-Kalb*, and a visual that likely corresponds to *Plantago major* with the marginal Arabic notation *Lisān al-Ḥamal*. The presence of marginal Arabic glosses could provide supplementary identifiers for substances with less clear Armenian names. These images hint at a possible integration of Greco-Arabic medicinal iconography within the Armenian medical tradition. Considering that manuscripts like MS M 6594 were possibly utilized by Armenian apothecaries in the Armenian Highland and historical Western Armenia, potentially even into the twentieth century, they represent a potentially valuable resource for understanding historical pharmaceutical practices. Further research into these manuscripts could contribute to our understanding of historical medical knowledge exchange and potentially uncover forgotten therapeutic approaches.

E. Summary of Scored Entries

Table 3 shows the result of the identification-scoring, based on the described method above.

Table 3. Botanical Identifiability Assessment of "Tongue"-Named Medicinal Substances in Angitac′ Anpēt (AAAA - Amirdovlat′ Amasiac′i's Angitac′ Anpēt)

Reference (AAAA No.)	Drugs								
	Name	*Botanical Candidate*	*A*	*B*	*C*	*D*	*E*	*Total*	*Certainty Level*
1017	*Lisan*	*Animal organ*	-	-	-	-	-	-	-
1018	*Lisan al-Baḥr*	*Sepia officinalis*	-	-	-	-	-	-	*High certainty*
1019	*Lisan al-Ṣaḥb*	*Anchusa azurea*	4	5	1	2	2	14	*Probable*
1020	*Lisan al-K′alb*	*Cynoglossum officinale*	6	5	2	3	3	19	*High certainty*
1021	*Lisan*	*Echium plantagineum*	4	4	1	2	2	13	*Probable*
1022	*Lisan al-ʿUṣfūr*	*Fraxinus excelsior*	3	2	1	2	2	10	*Possible*
1023	*Lisani Sēvr*	*Borago officinalis or Anchusa italica*	5	5	2	3	2	17	*High certainty*
1024	*Lisan al-Ḥamal*	*Plantago major, P. media, or P. psyllium*	6	5	2	3	3	19	*High certainty*

These results validate the proposed methodology and demonstrate its capacity to resolve challenging semantic-lexical ambiguities in historical pharmaco-botanical texts.

II. Conclusion: Implications for Philological and Medical Sciences

This study introduces a replicable and transparent system for the evaluation of historical botanical names that accounts for linguistic diversity, cultural transmission, and botanical accuracy. The results from the case study of "tongue"-related plant names demonstrate the feasibility and precision of the method. The correlation with manuscript MS 6594 not only reinforces identifications but also highlights the importance of continuity in the transfer of medical knowledge.

Beyond its philological and pharmacobotanical relevance, this study offers indirect but meaningful implications for equine phytotherapy. Several of the "tongue"-named plants – especially species of *Cynoglossum*, *Plantago*, and *Borago* – have recognized anti-inflammatory, mucilaginous, and wound-healing properties, which remain relevant in veterinary applications today. The identification of such plants in Amirdovlat's *Angitacʻ Anpēt* not only validates their historical use but also strengthens the evidence for cross-species medicinal knowledge, including applications in equine care. Furthermore, the dense integration of Arabic and Persian loanwords into Armenian pharmacological nomenclature reflects the vibrant translational activity of the late medieval period. This lexical permeability supports the broader findings of our equine project, emphasizing how Armenian veterinary knowledge – often perceived as isolated – was in fact deeply embedded in wider Arabic and trans-Eurasian knowledge systems. These findings advocate for a re-evaluation of medieval Armenian sources in veterinary botany, especially in reconstructing premodern equine pharmacopoeias.

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