

Clangores, stridores et sibili –
animal sounds in ancient Latin literature
from 55 BC to AD 180

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A Thesis in the Field of Ancient History
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Declaration

I, Rodney Cross, hereby declare and certify that my thesis, entitled '*Clangores, stridores et sibili – animal sounds in ancient Latin literature from 55 BC to AD 180*', has not been submitted for a higher degree to any university or institution other than Macquarie University, Sydney. This thesis is an original piece of research and the work and assistance of others is duly acknowledged where appropriate.

Signed:

Rodney Martin Cross

Dated 15 / 03 / 2020

Abstract

Evaluating the specific vocabulary used by Latin authors to denote sensory experiences – be they real and perceived through authentic experiences, or imagined and constructed through literary techniques – can enrich our understanding of the qualities denoted by, and ascribed to, specific sensory terms. Through a combination of traditional lexicographical methods and comparative sound analysis, this thesis prompts historians to consider textually-transcribed sounds in ancient texts as evidence of aural perception, and will demonstrate the value of comparing literary descriptions of animal sounds with extant sounds produced by modern animals. Building on a recently proposed methodology in the field of historical sensory studies (Vincent 2017), what follows will facilitate a critical survey of the vocabulary used by ancient Roman authors to denote and characterise animal sounds in Latin literature. ‘*Clangores, stridores et sibili*’ foregrounds sound and contemplates the processes underpinning the literary descriptions of aural stimuli.

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Abbreviations Used

Reference Works

CODM – Concise Oxford Dictionary of Music

LSJ – Liddell-Scott Greek-English Lexicon

OCD – Oxford Classical Dictionary

OED – Oxford English Dictionary

OLD – Oxford Latin Dictionary

PHI – Packard Humanities Institute online database of classical Latin texts, located at:

<https://latin.packhum.org>

SAALL – Sounds of Animals in Ancient Latin Literature Dataset

Ancient Authors and Texts

Where applicable, the following abbreviations are used in accordance with the *Oxford Classic Dictionary 4th ed.* Esther Eidinow (ed.) 2012. Oxford University Press.

Aetna

APUL.

De deo Soc. praef.

Flor.

Met.

ARIST. *Hist. an.*

BAfr.

CALP. *Ecl.*

CASS. DIO.

CIC.

Att.

De or.

Div.

Fam.

Leg.

Appendix Vergiliana, *Aetna*

Apuleius

De Deo Socratis, Praefatio.

Florida

Metamorphoses

Aristotle, *History of Animals*

Bellum Africum

Calpurnius Siculus, *Eclogues*

Cassius Dio, *Historia Romana*

Cicero

Epistulae ad Atticum

De oratore

De divinatione

Epistulae ad familiares

De Legibus

| | |
|-------------------------|---|
| <i>Luc.</i> | <i>Lucullus</i> |
| <i>Nat. D.</i> | <i>De natura deorum</i> |
| <i>Pis.</i> | <i>In Pisonem</i> |
| <i>Rosc. Am.</i> | <i>Pro Sexto Roscio Amerino</i> |
| <i>Sest.</i> | <i>Pro Sestio</i> |
| <i>Ciris</i> | Appendix Vergiliana, <i>Ciris</i> |
| COLUMELLA, <i>Rust.</i> | Columella, <i>De re rustica</i> |
| <i>Copa</i> | Appendix Vergiliana, <i>Copa</i> |
| <i>Cul.</i> | Appendix Vergiliana, <i>Culex</i> |
| CURT. | Quintus Curtius, <i>Historiae Alexandri Magni</i> |
| <i>Dirae</i> | Appendix Vergiliana, <i>Dirae</i> |
| FLOR. | Florus, <i>Epitome</i> |
| FRONTO. <i>Ep.</i> | Fronto, <i>Epistulae</i> |
| GELL. NA. | Aulus Gellius, <i>Noctes Atticae</i> |
| GRATTIUS | Grattius, <i>Cynegetica</i> |
| HOR. | Horace |
| <i>Carm.</i> | <i>Carmina or Odes</i> |
| <i>Epist.</i> | <i>Epistulae</i> |
| <i>Epod.</i> | <i>Epodi</i> |
| <i>Sat.</i> | <i>Satirae</i> |
| JUV. | Juvenal, <i>Saturae</i> |
| <i>Laus Pis.</i> | <i>Laus Pisonis</i> |
| LIVY | Livy, <i>Ab Urbe Condita</i> |
| <i>Per.</i> | <i>Periochae</i> |
| LUC. BC. | Lucan, <i>de Bellum Civile</i> |
| LUCR. | Lucretius, <i>De rerum natura</i> |
| <i>Lydia</i> | Appendix Vergiliana, <i>Lydia</i> |
| MAN. Astr. | Manilius, <i>Astronomica</i> |
| MART. | Martial, <i>Epigrammata</i> |
| OV. | Ovid |
| <i>Ars Am.</i> | <i>Ars amatoria</i> |
| <i>Cons. ad Liviam.</i> | <i>Consolatio ad Liviam</i> |
| <i>Epigr.</i> | <i>Epigrammata</i> |
| <i>Fast.</i> | <i>Fasti</i> |
| <i>Her.</i> | <i>Heroides</i> |
| <i>Ib.</i> | <i>Ibis</i> |
| <i>Met.</i> | <i>Metamorphoses</i> |
| <i>Pont.</i> | <i>Epistulae ex Ponto</i> |
| <i>Tr.</i> | <i>Tristia</i> |
| PERS. | Persius, <i>Saturae</i> |

| | |
|--------------------------|--|
| PETRON. | Petronius |
| <i>fr.</i> | <i>Fragments</i> |
| <i>Sat.</i> | <i>Satyrica</i> |
| PHAED. | Phaedrus, <i>Fabulae Aesopiae</i> |
| PLIN. <i>Ep.</i> | Pliny (the younger), <i>Epistulae</i> |
| PLIN. <i>HN.</i> | Pliny (the elder), <i>Naturalis historia</i> |
| PROP. | Propertius, <i>Elegiae</i> |
| QUINT. <i>Inst.</i> | Quintilian, <i>Institutio Oratoria</i> |
| <i>Rhet. Her.</i> | <i>Rhetorica ad Herennium</i> |
| SEN. | Seneca (the younger) |
| <i>Ag.</i> | <i>Agamemnon</i> |
| <i>Dial.</i> | <i>Dialogi</i> |
| <i>Ep.</i> | <i>Epistulae Morales ad Lucilium</i> |
| <i>Her. F.</i> | <i>Hercules furens</i> |
| <i>Med.</i> | <i>Medea</i> |
| <i>Oct.</i> | <i>[Seneca (the younger)], Octavia</i> |
| <i>Oed.</i> | <i>Oedipus</i> |
| <i>Qnat.</i> | <i>Quaestiones Naturales</i> |
| <i>Thy.</i> | <i>Thyestes</i> |
| SIL. | Silius Italicus, <i>Punica</i> |
| STAT. | Statius |
| <i>Ach.</i> | <i>Achilleis</i> |
| <i>Silv.</i> | <i>Silvae</i> |
| <i>Theb.</i> | <i>Thebais</i> |
| SUET. | Suetonius |
| <i>Aug.</i> | <i>Divus Augustus</i> |
| <i>Dom.</i> | <i>Domitianus</i> |
| <i>Rel. Reiff.</i> | <i>Reliquiae</i> , ed. Reifferscheid |
| TIB. | Tibullus, <i>Elegiae</i> |
| VAL. FLAC. <i>Argon.</i> | Valerius Flaccus, <i>Argonautica</i> |
| VAL. MAX. | Valerius Maximus |
| VARRO | Varro |
| <i>Ling.</i> | <i>De lingua Latina</i> |
| <i>Rust.</i> | <i>De re rustica</i> |
| VERG. | Vergil |
| <i>A.</i> | <i>Aeneid</i> |
| <i>Ecl.</i> | <i>Eclogues</i> |
| <i>G.</i> | <i>Georgics</i> |

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1. Introduction

Sound accentuates the underlying rhythms of life. Alarms rouse us from our sleep, whistling kettles call us to remedy our drowsiness with much-needed coffee. Rattles, drones, and honks punctuate morning rush-hour traffic. Personal music devices and noise-cancelling headphones provide curated soundscapes for our drive-time commutes. The technology-driven sounds of the modern world differ considerably from those of the ancient world. It can be difficult to engage on a personal and sensory level with ancient accounts of the percussive clanging of coppersmiths, or the dreadful clamour of the ancient battlefield, as they are aural experiences that we are not typically accustomed to hearing. Analysing ancient vocabularies of sound can be an extremely difficult task, as we cannot confidently make clear aural comparisons. But surviving descriptions of animal sounds in ancient Latin texts provide us with a direct sensory link to the distant past. '*Clangores, stridores et sibili*' will demonstrate that we can vastly augment our current understanding of the terminology used to denote sounds in antiquity, by comparing literary descriptions of animal sounds with extant sounds produced by modern animals.

1.1. Defining the Problem

Despite a recent increase in scholarship on the sounds of antiquity, very few works have focused solely on the sonic vocabulary of Latin. The interdisciplinary approach of this thesis draws deserving attention to the study of sound in Latin literature. The representation of aural stimuli visually in text presents unique challenges, and many

questions have arisen over the course of this study. In what ways are sounds represented/recorded/transcribed in text by ancient Latin authors? Do Latin authors attempt to moderate the subjectivity of their textual descriptions of sound? Do author or genre-specific patterns of sound-term-usage emerge? How consistently are these Latin sound-terms used? Is there consistency in the translations of these Latin sound-terms into English? And in what ways can differing patterns of usage affect the subtleties in the meanings and connotations of these terms? This thesis will consider and address a number of these core questions through the application of an adapted methodology that combines traditional lexicography with comparative analysis.

1.2. The Scope of the Study

‘Clangores, stridores et sibili’ will provide a broad survey of the vocabulary used by Latin authors from 55 BC to AD 180 to denote and characterise the sounds of non-human animals in text.¹ But as this is a sizeable topic, I have imposed further limitations on the scope of this thesis. Firstly, I have decided to focus solely on the use of Latin sound terminology. Though I do acknowledge that ancient Greek was an important influence on the development and use of Latin during the chosen time period, a full comparative survey of animal sounds in ancient Greek and Latin would not have been feasible within the set word-limits of this doctoral thesis. Ancient Greek sound terminology has already been the focus of several important monographs, and has received considerable discussion especially with the resurging interest in ancient Greek musical practices. There are however, relatively few studies on Latin sound terminology. There are instances in this

¹ Hereafter simply, animals.

work when concise comparisons are required, but larger, more wide-ranging appraisals of the two languages would only add to the current disparity in modern scholarship. '*Clangores, stridores et sibili*' will therefore serve as a foundational text on the sonic vocabulary of Latin.

I have chosen to restrict the temporal scope of this thesis to literature from 55 BC to AD 180, which is also reflected in the *SAALL* dataset. Incorporating texts outside of this range would have far exceeded the set limits for this thesis. This range commences with Lucretius' *De Rerum Natura*, and ends with Apuleius' *Metamorphoses*. Future studies may expand this scope to include earlier and later Latin texts that would be valuable sources of additional comparison, including: *Scriptores Historia Augusta*, the writings of Nonius Marcellus, the *Etymologiae* of Isidorus of Sevilla, as well as Christian Latin Literature, including Augustine's *Confessiones*.

I have chosen to omit references to animal sound that are present in the *Anthologia Latina*. The dating of this collection of fragmentary Latin poems ranges from the 1st to the 6th Centuries AD, and are of varying degrees of provenance and type. The dating of individual fragments are often contested and it would have been impractical to filter through the collection to fit the chosen scope. This source is not featured in the present work or in the *SAALL* dataset. Despite occurring within the chosen scope, I have also decided to omit a discussion of the Reifferscheid sound catalogue that is tentatively ascribed to Suetonius. This ancient source has already received considerable attention in Bettini's *Voci*.²

² BETTINI 2008a.

Chapter 4 presents an article entitled *Stridor et Murmur*, which will conduct a full, exhaustive review of the sound-terms applied to insects in Latin literature during the chosen period. Accounting for the comparatively infrequent references to the sounds of insects in Latin literature, I have also decided to incorporate references to the anthropomorphised insects of Phaedrus' *Fables*. Elsewhere in the work however, I have refrained from referencing Phaedrus, as the representation of his 'talking' animals complicates our comparison between Latin sound-terms and the sounds of *actual* animals. In a similar way I have also selected references from Ovid's *Metamorphoses* with care. Ovid often uses deft descriptions of sounds to accentuate the animalistic qualities of his characters post-metamorphosis. But to what extent are the lamentations of Alcyone, the human exclamations of a grieving wife, or the cries of a bird? In many of Ovid's accounts of transformation, themes of the 'human' and 'animal' are indelibly entwined. It is difficult, and at times impossible, to separate elements of *fact* from Ovid's poetics. An exploration of the intersection of 'human' and 'animal' sounds in Phaedrus and Ovid lies outside the scope of the present work, but it remains a profitable avenue for future study.

I have chosen to restrict the scope even further for the article, *Clangor et Plausus*. This narrowed scope demonstrates the usefulness of the methodology in evaluating a smaller, sub-corpus focused on the sound-terms applied to a single type of sound-production. In this section I will evaluate the denotation of non-vocal bird sounds, including: wing-beats, feather-whistles, other general flight sounds and beak rattles. These sounds have not been considered to the same extent as birdsong, which has been the focus of numerous modern studies.

Including a full review of the sounds of mammals would have far exceeded the limits of this doctoral dissertation. In lieu of this examination, I have chosen to evaluate the sonic vocabulary employed by Pliny the Elder, and to provide a selective commentary on his descriptions of animal sounds in books VIII to XI of the *Natural History*. '*Dissimiles ceteris voce*' will demonstrate the effectiveness of the chosen method in evaluating the sonic vocabulary of an individual Latin author. In the evaluation of Pliny's sound-term usage, I will also provide comparative figures of other ancient authors including Ovid, Vergil, Statius and Apuleius. The commentary of books VIII to XI of the *Natural History* will draw scholarly attention to these comparatively understudied volumes. And reviewing the sound-terms in book VIII will also allow us to present a discrete sample of the Latin terminology used to denote the sounds of mammals.

This study provides a wide-ranging cross-section of the sonic vocabulary of Latin authors. Future scholarship can expand upon this research by: examining other sound sources (including anthropogenic or natural sounds), concentrating on a single sound-term or family of terms, by evaluating and/or comparing the sonic vocabulary of other authors, or by expanding the temporal scope of the study. While I believe the breadth of this study is a great strength, such scope can hinder more in-depth discussions of certain sound-terms. Some terms will naturally receive more attention than others. As a full exhaustive review of the sounds of mammals does not feature in the present work, sound-terms that are applied primarily to this animal type will receive comparatively less discussion.

Many of the attributive sound-terms identified in the present work are also applied to denote qualities of other sensory stimuli, including: colours and light, smells, tastes, and

even, tactile stimulation. Evaluating the multisensory nature of such Latin terms would also be an extremely fruitful path for further study, which addresses a clear *lacuna* in the field of Roman sensory studies. But aside from minor observations, it will not be a focal point of the present work.

Finally, I will not discuss the semantic complexities of the boundary between concepts of ‘music’ and ‘non-musical sound’ in the Latin corpus. My chief goal is to encourage further research into the descriptions of sound in Latin texts. But I do hope that this work may be a suitable foundation for future studies that seek to probe the conceptual delineations between ‘sound’ and ‘music’ in Roman thought more directly.

1.3. Structure of the Thesis

In accordance with Macquarie University’s encouraged model of a ‘thesis by publication’, this doctoral thesis presents a series of scholarly articles at various stages of the publication and peer-review process. At present, *Stridor et Murmur* has been submitted to *Arethusa* for peer-review, and *Nature’s Song Remains the Same* was presented at the ‘In Pursuit of Sound’ Symposium at the Faculty of English, Cambridge, where it received critical feedback from scholars in fields of English literature, sound studies and anthropology. The remaining chapters will be subsequently refined and prepared for standalone publication in academic journals. To ensure overall coherency, each chapter will commence with a brief preface for context, and the thesis will conclude with a discussion that synthesises overall findings. As these chapters are intended to be subsequently published as discrete papers, there will inevitably be some repetition, but this will be minimised wherever possible.

The introductory section presents my core questions and hypotheses, and outlines the overall scope and structure of the thesis. Section [2](#) contextualises the present work by presenting a review of terminology, and a summary of relevant modern literature. Section [3](#) outlines my chosen methodology in an article entitled, *Nature's Song Remains the Same*. The following four chapters will present four discrete research articles. The first two articles ([4.](#) and [5.](#)) will identify and evaluate the sonic vocabulary used by Latin authors to denote and describe the sounds of insects, and reptiles and amphibians, respectively. The third article ([6.](#)) will consider the denotation of non-vocal bird sounds (feather-whistles wing-beats, and beak-rattles). The final chapter ([7.](#)) will evaluate the sonic terminology used by Pliny the Elder, and will provide a commentary on the description of animal sounds in books VIII to XI of his *Natural History*. Section [8](#) will present a summary of my overall findings and avenues for further research. Four appendices are located at the end of the text. These appendices include: a list of Latin word-frequency tables ([10.1](#)), a collection of figures that visually represent word-frequency statistics ([10.2](#)), a detailed account of the construction of the *Sounds of Animals in Ancient Latin Literature* dataset (SAALL) ([10.3](#)), and a list of sound recordings that are cited in the work for the comparative analysis of sound ([10.4](#)). The SAALL dataset itself can be found as a supplementary file attached to this digital thesis.

1.4. Limitations of Evidence

Textual representations of sound in Latin literature may transcribe real sounds as perceived through authentic experiences, or they may be imagined, and constructed through literary techniques. In either circumstance, these aural transcriptions are products

of the sensory processes of each individual author, which are intrinsically subjective. As Alexandre Vincent puts it “the sounds of the *Annals* and *Histories* are a characteristic of Tacitus’ perception of the world, which is no more universal than it is socially objective.”³ Furthermore, the Latin canon itself is indicative of the elite writing class, and it does not necessarily reflect the vocabulary of ‘everyday Romans.’ If we consider the ways that we interact with sound in our own lives, we would find that our listening is typically directed in a *causal* way. We may try to identify mysterious rattles, or complain about persistent noises at odd hours, but it is very unlikely that we would quote Shakespeare or Chaucer in our doing so. The figurative ways in which sounds are often described in literature, suggests that textual descriptions of sound would differ considerably from more mundane, everyday aural experiences. It is unlikely therefore, that *all* of the aural expressions examined in this work were applied in wider social contexts.

As outlined in the Methodology in Chapter 3., this thesis will supplement ancient literary evidence with modern recordings of animals. The paucity of accurate, scientific recordings of animal sounds for aural comparison does however, impose certain limitations on the present work. Modern biological studies often provide objective, scientific descriptions of animal vocalisations, but actual audio recordings of these sounds are not always accessible. Nature documentaries can be useful sources for the visual depiction of behaviours associated with sound-production. But unfortunately, these works often add sound in the studio in post-production, and it can be difficult to gauge the reliability of the combined picture-sound. Errors attributed to this practice have garnered a negative response from a discerning public in recent years.⁴

³ VINCENT 2017, 149.

⁴ DAS 2019; PERCIVAL 2016.

The Tierstimmen Archiv and the Macaulay Library are valuable resources that collate and present recordings of animal sounds online. A number of these recordings are referenced in the present work. The full list of sound recordings can be found at Appendix [10.4](#). The Tierstimmen Archiv is particularly useful, as it includes a vast collection of animal sounds recorded by the prominent behavioural physiologist and zoologist, Günther Tembrock,⁵ who was also an early pioneer of bioacoustics. Utilising Tembrock's field-recordings therefore, bolsters the credibility of these specific recordings. The various animal recordings are especially useful in the comparative analysis of sound-term and sound-production, especially for more unfamiliar sounds, like the clattering of a stork's bill,⁶ or the versatile vocalisations of hyena.⁷ Despite being considerably more reliable than nature documentaries in presenting recorded sound-production, we cannot be fully certain of the accuracy of these recordings, or their archival descriptions. The optimal approach for future studies of this kind, would be to gather bioacoustic material explicitly for the purpose of such a comparative study. But such an approach would have required extensive funding and additional resources, and was therefore not suitable for this thesis.

It is worth noting that these modern animal recordings should not be considered as *more* objective than the ancient literary descriptions, but rather as a different supplementary form of evidence with their own limitations. While these modern recordings are true representations of the audible sound at the time of recording, they are often presented without relevant contextual details. If behavioural, and other contextual observations were

⁵ TEMBROCK 1959.

⁶ See Sound Recording 36, Sound Recording 37, and Sound Recording 38.

⁷ See Sound Recording 50, Sound Recording 51, Sound Recording 52, and Sound Recording 53.

not made at the time of recording (or even subsequently lost during archival), it is difficult to identify the animal behaviours associated with specific sounds.

It is also important to emphasise that by using modern recordings as supplementary evidence, I am not arguing that specific animal calls have not changed over time. Some onomatopoeic Latin names for birds provide convincing evidence for the unvaried continuation of calls over the past 2000 years;⁸ but more broadly, it is impossible to know the extent to which different types of animal calls may have changed over time. While specific variation in animal calls may have occurred, I would argue that the *mechanism* for sound production in these animals has remained constant. As an example, it is impossible to definitively identify the *specific* frequency of cicada stridulations from 2000 years ago; but the physicality and sound-producing behaviours of cicadae are still easily recognisable from ancient textual descriptions and visual evidence. It is logical therefore to posit that modern cicadae sound very similar to the cicadae of Athens in the 1st Century AD.

Presentation of word-frequency data is extremely useful, however the *SAALL* dataset upon which these statistics are based, is not a completely exhaustive collection of references to animal sound in Latin literature. Due to the sheer weight of references to birds, mammals, and reptiles (i.e. snakes), it was simply not practicable to conduct an exhaustive survey of sound-terms related to *all* animals.⁹ This word-frequency data nevertheless provides valuable information that is indicative of broader patterns of usage, and clearly identifies avenues for further research.

⁸ The Greek *tyto*, and the Latin *bubo*, correspond directly with calls made by owls that still exist today (the little owl and Eurasian eagle owl, respectively). Cf. *Tyto*: ARNOTT 2007, 367 and Sound Recording 32; Cf. *Bubo*: ARNOTT 2007, 40 and Sound Recording 29.

⁹ More details regarding the parameters of the database can be found at Appendix [10.3](#).

1.5. Hypothesis

The perception of sound is an inherently personal experience, and as such, the language used to describe aural stimuli is naturally subjective. This subjectivity will seep into ancient Latin descriptions of sound, and may present in the form of disparate, contrasting and, at times, contradictory characterisations of sounds from one author to the next. Subjectivity will also have an impact on the semantic range of some sound-terms. As Latin has a rather small vocabulary for the denotation of sounds, it is likely that authors will extend the range of some terms to encompass a vast array of similar sounds, perhaps even from different sound-emitters. This will result in the considerable semantic overlap of certain sound-terms. To illustrate the comparable semantic intersection in English terms; how would we differentiate between a rattle and a clatter? Or a hiss and a whistle? Each individual author is likely to have very distinct patterns and habits for the denotation of sounds in text. The frequency and relative weight of overall sound-term usage, and the complexity of their sonic vocabulary will vary considerably. Variations in frequency and sound-terms will also correspond with animal type. We are likely to see major fluctuations in the frequency of sound-terms applied to insects, reptiles and amphibians, and specific references to non-vocal bird sounds. As with other languages, it is expected that we will find close and consistent associations between animal-type and specific sound-terms (e.g. snakes *hiss* and dogs *bark*). But due to the increased contact with animals in the ancient world, we are also likely to see (or rather hear) the sounds of more uncommon animals.

2. Background and Literature Review

2.1. Terminology

2.1.1. Issues of Modern Terminology

In contemporary sound studies, the terminology used to analyse sound often intersects with the critical apparatus used to analyse music. Musical concepts of pitch, loudness, duration and tone quality can be extremely useful tools when attempting to categorise and analyse transcribed descriptions of sounds (especially adjectives and adverbs). But one of the chief stumbling blocks of sound and musical analysis is the considerable variability (and often subjectivity) of its terminology.

In 1908 F. Gilbert Webb delivered an impassioned speech against the vagueness of certain musical nomenclature to the Royal Musical Association.¹⁰ Notable terms fixed in Webb's discriminating crosshairs were 'rhythm', 'tempo', 'tone', and 'tone colour'. Webb identifies several distinct meanings for the word 'tone', including: a musical sound, the *quality* of a sound (i.e. rich tone, or poor tone), and the interval of a whole-step in Western music (e.g. a major second interval from C to D).¹¹ The secondary usage of the word 'tone', meaning the quality of an acoustic sound signal, influences the sense of the English term 'tone colour'.¹² An entry on "American Terminology of Music" in the Concise Oxford

¹⁰ WEBB 1908

¹¹ WEBB 1908, 69.

¹² The French word 'timbre' is often used for tone colour, and less commonly in Anglophone scholarship, the associated German words, *klangfarbe* or *tonfarbe*

Dictionary of Music outlines the key terminological debates that emerged between American and British musical schools, especially with regards to the usage of the term ‘tone’.¹³

Webb proposed to address the issue of vagueness, and reinvigorate music scholarship, by establishing a universal critical vocabulary for the study and analysis of music (including a futile nod to the then-expected proliferation of *Esperanto*).¹⁴ But despite a century of scholarship, the ambiguity of technical music jargon continues to vex musicologists and scholars of sound studies alike. French composer and musicologist Michel Chion is compiling a multi-lingual dictionary of ‘sound-words’ that accurately convey specific qualities, across the full sonic spectrum.¹⁵ To this end, Chion plans to scour multiple languages for the most accurate ‘sound-word’ for an enormous collection of common sounds. An example of one such ‘sound-word’ is the onomatopoeic English word ‘ding’, which effectively represents a high-pitched sound, with a short, sharp attack, and a rapid decay. The term ‘ding’ evokes the aural image of ‘striking a champagne glass’ or the call-bell of a reception or waiting room. While this exercise would indeed be useful, the sheer scope of the task places Chion in a rather unenviable position. Another common response to the imprecision of musical terminology is the creation of weighty neologisms. Musicologist Phillip Tag provides a plethora of examples culminating in an impressive

¹³ CODM, 1974, 18-19, s.v. "American Terminology of Music"; A rather haughty statement ensues suggesting that American scholars sought to “defy more than 5 centuries of English usage, including that of Chaucer and Shakespeare... and also to ignore earlier American usage”.

¹⁴ WEBB 1908, 69-70.

¹⁵ CHION 2016, 212-215; VELASCO-PUFLEAU 2018, 1–5.

vocabulary of constructed terms appearing in his writings from 1979 to the late 2000s.¹⁶ While some neologisms can be applied advantageously, they need to be approached with caution, as they can be susceptible to manipulation and can be underpinned by contentious ideologies. The widespread use of the term ‘soundscape’ exemplifies this issue.¹⁷ Many scholars have attempted to disentangle the word from Schafer’s own critical views on urban ‘noise’, or offered their own equivalent terms.¹⁸

The ambiguity of modern, value-laden terminology adds further complications to the assessment of textual records of sound in historical sources. The interplay between modern analytical methods and concepts need to be carefully balanced by historians of music and sound to avoid the anachronistic projection of modern concepts onto the past. The omission of all modern analytical constructs would be optimal in achieving this separation of ancient and contemporary concepts. But for the effective organisation and communication of subsequent research findings, I believe it is necessary to cautiously proceed with a considered, and balanced degree of categorisation. I will proceed within the confines of established terminology and outline my usage for the sake of clarity.

¹⁶ TAGG 2008; Terms with varying degrees of usefulness; from ‘paramusical’ (referring to typically unmusical sounds associated with musical practice) to ‘sexaphone’ (describing the use of saxophone to emphasise sexual tension in TV sitcoms).

¹⁷ SCHAFER 1994.

¹⁸ BETTINI 2008a, VINCENT 2015. See also below §[2.2.3](#).

2.1.2. Exposition of Terms

Due to the interdisciplinary nature of this topic, it is important to clearly outline my specific use of modern terms and concepts. This brief overview section is presented as an annotated glossary and will provide succinct definitions of key terms, and justifications for their use. Some analysis of modern scholarship that is presented in this section will be explored in greater detail in section 2.2. Literature Review.

2.1.2a. ‘Acoustic Qualifications’

The phrase ‘tonal attributes’ was employed by Maarit Kaimio in her monograph, *Characterisation of Sound in Early Greek Literature*, to identify the acoustic characteristics of sounds transcribed in ancient Greek texts.¹⁹ The use of this phrase can be traced to early works on the psychology and physiology of hearing.²⁰ Kaimio specifically draws on the 1938 text “Hearing: its Psychology and Physiology”, which identifies: pitch, loudness, volume and density, as the primary qualities of sound and hearing analysis.²¹ ‘Tonal attributes’ is used throughout the text as one of three categories designed to assess the characteristics of ancient Greek sound, rounded out by ‘affective’ and ‘aesthetic qualities’. ‘Tonal’ in this usage refers to *multiple* acoustic characteristics, including: pitch, loudness, and tone quality. This broad use of ‘tonal’ conflicts with my more restricted use of the term ‘tone’, prompting an adjustment to the usage of Kaimio’s otherwise useful designation.

¹⁹ For further discussion on how this text relates to the present work, see §2.2.4. and §3.5.

²⁰ RICH 1919; STEVENS & DAVIS 1938.

²¹ STEVENS & DAVIS 1938.

More recently, in an analysis of adjectives applied to the sounds of brass instruments in ancient Latin texts, Alexandre Vincent distilled Kaimio's categories of 'tonal attributes', 'affective' and 'aesthetic qualities', into two main groups: 'acoustic qualifications' and 'adjectives of impression'.²² 'Acoustic qualifications' is a neat and succinct designation that more effectively communicates the category of the acoustic qualities of a sound. This is contrasted with Kaimio's 'tonal attributes', which can be easily misconstrued as a reference to a sound's specific tonal qualities. The broader term 'sound qualities' will be applied to encompass the three sub-categories of: acoustic, affective and aesthetic qualities.

For this thesis I have chosen four key acoustic qualities that are commonly defined in the field of musicology to analyse music. They are: pitch, loudness, duration, and tone-quality.²³ When categorising ancient descriptions of sounds in the ensuing work, I will employ the use of 'acoustic qualifications' or 'acoustic qualities' to encapsulate references to these four qualities, which will be outlined below.

2.1.2b. *Pitch*

The pitch of a sound is "governed by the frequency of the vibrations producing it".²⁴ When used in musical analysis the term 'pitch' refers to the features of melody and

²² VINCENT 2017, 151-153; For further discussion on Vincent's analysis of sound adjectives, see §2.2.5., and §3.3.

²³ Chion has formulated an entirely new classification for the analysis of noises in place of more traditional systems used for the analysis of music, see CHION 2016, 173-176. This classification model repositions sound as the focus of study, and was designed primarily to assist with analysis and design of soundtracks for film. But the complex theoretical principles and jargon-laden vocabulary of Chion's revised system are not well-suited to the interdisciplinary aims of this thesis.

²⁴ OED ONLINE 2019, s.v. "pitch, n.2., 25a".

harmony in a piece of music. Pitch can be determinate or indeterminate. The percussion section of an orchestra provides a good comparison of the two distinct types of pitch. There are tuned percussion instruments of determinate pitch, such as: the glockenspiel, marimba, xylophone and timpani; and untuned percussion instruments of indeterminate pitch like the bass drum, snare and cymbal. Determinate pitch takes the form of a musical note (or a series of notes), or pure tone, that can be transcribed in a form of musical notation (e.g. an ascending arpeggio of a C major chord on a piano), or measured scientifically in hertz.²⁵ Non-musical sounds are generally of indeterminate pitch; that is to say they may have a high or low-pitch, but it is not possible to clearly discern a precise frequency by ear. For example, a whistling kettle would produce a high-pitched sound, whereas a fog-horn produces a low-pitched sound. In the present study, due to the nature of animal sound, I use the term pitch to refer specifically to this form of indeterminate pitch.

2.1.2c. *Loudness*

Loudness is defined in the *OED* as “the quality or condition of being loud... [and] the (great or small) extent to which a sound is heard as loud.”²⁶ We are perhaps more accustomed to the term ‘volume’ in describing the loudness or softness of music; our home and car stereos, computers, mobile-phones and headphones all have volume controls. But when applied to the analysis of sound, volume actually refers more specifically to the physical amplitude of the sound’s frequency itself. Loudness instead refers to the physiological response of the ear to the volume of a sound. To explain this in another way,

²⁵ Hertz measures cycles per second, one hertz is equivalent to one cycle per second. The orchestra typically tunes to A 440, which is a tone of 440 hertz.

²⁶ *OED* ONLINE 2019, s.v. ‘loudness’.

the average lawnmower produces a *volume* of 90 decibels;²⁷ whereas my irritation at the sound, on a Sunday morning at 8am, is my reflexive, physiological response to its *loudness*. In relation to both pitch and loudness Vincent astutely notes, “pure sound measured in decibels [volume] or hertz [determinate pitch] does not exist in the social world”.²⁸

2.1.2d. *Duration*

I use the term duration quite simply to refer to the length of a sound over time, or to its rhythmic properties. Sounds may be held and sustained for a long duration,²⁹ or they could be short and accentuated.³⁰ Sounds may also be characterised by their repetition,³¹ or by the suddenness of their production.³²

2.1.2e. *Tone / Tone Quality*

The multiple, overlapping definitions of the term ‘tone’ can cause considerable confusion in the analysis of music or sound. As the focus of the present work involves the critical evaluation of animal sounds in text, the principal use of the term will be to designate that somewhat intangible ‘quality of sound’, distinct from attributes of loudness, pitch or duration (e.g. “the animal’s screech possessed a shrill tone”). This aligns with the *OED* definition of ‘tone’, as a certain “Quality of sound”.³³ I have chosen to use ‘tone’ in this fashion to mitigate the contextual and anachronistic issues that would arise with the use of

²⁷ SAFE WORK AUSTRALIA 2019, ‘[Noise](#)’.

²⁸ ‘*Le son pur, mesurable en décibels ou en hertz, n'existe pas dans le monde social.*’ VINCENT 2015, 19.

²⁹ PLIN.*HN*.10.81.6.

³⁰ PLIN.*HN*.11.267.

³¹ OV.*Met*.15.684.

³² COLUMELLA, *Rust*.9.8.2.3.

³³ *OED* ONLINE 2019, s.v. “tone, n.”.

the synonyms, ‘timbre’ or ‘tone colour’. Both terms have significant disadvantages if applied to an ancient context; I will briefly outline their terminological shortcomings.

The French word *timbre* is commonly used in musicological studies to denote a quality that identifies sounds of dissimilar instruments or distinct sources of sound. As defined in Grove Music Online “a clarinet and an oboe sounding the same note at the same loudness are said to produce different timbres.”³⁴ The *COMD* offers a similar delineation, defining timbre as “that ‘tone-quality’ or ‘tone-colour’ which distinguishes the effect of a flute from that of an oboe.”³⁵ But definitions of *timbre* in the fields of music psychology and music perception are still a matter of considerable debate. Ferrer notes that “despite the fact that categorisation of specific qualities of music, in terms of timbre, began almost two hundred years ago, psychologically inspired descriptions of timbre and existent research have not attained sufficient strength for generating a general theory of timbre”.³⁶

In a similar way, the English ‘tone colour’ evokes a clear association between aural and visual realms, by applying vocabulary for the analysis of visual media in the characterisation of sound and music. An intersection between ancient Greek terms referring to both colour and sound has been identified and discussed in recent scholarship,³⁷ and this multisensorial use of specific adjectives can also be observed in Latin. For example, the overlap in sensory terminology is evident in the use of the Latin adjective *acer*, which can refer equally to bright, vivid, dazzling colours or lights; shrill, harsh, or sharp sounds; bitter,

³⁴ CAMPBELL 2001.

³⁵ *COMD*, 1974, 567 s.v. “timbre”; once again combining concepts of ‘tone’ and ‘timbre’ together.

³⁶ FERRER 2011.

³⁷ LATHER 2017, LEVEN 2013.

acidic tastes; strong, pungent, or acrid smells; or a sense of a tactile stinging.³⁸ While the multisensorial nature of such Latin terms would be a profitable avenue for further study, it will not be discussed in greater detail in the present work.

Ultimately, we should be mindful of the 19th Century origin of our modern conception of ‘tone colour’, and approach any comparison between ancient and modern constructs with extreme caution. As such, I have made a conscious decision to refrain from the use of ‘tone colour’ in the present work. The categorization of sound characteristics is intended to merely assist with the organization and communication of data, rather than to distort ancient evidence to fit modern concepts. I will apply the term ‘tone’ when applying to this contentious sound quality.

2.1.2f. *Soundscape*

The term ‘soundscape’, a neologism coined by Raymond Murray Schafer in 1977,³⁹ is widely-used in a range of disciplines including: architecture planning, acoustics, sound design, urban sociology, anthropology, and musicology.⁴⁰ ‘Soundscape’ is typically used as a broad, descriptive term for the contextualisation of sounds within a specific time-space. But the ulterior motive of Schafer’s text (to actively influence and shape our own ‘soundscape’, including the abolition of ‘unwanted’ noise-sounds) ultimately compromises the objectivity of the term. The prejudiced underpinnings of the term are concerning, especially when the term is applied by anthropologists or historians to provide objective

³⁸ OLD 1968, 24. s.v. "acer".

³⁹ The text was subsequently re-released in 1994 as "*Soundscape: Our Sound Environment and the Tuning of the World*".

⁴⁰ KELMAN 2010.

analyses of sound environments of the past. In an extended critique of the usefulness of the term, Alexandre Vincent provides a delineation of ‘soundscape’ for its continued use in historical fields:

Un paysage sonore est: la représentation (1) par un individu ou un groupe d’individus (2), dont les sens sont le produit d’une construction sociale historiquement datée et contextualisée (3), d’un ensemble d’évènements sonores (4) entendus en un lieu et un temps historique déterminé (5) pouvant être urbain ou rural (6).⁴¹

‘A soundscape is: (i) a representation (ii) that can be experienced and/or transcribed by an individual (or group of individuals) (iii) whose senses are the product of their own historical and contextualised social constructs. The soundscape must also be (iv) related to a set of sound events, (v) and to a location and determined historical time, (vi) which can be either urban or rural’.

Further use of the term ‘soundscape’ in the present work consciously eschews any association with Schafer’s proposed censorship of ‘noise’, and is used within Vincent’s proposed disciplinary-specific limitations. Further evaluation of this term (specifically critiques offered in the field of ancient music studies) can be found at [2.2.3](#).

2.1.2g. Auralisation⁴²

The first use of the term appears in 1913 in a text by Tobias Matthay entitled ‘*Musical Interpretation, its Laws and Principles, and their Application in Teaching and*

⁴¹ VINCENT 2015, 28-29.

⁴² I have opted for the British spelling ‘auralise/auralisation’, over the American ‘auralize/auralization’.

Performing'.⁴³ Matthay emphasises the importance of imagination in music education and employs the term 'auralise' as a sensory parallel for the visual 'visualise'.⁴⁴ The term has since been espoused by the field of acoustics, the primary definition of the term now relates to the process in room-acoustics "of rendering audible, by physical or mathematical modelling, the sound field of a source in a space."⁴⁵ In 2008 Summer called for clarification from the field in regards to the broadening of its definition and provided a useful overview of its various applications.⁴⁶

Auralisation is used throughout this thesis to refer to a very specific form of sensory imagination that is essential for any evaluation of sound that is transcribed in written form. This process allows "silent texts to prompt our imagination into a 'mental image' of those voices that once nourished the ancient soundscape."⁴⁷ Historians can sometimes overlook the chief usefulness of imagination as a tool for the historical process, perhaps for fear of sacrificing objectivity, or concern over inaccurate interpretations. Despite this, auralisation has useful applications for interpreting and understanding sensory material transcribed in a written form, as it prompts the reader to draw upon their own prior sensory experiences with a specific sound or emitter.

I suggest that auralisation is also an *expectation* that authors have of their intended audience. When an author composes a textual description of visual stimuli, it is expected that the reader will be able to interpret and imagine those visual cues. I argue that this is also true for descriptions of *aural* stimuli. 'The sound of a cow' conjures the auralisation

⁴³ MATTHAY 1913.

⁴⁴ MATTHAY 1913, 10.

⁴⁵ KLEINER, DALENBÄCK, and SVENSSON, 1993.

⁴⁶ SUMMER 2008.

⁴⁷ FOX 2008.

of a cow ‘mooring’. The extent to which a reader can naturally engage in this auralisation process is of course dependent on their own sociocultural and geotemporal contexts. Bettini touches upon this notion in his article *Laughing Weasels*.⁴⁸ In recounting Galanthis’ transformation, Ovid does not explicitly identify her transfigured form, but instead presents only vague hints in a form of a riddle. Ovid tells us that the animal: gives birth through the mouth,⁴⁹ comes in and out of the house,⁵⁰ and that Galanthis was making laughing-sounds during her transformation.⁵¹ Bettini argues this *laughing* is a particularly nuanced allusion to the repetitive ‘chirp-like’ sounds of weasels.⁵² He too notes that while human-weasel interactions are quite rare in the modern world, weasels were common in Greek and Roman households.⁵³ Context was evidently crucial in auralising the sound of a weasel in this account. Auralisation also relates to aural *evocation*, which is discussed more fully in section 3.7.

⁴⁸ BETTINI 2008b.

⁴⁹ OV. *Met.*9.323.

⁵⁰ OV. *Met.*9.324.

⁵¹ OV. *Met.*9.317.

⁵² BETTINI 2008b, 213-214.

⁵³ BETTINI 2008b, 211.

2.2. Literature Review

“In antiquity, life was nothing but silence...”

– Luigi Russolo, *The Art of Noises (futurist manifesto, 1913)*

2.2.1. Introduction

Little over a century ago, Italian futurist, painter and composer Luigi Russolo juxtaposed the ‘peaceful stillness’ of antiquity with the “pounding atmosphere of great cities” and the rise of “noise-sound” in the 19th Century. Russolo claimed that the proliferation of modern machinery created such varied noises “that [organic] sound, with its littleness and its monotony ... fail[ed] to arouse any emotion.”⁵⁴ This manifesto portrays the proclivity of contemporaneous composers to push the boundaries of chromaticism and dissonance in their compositions;⁵⁵ proclaiming that the future of musical expression lay in a full integration of “noise-sound” into their works (while also inadvertently predicting the popularity of Industrial Rock music of the 1980s and ‘90s). The text itself has since become a staple of contemporary music and sound studies readers.⁵⁶ But it is Russolo’s representation of a ‘silent antiquity’ that strikes a collective nerve in historians of the ancient sensorium. This notion of an ‘inaudible past’ has been systematically refuted by a multitude of contemporary scholarship that highlights the rich musical cultures of antiquity and underlines extant descriptions of sounds and soundscapes. More specifically for the

⁵⁴ RUSSOLO 2004, 5.

⁵⁵ The manifesto was dedicated to fellow futurist composer, Francesco Balilla Pratella, after the boisterous premiere of his ‘Futurist’ Symphony *Inno alla vita* in Rome on 9th March 1913. Reactions to the avant-garde composition resulted in riots that spilled out onto the streets (TOWNSEND et al. 2014, 4). It is interesting to note that similarly violent scenes erupted several months later, in May of the same year, at the premiere of Stravinsky and Diaghilev’s Ballet *Le sacre du printemps* in the Théâtre des Champs-Élysées.

⁵⁶ BULL 2013; COX and WARNER 2008.

current work, ancient authors recorded numerous references to the various sounds of animals.

'Clangores, stridores et sibili' is at the nexus of a range of interdisciplinary fields, including ancient history, sound studies, animal studies, and ethnozoology. The core focus of the work on the textually recorded perception of animal sounds in Latin literature places the work firmly in the field of 'ancient sound studies' or 'sensory studies in antiquity'. This niche field is considered to be a thematic sub-discipline of both 'sound studies' and 'ancient history'. 'Ancient sound studies' as a discrete sub-discipline draws upon the findings of several fields in the social sciences, including: anthropology, ethnomusicology, classical and historical studies, musicology, and sociology. Due to the interdisciplinary nature of this sub-discipline, it is important to consider its development in its broader scholarly context.

For the sake of clarity and to better illustrate the parallel development of key related disciplines, this review will be divided into four sections. The first section will focus on the early works on ancient Roman music and chart the expansion of ancient musical studies as a distinct sub-discipline of classical studies. Research into the musical cultures of the ancient world laid the foundation for further scholarly expansion into the soundscapes of antiquity. The second section will consider the first major publication on the sounds of the ancient world, *Le Paysage Sonore de l'Antiquité*.⁵⁷ In this section I will also examine the critiques of Schafer's neologism 'soundscape' presented in this work, and examine the suggested amendments for its usage in historical disciplines. A survey of lexical and

⁵⁷ EMERIT, PERROT, & VINCENT 2015.

linguistic works relating to sound in Ancient Greek and Latin will occupy the third section, which will reflect on the works of Kaimio,⁵⁸ Bettini⁵⁹ and Pierre.⁶⁰ This chapter will conclude with a detailed review of Alexandre Vincent's proposed methodology 'Tuning into the past'. This thesis employs an adaptation of this approach, which will be outlined in Chapter [3. *Nature's Song Remains the Same*](#).

The sounds of animals are incidentally discussed in a number of modern works on animals in antiquity. These texts typically restate the observations of animal behaviours made by ancient authors, but the production of sound is not their core focus. As these works do not add substantial value in relation to the interpretation of sensory data, I will present discrete literature surveys on the relevant works in the introductions to chapters [4](#) (on insect sounds), [5](#) (on the sounds of reptiles and amphibians) and [6](#) (on non-vocal bird sounds).

This literature review is useful in outlining the core research gaps in current scholarship that will be subsequently addressed by this study. The influence of Wille's monograph *Musica Romana* cannot be understated, and it remains an important formative work for the study of ancient Roman music and ancient sound studies. A consideration of this work provides an appropriate entry point to this literature review.

⁵⁸ KAIMIO 1977.

⁵⁹ BETTINI 2008a, 2008b.

⁶⁰ PIERRE 2016.

2.2.2. Ancient Music Studies

While studies on the music of the ancient Mediterranean can be traced back to early works on Greek Music in the late 19th and early 20th Century,⁶¹ the study of the *sounds* of ancient societies has only more recently developed into significant area of interest for classicists. The current surge of scholarship exploring the sounds of antiquity, can be attributed to an extent, to the increased focus on ‘the sensory turn’ in the humanities since the early 2000s. Publications that touch upon this research theme of ‘ancient sounds’ *have* however, been published in ancient music studies as early as the 1960s. Gunther Wille in his 1967 text *Musica Romana* drew perplexed criticism⁶² for his treatment of ‘Melodic Street-calls’ (*Melodische Straßenrufe*) in a chapter on Roman ‘Folk Music’ (*Volksmusik*). In his endeavour to collate an exhaustive collection of references to the musical cultures of ancient Rome, Wille commented upon the ‘paramusical’⁶³ sounds of ancient Roman street life as transcribed by ancient authors. In an introductory footnote, Wille referred to a sonorous entry in the travel diary of Goethe. In this entry, which detailed his experiences in Verona on 17 September 1786, Goethe recorded the noisy comings and goings in the marketplaces, and remarked upon the melodious sounds of Veronese street-life:

“The squares are very full on market days... throughout the day there is a ceaseless screaming, bantering, singing, squalling, huzzaing and laughing... at night singing and all sorts of noises begin. The ballad of

⁶¹ ABERT 1899 and 1905; BEKKER 1927, and GEVAERT 2012.

⁶² MARROU 1967, 610.

⁶³ A neologism coined by MARCEL-DUBOIS (1981). *Paramusical* means "'alongside' the music, i.e. semiotically related to a particular musical discourse without being structurally intrinsic to that discourse" [TAGG](#) 2008.

“*Marlbrook*” is heard in every street; - then comes a dulcimer, then a violin.

They try to imitate all the birds with a pipe. The strangest sounds are heard
on every-side.”⁶⁴

With reference to this entry, Wille paralleled the joy and liveliness of the sounds of *modern* Italian life to surviving passages from Roman antiquity, and emphatically stressed that we cannot simply dismiss the ‘everyday’ musicality of ancient Roman peoples as ‘noise’.⁶⁵ This interesting passage in *Musica Romana* identifies various ancient accounts attesting to the hollers of vendors and beggars chanting in the streets;⁶⁶ retailers tunefully peddling their wares;⁶⁷ shepherds hawking milk, enticing patrons with their rustic *hirtenmusik*.⁶⁸ Another instance of such ‘paramusical’ digression appears in a brief discussion of mythical bells that could both attract⁶⁹ and pacify⁷⁰ bees.

Wille’s inclusive approach to the analysis of musical culture is an important thematic precursor to the research objectives of ancient sound studies. But these ambitious aims were not well-received by a discipline that, at that stage, was not amenable to this line of enquiry, and regarded the discussion as a ‘curious excursus’.⁷¹ Henri-Irenée Marrou in his review of *Musica Romana* referred to the passages relating to ancient soundscapes as “*les choses les plus inattendues*.”⁷² Wille was both praised⁷³ and criticised⁷⁴ for the

⁶⁴ GOETHE 1885, 40.

⁶⁵ WILLE 1967, 17-18.

⁶⁶ HOR. *Ep.* 1.17.46-49.

⁶⁷ SEN. *Ep.* 56.2.

⁶⁸ VERG. *Ecl.* 3.26; CALP. *Ecl.* 4.25-28.

⁶⁹ OV. *Fast.* 3.740ff.

⁷⁰ VERG. *Georg.* 4.6.4.

⁷¹ VENDRIES 2015, 215.

⁷² MARROU 1967, 610.

⁷³ FEAVER 1970, LIND 1968.

⁷⁴ LEVIN 1970, MCKINNON 1968.

monograph. Most scholars laud the sheer scope of the collected ancient source material, but Wille's critical analysis of the sociocultural implications of certain musical practices was the focus of some criticism.⁷⁵ Despite these critiques *Musica Rustica* remains an invaluable foundational text. The considerable influence of this text in shaping the early development of ancient music studies (and subsequently ancient sound studies) ought to be acknowledged.

Several important monographs on Roman music and musicians were published afterwards, drawing upon Wille's sociocultural approach to the ancient source material; most notably Baudot's '*Musiciens romains de l'Antiquité*'⁷⁶ and Comotti's '*Music in Greek and Roman Culture*' (an English revision of his earlier Italian monograph '*La musica nella cultura greca e romana*').⁷⁷ These important works, alongside the chorus of texts specifically on ancient *Greek* musical practices,⁷⁸ serve well to emphasise the gathering momentum of the field of 'ancient music studies' over the past half-century. This crescendo of publications prompted the creation of a journal dedicated to the study of Greek and Roman music in 2013.⁷⁹ Inaugural editor of the journal, Andrew Barker, stated that "in view of the striking revival of interest in music-related issues among classical scholars in recent decades ... the time for such an enterprise is ripe."⁸⁰

⁷⁵ MCKINNON 1968.

⁷⁶ BAUDOT 1973.

⁷⁷ COMOTTI 1989.

⁷⁸ BARKER, STEVENS & LE HURAY 1984, BARKER 1984, WEST 1992, ANDERSON 1994, LANDELS 1999, PÖHLMAN & WEST 2001, and HAGEL 2009.

⁷⁹ ROCCONI, E., (Ed.) *Greek and Roman Musical Studies* [Journal], Brill Publications, 2013-2020.

⁸⁰ BARKER 2013.

Upon reflecting on the nature of the term ‘soundscape’ and its applications in the social sciences,⁸¹ Christophe Vendries posits that it may be time to reconsider our own strict boundaries between ‘music’ and ‘sound’. Vendries argues that we must be sensitive to the impacts of our own approaches to the ‘music’ of the ancient world, and not impose conceptual restrictions based on our contemporary definitions of ‘music’.⁸² This is a timely ‘call to arms’ (or perhaps, pens) marking an important ideational shift to more contextualised considerations of the sociocultural impacts of both sounds *and* music in antiquity. In 2012, a French research initiative entitled ‘*Paysages sonores et espaces urbains de la Méditerranée ancienne*’, was established by the Institut Français d’Archéologie Orientale (IFAO) and the other affiliate French schools (EFA and EFR), drawing considerable attention to the aural perception of sound and music in the ancient Mediterranean. This initiative culminated in a series of international roundtable discussions,⁸³ and produced several significant monographs on the subject.⁸⁴ Recent volumes in the *Journal of Greek and Roman Musical Studies* have also included articles that present lexical approaches to the analysis of both musical *and* non-musical sounds.⁸⁵ These developments in the field of ‘ancient music studies’ have led to the broadening of the scholarly focus to incorporate the perception and expression of ancient sounds.

⁸¹ See below §[2.2.3](#) for further discussion.

⁸² VENDRIES 2015, 212.

⁸³ For more detail on this programme see VINCENT, EMERIT & PERROT 2012.

⁸⁴ EMERIT 2013; EMERIT, PERROT & VINCENT 2015.

⁸⁵ LEVEN 2013; LATHER 2017.

2.2.3. *Le Paysage Sonore de l'Antiquité* and the Critical Reception of 'Soundscape' in Historical Studies

David Howes' seminal text, *Empire of the Senses*,⁸⁶ is often regarded as a watershed moment for the 'sensory turn', as it prompted a significant shift in scholarly focus in the humanities towards the sociocultural study of the senses. This text gathers together twenty-two articles that centre on approaches to the 'sensorium', and demonstrate that our sensory perception is shaped by our own sociocultural contexts. The trajectory of 'the sensory turn' and 'aural turn' into the field of ancient history is widely discussed in '*Le Paysage Sonore de l'Antiquité*'.⁸⁷ This landmark text, the first major publication on the 'soundscape' in the field of ancient history, draws together the disparate methodological threads of the 'aural turn' and identifies the ways in which these approaches can be modified and applied to the study of antiquity. Each chapter provides its own miniature survey of significant literature, and presents an overarching scholarly narrative of the development of ancient sound studies. The text features methodologies adapted specifically for Egyptian,⁸⁸ Near Eastern,⁸⁹ Greek,⁹⁰ and Roman contexts.⁹¹ An important outcome of this work is the thorough critical evaluation of the term 'soundscape', which until this time, had been applied indiscriminately in historical disciplines. '*Le Paysage Sonore de l'Antiquité*' assesses the usefulness of the term and defines the parameters of its subsequent usage in historical fields.

⁸⁶ HOWES 2005.

⁸⁷ EMERIT, PERROT, VINCENT 2015; see especially VINCENT 2015 and 2017.

⁸⁸ EMERIT 2015.

⁸⁹ RENDU LOISEL 2015.

⁹⁰ PERROT 2015.

⁹¹ VENDRIES 2015.

The term ‘soundscape’, as coined by Raymond Murray Schafer in his influential 1977 text *‘The Tuning of the World’*,⁹² has been used in a variety of contexts as a broad, descriptive term for the contextualisation of sounds within a specific time-space. A number of alternative terms have been suggested including: ‘sonosphere,’ *‘fonosfera antica,’*⁹³ ‘sonic spectrum,’⁹⁴ ‘sound community,’⁹⁵ ‘world of sound,’ ‘sound space’ and even ‘sound environment.’⁹⁶ But it is the association between ‘soundscape’ and *landscape* that adds to its effectiveness, and offers a possible explanation for its propagation across numerous disciplinary divides. By emphasising this connection, the term effortlessly transfers from the visual sense to the aural sense. The term connotes the shifting aural evocations of a collection of *sounds* situated and perceived in context, in place of the static visual image in time and space.

Schafer offers sonically-rich textual examples to convey the recorded perception of sounds in literature, adding sensory emphasis to his neologism. The entire first part of the work surveys ‘early soundscapes’, which provides descriptions of natural world sounds; the sounds of animal life, sounds of the rural landscape in the antique to early-modern periods, and concludes along this chronological progression, by tracing the propagation of noises ‘from town to city’. An early passage on ‘the natural soundscape’ compares the

⁹² The text was subsequently re-released in 1994 as *“Soundscape: Our Sound Environment and the Tuning of the World”*.

⁹³ BETTINI 2008a, 3, 6.

⁹⁴ VENDRIES 2015, 216.

⁹⁵ BORSAY 2015, 95.

⁹⁶ VINCENT 2015, 2.

sonorous description of the fierceness of the ocean in the Norse *Eddas*⁹⁷ to the gentle lapping waves of northern Australia.⁹⁸ Schafer also provides several examples of sound perception from ancient Greek and Roman perspectives, including references to the idyllic *Eclogues* of Theocritus and Vergil, in a discussion on rural landscapes.

One of the greatest strengths of the work is that it foregrounds sound as a central focus of study, and re-emphasises the importance of sound and hearing in society. Schafer also introduces new methods of *listening*, which conveys an intent to more deeply engage with aural stimuli. *The Tuning of the World* challenges the reader to consider the importance of sound in our everyday lives, and in doing so raises awareness of the increasing issues concerning noise-pollution in urban centres. The term ‘soundscape’ has been widely applied in acoustics, sound architecture and urban planning for its approaches to the mediation of “noise-sound”.⁹⁹ Schafer regards us as ‘custodians’ of our own ‘worlds of sound’ and argues that we should actively preserve pleasing sounds that are in danger of ‘extinction’, and remove disagreeable or unpleasant ones. In the process Schafer provides a rather critical assessment of the noise of aeroplanes and its negative effect on the community.¹⁰⁰ Schafer remarks that “ultimately, this book is about the sounds that matter... [and that] in order to reveal them it may be necessary to rage against those which don’t.”¹⁰¹ Wherein lies the core issue of Schafer’s ‘soundscape’. The subtext to this

⁹⁷ SCHAFFER 1994, 17: “waves roared against the sides of the ship, it sounded as if boulders were being clashed together.”

⁹⁸ SCHAFFER 1994, 17; “waves coming up: high waves coming up against the rocks, breaking, shi! shi!”

⁹⁹ *Soundscape: Our Sonic Environment and the Tuning of the World* has been cited in excess of 1800 times according to Google Scholar, but some pertinent examples of citations in the fields of Urban Planning include: GIDLÖF-GUNNARSSON & ÖHRSTRÖM 2007, ATKINSON 2007, and ZHANG & KANG 2007.

¹⁰⁰ SCHAFFER 1994, 85-87.

¹⁰¹ SCHAFFER 1994, 12.

approach reveals an ulterior motive that profoundly alters the meaning, impact and overall application of the term ‘soundscape’. Kelman states that the text is heavily “suffused with instructions about how people *ought* to listen ... deeply informed by Schafer’s own preferences for certain sounds over others... and, [that] it traces a long dystopian history that descends from harmonious sounds of nature to the cacophonies of modern life.”¹⁰² These personal factors very clearly impact the objectivity of the term, especially when applied by anthropologists or historians to convey a sense of connectedness between the sensory world and the historical perceiver.

Of the many critiques present in *Le Paysage Sonore*, Alexandre Vincent’s offering, entitled ‘*Paysage sonore et sciences sociales: sonorités, sens, histoire*’,¹⁰³ provides the most immediate benefit to the present work. Vincent reviews the use of ‘soundscape’ (*paysage sonore*) and coins a practical definition of the term for usage in historical studies. This field-specific definition considers both the transmission of ancient aural perception via the process of history-making, and the ways in which the modern historian investigates antiquity. Despite the various issues with Schafer’s *The Tuning of the World*, Vincent argues that its core strength is that it formed the basis for a new way of listening and engaging with our world on a sensory level, and gave the public an accessible tool that could be used to decipher, analyse or simply describe their immediate sound environment.¹⁰⁴ Vincent underlines the ideational gap between the usage of the term from one discipline to the next,¹⁰⁵ leading to disciplinary specific definitions of ‘soundscape’ in fields as varied as: architecture planning, acoustics, sound design, urban sociology,

¹⁰² KELMAN 2010, 214; Emphasis added.

¹⁰³ VINCENT 2015.

¹⁰⁴ VINCENT 2015, 10.

¹⁰⁵ VINCENT 2015, 11.

anthropology, and musicology; with each discipline defining the terms that suit their own research.¹⁰⁶ For Vincent, the historian's soundscape is not simply the sum of the sounds heard in a single location, but the complex interactions between the world of sound and an individual equipped with the perceiving sensory tools of their time.¹⁰⁷ The role of the sensory historian then, is to investigate this interaction between the source of the sound (the emitter), the author themselves (the perceiver), and the transcribed perception of the original sound (the perceived, recorded sound event).

Following this considered analysis, Vincent offers a six point criteria for the definition of the soundscape in ancient historical studies.

“A soundscape is (i) a representation (ii) that can be experienced and/or transcribed by an individual (or group of individuals) (iii) whose senses are the product of their own historical and contextualised social constructs. The soundscape must also be (iv) related to a set of sound events, (v) and to a location and determined historical time, (vi) which can be either urban or rural.”¹⁰⁸

To provide further context to these criteria, Vincent elaborates that the first three conditions refer specifically to the subjectivity of these surviving aural representations; and that the ancient evidence does *not* provide us with ‘the sounds of the past’ but merely the recorded perception of the historical ‘sound objects’ (the fourth condition) and their contextual meaning. The fifth condition also establishes an important notion of the ‘sonochronotope’; that the location and determined historical time is directly related to the individual

¹⁰⁶ For the various interdisciplinary applications of the term ‘soundscape’ see, KELMAN 2010.

¹⁰⁷ VINCENT 2015, 27-28.

¹⁰⁸ VINCENT 2015, 28.

contextualised perception and response.¹⁰⁹ Vincent adds that groups coinciding within the same ‘sonochronotope’ form an ‘acoustic community’. The sixth, and final, criteria is an important reminder of the limitations of Schafer’s soundscape and his deep-seated bias against “the urban”. Vincent concludes with a discussion on the possibility of examining large scale sound panoramas (“*panorama sonores*”) that are occupied with smaller-scale soundscapes, categorised by variations in the above listed criteria. The sounds surviving in ancient texts therefore, are a distinct snapshot (“*instantané sonore*”) of an author’s perception of a specific sound (or sounds) at a certain point in time.

The perception, and expression of sound has become a significant point of interest in the field of ancient history. While various studies have focussed on the sonic terminology of ancient Greek, very few have focused solely on the characterisation of sound in Latin literature. A select review of these lexical and linguistic studies will occupy the next section.

2.2.4. Lexical and Linguistic Studies of Sound in Ancient Greek and Latin

There has been a considerable swell of recent scholarship on the sensory processes in antiquity. While the importance of multisensory approaches is noted, the sheer bulk of material has prompted historians to focus on the perception of individual senses.¹¹⁰ A number of monographs have been recently produced that present literature reviews and

¹⁰⁹ VINCENT 2015, 28.

¹¹⁰ VINCENT 2017, 147.

methodologies to approach the sensory material recorded in ancient sources.¹¹¹ The increase in scholarship is certainly welcome, but competing and contradictory methodologies present an unintended stumbling block for the further progression of the field. Critical and literary theories have been applied to assess processes of ‘hearing’ and ‘listening’ in recent works,¹¹² but little attention is directed to the ways in which ancient Latin authors communicate sounds in the written form, and the semantic range of Latin sound terminology itself. I have therefore chosen to review three important works that focus on improving our understanding of the vocabulary of sound-terms in Greek and Latin. An evaluation of these works will highlight the key gaps in the field that this thesis will address.

In her 1977 text *Characterization of sound in early Greek literature*, Maarit Kaimio applies an overarching lexicographical approach, that considers the expressions used to characterise different qualities of sound in ancient Greek literature prior to 400 BC. Kaimio prefaces her introduction by emphasising the importance of music in ancient Greek life and notes that because of this, “it would be desirable to find out all the possible information concerning music, [and] the attitude of music and subjective auditory perceptions in general from ancient authors”.¹¹³ In this pursuit, Kaimio decides to treat ‘sound’ as a broad concept that incorporates “all kinds of sounds from musical tones to noises... with reference to the quality of the sound in question... [including] instrumental music and song, human speech, shouting or wailing, [and] sounds produced by animals and inanimate

¹¹¹ BETTS 2017; EMERIT, PERROT, VINCENT 2015; BUTLER & NOOTER 2018.

¹¹² LEVEN 2018, BUTLER 2018.

¹¹³ KAIMIO 1977, 7.

nature.”¹¹⁴ This nuanced approach allows for a thorough comparison and evaluation of sound descriptors across (often constructed) ‘musical’ and ‘non-musical’ boundaries. This laudable aim aligns with the objectives of recent studies on ancient music and sound, and is one of the great advantages of the work. This broad treatment of “sound” presented by Kaimio provided a solid basis for subsequent studies on the language of Greek music.

An important qualification of the work is that it does not discuss *all* sounds in early Greek literature, but rather restricts the scope to the expressions that denote the specific *qualities* of sound. Kaimio therefore focusses primarily on the adjectives and adverbs (and some onomatopoeic verbs)¹¹⁵ that are applied to the nouns and verbs that denote sound. Kaimio presents a useful framework for the categorisation of these qualities into three distinct groups: 1) tonal attributes, 2) affective qualities (pertaining to emotions, e.g. sadness/cheerfulness), and 3) aesthetic qualities (pleasantness/unpleasantness). Tonal attributes relate to the specific acoustic properties of a sound. Steven and Davis define these properties as pitch, loudness, volume and density,¹¹⁶ and Kaimio adopts their definitions. I will provide a more in-depth discussion of these categories, and my adaptations to them in the following chapter, [*Nature's Song Remains the Same*](#).

Kaimio organises her discussion of sound qualities by genre, author and sound-term. Concise literary analyses and word frequency data are presented in the discussion of each term. The word frequencies record the total sum of occurrences for each identified sound-term, and divides this figure into formulaic uses and unique expressions. This

¹¹⁴ KAIMIO 1977, 7.

¹¹⁵ Those terms that I refer to as ‘attributive sound-terms’, see §3.5. for a more detailed discussion.

¹¹⁶ STEVEN & DAVIS 1938.

approach allows Kaimio to identify various patterns of usage and associations, and trace developments by genre and author. This structure was chosen in an attempt to mitigate repetition across the discussion, as Kaimio argues that a “disposition based on the different sources of sound would not be possible/plausible ... as the characteristics are not restricted to certain sources of sound.”¹¹⁷ In contrast, I have chosen to arrange my thesis by sound-emitter (i.e. animal-type) as I believe that the benefits of comparative analysis with extant animal sounds outweighs the inconvenience of repetition.

Kaimio’s conclusions have largely informed my own hypotheses for the present work. According to Kaimio expressions for loudness “are [the] most clearly discernible,”¹¹⁸ and that clear references to pitch are comparatively rare.¹¹⁹ She argues that high and low pitch are not the only, nor even the strongest connotations of certain terms. Furthermore, the precise qualities denoted by these terms are often doubtful, as the same word may imply two, or even more, qualities at the same time. Many sound-terms also originate from the visual field which highlights the use of multisensory or synesthetic expressions.¹²⁰ This degree of uncertainty and subjectivity is to be expected. As musicologist and composer, Michel Chion notes, when we evaluate the words used to describe and denote sound we must embrace the subjectivity and “cleave as closely as possible to their nuances and contradictions.”¹²¹

¹¹⁷ KAIMIO 1977, 16.

¹¹⁸ KAIMIO 1977, 8; Kaimio states that we cannot distinguish references to loudness from volume. But as we have discussed in the previous section on terminology (§[2.1.2c Loudness](#)), volume refers to the physical amplitude of the frequency of the sound; whereas loudness refers to the physiological response of the ear to this volume.

¹¹⁹ KAIMIO 1977, 247.

¹²⁰ KAIMIO 1977, 234.

¹²¹ CHION 2016, 214.

The sheer breadth of Kaimio's text is its greatest strength, and I believe that the wide-ranging survey presented in this work has been an important factor in the progression of scholarly interest in ancient Greek sound terminology. This foundational text facilitated a shift in more recent academic works towards an evaluation of the terms applied in ancient Greek music,¹²² and has contributed to an overwhelming imbalance between the study of Greek and Latin sound terminology. There is no equivalent to Kaimio's work in the study of sound in Latin. I believe this to be a major factor in the comparative paucity of monographs on the Latin vocabulary of sound and music. A core aim of this thesis is to address this imbalance and provide an overview of Latin sound terminology, while demonstrating the effectiveness of the chosen method.

Classical philologist Maurizio Bettini employs a vastly different approach in his sprawling monograph *Voci: Antropologia sonora del mondo antico*, which considers the sounds of animals and their perception by humans in antiquity. Bettini combines theoretical principles from the field of ecological psychology with rather eclectic comparative philological discussions on animal sounds in Greek and Latin; an approach that would best be labelled as 'lexical anthropology'. Affordances theory is presented as a conduit by which we can interpret the semantic associations forged by the human perception of animal sounds. This theory suggests that the definition of an object is intrinsically linked to the possibilities that the object presents to our awareness.¹²³ Affordances theory prompts us to contemplate "the perceived possibilities ... that an object (such as an animal) offers in relation to a human project of a symbolic and intellectual nature".¹²⁴ Bettini directs this

¹²² STEINMAYER 1985; ROCCONI 1999, 2003; MERIANI 2003.

¹²³ GIBSON 1979 & REED 1994.

¹²⁴ BETTINI 2008b, 214.

theoretical framework to better understand the meaning making processes of the sonic vocabulary in Latin,¹²⁵ which is especially useful in evaluating the affective qualities ascribed to the sounds of animals.¹²⁶ Bettini occasionally compares the sound-producing behaviours of animals with the sonic terminology used to denote their vocalisations in Greek and Latin texts. This comparative analysis has considerably influenced the methodology of the present work.

Bettini narrates the interrelated connections between ancient peoples and animals. Some of *Voci*'s core research questions include: 1) how certain animal sounds were turned into human words, 2) how those words were imbued with meanings, and 3) how humans may understand and impersonate animals. Corresponding with the themes of these core research questions, *Voci* can be divided into three main parts: 1) chapters two to four present conceptions of animal sounds in opposition to human voice and language, 2) chapters five to eight address the voices of animals in myths and the ways in which these myths are semantically linked to the emissions of these sounds; and finally, 3) chapters nine and ten discuss human imitations of animal sounds, presenting the practise of glossolalia as a case study.

The first part of *Voci* is certainly the most relevant for the present work, as it considers the formulation of sound-terms that are applied to animals. Three different types of sound-terms are identified:

¹²⁵ Cf. BETTINI 2008b.

¹²⁶ See below for further discussion, §[3.6.2](#).

1) Generic sound-terms of likely onomatopoeic origin; applied to animals e.g. snakes *sibilare*, birds *clangere*, wolves *ululare*, 2) terms that are not onomatopoeic but describe the utterance, e.g. *gemere* for doves, and 3) terms that refer to actions and behaviours of sound-production rather than voice, e.g. *saevire* of bears and *frendere* of wild boars.¹²⁷

The formation of this first group of terms combines an onomatopoeic stem (*mug-*, *hinn-*) with conventional Latin grammaticalization, which forms regular verbs (*mugit*, *hinnit*).¹²⁸ In chapter four Bettini also identifies a number of animals as *icone sonores* (sound icons), in that their names are etymologically linked to the sounds they produce. Two of the most notable examples in Latin are *grus* (crane) and *bubo* (owl), but this is also comparable to the English name for the ‘cuckoo’.

Bettini’s discussion of sound terminology focusses primarily on the formulation of denotative sound-terms, which is particularly noticeable in his extended discussion of ancient and medieval animal sound catalogues. Bettini however, does not discuss the attributive sound-terms (i.e. words that denote the qualities of sound) that were the core focus of Kaimio’s research.¹²⁹ And while Bettini does provide useful philological discussion regarding the origin of such onomatopoeic verbs and stems, he is far more concerned with an anthropological understanding of human interactions with animal sounds. In a review of *Voci*, Rita Caprini suggests that the subtitle is more revealing of the true heart of the work, that centres “not [on] ‘what birds say’, but what people *believe*

¹²⁷ BETTINI 2008a, 87.

¹²⁸ BETTINI 2008a, 76-78.

¹²⁹ See above §2.2.4., and below §3.5.

birds say.”¹³⁰ Caprini further argues that the text provides interpretations of the behaviour of human beings in antiquity in relation to birdsong, rather than evaluating the qualities of the sounds themselves.¹³¹

The digressive nature of the work is perhaps its greatest flaw, as it prevents a more systematic evaluation of the terminology applied by ancient authors to transcribe the sounds of animals in text. This structure leads to an imbalanced discussion towards the sounds of birds, and presents sometimes disconnected digressions and anecdotes. Furthermore, discussions of several important Latin sound-terms are simply overlooked. Bettini glosses over a discussion of the Latin term *vox*, in favour of a discussion of the well-evaluated Greek terms: *phōnē* (φωνή), *psophos* (ψόφος) and *dialektos* (διάλεκτος).¹³² The absence of a broader discussion of Lucretius’ theory on the origin of human *vox*, in contrast to the *voces* of animals is noted in a contemporaneous review of the work.¹³³ Bettini also consciously omits a discussion on the translation of Latin sound-terms into Italian.¹³⁴ I certainly acknowledge the pitfalls and challenges in approaching the translation of such subjective and conceptual terms as those applied to qualities of sound. But I believe such discussions are of fundamental importance. By raising awareness of the semantic issues surrounding the sensory vocabularies of ancient languages, we can work towards an augmentation of our understanding of their function and use in ancient literature.

¹³⁰ Emphasis added; ‘non “cosa dicono” gli uccelli, ma cosa credono gli uomini che dicano gli uccelli’, CAPRINI 2010, 63.

¹³¹ CAPRINI 2010, 64.

¹³² Cf. AX 1978, ZIRIN 1980, and FÖGEN 2014, 219-221.

¹³³ FOX 2008; cf. STEVENS 2008, and see below §[7.4.1](#).

¹³⁴ BETTINI 2008a, 33.

Despite these criticisms *Voci* remains an invaluable resource for the field of ancient sensory studies, and provides important discussions on: the philological origin of onomatopoeic verbs in Latin, the mythological connotations of birdsong, notions of the sociocultural distinctions between human and animal utterances, and the implications for disrupting these sociocultural expectations. Bettini's approach is useful in gaining a contextual understanding of semantic connotations of terms, especially in relation to their associations with myth. But I believe Vincent's hybrid approach of comparative-lexicography better equips us to directly challenge and test the vagueness and subjectivity of Latin sensory terminology.

We turn now to a final discussion of Maxime Pierre's 2016 monograph *Carmen: étude d'une catégorie sonore romaine*. This analysis presents a historically sensitive re-examination of *carmen* within its family nexus.¹³⁵ An 'intracultural' method is chosen, embracing 'emic' over 'etic', which perhaps seeks to correct the course of Thomas Habinek's Latin-centric evaluation of the same term in his earlier, somewhat controversial, *The World of Roman Song*.¹³⁶ Pierre's bilingual 'emic' approach takes into account Greek interferences and interactions with Latin terms, and explores bilingual linguistic processes of calquing and parallel/reciprocal morphing. This method opposes more traditional 'etic' approaches that rather trace etymologies, original sense, or semantic mapping by tabulation determination that is associated with the Oxford Latin Dictionary.¹³⁷

¹³⁵ HENDERSON 2017.

¹³⁶ HABINEK 2005; See especially FEENEY & KATZ 2006, HORSFALL 2006, ZETZEL 2006, cf. MILLER 2006, LOWRIE 2006 and MILNOR 2007.

¹³⁷ HENDERSON 2017.

Pierre notes a clearly defined shift between the usage of the term *carmen* from the early Republic through to the Augustan period. Earlier invocations of *carmen* or the related verb *canere* are closely associated with birdsong and instruments, which is positioned as an assumed semantic core for the term-group. Over time the applications of the term were extended to humans through metaphorising birdsong and the music of instruments, as possessing a ‘human-like’ voice. Pierre notes interference from Greek concepts *melos* (μέλος), *odos* (ὁδός) and *nomos* (νόμος) in the applications of *carmen-cano* and traces its semantic development towards that of an incantation or to juridical formulae. Use of the term group in the late Republic and Augustan period sees the development of a parallel with the Greek term *adein* (ᾄδειν), or in poetic language *aeidein* (ἀείδειν). This work ultimately traces the sociocultural development of the term *carmen* into a semantically broad polysemy that denotes multiple but related meanings.

Maxime Pierre’s *Carmen* is an excellent example of a balanced evaluation of a single sound-term within its sociocultural and linguistic context. This text is an indication of the ways in which the field can build upon a foundation of a broader overview of sonic terminology in antiquity, as is presented in the present work. Such an overview will highlight key contentious sound-terms, and will further prompt scholarship to focus on these specific terms, with a view to providing further bilingual evaluations of their usage and development over time. Some thematic aspects of Pierre’s work have impacted on the structure of this thesis. *Carmen* and *canere* appear frequently in denoting the sounds of animals, most typically birds. Pierre’s treatment of *carmen* contributes to an overabundance of scholarship on birdsong in antiquity, and prompts a discussion on more under-represented sounds, such as non-vocal bird sounds, which will feature in a later

chapter.¹³⁸ The emic perspective championed by the work has its merits, but as no overview of the broader sonic vocabulary in Latin currently exists, scholarship is currently positioned to return to re-examinations of contentious sound-terms that are already the subject of much debate. Adapting and applying Vincent's contextualised method allows for a degree of balance in the debates surrounding emic/etic approaches; first by identifying the limitations of the textual evidence as transcription of the aural perception of authors, and secondly by comparing these aural perceptions with sounds that we can engage with on a sensory level. This process allows us to hear qualities that are not easily audible understood (audible) from the silent texts.

2.2.5. Review of Vincent's *'Tuning Into the Past'*.

In acknowledging the valuable contributions of the anthropology of the senses, Vincent commences his methodology by emphasising the importance of approaching sensory perception by means of a contextualised framework. Noting that our sensory perception is informed by our own 21st century sociocultural contexts, we must be mindful that our own understanding of 'sound' and 'noise' is markedly removed from the sensory processes of ancient Roman society c. 100 BC. The semantic meanings associated with certain sounds can vary considerably across time, social status, and even from one individual to the next. 'Acoustic perception' essentially encapsulates this relationship between the emitter of the sound and the interpretation of sensory data/aural stimuli by the

¹³⁸ See below §[6. Clangor et Plausus](#).

author of the text (or their constructed literary persona).¹³⁹ We are reminded in this way that the sounds of antiquity are filtered by the perception processes of ancient authors (and their own sociocultural lenses), and that it is their sensory *interpretation* that survives in these ancient texts. Vincent notes that these author-specific descriptions are “no more universal than [they are] socially objective”.¹⁴⁰ Relying on textual sources alone therefore, leads to what Vincent aptly describes as a “methodological blockage”.¹⁴¹

Circumventing this impasse may be achieved by supplementing the analysis of ancient textual evidence with critical evaluations of the emitted sounds; more specifically for Vincent’s case study, the sounds of a reconstructed *tuba* (an ancient Roman straight-trumpet). This comparison of sound perceptions (as transcribed in Latin literature) with the emission of the sounds of a reconstructed instrument, allows us to moderate the subjectivity of the transcribed perception with “empirical evidence from sonorous material.”¹⁴² Vincent undertakes a full lexicographical survey of references to *tubae* and *tubicines* (musicians that played the *tuba*), and includes only those that specifically qualify the denotative and connotative characteristics of the perceived sound. Vincent separates these terms into ‘acoustic qualifications’ (denoting the acoustic properties of the sound, including loudness, pitch, duration and tone) and ‘adjectives of impression’ (the connotative qualities ascribed to the sound, including affective and aesthetic meaning). Some of the most common descriptions of this instrument are related to affective qualities; as the instrument was

¹³⁹ VINCENT 2017, 149.

¹⁴⁰ VINCENT 2017, 149.

¹⁴¹ VINCENT 2017, 150.

¹⁴² VINCENT 2017, 151.

commonly characterised by its fear-inspiring sound.¹⁴³ But of the acoustic qualifications, the Latin adjective *raucus* is identified as the most common designation.¹⁴⁴

Raucus is used as an entry point to the analysis of the sonorous characteristics of Roman *tubae*, and its use is reviewed in greater detail. The term *raucus* (which in a general sense, refers to a hoarseness or roughness)¹⁴⁵ has varying contextual applications, and through a survey of approximately 200 references to the term, Vincent was able to identify themes of its use throughout the corpus. Among some of the noisier sounds denoted by the term (including metallic percussion instruments, and creaky hinges or clattering of shields), *raucus* was used to denote certain hoarse qualities of the human voice, and particularly the abrasive voices of some noisy animals. But *raucus* was also used to characterise a variety of less obtrusive sounds, including: the vocalisations of birds, the thrum of cicadae and the buzzing of bees, as well as the sounds of rushing streams, stagnant swamps and rivers, and rocks moved by bodies of water.¹⁴⁶ By identifying the sounds to which this term is ascribed in Latin texts, we can identify and isolate some of the common acoustic qualities shared by these sounds. Vincent embraces the apparent disparity between these themes and distils them into the possible acoustic qualities likely ascribed to the term; notably a degree of acoustic complexity and repetition of multiple micro-sound-events.

Vincent frames this case-study as the small-scale ‘first step’ toward providing sociocultural enhancements to the findings of archaeomusicology. But there are some

¹⁴³ VINCENT 2017, 153.

¹⁴⁴ VINCENT 2017, 153.

¹⁴⁵ OLD 1968, 1577, s.v. “*raucus*”.

¹⁴⁶ VINCENT 2017, 155.

considerable hurdles to the further application of this method as it currently stands. Surviving ancient musical instruments are extremely rare, and their reconstruction based on accurate scientific measurements is both costly and logistically challenging; especially for antipodean researchers (such as myself). Evaluating the emissions of scientifically reconstructed ancient instruments is certainly a desirable ultimate objective (and to Vincent's credit, it serves to illustrate his contextualised method effectively), but it is not the logical first step for the further application of such an augmented lexicographical approach. Vincent directly evokes the familiar sensory perceptions of the sounds of water, birds and insects to further strengthen the findings of his own critical analysis of the recorded aural material. The comparison of the diverse uses of *raucus* provides a stimulating focal point for the text, as these are all sounds that we, even as a contemporary audience, can fully comprehend and engage with on a sensory level. To further our understanding of aural perception and its representation in Latin literature, it makes perfect sense therefore to apply Vincent's contextualised method to the more accessible sounds of nature.

2.2.6. Concluding Remarks

Ancient sound studies is an important point of focus in the broader field of Classics, and has been flagged by scholars as fertile ground for further research. The sound terminology in ancient Greek has received considerable discussion, whereas comparatively few have evaluated the sonic vocabulary of Latin to the same extent. Kaimio emphasized the benefits of an overview survey of the sound-terms of a language, which prompted further works to explore the etymologies and semantic range of individual terms in closer

detail. Bettini's *Voci* relates in many ways to the present work, especially in relation to the thematic treatment of the sounds of animals, however his approach is far from uniform and includes disparate discussions, with a greater focus on anthropological understandings of human interactions with animal sounds. The general thematic focus on animal sounds is of clear interest to the present work, and aspects of his methodology will prove useful, but ultimately I do not intend to follow his paradigm. Pierre's focus on the terms *carmen/canere* addresses a highly contentious issue in the field regarding the conceptual delineations between music and sound. But such a focussed bilingual approach is not feasible prior to a broader initial survey of Latin sonic vocabulary, as will be presented in the present work. I believe Vincent's balanced approach of comparative-lexicography facilitates a better overall, initial critique of Latin sonic terminology, especially when compared with the sounds of animals.

3. Methodology: *Nature's Song Remains the Same*

3.1. Preface

Nature's Song Remains the Same is the first of five publications that will be presented in discrete chapters in this thesis. This section will outline my critical approach, which is applied throughout this thesis to assess the characterisation of animal sound terminology. This paper was delivered at the 'In Pursuit of Sound' Interdisciplinary Symposium at the Faculty of English, Cambridge, in October 2019. *Nature's Song Remains the Same* will be subsequently submitted to *Sound Studies: An Interdisciplinary Journal* for peer-review. This section will repeat aspects of the previous 'Literature Review' chapter to contextualise the field of historical sound studies, and to emphasise the need for the developed approach. A core aim of this paper is to signpost the progression of 'historical sound studies' as a related subfield of 'sound studies', and to stimulate further interdisciplinary collaboration between these disciplines.

*Nature's Song Remains the Same: animal sounds, text
and perception in ancient Latin literature*

3.2. Introduction

The ancient Mediterranean was a sonorous place. In an often-cited example, the Roman author Martial (writing in the mid-first century AD), lamented the considerable ‘noisiness’ of the city of Rome, as it frequently disrupted his thoughts and rest; the “schoolmasters deny [him] life in the morning, bakers at night, the hammers of the coppersmiths all day”.¹⁴⁷ There are also accounts that attest to the cries of shop-vendors and beggars chanting in the streets;¹⁴⁸ traders melodiously praising their goods, each with their own distinctive ‘*modulatio*’;¹⁴⁹ and the sounds of shepherds, attracting buyers for their milk with their shepherd-songs.¹⁵⁰ For the historian of ancient sensory perception, the best evidence of the sounds of the ancient Roman world are their transcribed approximations in surviving literature. Thankfully, ancient Roman authors often recorded sound textually, as they perceived or imagined it, and throughout the Latin canon we find a vast array of these vignettes (ancient Roman “sound bites”, if you will) of their aural perceptions. From these Roman “sound bites” we can construct a glimpse into the aural experiences of the authors who recorded them, and reconstruct the sonorous environments of the city of Rome; a central part of everyday life for Romans of unimpaired hearing.

¹⁴⁷ MART. 12.57.4-13; SHACKLETON BAILEY 1993b, 137.

¹⁴⁸ HOR. *Epist.* 1.17.46-49.

¹⁴⁹ SEN. *Ep.* 56.2.

¹⁵⁰ VERG. *Ecl.* 3.26; CALP. *Ecl.* 4.25-28.

But as with today, issues arise in the process of transcribing aural phenomena to another medium.¹⁵¹ The terminology used to record sound characteristics in text is often imprecise, subjective, or utterly vague. The difficulties of interpreting the denotative and connotative meanings of these ‘sound-terms’ from such written evidence, is further compounded in the case of ancient Latin, which exists without a continued spoken-language tradition. Sonorous references in the extant Latin corpus therefore survive in a manner akin to the great ruins of ancient Roman civilisation; as artefacts to be excavated, interpreted and preserved. While our ‘sonosphere’ is markedly removed from Rome circa 1st century BC, and the sounds of the ancient city and its people are all but lost to us, the sounds of the animal world remain relatively unchanged. Bees *still* “buzz,”¹⁵² birds *still* “sing,”¹⁵³ and “screech,”¹⁵⁴ cicadae *still* proclaim the hot summer’s day,¹⁵⁵ and the ‘ping’ of mosquitoes *still* have the uncanny knack of disrupting our sleep.¹⁵⁶ By comparing literary descriptions of animal sounds with extant sounds produced by modern animals, we can supplement our ancient literary evidence with empirical evidence and further moderate the subjectivity of surviving, textually recorded acoustic perception.¹⁵⁷

Nature’s song remains the same builds upon and adapts a recently proposed methodology by Alexandre Vincent.¹⁵⁸ My augmentation of this approach facilitates a critical evaluation of the vocabulary used by ancient Roman authors to denote and

¹⁵¹ It is worth noting that these issues have also been encountered in a range of diverse fields, including: ornithology (BRUYNINCKX 2012), mechanics (KREBS 2012) and medicine (RICE 2012).

¹⁵² VARRO, *Rust.* 3.16.32.5.

¹⁵³ PLIN. *HN.* 10.8.

¹⁵⁴ PLIN. *HN.* 10.34.

¹⁵⁵ PLIN. *HN.* 11.107.

¹⁵⁶ HOR. *Sat.* 1.5.14; *Culex.* 208.

¹⁵⁷ VINCENT 2017, 151.

¹⁵⁸ VINCENT 2017.

characterise the sounds of animals in Latin literature. Following a brief overview of Vincent's method, I will outline my own adaptations for the evaluation of 'denotative' 'attributive' and 'self-qualifying' sound-terms, and for the categorisation of sound qualities into three distinct groups: acoustic, affective and aesthetic. To demonstrate the application of this adapted approach, this article will conclude by considering the use of the Latin term *stridor* to denote the wing-sounds of birds.

3.3. 'Reading' Ancient Sounds

Classicists and ancient historians have been rather hesitant to heed the call of the 'aural turn' in the humanities, displaying a reluctance that has been characterised as "*la surdit  des historiens*."¹⁵⁹ The first major publication on the 'soundscape' in ancient historical studies '*Le Paysage Sonore de l'Antiquit *', was published only recently in 2015.¹⁶⁰ The field has since witnessed a crescendo of publications, including a number of methodologies and companion texts centred on approaches to the senses and the study of sounds in antiquity.¹⁶¹ Eleanor Betts' edited work 'Senses of the Empire',¹⁶² has gathered together a collection of multisensory approaches to Roman culture specifically.

In this work, Alexandre Vincent's chapter 'Tuning into the Past' proposes to combine traditional lexicographical approaches with the comparative analysis of 'reconstructed sound' to bolster the objectivity of our analyses and improve our

¹⁵⁹ "The deafness of historians". CHIM NES (1998, 78) first used the phrase to emphasise the conceptual 'no man's land' between musicology and historical studies. Cf. VENDRIES 2015, 210.

¹⁶⁰ EMERIT, PERROT, VINCENT 2015.

¹⁶¹ Most notably, TONER 2016, BETTS 2017, and a Routledge companion series running from 2014 – 2019, entitled 'the senses in antiquity'.

¹⁶² BETTS 2017.

understanding of Latin sound terminology. This contextualised approach is built upon the principal findings of anthropology of the senses; that sensory perception is not universal.¹⁶³ Sensory hierarchies can differ from one culture to the next. Sociocultural perceptions of, and responses to, sensory stimuli are inextricably linked to their respective geo-temporal contexts.¹⁶⁴ That is to say, when we read descriptions of sounds in surviving ancient texts, we must remember that they are filtered by the perception processes of individual ancient authors (and their own sociocultural lenses). Their subjective acoustic interpretation is all that survives in these accounts, and these author-specific descriptions are as Vincent notes, “no more universal than [they are] socially objective.”¹⁶⁵ Relying solely on ancient written sources for evidence of ancient acoustic perception therefore leads to a methodological impasse.¹⁶⁶

Vincent mitigates the impact of this issue by comparing the sounds produced by scientifically reconstructed Roman brass instruments with the Latin adjectives used to describe them in ancient texts.¹⁶⁷ But there are hurdles to extending Vincent’s proposed approach for further study. Ancient musical instruments are rare finds and accurate reconstructions are both costly and logistically challenging. Evaluating the emissions of scientifically reconstructed ancient instruments is certainly a desirable ultimate objective, but it is not the logical first step for the further application of such an augmented

¹⁶³ VINCENT 2017, 147.

¹⁶⁴ VINCENT 2017, 147-148.

¹⁶⁵ VINCENT 2017, 149.

¹⁶⁶ VINCENT 2017, 150.

¹⁶⁷ VINCENT’S case study compares the Latin term *raucus* with the sounds of a reconstructed Roman straight-trumpet known as a *tuba* (2017); see also VINCENT 2019. MEUCCI (1989) provides an excellent introductory overview of the four main ancient Roman brass instruments: the *tuba*, *cornu*, *bucina* and *lituus*. For further reading on these Roman aerophones see also: ZIOLKOWSKI 1999, ALEXANDRESCU 2010, and VINCENT 2013.

lexicographical approach. Vincent directly evokes the familiar sensory perceptions of the sounds of water, birds and insects to further strengthen the findings of his own critical analysis of the textually recorded aural material. By rather engaging with sounds that we, even as a contemporary audience, can comprehend and imagine on a sensory level, we can improve the range of applications for this method. It makes sense therefore to invert Vincent's method and commence with analysis of the more accessible sounds of nature. By focussing specifically on animal sounds, we can also further support our analysis with empirical evidence from the fields of biology and animal behavioural studies.

3.4. Denotative Sound-Terms

Through my ongoing analysis of the Latin sound vocabulary, I have identified three discrete groups of sound-terms: 'denotative', 'attributive', and 'self-qualifying' sound-terms. 'Denotative sound-terms' (usually nouns, verbs and participles) are used to denote the presence of aural stimuli or a sound-event explicitly in text. For example, when Pliny the Elder notes that "the blackbird ... sings (*canit*) in the summer, and chirps (*balbutit*) in winter",¹⁶⁸ he is using the verbs *canere* and *balbutire* to differentiate between two distinct calls of a blackbird. These 'denotative sound-terms' typically evoke in the audience the memory of prior sensory experiences with a specific sound or sound-emitter. Reflecting on the denotative meaning of such terms can be quite informative, especially in relation to the historical perceptions of particular sounds. In certain contexts, 'denotative sound-terms' can also allude to the acoustic, affective or aesthetic qualities of the sound, although such implicit connotations typically require further analysis.

¹⁶⁸ PLIN. *HN*, 10.8; RACKHAM 1983, 343.

3.5. Attributive and Self-Qualifying Sound-Terms

As the name suggests, ‘attributive sound-terms’ (adjectives and adverbs) are used to attribute sound qualities to ‘denotative sound-terms’. In another example, Pliny ascribes the adjective *flebilis* (mournful) to the swansong: “a story is told about the mournful song (*flebilis cantus*) of swans at their death—a false story as I judge on the strength of a certain number of experiences.”¹⁶⁹ A related sound-term category type is the ‘attributive statement’. ‘Attributive statements’ are *phrases* that ascribe qualities to a corresponding denotative sound-term, and they are archived in the *SAALL* dataset as a complete phrase.¹⁷⁰ By way of example, Varro states that when a bee-hive is almost ready to disperse, the bees make a “loud humming sound (*consonant vehementer*)” ... exactly as soldiers do when they are breaking camp (*milites faciunt, cum castra mouent*).¹⁷¹ This discrete clause clearly ascribes imitative qualities to the ‘*consonant vehemeter*’. Separating this attributive statement into its individual terms would obscure the intended connotations of the attributed quality. These ‘attributive statements’ are used to: add detail to the characterisation of sounds, denote the imitation of voice, or to compare or contrast the sounds of two distinct sound-emitters.

‘Self-qualifying sound-terms’ are a combination of both ‘denotative’ and ‘attributive’ terms. These ‘self-qualifying’ terms are unique in that they both denote the production of sound, and also ascribe specific acoustic, affective or aesthetic qualities to the sound. ‘Self-qualifying’ sound-terms function without a related sound-noun or sound-

¹⁶⁹ PLIN. *HN*, 10.63; RACKHAM 1983, 333.

¹⁷⁰ There is also a single reference to a ‘denotative statement’ in the *SAALL* corpus, which occurs in Pliny. This reference is an evocation of the flight sounds of insects using the indirect language “begin and cease to give an audible sound” (*incipere audiri et desinere*) PLIN.*HN*.11.267; RACKHAM 1989, 601.

¹⁷¹ VARRO.*Rust*.3.16.30.

verb, and are applied directly to the emitter of the sound. Two ‘self-qualifying’ sound-terms appear in a single phrase of the *Dirae*, as “the croaking frog (“*garrula rana*”) dwell[s] in the chirping cricket’s (“*arguti grylli*”) hollow lairs”.¹⁷² In English, these sound-terms appear to be verbs, but they are in fact expressed by the adjectives *garrulus* and *argutus*. In this phrase the adjectives are applied directly to the sound-emitters themselves: frogs (*ranae*) and a cricket (*gryllus*) respectively.

The difference between these three sound-term categories can be further highlighted by way of a simple example. In the sentence ‘the frogs croak’, the verb ‘croak’ is used as a denotative sound-term, as ‘croak’ denotes the production of sound by frogs. If ‘the frogs croak *loudly*’, the denotative ‘croak’ is modified by the attributive sound-term ‘loud’, which ascribed the acoustic quality of loudness to the ‘croak’. If ‘the frogs are vocal’, the term vocal is ‘self-qualifying’ in that it both denotes the production of sound by the frogs and ascribes a sound-quality to this denoted sound.

Attributive and self-qualifying sound-terms can be easily categorised into groups according to the types of sound qualities they represent. These three sound quality groups are as follows: i) acoustic qualities, descriptions pertaining to pitch, loudness, duration, and tone-quality; ii) affective qualities, descriptions of associated (explicit or implicit) emotions (e.g. joyful, sad, plaintive); and finally, iii) aesthetic qualities, descriptions where an aesthetic value judgement is implied (e.g. pleasant or unpleasant). This categorisation system was developed by combining Vincent’s categories with those employed by Maarit

¹⁷² *Dirae* 74; FAIRCLOUGH and GOOLD 1918, 393. Emphasis added.

Kaimio in her earlier monograph, ‘*Characterisation of Sound in Early Greek Literature*’.¹⁷³

While the philological method and general scope of Kaimio’s text differs from my own approach, her system of categorisation has provided a useful framework upon which to build my adapted method. I have employed several distinct approaches to critically assess references when categorised by these three sound-quality groups.

3.6. Categorisation: Sound Qualities

3.6.1. Acoustic

Comparative analysis is central to my evaluation of the acoustic qualities applied to Latin sound-terms. By undertaking lexicographical enquiries, we can compile and collate references to a specific Latin sound-term and identify the various ‘emitters’ of that sound. Comparing these sound-terms with the actual sounds they denote allows us to identify and classify acoustic similarities characteristic of specific Latin terms. In comparing the sounds of animals we can supplement our lexicographical analysis with modern biological studies. These works often provide descriptions of animal vocalisations in a scientific and objective manner that makes them extremely useful evidence for this adapted method. The Tierstimmen Archiv and the Macaulay Library are both suitable databases that gather together a range of animal sound recordings that can be accessed online. In lieu of the specific sensory stimulus that inspired the author’s description of sound in text, we can also certainly visualise, or rather *auralise*,¹⁷⁴ the sounds evoked by

¹⁷³ KAIMIO 1977.

¹⁷⁴ The terms *auralise*/*auralisation* have been adopted and used extensively in the field of acoustics to denote the practice of constructing acoustic environments by means of digital modelling; see SUMMERS

ancient literature. We will return to further demonstrate this approach in a case-study in the final section of this paper, focussing on a specific contextual use of the denotative sound-term *stridor*.

3.6.2. Affective

Ancient authors commonly ascribed emotions to the sounds of animals. These affective qualifications can be attributed through anthropomorphism, as is commonly the case in Phaedrus' Aesopian *Fables*, and the transformed human-animals in Ovid's *Metamorphoses*. But these references can originate from hidden truths that indicate a keen observation of specific animal behaviours. If we compare the affective attributes to the sounds of animals with the evidence of modern animal behavioural studies, we can sometimes uncover logical explanations for seemingly illogical symbolic associations.¹⁷⁵ Maurizio Bettini provides a suitable framework in assessing the symbolism of etiological animal myths by adapting 'affordances theory' from ecological psychology. This approach facilitates comparisons of ancient and modern accounts of animal behaviours, as it prompts us to consider "the perceived possibilities ... that an object (such as an animal) offers in relation to a human project of a symbolic and intellectual nature".¹⁷⁶ Bettini demonstrates this method by examining Ovid's account of the transformation of Galanthis (the midwife to Hercules' mother, Alcmena) into a laughing weasel. Bettini argues that the sounds of animals can "offer special affordances to the symbolic projects of human beings: [in which]

2008. I refer to the term's original sense; an aural parallel to the visual, 'visualise'. Also see above: §2.1.2c. [Auralisation](#).

¹⁷⁵ It is worth noting that it is widely believed that many animals do feel and express a wide range of emotions. Studies have identified the expression of emotion in animals, but there is considerable debate in scientific fields as to the correct methods of empirically researching this topic, see BECKOFF 2000.

¹⁷⁶ BETTINI 2008b, 214.

a “series of sharp, explosive barks or chirps” produced by a stressed weasel ‘affords’ the mythological creation of a laughing girl / weasel.”¹⁷⁷ Examining affective references in this way can vastly improve our understanding of human-animal relations in antiquity.

3.6.3. Aesthetic

By collecting references to aesthetic qualifications of sound we can begin to map spectrums of aesthetic responses (ranging from pleasant to unpleasant) to aural stimuli in ancient texts. This collation allows us to evaluate author- or genre-specific patterns of aesthetic value judgement. There can be a degree of overlap between the affective and aesthetic qualities signified by sound-terms, which is to be expected, “aesthetic pleasure being naturally an affective reaction.”¹⁷⁸ But in some instances, terms used to qualify the tone-quality of the sound can also connote certain aesthetic judgments. Statius uses the adjective *asper* (meaning 'rough' or 'hoarse') to describe the fierce sound of swarming bees,¹⁷⁹ and Apuleius describes the sweet melodies ("*mellei moduli*") of the avian entourage of the goddess Venus.¹⁸⁰ But when analysing the aesthetic qualities ascribed to sounds in text, we must remember that perceptual responses to sensory experiences can vary considerably over time, across cultures, and even from one author to another. The need for caution is clear, especially when we consider the disparate aesthetic responses to the sounds of cicadae in antiquity. In the earlier Ancient Greek tradition, the unbroken drones of cicadae were considered to be pleasant, musical sounds.¹⁸¹ Latin authors were

¹⁷⁷ BETTINI 2008b, 215.

¹⁷⁸ KAIMIO 1977, 8.

¹⁷⁹ STAT. *Theb.* 10.576.

¹⁸⁰ APUL. *Met.* 6.6.12.

¹⁸¹ BEAVIS 1988, 101.

far more critical of these noisy hemipterans and would usually accentuate their shrillness and garrulity.

3.7. Aural Evocations of Sound in Text

Latin authors sometimes employed a more indirect approach to the transcription of sounds in text that engages the audience's imagination to 'hear' sound through evocation. Chion uses an excerpt of an obscure poem by Victor Hugo, '*Fenêtres ouvertes. Le matin. En dormant*', to illustrate aural evocation of sounds in text.¹⁸² In the poem's final line, "A fly enters. Immense breath of the sea".¹⁸³ Without any sonic terminology in the sentence, Hugo prompts us to *auralise* the buzzing drone of a lone fly. Aural evocations such as this example from Hugo, are also frequently employed in Latin literature. By evaluating these evocations in Latin texts we can identify sociocultural responses to specific sounds and their sources. An example in Latin literature is the association of the sound of the mosquito (*culex*) with the disruption of sleep. In Vergil's poem *Culex*, the eponymous insect arouses a sleeping shepherd to warn him of a serpent poised to strike.¹⁸⁴ The shepherd wakes in time unscathed but kills the mosquito in the process. The cursed *culex* returns as a haunting spectre, once again rousing the shepherd from his sleep.¹⁸⁵ We see this allusion again in

¹⁸² CHION 2016, 25-26; 213.

¹⁸³ CHION 2016, 213.

¹⁸⁴ *Culex* 182-184.

¹⁸⁵ *Culex* 208.

Horace, as *culices* are characterised as agents of sleep-deprivation “that drive off sleep” (“*avertus somnus*”).¹⁸⁶

3.8. Case Study: *Pinnarum Stridorum*

In antiquity, the Latin noun *stridor* (and its verbal cognates *strido/strideo*), from which we derive the English word *strident*, was used to denote a varied mix of natural and anthropogenic sounds. By gathering together the numerous uses of *stridor* in denoting sound, we can compare the disparate applications and consider the similarities in their represented acoustic characteristics. This comparison allows us to identify the acoustic qualities that the focal term likely denotes. Sources of *stridor* in Latin literature include: wind moaning through the rigging of ships;¹⁸⁷ airborne projectiles as they whirr through the air;¹⁸⁸ grinding and screeching metal (including the grating of hinges, and squeaky carts);¹⁸⁹ hissing steam (including the violent hiss of quenching hot metal),¹⁹⁰ and Roman brass instruments.¹⁹¹ But the term was often applied to animal sounds as well, such as hissing snakes,¹⁹² cackling geese,¹⁹³ shrill bellowing bulls¹⁹⁴ and the sounds of wings. This final example is represented through a repeated association between *stridor* and Latin terms for wings, *alis* and *pennae*. By my estimates there are eight references to the ‘*stridor*’ of wings between 55 BC to AD 180.

¹⁸⁶ HOR. *S.* 1.5.14; FAIRCLOUGH 1926, 65.

¹⁸⁷ OV. *Tr.* 1.4.9; PLIN. *Ep.* 9.26.4.6; PROP. 3.7.47.

¹⁸⁸ LUC. 9.827; SEN. *Her. F.* 993; SIL. 1.317.

¹⁸⁹ STAT. *Theb.* 4.244; VERG. *A.* 6.558; 6.573; 7.613.

¹⁹⁰ MART. 14.33.2; OV. *Met.* 4.123; 9.171; VERG. *A.* 8.420; 8.450; *G.* 4.172.

¹⁹¹ SIL. 5. 189, LUC. 7. 475, SEN. *Oed.* 733; SEN. *Thy.* 575.

¹⁹² LUC. 9.631; OV. *Met.* 9.65; SIL. 2.537; STAT. *Theb.* 1.599.

¹⁹³ PETRON. *Sat.* 136.4.4.

¹⁹⁴ OV. *Met.* 8.287.

If we compare the sounds denoted by *stridor*, what acoustic qualities might they have in common? We could say these sounds tend to be of higher indeterminate pitch, with a piercing or sharp tone, but also possibly high loudness. ‘Whooshing’ sounds caused by air displacement of a bird’s wing when in flight or engaged in defensive swooping behaviours, could fit this aural description of similar sound characteristics. But there is also another possible denotation. Feather-whistles are quite common in birds. Recent research has been conducted on the whistling tonal sounds produced by means of specialised primary feathers during flight in common Rock pigeons (*Columba livia*).¹⁹⁵ The ancestors of these rock pigeons were some of the earliest species of birds to be domesticated around 3000 BC.¹⁹⁶ The species is now commonly found throughout Europe and is widely considered to be a pest.

Despite being geographically removed from the European focus of the present enquiry, the ‘feather whistles’ of the Australian crested pigeon (*Ochyphaps lophotes*) are another example of such non-vocal sound in birds. These crested pigeons issue a shrill and rhythmic, ‘whistling’ sound that is caused by their flight feathers on the downstrokes of their wing-beats upon take off.¹⁹⁷ For crested pigeons these ‘feather whistles’ have evolved as a non-vocal alarm signal to communicate signs of danger, when detecting a nearby predator.¹⁹⁸ But more passive forms of these feather alarm-sounds are produced by a similar means of aeroelastic flutter in a wide variety of birds. Following this supplementary

¹⁹⁵ NIESE & TOBALSKE 2016, 2173.

¹⁹⁶ BROOKE & BIRKHEAD 1991, 298.

¹⁹⁷ [Murray 2017](#). See also Sound Recording 34 and Sound Recording 35.

¹⁹⁸ HINGEE & MAGRATH 2009; MURRAY, ZEIL, & MAGRATH 2017; MURRAY 2017.

analysis, it is likely that *pinnarum stridorum* denotes a combination of feather whistles, and more general sounds of air-displacement during flight and take-off.

Across the Latin corpus the association of *stridor* with wings is typically only used in relation to birds.¹⁹⁹ But Pliny provides an interesting exception in describing an enormous locust swarm. Pliny states that the locusts “are seen of exceptional size, and also they fly with such a noise of wings (*"pinnarum stridore"*) that they are believed to be birds”.²⁰⁰ In describing the sounds of the locusts, Pliny directly reinforces the sense of confusion in the onlookers, by employing language that is contextually synonymous with *birds*. The locusts are believed to be birds, because they *sound* like birds. In the context of this passage, *pinnarum stridore*, the sound of this plague-proportioned swarm evokes the sense of a myriad of small, repetitive impulses, occurring at irregular intervals, uniting to create a continuous, white-noise-like, humming drone.

One of the outcomes of this research is that this comparative analysis lends itself to nuanced reflections on existing English translations of Latin texts. Rackham’s translation of Pliny’s *Natural History* Volume’s VIII through XI does have its limitations, both in the identification of specific species or types, and in relation to sound terminology. The translation of *"pinnarum stridore"* as “a noise of wings” (a simple reference to the production of ‘sound’ with reference to its emitter), falls short of evoking the true sense of the transcribed sound in question. When applied in this context of the flight sounds of swarming locusts, we could safely (and more evocatively) translate *"pinnarum stridore"* as “fluttering” or “buzzing”; or perhaps, even more *poetically* in this context, as a “whirring of wings”.

¹⁹⁹ See below especially, §[6](#).

²⁰⁰ PLIN. *HN*. 11.98-104; RACKHAM 1983, 497.

3.9. Discussion

Close analysis of denotative, attributive and self-qualifying sound-terms in Latin literature reveals the ways in which ancient Latin authors perceived and imagined their own worlds of sound. While these ancient *sonospheres* survive only as transcriptions in literature, the sounds of modern animals offer an invaluable point of comparison; echoing the noises of their ancient kin. Combining such comparative analysis with a more traditional lexicographical approach allows us to gain a more nuanced understanding of sound-term use throughout the Latin literary canon. Ultimately this method was adapted to equip historians with an approach to ancient sensory vocabulary that allows us to more boldly explore notions of multisensoriality, and the intersections of music and sound in the ancient Roman world. The vocabulary used for animal sound in antiquity also overlaps considerably with Roman musical culture. For instance, the Latin noun *cantus*, often translated as ‘song’, and its related verbal form *canere*, ‘to sing’, were applied both to human music and the sounds of insects, and birds.²⁰¹ Such an overlap in terminology between distinctly musical and ‘non-human’ animal sounds raises questions about the Roman definitions of ‘music’. These parallels between the human and the animal worlds of sound are not restricted to Pliny; we can also consider for instance Lucretius’ account of the origin of music through the imitation of nature (*imitatio natura*).²⁰² It would be profitable in the future to approach an investigation into Roman responses to the aural world against the backdrop of the dichotomy between ‘the human’ and ‘the natural’. In so

²⁰¹ PLIN.HN.11.93-95; PLIN. HN. 10.106. See also below (§[7.4.2.](#)), which considers the influence of the Greek *adein* on the contextual use of *cantus*.

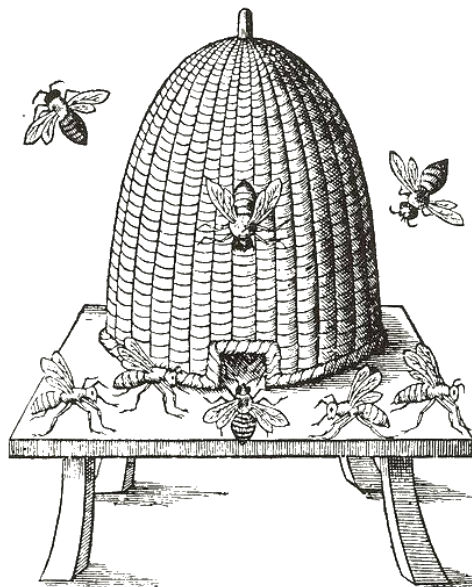
²⁰² LUCR. 5.1379-1414.

doing, we are likely to reveal valuable new insights into processes of Roman sensory perception.

4. *Stridor et Murmur*

4.1. Preface

Stridor et Murmur evaluates the terminology used by Latin authors to characterise the sounds of insects in the surviving corpus from 55 BC to AD 180. By applying the approach outlined in the previous chapter, this section will provide an exhaustive review of the description of insect sounds in Latin literature during this time period. Certain groupings of sound-producing insects are especially noted by Latin authors, and will be the primary focus of this discussion. These sonorous insects include bees (*apes*), mosquitoes and gnats (*culices*), flies (*muscae* / *asili*), and cicadae, crickets and grasshoppers (*cicadae* / *grylli* / *locustae*). This paper was submitted to *Arethusa* for peer-review in 2019.



*Stridor et Murmur: characterisation of insect sounds
in Latin literature from 55BC to AD180*

4.2. Introduction

At the height of the Australian summer, the bushland pulsates with the complex, ceaseless thrumming of cicadae. Their calls pierce the air with a distinctly oppressive quality, providing an undulating soundtrack to the stark eucalypt forest environment. When considering the sounds of nature, it is impossible to disregard (by way of selective deafness or otherwise) the sonorous world of insects. As with all sounds, the buzzes, chirps, and stridulations of insects are experienced and perceived in context. When perceived by human communities, the sounds themselves are shaped by the sociocultural attitudes of the perceiver, which subsequently moulds the signified meaning of the perceived sound.²⁰³ The sounds of insects in indigenous communities of central and northern Australia for example, are important in signifying the emerging presence of essential natural resources. In the desert language of the Kaytetye people of central Australia, the names of certain insect species refer specifically to their sounds and the sociocultural meaning that sound signifies.²⁰⁴ For example, the Kaytetye word: *anatyaylewene* or ‘yam-singer,’ denotes a type of beetle that assists in the reproduction of edible yams and grass seeds. The increased chirping of these insects is typically followed by plants coming to fruit; the transmitted meaning of the beetle stridulations is this connection between sound and food.²⁰⁵ In a similar way, to indigenous communities in Arnhem Land in Northern coastal Australia, the sounds of katydids signal the ensuing ripeness of yams, and cicadae can signal that “green plums are ripe and can be gathered.”²⁰⁶

²⁰³ For the work of musicologists on the semiotics and semantics of sound, see SCHAEFFER 1967, and CHION 1983. C.f. CHION 2016, 224 – 330, for specific reference to textual representation of sounds.

²⁰⁴ TURPIN 2013, 508.

²⁰⁵ TURPIN 2013, 509.

²⁰⁶ SI & TURPIN 2015, 177.

In written languages, descriptions of sounds, and the sociocultural meanings associated with them, can also be ‘transcribed’ via text. Many descriptions of insect sounds, as perceived by ancient Roman authors, survive in transcriptions of the author’s acoustic perception. The notion of ‘acoustic perception’ essentially encompasses the relationship between the emitter of the sound, and its perception and interpretation by the author (or their literary persona).²⁰⁷ But transcribing aural phenomena in text can result in subjective or ambiguous descriptions. To improve our understanding of the processes of represented sound in Latin text, we rely on comparative, and contextualised analyses of the sound-terms and their meanings. These analyses can provide information about the sociocultural significance of specific sounds, and importantly, assist us in better understanding the acoustic, affective and aesthetic qualities ascribed to such terms.

While the volume of scholarship on the senses in antiquity has increased considerably, at present, most studies have focussed primarily on the accumulation of literature reviews and adapting methodologies of the sensorium for ancient historical contexts.²⁰⁸ Bettini’s monograph *Voci*,²⁰⁹ pre-dating this new surge of sensory scholarship, demonstrates an interdisciplinary methodology that combines elements of anthropology and lexicography for the evaluation of animal sounds in Greco-Roman society. But since its publication in 2008, the study of the representation of animal sounds in Latin literature specifically, has remained comparatively unexplored.²¹⁰ The sounds of animals (as described in ancient texts) are however, often considered in ancillary discussions on the representation of animals in

²⁰⁷ VINCENT 2017, 149.

²⁰⁸ See especially, EMERIT, PERROT, & VINCENT, 2015, BETTS 2017, BUTLER and NOOTER 2018.

²⁰⁹ BETTINI 2008.

²¹⁰ Despite both VENDRIES (2015, 223) and BETTINI (2008a and 2008b, 214) having signalled the vast possibilities for further study in this area.

antiquity.²¹¹ Sound-production is a common feature of Ian Beavis' monograph *Insects and other invertebrates in classical antiquity*, as these sounds were often recorded by ancient authors.²¹² The text is not exhaustive in its treatment of insect sound-production however, and some aspects are overlooked or provide merely peripheral observations. Bees are omitted from the work entirely, in lieu of existing publications on Greek apiculture, leaving considerable *lacunae* on the tradition and representation of bees and apiculture in Latin literature.

Exposition of sound terminology use in English translations and commentaries of ancient literature is also somewhat lacking. Pliny's *Natural History*, Books VIII through XI (centred on mammals, reptiles, birds and insects), have not received a full English commentary, and the Loeb translation is restricted in its interpretation.²¹³ In contradistinction Ernout and Pépin's French translation and commentary of Book XI is quite useful in their approach to identification of insect type; but provides little analysis of sound terminology.²¹⁴

4.3. Sonorous Insects: Type and Identification

In the surviving Latin corpus from 55 BC to AD 180, the transcribed noises of insects are limited to a select few sonorous groups, and in the case of mosquitos and flies are, even then quite sparse.²¹⁵ These groups of noise-producing insects include: bees (*apes*), grasshoppers, crickets and cicadae (*locustae*, *grylli* and *cicadae*),²¹⁶ mosquitos, gnats and

²¹¹ A valuable parallel to this study is LEITMEIR'S discussion of the visual representation of locusts, grasshoppers and cicadas as muses in antiquity (2017). For other general works on the representation of animals in antiquity, with species-specific discussions on sound production see, LEWIS & LLEWELLYN-JONES 2017, KITCHELL 2010 and ARNOTT 2007.

²¹² BEAVIS 1988.

²¹³ RACKHAM 1983.

²¹⁴ ERNOUT & PÉPIN 1947.

²¹⁵ As a point of comparison, PLINY refers to bird sounds more than one hundred times in his *Natural History*, but refers to the sound of a *culex* only once (*HN*. 11.2.4), and completely omits any references to the sounds of *muscae* or *asili*.

²¹⁶ For the sake of clarity, in the present work the Latin term *cicada* (which can sometimes be used to denote crickets and grasshoppers) will always be italicised. In contrast to the unitalicised English 'cicada', which is understood as an insect of the order 'Cicadidae'.

midges (*culices*), and flies (*muscae* and *asili/oestra*).²¹⁷ But analysing the representation of insects in ancient texts can be a rather challenging objective. Ambiguous, and at times interchangeable, use of insect names, misinterpretation of behaviours and physiology, and misidentification of species are common occurrences in the representations of insects in ancient texts. Modern scholars typically rely on contextual meaning to assist in our identification of specific insect types in ancient texts.²¹⁸ But the blame does not lie solely with ancient authors; the term *cicada* in ancient Latin for example, has been translated as ‘cricket’,²¹⁹ ‘tree-cricket’,²²⁰ ‘grasshopper’,²²¹ or ‘cicada’²²² seemingly at the discretion of the translators.²²³ Surviving visual depictions of these insects suggest that ancient artists (at the very least), knew their crickets from their cicadae.²²⁴ Despite the similar acoustic qualities of their sounds, Pliny makes a specific distinction between the timing of locust and cicadae sounds; noting that locusts are heard at the equinoxes and cicadae sounds are heard frequently in mid-summer.²²⁵

I have chosen to arrange the insects roughly by order or family, but also accounting for the ambiguity and interchangeability of Latin terms. In this way insects of the families *Culicidae* (mosquitoes) and *Ceratopogonidae* (biting midges or sandflies) are combined under the Latin name *culex*. Insects of the order *Orthoptera*, which includes grasshoppers, locusts, and crickets, will be incorporated with insects of the family *Cicadidae* (cicadae) into a section on the Latin names *locustae*, *grylli* and *cicadae*.

²¹⁷ A handful of references to insects that cannot be grouped into these groups, include a likely reference to a chafer (PLIN.*HN*.11.98; see below fn. 300 and §7.5.5.); and incidental references to the voice of anthropomorphised wasps in PHAEDRUS’ *Fables* (3.13), and in PEROTTI’S appendix to PHAEDRUS (31), PERRY 1965.

²¹⁸ BEAVIS 1988; LEITMEIR 2017; LEWIS & LEWELLYN-JONES 2017.

²¹⁹ MART. 11.18.5; BAILEY 1993.

²²⁰ CALP. *Ecl.* 5.56; DUFF & DUFF 1934.

²²¹ *Laus Pis.* 79; OV. *Ars.* 1.271; *Ibid.*; MOZLEY 1929.

²²² APUL. *Fl.* 13.8; VERG. *Ecl.* 2.13; JONES 2017.; FAIRCLOUGH 1916.

²²³ On the translation of *cicadae* in context, see below fn. 225, 303, 318, and 341.

²²⁴ BEAVIS 1988, 91.

²²⁵ PLIN. *HN* 11.107. Several references associate the Latin *cicadae* with Summer (*Copa* 27; MART. 10.48; OV. *Ars* 271; JUV. 9.69), and even the heat of mid-day (VERG. *Ecl.* 2.13, *G.*3.327; APUL. *Fl.* 13.4). In such instances, I believe we can safely interpret *cicada* as the heat-loving, hemipteran cicada.

4.4. Brief Methodological Overview

To provide a more holistic critical analysis of insect sound descriptions in Latin literature, I have adapted a methodology recently proposed by Alexandre Vincent that combines lexicographical approaches with comparative sound analysis.²²⁶ The present work will employ this adapted method by comparing Latin sound-terms with modern sensory perceptions of identifiable insect sounds. In brief, I have used lexicographical methods to gather a corpus of references to insect sound in Latin literature in the chosen time period, analysed the word frequency and identified the “emitter” of the sound (i.e. the type of insect producing the specific sound described) in each reference, to identify general patterns of usage. Vincent’s methodology focussed primarily on the evaluation of Latin adjectives, by categorising their represented qualities into acoustic and impressionistic qualifications. The methodology used here modifies this categorisation in relation to earlier research by Maarit Kaimio on the characterisation of Greek sounds.²²⁷ I will categorise sound characteristics into the following groups: i) acoustic qualities, descriptions pertaining to pitch, loudness, duration, and tone-quality; ii) affective qualities, descriptions identifying associated emotions (for example, joyful, sad, plaintive); and finally, iii) aesthetic qualities, descriptions where an aesthetic value judgement is implied (e.g. pleasant or unpleasant).²²⁸ The analysis will also be supported by biological or animal behavioural evidence.²²⁹

4.5. Comparative Analysis of Sound-Terms Organised by Insect Type

²²⁶ VINCENT 2017. It is important to note that there are numerous methodologies developed to analyse sound in the ancient world. For further reading see: EMERIT, PERROT, and VINCENT 2015, LAURENCE 2017, VEITCH 2017, BUTLER and NOOTER 2018.

²²⁷ KAIMIO 1977.

²²⁸ Affective and aesthetic qualities are categorised in Vincent’s methodology as articles of impression, see VINCENT 2017, 147.

²²⁹ Maurizio BETTINI also uses animal behavioural evidence to supplement his analyses in *Voci* (2008), and “Laughing Weasels” (2008b). Bettini focusses primarily on verbal forms and sound catalogues in ancient texts, and places considerable emphasis on the sociocultural views on concepts of ‘voice’ and ‘communication’, especially in relation to animals.

The ensuing analysis will be arranged into categories of insect-type. This structure better frames the comparative analysis of sound and textual representations with a specific emphasis on the *emitter* of the sound. Categorising sound descriptions by source was consciously avoided by Kaimio in her earlier monograph.²³⁰ But this choice was primarily to avoid repetition. Kaimio's work involved a much larger scope than the present research, in its assessment of all references to the qualities of sound in the Ancient Greek corpus prior to 400 BC.²³¹ There will inevitably be *some* repetition, however this will be minimised wherever possible.

4.5.1. Bees (*apes*)

The Latin noun *bombus* and its verbal cognates *bombire* and *bombilare*, are used rather infrequently during this period, but provides an initial point of discussion regarding bee sounds in Latin literature. One of the earliest references using this term during the chosen period appears in Lucretius, who rather noisily, conjures the aural image of the “deep and hollow roar” (“*depresso graviter*”) of the Roman *tuba* resounding in the landscape with its “barbarous boom” (“*barbita bombum*”)²³². In the Latin literature of the late Republic and early imperial period, *bombus* (and its cognates) is regularly associated with Roman wind instruments, including the curved *cornua*,²³³ the straight *tubae*,²³⁴ and the double-piped *tibiae*.²³⁵ *Bombus* is also applied to sounds of bees in Varro²³⁶ and Pliny,²³⁷ and all three references draw direct associations between the buzzing of bees and Roman military brass instruments. Varro's discussion of apiary practices draws an extended comparison between bees and soldiers:

²³⁰ KAIMIO 1977.

²³¹ KAIMIO 1977, 12.

²³² LUCR. 4.544; MELVILLE 2008, 116.

²³³ CATULL. 64.263; NERO *poet.* 3.1; PERS. 1.99.

²³⁴ APUL. *Met.* 10.31.25; LUCR. 4.544.

²³⁵ APUL. *Fl.* 3.

²³⁶ VARRO. *Rust.* 3.16.32.

²³⁷ PLIN. *HN.* 11.20.3; 11.26.3.

sleeping and working in alternating watches,²³⁸ giving orders with a voice imitating the sound of a *tuba* ("vocem ut imitatione tubae"),²³⁹ and producing a loud humming noise ("consonant vehementer") when about to swarm, like soldiers breaking camp.²⁴⁰ The allusion between bees and Roman martial music is a common motif that appears in a variety of literary products of the time. Vergil describes the sound of bees as imitating the "broken sound" of *tubae* ("fractos sonitus imitata tubarum"),²⁴¹ a reference cited by Columella when referring to the audible changes in humming and buzzing of the hive before dispersal.²⁴² There are very clear connotative reasons for the use of *bombus*, in relation to Roman martial instruments: to extend metaphors of bees as a military unit, and to evoke notions of communication, organisation and industry. This provides writers like Vergil and Pliny with a familiar, effective way to represent the industriousness of the Roman spirit.

While this extension of military metaphors appears to be a central motive for the use of *bombus* in Varro and later Pliny, it seems likely that these authors were intentionally alluding to similarities in the acoustic properties of the sounds of bees and 'brass instruments'. If we review and compare references to the sounds produced by these emitters, we can gain a broader contextualised picture of their meaning and use. Varro, our earliest account, states that honey is ready to harvest when the bees make a "humming noise" ("*bombus*") and when they "flutter" ("*trepidant*") in and out of the hive.²⁴³ Pliny embellishes several details from Varro, stating that sleeping bees are woken by one bee that issues "a double or triple buzz as a sort of bugle-call" ("*excitet gemino aut triplici bombo ut bucino*"),²⁴⁴ and with the same "loud buzz" (*bombus*)

²³⁸ VARRO. *Rust.* 3.16.9.

²³⁹ VARRO. *Rust.* 3.16.9; cf. PLIN. *HN.* 11. 20. In the same way that Roman brass instruments were used as a form of communication in warfare during this period, CROSS 2014a, 2014b.

²⁴⁰ VARRO. *Rust.* 3.16.30.

²⁴¹ VERG. *G.* 4.67-72.

²⁴² COLUMELLA. *Rust.* 9.9.4.4.

²⁴³ VARRO. *Rust.* 3.16.32.5.

²⁴⁴ PLIN. *HN.* 11.20.

also sounds the call to sleep.²⁴⁵ Comparing these descriptions with other references to brass instruments and bees, in Vergil – for instance, the “broken sound” of *tubae* (“*fractos sonitus imitata tubarum*”)²⁴⁶ – we get a sense of short bursts of ‘buzzing’ of individual insects in contrast to greater, more complex swarming noises.

A possible behavioural explanation for this sound-designation is the short, buzzing impulse given off by bees when communicating. Queen bees have been observed to issue short buzzing sounds in the context of preparing for swarming, which are called “toots” or “quacks”.²⁴⁷ Recordings of these sounds are particularly evocative of Pliny’s *bucinator*-bee.²⁴⁸ Another context for these buzzing impulses is the so-called “waggle dance,” characterised by a figure-of-eight movement. As the lead-bee commences the ‘waggle run’ along the horizontal axis of the figure-of-eight shape, it will intermittently issue short impulses of airborne sound.²⁴⁹ These short iterative impulses also correspond neatly to Pliny’s reference to the “double” or “triple” buzz.²⁵⁰ This suggested correspondence is strengthened by Varro’s description of the bees’ action as *trepidant* (i.e. the insects “tremble”) immediately after his reference to their sound as *bombus*. In short, identification and extrapolation of specific insect behaviour using sound references in Latin literature – in this introductory example, references to the linguistic descriptor *bombus* to represent a particular sound associated with the bee – is more than conjectural. Here, when applied to bees, *bombus* refers to the short, punctuated ‘buzzings’ of individual bees as opposed to more complex swarming sounds. This sound may be characterised by the staccato sound traditionally designated ‘buzz’ in English, followed closely

²⁴⁵ PLIN.*HN*. 11. 26.

²⁴⁶ VERG.*G*. 4.67-72.

²⁴⁷ MICHELSON et. al. 1986.

²⁴⁸ PLIN.*HN*.11.20.2-3. See especially Sound Recording 4.

²⁴⁹ GRÜTER & FARINA 2009, 243.

²⁵⁰ PLIN.*HN*. 11.20.

by a second or third impulse, which can be transcribed onomatopoeically as “*bzz-zzt*” or “*bzz-zzt-zzt*”.²⁵¹

The term *bombus* is applied by Suetonius in his *Life of Nero*, to denote a noisy style of applause that was associated with Alexandrians.²⁵² Rolfe translates the term *bombus* in this context as “the bees”. Rolfe notes that the use of *bombus* in this context “seems to have derived its name from the sound, which was like the humming of bees.”²⁵³ But as noted above, during this period we find more references to *bombus* in association with wind instruments than bees. Suetonius is one of the later sources in the chosen period to use this term, and the verbal cognates of *bombus*, *bombire* and *bombilare* do also appear in the pseudo-Suetonian sound catalogue.²⁵⁴ This later pseudo-Suetonian association of *bombus* with bees could lend credence to Rolfe’s translation, especially if we consider the fragment as a Suetonian piece. But in considering the overall patterns of usage during this period, I believe a denotation of the overall sound quality of their applause, rather than the symbolised emitter would be more accurate – in English this could be transcribed as “the buzzers” or “the rumblers”.

In contrast to the staccato buzzing’s denoted by *bombus*, a variety of other sound nouns and verbs seem to characterise the complex rumbling, humming, and drawn-out droning of the swarm. Two of the most common general sound-terms when referring to the sounds of bees are *murmur* and *stridor* (and their various cognates). *Stridor* is a complex term that encompasses many distinct types of sound. During this period the term *stridor* is used to denote the sounds of wind whistling through rigging,²⁵⁵ the whirring sound of missiles and arrows as

²⁵¹ See Sound Recording 5.

²⁵² Suet. *Nero*, 20.3.

²⁵³ Rolfe 1914.113.

²⁵⁴ Suet. *Rel.* REIFF 161.

²⁵⁵ Ov. *Tr.* 1.4.9; Plin. *Ep.* 9.26.4.6; Prop. 3.7.47.

they fly,²⁵⁶ metallic screeching and grating noises,²⁵⁷ hissing steam,²⁵⁸ and sounds of quenching metal,²⁵⁹ as well as brass instruments,²⁶⁰ and other animals.²⁶¹ *Murmur* is similarly complex in its diverse representation of sounds, and is usually referred to the sounds of: earthquakes,²⁶² rumbling thunder,²⁶³ the sounds of rushing water,²⁶⁴ and the roar of the ocean,²⁶⁵ invoking incantations or evil mutterings,²⁶⁶ the murmurs of crowds,²⁶⁷ and figuratively as whispering rumours.²⁶⁸ If we compare the sounds made by bees with the other sounds denoted by these terms, we can identify similar sound qualities shared across these references.

When referring to the sounds of bees, both *stridor* and *murmur* are used in a variety of contexts, and appear to be used in a general sense, to simply designate that a sound is being produced. Denotative sound-terms of this type rely on our own prior experiences and knowledge of the sounds in question to complete the aural picture. In references to bees, *stridor* (and its cognates *stridulus* and *stridere*) is used in relation to the sounds of swarming behaviours.²⁶⁹ The application of this term to the sounds of bees, seems to extend on the notion of the air-displacement sounds of bee swarms, which are typically dynamic, and fluid in nature, made up of multiple micro-sound events. Swarming sounds are typically characterised by constant fluctuations in loudness, density, and duration.²⁷⁰ The use of *murmur* (and its

²⁵⁶ LUC. 9.827; SEN *Her. F.* 993; SIL. 1.317.

²⁵⁷ STAT. *Theb.* 4.244; VERG. A. 6.558; 6.573; 7.613.

²⁵⁸ MART. 14.33.2; OV. *Met.* 4.123; 9.171.

²⁵⁹ VERG. A. 8.420; 8.450; G. 4.172.

²⁶⁰ SIL. 5. 189, LUC. 7. 475, SEN. *Oed.* 733; SEN. *Thy.* 575.

²⁶¹ *Elephants: BAfr.* 84.1.6; CURT.*Alex.* 8.14.23.2; FLOR.*Epit.* 1.13.34; *Snakes: LUC.* 9.631; OV. *Met.* 9.65; SIL. 2.537; 2.587; STAT. *Theb.* 1.599.

²⁶² *Aetna*, 463; STAT. *Theb.* 7.796; VERG. A. 3.582.

²⁶³ LUCR. 5.1193; 5.1221; 6.288.

²⁶⁴ STAT. *Theb.* 4.809; 9.348; *Silv.* 1.3.22; VERG. A. 1.245.

²⁶⁵ LUCR. 3.1032; 6.142.

²⁶⁶ APUL. *Met.* 2.1.11; STAT. *Theb.* 9.734; 11.337.

²⁶⁷ GELL. *NA.* 11.7.8.1; VERG. A. 5.369; STAT. *Theb.* 6.784; *Silv.* 1.1.65.

²⁶⁸ STAT. *Silv.* 1.4.14; *Theb.* 12.537; *Ach.* 1.380.

²⁶⁹ OV. *Fast.* 3.747; STAT. *Theb.* 10.576; VERG. A. 7.65; 12. 590; G. 4.556.

²⁷⁰ See especially, *Sound Recording 3*; VINCENT identified these characteristics in his analysis of the adjective *raucus* (2017, 154-155), which is also used to characterise the sounds of both Roman brass instruments and bees.

participle *murmurans*) is similar, but the term is most commonly used for the humming and rumbling sounds of bees while *inside* the hive,²⁷¹ especially prior to an unwanted dispersal of the swarm.²⁷² The evidence seems to suggest the onomatopoeic *murmur* evokes the muffled murmurings of the bees from inside the hive, characterised by a lower intensity, and loudness, especially when compared to more defensive swarming behaviours. Pliny does also use the term *murmur* in a more general sense however, as the stereotypic sound produced by bees.²⁷³

Fremitus is also used by Vergil in denoting the sound of bees when attending to the queen bee in dense swarms.²⁷⁴ This term is usually characterised as a continuous, deep rumbling, humming or buzzing sound, and is often used for several noisy or clamorous sounds.²⁷⁵ In a similar way, Statius' use of the verbal cognate of *fremitus*, *fremere* comes in the general denotative sense of 'issuing a sound'.²⁷⁶ Considering the context of the passage and the aggressiveness of the bees while engaging in defensive behaviour (further qualified by the adjective *asper*), *fremo* here seems to designate a fierce, frenzied, noisy, and complex swarming noise.

In most of the instances discussed above the sound-terms are also qualified by attributive sound-terms that provide further characterisations of their acoustic, aesthetic and affective qualities. Of these qualities, references to the acoustic characteristics of bee sounds are the most common. Bee sounds are described in a rhythmic sense as *contractus* ('contracted'),²⁷⁷ or *fractos sonitus* ('broken sound') as described by Vergil.²⁷⁸ These terms

²⁷¹ COLUMELLA. *Rust.* 9.8.2.3; PLIN. *HN.* 11. 63; VERG. *A.* 12. 590.

²⁷² COLUMELLA. *Rust.* PLIN. *HN.* 11. 54; An aural simile in Statius' *Achilleis* and a similar reference in SILIUS (2. 220) are outliers in this instance; as *murmur* is employed when comparing the sounds of a dispersing Greek army with the joyful murmuring of Hybla's "swarms return[ing] to their grotto laden with new honey", 1.554.

²⁷³ PLIN. *HN.* 11. 266.

²⁷⁴ VERG. *G.* 4.215-216.

²⁷⁵ OLD 1968, 732. s.v. "*fremitus*".

²⁷⁶ STAT. *Theb.* 10.576.

²⁷⁷ PLIN. *HN.* 11. 266.

²⁷⁸ VERG. *G.* 4.67-72.

characterise the sounds as short, and punctuated. But the buzzing of bees could also be drawn-out especially at times of collective ill-health in the hive.²⁷⁹ Vergil describes the observable changes to the sounds of a diseased hive, noting that a “duller sound [and] a long-drawn buzz” (“*sonus grauior, tractimque susurrant*”) can be heard. The terms *gravis* and *traho* signify the pitch and duration of the sounds described in this passage, in comparison to more typical hive or swarming sounds, at higher pitches and greater intensity. *Gravis* when used to refer to sound is usually understood in terms of a low pitch,²⁸⁰ but the term can also be used in a more affective sense to refer to being overwhelmed by sorrow or anxiety.²⁸¹ Modern studies note that changes in the brood cycle and quality of hive health can be identified by variations in the vibrations and acoustic signals from within the hive itself.²⁸² These changes in vibration manifest themselves as variations in the audible sound of the hive, which could add credence to Vergil²⁸³ and Pliny’s²⁸⁴ accounts of the distinct sounds of a diseased hive.

Vergil, Varro and Columella present terms relating to the loudness or intensity of bee sounds, most notably the participles *ingens* and *vehemens*. Vergil characterises the loud humming of a dense swarm of bees as *stridore ingenti*.²⁸⁵ *Ingens* denotes a great size or number, or considerable intensity. In a similar way, these sounds are characterised as *vehemens*, by Varro²⁸⁶ and later by Columella.²⁸⁷ *Vehemens* places emphasis on the loudness, energy and intensity of the sound.²⁸⁸ Only a handful of references to the tone quality of bee sounds can be found in the corpus during this period. They occur in a passage in which Vergil compares the

²⁷⁹ VERG. *G* 4.262.

²⁸⁰ VAR. 2.9.4; OV. *Fast.* 3.368; SEN. *Thy.* 574; SIL. 2.545; CATULL. 63.22.

²⁸¹ SEN. *Ep.* 80.6; Ag. 306; SIL. 17.160; OLD 1968, 775. s.v. “*gravis*”.

²⁸² BENCSIK, *et al.* 2015; QANDOUR, *et al.*, 2015.

²⁸³ VERG. *G*. 4.262.

²⁸⁴ PLIN. *HN*. 11.63.

²⁸⁵ VERG. *A*. 7.65.

²⁸⁶ VARRO. *Rust.* 3.16.30.

²⁸⁷ COLUMELLA. *Rust.* 9.8.2.3.

²⁸⁸ OLD 1968, 2020. s.v. “*vehemens*”.

sounds of bees to the “warlike ring of the hoarse clarion” (“*Martius ille aeris rauci canor*”),²⁸⁹ and while engaging in a close swarming formation in a passage from Silius.²⁹⁰ *Raucus*, usually translated as ‘hoarse’, seems to qualify the repetitiveness and fluidity of the complex swarming sounds of bees.²⁹¹

In part, due to the personification of certain behavioural traits and the extended metaphors between bees and the military by Latin authors, the sounds of bees were also ascribed with affective meaning. Pliny describes the sounds of the hive as mournful (*tristis*), at the death of the queen bee²⁹² during times of pestilence and disease.²⁹³ While this reference reads as a figurative, personified representation of bees mourning their monarch,²⁹⁴ there may also be a more literal explanation for this description. If we reconsider Vergil’s description of the low and drawn-out sounds of the diseased hive,²⁹⁵ these distinct changes in the sounds of the hive could easily be interpreted by ancient authors as an expression of sadness. As anyone who has had the displeasure of accidentally disturbing a bee-hive would tell you, bees can also *sound* angry. Vergil notes the fierce, angry sounds associated with swarming behaviours in response to smoking bees,²⁹⁶ a custom of Roman apiary practices.²⁹⁷ This interpretation conflates emotional responses of anger with typical defensive swarming behaviours in bees,

²⁸⁹ VERG.*G.* 4.71; Also quoted by COLUMELLA.*Rust.* 9.9.4.

²⁹⁰ SIL.2.221.

²⁹¹ VINCENT 2017, 155.

²⁹² PLINY incorrectly identifies the sex of the queen bee, as a masculine ‘king’.

²⁹³ PLIN. *HN.* 11. 63.

²⁹⁴ This also serves as an aural allusion to the loud, wailing and lamenting of Roman funerary practices, see HOPE 2017.

²⁹⁵ VERG.*G.* 4.262.

²⁹⁶ VERG.*A.* 12.588.

²⁹⁷ For an overview of Roman bee-keeping, see CRANE 1999, 203-211.

but perhaps justifiably so. Defensive swarming sounds can be characterised by a raised pitch, loudness and overall intensity, matched equally by the fierceness of the swarm.²⁹⁸

4.5.2. Grasshoppers, Crickets and Cicadae (*locustae, grylli, cicadae*)

Grasshoppers, crickets and cicadae are another group of sonorous insects described often in ancient Latin texts. As we have already noted above the denotative meaning of sound-nouns and adjectives derives almost entirely from context, and when referring to the sounds of *Orthoptera* and *Cicadidae*, the terms signify the high-pitched, and at times piercing, sounds associated with these insect groups. As with the sounds of bees, *stridor* is also used, in a distinct way to denote the chirping sound of crickets,^{299, 300} the stridulations of locusts³⁰¹ and the shrill sounds of cicadae.³⁰² Pliny uses the term in a general sense, in contrast to the *murmur* of bees, and associates a “brief hiss” (“*contractum stridorem*”; as the characteristic sound of *cicadae*).³⁰³

²⁹⁸ BETTINI’S adaptation of ‘affordances theory’ is useful here, as a method to “understand the perceived possibilities ... that an object (such as an animal) offers in relation to a human project of a symbolic and intellectual nature” (2008b, 214). This modified approach can assist in our critical analysis of the affective and aesthetic qualities ascribed to some animal sound-terms.

²⁹⁹ Plin. *HN*. 29.138.5; 11. 98.

³⁰⁰ RACKHAM (1983) ascribes the “shrill noise... at night” (“*nocturno stridore vocales*”) in PLINY (*HN* 11.98) to the death-watch beetle in association with the claim that the insects “bore numerous holes in hearths and walls” (“*alii focos et parietes crebris foraminibus excavant*”). But it seems far more likely that the shrill nocturnal voice in this passage belongs to a cricket. The percussive ticking of the death-watch beetle, made by repetitively striking wood with its head, is attested by modern behavioural evidence, see BIRCH 1991, and GOULSON et al. 1994, cf. with [Sound Recording 1](#) and [Sound Recording 2](#). Such sounds do not correspond with the typical acoustic characteristics signified by *stridor*. ERNOUT and PÉPIN consider the phrase ‘*volitant alii magno cum murmure aut mugitu*’ as a separate clause, prompting them to identify the fluttering wings of a European chafer (French: *hanneton*) as the source of the *murmur* and *mugitus*, see ERNOUT and PÉPIN. 1947, 59; 149, §98.3. I find this to be a sound conclusion, and prefer to interpret two distinct sound-producing insects in this passage; the shrill night cricket, and the fluttering chafer.

³⁰¹ PLIN. *HN*. 11.107.

³⁰² *Laus Pis.* 79-80; PLIN. *HN*. 11. 107, 266.

³⁰³ PLIN. *HN*. 11.266; While RACKHAM translates *cicadae* as ‘grasshopper’ (1983) it is clear PLINY is here rather accurately describing the sound producing methods of cicadae, BEAVIS 1988, 100-101.

Other general sound-terms used to evoke the sound of cicadae include *convicium*,³⁰⁴ *clamare*,³⁰⁵ *fremere*,³⁰⁶ *increpare*³⁰⁷, *resonare*³⁰⁸ and *canere*.³⁰⁹

Another common use for the term *stridor* denotes the sounds made by wings or feathers. The sound is denoted by Pliny as "*pinnarum stridore*".³¹⁰ The association of *stridor* with *pennae* (or its alternate form *pinnae*) is typically only associated with birds.³¹¹ This typically refers to the sound of air-displacement that occurs when birds fly, including general “whooshing” sounds and high-pitched feather-whistles. This likely draws from the wide usage of *stridor* to denote similar whistling sounds of air-displacement, such as wind through the rigging of ships,³¹² and the whirring of arrows and missiles.³¹³ Pliny explicitly employs this phrase in characterising the sound of an enormous swarm of locusts in flight, stating that, due to their size, the sound of their wings were mistaken for birds.³¹⁴

Ancient Latin authors also note the short or staccato ("*contractus*"),³¹⁵ rapid ("*rapidus*"),³¹⁶ and persistent duration of their sounds ("*crebro*").³¹⁷ But descriptions of the shrill tonal quality of the sounds of cicadae are more commonplace. Pliny notes that when the Scolymus (golden thistle) is in blossom “the song of the [cicada] is shrillest” ("*qui florente ea*

³⁰⁴ *Laus Pis.* 79-80; For the use of *convicia* to characterise the reproachful voice of the *culex*, see below §4.5.3.

³⁰⁵ PHAED. 3.16.3.

³⁰⁶ *Culex* 153.

³⁰⁷ CALP. *Ecl.* 5.56.

³⁰⁸ VERG. *Ecl.* 2.13.

³⁰⁹ PLIN. *HN.* 11. 92-95.

³¹⁰ PLIN. *HN.* 11. 104.

³¹¹ Verg. *G.* 1.406-407. Cf. *Ciris.* 515, 539, 4. 310; Ov. *Tr.* 1.75; Stat. *The.* 5.433. PLINY also employs a variation of this phrase, *implicatis strepitu pennis* (*HN.* 10.108). For more detailed discussion of the wing and flight sounds of birds see below, §6.3.1.

³¹² OV. *Tr.* 1.4.9; PLIN. *Ep.* 9.26.4.6; PROP. 3.7.47.

³¹³ LUC. 9.827; SEN *Her. F.* 993; SIL. 1.317.

³¹⁴ PLIN. *HN.* 11. 104.

³¹⁵ PLIN. *HN.* 11. 266.

³¹⁶ *Laus Pis.* 79.

³¹⁷ *Copa.* 27. Cf. Especially Sound Recording 6.

cicadas acerrimi cantus").³¹⁸ Phaedrus also qualifies the sound of his arrogant cicada as *acerbus*.³¹⁹ This short fable is littered with sound-terms characterising the incessant, noisiness of the cicadae, which pays the ultimate price for its ignorance. Vergil seems to use the participle *ardens* in a similar way to *acer* (or *acerbus*),³²⁰ in denoting the tone quality of shrill or sharp sounds.³²¹ But *ardens* here could also be interpreted as a reference to intensity or loudness of the sound, as it is often used in other contexts to refer to shining, or bright colours,³²² heat,³²³ or passionate, fierce or even violent emotions³²⁴ and actions.³²⁵

Along with these associations with shrillness, the term *argutus* is used to refer to *cicadae* in the pseudo-Vergilian work *Culex*,³²⁶ Calpurnius Siculus' *Eclogues*³²⁷ and Martial's *Epigrams*.³²⁸ The vast contextual uses of the term *argutus* make it difficult to clearly identify its specific connotative qualities.³²⁹ As *argutus* can be used to convey the clear definition of visual shapes,³³⁰ and of brightness,³³¹ it may convey a sense of tonal clarity. Its use in direct reference to the sound of *grylli* (crickets) in the Latin corpus,³³² may also add credibility to this interpretation. If we consider the evening chirps of the solitary cricket, there is a bright, clarity to it; especially when compared to the raucous texture and density of a midday chorus of

³¹⁸ PLIN. *HN*. 22.87; RACKHAM again translates *cicada* as 'cricket'. *Scolymus hispanicus* or 'Golden Thistle' is a wild plant that grows in the Mediterranean, and typically flowers in Italy from June to September (GAETANO 2009.119; 121). The contextual association between *cicadae* and Summer, suggests 'cicada'; see above, fn.225.

³¹⁹ PHAED. 3.16.3.

³²⁰ OLD 1968, 164-165. s.v. "*ardeo*".

³²¹ VERG. *Ecl.* 2.13.

³²² VERG. *G.* 4.91; OV. *Hal.* 113; SEN. *Nat.* 7.27.6; PLIN. *HN.* 37.91; 21.16; JUV. 11.155.

³²³ OV. *Met.* 1.46; PLIN. *HN.* 29.26; 31.45; CIC. *Tusc.* 1.42; PLIN. *HN.* 5.51.

³²⁴ CIC. *Fin.* 2.61; LUCR. 3.663; VERG. *A.* 6.130; SEN. *Con.* 1.1.21; QUINT *Inst.* 4.2.96; APUL. *Met.* 9.18.

³²⁵ CIC. *Brut.* 276; VERG. *G.* 3.46; SUET. *Jul.* 55.3.

³²⁶ *Cul.* 153.

³²⁷ Calp. *Ecl.* 5.56.

³²⁸ MART. 11.18.5.

³²⁹ OLD 1968, 168. s.v. "*argutus*".

³³⁰ VERG. *G.* 3.80.

³³¹ OV. *Am.* 3.3.9.

³³² *Dirae* 74.

cicadae.³³³ But *argutus* is also used in some instances to evoke a melodious quality.³³⁴ In the Greek tradition, the chirps of crickets, and the monotonous drones of cicadae were regarded as pleasant, if not melodious sounds;³³⁵ but Latin authors are rather more critical of these sonorous insects.³³⁶ Which leads us to the most likely explanation; the term *argutus* is also used to convey a sense of talkativeness or garrulousness.³³⁷

The representation of *cicadae* as clamorous, plaintive and talkative is a common characteristic in ancient Latin literature; a representation that straddles the line between affective and aesthetic qualities. These references appear in Apuleius, Vergil and Phaedrus, and seems to align with the more critical Roman view of cicadae as insects of annoying noises. Apuleius uses the adjective *obstreperus* to characterise the sounds of cicadae, which ascribes qualities of persistence or insistence to their prolonged dronings. This rings true with the primary usage of the verbal cognate *obstrepere* ('to make a louder noise in opposition or competition'),³³⁸ which adeptly evokes the image of apparent competitiveness in *cicadae*, clamouring to be heard over one another. Vergil extends this theme by applying the verb *rumpire* ('to burst forth') and *querulus*, usually translated as plaintive or complaining.³³⁹ The sense of this incessant song bursting forth also appears in the pseudo-Vergilian *Copa*.³⁴⁰ Ovid also rather emphatically refers to their chattiness in an adynaton, declaring that "sooner would birds be silent in spring, or [*cicadae*] in summer..."³⁴¹ than a woman persuasively wooed resist

³³³ Compare Sound Recording 8 and Sound Recording 7.

³³⁴ HOR. *Carm.* 3. 14 .21; 4.6. 25. *Ep.* 2.2. 90; MART. 6.34.7; 8.73.7.

³³⁵ BEAVIS 1988.101.

³³⁶ For a more detailed discussion on the differing attitudes toward the cicada's song in Greek and Roman culture, see BEAVIS 1988, 101.

³³⁷ CIC. *Att.* 6.5.1; PROP. 1.18.26; OV. *Ars.* 1.80, *Tr.* 5.9.23; PLIN. *Ep.* 5.6.40.

³³⁸ OLD 1968, 1225. s.v. "*obstrepero*"

³³⁹ VERG. *G.* 3.328.

³⁴⁰ *Copa* 27.

³⁴¹ MOZLEY also translates *cicadae*, as 'grasshoppers' (1929). Once again, cicada seems more appropriate in this context; see above, fn.225; BEAVIS, 1988, 101.

a lover” (“*Vere prius volucres taceant, aestate cicadae ... Femina quam iuveni blande temptata repugnet*”).³⁴² Garrulousness is heavily criticised in Phaedrus’ fable of the “Cicada and the Owl,” and in this context the insistent, incessant chittering is designated by the Latin *garrulus*.³⁴³ In this fable Phaedrus employs a wide range of sound-terms to qualify the annoying sound of the cicada, and also refers distinctly to the increasing loudness of its song, by employing the term *validior*; whereupon the oblivious cicada began to clamour much more loudly than before (“*multo validius Clamare occepit*”).³⁴⁴ In these references a sense of unwanted noise is quite clear and well-understood.³⁴⁵

Due to this characterisation as incessantly noisy insects, references to silent cicadae receive an added emphasis. Pliny characterises a distinct species of cicada (*tettigonia*, a Latin transliteration of the Greek *τεττιγόνιον*) as ‘mute’ (“*mutus*”),³⁴⁶ and asserts that all female cicadae are similarly silent (“*silere*”).³⁴⁷ According to Pliny the cicadae of the Reggio territory are also silent (“*silere*”), “but beyond the river in the region of Locri they sing” (“*ultra flumen in Locrensi canunt*”).³⁴⁸

4.5.3. Mosquitoes and Gnats (*culices*)

At my count, there are a mere five references to sounds of *culices* in Latin literature during this period. Perhaps the most obvious is the Pseudo-Vergilian poem *Culex* that features the shrill, reproachful voice of a vengeful ghost-*culex*. A brief summary of the text allows us

³⁴² OV. *Ars.* 1.271.

³⁴³ PHAED. 3.16.3.

³⁴⁴ PHAED. 3.16.

³⁴⁵ We do need to be aware of the deeper sociocultural meanings ascribed to the word “noise” in the 21st century, see COATES 2005 for examples, especially 661, fn.28; But within the context of these select references, the unpleasant aesthetic qualities of unwelcome, undesirable and annoying sounds are quite evident.

³⁴⁶ PLIN.*HN.* 11.92; Cf. ARIST. *HA* 556b.14; see also, BEAVIS 1988, 92.

³⁴⁷ PLIN.*HN.* 11.92; While male mating-calls are perhaps the most recognisable sounds of cicadae (PRINGLE 1954), female cicadae of some species can also produce a stridulatory response call, by flicking their wings together, see LUO & WEI 2015.

³⁴⁸ PLIN.*HN.* 11.95; RACKHAM 1983.

to identify patterns in the characterisation of the *culex*'s sound in this poem. A shepherd falls asleep under a tree while guarding his flock,³⁴⁹ when a fierce snake approaches.³⁵⁰ The snake is set to attack the sleeping shepherd when he is awoken by the bite of a *culex* on his eyelid,³⁵¹ and presumably by the sound of the insect as it flew by his ear. In reflex the shepherd swats away the mosquito, inadvertently crushing it, before seeing the snake and killing it with a tree branch.³⁵² That night, the ghost of the mosquito delivers a reproachful lament to the shepherd requesting a proper burial in exchange for saving his life.³⁵³ The work ultimately concludes with the shepherd, carving an *elogium* into the tree for the departed insect.

One common characteristic of the *culex*'s sound is its influence on disrupting sleep. At first the *culex* awakens the shepherd in alert to the approaching snake, and the second instance, we see the mosquito again, but now as a haunting spectre, awakening the shepherd by way of its reproachful and lamenting verse. The author here characterises the sound of the ghost-*culex* as *convicia*, which is typically reserved for shrill sounds (such as the sound of *cicadae*),³⁵⁴ or employed as “a vehicle of reproach (e.g. Cic. *Cael.* 3.6; *Fam.* 1.5.bl), importunity (Cic. *Clu.* 74) or disapproval (Cic. *Pis.* 26.63)”.³⁵⁵ In the context of this passage the use of *convicia* embodies all of these qualities, while evoking in a vivid sense the shrill, whining sound produced by the solitary, droning mosquito. The synonymous “ping” sound it produces, is characterised by a high-pitched frequency and a quick loudness swell and decay, as it whizzes past your ear. This sound is also closely associated with the subsequent irritation and discomfort of mosquito bites. Horace also alludes to this characterisation of *culices* (and *ranae* – frogs) as “cursed” (“*malus*”)

³⁴⁹ *Cul.* 157-158.

³⁵⁰ *Cul.* 163-165.

³⁵¹ *Cul.* 182-184; As the *culex* bites the shepherd it is mostly likely denoting a mosquito, as gnats very infrequently bite humans (BEAVIS 1988, 230).

³⁵² *Cul.* 187-201.

³⁵³ *Cul.* 208.

³⁵⁴ PHAED. 3.16.3.

³⁵⁵ SYPNIEWSKI 2002, 191, fn.409.

agents of sleep-deprivation, that “drive off sleep” (*"avertus somnos"*).³⁵⁶ The negative connotations associated with the sound of mosquitos are not too far-removed from our own contextual connotations of their insomnia and pre-emptive itch-inducing sounds.

Rackham translates the Latin *culex* as ‘flea’, in a passage describing the insect possessing “truculent and ... very loud voice” (*"truculentam et maximam vocem"*).³⁵⁷ As with many Latin insect names there is some ambiguity surrounding *culex*,³⁵⁸ but the term is usually understood to denote numerous species of ‘gnats’, ‘mosquitos’ or the smaller, swarming ‘midges’ “belonging mainly to the superfamily *Culicoidae*”.³⁵⁹ Rackham may have used ‘flea’ to emphasise the miniscule size of the insect’s body and emphasise Pliny’s reference to the insect’s “greedy thirst for [human] blood”.³⁶⁰ But when we also consider Pliny’s *culex* as *"maximam vocem"*, ‘gnats’, ‘mosquitos’ or ‘midges’ can be easily, and more correctly, understood. Translating *culex* as ‘midge’ in this context serves a satisfying dual-purpose; in the first instance, underscoring the miniscule size of the insect itself, but also referencing the loud, high-pitched and droning, whine sound that occurs when midges engage in collective swarming behaviours. In this context *"truculentus"* is an interesting choice, typically meaning ‘ferocious’ or ‘aggressive’.³⁶¹ Pliny seems to associate the connotations of their blood-sucking habits with their sound; essentially depicting *culices* as fierce, in both sound and in nature. This aggressive affective quality applied to the sound also suggests quick, sporadic movement, which further evokes the frenzied, complex, high-pitched humming of *Culicoides* swarms.

³⁵⁶ HOR. S. 1.5.14.

³⁵⁷ PLIN. HN. 11.2.4; RACKHAM 1983, 435.

³⁵⁸ BEAVIS also notes that the term *culex* is sometimes used for “other insects that bear a superficial resemblance to gnats or mosquitos” including fig-wasps, gall-wasps and other garden pests (1988, 233, fn.56). ERNOUT & PÉPIN in their French translation opt for *cousin*, in denoting a crane-fly or large mosquito-like gnat (1947, 30).

³⁵⁹ BEAVIS 1988, 229-236.

³⁶⁰ PLIN. HN. 11.2.4; RACKHAM 1983, 435.

³⁶¹ OLD 1968, 1981. s.v. *"truculentus"*.

One lone reference to the aesthetic qualities attributed to the sound of *culices* can be found in Martial's rather savage invective against a 'Vetusilla', who, among other things,³⁶² Martial claims had but "three hairs and four teeth, with the bosom of a grasshopper and the leg and complexion of an ant".³⁶³ In a 'part by part' style, that is common in invective texts of this period³⁶⁴ Martial also claims that "the frogs of Ravenna chatter more agreeably" ("*Meliusque ranae garriant Ravennates*"),³⁶⁵ and that "the gnat of Atria sings sweeter" ("*Atrianus dulcius culex cantet*").³⁶⁶ If we consider the broader contextualisation of *culices* as insects with "truculent and loud voice",³⁶⁷ that are associated with the annoyance of disrupting sleep,³⁶⁸ Martial's use of the adverb *dulciter*³⁶⁹ is clearly employed sarcastically to evoke the opposite sense; emphasising impressionistic qualities of annoyance, unpleasantness, perhaps even shrillness. Without pause to reflect on the further negative implications for the qualities of Vetusilla's voice, we move now to our final insect grouping; flies.

4.5.4. Flies (*muscae*, *asili*)

References to the sounds of flies in Latin texts during this period are quite scarce. Pliny in describing insect sound-production methods, refers generally to flies (*muscae*), bees (*apēs*), and "other creatures" stating they begin to create "an audible sound when they begin and cease to fly, as the sound is caused by friction and by the air inside them, not by breathing".³⁷⁰ Cicero

³⁶² A typo in the reference to this epigram is present in BEAVIS' treatment of *culices* (1988, 233), which I suspect may have been a deliberate attempt to shield the innocent young classicist from MARTIAL'S abrupt use of the obscene *cunnus*.

³⁶³ MART. 3.93.3; SHACKLETON BAILEY 1993a, 253.

³⁶⁴ RICHLIN 1984, 70-71.

³⁶⁵ MART. 3.93.8; SHACKLETON BAILEY 1993a, 255.

³⁶⁶ MART. 3.93.9; SHACKLETON BAILEY 1993a, 255.

³⁶⁷ PLIN. *HN*.11.2.4.

³⁶⁸ *Cul.* 208; HOR. *Sat.* 1.5.14.

³⁶⁹ Meaning, "in a sweetly sounding manner; in a manner that gives enjoyment, delightfully; in a charming style" (OLD 1968, 579, s.v. "*dulciter*").

³⁷⁰ PLIN. *HN*. 11. 266 – 267; RACKHAM 1983, 601. The more literal sense of the Latin meaning "they commence and cease to be heard".

and Phaedrus do provide allusions to the sound and general annoying nature of flies. Cicero has his character Strabo allude to flies, when disapproving of Vargula's pun directed against Aulus and Marcus Sempronius; "Boy, drive away these buzzers" ("*puer, abige muscas*").³⁷¹ In addition to denoting flies and horseflies, *Musca* was also a cognomen for the gens Sempronia. Vargula in this reference, appears to be implying a comparison between the buzzing of biting insects, and "the chattering [of] irritating canvassers".³⁷² This aural allusion to the 'buzzing' of flies, enhanced dramatically by Rackham and Sutton's translation of *muscas* as "buzzers," ascribes a negative aesthetic quality to the sound and behaviour of flies, in the form of an unpleasant annoyance.

We also see this characterisation in Phaedrus' *Fables*. In the 'The Fly and the Mule' Phaedrus anthropomorphises the *musca*, who "rails at a mule" ("*mulam increpans*") for pulling a wagon along too slowly.³⁷³ Due to the fly's threat of a nasty sting, it seems likely that *musca* here denotes a biting-fly such as the stable fly (*Stomoxys calcitrans*), which shares a similar size and appearance with the common housefly (*Musca domestica*) but sucks the blood of humans and animals.³⁷⁴ Figurative use of the term *increpans* suggests here a noisy and reproachful, protesting or complaining tone to the fly's speech. The term is also used in the verbal form *increpare*³⁷⁵ in denoting the sound-production of *cicadae* in Calpurnius's fifth eclogue, which is translated as "chirping".³⁷⁶ But as previously noted, in Roman society the sounds of *cicadae* were not held in the same high-regard as the Greeks,³⁷⁷ so this may further contextualise the use of *increpans* by Phaedrus as an example of uncomplimentary

³⁷¹ CIC. *De or.* 2.247.7; SUTTON & RACKHAM 1942.

³⁷² SUTTON & RACKHAM 1942, 381.

³⁷³ PHAED. 3.6.1; PERRY 1965.

³⁷⁴ BEAVIS 1988, 219.

³⁷⁵ OLD 1968, 875. s.v. "*increpo*".

³⁷⁶ CALP. *Ecl.* 5.56; DUFF and DUFF 1934, 263.

³⁷⁷ BEAVIS 1988, 101.

connotations of the term. This characterisation of Phaedruss' complaintive *musca* contributes to the notion of flies and their associated sounds as an annoyance.

The context and tone of Phaedruss' reproachful fly is markedly similar to the sound of the *asilus* as described in Vergil's *Georgics*. The buzzing of the gadfly³⁷⁸ is characterised as 'shrill of note' (*acerba sonas*).³⁷⁹ *Acerbus* here denoting a harsh, strident, discordant tone quality. In the context of the passage in Vergil, the harshness of the gadfly's buzzing is juxtaposed with its painful, blood-sucking bite and the instinctive fear this insect induces in herds of cattle. As with Phaedruss' *musca*, association with the insect's painful bite seems to also allude to rather unpleasant aesthetic and affective denotations to the sound's description. Once again, we also see a parallel between the harsh sounds of flies (in this case Vergil's shrill *asilus*) and the piercing, sounds of *cicadae* in both Pliny and Phaedruss.³⁸⁰

4.6. Patterns of Sound-Term Frequency

To further distil the implications of the above findings, it would be beneficial to provide a brief overview of the frequency of Latin terms used to characterise insect sounds throughout the Latin corpus. Evaluating the sound-term frequencies helps us to visualise the broad patterns relating to the most common sound-emitters, most frequently used words, author sound-term density and the diversity of sonic vocabulary. By doing so, we can trace broad patterns of usage during this two and a half century period. These patterns can also identify important avenues for further research, especially in relation to gauging the 'noisiness' of certain authors.³⁸¹

³⁷⁸ FAIRCLOUGH (1916) translates the Latin *asilus* as 'gadfly'; a sufficiently ambiguous term that typically refers to any "of various parasitic flies which cause great agitation in the livestock on which they deposit eggs or inflict bites; esp. a botfly (family Oestridae) or horsefly (family Tabanidae)", OED ONLINE 2019, s.v. 'gadfly'.

³⁷⁹ VERG. *G.* 3.149.

³⁸⁰ PLIN. *HN.* 22.87, 29.90; PHAED. 3.16.3.

³⁸¹ See below §7. for a review of the sonic vocabulary of Pliny the Elder.

Of the 133 instances of sound-term use in relation to insects (identified by this research); 60 of them relate to *apes*, followed by *cicadae* with 42 references; *culices*, *locustae*, *grylli* and *muscae*, with 9, 5, 3 and 2 references respectively, and with single, direct references to *asili*, *examinae*, *scarabaei*, *pulli* and *vermiculi*. The high number of references to *apes* and *cicadae* is expected. The sheer quantity of references to bees and bee-keeping in the Latin corpus naturally increases the possible amount of references to their sound. In contrast, the shrill, incessant sound of *cicadae* is perhaps their most identifiable feature; they can often be heard, without being seen. But I do find it surprising to find so few references to *muscae* by comparison, considering the nature of their rather persistent and often disruptive ‘buzzings’.

In terms of author frequency, Pliny unsurprisingly sits atop the list with 46 instances of sound-terms. The bucolic works of Vergil (28) and Calpurnius Siculus (2), following with a combined 30 references, and the agricultural texts of Columella (10) and Varro (6) are both fertile ground for the representation of sonorous material. The remaining references are spread quite evenly across a range of Latin literature, including epic poetry,³⁸² satire,³⁸³ and prose.³⁸⁴ The representation of sound in epic poetry can be very voluminous (in both quantity and loudness), but typically of the sounds of battles and war. It is not surprising therefore, to see an under-representation from this genre, considering the focus of the present work on insects.

Denotative sound-terms make up over half the references to insect sound in the selected corpus (84), followed by attributive (39) and self-qualifying terms (6). A number of aural evocations (4) are also used to allude to the sounds of insects. If we compare the frequency of denotative and attributive sound-terms, it is clear that 46% of denotative terms are further qualified by an associated attributive term. The quantity of references to the acoustic, affective or aesthetic qualities of sound can be challenging to interpret. This difficulty is attributed to

³⁸² eg. STAT. *Theb.*10.576; *Ach.* 1.554.

³⁸³ eg. HOR.*S.*1.5.14.

³⁸⁴ eg. CIC. *deOrat.* 2.247.7.

interpreting the ambiguities in the qualities connoted by an individual sound-term. The semantic range of a sound-term can sometimes be broad enough that it overlaps quality delineations, at other times the sound-terms can simply connote multiple qualities. It is worth noting that quality totals are not indicative of the number of attributive references that ascribe qualities, but rather the total number of *qualities ascribed*. That is to say, if a term connotes both aesthetic and affective qualities, each quality will be counted. Presenting these figures can nevertheless provide us with insights into the ways ancient Latin authors depict and characterise sound of different animal types in texts.

Acoustic qualities are the most common sound quality attributed to the sounds of insects with a total of 63 qualities recorded, followed by affective (14) and aesthetic (13) qualities. It is also interesting to note the diversity of sound terminology used to characterise insect sounds. While there are 70 distinct terms applied, according to my estimations only 13 of those terms are used more than 3 times throughout the entire corpus; and 57 of these references are used only once.

4.7. Concluding remarks

Stridor et Murmur has provided an exhaustive overview of the terminology used by Latin authors to denote and characterise the sounds of insects in literature from 55 BC to AD 180. The sound-producing insects in Latin literature are limited to a select few groups: bees (*apes*), cicadae, crickets and grasshoppers (*cicadae*, *grylli* and *locustae*), mosquitoes and gnats (*culices*) and flies (*muscae*, *asili/oestra*). The denotation of insect sounds in Latin literature varies considerably from one insect-type to the next. The sounds of bees are consistently associated through metaphor with Roman military brass instruments. These metaphors emphasise concepts of communication and organisation within the hive unit. There are contextual applications of sound-terms that are applied quite precisely to convey specific sound

qualities. *Bombus* is applied to solitary buzzings, which can be biologically linked to either the tooting of queen bees, or to the 'waggle-dance'. *Murmur* is applied to the muffled, rumbles and murmurs of bees within the hive, conveying a lower intensity and loudness of the sound. In contrast to *murmur*, *stridor* is associated with the complex sounds of air displacement of swarming bees *outside* the hive. The qualities ascribed by attributive sound-terms typically characterize the duration and intensity of their buzzes. While ancient Greek authors considered *cicadae* to be great musicians, they were viewed much less favourably in Latin literature. Latin authors usually characterise *cicadae* as talkative, garrulous or complaintive, and emphasise the incessantness of their stridulations. The qualities ascribed by attributive sound-terms usually emphasise their shrill and harsh tone, and the intensity, and duration of their sounds. References to the sounds of mosquitoes and flies are much less common in the Latin corpus, however both of these sonorous groups were characterised as noisy, reproachful and annoying insects. The shrillness of their buzzing was commonly accentuated.

Concluding this chapter with an examination of word frequency statistics allows us to gain broader insight into the ways in which Latin authors denote the sounds of these sonorous insects. The application of the chosen adapted methodology allows for a contextualised analysis of the characterisation of insect sounds in ancient Latin texts. By comparing the aural evidence, as transcribed and preserved by ancient authors in text, with the sounds of insects today, we can gain substantial insights into the qualities that are ascribed to specific Latin 'sound-terms'.

5. *Sibilus et Vocalis*

5.1. Preface

Using the method outlined in [*Nature's Song Remains the Same*](#), *Sibilus et Vocalis* will present an extensive review of the terminology used by Latin authors to characterise the sounds of reptiles and amphibians. The most sonorous of these animal types in Latin literature during the chosen period are snakes (*serpentes*) and frogs (*ranae*), respectively. These two groups will be the primary focus of the following discussion.



5.2. Introduction

Frogs are often heard before seen. Raucous croaks resound from the drain-pipes of homes before and during rain. Ponds, pools, marshes and rivers are awash with their chatter. But these audience-shy amphibians often cease singing when they realise they have attracted the attention of an overly-inquisitive human. Needless to say, visually identifying frogs for studies on population density can be a rather challenging endeavour. But the distinctiveness of frog vocalisations across species can assist scientists in providing *aural* identifications of species. A citizen-scientist project has recently been launched to monitor Australia's native frog populations by analysing publicly-sourced field-recordings of frog calls.³⁸⁵ Ancient Latin authors were also quite attuned to the acousmatic emissions of anurans, and descriptions of their vocalisations appear regularly in Latin literature.

In contrast to these vociferous amphibians, our everyday interactions with reptiles would rather suggest these cold-blooded creatures live a completely silent existence. When disturbed, sunbathing skinks slink, soundlessly, seeking cover; only the slightest crackling of leaves betrays their presence. A larger agitation of the foliage is likely to indicate the serpentine movements of a blue-tongued lizard, or in Summer, the serpentine movements of an *actual* snake. Perhaps it is our generally infrequent contact with reptiles that leads us to imagine this cold, quiet soundscape. But in actual fact, various types of reptiles make noises. Many different species of lizard expel air from their mouths "when "excited", thus

³⁸⁵ ROWLEY, et al. 2019.

producing a sound."³⁸⁶ Certain types of crocodile utter ferocious hisses and roars while charging in aggressive or defensive behaviours.³⁸⁷ And of course, snakes are widely known for their rattles and hisses. But aside from singular references in Pliny's *Natural History* to the sound of a gecko and a tortoise,³⁸⁸ snakes and frogs are the primary sound-producing reptiles and amphibians in ancient Latin literature.

Reptiles and amphibians are incidentally discussed in a number of general modern studies on animals in antiquity, including Campbell,³⁸⁹ Kitchell,³⁹⁰ and Lewis and Llewellyn-Jones.³⁹¹ There are also specific discussions of the representation of reptiles and amphibians in ancient art,³⁹² and archaeology.³⁹³ Several studies focus more closely on the literary representation of snakes, including Sauvage's *Le Serpent dans la Poesie Latine*,³⁹⁴ and an article by Ramírez del Prado on the serpents in the poetry of Vergil.³⁹⁵ But these articles do not evaluate the production of sound by these animals, or the ancient terminology used to characterise their sounds. Furthermore Sauvage argued that a closer investigation of the sounds of snakes would be "*d'un intérêt médiocre*."³⁹⁶ To my knowledge, the only modern work to discuss the denotation of snake sounds in antiquity is Perrot's discussion on the '*sifflement*' of serpents in ancient Greek.³⁹⁷

³⁸⁶ GANS & MADERSON 1973, 1196-1197.

³⁸⁷ GANS & MADERSON 1973, 1197.

³⁸⁸ *Gecko*: PLIN.HN.29.90.7. *Tortoise*: PLIN.HN.11.267.

³⁸⁹ CAMPBELL ed. 2014.

³⁹⁰ KITCHELL 2010.

³⁹¹ LEWIS, & LLEWELLYN-JONES 2017.

³⁹² TOYNBEE 1996.

³⁹³ JASHEMSKI & MEYER 2002.

³⁹⁴ SAUVAGE 1975.

³⁹⁵ RAMIREZ DEL PRADO 2003.

³⁹⁶ SAUVAGE 1975, 249.

³⁹⁷ PERROT 2012.

5.2.1. A Brief Note on Identification and Structure.

As snakes and frogs are the chief sound-producing reptiles and amphibians of Latin literature, the ensuing discussion will be structured by these two broad groups. It is not necessary to further split these groups into sub-divisions of species. In fact, such a further division would be extremely difficult to achieve and ultimately immaterial to this discussion. This is due to both the homogeneity of the snake's primary 'hissing' sound, and the vagueness of the general Latin term for frogs, "*ranae*".

The homogeneity of the hissing of snakes is further reflected in the literary evidence.³⁹⁸ While there are numerous Latin names for snakes,³⁹⁹ the denotation of their sound is considerably uniform, with the bulk of denotative sound-term references coming primarily from two overlapping lexical families: *sibilus* and *stridor*. But this sameness does allow us to include fictitious and mythical serpents into our analysis of sound terminology. The diction used to denote the hissings of the horrible *hydra*, and the sibilant sounds of the *basiliscus*, is consistent with the sounds of more common *serpentes* and *angues*. This subsequent section on the sounds of snakes will be ordered more-or-less in the same fashion as the previous chapter, [*Stridor et Murmur*](#). We will commence with an overview and evaluation of the specific denotative sound-terms used, and will conclude this section with a review of the attributive sound-terms that ascribe, acoustic, affective and aesthetic qualities to their sounds.

³⁹⁸ See below (§[5.6](#).) for comments on the lexical diversity of terms denoting snake and frog sounds.

³⁹⁹ LUCAN alone lists 17 distinct names for both real and fictitious serpents in a passage of his *Civil War* (*BC*.9.700-736); Cf. LEWIS, & LLEWELLYN-JONES 2017, 589-590.

In contradistinction, despite evidence of several species of frogs endemic to mainland Italy during the chosen period,⁴⁰⁰ frogs were primarily denoted by a single Latin name: *ranae*. An alternate term *bufo* is applied to toads, but there are no references to their sound in the Latin corpus. The vocalisations of frogs do differ considerably across species,⁴⁰¹ but the sheer vagueness of their Latin name *ranae* makes it virtually impossible to differentiate between species based solely on their literary descriptions. The lexical variation of Latin terms for frog sounds does however, correlate well with the overall diversity of their vocalisations. Due to the comparative complexity of these sound-terms, this section requires a slightly different structure to the evaluation of snake sounds. The discussion will commence with an examination of general denotative sound-terms, including those related to the production of sound. This section will also present a brief account of the contextual application of *vox*. The remaining sound-terms, both denotative and attributive, will be organised into thematic groups. These thematic groups include: "communicative" sound-terms that are associated with the action of 'calling' or 'communicating', and terms that characterise the 'chattiness' or 'garrulity' of these vocal amphibians.

Following the examination of the sounds of snakes and frogs in Latin texts, I will provide brief comments on Pliny's references to the sounds of geckoes (*galeotes*) and tortoises (*testudines*). This chapter will conclude with a summary of the overall sound-term frequency statistics of this sub-corpus.

⁴⁰⁰ JASHEMSKI & MEYER (2002, 332) identifies four European species of the genus *Rana* that are found in the region of Pompeii; "the agile frog *R. dalmatina*, the stream frog *R. graeca*, the pool frog *R. lessonae*, and the edible frog *R. esculenta*".

⁴⁰¹ Cf. Sound Recording 10, Sound Recording 13, and Sound Recording 14.

5.3. Snakes (*angues, cerastae, colubri, serpentes*)

The ‘hiss’ is certainly the most common form of sound production in snakes,⁴⁰² and Latin authors denote ‘hiss’ sounds and the action of ‘hissing’ in several different ways. They may refer more generally to the ‘sound’ or ‘voice’ of the snake, employing simple denotative terms such as *sonus*,⁴⁰³ *sonitus*,⁴⁰⁴ or *vox*,⁴⁰⁵ respectively. Verbs that denote general forms of sound production are also used, especially, *sonare* ("to sound"),⁴⁰⁶ *dare* ("to utter, produce sounds"),⁴⁰⁷ and *mittere* ("to utter, emit").⁴⁰⁸ But Latin authors also apply more specific denotative sound-terms to the hissing of snakes.

The most prolific of these specific Latin ‘hisses’ is the onomatopoeic noun *sibilus* and its verbal cognate *sibilare*.⁴⁰⁹ *Sibila*, the feminine form of the noun, is the characteristic form used in poetry of this period.⁴¹⁰ This stereotypic use is likely due to the applicability of its metre.⁴¹¹ The masculine form of *sibulus* is only used to denote the hiss of a snake twice in Petronius’s *Satyricon* and Pliny’s *Natural History*,⁴¹² which clearly demonstrates a well-defined distinction of the use of *sibilus* between poetic and prose texts. Vergil also

⁴⁰² YOUNG 1997, 39; 2003, 315.

⁴⁰³ STAT.*Theb.*8.345, referring to the hissing of Tisiphone’s serpentine hair; SEN.*Her.F.*784, referring to the sound of Cerberus’ great mane of snakes.

⁴⁰⁴ OV.*Ib.*159.

⁴⁰⁵ OV.*Met.*4.589; OVID employs ‘vox’ to contrast Cadmus’ human voice with his unintelligible hissing after his metamorphosis into a serpent. OVID’S uses ‘vox’ in a similar way to denote Callisto’s voice after being transformed into a bear by Juno (*Met.*2.484).

⁴⁰⁶ OLD 1968, 1791. s.v. "sono"; OV.*Met.*4.492; SEN.*Med.*961.

⁴⁰⁷ OLD 1968, 566-568. s.v. "do", esp. 567 §26; OV.*Met.*15.684.

⁴⁰⁸ OLD 1968, 1119-1120. s.v. "mitto", esp. 1120 §11; OV.*Met.*15.670.

⁴⁰⁹ LUC.*BC.*6.690; OV.*Met.*4.589; PROP.4.7.54; SEN.*Her.F.*786, 794; *Oed.*727; SIL.2.546; VERG.A. 7.447, 11.754; *exsibilare*: SIL. 6.219.

⁴¹⁰ LUC.*BC.*7.772, 9.631, 9.640, 9.724; OV.*Met.* 3.38, 4.494, 15.670, 15.684; PROP.4.8.8; SIL.2.587, 3.186, 6.189, 7.424, 9.443; STAT.*Silv.*2.1.48, 3.3.26; *Theb.*1.115, 5.528, 6.248, 8.345; VAL. FLAC. *Argon.*7.522-534; 8.103; VERG.A.2.211.

⁴¹¹ OLD 1968, 1753, s.v. *sibulus*^l.

⁴¹² PETRON.*Sat.*89.1 vs.40; PLIN.*HN.*8.78.

uses a self-qualifying sound-term by attributing the adjective *sibilus* to denote the hissing necks (*colla*) of snakes.⁴¹³

The earliest use of *sibila* in the chosen time period appears in Lucretius' *De Rerum Natura*. Lucretius employs *sibila* to denote the sougling of wind through hollow-reeds ("cavas cicutas") that first inspired "the country-folk to blow through pipes."⁴¹⁴ This sibilant sougling sound conjured here by *sibila* reconciles quite well with other general hissing sounds, including those of snakes. But later Latin authors like Ovid, Calpurnius and Statius, evoke Lucretius' use of *sibila*, and figuratively extend the term to the music of the shepherd's pipes that were *constructed* from hollow-reeds.⁴¹⁵ The application of *sibilus/sibilare* to the music of shepherd's pipes shifts the implied sound from a gentle, rustle or hiss of wind through leaves to the pitched sounds of melodic piping. These two contrasting semantic applications of *sibilus/sibilare*, present an interesting aural duality in the context of bucolic poetry. Snakes, the chief emitters of *sibili*, are depicted as both a physical threat to shepherds, and as a corrupting force to the bucolic realm more generally.⁴¹⁶ That the death of the *serpens* is symbolic of the commencement of Vergil's golden age in *Eclogue IV* is particularly telling.⁴¹⁷ So for the archetypal Roman shepherd, as constructed in literary texts, *sibilus* could denote both friendly and hostile sounds; the soft, melodious sounds of pipes, and the hissing maws of venomous vipers.⁴¹⁸

⁴¹³ VERG.A.5.277; G.3.420, which is also later quoted in COLUMELLA, *Rust.*7.4.6.12.

⁴¹⁴ LUCR. 5.1382; MELVILLE 2008, 176.

⁴¹⁵ OV.*Met.*13.785; CALP.4.45, 101; STAT.*Theb.*6.338.

⁴¹⁶ *Culex* 163-201; VERG.*Ecl.*3.93, 414; 8.93; G.3.420; STAT. *Theb.*11.310; COLUMELLA, *Rust.*7.4.6.12.

⁴¹⁷ *Ecl.*4.24; for further discussion of the 'snake in the grass' and the 'unfriendly landscape' of VERGIL's third eclogue see, KARAKASIS 2011, 117-120.

⁴¹⁸ There is however, only one reference to a snake in CALPURNIUS' *Bucolics* (5. 91.), and while it is postured as an noxious enemy to be thwarted by the shepherd, CALPURNIUS' snake does not hiss. Nevertheless OVID and STATIUS do apply *sibilus/sibilare* to both shepherds pipes and the hissing of snakes.

But prior to Ovid's first use of *sibila* in characterising the music of pastoral pipes, it is quite clear that earlier use of these terms in Latin texts remained within clearly defined semantic limits. In addition to denoting the hissing of snakes, and the soughing of leaves,⁴¹⁹ these terms were applied to denote the contemptuous hissing of people or crowds,⁴²⁰ and whispering sounds of wind, more generally.⁴²¹ Even by the late 1st century AD, the rhetorician Quintilian was presenting *sibilus* as a key example of a Latin onomatopoeia.⁴²² This assertion positions the comparatively infrequent use of *sibilus/sibilare* in denoting shepherd's music, as an ancillary definition. The subtle overlap between the use of *sibilus/sibilare* in denoting whispering 'whistles' and sibilant 'hisses' foreshadows the semantic complexity of the next sound-term group. The use of *stridor* in denoting hissing sounds provides yet another facet of this expansive sound-term.

Stridor is perhaps the most multifaceted sound-term that we have discussed in the course of this thesis, and indeed will feature prominently in the following chapter [*Clangor et Plausus*](#). Encompassing everything from the whistling of arrows, to the shrill trumpetings of elephants, and the buzzing of bees, *stridor* has an incredibly vast semantic range that simply cannot be mapped onto a single English word. Because of this the translation of the term into English is largely dependent on its contextual use. As *stridor* is applied consistently to the quenching of hot metal,⁴²³ this term encompasses a clear sub-group of "hissing sounds" within its semantic range. This sub-group of hissing *stridores*

⁴¹⁹ CATULLUS, 4.121; LUCR. 5.1382; SEN.*Qnat.*2.28.3.2.

⁴²⁰ HOR.*Sat.*1.1.66; CIC.*Pis.*65.6, *Rosc. Am.*30.10, *Sest.*116.1; SEN.*Ep.*102.9.5; VAL. MAX. 7.3(ext).6.8.

⁴²¹ VERG.*Ecl.*5.82; STAT.*Theb.*12.653; VAL.FLAC.*Argon.*3.50.

⁴²² Along with *mugitus* and *murmur*, see QUINT.*Inst.*8.6.31.4

⁴²³ MART. 14.33.2; OV. *Met.* 4.123; 9.171; VERG. *A.* 8.420; 8.450; *G.* 4.172.

overlaps considerably with the scope of *sibilus/sibilare*. Other than the hissing of snakes there are several sound-emitters that are characterised by both of these terms, especially the sounds of airborne-missiles, and wind through the rigging of ships.⁴²⁴ In the Latin corpus *stridor* or its cognates are sometimes associated with, or applied directly to, *sibilus/sibilare*.⁴²⁵ Lucan even uses the adjectival form *stridulus* to qualify the *sibilus* of a snake,⁴²⁶ which further emphasises the overlap between these two lexical families.

The earliest use of *stridor* or its cognates for the hissing of snakes appears in the *Aeneid*. In this passage Vergil applies the participle *stridens* to denote the 'horrible hissing' ("*horrendum stridens*") of the Lernean Hydra.⁴²⁷ Cognates of *stridor* are used thirteen times in the characterisation of snake sounds ranging chronologically from Ovid through to Statius. Apart from a single use of the term in Pliny's *Natural History*,⁴²⁸ all other references to the term in relation to hissing appear in poetic works.⁴²⁹ As further evidence, the terms *stridor/stridere/stridulus* are used forty-three times in Silius' *Punica* alone.

A common feature of *stridor/stridere* across all of its thematic sound-groups is a sense of a higher-pitch, or of heightened intensity. This can be contrasted with the primary use of *sibilus* that generally connotes sibilant sounds of indeterminate pitch. If we consider the use of *stridor* in denoting the forceful hiss of quenching hot metal, we can auralise a heightened intensity. This intensity is also evident in Pliny's specific, contextual use of the

⁴²⁴ Airborne missiles: LUC. 9.827; SEN. *Her. F.* 993; SIL. 1.317; wind through rigging: OV. *Tr.* 1.4.9; PLIN. *Ep.* 9.26.4.6; PROP. 3.7.47.

⁴²⁵ LUC.*BC.*9.631; OV.*Met.*12.279; SIL. 2.587, 9.247, 12.616, 17.256.

⁴²⁶ LUC.*BC.*9.631.

⁴²⁷ VERG.*A.*6.288.

⁴²⁸ PLIN.*HN.*10.206.

⁴²⁹ CUL.179; VERG.*A.*6.288; OV.*Met.*9.65; LUC.*BC.*1.574, 9.631. PLIN.*HN.*10.206, STAT.*Theb.*1.599, 11.65, 11.494; SIL. 2.537, 2.587, 3.191.

term in denoting the frenzied, defensive *stridens* of a *serpens* caught in a spider's web.⁴³⁰ In this way it appears that *stridor* and its cognates are applied to emphasise either the pitch, loudness or intensity of the hissing.

A unique use of the verb *intonare* for the sound of a snake appears in the pseudo-Vergilian *Culex*.⁴³¹ The verb is used primarily in denoting thunder; deep booming rumbles, but also sharp, and loud lightning cracks.⁴³² Pliny also applies the verb to the fierce barking of an Albanian hound while fighting in a demonstration for Alexander.⁴³³ As the *serpens* in the *Culex* is poised to attack the sleeping shepherd, the verb evokes the intensity and suddenness of a lightning bolt.⁴³⁴ When hissing coincides with a defensive warning strike, the short, crackling hiss, characterised by a rapid increase in loudness, is an incredibly effective defence mechanism. A similar aural evocation appears in Seneca's *Medea*, in which "a huge snake hisses, entwined in a lashing whip" ("*ingens anguis excusso sonat tortus flagello*").⁴³⁵ Here the sound of the snake aurally alludes to the cracking of the whip, once again evoking a fierce, rapid-onset hiss. This description also further extends into the trans-sensual with a tactile allusion comparing the sharp pangs of snake bites with the searing strokes of the *flagellum*. A similar description in Ovid associates the sharp cracking of *verbera* with the hiss of *colubrae*.⁴³⁶

⁴³⁰ PLIN.*HN*.10.206.

⁴³¹ *Culex* 179.

⁴³² VERG.*A*.1.90; 2.693; 8.239; SEN. *Qnat.* 2.54.2; 6.2.4; STAT. *Theb.* 5.87; OV. *Tr.* 1.5.29; *Pont.* 2.3.24.

⁴³³ PLIN.*HN*.8.150.

⁴³⁴ SYPNIEWSKI (2002, 171) does also associate the use of *intonare* with VERGIL'S aural characterisation of Allecto's thunderous cries (*A*.6.607).

⁴³⁵ SEN.*Med*.961.; FITCH 2018, 399.

⁴³⁶ OV.*Ib*.159.

Some snakes actually do not hiss at all, but instead produce non-vocal warning sounds; the tail vibrations of the North American rattlesnake is a well-known example. While rattlesnakes are not native to the Mediterranean, other snakes located in this region do produce different types of non-vocal warning sounds. Some saw-scaled vipers, specifically *Echis carinatus* and *E. coloratus*, are known to emit a rough, rasping, sound by rubbing their scales together when threatened.⁴³⁷ This defensive display is achieved by forming an open c-shaped coil and, while remaining in place, the snake cycles its body rapidly through the shape.⁴³⁸ This rustling sound is attested in several ancient Greek texts, including Philoumenos and Nicander.⁴³⁹ Such sounds could serve as an inspiration for Ovid's aural description of the Colchian serpent "a-bristle with rattling scales" ("*squamis crepitantibus horrens*").⁴⁴⁰ Ovid applies the participle *crepitans*, which typically denotes iterative, rhythmic, rattle-like noises, like the crackling of flames, clattering bills of storks, and fluttering of the wings of birds.⁴⁴¹

Due to the homogenous nature of snake 'hisses', Latin authors often qualify their descriptions with attributive sound-terms. Snakes are characterised as having a long, and drawn-out sound, as designated by the adjective *longus*.⁴⁴² Pliny directly contrasts the augmented *sibila* of a snake with the abrupt hiss of a tortoise.⁴⁴³ The duration of their hissing is also noted in Statius who opts for the poetic, "ever hissing" ("*aeternum*

⁴³⁷ GANS & MADERSON 1973, 1200.

⁴³⁸ This behaviour can be seen (and heard) in the following YouTube clip, [BBC Earth Unplugged 2018](#).

⁴³⁹ KITCHELL 2010, 81.

⁴⁴⁰ OV.*Her.*12.102; SHOWERMAN & GOOLD 1914, 151.

⁴⁴¹ OLD 1968, 457. "s.v. *crepitus*", "*crepito*".

⁴⁴² PLIN.*HN*.11.267, STAT.*Theb.*11.65.

⁴⁴³ PLIN.*HN*.11.267.

stridens").⁴⁴⁴ Ovid applies the adverb *ter*, which characterises a hiss as ‘thrice emitted with darting tongue.’⁴⁴⁵ The adjective *acerbus* characterises the din of Tisiphone’s susurrating tresses as harsh,⁴⁴⁶ and *stridulus* is applied to connote a sense of shrillness or intensity to an *angues’ sibila*.⁴⁴⁷ Valerius Flaccus applies the participle *trepidans* to the sound of the Colchian *angues* that Jason faced to claim the golden fleece.⁴⁴⁸ As translated by Mozley, this fabled serpent “as never before, lifted his head and sent forth vibrant hisses” (“*trepidantia ... sibila*”).⁴⁴⁹ ‘Vibrant’ as an attributive sound-term in English has strong connotations that evoke the shimmering brightness of cymbals. This evocative translation is quite effective in maintaining the original sense of *trepidans*, which characterises a vibrating or wavering, but extends this characteristic quality directly to the *sibila*. Other possible translations of the term in relation to sound are ‘vibrato’ or ‘tremulous’.

There are only two references that seem to characterise the loudness or resonance of hissing through the application of attributive sound-terms. Silius uses the verb *implere* to attribute a expansive denseness to a *sibila* that “fill[s] all the grove”.⁴⁵⁰ The *sibila* of Cerberus’ mane of snakes, softens and lowers in loudness (“*lenire*”), expressing a placated response to Orpheus’ calming music.⁴⁵¹ There are equally few direct references to the silence of snakes. In the *Argonautica* *angues* are forcibly quietened,⁴⁵² but Silius directly

⁴⁴⁴ STAT.*Theb.*1.599; SHACKLETON BAILEY 2004, 85.

⁴⁴⁵ OV.*Met.*15.684; MILLER & GOOLD 1916, 413.

⁴⁴⁶ “*acerba sonum*” STAT.*Theb.*8.345.

⁴⁴⁷ “*stridula sibila*” LUC.*BC.*9.631.

⁴⁴⁸ VAL. FLAC. *Argon.*7.522-534.

⁴⁴⁹ MOZLEY 1934, 399.

⁴⁵⁰ SIL.6.189

⁴⁵¹ LUC.*BC.*9.640

⁴⁵² VAL. FLAC. *Argon.* 7.531, 8.66.

denotes the silence of a *serpens* that "climbs noiselessly (*tacitus*)" ... and opens its dreaded jaws near the nestlings" of eagles.⁴⁵³

Attributive sound-terms are also applied to the sounds of snakes in Roman poetry to emphasise their monstrous aesthetic and affective qualities. Authors project the deadliness of the snakes onto the sounds themselves, and these attributive terms often portray their hisses as outward, aural expressions of anger, violence and ferocity. The fierce serpent in the *Culex* "rages in mind, [and] hisses in wrath" ("*ardet mente, furit stridoribus*"); as it strikes forth, it issues crackling hissings from its mouth ("*intonat ore*").⁴⁵⁴ Silius relates the adjective *letiferus*, "with deadly blast", to the verb *sibilare*.⁴⁵⁵ Statius presents a similar evocation in describing the "bloody (*cruentus*) hisses from [the] dying mouth" of an *angues*.⁴⁵⁶ In poetic works the noises of these monstrous serpents can also invoke fear, which is ascribed by use of the adjective *horrendus*.⁴⁵⁷ The ferocity or violence of these sounds were also denoted by other adjectives including *infestus*,⁴⁵⁸ *ferus*,⁴⁵⁹ and *minax*.⁴⁶⁰ The hiss is a snake's primary defence mechanism, and they typically only engage in these aggressive hissing behaviours when they feel threatened.⁴⁶¹ The fear-inducing hisses of monstrous serpents in Latin epic poetry corresponds quite neatly with the observable aggressive, defensive behaviour of snakes.

⁴⁵³ SIL.12.57

⁴⁵⁴ *Culex* 179.

⁴⁵⁵ SIL.3.191; DUFF 1934, 127.

⁴⁵⁶ STAT.*Theb.*6.248; SHACKLETON BAILEY 2004, 345.

⁴⁵⁷ OV.*Met.*3.38, SIL.7.424, VERG.A.6.288

⁴⁵⁸ VAL. FLAC. *Argon.*8.103

⁴⁵⁹ STAT.*Theb.*1.115, OV.*Met.*9.63-67

⁴⁶⁰ SEN.*Her.F.*794

⁴⁶¹ GANS & MADERSON 1973, 1196.

5.4. Frogs (*ranae*)

The textual descriptions of frog vocalisations are considerably more diverse than those of hissing snakes. This diversity is reflective of the cacophonous croaking and garrulous chatters of different species of frogs, which differ in relation to their pitch, frequency and duration. But compared with the hisses of snakes, Latin authors used fewer *general* sound-terms in the denotation of frog croaks, or the action of croaking. Of the surveyed Latin texts Pliny's descriptions of the sounds of *ranae* are perhaps the most general and objective in tone. In a passage that describes the particular anatomical methods of sound production in frogs, Pliny employs the denotative terms *emittere* and *vox*.⁴⁶² Pliny states that when the male frogs croak ("*vocem emittunt*"), they are given the name *ololygones*, which is a transliteration of the onomatopoeic Greek term for "croaking" (*όλολυγών*).⁴⁶³ The verb *elidere* is used to denote the specific process by which frogs force out their sound. According to Pliny, frogs draw water into their mouths and throat, and vibrate their tongues in this water.⁴⁶⁴ This vibration produces an undulation that forces ("*elidere*") a croaking sound ("*ululatus*") from the mouth.⁴⁶⁵ *Elidere*, meaning 'to emit' or 'cause to be emitted', does seem to carry connotations of the intensity with which the sound is being produced.⁴⁶⁶ While this is certainly not an accurate portrayal of sound production in frogs, it could be based on an observation of frog behaviours in which they croak while in, or under, water. This behaviour has been observed during the issuing of "amplectant

⁴⁶² PLIN.*HN*. 11.173.

⁴⁶³ LSJ 1940, s.v. "όλολυγών".

⁴⁶⁴ PLIN.*HN*. 11.173.

⁴⁶⁵ Cf. ARIST. *Hist. an.* (IV.9.) 536a. 8-13, 16-19.

⁴⁶⁶ OLD 1968, 599. s.v. "*elido*".

calls” in some species.⁴⁶⁷ Rackham translates the denotative sound-noun *ululatus*, as the species-specific English term ‘croaking’.⁴⁶⁸ But elsewhere in the Latin corpus this term denotes the sounds of mourning and wailing.⁴⁶⁹ As with many of Pliny's accounts of animals, this particular passage is based heavily on Aristotle's earlier account in his *History of Animals*.⁴⁷⁰ Through a close comparison of these two related passages it is evident that Pliny is rather equating the Latin *ululatus*, with the broader usage of the Greek noun *ololygnē* (ὀλολυγή) that was also applied to wailing cries.⁴⁷¹ Frogs do issue a particularly high-pitched squealing when threatened, so it is certainly possible that Aristotle's original description relates to this particular defensive shriek.⁴⁷²

Later Pliny elaborates that the *vox* of a frog is " a special kind of voice ("*vox*")... because ‘voice’ means a sound formed in the mouth, not in the chest."⁴⁷³ This statement refers to Pliny's delineation of *vox*, as produced by means of expelling air from the lungs, and *sonus*, which is applied to sounds produced by other parts of the body (i.e. the sounds produced by insects).⁴⁷⁴ This demarcation however is an artificial one based on Pliny's reading of Aristotle's *History of Animals*. There are no such distinctions between the use of *sonus* and *vox* elsewhere in the Latin corpus, and indeed Pliny himself is inconsistent with this rule. Pliny's use of *vox* will be closely examined in greater detail at §7.4.1. Pliny

⁴⁶⁷ TOLEDO, et al. 2014, 90.

⁴⁶⁸ RACKHAM 1983, 541.

⁴⁶⁹ OLD 1968, 2087. s.v. "*ululatus*"; VERG.A.4.667; 11.190; OV.Her.5.73; CURT.5.12.12; LUC.2.33; STAT. Silv. 5.5.71; PLIN. Ep.6.20.14; cf. HOPE 2017.

⁴⁷⁰ Cf. ARIST. *Hist. an.* (IV.9.) 536a.16-19.

⁴⁷¹ LSJ 1940, s.v. "*ὀλολυγή*".

⁴⁷² TOLEDO, et al. 2014, 92.

⁴⁷³ PLIN.HN.11.268.8-10

⁴⁷⁴ PLIN.HN.11.266.1.

also applies the verb *canere* to the vocalisation of frogs.⁴⁷⁵ This term is usually translated as 'to sing', however this traditional interpretation has been the focus of recent scholarly appraisal. Maxime Pierre has suggested that when applied to musical instruments or animals, including birds, and amphibians, that the primary function of *canere* is to denote the issuing of a "signal" in opposition to the production of "music".⁴⁷⁶ Pierre's semiological interpretation of *canere* can certainly be reconciled with the term's use in denoting the croaking of *ranae*. A closer examination of *canere*, along with the related noun *cantus*, will follow in a later chapter.⁴⁷⁷ The 'signalling' use of *canere* is also supported by Pliny's later application of the participle of *ciere*, meaning "to call or rouse up," to the vocalisations of male frogs, in the calling of females to mate.⁴⁷⁸ There are several other sound-terms that are also employed by Latin authors to emphasise the action of 'calling' or 'communicating' in frogs, including the verbs, *appellare*,⁴⁷⁹ *petere*,⁴⁸⁰ and *tollere*.⁴⁸¹ It is quite surprising how applicable these Latin terms actually are, as the vast percentage of audible frog vocalisations are advertisement calls, and they are produced by almost all species.⁴⁸²

Apuleius offers a thoughtful and evocative aural image of the harsh calls of an innkeeper who had been transformed into a frog. Even after his metamorphosis the misfortunate barkeep would drunkenly "call out hoarsely to his old customers with courteous croaks" ("*officiosus roncis raucus appellat*") from within a barrel of his own

⁴⁷⁵ PLIN.*HN*.8.227.

⁴⁷⁶ PIERRE 2016, 44.

⁴⁷⁷ See below §[7.4.2](#).

⁴⁷⁸ PLIN.*HN*.11.173; OLD 1968, 313-314. s.v. "*cieo*".

⁴⁷⁹ APUL.*Met*.1.9.6

⁴⁸⁰ PHAED.1.2.10

⁴⁸¹ PHAED.1.6.4

⁴⁸² TOLEDO, et al. 2014, 89.

wine.⁴⁸³ The verb *appellare*, meaning 'to address' or 'to call upon',⁴⁸⁴ corresponds neatly with other terms used to denote the sounds of frogs as 'communicative' or 'calling'. But this term offers a particularly effective turn of phrase, as *appellare* can also be understood as the cries of an innkeeper calling after his clients. The unique use of the noun *rhonchus* in denoting the sounds of a *rana* equates croaking with a rough, nasal, snoring sound.⁴⁸⁵

Phaedrus combines similar appellative verbs with complaintive diction in two short fables.⁴⁸⁶ The first, "*Ranae Regem Petierunt*", is an allegorical tale about the fall of democracy to tyranny. In this fable a colony of frogs "called with loud cries on Jupiter to grant them a king" ("*clamore magno... petiere*").⁴⁸⁷ Jupiter acquiesced and, in jest, offered forth a timber plank. The *ranae* responded by hurling innumerable insults at their ligneous monarch,⁴⁸⁸ and they begged the king of the gods for another ruler. Their new sovereign set upon them in the form of a water snake, and devoured them for their audacity. In the second fable, an army of frogs raged against the wedding of the Sun, and "raised their clamour to the stars" ("*clamorem ranae sustulere ad sidera*").⁴⁸⁹ Being unsettled by the racket, Jupiter enquired as to the cause of their querulous chattering.⁴⁹⁰ In this passage Phaedrus employs the nouns *clamor*, *querela*, and *convicium* in denoting the reproachful uproar of the frogs. The terminology used by Phaedrus to characterise the chattering *ranae*

⁴⁸³ APUL.*Met.*1.9.6;

⁴⁸⁴ OLD 1968, 150. s.v. "*appello*²".

⁴⁸⁵ OLD 1968, 1652. s.v. "*rhonchus*"; cf. MART.1.3.5; 3.82.30; 4.86.7.

⁴⁸⁶ PHAED.1.2; 1.6.

⁴⁸⁷ PHAED.1.2.10.

⁴⁸⁸ "*inquinassent omni contumelia*", PHAED.1.2.21.

⁴⁸⁹ PHAED.1.6.4.

⁴⁹⁰ "*convicio permotus quaerit Iuppiter causam querellae*", PHAED.1.6.5-6.

is also applied to the garrulousness of *cicadae* and the reproachful phantom *culex*.⁴⁹¹ While the *ranae* in Phaedrus' fables are heavily anthropomorphised, other Latin authors would also characterise the continuous croaking as garrulous streams of curses and complaints. In a considerably similar manner to Phaedrus, Columella applies both *querelus* and *convicium* in denoting "the frog's complaint and curses."⁴⁹² *Querela* is employed by the author of the *Culex* to describe the "querulous tone" of frogs,⁴⁹³ and Vergil also uses this term to characterise "their immemorial plaint."⁴⁹⁴ But their unrelenting chatter was not always described as unpleasant. Vergil elsewhere applies the adjective *loquax*, which emphasises their loquaciousness.⁴⁹⁵ Pliny denotes this quality with the adjectival *vocalis*, which quite generally characterises *ranae* as "vocal".⁴⁹⁶ The adjective *garrulus* is used to convey this verbose quality in the *Dirae*.⁴⁹⁷

At times it can be challenging to identify specific acoustic, affective and aesthetic qualities that are associated with sound-terms. This is especially the case with sound-terms that characterise an incessantness or a tone of complaint. As we have seen with the denotation of the garrulousness of *cicadae* and *ranae*, the talkativeness of these animals could be interpreted: acoustically, in relation to its duration or frequency; affectively, in regards to the emotional context of the querulous calling; or aesthetically, by considering the unpleasantness of the unending stream of aural abuse. Several references however

⁴⁹¹ See above §4.5.2 and §4.5.3.

⁴⁹² COLUMELLA, *Rust.* 10.1.1.12

⁴⁹³ *Culex* 150

⁴⁹⁴ VERG. *G.* 1.378.

⁴⁹⁵ VERG. *G.* 1.431.

⁴⁹⁶ PLIN. *HN.* 8. 227, 10. 79; 18. 362.

⁴⁹⁷ *Dirae* 74.

clearly qualify the loudness of frog calls. The participle *vociferans* is used by Pliny to characterise the loudness of a specific type of arboreal frog.⁴⁹⁸ *Magnus* is similarly used to amplify the loudness of the *clamor* of Phaedrus' complaining *ranae*.⁴⁹⁹ The characterisation of frog croaks as '*raucus*' is also a clear reference to a harsh or rough acoustic quality of the sound.⁵⁰⁰ *Raucus* is used to describe the *voces* of Lycian peasants who were transformed by Latona into frogs,⁵⁰¹ and the snore-like croaks of Apuleius' amphibious publican.⁵⁰² As this term is applied twice in characterising the croaks of transformed human-frogs, *raucus* perhaps also figuratively emphasises an animalistic quality brought about through their transformation. It is also worth noting that Ovid applies *raucus* on several other occasions to aurally illustrate the transition from human to animal voice.⁵⁰³

Several Latin authors make strong judgments on the aesthetic qualities of the clamorous songs of *ranae*. Horace evokes their incessant chattering by characterising them as malign forces of sleep-deprivation, that "drive off sleep" ("*avertus somnos*").⁵⁰⁴ Martial applies the verb *garrire* to denote the jabbering of the frogs of Ravenna, stating that they "chatter more agreeably" than *Vetusilla*.⁵⁰⁵ In relating the prophetic habits of *ranae*, Cicero designates their *voces* as *absurdus*.⁵⁰⁶ Falconer translates this adjective as "absurd",⁵⁰⁷

⁴⁹⁸ PLIN.*HN*.32.92.44.

⁴⁹⁹ PHAED.1.2.10.

⁵⁰⁰ OLD 1968, 1577. s.v. "*raucus*". Cf. VINCENT 2017, 153-155.

⁵⁰¹ OV.*Met*.6.377.

⁵⁰² APUL.*Met*.1.9.6.

⁵⁰³ OV.*Met*.2.484; 13.567; 14.280.

⁵⁰⁴ HOR. *S*. 1.5.14.

⁵⁰⁵ MART. 3.93.8; SHACKLETON BAILEY 1993a, 255.

⁵⁰⁶ CIC.*Div*.1.15.

⁵⁰⁷ FALCONER 1923, 239.

however when relating to sound, this term seems to connote a sense of dissonance, or a state of being discordant.⁵⁰⁸

Pliny often comments on the silence of otherwise vocal animals, and makes several references to the silence of frogs, usually in relation to their location. Pliny relates that Cyrenean frogs are mute ("*mutus*"), and despite the introduction of another vocal species, the silent type still persisted.⁵⁰⁹ Macedonian frogs are similarly *mutus*,⁵¹⁰ as are the frogs from the island of Seriphus.⁵¹¹ But the latter would commence singing ("*canere*") when taken away from the island.⁵¹² Later in book XXXII of the *Natural History*, Pliny denotes the muteness of a particular small frog by simply stating that it is without voice ("*sine vox*").⁵¹³ In characterising the abnormal hush of these annoying anurans, Suetonius also employs a unique denotative sound-term. The Latin verb *coaxare*, a species-specific sound-term and calquing of the infamous "*koax koax*" of Aristophanes' frogs, is only found twice throughout the Latin corpus. Suetonius relates an anecdote of the young Octavian who, upon being interrupted by the clamouring of frogs, "bade them be silent ("*ranas silere iussit*") ... [and] ... since then no frog has ever croaked there."⁵¹⁴ The only other reference to the *coaxare* in the Latin corpus is in the boisterous Reifferscheid sound-list.⁵¹⁵ The particular use of *coaxare* adds credence to Suetonius' identification as the author of this fragment.

⁵⁰⁸ OLD 1968, 15. s.v. "*absurdus*".

⁵⁰⁹ PLIN.HN.8.227.

⁵¹⁰ PLIN.HN.11.267.

⁵¹¹ PLIN.HN.8.227.

⁵¹² *Ibid.*

⁵¹³ PLIN.HN.32.75.2.

⁵¹⁴ SUET.Aug.94.7.2-3.

⁵¹⁵ SUET.Rel. REIFF 161.

5.5. *Galeotes Acerbus*, *Testudo Abruptus*

Gecko vocalisations are a distinctive, high-pitched cheeping⁵¹⁶ or laughing "geck-geck-geck",⁵¹⁷ rather accurately characterised by Pliny as '*stridor acerbus*'.⁵¹⁸ As earlier discussions of these terms have revealed, *stridor* denotes all manner of high-pitched sounds, and *acerbus* is used to attribute a further harshness or shrillness to the sound.⁵¹⁹ Considering the duration and loudness of their vocalisations, it is strange that their calls are not mentioned more frequently. But as geckoes are not native to Italy,⁵²⁰ their scarcity on the Italian mainland could certainly account for the infrequent references to their sound in Latin literature. Regarding the sound of *testudines*, Pliny only states that they have a '*sibilus abruptus*', but this brief statement is clearly supported by modern behavioural evidence.⁵²¹

5.6. Patterns of Sound-Term Frequency

As we have seen with the previous chapter on the sounds of insects, an evaluation of sound-term frequencies in the discrete sub-corpus provides a useful visualisation of the over-arching patterns in the data. By presenting these word-frequency statistics we can identify the most common sound-emitters, rank the most frequently used sound-terms, evaluate the sound-term density of specific Latin authors and assess the lexical variation

⁵¹⁶ GANS & MADERSON 1973, 1197–1198.

⁵¹⁷ A *galeotes* (γαλεώτης) disrupts Socrate's philosophical musings by defecating on him in a satirical anecdote from ARISTOPHANE'S *Nubes* (169-173). Auralising the gecko's laughing vocalisations in this scene adds a certain comedic weight.

⁵¹⁸ PLIN.HN.29.90.7.

⁵¹⁹ For *stridor* see especially above §3.8. and §5.3.; for *acerbus* see: §4.5.2. and §4.5.4. Cf. OLD 1968, 1828. s.v. "*stridor*"; 25. s.v. "*acerbus*".

⁵²⁰ PLINY repeatedly refers to them as *stellio transmarinus*, HN.30.53.4; 30.55.4; 30.88.5.

⁵²¹ PLIN.HN.11.267; Cf. GANS & MADERSON 1973, 1195.

of the sonic terminology. This sound-term diversity can be examined in relation to a single author or sound-emitter, which will be a particularly important factor in this discussion. Presentation of word-frequency data is extremely useful, but for this current chapter some word frequency figures relating to the sounds of snakes are not exhaustive. There are specific terms that *are* exhaustive; references to *sibilus* / *sibilare*, and *stridor* / *stridere*, for example. But due to the sheer weight of references to terms such as *serpens*, *coluber* and *angues*, it was simply not feasible to conduct a full survey of sound-terms related to these words. I have decided rather to select a random sample of the corpus. Nevertheless, these figures provide valuable data relating to broader patterns of usage and will be presented in full.

Of the 133 sound-term references to reptiles and amphibians, 90 of them relate to the various Latin terms for snakes, followed by frogs (*ranae*) with 41 references, lizards with only two direct references and a sole reference to the vocalisations of tortoise (see Table 24). We can further breakdown word frequencies related to the sounds of snakes into sub-groups designated by their specific Latin names; *serpentes* (37), *angues* (21), *cerastae* (4), *colubri* (4), *viperæ*, (1) (see Table 25). Due to the homogeneity of snake sounds, I have also included references to mythical snakes, the word frequencies are as follows: *erinyes* (8), the serpentine mane of Cerberus (6), the *hydra* (4), and the Colchian serpent (2) (see Table 25).

It is not at all surprising that Pliny sits atop the list of ancient authors, with a total of 26 references to sound-terms applied to the sonic emissions of reptiles and amphibians. Authors of poetic works follow in descending order: Ovid (18), Silius Italicus (15), Statius

(15), Vergil (10), and Lucan (8) (see Table 20). The frequency of sound-terms varies considerably across different genres, as some animals are more commonly associated with specific literary styles. Poetry is the most common genre by far with an overall combined total of 79. References to snakes in epic poetry account for over half of this figure (48). This is not surprising considering their frequent, stereotypically monstrous depictions in poetry. The raucous croaks of *ranae* are only slightly more common than susurrating snakes in bucolic works (which includes both poetry and agricultural texts (such as Columella's *De Re Rustica*)) with totals of 6 and 5 references respectively. There are no references to the sounds of *ranae* in epic poetry. In fact, their vocalisations are more common in prose (32) than poetic works (6).⁵²²

Denotative sound-terms are the most common, with 92 of the 133 sound-term references simply denoting the production of a sound. The remaining terms consist of 29 attributive and 13 self-qualifying sound-terms (see Table 22). This means that only 32% of the total number of denotative sound-terms are further qualified by an associated attributive sound-term. This can be compared with the 46% of the qualified denotative sound-terms relating to insect sounds. We can also apply this examination to the specific denotative and attributive frequencies of snakes and frogs, as two distinct groups. Snakes have a total of 65 denotative and 21 attributive sound-terms, compared with 26 denotative and 7 attributive sound-terms for frogs. It is interesting to discover that both snakes and frogs share a similar percentage of qualified denotative sound-terms to the overall total; snakes with 33% and frogs with 27%.

⁵²² This figure represents four references bucolic poetry, and singular references in both *Dirae* (74) and OVID's *Metamorphoses* (6.377).

As seen in our previous discussion on the word frequency of insects, the frequency figures for acoustic, affective and aesthetic qualities are a little more difficult to interpret, as some terms can connote multiple sound qualities. Once again, it is worth recalling that sound quality totals are not indicative of the number of attributive sound-term references that attribute qualities, but rather the total number of *qualities ascribed*. For example if a term connotes both affective and aesthetic qualities, both qualities will be counted. There are 46 sound-terms that ascribe acoustic qualities, followed by 19 for affective and 13 for aesthetic qualities (see Table 23). This shows that ancient authors more frequently characterised the acoustic properties of reptile and amphibian sounds.

Finally, for this sub-corpus, it is also beneficial to establish the lexical variation of the denotative sound-terms applied to snakes and frogs (see Table 26, and Table 27). We can do this by calculating a type-token ratio (TTR), a common approach of text frequency analysis.⁵²³ To do so, we divide the total number of denotative sound-term references ('tokens') by the number of unique lexical items (distinct terms, or 'types') that are applied to the denotation of sounds. The calculated ratio gives a numerical value to the degree of lexical variance, and generally speaking "the higher the type-token ratio the less varied the text."⁵²⁴ If we divide the total of 65 denotative sound-terms for the sounds of snakes with the 18 unique lexical items, we result in a ratio of: 3.6 : 1. Repeating the same process for the denotative sound-terms for frogs⁵²⁵ produces a ratio of: 1.4 : 1. The higher TTR for the denotative sound-terms of snakes represents an overall lack of diversity in this sound-term

⁵²³ ADOLPHS 2006, 39-40.

⁵²⁴ ADOLPHS 2006, 39-40.

⁵²⁵ Dividing the total denotative (26) by unique lexical items (18).

category. This figure results from the frequent use of *sibilare/sibilus*, which again is clearly indicative of the overall homogeneity of snake hisses. This figure can be contrasted with the lower TTR for frogs that depicts a significantly higher lexical variance. As discussed above, the vocalisations of frogs are denoted in many different ways by ancient Latin authors.

5.7. Concluding Remarks

Sibilus et Vocalis has evaluated the sound-terms used by ancient Latin authors to denote and characterise the sounds of reptiles and amphibians in the literature of the chosen period. Despite singular references to the abrupt hiss of a tortoise, and the shrill cries of geckoes, snakes and frogs were the primary sound producing reptiles and amphibians in Latin literature, respectively. The sounds produced by snakes and frogs are entirely dissimilar. Snakes produce rather homogenous hisses, while the vocalisations of different species of frogs are particularly varied. But the homogeneity and diversity of the sounds of these two respective groups is clearly reflected in the Latin sound vocabulary, and is supported by word frequency statistics in the latter part of this chapter. The hissing of snakes is primarily denoted by two overlapping sound-terms *sibilus* and *stridor*, but there are also some vivid aural allusions that equate the sounds of striking serpents with the cracking of whips. The hisses of snakes are often characterised as fierce or aggressive, which correlates with the biological function of the hiss as a primary defence mechanism. The diverse croaks of frogs employ a much wider range of terminology that typically characterises their garrulousness and complaintive chatter. Sound-terms are sometimes denotative of calling and communication, which is particularly appropriate in denoting the

mating calls of frogs. A number of qualities are ascribed through attributive sound-terms, which emphasise their loudness, harsh tone and their uncharacteristic silence.

The interchangeability of *sibilus* and *stridor* in denoting the hissing of snakes is perhaps the most contentious issue in this chapter, especially due to the use of *sibilus* in denoting the sounds of shepherds pipes. Perrot in his evaluation of the Greek term "*syrigma*" identifies a similar overlap in the denotation of snake hisses and the pitched whistling of pan-pipes in ancient Greek literature.⁵²⁶ Even in English, the semantic range of 'whistles' and 'hisses' overlap to some extent. Both of these English terms convey a certain sibilant quality, but the former also conveys a sense of pitch. Further comparative examination of these sonorous synonyms is necessary. But I believe the present exploratory overview of *sibilus* and *stridor* forms the basis of a future, more extensive multilingual analysis on the denotation of 'whistles' and 'hisses'.

⁵²⁶ PERROT 2012.

6. *Clangor et Plausus*

6.1. Preface

The general scope of *Clangor et Plausus* differs considerably from the previous two chapters, on the sounds of insects and, reptiles and amphibians. This article will demonstrate the benefits of the chosen method in evaluating the various sound-terms used to characterise a single type of sound-production. The focus of this chapter will be the characterisation of non-vocal bird sounds by Latin authors. Non-vocal bird sounds include noises associated with flight, such as wing-beats, feather-whistles, and beak-rattles.



Clangor et plausus: the denotation of
non-vocal bird sounds in Latin literature

6.2. Introduction

The melodious songs of birds are exceedingly common in ancient Latin literature. Lucretius evokes the "liquid notes of ... birds" ("*liquidas avium voces*") in his description of the origin of human music.⁵²⁷ Ovid offers a lengthy elegiac poem to the tuneful loquaciousness of Corinna's deceased parrot.⁵²⁸ And even Pliny, who is comparatively objective in his presentation of facts about the animal world, characterises the nightingale as a songstress of unparalleled skill, and applies over thirty distinct sound-terms in his description of its complex song.⁵²⁹ But ancient Latin authors also had very precise ways of denoting and characterising non-vocal bird sounds. These sounds include noises associated with flight, such as wing-beats, the rustling, fluttering sounds of feathers and wings, and beak-rattles.

The representation of birds in antiquity has been studied quite voluminously in the late 19th to 21st centuries, and is the subject of numerous monographs.⁵³⁰ The transcribed vocalisations of birds in ancient texts are often used by modern historians and ornithologists as evidence for the tentative identification of denoted species.⁵³¹ The specific

⁵²⁷ LUCR. 5.1379-1381; MELVILLE 2008, 176.

⁵²⁸ OV.*Am.*2.6.

⁵²⁹ PLIN.*HN.*10.81-83. See Sound Recording 41, and Sound Recording 42.

⁵³⁰ HAMMERSCHMIDT 1897; MARTIN 1914; THOMPSON 1936; ANDRÉ 1967; CAPPONI 1979; ARNOTT 2007; MYNOTT 2018.

⁵³¹ Especially ANDRÉ 1967; CAPPONI 1979; ARNOTT 2007.

terminology used to characterise birdsong has also been the focus of a number of works that are either partly or entirely devoted to evaluating the perception of birdsong in antiquity.⁵³² The considerable weight of existing scholarship on this topic has prompted me to listen out for the "quieter" (i.e. less common) bird sounds that were recorded in Latin literature. Aside from incidental references to the wing and beak sounds of birds in general works, including those written by André, Capponi and Arnott,⁵³³ no existing work provides a collective examination of the terminology used to characterise these non-vocal bird sounds. This chapter therefore provides an opportunity to identify for the first time, the various ways in which ancient Latin authors characterise non-vocal bird sounds in written texts, and to demonstrate the effectiveness of the chosen approach in the evaluation of a more narrowed subset of sound-emitters.

The subsequent discussion will be divided into two main sections. The first section will examine sounds produced by the wings of birds, revealing precise variations in the Latin terminology used to denote 'feather-whistles', and 'wing-beats'. The second will focus on a much smaller subcategory of non-vocal utterance, the sounds produced by beaks. This section will consider descriptions of the cage-rattling beak of a *psittacus*, and the clattering bills of *ciconiae*, and will reflect upon a peculiarly silent omission in the Latin corpus. As this discussion is primarily concerned with the transcription of non-vocal bird sounds in text, denotative sound-terms are the principal focus, and the two main sections will be further divided and arranged by these denotative terms.

⁵³² BETTINI 2008a; PIERRE 2016, 39-42; MYNOTT 2018, 43-63.

⁵³³ ANDRÉ 1967; CAPPONI 1979; ARNOTT 2007.

6.3.1. Wing Sounds

As with most animal sounds that have been reviewed over the course of this thesis, the sounds of wings were sometimes denoted by simple, generic sound-terms. Martial applies the verb *sonare* to denote the resounding wings of a *columbarium*.⁵³⁴ Ovid also uses *sonare* to denote the wing sounds of the daughters of Pierus, following their transformation into chattering *picae*.⁵³⁵ But the sounds of wings were often denoted by broader, noisy sound-terms that encompassed a wide-range of sounds, and were associated with a variety of sound-emitters. These 'noisy' sound-terms include *clangor*, *crepitus* and *increpare*. *Clangor*, derived from the Greek *klangē* ("κλαγγή"),⁵³⁶ was used to denote all manner of sounds including: the baying of hounds, the blasts of trumpets, the clanging of iron, as well as the various cries of birds, and humans.⁵³⁷ This broad sound-noun is also used to denote the sounds of flight (*volitans*); especially the auspicious wings of an eagle,⁵³⁸ and the loud, noisy wings of the legendary Lapithian hero Caeneus.⁵³⁹ Livy also applies the noun *crepitus* to denote the noisy, flapping wings (*alae*) of the sacred geese of Juno that roused the ex-consul Manilius, and helped to save the Capitol during the Gallic invasion of 390BC.⁵⁴⁰ The sharp, snapping sounds produced by their clapping wings, correspond quite well with other uses of the term in denoting repetitive, percussive sounds, which include: the crackling of flames and rattling of the bills of storks.⁵⁴¹ The related verb

⁵³⁴ MART.3.58.10-21.

⁵³⁵ OV.*Met.*5.295-299.

⁵³⁶ LSJ 1940, s.v. "κλαγγή".

⁵³⁷ OLD 1968, 332. s.v. "*clangor*".

⁵³⁸ LIVY.1.34.8.3.

⁵³⁹ OV.*Met.*12.525.

⁵⁴⁰ LIVY.5.47.4.1.

⁵⁴¹ OLD 1968, 457. s.v. "*crepitus*", "*crepito*".

increpare is modified by the prefix "in-" to emphasise the loudness and intensity of the sound.⁵⁴² Vergil uses this verb to denote the sound of a dense flock of *corvi* that "clang with serried wings" ("*corvorum increpuit densis ... alis*").⁵⁴³ In contrast to these more general sound-descriptors, there are two specific qualities attributed to the sounds of wings that are denoted by two well-defined groups of sound-terms. The first are wing- or feather-whistles that are denoted by the terms *stridor*, and *stridere*, and the second, wing-beats, which are denoted by *plausus* and its verbal cognate *plaudere*.

6.3.1a. Feather-Whistles

In this section we return to the complex terms *stridor* and *stridere* to consider their use in denoting the whirring tones of wings. As we have discovered over the course of this thesis, Latin authors applied *stridor/stridere* to denote the sounds produced by a wide variety of sound-emitters. Earlier in the present work (§3.8.), to demonstrate the chosen approach, the sounds denoted by these terms were compared to reveal similarities in their acoustic qualities. The most obvious commonality was the presence of a higher, indeterminate pitch, with a sharp or piercing tone, but also possibly of increased loudness. By considering these key characteristics and auralising the sounds made by the wings of birds, these terms were associated with the sounds caused by air displacement during flight, and the tonal feather-whistles of some birds. The former corresponds neatly with similar denotations of *stridor/stridere* in characterising the sound of air displacement of wind;⁵⁴⁴ whereas the latter fully encompasses the broad sonic connotations of the terms. Many

⁵⁴² OLD 1968, 875. s.v. "*increpo*".

⁵⁴³ VERG. *G.* 1.380-389; FAIRCLOUGH & GOOLD 1916, 125.

⁵⁴⁴ *Wind through rigging*: OV. *Tr.* 1.4.9; PLIN. *Ep.* 9.26.4.6; PROP. 3.7.47; *airborne missiles*: LUC. 9.827; SEN *Her. F.* 993; SIL. 1.317.

different types of birds issue a certain ‘whistling’ sound by means of their wings. But these whistling tones are particularly recognisable in common rock pigeons (*Columba livia*), doves, including the Eurasian collared dove (*Streptopelia decaocto*),⁵⁴⁵ and mute swans (*Cygnus olor*). Vergil applies *stridor* to denote the characteristic feather-whistles of mute swans, which presents a convincing link between *stridor* and these whistling wing-tones.⁵⁴⁶ Arnott has postulated that the whistling wings of mute swans may be the origin of the ancient poetic association between swans and music.⁵⁴⁷

Modern studies have also investigated the importance of these feather-whistles as non-vocal alarm signals, especially in the Australian crested pigeon.⁵⁴⁸ A more recent study has evaluated the role of non-vocal sound in scaled doves (*Columbina squammata*) as a communicative signal especially in the context of predator avoidance. These studies propose that feather-whistles have evolved in order to warn conspecifics of danger. The sensitivity of doves and pigeons to the sounds of feather-whistles and swooping noises is communicated quite clearly in a passage from Ovid, who states that “the least rustle of a feather (*"minimo pennae stridore"*) brings dread upon the dove that thy talons, O hawk, have wounded”.⁵⁴⁹ The use of *stridor* in this context refers to the wings of a hawk (*accipiter*), but this passage nevertheless accurately conveys the flight behaviours of pigeons when startled by the sound, or sight, of aerial predators.

⁵⁴⁵ See Sound Recording 33, and compare with the whistling of Australian crested pigeons: Sound Recording 34, and Sound Recording 35.

⁵⁴⁶ VERG.A.1.397; Cf. Sound Recording 17, and Sound Recording 18.

⁵⁴⁷ ARNOTT 2007, 183-184; See Sound Recording 17, and Sound Recording 18.

⁵⁴⁸ CLARK, C. J. et al. 2016, and MURRAY & MAGRATH 2017.

⁵⁴⁹ OV. *Tr.* 1.1.75; WHEELER and GOOLD 1924, 9.

The earliest association between wings and *stridores* during the chosen period appears in Vergil's *Georgics*. In this context *stridor* is used to denote the "loud whirr" ("*magno stridore*") of Nisus' wings in his "savage and ruthless" pursuit of Scylla, who were both transformed into sea-birds.⁵⁵⁰ This passage is directly quoted in the final lines of the pseudo-Vergilian *Ciris*, which also relates the myth of Nisus and Scylla.⁵⁵¹ The author of the *Ciris* employs *stridor* twice in this work to denote wing-sounds.⁵⁵² The terms *stridor* and *stridere* are also used to characterise the sounds of wings elsewhere in Vergil, Ovid, and Valerius Flaccus.⁵⁵³ Pliny harnesses the stereotypic association between *stridor* and the wings of birds to emphasise the incredible magnitude of a plague of locusts.⁵⁵⁴ In a separate instance, Pliny employs a variation on the formulaic '*pinnarum stridorum*' by substituting *stridor* with the general sound-noun *strepitus*.⁵⁵⁵

6.3.1b. *Wing-Beats*

The wings of pigeons and doves are especially noisy. Not only do they produce feather-whistles upon take-off (as we have mentioned above), but the mechanical sounds caused by the striking together of their wings are also particularly pronounced. This clamorous clapping sound is consistently denoted in Latin texts by two related sound-terms; the noun *plausus*, and its verbal form *plaudere*. These terms were typically used to denote: the sound-producing action of applause, often in an expression of approval, and

⁵⁵⁰ VERG. *G.*1.407; FAIRCLOUGH & GOOLD 1916, 127.

⁵⁵¹ *Ciris* 539; Cf. VERG. *G.*1.407.

⁵⁵² *Ciris* 515, 539.

⁵⁵³ VERG. *A.*12.869; *Met.*4.616; VAL. FLAC. *Argon.*4.498.

⁵⁵⁴ PLIN. *HN.* 11.98-104.

⁵⁵⁵ PLIN. *HN.* 10.108.; OLD 1968, 1827. s.v. "*strepitus*".

other clapping sounds, more generally.⁵⁵⁶ When applied to the wings of pigeons and other birds, these terms clearly denote the more rhythmic and percussive qualities associated with their wing-beats. Fronto starkly contrasts the percussive clapping ("*plaudere*") of *columbae*⁵⁵⁷ with the inaudibly soft wingbeats of *hirundines*.⁵⁵⁸ Martial states that the dove-cotes sound with the *plausibus* of *columbae*.⁵⁵⁹ Vergil also applies *plausus* and *plaudens* to *columbae* in the *Aeneid*.⁵⁶⁰ There are only two instances in which these percussive sound-terms are applied to other birds; both occur in Ovid's *Metamorphoses*. Ovid applies *plausus* to the wing-beats of a grey heron (*ardea*), which arose from the flames of the destroyed city of *Ardea* and "beat the ashes with its flapping wings ("*plausis everberat alis*")".⁵⁶¹ The use of the percussive *plausus* in this phrase is further supported by the verb *everberare*, which means "to beat or strike violently".⁵⁶² Ovid also applies the verbal form *plaudere* to the flapping wings of the partridge (*perdix*) which delighted in its reproach of Daedalus, while he mourned the loss of his son.⁵⁶³

6.3.1c. *Soft and Quiet Wings*

In contrast to whirring whistle-tones and rhythmic wingbeats, Latin authors did also describe the soft and near silent flight of some types of birds. Fronto applies the adverb

⁵⁵⁶ OLD 1968, 1387. s.v. "*plaudo*"; 1388. s.v. "*plausus*".

⁵⁵⁷ *Columba* is sometimes translated inconsistently as either dove or pigeon. ARNOTT (2007, 225-226) suggests the most likely identification for this Latin name is the common rock pigeon (*Columba livia*). In contrast the *palumbes* is generally understood to mean woodpigeon (*C. palumbus*); see ARNOTT 2007, 267-269.

⁵⁵⁸ FRONTO.Ep.170.12.5.

⁵⁵⁹ MART.3.58.10-21.

⁵⁶⁰ VERG.A.5.213, 516.

⁵⁶¹ OV.Met.14.573-580; MILLER & GOOLD 1916, 341.

⁵⁶² OLD 1968, 625. s.v. "*everbero*".

⁵⁶³ OV.Met.8.237.

clementer, "in a kindly manner ... gently",⁵⁶⁴ and the adjective *placidus*, "gentle, quiet",⁵⁶⁵ to characterise the soft, fluid movements of swallows.⁵⁶⁶ *Placidus* is also used by Quintus Curtius in denoting the softness of an eagle hovering above the head of Alexander the Great. This prophetic sign was interpreted as an omen of victory prior to the battle of Gaugamela.⁵⁶⁷ *Aquila* were recognised as *alites* in Roman augural practises, and they were believed to issue divine signs through their flight and by their wings.⁵⁶⁸ A similar augural account appears in Livy's *History*, in which an eagle "gently descended", plucked the cap off the head of the future King Tarquinius, before promptly returning the purloined *pilleus*.⁵⁶⁹ There is some uncertainty regarding the specific term used to denote the eagle's placid descent. Foster identifies two different terms drawn from divergent manuscript traditions for the work; associating *leniter* with "one or more of the inferior MSS. and early printed editions", and *leviter* with more reliable MSS.⁵⁷⁰ The sense of the passage remains in either case, characterising a particular gentle, softer or quiet quality.⁵⁷¹

6.3.2. Beak Sounds

Descriptions of the sounds produced by the beaks of birds are far less common in Latin literature, but each of the extant references are particularly evocative. Statius dedicates a lengthy dirge to the deceased parrot of Atedius Melior, and calls upon its avian

⁵⁶⁴ OLD 1968, 336. s.v. "*clementer*".

⁵⁶⁵ OLD 1968, 1386. s.v. "*placidus*".

⁵⁶⁶ FRONTO.Ep.170.12.5.

⁵⁶⁷ CURT.4.15.26.4.

⁵⁶⁸ FESTUS p197.8M.

⁵⁶⁹ LIVY.1.34.8.3.

⁵⁷⁰ FOSTER 1919, vii.

⁵⁷¹ Cf. OLD 1968, 1016. s.v. "*leniter*"; 1021 s.v. "*leviter*".

kin to offer lamentations to this formerly tuneful *psittacus*.⁵⁷² Statius evokes the clattering sounds produced by the parrot's mischievous tendency to rattle the door of its gilded cage with its beak. In this passage, the adjective *argutus* is applied directly to the bird's beak ("*cornu*"). This self-qualifying sound-term characterises the *cornu* as an emitter of clear, sharp sounds.⁵⁷³ The parrot's noisy beak is also identified as the source of the *stridere* at the threshold of the cage. *Stridere* and its noun form *stridor*, are often applied to metallic sounds, including the grinding or squeaking of metal.⁵⁷⁴ In this context *stridere* is used to denote the metallic rattles and creaks of the bird's beak against its silvery enclosure. The use of the creaking *stridere* is juxtaposed and contrasted with the sounds of the empty cage, which offer "their own complaint" ("*querulae iam sponte fores*").⁵⁷⁵ Shackleton Bailey and Parrott astutely associate the adjective *querulus*, which conveys a complaintive quality, with the squeaky hinges of the cage's open doors;⁵⁷⁶ the empty enclosure itself mourns the loss of its feathered friend. Statius' manipulation of the constructed soundscape adds considerable emotional weight to this passage.

The stork (*ciconia*) produces a characteristic, clattering sound that is also occasionally transcribed by ancient Latin authors in text.⁵⁷⁷ This clattering is an extremely common form of communication among white storks, and it is produced by the rapid and repeated clapping of the upper and lower mandibles.⁵⁷⁸ Along with its characteristic sharp, "clacking", this sound also features slight modulations in tone and pitch.⁵⁷⁹ Ovid employs

⁵⁷² STAT.*Silv.*2.4.

⁵⁷³ OLD 1968, 168. s.v. "*argutus*".

⁵⁷⁴ OLD 1968, 1827-1828. s.v. "*strido*"; 1828. s.v. "*stridor*".

⁵⁷⁵ STAT.*Silv.*2.4.13; SHACKLETON BAILEY & PARROTT 2015, 125, fn.2.

⁵⁷⁶ SHACKLETON BAILEY & PARROTT 2015, 125, fn.2.

⁵⁷⁷ The scientific name for the white stork, *Ciconia ciconia*, is derived from its original Latin name.

⁵⁷⁸ BOCHENSKI & JERZAK 2006, 297-298; Cf. KAHL 1972.

⁵⁷⁹ See Sound Recording 36, Sound Recording 37, and Sound Recording 38.

the now familiar verb *plaudere*, along with the participle *crepitans* to denote the "clapping" of Antigone's "rattling bill", after she was transformed into a stork by the goddess Juno.⁵⁸⁰ Petronius likens the rhythmic bill-clapping of *ciconiae* to a rattling, castanet-like instrument called the *crotalum*, or *króton* ("κρόταλον").⁵⁸¹ In the context of this passage Petronius applies the noun *crotalistria*, which was used to denote "a woman who dances to the accompaniment of castanets".⁵⁸² This aural association between the clattering of storks and the rattling of *crotala* forms the etymological basis for the verb *crotolare*, which denotes the sound of *ciconia* in the pseudo-Suetonian Reifferscheid sound list.⁵⁸³ These descriptions are extremely effective in evoking the rhythmic, and tonal qualities of their clapping.

We cannot conclude this discussion on non-vocal bird sounds without acknowledging a conspicuous omission in the Latin corpus; the drumming rolls of woodpeckers. A woodpecker's percussive pecking on the trunks of trees is clearly audible as a series of short, rapid beats.⁵⁸⁴ This drumming sound often reveals their presence, even at considerable distances, and it is believed that this behaviour is employed by woodpeckers for long-distance intraspecies communication.⁵⁸⁵ Recent ecological research has even demonstrated that these rhythmic rolls vary between different species of European

⁵⁸⁰ *Ov.Met.* 6.97;

⁵⁸¹ *PETRON.Sat.* 55.6.6; For examples of the use of *crotalum*, cf: *Copa* 2, *APUL.Met.* 8.24.10; 9.4.12; *FRONT.Ep.* 10.4; HAINES 1920, 111.

⁵⁸² *PROP.* 4.8.39; cf. *OLD* 1968, 461. s.v. "*crotalistria*".

⁵⁸³ *SUET. Rel.* REIFF 161.

⁵⁸⁴ See Sound Recording 39 and Sound Recording 40.

⁵⁸⁵ FLORENTIN, et. al. 2016, 62.

woodpeckers, and may be a marker for the distinctiveness of individual birds.⁵⁸⁶ The woodpecker was a particularly significant symbol in Roman society due to its association with Mars,⁵⁸⁷ and its identification as an augural *ales*.⁵⁸⁸ In a version of the Romulus and Remus myth, a *picus* brought the children food which helped to sustain them.⁵⁸⁹ It has been argued that the woodpecker's Latin name, *picus*, was onomatopoeically linked to their percussive sound.⁵⁹⁰ But despite their symbolic importance and the distinctiveness of their sound, I was unable to find any *direct* references to the percussive rolls of *pici* in the Latin literature of this period. But Ovid does *allude* to their persistent pecking in his aetiological account of the transformation of the ancient Italian king Picus into the homonymous bird.⁵⁹¹ After his unexpected transformation, Picus beset upon the oaken branches with furious intent, piercing them repeatedly with his sharp beak. Ovid applies the verb *figere* to denote Picus' passionate physical response,⁵⁹² which merely *evokes* the sound of beak drumming through a description of the sound-producing action. Ovid often uses sound to signify the change from human to animal,⁵⁹³ so it is clear that the omission of the woodpecker's characteristic drumming is a deliberate literary choice. Ovid also uses this type of restrained sound-evocation in his description of Galanthis' laughter prior to her

⁵⁸⁶ FLORENTIN, et. al. 2016; BUDKA, et. al. 2018; For reference Compare the intermittent beats of a greater spotted woodpecker (Sound Recording 39) with the rapid, creaking, trills of a lesser spotted woodpecker (Sound Recording 40).

⁵⁸⁷ ARMSTRONG 1958, 101-103; MYNOTT 2018, 259.

⁵⁸⁸ FESTUS p197.8M.

⁵⁸⁹ OV.*Fast.*3.37, 53.

⁵⁹⁰ ANDRÉ 1967, 129.

⁵⁹¹ OV.*Met.*14.388.

⁵⁹² OLD 1968, 699. s.v. "*figo*".

⁵⁹³ e.g. OV. *Met.* 2.484; 4.589; 6.377. 13.567 & 14.280.

transformation into her mustelid form.⁵⁹⁴ But the reasons for the comparative silence of these percussive woodpeckers in Latin literature, more generally, remains unclear.

6.4. Concluding Remarks

While there are a number of existing works on the sounds of birds in antiquity, they typically focus on the melodious nature of birdsong. The unique calls of different species are valuable evidence for conjectural species identification, which is a central aim of several monographs on birds.⁵⁹⁵ But non-vocal bird sounds, produced by the wings and beaks of birds, are often overlooked or mentioned only briefly in passing. *Clangor et Plausus* provides an extensive examination of the terminology used to denote the sounds of wings and beaks in Latin literature from 55 BC to AD 180. There are a number of general denotative sound-terms applied to the sounds of wings, however specific subsets of wing sounds emerge in the consistent application of distinct sound-terms. Feather-whistles, the pitched whistling tones caused by the feathers of birds, are clearly denoted by the multifaceted sound-term *stridor* (and its cognates). Percussive wing-beats, caused by the mechanical striking of wings during flight or upon take-off, are typically denoted by the noun *plausus* and its related verb *plaudere*. These rhythmic wing-beats are particularly associated with the noisy wings of *columbae*. Latin authors do occasionally refer to the quietness or gentleness of wings, the majority of references of this type refer to the augural flights of *aquilae*. There are relatively few references to the sounds made by the beaks of birds, however they are especially evocative. Statius provides a noisy elegiac poem for a former *psittacus*, in which *stridor* is used to denote the sound produced by the rattling of

⁵⁹⁴ Ov. *Met.* 9.317; Cf. BETTINI 2008b, 213-214.

⁵⁹⁵ ANDRE 1967; CAPPONI 1979; ARNOTT 2007.

the parrot's beak against its metallic cage. This sound is compared with the plaintive squeaking of the cage's hinges, after the bird's untimely death. Storks are portrayed as percussionists due to the characteristic rattling of their beaks, and a consideration of the peculiar omission of the drumming of woodpeckers draws this chapter to a close. A core finding of this chapter is the consistency with which Latin authors apply sound-terms to specific sounds, such as the rattling beaks of storks and the wing-beats of *columbae*. Another key finding is the precise distinction between different sounds produced by a singular sound-emitter, such as feather-whistles, and wing-beats.

7. *Dissimiles ceterus voces*: the sonic vocabulary of Pliny the Elder

7.1. Preface

This final chapter demonstrates another application for the chosen method, in the evaluation of a single author's sonic vocabulary. This chapter is divided into three major parts, i) an overview of word frequency statistics related to Pliny's use of animal sound-terms (§[7.3](#)), ii) a closer examination of *vox*, *cantus* and *canere*, the three most commonly used sound-terms in the writings of Pliny (§[7.4](#)), and iii) a selective commentary on the sound of animals in books VIII to XI of Pliny's *Natural History* (§[7.5](#)).



7.2. Introduction

Pliny the Elder is the most voluminous of Latin authors (from 55 BC to AD 180) in relation to his characterisation of animal sounds. With a total of 264 sound-term references, Pliny's descriptions of animal sound account for almost 26% of the total sound-term count in the *SAALL* Corpus. Pliny the Elder's *Natural History* is therefore a logical starting point for a close evaluation of the sonic vocabulary of a single Latin author. This chapter will be organised into three distinct parts. Part one will provide an overview of word frequency statistics related to Pliny's use of animal sound-terms (§7.3.). This review will allow for a much closer examination of specific word-frequency statistics related to Pliny's individual use of sound-terms in this corpus. In order to fully appreciate and contextualise some of this data, I have included comparisons with the animal sound-term usage of Ovid, Vergil, Apuleius and Statius. Along with Pliny, these four authors round out the top five authors for most references to the sounds of animals in Latin texts during the chosen period (see Table 1). The cross-examination of Pliny's sonic vocabulary in juxtaposition to these other authors will reveal important avenues for further research. This initial section will consider word-frequency statistics of Pliny's most common sound-emitters, and most frequently used sound-terms, which will shape the subsequent discussion. The complexity of the sound vocabularies, and animal sound-term weights of these five sonorous Latin authors, will also be compared and evaluated.

The second part will present a more focused examination of three of the most commonly used sound-terms in Pliny: *vox*, *cantus* and *canere* (§7.4.). This section will

evaluate Pliny's consistency of term usage, and based on this analysis, I will outline potential delineations for Pliny's use of these terms.

This chapter will conclude with a selective commentary that evaluates Pliny's characterisation of animal sounds in books VIII to XI of the *Natural History* (§7.5.) Book VII of the *Natural History* that centres on the 'human animal', was the focus of an extensive English commentary by Mary Beagon.⁵⁹⁶ But no English commentary currently exists for books VIII to XI. Italian and French commentaries of these volumes are extremely useful, but they provide scant interpretations on the use of specific sound-terminology.⁵⁹⁷ This commentary therefore provides an opportunity to both closely examine Pliny's use of sound-terms in context, and to draw attention to these comparatively understudied volumes of the *Natural History*.

7.3. Animal Sound-Term Usage, Frequency, Complexity and Weight

The sounds of birds are the most heavily represented in the works of Pliny with a total of 131 references, followed by insects (48), mammals (41), reptiles and amphibians (26), mythological creatures (9), and fish and crustaceans (8) (see Table 30, and Figure 8). It will come as no shock therefore, to note that the nightingale (*luscini*a) is the most commonly referenced sound-emitter throughout Pliny's works. Pliny's account of the nightingale's song in book VIII⁵⁹⁸ is one of the most vivid and objectively detailed textual

⁵⁹⁶ BEAGON 2005.

⁵⁹⁷ BORGHINI et. al. 2010; ERNOUT 1952; DE SAINT DENIS 1955, 1961; ERNOUT & PEPIN 1947.

⁵⁹⁸ PLIN. *HN*. 10.81-82.

transcriptions of animal sound in Latin literature. Pliny applies both denotative and attributive sound-terms to formulate his thorough description of the complex variations in this songbird's vocalisations. Following the nightingale in descending order of sound-term frequency are: frogs (*ranae*), cicadae (*cicadae*), bees (*apes*) and roosters (*galli*)(see Table 31). Due to their extremely identifiable sounds, these four animals appear regularly in Pliny's discussions on the nature of animal *voces*. The combination of both the peculiarity of their respective sounds, and the extent of Pliny's deliberations on the term *vox*, provides a likely explanation for their high sound-term usage in this work. It logically follows that *vox* is Pliny's most commonly used sound-term, followed by *cantus*, *canere*, *stridor* and *vocalis*. *Stridor* has received extensive treatment throughout this thesis due to the broad situational associations and semantic range of the term. Pliny's use of *vox*, *cantus* and *canere* requires a more detailed examination, which is the primary focus of the next section.⁵⁹⁹

In regards to the types of sound-terms (i.e. denotative, attributive and self-qualifying), Pliny roughly correlates to the broader trends of sound-term type across the overall *SAALL* corpus, as well as each of the other four authors.⁶⁰⁰ Pliny does however, use a higher percentage of sound-nouns than other authors, which is also higher than the overall figures. One of Pliny's unique features is his extensive use of 'attributive statements'. 'Attributive statement' as a category, incorporates comparative clauses (typically containing verbs of imitation) to characterise and ascribe qualities to a denotative sound-term.⁶⁰¹ Pliny will often compare the sounds of animals using this formula, particularly in

⁵⁹⁹ See below §7.4.1., and §7.4.2.

⁶⁰⁰ See especially: Table 9, Table 10, Table 11, Table 12, Table 13, and Table 14.

⁶⁰¹ See above, §3.5.

describing uncharacteristic vocalisations, or the sonic emissions of uncommon, or monstrous animals.⁶⁰²

As discussed in examinations of the acoustic, affective and aesthetic qualities ascribed to the sounds of insects, and reptiles and amphibians, sound quality totals do not represent the number of attributive sound-terms, but rather the total number of *qualities ascribed* by sound-terms generally. Denotative, attributive and self-qualifying sound-terms can each connote these sound qualities, depending both on the individual term and its contextual use. Acoustic qualities are the most commonly applied attributes, followed by affective and aesthetic (see Table 29). The frequency of these acoustic attributes is buoyed by Pliny's habit of relating the uncharacteristic silence of typically vocal species (usually tied to a specific location), his extensive use of aural comparison, and his detailed descriptions of birdsong.

Gauging the lexical variation of the sound-term usage of Pliny and other authors, provides us with important insights into the complexity of their descriptions of sound in text. We can evaluate the diversity or homogeneity of their sonic terminology, which is expressed numerically by calculating token-type-ratios. Once again, this ratio is calculated by dividing the total sound-term count by the unique lexical items of the discrete corpus. This information is particularly valuable in identifying future avenues of research. Higher complexity and variance in the vocabulary applied to the sounds of animals, may indicate that the author has a more diverse *sensory* vocabulary that would be worth exploring in subsequent studies. Overall Pliny has a comparatively high TTR of 2:1, which indicates a

⁶⁰² See especially: PLIN. *HN*.8.73.2, 75.5-6, 106.2-3, 107. 2-6.

lower degree of variation in sound-term usage (see Table 32). Despite his varied use of participles, Pliny draws from a significantly smaller group of nouns that are used to denote sound. This is once again, an expected result of the broad and regular use of the general term *vox*, and other common sound-nouns such as: *sonus*, *murmur* and *stridor*. We see a much greater degree of variation in the sonic vocabularies of other authors, most notably Apuleius, who has the lowest TTR of this group (see Table 37). This indicates that the vocabulary applied by Apuleius to denote animal sound is even *more* varied than the epic poets, Vergil and Ovid. In future, it would certainly be of interest to expand this examination to include *all* references to sound or perceptions of the other senses, to gain a fuller picture of the sonic or sensory vocabularies of these authors.

Sound-term weight is another profitable calculation that can assist in visualising the quantity of sound-terms in relation to the overall total words of a corpus. Similar to establishing TTR's for sound-terms by author, this can identify ancient authors that place emphasis on the characterisation of sound. This figure, displayed as a percentage, is determined by dividing the number of sound-terms by the total number of words in a text, or collection of texts. The *PHI* presents a similar weight figure on the statistics page associated with the word search function.⁶⁰³ Based on these figures, the total number of words written by Pliny the Elder is 398,104.⁶⁰⁴ Dividing the total number of references to animal sound by the total number of words in the corpus gives Pliny an animal sound-term weight of 0.06631% (see Table 2). As a point of comparison, of the five selected authors, Pliny actually has the second highest sound-term weight after Vergil (0.10680%) (see

⁶⁰³ e.g. PACKARD HUMANITIES INSTITUTE, "Statistics of '*cantus*'" Located at: <https://latin.packhum.org/stats?q=cantus>. Accessed 4 January 2020.

⁶⁰⁴ Included in this total is the *Dubius Sermo*; DELLA CASA 1969.

Table 2). If we further restrict the total corpus length to books VIII to XI of Pliny's *Natural History* (a total of 49,410 words), which encompass the vast bulk of his references to animal sound-terms (234), Pliny's weight jumps up to 0.47561% (See Table 38). This revised animal sound-term weight is actually higher than the top weighted text in the corpus, the *Laus Pisonis*, which has a weight of 0.35566%. This calculation clearly demonstrates the key importance of sound in Pliny's discussion of animals through books VIII to XI. The following discussion will present an analysis of Pliny's three most frequently used sound-terms *vox*, *cantus* and *canere*, which will be split into two discrete discussions.

7.4. Voices, Calls, or Songs? The *Voces* and *Cantūs* of Pliny's Animals

7.4.1. *Vox*

Vox is a sound-term that is typically used to denote "voice".⁶⁰⁵ The term is frequently applied to the sounds of animals, and is the most commonly used animal sound-term in the writings of Pliny the Elder. In a broader discussion on anatomy at the end of book XI, Pliny provides an extensive account of sound-production.⁶⁰⁶ The term *vox* is central to this account, and Pliny specifically outlines the ways in which the word can be applied to the sounds of animals. In this section Pliny draws heavily from Aristotle's earlier *History of Animals*,⁶⁰⁷ which Pliny makes clear in his opening statement: "Aristotle thinks (*"Aristoteles putat"*) that only animals with lungs ... possess a voice (*"vox"*); and that consequently even insects make a sound (*"sonus"*), but have not a voice (*"vox"*)".⁶⁰⁸ Citing

⁶⁰⁵ OLD 1968, 2104 s.v. "*vox*".

⁶⁰⁶ PLIN.HN.11.266-272.

⁶⁰⁷ ARIST.Hist. an. (IV) 535a.30 - 535b.20.

⁶⁰⁸ PLIN.HN.11.266.1; RACKHAM 1989, 599.

Aristotle is certainly an example of good historical practice here by Pliny, but I suspect the main reason it is so clearly stated is rather to qualify Pliny's conflicting use of *vox* in describing insects sounds earlier in book XI.⁶⁰⁹ Pliny goes on to identify a further special exception to Aristotle's delineation of voice, claiming that the *vox* of a frog is "formed in the mouth, not in the chest."⁶¹⁰ Why does Pliny outline the situational rules for applying *vox* to animal sounds, only to break them elsewhere in the *Natural History*? There are two main factors that clarify Pliny's use of *vox*. Firstly, Pliny selectively paraphrases Aristotle's discussion of animal sound-production, upon which Pliny's account is based.⁶¹¹ And secondly, Pliny's consistent translations of the Greek sound-terms used by Aristotle reveal a divergence in the semantic range and situational usage of the respective Greek and Latin terms.

Aristotle establishes a clear distinction between three different Greek sound-terms: *phōnē* (φωνή), *psophos* (ψόφος) and *dialektos* (διάλεκτος), and outlines their application to denote distinct types of sound distinguished by the method of their production. Aristotle ascribes *phōnē* to vocalisations produced by expelling air from the lungs via the pharynx,⁶¹² and applies *psophos* to sounds produced by "other parts of the body";⁶¹³ providing insects as the key source of this latter sound type. Aristotle then juxtaposes *phōnē* and *psophos*, with *dialektos*, which according to his delineation, is "the articulation (*diarthrōsis*) of *phōnē* with the help of the tongue."⁶¹⁴ This comparison ascribes clear semantic boundaries

⁶⁰⁹ PLIN.*HN*.11.2-3, 98, 107.

⁶¹⁰ PLIN.*HN*.11.268.8-10; RACKHAM 1968, 601.

⁶¹¹ ARIST.*Hist. an.* 535a.30 - 535b.20.

⁶¹² ARIST.*Hist. an.* 535a.27-31.

⁶¹³ ARIST.*Hist. an.* 535b.3; PECK 1970, 75.

⁶¹⁴ FÖGEN 2014, 219.

for *phōnē* and *dialektos* along conceptual lines of ‘articulateness’. In paraphrasing Aristotle, Pliny translates *phōnē* consistently as *vox* throughout his own account of animal sound-production, and correlates *psophos* with the Latin *sonus* (and the related verb *sonare*). This latter translation explains his precise use of *sonus* / *sonare* in describing insects at *HN*.11.266-267, compared with his use of *vox* elsewhere in book XI. Pliny does discuss the characteristics of the human voice at the end of his passage on *vox*, using words synonymous with human speech, such as: *sermo* and *locutus*.⁶¹⁵ But Pliny does not extend the comparison to establish a hierarchy between human and animal utterance, as articulate and inarticulate voices. Nor does Pliny present any Latin term as a direct equivalent to *dialektos*. It is possible that Pliny simply disagreed with the statement that animals are incapable of producing *articulate* voice. Or perhaps rather, that he believed such a distinction between human and animal sounds could not be reconciled with his own earlier accounts.⁶¹⁶ But I believe that a significant factor in the omission of such a comparison, is the semantic incompatibility of Pliny’s Latin sound-terms with Aristotle’s established delineations of *phōnē*, *psophos* and *dialektos*.

Traditional usage of *vox* in earlier Latin texts simply does not display the same clear conceptual connotations of *phōnē*. Bettini asserts that *vox* was a general term, of ‘neutral character’, that did not convey any connotations of ‘articulateness’.⁶¹⁷ Varro states that many Latin words were originally “transferred from the cries of animals,”⁶¹⁸ and he provides examples in which these ‘animal sound-terms’ were contextually applied to

⁶¹⁵ PLIN.*HN*.11.270.2-3.

⁶¹⁶ PLIN.*HN*.8.72-73, 8.105-106, 9.7.23, 10. 142.

⁶¹⁷ BETTINI 2008a, 49.

⁶¹⁸ VARRO.*Ling.* 7.103; KENT 1938, 355.

human utterances.⁶¹⁹ Bettini presents this account as clear evidence of the broad use of *vox* in the late Republican period.⁶²⁰ But a more telling instance appears in Lucretius' earlier didactic poem, *De Rerum Natura*. In a passage that relates to the development of human language, Lucretius applies the term *vox* to the vocalisations of both humans and animals.⁶²¹ In doing so, Lucretius positions the consistency of his own diction as evidence of the natural origin of human language.⁶²² By using the term *vox* in this measured way, Lucretius "moves past the traditional ancient distinction between human and animal sounds as, respectively, more or less articulate."⁶²³ Lucretius contextually modifies the *vox* of humans and animals by applying the verbs *notare* ("to mark")⁶²⁴ and, *ciere* and *emittere* ("to emit", or "to produce"),⁶²⁵ to the production of their respective *voces*. Lucretius states that humans "mark all things with voices" ("*cuncta notare vocibus*"),⁶²⁶ and argues that the complexity of this vocal expression is not entirely dissimilar from the ways in which animals "make noises" ("*voces... ciere*")⁶²⁷ and "utter different sounds" ("*varias emittere voces*").⁶²⁸ But the distinction that Lucretius makes by using the verb *notare*, is that humans are unique in producing "vocal sounds as symbols by which to denote things" ("*uaria res uoce notaret*").⁶²⁹ The use of *vox* by Lucretius and Varro, writing in the mid to late 1st century BC, clearly demonstrates the broad semantic range of the term, which is

⁶¹⁹ VARRO *Ling.* 7.103-104.

⁶²⁰ BETTINI 2008a, 49.

⁶²¹ LUCR. 5.1043 – 5.1090.

⁶²² LUCR. 5.1028.

⁶²³ STEVENS 2008, 530.

⁶²⁴ OLD 1968, 1193. s.v. '*noto*'.

⁶²⁵ OLD 1968, 313. s.v. '*ciere*'; 604-605. s.v. '*emitto*'.

⁶²⁶ LUCR. 5.1043-1044 (cf. 1058); MELVILLE 2008, 166.

⁶²⁷ LUCR. 5.1060; MELVILLE 2008, 167.

⁶²⁸ LUCR. 5.1088; MELVILLE 2008, 167.

⁶²⁹ STEVENS 2008, 552.

incompatible with Aristotle's rather narrowed delineation of *phōnē* in opposition to *dialektos*. The unambiguous use of *vox* in *De Rerum Natura* directly shapes Pliny's own linguistic choices, especially as Lucretius conscientiously eschews stereotypic distinctions of 'articulateness' between human and animal utterances. For Pliny, the term *vox* could be applied indiscriminately to the voices of both humans⁶³⁰ and animals.

7.4.2. *Cantus* / *Canere*

After *vox*, the noun *cantus* and the verb *canere* are the second and third most frequently used animal sound-terms in the writings of Pliny. The semantic underpinnings of these terms are particularly nebulous, and their linguistic connection to the contentious term *carmen* places them at the epicentre of ongoing debate on the nature of Roman “song”.⁶³¹ The *OLD* primarily associates these terms with “song” and “the act of singing”.⁶³² In English Loeb editions, translators often take *cantus* as “song”, and *canere* “to sing”,⁶³³ but will also sometimes provide a more species-specific, English denotative sound-term, such as “crowing” (“*canere*”) of a rooster,⁶³⁴ and “cooing” (“*cantus*”) of wood-pigeons.⁶³⁵

The musical associations of *cantus* / *canere* have been recently questioned by Maxime Pierre in his bilingual cross-examination of the related word *carmen*. Pierre argues

⁶³⁰ PLIN. *HN*. 2.22.4; 2.115.4; 6.2.7; 7.4.3; 7.70.6; 7.76.3.

⁶³¹ HABINEK 2006, cf. FEENY & KATZ 2006, PIERRE 2016.

⁶³² *OLD* 1968, 268 s.v. “*cantus*”; 266 s.v. “*cano*”.

⁶³³ *cantus* “song”: *Culex* 147, FAIRCLOUGH & GOOLD 1918, 415; VERG.*G*.1.403, FAIRCLOUGH & GOOLD 1916, 127; *canere* “to sing”: APUL.*Flor.*12.7, JONES 2017, 277; VERG.*A*.12.862, FAIRCLOUGH & GOOLD 1918, 361.

⁶³⁴ RACKHAM 1983, 325; PLIN.*HN*.10.50.

⁶³⁵ RACKHAM 1983, 359; PLIN.*HN*.10.106.

the primary function of *canere*, when applied to Roman wind-instruments or animal vocalisations, was to designate the issuing of a “signal”, completely distinct from any “musical” connotations.⁶³⁶ Pierre characterises sounds associated with these terms as “signals to be interpreted”, similar to the semantically-steeped wailings of a klaxon or siren.⁶³⁷ The systemic use of *cantus* and *canere* to denote the sounds, and sound-production of Roman brass instruments is compelling evidence to support this interpretation. This functional distinction between ‘sound-producing’ and ‘musical’ instruments was also a principal finding of my Masters thesis on the sociocultural perception of Roman brass instruments and musicians.⁶³⁸ But Pierre further extends this semantically charged form of ‘sound-production’ to the denotation of animal sounds.

Birds played an important role in Roman augury, whereby the actions of birds were interpreted as conveying prophetic signs. Two distinct types of augural birds are identified by Festus, *oscines* and *alites*. The former give their signs through their utterance, and the latter by their flight-patterns and wings.⁶³⁹ Pierre argues that the contextual use of *carmen*, *cantus* and *canere* with the semantic cries of these *oscines*, supersedes any lingering musical association.⁶⁴⁰ The application of these terms to certain harsh-voiced *oscines* (including ravens, crows, and owls)⁶⁴¹ supports this argument to some extent. Pierre presents further examples in which these terms were applied to animal sounds typically

⁶³⁶ PIERRE 2016, 44.

⁶³⁷ PIERRE 2016, 44.

⁶³⁸ CROSS 2014a, 42-48.

⁶³⁹ FESTUS p197.8M.

⁶⁴⁰ PIERRE 2016, 41.

⁶⁴¹ PIERRE 2016, 41; FESTUS p197.8M. *Corvi*: APUL. *De deo Soc.* praef.4.10, CIC.*Div.*2.16.12, LUCR. 5.1084; *Cornices*: CIC.*Div.*2.78.9, CIC.*ND.*3.14.10; *Bubones* and *strigae*: OV.*Her.*2.119, TIB.*Eleg.*1.5.52.

considered to be ‘unmusical’, including the barking of dogs,⁶⁴² and the crowing of roosters.⁶⁴³ These two sound-emitters are perfect examples of Pierre’s semantic *cantus*. The barking of a dog, like a fire alarm, conveys a sense of warning, perhaps alerting its owner to the presence of an intruder. The crowing of a rooster conveys the rising of the sun. Pliny’s use of *cantus* / *canere* generally correlates well with Pierre’s delineation of these terms as ‘signal-production’, however there are some minor exceptions that will be subsequently examined in closer detail.

Given Pierre’s identification of the clear link between *oscines* and *cantus* / *canere*, we would expect this association to be plainly reflected in Pliny’s use of the terms. Pliny does identify *oscines* and *alites* in his classification of birds in book X, but rather as a sub-category of his own three distinct groups. It is worth briefly exploring the contradictions and complexities of Pliny’s model of classification to determine whether his use of *cantus* / *canere* is associated with *oscines*.

Pliny’s *oscines*

Pliny divides his discussion of birds into three groups, based on the anatomical features of their feet: i) those with hooked talons (presumably birds of prey), ii) those with *digiti* (literally ‘toes’ or ‘digits’), and iii) those with webbed feet (which incorporates all remaining aquatic birds).⁶⁴⁴ The second group (birds with *digiti*), are further divided into two sub-categories, *oscines* and *alites*. Pliny’s comment that *oscines* “are distinguished by

⁶⁴² VARRO.*Ling.*5.99.

⁶⁴³ COLUMELLA, *Rust.* 8.2.11.6; CIC.*Div.*1.74.10, 12; OV.*Met.*11.596.

⁶⁴⁴ PLIN.*HN.*10.29.

their song ("*cantus*") and [*alites*] by their size"⁶⁴⁵ draws from Festus' distinction between these two groups, but makes no reference to their significance as distinct types of Roman augural birds. Furthermore, Pliny's use of the terms *oscines* and *alites* is not consistent with other accounts of these augural categories in Latin literature. The *corvus*, perhaps the most identifiable of the prophetic *oscines*, is classified into the first group of birds with hooked talons.⁶⁴⁶ The *gallus*, despite elsewhere in Pliny being associated with its foretelling cries,⁶⁴⁷ is identified as an *ales*.⁶⁴⁸ In contradistinction, the birds that Pliny most clearly associates with the term *oscines* are actually *songbirds*, including blackbirds, nightingales and others that are not traditionally linked with Roman augury. J.J. Hall asserts that while Pliny's model of classification seems indebted to both Aristotle (in regards to classification by anatomical features, i.e. their feet), and to Roman augural traditions, it is entirely distinct from both.⁶⁴⁹ It is clear that Pliny applies the names for these traditional augural categories, *oscines* and *alites*, to his own arbitrary groups of birds that are merely *identifiable* by their song, and their size; rather than the communication of prophetic signs via these respective methods. Essentially we must distinguish between two distinct types of *oscines*: i) the traditional augural type, i.e. birds that *give prophetic signs* by their calls, and ii) Pliny's *oscines*, those birds that can be *identified* by their calls, i.e. songbirds. In addition to Pliny's unconventional use of the term *oscines*, his erratic anecdotal style further muddies the categorisation of distinct species into these groups. As Pliny often links

⁶⁴⁵ PLIN.*HN*.10.43.

⁶⁴⁶ Which in itself is an erroneous identification, see RACKHAM 1989, 310-311, fn. *a*.

⁶⁴⁷ PLIN.*HN*.10.49.7-10.

⁶⁴⁸ RACKHAM (1989, 318, fn.*c*) argues that Pliny seems to justify the classification of the *gallus* as an *ales*, by stating that its "*cantus* is preceded by *plausus laterum*, and by reference to its *tripudia*." *Tripudium* is a term applied to an observable sign made by augural chickens (*pulli*), see DRIEDIGER-MURPHY 2019, 109.

⁶⁴⁹ HALL 1991, 225; It is my view that Pliny ultimately devised this method of categorisation to correspond with his overall schema for books VIII to XI, which orders animals in descending order of size.

his accounts by theme, it is challenging to establish whether a bird actually belongs to the category being discussed, or is present simply by thematic association. Due to these uncertainties we cannot confidently draw a clear line of association between the use of *cantus* / *canere* and *oscines* in the *Natural History*.

But the question remains, why does Pliny associate *cantus* / *canere* with some species of birds and not others? Is there a discernible pattern to his use of the terms? Pierre's interpretation of *cantus* / *canere* as 'signal-producing' does account for a number of these references. Pliny applies *cantus* to the crowing of a rooster by which it "herald[s] the coming day,"⁶⁵⁰ and he relates that even the rooster's evening song ("*vesperinus cantus*") was believed to contain portents.⁶⁵¹ *Cantus* is also applied by Pliny to the identifiable sound of the cuckoo (*cuculus*), which was considered to be a signal of the approaching spring.⁶⁵² Pliny also associates the call of wood-pigeons (*palumbes*) with spring, which could provide context for his use of *cantus* in the denotation of their cooing.⁶⁵³ The terms are used by Pliny to denote the sounds of frogs,⁶⁵⁴ which are characterised elsewhere in the Latin corpus as emphasising a sense of incessant communication and signalling.⁶⁵⁵ But it is Pliny's use of *canere* in denoting the sounds of *cicadae*⁶⁵⁶ that provides a glimpse into a 'musical' exception to Pierre's semiological interpretation. Pierre argues that instances in

⁶⁵⁰ PLIN.*HN*.10.46-47; RACKHAM 1968, 323.

⁶⁵¹ PLIN.*HN*.10.49.

⁶⁵² PLIN.*HN*. 30.85.6; PLINY (*HN*. 18.249.5.) accounts the imitative origin of a cuckoo's call as a derogatory slur. For an example of the contextual use of the insult, see HOR.*Sat*.1.7.31.

⁶⁵³ PLIN.*HN*.10.106.4-6.

⁶⁵⁴ frogs: PLIN.*HN*. 8.227; cicadae: PLIN.*HN*.11.92-95.

⁶⁵⁵ See above, §[5.4](#).

⁶⁵⁶ PLIN.*HN*.11.92-95.

Latin literature where *cicadae* “sing”,⁶⁵⁷ echo the earlier Hellenistic tradition in which *cicadae* were the musicians “*par excellence*.”⁶⁵⁸ Considering these examples Pierre concedes that this situational use of the term is a semantic calque of the Greek sound-verb *adein* (ᾄδεν), meaning “to sing”.⁶⁵⁹ This situational application of *cantus* / *canere* provides a suitable delineation for a number of these terms in the *Natural History*. Pliny’s references to the singing of blackbirds (*merulae*),⁶⁶⁰ nightingales (*luscinae*),⁶⁶¹ and swans (*olores*),⁶⁶² can all be traced to descriptions of their sound in Aristotle’s *History of Animals*. In the corresponding passages upon which Pliny’s accounts are based, Aristotle denotes their respective sounds with the Greek *adein* (ᾄδεν), which is then translated consistently by Pliny as *canere*. Aristotle even applies *adein* to the sound-production of roosters,⁶⁶³ which adds further semantic weight to Pliny’s application of *cantus* / *canere* to the cries of *galli*.

The utterances of *halycones* and *bubones* are the only remaining examples in Pliny in which *cantus* / *canere* are used to denote the sounds of animals.⁶⁶⁴ We know *halcyones* were considered to be one of the major songbirds of Roman poetry, but their representation is heavily mythologised.⁶⁶⁵ Pliny’s discussion of the *halcyones* immediately follows a reintroduction of the main discussion of his *oscines* (songbirds). The denotation of the calls

⁶⁵⁷ *Copa* 27, VERG. *G.* 3, 328.

⁶⁵⁸ PIERRE 2016, 42.

⁶⁵⁹ PIERRE 2016, 42., cf. MICHAELIDES 1978, 1. s.v. “*adein*, ᾄδεν.”

⁶⁶⁰ PLIN.*HN*.10.80., cf. ARIST.*HA*.(IX. 49) 632b.17.

⁶⁶¹ PLIN.*HN*.10.81. cf. ARIST.*HA*. (IV. 9) 536b.15; (IX. 49) 632b.21-22; and VERGIL’S use of *carmen* in denoting the cries of the transformed Philomela (*G.* IV. 511-515).

⁶⁶² PLIN.*HN*.10.63. cf. ARIST.*HA*.(IX. 49) 632b.21-22.

⁶⁶³ ARIST.*HA*. (IV. 9) 536b.15.

⁶⁶⁴ This is not including a reference to the mythical sirens at PLIN.*HN*.10.136-137. But the musical connotation of the term is clearly understood in this context.

⁶⁶⁵ ARNOTT 2007, 20-21; ANDRE 1967, 25-27; CAPPONI 1979, 51-57.

of *halcyones* as *cantus* is likely a combination of proximity to other birds whose songs are denoted by *cantus* / *canere* (blackbirds and nightingales), and a response to traditions in Latin poetry that position the *halcyon* as a songstress. Finally, Pliny states that the *vox* of the *bubo* is “not a musical note (*"nec cantus"*) but a scream (*"sed gemitus"*)”.⁶⁶⁶ If Pliny rather intends *cantus* in the sense of ‘signal production’ (i.e. ‘the *bubo*’s cry does not produce signs’), this statement directly contradicts contemporary accounts of the oracular signs attributed to the cries of this bird.⁶⁶⁷ This account cannot be traced to Aristotle, which by extension means there is no clear link to the Greek term *adein* that carries the musical connotation of *cantus*. But if we consider the way in which Pliny associates *nec cantus* with *gemitus*, interpreting the musical sense of *cantus* (as Rackham has done), seems the most appropriate.

Pliny’s use of *cantus* / *canere* when applied to animal sounds is split into two delineations, as identified by Pierre: i) the production of semiological signals by means of vocalisations, and ii) the production of a sound that carries musical connotations by means of a bilingual association with the Greek verb *adein* (ἀδεν).

⁶⁶⁶ PLIN.*HN*.10.34.

⁶⁶⁷ VERG. *A.* 4. 462-3; SEN. *Her.F.* 686.

7.5. Animal Sounds in the *Natural History* VIII – XI – Commentary

7.5.1. Introduction

Pliny arranges books VIII to XI of the *Natural History* by animal type, and then subsequently by size, descending from largest to smallest. Book VIII centres on terrestrial animals, book IX on aquatic animals, book X focusses on birds, and book XI is divided into two parts; the first half discusses insects, and the second presents general biological observations. Despite the ordered arrangement of these books by animal type, individual sections can become disjointed due to Pliny's penchant for digressive anecdotes based on thematic association. The commentary format of this section is particularly effective, as it simply parallels Pliny's accounts in sequential order.

This commentary will examine and evaluate Pliny's descriptions of animal sounds in books VIII to XI. The restricted scope of this commentary will focus solely on Pliny's comments regarding sound production in animals. But this text forms the basis of an expanded study that will evaluate the veracity of Pliny's animal behavioural observations through close comparisons with modern evidence. This commentary will: identify similar species-specific usage of sound-terms in other ancient authors (where applicable), identify possible antecedents to Pliny's accounts, identify unique use of sound-terms, compare descriptions of sound production behaviours with modern scientific evidence, and at times, provide clarification on animal type or species.

The vast number of references to animal sound, across these four books, has necessitated the implementation of additional limits to the scope of this selective commentary. I have omitted a close examination of Pliny's treatment of the nightingale at

HN. 10.81-83, and his broad discussion of the nature of animal voices at *HN.* 11.260-267.

Close-examinations of these extended passages are best left to future research articles that can evaluate the nuances of these sections more fully.

7.5.2. Book VIII

5.9. [elephants] *iras proflare*:

Rackham translates this phrase as "trumpets angrily".⁶⁶⁸ *Proflare* is used to denote the action of breathing out, or emitting an exhalation.⁶⁶⁹ It is applied in other texts to exhalations of other animals,⁶⁷⁰ and could allude to the physical methods of sound production of an elephant's trumpeting call. Elsewhere at *HN*.11.269, Pliny applies the verb *elidere* to the production of a sneezing sound ("*sternumento similem*") through an elephant's mouth. *Elidere* is used to emphasise the force or violence of an emission, which Rackham translates as "squeez[ing] out".⁶⁷¹ Pliny contrasts this sound with the harsh trumpet-like sound produced through its nose ("*per nares autem tubarum raucitati*").⁶⁷² If we take into consideration this comparison of the two distinct sound types, it would suggest that *proflare* is being used to simply denote the action of exhalation. Interpreted in this way *proflare* is rather an allusion to the accompanying sound. I would suggest 'snort' as an alternate English translation, which is consistent with Mozley's treatment of the term.⁶⁷³

21.7. [elephants] *lamentatione conplorantes*:

⁶⁶⁸ RACKHAM 1983, 8.

⁶⁶⁹ OLD 1968, 1477. s.v. "*proflo*".

⁶⁷⁰ *taurus*: VAL. FLAC. *Argon.* 6.435; 7.571.

⁶⁷¹ See OLD 1968, 599. s.v. "*elido*"; RACKHAM 1983, 601.

⁶⁷² PLIN.*HN.* 11.269.

⁶⁷³ MOZLEY 1934, 333 & 403.

Pliny relates a slaughter of elephants in the arena in 55 BC, which was arranged by Pompey to honour the dedication of his theatre.⁶⁷⁴ Pliny's application of both *conplorare* (an alternative form of *complorare*) and *lamentatio* to the sounds of elephants is unique. These terms are used here to emphasise the emotions expressed by the elephants through their wailing, in a way humanising them, while at the same time demonising Pompey (and foreshadowing his demise).⁶⁷⁵ Cicero provides an eye-witness account and asserts that the spectators felt compassion for the elephants, sensing a human quality in them.⁶⁷⁶ Cassius Dio also presents an account of this event in his *Historia Romana*.⁶⁷⁷

27.9-10. [*elephans, suus*] *iidem minimo suis stridore terrentur*:

Pliny notes the elephant's fear (*terror*) of the high-pitched squealing of pigs. He emphasises this fear-inducing quality by applying the diminutive adjective *minimus* to the denotative *stridor*; "even the *slightest* shriek of a pig". The innate aversion of elephants to high-pitched sounds was well known in antiquity, and this weakness was often exploited in battle.⁶⁷⁸

48.3. [*leo*] *Leoni tantum ex feris clementia in supplices. prostratis parcit et, ubi saevit, in viros potius quam in feminas fremit, in infantes non nisi magna fame*:

⁶⁷⁴ KITCHELL 2014, 65.

⁶⁷⁵ PLIN.*HN.* 21.10-22.

⁶⁷⁶ CIC. *Fam.* 7.1.3.

⁶⁷⁷ CASS. DIO. 39.38.

⁶⁷⁸ AEL. NA 16.36; SEN. *De Ira* 3.1.11.6; also, CROSS 2017, 155.

Fremitus is also used by other Latin authors to denote the deep roars and growls of lions,⁶⁷⁹ and tigers.⁶⁸⁰ This term is only used twice more in volumes VIII to XI of the *Natural History* to denote the sounds made by tigers and seals (see below).⁶⁸¹

66.7. [*tigris*] *raptor adpropinquante fremitu abicit unum ex catulis*:

As above (HN.8.48.3), *fremitus* commonly denotes the deep roars and bellows of large terrestrial mammals, especially in Pliny's works: lions, tigers, and seals.

72.7-8. [*cercopithecus*] *cercopithecus nigris capitibus*, ... *dissimiles ceteris voce*:

Aristotle does not refer to this type of monkey, but it first appears in Strabo, who is quoting Megasthenes.⁶⁸² Pliny is quite ambiguous in his statement that the voice of the *cercopithecus* is unlike that of any other primate. This unique reference is one of nine 'attributive statements' that characterise the sound of an animal through direct or indirect comparison. This method of sound description is particularly distinctive of Pliny.⁶⁸³ Kitchell discusses possible identifications for this particular animal.⁶⁸⁴

73.2. [*leucrocota*] *hanc feram humanas voces tradunt imitari*:

⁶⁷⁹ VAL. FLAC. *Argon.* 3.239; PLIN. HN.8.48.3; SEN. *Dial.* 3.1.6.3; SIL. 7.424.

⁶⁸⁰ STAT. *Theb.* 7.584; JUV. 8.37.

⁶⁸¹ *Tigers*: PLIN. HN. 8.66.7; *seals*: PLIN. HN. 9.41.8-42.1.

⁶⁸² STRABO, 15 1.29-37; BORGHINI, et al. 2010, 189, fn. 5.

⁶⁸³ See below cf, PLIN. HN.8.75; 8.105-106; 8. 107; 11. 269.

⁶⁸⁴ KITCHELL 2010, 25-26, s.v. '*cebus*' and '*cercopithecus*'.

Another unique ‘attributive statement’. The *leucrocota*’s uncanny ventriloquism defamiliarises the human voice. This technique emphasises the uncanny monstrousness of the *leucrocota*. Rackham identifies this animal as a type of hyena.⁶⁸⁵ Kitchell argues the creature is certainly fictional.⁶⁸⁶ While descriptions of the animals form are quite fabulous (e.g. “a lion’s neck, tail and breast, badger’s head, [and] cloven hoof”),⁶⁸⁷ there are clear similarities between Pliny’s accounts of human mimicry in the *leucrocota* and the *hyaena*.⁶⁸⁸ I agree that species identification of the *leucrocota* cannot be definitive, but the similarities between these two accounts do support Rackham’s claim.

75.5-6. [*mantichora*] vocis ut si misceatur fistulae et tubae concentus:

Pliny quotes Ctesias in describing the *mantichora*, a fabulous creature said to originate from India. Aristotle records its existence but is sceptical.⁶⁸⁹ Borghini et. al. suggest the identification of a Bengal tiger (*Panthera tigris*) is consistent with the manticore’s Indian origin, leonine body and status as a “man-eater.”⁶⁹⁰ Pliny states the voice of a *mantichora* is a mixture of cross-blown pan-pipes (*fistulae*) and Roman straight-trumpets (*tubae*). This indirect comparison allows Pliny to retain a degree of impartiality in his description of the sounds of fabulous creatures.

⁶⁸⁵ RACKHAM 1983, 54, fn.b.

⁶⁸⁶ KITCHELL 2010, 108.

⁶⁸⁷ RACKHAM 1983, 55.

⁶⁸⁸ PLIN.HN. 8.105-106.

⁶⁸⁹ ARIST. *Hist. An* 501a 25.

⁶⁹⁰ "mangiatore di uomini " BORGHINI, et al. 2010, 191, fn75.1.

Similar to the sounds of the *leucrocota*, Pliny defamiliarises well-known sounds of Roman musical instruments. Both instruments are stereotypic of the pastoral sphere; the *fistulae* appear commonly in bucolic poetry of the period,⁶⁹¹ and *tubae* (and *bucinae*) were used by herdsmen to call their animals from greater distances.⁶⁹² There is no evidence in extant literature that suggests *fistulae* and *tubae* were ever played together, and their varied functions would suggest that this was extremely unlikely. Furthermore, the tone quality of these instruments is very distinct; think about the contrast between Peruvian pan-pipes and a military bugle. Considering the disparate sociocultural functions of these two instruments and their contrasting tone, Pliny clearly chose to blend these fundamentally dissimilar sounding wind-instruments to further emphasise the uncanniness of the *mantichora*'s voice.

76.7. [*monoceros*] *asperrimam autem feram monocerotem... mugitu gravi*:

Pliny's description of the *monoceros*, a name referring to the animal's single horn, likely originates from sightings of rhinoceros. *Mugitus* characterises the *monoceros*' sound as akin to the bellowing of oxen,⁶⁹³ and is further qualified by *gravius*, usually interpreted to signify a deepness, or lowness of pitch. Pliny also applies *mugitus* to the sound

⁶⁹¹ CALP. *Ecl.* 4.73-80; NEMES. *Ecl.* 2.37; VERG. *Ecl.* 3.25-29; 8.32.

⁶⁹² PLIN. *HN*, 16.78-82; VARRO. *Rust.* 2.4.20; POLYB. 12.2.4; see also CROSS 2017.

⁶⁹³ PLIN. *HN*.2.193.6; OVID. *Fast.* 1.560; SEN. *Dial.* 6.7.2.7; VERG. *A.* 2.214.

made by some insects,⁶⁹⁴ and also to the sound made by seals.⁶⁹⁵ This passage occurs in a section that presents the animals of India, so it is possible this could be referring to an Indian or greater one-horned rhino (*Rhinoceros unicornis*).⁶⁹⁶ While the animal today is listed by the IUCN list as vulnerable,⁶⁹⁷ it currently inhabits regions along the north-eastern border of India and Nepal.

If we compare recordings of the sounds of Indian rhino, we can find a few examples that are similar to the lowing and bellowing sounds made by oxen.⁶⁹⁸ It is unlikely that Pliny would have heard the sounds of this animal himself. It seems Pliny has rather applied the sonic terminology consistent with oxen, as they have a similar size and build to his description of the *monoceros*.⁶⁹⁹ If the Indian rhino is the actual inspiration for Pliny's *monoceros*, I would argue that his application of *mugitus* is perfectly appropriate.

78.4. [*basiliscus*] *sibilo omnis fugat serpentes*:

Sibilus is the most common denotative term for the hiss of a snake.⁷⁰⁰ The statement that it puts other serpents to flight (*fugat*), could refer to the intensity of its hiss. But due to the fabulous nature of the

⁶⁹⁴ See below, *HN*. 11.98.4-5.

⁶⁹⁵ *PLIN.HN*. 9.41.6.

⁶⁹⁶ BORGHINI, et al. 2010, 193, fn76.3.

⁶⁹⁷ TALUKDAR, et. al. 2008.

⁶⁹⁸ For the sounds of Indian rhinoceros see Sound Recording 47, and Sound Recording 48;

Compare with the bellowing of bull, see Sound Recording 49.

⁶⁹⁹ *PLIN. HN*. 76.6-8; "The body of a horse... head of a stag... feet of an elephant", RACKHAM 1983, 57.

⁷⁰⁰ See above §5.3.

basiliscus, it is not possible to assess the veracity of this statement. Pliny does also apply this verb *fugire* to the *vox* of a *tinnungulus* (identified by Rackham as a kestrel).⁷⁰¹ Considering this contextual use, the verb could simply denote a natural flight response. Kitchell suggests Pliny could here be referring to an Egyptian cobra (*Naja haje*), as his descriptions correspond to its characteristic movement with head raised, and its animosity with mustelids such as, weasels and mongoose.⁷⁰² Some commentators identify this creature as *Draco volans*, the basilisk lizard.⁷⁰³

106.2-3. [*hyaena*] *sed maxime sermonem humanum...adsimulare...*

106.3-4. ["] *nomenque alicuius addiscere quem evocatum foris laceret...*

106.4-5. ["] *item vomitionem hominis imitari ad sollicitandos canes:*

Pliny in this passage relates a lengthy description of the variety of sounds made by *hyaenae*. These horrible *hyaenae* can imitate human speech ("*sermonem humanum... adsimulare*"), call shepherds by their name ("*nomenque... evocatum*"), and imitate the sounds of humans vomiting to attract the attention of dogs ("*vomitionem hominis imitari ad sollicitandos canes*"). All of these sounds are used to lure herdsmen and their dogs to gruesome deaths. Pliny is again, using these attributive statements to twist familiar human sounds into the sounds of an uncanny monster. Calling shepherd's by name seems to be an extension on

⁷⁰¹ See below, PLIN.HN. 10.109.3-4.

⁷⁰² KITCHELL 2010, 10.

⁷⁰³ BORGHINI et al. 2010, 193, fn78.1.

previous descriptions of imitative monsters. There is no biological evidence that suggest hyenas actually *imitate* sounds, but they do produce an extremely wide variety of vocalisations, including: high-pitched ‘whoops’ akin to laughter; barks, yelps and chirps (sounds that we would expect from dogs more generally), and low growls.⁷⁰⁴ Their ‘whooping’ calls can also travel vast distances, up to 5km.⁷⁰⁵ Recordings of the sounds of hyenas attest to the variation of their calls, and are quite frankly, rather unsettling.⁷⁰⁶ A peculiar aspect of this account is the hyaena’s imitation of the sound of a human vomiting, as an enticement for unsuspecting dogs.⁷⁰⁷ A curious notion; but nevertheless, an intense, low, bubbling, guttural defence call made by an adult brown hyena (*Hyaena brunnea*) is quite similar to Pliny’s description of this sound.⁷⁰⁸

In relation to their threat to humans, a recent survey of 1,200 spotted hyena scats in Northern Ethiopia found that 5.5% contained human hairs.⁷⁰⁹ Combining the variations of their calls with their threat to humans forms a believable basis for Pliny’s monstrous imitative *hyaenae*.

107. 2-3. [*corocotta*] *similiter voces imitantem hominum pecorumque:*

⁷⁰⁴ HOLEKAMP, SAKAI, & LUNDRIGAN 2007, 525.

⁷⁰⁵ HOLEKAMP, SAKAI, & LUNDRIGAN 2007, 525.

⁷⁰⁶ See Sound Recording 50, Sound Recording 51, Sound Recording 52, and Sound Recording 53.

⁷⁰⁷ According to KITCHELL, dogs were known in antiquity for eating vomit; 2010, 92.

⁷⁰⁸ See Sound Recording 50.

⁷⁰⁹ ABAY, BAUER, GEBRIHIWOT & DECKERS 2010, 759.

Pliny relates the *corocotta*'s ability to mimic the voice of men and cattle in a similar uncanny, and defamiliarising way as the *leucrocotta* and *hyaena*. Due to the close similarity between these three accounts, I would suggest that they represent distinct species of hyena. But I do not believe we can confidently identify the species based on the evidence presented in Pliny's account. Rackham simply states that the *corocotta* is "an unknown animal."⁷¹⁰ Kitchell identifies this animal as the striped hyena (*Hyaena hyaena*).⁷¹¹ It may be of interest therefore to compare Pliny's account with a recording of striped hyena vocalisations.⁷¹²

107.6. [*mantichora*] *hominum sermones imitari et mantichoran*:

Pliny concludes this digression on the monstrous mimicry of human sounds, by adding that (according to Juba) the *mantichora* of Ethiopia also mimics human speech. Once again, this parallels Pliny's other descriptions of human mimicry as a "monstrous voice", notably through the use of an attributive statement. It is worth noting however that this reference complicates the prior identification of *mantichora* as a tiger,⁷¹³ as tigers are not native to the African sub-continent.

114.1. [*canis*] *autem latratu canum audito*:

142.7. [*canis*] *laniatuque et latratu coactum fateri scelus*:

⁷¹⁰ RACKHAM 1983, 76. fn.a.

⁷¹¹ KITCHELL 2010, 34.

⁷¹² See Sound Recording 53.

⁷¹³ See above, PLIN.HN.8.75.5-6.

Latratus is a species-specific sound-term, meaning that the primary denotation of the term is tied to a single species; in the case of *latratus* it denotes the barking of dogs.⁷¹⁴ In both of these references, *latratus* is used as a basic denotative sound-term. The clearly defined semantic range of this term adds significance to the prodigy of a barking snake related at *HN*. 8.153.6.

145.5-6. [*canis*] *maestos* ... *ululatus*:

A dog belonging to one Titius Sabinus, who was murdered by Nero, uttered sorrowful howls ("*maestos* ... *ululatus*") on the Gemonian Stairs. These stairs were located on the Aventine hill in Rome, and criminals were dragged down them on the way to the Tiber.⁷¹⁵ Borghini et. al. note that a popular etymology for the Gemonian Stairs is the verb *gemere*,⁷¹⁶ which denotes sounds that express pain, regret or sorrow, and is also applied to the sounds of animals. Pliny here uses the term *maestos* to characterize the affective mournful qualities of the *ululatus*, or howling, of the dog. As an important aural comparison, *ululatus* commonly denotes the wailing expressions of grief,⁷¹⁷ which is also expected in Roman mourning practices. Pliny uses the sonic terminology to shape his personification of the dog in a human expression of mourning for its deceased owner.

⁷¹⁴ OLD 1968, 1007. s.v. "*latratus*".

⁷¹⁵ OLD 1968, 757. s.v. "*Gemoniae*".

⁷¹⁶ BORGHINI, et al. 2010, 235, fn145.2.

⁷¹⁷ VERG.A.4.667; 11.190; OV.*Her*.5.73; CURT.5.12.12; LUC.2.33; STAT. *Silv*. 5.5.71; PLIN. *Ep*.6.20.14; See OLD 1968, 2087, s.v. "*ululatus*"; cf. HOPE 2017.

150.4-5. [*canis*] *ingenti primum latratu intonuit*:

Pliny applies a unique use of the verb *intonare* to characterise the *latratus* of a dog that fought against an elephant in a demonstration for Alexander the Great. *Intonare* is infrequently used for animals, primarily denoting thunderous sounds associated with lightning, the sounds of the Gods, or other forceful utterances.⁷¹⁸ But the author of the *Culex* uses this verb rather to evoke the quick and intense hisses of a striking serpent.⁷¹⁹ Rackham here translates the term as "thunderous,"⁷²⁰ which in English signifies a rather deep rumbling quality. This translation is acceptable, but underlying connotations through the semantic association of *intonare* with lightning and the defence hisses of snakes, would suggest Pliny's use of the term conveys a heightened sense of clarity, suddenness and intensity.

153.5. [*canis*] *canem locutum in prodigiis*:

153.6. [*serpens*] *serpentem latrasse cum pulsus est regno Tarquinius*:

183.9-10. [*bove*] *est frequens in prodigiis priscorum bovem locutum*:

Pliny here presents a prodigy of a talking dog and a barking snake occurring in the year that King Tarquinius was driven from Rome. According to Ernout the account of the dog speaking is related in Julius Obsequens and occurred during the consulship of C. Marius and C.

⁷¹⁸ OLD 1968, 952. s.v. "intono".

⁷¹⁹ *Culex* 179. See above §5.3.

⁷²⁰ FAIRCLOUGH & GOOLD 1918, 417.

Flaccus.⁷²¹ *Locutum* is used to stress the dog's uttering of human language and phraseology rather than its own natural voice ("vox"). *Locutum* is also used in this way at *HN*. 10.183.9 to differentiate between an oxen's typical vox or *mugitus*, and the speaking of human language. According to Ernout this latter prodigy was common in antiquity.⁷²² This is most likely due to the frequency of contact with oxen.

Latratus is a largely species-specific sound-term and its uncharacteristic use for the *serpens* is compared with the strangeness of a talking dog. As unlikely as a barking snake would seem, the king cobra (*Ophiophagus hannah*), which is native to India and Southeast Asia, has actually been observed to emit deep, rumbling hisses that sound rather like a low-pitched growling.⁷²³

Bettini argues that the divide between human and animal voices in the ancient world was inviolable; and that when animals imitated the voice of humans in antiquity "the horror [was] guaranteed."⁷²⁴ Bettini groups these speaking prodigies, with other monstrous mimics including the *mantichora*, *hyaena*, *corocotta* and *leucrocotta*.⁷²⁵ Mary Beard counters that prodigious animals were actually considered to be "conduits of divine speech,"⁷²⁶ and were cared for by the state.⁷²⁷ I would argue that

⁷²¹ ERNOUT 1952, 150 fn.153.2.

⁷²² ERNOUT 1952, 159-160, fn.183.4.

⁷²³ YOUNG 2003, 317; YOUNG 1991.

⁷²⁴ "*L'orrore è garantito*"; BETTINI 2008, 64.

⁷²⁵ BETTINI 2008, 65.

⁷²⁶ BEARD 2012, 30.

⁷²⁷ BEARD 2012, 30, fn. 37; LIVY 35.21; 41.13; *Obsequens* 27.

there are two clear factors that account for the differing responses to prodigious animals, and monstrous mimics in Roman society. The first is the perceived intent behind the sound-production itself, and the second is the level of familiarity with the sound-emitter (i.e. the animal that produces the sound). While prodigies do produce atypical sounds for their species, they are common animals, and their uncharacteristic speech was considered to be benevolent omens from the gods. In contrast, the other human-mimics in Pliny border on mythic status, and their imitations are ill-intentioned, as they were used to lure shepherds and dogs to their deaths. Their production of human voice therefore, only adds to their uncanny features.

227.1-2. [*rana*] *Cyrenis mutae fuere ranae, inlatis e continente vocalibus durat genus earum...*

227.2-3. [*rana*] *mutae sunt etiamnum in Seripho insula, eadem alio tralatae canunt:*

Pliny is quick to note the uncharacteristic silence of a typically vocal animal, and in this reference relates that the frogs of Cyrene are silent ("*mutus*"), and although another vocal species from the mainland was introduced, the silent type still persisted. Theophrastus attributes the silence of these Cyrenean frogs to the low temperature of the water.⁷²⁸ The frogs of the island of Seriphus are also mute *in situ* but will begin to croak ("*canere*") when taken to other places. Pliny here employing the verb *canere* 'to sing', to denote the croaking of frogs. According to

⁷²⁸ BORGHINI, et al. 2010, 287, fn.227.2.

Pliny this phenomenon also occurs with the frogs of the Siccanean Lake in Thessaly.

7.5.3. Book IX

7.23. [*dolphinus*] *pro voce gemitus humano similis*:

Pliny compares the voice ("vox") of a dolphin to the moans or groans ("*gemitus*") of a human being. While this description is similar to the characterization of mythological animal sounds in the previous section, Pliny mitigates the uncanny quality associated with the imitation of human sounds by employing the adjective *similis*. In addition to this, the term *gemitus* is commonly applied to animals.⁷²⁹ So the use of *gemitus* here, despite being associated with human utterance, carries connotations of the moaning sounds of animals, rather than human speech. This comparative attributive statement allows Pliny to denote the voice of the dolphin ("vox") and apply uncharacteristic sound descriptions without characterising the animal as 'monstrous'. Recordings of dolphin sounds do not correspond well with Pliny's denotation of their sound as *gemitus*, as they typically issue high-pitched chirps, squeals and clicks.⁷³⁰ Aristotle's account at *Hist. an.* 535b.32 relates more closely to these shrill sounds, as he denotes the sound of the dolphin as *trigmos* (τριγμός). The term seems to share some

⁷²⁹ OLD 1968, 756. s.v. "*gemitus*".

⁷³⁰ See Sound Recording 56, and Sound Recording 57.

similarities with the Latin *stridor*.⁷³¹ Aristotle does also use the Greek verb *muzō* (μύζω), and it appears that Pliny has simply translated the Greek term along similar semantic lines as *gemere*, of issuing moans or groans.⁷³²

41.6-7. [vitulus (seal)] *ipsis in sono mugitus, unde nomen vituli...*

41.7-8 [vitulus (seal)] *voceque pariter et nisu populum salutant...*

41.8 - 42.1 [vitulus (seal)] *incondito fremitu nomine vocati respondent:*

Pliny likens the sound of seals to the lowing of calves and cows, here denoted by the species-specific *mugitus*. Indeed this aural comparison is given as justification for the Latin name of this animal *vitulus*, which is applied to calves, or the young of other animals.⁷³³ In this section Pliny discusses the training of seals and asserts that they can be trained to salute ("*salutare*") with their voice ("*vox*") in response to their name, and that they issue a harsh roar ("*incondito fremitu*"). The use of *inconditus* for animal vocalisations is rare, but the term usually characterises as an unpolished, rough, crude or unrefined quality.⁷³⁴ It is not clear whether this term relates to a tonal harshness, or rather a sense of unintelligibility. *Fremitus* is commonly applied to tigers and other land mammals, and is used to denote deep and roaring types of sound.⁷³⁵

The only species of seal currently extant near Italy is the Mediterranean monk seal (*Monachus monachus*). This species is

⁷³¹ LSJ 1940, s.v. "τρυγμός".

⁷³² LSJ 1940, s.v. "μύζω"; cf. OLD 1968, 757, s.v. "gemo".

⁷³³ OLD 1968, 2081, s.v. "vitulus".

⁷³⁴ OLD 1968, 873, s.v. "inconditus".

⁷³⁵ See above, PLIN.HN.8.48.3; 66.7.

extremely rare, and it is believed that there are only 700 remaining in the wild.⁷³⁶ As such, it is virtually impossible to find sound recordings of these animals. But for reference, see the defence sounds of Northern (*Callorhinus ursinus*) and South American (*Arctocephalus australis*) fur seals, respectively.⁷³⁷

70.3. [Adonis] *circa Clitorium vocalis hic traditur... idem aliquis Adonis:*

Pliny refers to the sound of a fish, called 'Adonis', that has a voice but no gills. The adjectival form of *vox* is applied, which denotes that it possesses 'voice' or 'is vocal'. Fish are not considered to be particularly noisy creatures, but it certainly is a fact that a number of species *do* produce sounds by means of their teeth, or by issuing grunting sounds of other kinds.⁷³⁸ It is not clear what species of fish this reference pertains to, nor how ancient authors would have been able to hear and perceive this sound. Athenaeus provides further description of this fish, which he also calls *exōkoitos*.⁷³⁹ Borghini *et. al.* note that no species of fish are without gills.⁷⁴⁰

7.5.4. Book X ⁷⁴¹

6.5-7.1. [*leporaria*] *sola sine clangore, sine murmuratione:*

⁷³⁶ KARAMANLIDIS & DENDRINOS 2015.

⁷³⁷ See Sound Recording 54, and Sound Recording 55.

⁷³⁸ ZELICK, MANN & POPPER 1999.

⁷³⁹ ATHENAEUS, 332c.

⁷⁴⁰ BORGHINI, et al. 2010, 335, fn70.3.

⁷⁴¹ Due to the sheer quantity of references to bird sounds in this volume, some will be omitted in this section of the commentary.

Aristotle calls this type of eagle '*lagophonos*', which means 'hare-killer'.⁷⁴² Pliny ascribes the name *leporaria*, "so called from its habit of killing hares."⁷⁴³ Pliny simply states that this type of eagle does not produce a *clangor* or *murmur*. The phrasing of this statement suggests that these sounds are otherwise quite common for other types of eagles.⁷⁴⁴ As we have seen previously, *clangor* can sometimes be used to denote non-vocal wing sounds.⁷⁴⁵ Based on Pliny's emulation of Aristotle, it seems that *clangor* and *murmur* are used as alternate vocal sound-terms. Arnott tentatively identifies Pliny's *leporaria* as a lesser spotted eagle (*Aquila pomarina*).⁷⁴⁶ The vocalisations of lesser spotted eagles are quite subdued, which could support their characterisation in Aristotle and Pliny as (comparatively) silent.⁷⁴⁷

8.4. [percnopteri] *eademieiunae semperaviditatis et querulae murmurationis*

Pliny accounts for the sound production of the *percnopterus*, a simple transliteration of Aristotle's Greek name for the same bird. There is some uncertainty around its identification. Rackham identifies the *percnopterus* as a 'hawk-eagle', however Arnott notes

⁷⁴² ARIST. *Hist. an.* 618b.28-32; ARNOTT 2007, 189.

⁷⁴³ OLD 1968, 1017-1018. s.v. "*leporaria*".

⁷⁴⁴ Cf. Suet. *Dom.* 6.2.

⁷⁴⁵ LIVY.1.34.8.3. Cf. §6.3.1.

⁷⁴⁶ ARNOTT 2007, 189.

⁷⁴⁷ Compare the vocalisations of a lesser spotted eagle (Sound Recording 24) with the cries of an imperial eagle (Sound Recording 25).

that discrepancies between original manuscripts of Aristotle ultimately hinders an accurate identification.⁷⁴⁸ Borghini et. al. suggest the *percnopterus* could be a type of vulture.⁷⁴⁹ Pliny characterises its sound as a type of querulous murmuring, translated by Rackham as "plaintive screaming."⁷⁵⁰ Rackham's translation of *murmur* as 'scream' is consistent with his translation of the *leproraria's* silence.⁷⁵¹ But the use of *murmur* in this context seems rather atypical; *murmur* is characteristic of duller, rumbling sounds, rather than a harsh high-pitched screeches, and cries that we would expect of birds of prey.

30.4-5. [*cornix*] *ipsa ales est inauspicatae garrulitatis, a quibusdam tamen laudata:*

Pliny applies the noun *garrulitas* to denote the 'talkativeness' of the *cornix*. Rackham emphasises the repetitiveness of *garrulitas* through his species-specific translation as "persistent croak."⁷⁵² According to Pliny this loquacity could be considered lucky or unlucky, depending on the person who interprets the sign. The *cornix* was a common "talking bird" in the Roman world, which was believed to issue prophetic cries.⁷⁵³ As a brief note on identification,

⁷⁴⁸ ARNOTT 2007, 261.

⁷⁴⁹ BORGHINI, et al. 2010, 417, fn.8.1.

⁷⁵⁰ RACKHAM 1983, 297.

⁷⁵¹ See above PLIN. *HN*. 6.5-7.1; RACKHAM 1983, 297.

⁷⁵² RACKHAM 1983, 311.

⁷⁵³ CIC. *Div.* 1.39.85; 2.78.91; *ND*.3.14.10; VERG. *Ecl.* 9.15; Especially PLIN.*HN*.10.121.5, 10.124.4. See also: ARNOTT 2007, 169.

I typically identify *cornices* as ravens and *corvi* as crows. But there is evidence of inconsistency between these two types of birds in antiquity, and the Latin names *cornix* and *corvus*, were sometimes used interchangeably.⁷⁵⁴

33.3-4. [*corvus*] *pessima eorum significatio cum gluttunt vocem velut strangulati*:

Pliny applies the adjective *pessimus*, which attributes a particularly emphatic negative connotation to the *corvus'* *vox*. Similar to the *cornix*, the *corvus* is linked to the production of prophetic signals by its voice. In characterising the sound of the *corvus* itself, Pliny uses an attributive statement, that they swallow their own voice as if they were choking. This description is particularly evocative of certain types of the croaking and cawing of crows. That the crows "swallow" their *vox* suggests a descending pitch. Several recordings compliment Pliny's characterisation of these sounds made by crows and ravens.⁷⁵⁵

34.3-5. [*bubo*] *bubo, funebris et maxime abominatus publicis praecipue auspiciis, ... noctis monstrum, nec cantu aliquo vocalis sed gemitu*:

In the Roman context the *bubo* was associated with death. Its sound was considered to be a particularly bad omen.⁷⁵⁶ The Latin name *bubo* is derived onomatopoeically from its own sound; "bu-bu"

⁷⁵⁴ ARNOTT 2007, 167.

⁷⁵⁵ See Sound Recording 26, Sound Recording 27, and Sound Recording 28.

⁷⁵⁶ VERG. A. 4. 462-3; SEN. *Her. F.* 686.

or "hu-hu".⁷⁵⁷ We can be quite confident in our identification of this bird as the Eurasian eagle owl (*Bubo bubo*).⁷⁵⁸ Pliny describes its *vox* as 'not musical' (*nec cantus*) but rather a 'moan' (*gemitus*). As I have argued previously, the musical interpretation of *cantus* here seems the most appropriate, as interpreting *cantus* as 'signal-producing' would contradict other earlier and contemporaneous accounts of the calls of this bird.⁷⁵⁹

37.2-3. [*clivia/clamatorius*] *cliviam quoque avem ab antiquis nominatam animadverto ignorari—quidam clamatoriam dicunt*;

Pliny applies a variation of the term *clamor* as an epithet to an unknown type of owl, presumably due to the intensity or harshness of its cries. De Saint Denis argues that the bird's synonym '*clivia*' suggests that it was an augural bird, and that its identification was subsequently lost to the layman.⁷⁶⁰ Due to a lack of detail in its description, the species cannot be confidently identified.⁷⁶¹ However based on the perceived 'noisiness' of its cries, the Western Barn Owl (*Tyto alba*) is a possibility.⁷⁶²

39.5-6. [*noctua*] *noctuas sexagenis diebus hiemis cubare et novem voces habere tradit Nigidius*;

Pliny describes the *vox* of the *noctua*, stating that it has nine different types of cries. The *noctua* is associated with the Greek *tyto*

⁷⁵⁷ See Sound Recording 29.

⁷⁵⁸ ARNOTT 2007, 40.

⁷⁵⁹ VERG. A. 4. 462-3; SEN. *Her. F.* 686; Cf. See above §[7.4.2](#).

⁷⁶⁰ DE SAINT DENIS 1961, 118, fn.37.1.

⁷⁶¹ RACKHAM 1983, 316, fn. *a*.

⁷⁶² See Sound Recording 30, and Sound Recording 31.

(τυτώ). The Greek name of this bird is onomatopoeically linked to the advertisement call of the male bird.⁷⁶³ There is however, no evidence that supports Pliny's description of the variety of its vocalisations.

43.2-3. [*oscines*] *illarum generi cantus oris, his magnitudo differentiam dedit:*

Pliny states that *oscines* are distinguished by their song ("*cantus*"), and presents them in opposition to *alites*, who are characterized by their size. These two types of birds were originally Roman augural categories, but Pliny applies these terms to his own constructed groups. For a more detailed discussion on the interpretation of *cantus* in this passage, see above §[7.4.2](#).

46.3-4. [*gallus*] *norunt sidera et ternas distinguunt horas interdiu cantu...*

47.1. [*gallus*] *diemque venientem nuntiant cantu... ipsum vero cantum plausu laterum:*

The rooster (*gallus*) is characterised as a bird that disrupts sleep with its crowing. Pliny consistently applies *cantus* to denote the sound of the *gallus*. The use of *cantus* in this way is consistent with Pierre's delineation of *cantus* as 'signal producing'.⁷⁶⁴ Pliny also specifically notes the production of wing-sounds ("*plausu laterum*") prior to issuing their *cantus*. Rackham suggests that Pliny includes this description of non-vocal signal production to justify his

⁷⁶³ ARNOTT 2007, 367; cf. Sound Recording 32.

⁷⁶⁴ PIERRE 2016, 44; See above §[7.4.2](#).

classification of *gallus* as an *ales*.⁷⁶⁵ *Ales* were the traditional augural group of birds that issue signals by their wings and flight.⁷⁶⁶

47.5-6. [*gallus*] *quod si palma contigit, statim in victoria canunt seque ipsi principes testantur*:

47.6. [*gallus*] *victus occultatur silens aegreque servitium patitur*:

49.7. [*gallus*] *habent ostenta et praeposteri eorum vespertinique cantus: ... ita coniecta interpretatione quoniam victa ales illa non caneret...*

50.1. [*gallus*] *Desinunt canere castrati*:

Pliny maintains his consistent use of *cantus* for the crowing of *galli*.⁷⁶⁷ This extended account details the fighting behaviours of roosters, and states that the winner of a cock-fight will "sing a song of victory" ("*victoria canunt*").⁷⁶⁸ Pliny directly contrasts this triumphant crowing with the defeated *gallus* who "hides in silence" ("*occultatur silens*"). The silence of the vanquished is further emphasised by Pliny's statement that a gelded rooster will no longer crow. Through the juxtaposition of these statements Pliny likens castration with defeat. Pliny also later states that a rooster will abstain from crowing when a hen has died in the farmyard.⁷⁶⁹ Their cries of supremacy were considered to be especially favourable omens, as only the victorious cock crows. According to Pliny the evening songs of *galli* foretold the victory of the Boeotians over the Spartans at the battle of Leuctra. In this way the 'cock-fight' becomes a metaphor for

⁷⁶⁵ RACKHAM 1983, 318, fn.c.

⁷⁶⁶ FESTUS p197.8M; See above §[7.4.2](#).

⁷⁶⁷ See above PLIN.HN.46.3-4.

⁷⁶⁸ RACKHAM 1983, 323.

⁷⁶⁹ PLIN.HN.10.155.1-4.

ancient battles. Pliny also extends this metaphor by comparing 'cock-fights' to gladiatorial combat.⁷⁷⁰

50.6. [gallus] in villa Galerii locutum gallinaceum,:

Pliny also presents a prodigy of a rooster that spoke in the consulship of Marcus Lepidus and Quintus Catulus.⁷⁷¹ According to Pliny a speaking rooster was a comparably rare prodigy. Once again the term *locutus* is used to clearly denote the production of human speech in contrast to the *imitation* of human *vox*.

51.1-2. [canis] *Est et anseri vigil cura Capitolio testata defenso, per id tempus canum silentio proditis rebus,:*

Pliny makes an offhand reference to the watchful vigilance of geese, which refers to their defense of the Capitol in 390BC. As Gauls were invading Rome, the sacred geese at the temple of Juno raised such a clamour that the ex-consul Manlius was roused, and was subsequently able to save the Capitol.⁷⁷² This noisy event is recounted by a number of other ancient authors,⁷⁷³ but Pliny does not explicitly refer to the sounds made by the geese. This omission is quite significant, as Pliny rather contrasts sound with its absence, and speaks only of the cowardly silence ("*silentium*") of the dogs. In this account the silence of betrayal speaks louder than rousing cries.

⁷⁷⁰ PLIN.*HN*.10.50.5.

⁷⁷¹ Cf. above, PLIN. *HN*.10.153.5-6.; 10.183.9-10.

⁷⁷² cf. HORSFALL 1981.

⁷⁷³ See especially in relation to the cries of geese: COLUMELLA, *Rust.*8.13.1-2; FLOR.1.7.55; LIVY.5.47.4.1; LIVY.*Per.*5.26; OV.*Met.*2.535-541; PROP.3.3.12; VERG.*A.*8.655.

59.4. [grus] dux erecto providet collo ac praedicat:

58.5-6. [grus] in extremo agmine per vices qui adclament dispositos habent et qui gregem voce contineant...

Pliny makes unique references to the verbs *praedicare*, meaning "to proclaim,"⁷⁷⁴ and *adclamo*, meaning "to shout,"⁷⁷⁵ in describing the signals of cranes (*grues*) whilst in their flying "v" formation. Arnott asserts their name is onomatopoeically derived from their "distinctive clarion-like 'krooh' call."⁷⁷⁶ Vergil presents the calls of *grues* as a simile for the battle signals ("*signa*") of the Trojans.⁷⁷⁷ The vocabulary by Pliny and Vergil plainly characterise the sounds of cranes as 'signal-producing'; with a clear association in Vergil between cranes and the military brass instruments that produce signals on the battlefield. These textual transcriptions are particularly evocative of the actual trumpeting vocalisations of cranes.⁷⁷⁸

63.8-10. [olor] olorum morte narratur flebilis cantus, falso, ut arbitror aliquot experimentis.

Pliny relates an account of the "mournful song" ("*flebilis cantus*") of swans at their death. The use of *cantus* in this context

⁷⁷⁴ OLD 1968, 1428. s.v. "*praedico*".

⁷⁷⁵ An alternate form of *acclamare*; OLD 1968, 22. s.v. "*acclamo*".

⁷⁷⁶ ARNOTT 2007, 80.

⁷⁷⁷ VERG.A.10.265.

⁷⁷⁸ See Sound Recording 15, and Sound Recording 16.

seems to be drawn from the Greek *adein* (ἀδεῖν).⁷⁷⁹ The characterisation of swans as "musical" birds originates from earlier ancient Greek literature.⁷⁸⁰ Arnott provides an extremely thorough overview of references to swansong in both Greek and Latin texts.⁷⁸¹ Arnott suggests this musical association could be a reference to the "bugle-like call" of whooper swans (*Cygnus cygnus*), or the whistling tones produced by the flight of mute swans (*C. olor*).⁷⁸² But only one reference to the whistling wings ("*stridentibus alis*") of swans appears in the Latin corpus in Vergil's *Aeneid*.⁷⁸³ Poetic comparisons in Latin literature often maintain the "musical" quality of swans, and occasionally contrast them with the "unmusical" vocalisations of geese and cranes.⁷⁸⁴

Pliny however is quite critical of this traditional association, and argues against this characterisation on the basis of "a certain number of experiences" ("*aliquot experimentis*").⁷⁸⁵ It is exceedingly likely that conceptions of "music" diverged considerably between 4th century BC, Athens, and 1st century AD, Rome. It remains a clear possibility that the original characterisation of swan sounds as

⁷⁷⁹ See above §[7.4.2](#).

⁷⁸⁰ CALLIMACHUS, *Hymn to Delos*, 249-254; ARISTOPHANES, *Birds* 769-76.

⁷⁸¹ ARNOTT 2007, 182-184.

⁷⁸² ARNOTT 2007, 183-184; For the rhythmic, whistling wing-tones of mute swans see: **Sound Recording 17**, and **Sound Recording 18**; compare with the trumpeting calls of whooper swans: **Sound Recording 19**, **Sound Recording 20**, and **Sound Recording 21**.

⁷⁸³ VERG.A.1.397; Also see above §[6.3.1](#).

⁷⁸⁴ LUCR.4.181, 490; PROP.2.34.83; VERG.*Ecl*.9.36.

⁷⁸⁵ RACKHAM 1983, 333.

"musical" was based on a perceptual truth. The difference between Greek and Roman perceptions of the sounds of *cicadae* is evidence enough for this possibility.⁷⁸⁶

79.6. [rana] ... *Theophrastus tradat ... esse ... in Cyrenaica vocales ranas.*

Pliny notes the differences of sound-production based on location, which is a common feature of his accounts on animal sounds.⁷⁸⁷ Pliny states that the vocal frogs ("*vocales ranas*") are not native to Cyrenaica.⁷⁸⁸

80.1-2. [oscines] *Alia admiratio circa oscines: fere mutant colorem vocemque tempore anni:*

The denotative noun *vox* is applied to the sounds produced by *oscines*. Pliny states that they change their *vox* with the season. This entire passage is derived from Aristotle's earlier account.⁷⁸⁹ Pliny's statement is supported, to some extent, by modern biological observations. Variations in the rates of song production by male passerine birds is evident across different seasons, in accordance with the breeding cycle.⁷⁹⁰

80.4-5. [merula] *merula ... canit aestate, hieme balbutit, circa solstitium muta:*

Pliny compares the vocalisations of the blackbird through the different seasons. According to Pliny in summer the blackbird "sings", using the verb *canere*, and in winter they "chirp", which is

⁷⁸⁶ See BEAVIS (1988, 101) for a thorough examination of the contrasting attitudes toward the cicada's song in Greek and Roman literature.

⁷⁸⁷ PLIN. *HN*.11 95.6-7; 11.267.11 - 11.268.1.

⁷⁸⁸ Cf. PLIN. *HN*.8.227.1-3.

⁷⁸⁹ ARIST. *HA*.(IX. 49) 632b.15-22.

⁷⁹⁰ CATCHPOLE & SLATER 2008, 114-121.

denoted by the verb *balbutire*. This is a unique use of *balbutire* by Pliny, but elsewhere in the Latin corpus this verb is used to denote the production of indistinct or babbling human speech.⁷⁹¹ The use of *balbutire* in this way could be a reference to the complexity of their song, which at times can sound confused or garbled.⁷⁹² Pliny states that in midsummer these birds are silent (*mutus*).

10.81-83 Pliny's account of the nightingale song

Pliny's vivid description of the songs of *luscinae* is extremely long and detailed, and contains many unique sound-terms that are not used elsewhere in his writings. Some of these terms include clear references to pitch, melody and rhythm; and other terms that connote aesthetic judgements that characterise the nightingale as a songstress. At my count there are at least 30 individual sound-terms within this passage alone. Unfortunately it is not feasible to fully investigate the application and semantic use of these terms in this commentary. But this is an especially rich passage for future research articles.`

102.5. [gallus] saepe voce tantum audita masculi:

102.7-8. [pullus] cum sensit feminam aucupis accedentem ad marem, recanat
revocetque et ultro praebeat se libidini

Pliny asserts that even the slightest draft of air from cocks flying overhead, or the very sound of their crowing (*vox*) is enough for

⁷⁹¹ OLD 1968, 224. s.v. "*balbutio*".

⁷⁹² See Sound Recording 22, and Sound Recording 23.

hens to conceive. The latter passage relates the practices of fowlers in breeding a reluctant hen, whereby a decoy hen is presented to the rooster. The female hen "chirps back" ("*recinere*") and summons ("*revocare*") the rooster jealously. The verb *recinere* is an alternate form of *recanere*, which is related to *canere*. There are clear associations with semantic signalling and communication in this passage. Furthermore Pliny anthropomorphises the envious calls of the hen.

109.3-4. [*tinnungulus*] ... *defendit enim illas terretque accipitres naturali potentia in tantum ut visum vocemque eius fugiant...*

The *tinnungulus* is identified as a kestrel by Rackham,⁷⁹³ and Pliny positions this bird as an enemy of a hawk (*accipiter*). According to Pliny, hawks are fearful of both the sight and the cries of the *tinnungulus*. Similar to the description of the sound of the *basiliscus* earlier in book VIII,⁷⁹⁴ Pliny states that other hawks fly in fear from ("*fugiant*") the *vox* of *tinnunguli*. Rackham translates *vox* quite simply as "sound".⁷⁹⁵ But the connotation of the English term "sound" in this context, strongly alludes to wing-sound, rather than vocal emissions. The more literal translation of "voice" would be appropriate in this phrase.

⁷⁹³ RACKHAM 1983, 361. Cf. ARNOTT 2007, 133.

⁷⁹⁴ PLIN.*HN*.8.78.4.

⁷⁹⁵ RACKHAM 1983, 361.

116.5-6. [avis "taurus"] est quae bourn mugitus imitetur, in Arelatensi agro taurus appellata, alioquin parva est:

116.7-8. [equus/herbae] equorum quoque hinnitus anthus nomine herbae pabulo adventu eorum pulsa imitatur ad hunc modum se ulciscens.

Pliny describes the sound of a bird called "taurus" that takes its name from a bull, whose sound it imitates. Pliny applies an attributive statement to characterise the bird's imitation ("imitator") of *mugitus*. Arnott identifies this bird as a European bittern.⁷⁹⁶ The bittern's calls are quite low and resonant, and are quite compatible with Pliny's denotation of its sound as '*mugitus*'.⁷⁹⁷

In the following lines of this section, Pliny also records the imitative sound of a Greek bird called the "*herbae*". Pliny states that this bird imitates (*imitator*), the neighing of horses, which is denoted by the onomatopoeic *hinnitus*. Arnott identifies this bird as a Yellow Wagtail (*Motacilla flava cinereocapilla*).⁷⁹⁸ But there are clear differences between the short, bright chirps of yellow wagtails and the whinnies of horses. Because of this, I am not entirely confident with Arnott's identification based on the qualities of its sound.⁷⁹⁹

As a brief side-note "the arrival of the horses" is also denoted by the noun *pulsus*.⁸⁰⁰ I have included this term as a sound-term reference, but the noun actually denotes the sound-producing action of

⁷⁹⁶ ARNOTT 2007, 83.

⁷⁹⁷ See Sound Recording 44, and Sound Recording 45.

⁷⁹⁸ ARNOTT 2007, 24.

⁷⁹⁹ See Sound Recording 46.

⁸⁰⁰ RACKHAM 1983, 367.

beating or striking, and is commonly applied to musical instruments.⁸⁰¹

Its use in this context however, very clearly denotes the thundering and galloping of horses.

121.5. [*corvus*] *is mature sermoni adsuefactus...*

124.4. [*cornix*] ... *dein plura contexta verba exprimens et alia atque alia crebro addiscens...*

Pliny presents two accounts of the speech of a *corvus* and a *cornix*. The speech of the *corvus* is denoted by the noun *sermo*. The *cornix* uttered sentences of several words ("*plura contexta*"),⁸⁰² and demonstrated that it was capable of expanding its vocabulary. Pliny is very clear with his diction that these birds were speaking with human words and phraseology.

127.3-4. [*aves* "Diomedean"] *advenas barbaros clangore infestant:*

Pliny relates an account of the so-called "Diomedean birds" that lived by the tomb of Diomedes, which was believed to be located on the largest island of the Tremiti archipelago, *Trimerus*.⁸⁰³ It was said that these birds were originally the companions of Diomedes who "were attacked by Illyrians on an island off the Apulian coast and ... were then transformed into birds by divine action."⁸⁰⁴ Pliny relates that these birds would set upon foreign visitors with "loud screaming,"⁸⁰⁵

⁸⁰¹ OLD 1968, 1519. s.v. "*pulsus*".

⁸⁰² RACKHAM 1983, 373.

⁸⁰³ DE SAINT DENIS 1961, 137 fn. 127.1.; BORGHINI, et al. 2010, 487, fn.127.1; cf. STRABO, 6.284.

⁸⁰⁴ FAIRCLOUGH & GOOLD 1918, 255, fn. 9.

⁸⁰⁵ RACKHAM 1983, 375.

denoted by the rather general sound-term *clangor*. *Clangor* typically denotes the harsh sounds of birds, shrill cries, screams, and in some instances, the baying of hounds.⁸⁰⁶ When associated with wings this term was also used to denote sounds of flight and wingbeats.⁸⁰⁷ Vergil in contrast, characterises the sounds of these birds as "tearful cries" ("*lacrimosis vocibus*").⁸⁰⁸

Based on the physical descriptions of these birds in ancient sources, Arnott tentatively identifies the birds as Cory's Shearwaters (*Calonectris borealis*).⁸⁰⁹ If we compare the sounds of shearwaters with the literary descriptions of their cries, Vergil's characterisation is particularly evocative.⁸¹⁰ But it is highly likely that the lamenting quality ascribed by Vergil, was rather an aetiological reference to their mythical transformation from humans to birds.

155.6-8. [pullus] *mox incerti singultus sollicite convocantis, postremo lamenta circa piscinae stagna mergentibus se pullis natura duce:*

Pliny quite heavily anthropomorphises the grief of a mother hen, who 'sobs in agitation' ("*singultus sollicite*") and 'laments about' ("*lamentum circa*") after her lost eggs. In characterising these sounds, Pliny employs a variety of sound-terms, and emphasises the affective qualities of the sounds. The noun *singultus* refers to the "catching of

⁸⁰⁶ OLD 1968, 332. s.v. "*clangor*".

⁸⁰⁷ See above §6.3.1.

⁸⁰⁸ VERG.A.11.274; FAIRCLOUGH & GOOLD 1918, 255.

⁸⁰⁹ ARNOTT 2007, 59-60.

⁸¹⁰ See Sound Recording 43.

breath in sobs,"⁸¹¹ and is used elsewhere in Pliny to characterise the prophetic choking sounds of a *corvus*.⁸¹² The adjective *sollicitus* is used quite rarely by Pliny,⁸¹³ and characterises a deep sense of agitation.⁸¹⁴

164.2-3. [ardea] *hi in coitu anguntur: mares quidem cum vociferatu sanguinem etiam.:*

Pliny relates an account of the "loud screams" of heron's (*ardeae*) during mating.⁸¹⁵ These cries are denoted by the noun *vociferatus*. This is not only a unique sound-term in Pliny, but it is also the only reference to this word in the extant Latin corpus.⁸¹⁶ The word is related to the noun *vociferatio* and the verb *vociferor*, which were also applied to loud cries, shouts or yelling, and to the vocalisations of other creatures.⁸¹⁷ This account is derived from a similar description in Aristotle, and Pliny's use of *vociferatus* appears to be a translation of the Greek *krázō* (κράζω).⁸¹⁸

202.3-4. [feles] *feles quidem quo silentio, quam levibus vestigiis obrepunt avibus!*

⁸¹¹ OLD 1968, 1796. s.v. "*singultus*".

⁸¹² PLIN.HN.10.33.3-4.

⁸¹³ Cf. PLIN.HN.11.104.4; 18.252.1.

⁸¹⁴ OLD 1968, 1785. s.v. "*sollicitus*".

⁸¹⁵ RACKHAM 1983, 397.

⁸¹⁶ OLD 1968, 2069. s.v. "*vociferatus*".

⁸¹⁷ OLD 1968, 2069. s.v. "*vociferatio*", "*vociferor*".

⁸¹⁸ ARIST. *Hist. an.* 609b. 23-25.

It seems fitting that the only reference to the sound of cats (*feles*) in the *Natural History* characterises their silence (*silentium*); specifically in the context of stalking birds.

206.5-6. [serpens] *ut stridens subinde et vertigine rotata ne filum quidem pendentis rumpere:*

The desperate hissing of an entrapped snake is characterised by the denotative participle *stridens*. This is the only use of *stridens* in the writings of Pliny. Furthermore it is the only instance that Pliny applies a cognate of *stridor* to the hissing of snakes. Pliny more commonly denotes these serpentine sounds with *sibilus*.⁸¹⁹ If we consider the context of this passage, the alternate term may indicate a variation in the connotations of the term. As the snake is fighting against the spider for survival, Pliny may be applying *stridens* to emphasise the intensity of the sound.

209.5. [aquatilia] *aquatilia quoque exiguum quidem etiam qui de ceteris dubitant dormire tamen existimant... verum ipsa quiete::*

Pliny asserts that the quietness ("*quietus*") of aquatic animals is evidence that these creatures sleep.

⁸¹⁹ PLIN.HN.11.267; 29.52.4; 32.14.2-3. Cf. *Sibilare* is also applied to the imitation of snake hisses in luring certain types of fish, PLIN.HN.32.14.3.

7.5.5. Book XI

2.6 - 3.1 [*culex*] *ubi vero truculentam illam et portione maximam vocem ingeneravit?*:

In this early passage, Pliny rhetorically asks of the origin of the *culex*'s "loud voice" ("*maximam vocem*"). Pliny uses the superlative of the adjective *maximus*, which characterises an object as 'the greatest in number', 'the largest', or when relating to sounds, 'the loudest'.⁸²⁰ While a translation of 'loudness' is an appropriate interpretation of *maximus* in this passage, both *maximus* and *magnus* can also be used to characterise the clarity or intensity of sounds depending on context. The adjective *truculentus* is denotative of a ferociousness and aggressiveness, and this seems to be related more to the intensity of the sound-producing action. It may also be a multisensory allusion to both the *culex*'s penchant for blood-sucking, and its high-pitched buzzing sound. For further discussion, see above §4.5.3.

6.1 [*insecta*] *iidem enim et vocem esse his negant...*

6.2 [*apis* and *cicada*] *in tanto murmure apium, cicadarum sono:*

Pliny here provides a description of the *vox* of insects, stating that "some people"⁸²¹ actually claim that despite the sounds produced by bees and cicadae, they do possess "*vox*". Pliny later notes Aristotle's claim that *vox* (or rather the Greek *phōnē*) can only be applied to animals that have lungs, while the production of sound

⁸²⁰ OLD 1968, 1064. s.v. "*magnus*".

⁸²¹ That is to say, ARISTOTLE; *Hist. an.* 4.535a.30.

in bees and cicadae is produced by other mechanisms not involving breath. See especially above for the use of *vox* in Pliny §[7.4.1](#).

20.2-3 [*apis*] *una excitet gemino aut triplici bombo ut bucino aliquo*:

Pliny draws an aural comparison of the sounds of Roman military brass instruments and the buzzing of bees through his application of the denotative term '*bombus*'. The term is primarily used to describe Roman brass instruments, including *cornua*, and *tubae*, and other wind instruments, such as the *tibia*.⁸²² The verb *bucinare* is also applied to the action of sounding of a brass instrument. This description continues a persistent symbolic association between bees and the Roman military.⁸²³ This term clearly corresponds with the short buzzing impulses of individual bees rather than more complex swarming sounds. The *bucinator*-bee that issues the double ("*geminus*") or triple ("*triplex*") *bombus* is not identified by Pliny specifically, but recordings have captured sounds produced by young queen bees that are incredibly similar to those described here.⁸²⁴ This type of sound-production is known as 'tooting', 'piping' or 'quacking', depending on the circumstances of the sound-production.⁸²⁵

⁸²² *Cornua*: CATULL. 64.263; NERO *poet.* 3.1; PERS. 1.99; *tuba*: APUL. *Met.* 10.31.25; LUCR. 4.544; *tibiae*: APUL. *Fl.*3.

⁸²³ See above §[4.5.1](#).

⁸²⁴ See [Sound Recording 4](#).

⁸²⁵ MICHELSEN, et al. 1986.

26.1-2 [*apis*] *cum adversperascit, in alvo strepunt minus ac minus...*

26.3 [*apis*] *donec una circumvolet eodem quo excitavit bombo...tunc repente... conticescunt:*

Pliny applies the verb *strepere* to characterize the sound of bees while within the hive, and ascribes to this sound the adjective *minus*. This denotes a gradual decrease in the loudness of the sound. Pliny also contrasts this diminuendo with a rousing *bombus*, that calls the bees to rest; whereby the sound fades suddenly to silence. This silence is denoted here by the verb *conticescere*.

49.4 [*apis*] *tum maxime murmurantes:*

Once again the adjective *maximus* is used, but this time applied to the more stereotypic ‘*murmur*’. Pliny however, erroneously associates the production of this sound with the friction and heat that he believed was required to hatch the larvae of bees.

54.3 [*apis*] *aliquot diebus murmure intus strepente:*

Pliny suggests that the king bee (a simple misidentification of the sex of the queen bee) issues a sound when the bees are ready to migrate. This readiness for migration is denoted by a characteristic buzzing noise from inside the hive. Pliny applies the words *murmur* and *strepens*. *Murmur* is stereotypic of the muffled buzzing sounds of bees when inside the hive.⁸²⁶ Other terms such as *stridor* are more commonly applied to the sound of bees when swarming out in the

⁸²⁶ COLUMELLA, *Rust.* 9.8.2.3; PLIN. *HN.* 11. 63; VERG. *A.* 12. 590.

open.⁸²⁷ Pliny's application of these terms is generally consistent with these observations. This account describes the particular sounds that bees produce in the hive prior to relocation and dispersal; behaviours that are also related in Vergil and quoted by Columella.⁸²⁸ These distinctive sounds have also been identified in modern apiary practices, which has prompted the development of remote sensing technologies that monitors the brood cycle based on these specific sounds.⁸²⁹

64.3-4 [*apis*] *tristi tantum murmure glomeratur circa corpus eius...*

The mournful, grieving sounds of worker bees upon the death of the queen bee is characterised by ascribing *tristis* to the noun *murmur*. Once again modern studies have shown that when a hive is afflicted by disease there are noticeable fluctuations in both pitch and loudness of the sound of bees, and that these sounds provide insights into the overall health of a hive.⁸³⁰ Vergil also describes this sound as a “duller sound [and] a long-drawn buzz” (“*sonus grauior, tractimque susurrant*”).⁸³¹

92.2-3 [*cicada*] *sunt autem mutae...*

92.3-4 [*cicada*] *sequens est volatura earum quae canunt: vocantur achetae...*

92.4-5 [*cicada*] *quae minores ex his sunt, tettigonia, sed illae magis canorae...*

⁸²⁷ OV. *Fast.* 3.747; STAT. *Theb.* 10.576; VERG. *A.* 7.65; 12. 590; *G.* 4.556.

⁸²⁸ VERG. *G.* 4.67-72; COLUMELLA, *Rust.* 9.9.4.4.

⁸²⁹ QANDOUR, et al. 2015.

⁸³⁰ BENCSIK, et al. 2015; QANDOUR et al., 2015.

⁸³¹ VERG. *G.* 4.262.

92.5-6 [*cicada*] *mares canunt in utroque genere, feminae silent:*

In this section Pliny identifies two distinct types of *cicadae* characterised by the sounds they produce. The first type identified by Pliny are mute (*muta*), which seems to be a misunderstanding of Aristotle's account of the same species.⁸³² The second type of *cicadae* were known as 'singers' ("*achetae*") and were characterized by their flight and their chirping song. Pliny applies the sound-verb *canere* to correspond with their denotation as '*achetae*'. This is consistent with Pliny's translation of the Greek *adein* as *canere*.⁸³³

93.8 [*cicada*] *pectus ipsum fistulosum; hoc canunt achetae, ut dicemus:*

Pliny erroneously describes the production of sound in *cicadae* through a pipe located in the chest of the insect. In doing so, Pliny applies an adjectival form of the Latin word *fistula*, which was also used to denote the cross-blown pipes of shepherds in bucolic poetry.⁸³⁴ This presents a clear allusion between the sound of shepherd's pipes and the singing of the *cicadae*. This singing is once again denoted by the verb *canere*.⁸³⁵

95.6-7 [*cicada*] *at in Regino agro silent omnes, ultra flumen in Locrensi canunt:*

Pliny provides another account that links the vocalisations of animals with a geographical location. Pliny notes here that these

⁸³² ARIST. *Hist. an.* 556b.14 ff., see also BEAVIS 1988, 92.

⁸³³ See above §[7.4.2](#).

⁸³⁴ CALP. *Ecl.* 4.73-80; NEMES. *Ecl.* 2.37 ff; VERG. *Ecl.* 3.25-29; 8.32f. For descriptions of *syringes* and other cross-blown pipes, see WEST 1994, 111.

⁸³⁵ see above §[7.4.2](#).

cicadae are silent ("*silere*") in the Reggio territory, but in the region of Locri they sing. *Canere* is again used consistently with *cicada* to denote the production of sound.⁸³⁶

98.4-5 [*scarabaeus*] *volitant alii magno cum murmure aut mugitu...*

98.5-6 [*grylli*] *nocturno stridore vocales*:

Rackham identifies the death-watch beetle as the emitter of the “shrill noise... at night” ("*nocturno stridore vocales* ") due to the claim in the following clause that the insects “bore numerous holes in hearths and walls” ("*alii focos et parietes crebris foraminibus excavant*"). Death-watch beetles issue repetitive and rhythmic tappings, made by striking their head upon wood. This sound-producing behaviour is attested by modern evidence, and field recordings.⁸³⁷ But it is clear that these percussive sounds simply do not correspond with the semantic range of *stridor*, as we have seen.

Ernout and Pépin translate "*volitant alii magno cum murmure aut mugitu*" as a separate clause, and identify the European chafer as the source of the *murmur* and *mugitus*.⁸³⁸ The characteristics of *murmur* and *mugitus* correspond well with the sound that is commonly produced when these insects fly. Borghini et. al. simply identify these insects as beetles ("*maggiolini*").⁸³⁹

⁸³⁶ see above §[7.4.2](#).

⁸³⁷ BIRCH & KEENLYSIDE 1991, and GOULSON, et al 1994.; cf *death-watch beetle*: [Sound Recording 1](#), and [Sound Recording 2](#); *field-cricket*: [Sound Recording 8](#).

⁸³⁸ Applying the French word: '*hanneton*'; ERNOUT & PÉPIN 1947, 59; 149, fn. §98.3.

⁸³⁹ BORGHINI, et al. 2010, 591, fn. 98.2.

Ernout and Pépin,⁸⁴⁰ and Borghini et. al.,⁸⁴¹ all identify emitter of the ‘shrill nocturnal voice’ as the stridulations of a cricket, and while identification is not precisely definitive, I believe this relates to Pliny’s description much more closely.

104.3 [*locusta*] *tanto volant pinnarum stridore ut alites credantu:*

Pliny compares the sound of a plague of locusts with a flock of birds, and in doing so applies sound terminology that is stereotypic of the wings of birds.⁸⁴² This is extremely effective in evoking the great size of the locusts; they are not only mistaken for birds *visually*, but they are also mistaken for birds *aurally*. This evocative comparison amplifies the emotional response to the sound, and the scene more generally. Similar to the imitation of human sounds by monstrous animals, the uncharacteristic sound associated with these insects emphasises the dread and anxiety of the onlookers that is evident in his account.

107.1. [*locusta*] *Vox earum proficisci ab occipitio videtur...*

107.3-4 [*locusta* and *cicada*] *stridorem edere:*

Pliny applies the term *vox* to the sound of *locustae*. He describes the sound-production by the movement of teeth located at the shoulder blades. Once again this method of sound-production is

⁸⁴⁰ ERNOUT & PEPIN 1947, 149, fn. §98.3.

⁸⁴¹ BORGHINI, et al. 2010, 591, fn. 98.3.

⁸⁴² See above §[6.3.1](#).

contrary to Pliny's established definition of voice at *HN* 11.266-270.⁸⁴³ Beavis states that this account could be based on observations of "the common diurnal bush-cricket (*Ephippiger ephippiger*) or its relatives which stridulate with very short wings set as it were 'at the back of their neck.'"⁸⁴⁴ Pliny here compares the seasonal production of sounds between *locustae*, that produce sounds at the equinoxes, and *cicadae*, that issue sound at the heart of midsummer.

173.1-2 [*rana*] *qua vocem emittunt mares, cum vocantur ololygones...*

173.3 [*rana*] *cientibus ad coitum feminas...*

173.5 [*rana*] *ibi lingua ululatus eliditur:*

Pliny's extended description of the anatomical features of sound-production in frogs is discussed in detail at §5.4, see above.

7.6. Concluding Remarks

This chapter has demonstrated the usefulness of the chosen method to critically appraise the sonic vocabulary of a single Latin author. Pliny's voluminous treatment of animal sounds in books VIII to XI of his *Natural History* presented a perfect sub-corpus for analysis. This chapter commenced with an overview of word frequency statistics related to Pliny's use of animal sound-terms. By contextualising this data with the animal sound-term

⁸⁴³ See above §7.4.1.

⁸⁴⁴ BEAVIS 1988, 71.

usage of Ovid, Vergil, Apuleius and Statius, this section has identified key patterns in Pliny's use of sound-terms, and has revealed important avenues for further research.

The second major section of this chapter provided a close examination of the three most commonly used sound-terms in the *Natural History*: *vox*, *cantus* and *canere*. This section highlights Pliny's heavy use of Aristotle as a source for volumes VIII to XI, and explores the ways in which Pliny translates key Greek sound-terms. Ultimately, Pliny applies *vox* to the voices of both humans and animals, which differs greatly from the Greek anthropocentric concept of *phone*. Pliny's use of *cantus* / *canere* is split into two clear delineations; the first, refers to the production of semiological signals by means of vocalisation, and the second, to the production of a sound that carries a musical connotation, which is associated with the Greek verb *adein* (ἀδεῖν).

A selective commentary of Pliny's characterisation of animal sounds in books VIII to XI of the *Natural History* brings this chapter to a close. This commentary has provided a novel examination of Pliny's use of sound-terms in context, and to draws due attention to these understudied volumes of the *Natural History*.

8. Discussion

'Ancient sound studies', as a thematic sub-discipline of both 'sound studies' and 'ancient history', has gained considerable momentum in recent years, and it is a genuinely exciting time for scholars with an interest in the ancient sensorium. The aims of this thesis were shaped by a desire to address gaps in the present scholarship, and to contribute meaningful findings for the further progression of the field. As such, this work builds upon and adapts a methodology developed by Alexandre Vincent for the analysis of ancient Latin sound-terms. This balanced approach combines traditional lexicographical enquiry with comparative sound analysis, which supplements the literary evidence and mitigates the subjectivity of written transcriptions of aural stimuli.

'Clangores, stridores et sibili' presents substantial adaptations to Vincent's method to facilitate an evaluation of the sounds of animals in Latin literature. The chapter entitled *'Nature's Song Remains the Same'* outlined these key adaptations. A classification of sound-term types was introduced, which defined the distinctions between: denotative, attributive and self-qualifying sound-terms. The sound qualities of Vincent and Kaimio were also further distilled into three categories: acoustic, affective and aesthetic qualities. The comparative analysis of modern sound recordings with the ancient textual evidence of aural perception highlights the benefits of engaging in 'sonorous scholarship', which integrates

sound recordings as evidence in the scholarly process.⁸⁴⁵ This thesis has demonstrated the effectiveness of its comparative lexicographical method in analysing written evidence of aural perception, making it a valuable contribution to the study of sound lexicography.

The subsequent chapters demonstrated the various applications for this adapted approach. '*Stridor et Murmur*' and '*Sibilus et Vocalis*' provided extensive reviews of sound-term references by animal-type, specifically insects, and reptiles and amphibians, respectively. *Clangor et Plausus* employed this method to evaluate a significantly smaller subset of references that characterise a single type of sound-production; the non-vocal sounds of birds. *Dissimiles ceterus voces* demonstrated the usefulness of this method in evaluating the sonic vocabulary of a single author, and compared the sound-term frequency statistics of Pliny with other Latin authors. The structure of this thesis has allowed me to explore topics that have been mostly overlooked by modern scholarship, and in doing so this thesis has augmented our understanding of knowledge of the animal world in Roman antiquity.

Despite the inherent subjectivity of sound-terminology there were some surprisingly accurate and consistent denotations of animal sounds in Latin texts. We identified several species-specific sound terms (including the *sibilus* of snakes and the *mugitus* of cows), which was certainly to be expected. But there are also very clear and discernible distinctions between seemingly similar sounds that are applied quite consistently by Latin authors. This includes the precise delineation between the feather-whistles and wing-beats of birds, and the contextual application of *murmur* and *stridor* to

⁸⁴⁵ Some anthropologists have called for a greater inclusion of sound as primary evidence in the humanities, see SAMUELS, D. W. *et al*, 2010; FELD, S & BRENNEIS, D. 2004.

denote the sounds of bees inside and outside of the hive, respectively. Of course subjectivity creeps into the vocabulary of aural descriptions, but there are comparatively few instances in which sound-term use is explicitly contrary to typical usage. The most notable example is the atypical *murmur* of bees while outside of the hive in Statius and Silius.⁸⁴⁶

The wide-ranging cross-section provided by this thesis has highlighted the ways in which Latin authors apply denotative, attributive and self-qualifying sound-terms for the denotation and characterisation of animal sounds in written texts. The creation of the *SAALL* dataset, an extensive dataset of over 1000 references to animal sounds in Latin literature from 55 BC to AD 180, facilitated the presentation of word-frequency statistics throughout this work. These statistics (especially those presented in chapters [4](#), [5](#), and [7](#); along with the tables and figures at [10.1](#) and [10.2](#)) are particularly useful in visualising the broad patterns relating to the most common sound-emitters, most frequently used words, author sound-term densities and the diversity of sonic vocabularies. Through the evaluation of this data, author- and genre-specific patterns of sound-term usage were clearly identified. Our examination of the sonic terminology used by Pliny the Elder to denote the sounds of animals revealed a considerable degree of variation in the sonic vocabularies of Ovid, Vergil, Statius and Apuleius. Some genre-specific patterns were apparent, as certain animals are more common in some genres than others. For instance, hissing snakes were a key feature of epic poetry, but croaking frogs were more common in bucolic and prose texts.

⁸⁴⁶ STAT.*Ach.* 1.554; SIL. 2.220.

Comparative sound analysis can be quite effective in identifying the acoustic qualities associated with sound-terms. But at times, there is considerable difficulty in navigating the ambiguities of the connotation of sound qualities. In some contexts the semantic range of a sound-term can be broad enough that it overlaps quality delineations; in others, the sound-terms simply connote *multiple* qualities. For example, when applied to sound, the adjective *gravus* is often understood as a lowness of pitch, but the term was also used to express a lowness of mood, and can ascribe connotations of mournfulness or sorrow. In a similar way, a number of animals discussed in this work, including cicadae and frogs, are characterised by Latin authors as talkative or garrulous. This characterisation could be interpreted as connoting: the tone or frequency of their chatter (i.e. an acoustic quality), the emotional context of their querulous calling (i.e. an affective quality), and/or a value-judgment on the unpleasantness of its persistent duration (i.e. an aesthetic quality). Multisensory terms such as *acerbus*, *argutus*, and *ardens* provide another stumbling block to the effective categorisation of connoted sound qualities. The vast contextual use of these terms in characterising visual, olfactory, gustatory, and tactile stimuli makes it difficult to clearly discern their specific connotative qualities.

Of course, many questions remain in regards to the sonic vocabulary of ancient Latin, but '*Clangores, stridores et sibili*' has set the stage for further research. This thesis has presented a broad, exploratory overview of the Latin sonic vocabulary for animal sounds during the chosen period. But future studies that centre solely on one ancient author or sound-term family could provide greater exploration and discussion on the relevant

historical, and sociocultural contexts related to the use of specific sonic terminology. This thesis has identified a number of complex sound-terms, particularly the sonorous noun *stridor* (and its cognates), that would benefit from a more-focussed evaluation. Future studies could provide more extensive bilingual or multilingual analyses on these key contentious sound-terms.

A broad evaluation of the sounds of mammals was excluded from the work, but such an examination would certainly be beneficial, and perhaps will be addressed in future studies. An investigation into the intersection of ‘human’ and ‘animal’ sounds in the writings of Phaedrus and Ovid would also be particularly valuable. Ovid uses sound-terms to emphasise the transition from ‘human’ to ‘animal’ in his *Metamorphoses*, and in contrast, Phaedrus anthropomorphises his animals, particularly in relation to their production of human speech. Similar to the transformations of humans to animal, it would be of interest to examine in greater detail the sounds of monstrous creatures, and compare the ways in which ancient Latin authors characterise these imagined sounds. Further studies might also problematise our understanding of the relationship between intelligent animals and the imitation of human speech in Roman thought. Future works may also raise further questions regarding possible hierarchies of sound. While this work does not address the conceptual boundary between concepts of ‘music’ and ‘non-musical sound’ in the Latin corpus, an objective of this thesis was to encourage further research into this area.

The collected references in the *SAALL* dataset could be further divided into literary sub-categories, which would allow for future analyses of linguistic patterns across more specific literary genres. The *SAALL* dataset could also be further expanded to incorporate different types of sounds, including anthropogenic or natural sounds. This would be a

profitable avenue for future studies on classical corpus linguistics. An examination of *all* references to sound in the Latin corpus would allow us to vastly improve our understanding of the sonic vocabularies of ancient Latin authors. Many of the terms used to denote sound are also applied to multiple senses, so it is possible to expand the field even *more* broadly to incorporate other sensory-terms. '*Clangores, stridores et sibili*' may prompt future studies to investigate these multisensory terms, which would address a well-defined lacuna in the field of Roman sensory studies. This thesis is primarily concerned with the lexicographical analysis of sound terminology of ancient Latin, but further studies may use the literary and comparative techniques demonstrated in this work to draw more speculative conclusions regarding the important sociocultural role of sound in antiquity.

In summation, '*Clangores, stridores et sibili*' evaluates the vocabulary used by ancient Latin authors to denote and qualify the sounds of animals – be they real and perceived through authentic experiences, or imagined and constructed through literary techniques. Comparing the sounds of extant animals with the terminology used to describe their sounds in ancient Latin texts has augmented our understanding of the qualities denoted by, and ascribed to, specific sound-terms. This thesis ultimately demonstrates that by listening with fresh and critical ears to the '*clangores, stridores et sibili*' of the animal kingdom, we can gain valuable new insights into the sonorous worlds of ancient Roman society.

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10. Appendices

10.1. Tables

Table 1. Latin Author Sound-Term Frequency – *SAALL* Corpus

| Author / Work | Sound-Term Count | % of Total |
|-------------------------|------------------|------------|
| Pliny | 264 | 25.882 |
| Ovid | 152 | 14.902 |
| Vergil | 89 | 8.725 |
| Apuleius | 66 | 6.471 |
| Statius | 55 | 5.392 |
| Seneca | 45 | 4.412 |
| Cicero | 37 | 3.627 |
| Silius Italicus | 31 | 3.039 |
| Appendix Vergiliana | 28 | 2.745 |
| Lucretius | 26 | 2.549 |
| Martial | 23 | 2.255 |
| Phaedrus | 16 | 1.569 |
| Lucan | 15 | 1.471 |
| Varro | 15 | 1.471 |
| Livy | 14 | 1.373 |
| Petronius | 13 | 1.275 |
| Calpurnius Siculus | 11 | 1.078 |
| Propertius | 11 | 1.078 |
| Columella | 24 | 2.353 |
| Valerius Flaccus | 9 | 0.882 |
| Quintilian | 8 | 0.784 |
| Suetonius | 8 | 0.784 |
| Grattius | 7 | 0.686 |
| Horace | 7 | 0.686 |
| Aulus Gellius | 6 | 0.588 |
| <i>Bellum Africanum</i> | 5 | 0.490 |
| Florus | 6 | 0.588 |
| <i>Laus Pisonis</i> | 6 | 0.588 |

| | | |
|-------------------------------|--------------|---------------|
| Quintus Curtius | 6 | 0.588 |
| Fronto | 4 | 0.392 |
| Manilius | 3 | 0.294 |
| Persius | 3 | 0.294 |
| <i>Aetna</i> | 2 | 0.196 |
| Juvenal | 1 | 0.098 |
| Tibullus | 1 | 0.098 |
| Vitruvius | 1 | 0.098 |
| <i>Lydia</i> | 1 | 0.098 |
| <i>Rhetorica ad Herennium</i> | 1 | 0.098 |
| Total | 1,020 | 100.00 |

Table 2. Animal Sound-Term Weight Percentage – *Latin Authors*

| Author / Work | Total Words (PHI) | Sound-Term Count | Sound-Term Weight (%) |
|-------------------------|------------------------------|-----------------------------|----------------------------------|
| Pliny | 398,104 | 264 | 0.06631 |
| Ovid | 250,000 | 152 | 0.06080 |
| Vergil | 83,333 | 89 | 0.10680 |
| Apuleius | 100,000 | 66 | 0.06600 |
| Statius | 94,937 | 55 | 0.05793 |
| Seneca | 365,145 | 45 | 0.01232 |
| Cicero | 1,000,000 | 37 | 0.00370 |
| Silius Italicus | 76,421 | 31 | 0.04056 |
| Appendix Vergiliana | 16,064 | 28 | 0.17430 |
| Lucretius | 50,000 | 26 | 0.05200 |
| Columella | 117,647 | 24 | 0.02040 |
| Martial | 59,631 | 23 | 0.03857 |
| Phaedrus | 11,640 | 16 | 0.13746 |
| Lucan | 51,133 | 15 | 0.02934 |
| Varro | 90,909 | 15 | 0.01650 |
| Livy | 526,316 | 14 | 0.00266 |
| Petronius | 30,983 | 13 | 0.04196 |
| Calpurnius Siculus | 5,157 | 11 | 0.21330 |
| Propertius | 25,316 | 11 | 0.04345 |
| Valerius Flaccus | 37,234 | 9 | 0.02417 |
| Suetonius | 79,151 | 8 | 0.01011 |
| Quintilian | 323,904 | 8 | 0.00247 |
| Grattius | 3,509 | 7 | 0.19949 |
| Horace | 44,118 | 7 | 0.01587 |
| <i>Laus Pisonis</i> | 1,687 | 6 | 0.35566 |
| Florus | 27,607 | 6 | 0.02173 |
| Quintus Curtius | 71,212 | 6 | 0.00843 |
| Aulus Gellius | 123,464 | 6 | 0.00486 |
| <i>Bellum Africanum</i> | 12,987 | 5 | 0.03850 |
| Fronto | 40,404 | 4 | 0.00990 |
| Persius | 4,525 | 3 | 0.06630 |
| Manilius | 27,500 | 3 | 0.01091 |
| Tibullus | 12,383 | 1 | 0.00808 |

| | | | |
|--------------|------------------|--------------|---------------|
| Juvenal | 25,000 | 1 | 0.00400 |
| Vitruvius | 57,692 | 1 | 0.00173 |
| Total | 4,245,113 | 1,016 | 100.00 |

*Total word count based on *PHI* figures of weight

***Appendix Vergiliana as listed on PHI includes: Dirae, Lydia, Culex, Aetna, Copa, Elegiae in Maecenatem, Ciris, Priapea, Catalepton, Priapeum 'Quid Hoc Novi Est?', Moretum, De Institutione Viri Boni, De Est et Non, De Rosis Nascentibus*

Table 3. Part of Speech Frequency – *SAALL Corpus*

| Part of Speech | Frequency | % of total |
|-----------------------|-------------|---------------|
| Noun | 366 | 35.882 |
| Adjective | 285 | 27.941 |
| Verb | 267 | 26.176 |
| Participle | 57 | 5.588 |
| Adverb | 18 | 1.765 |
| Attributive Statement | 24 | 2.353 |
| Denotative Statement | 1 | 0.098 |
| Idiom | 1 | 0.098 |
| Interjection | 1 | 0.098 |
| Total | 1020 | 100.00 |

Table 4. Part of Speech Frequency – *Pliny the Elder*

| Part of Speech | Frequency | % of total |
|-----------------------|------------|---------------|
| Noun | 110 | 41.67 |
| Verb | 58 | 21.97 |
| Adjective | 62 | 23.48 |
| Participle | 17 | 6.44 |
| Adverb | 1 | 0.38 |
| Attributive Statement | 15 | 5.68 |
| Denotative Statement | 1 | 0.38 |
| Total | 264 | 100.00 |

Table 5. Part of Speech Frequency – *Ovid*

| Part of Speech | Frequency | % of total |
|-----------------------|------------|---------------|
| Noun | 54 | 35.53 |
| Verb | 40 | 26.32 |
| Adjective | 46 | 30.26 |
| Participle | 8 | 5.26 |
| Adverb | 3 | 1.97 |
| Attributive Statement | 1 | 0.66 |
| Total | 152 | 100.00 |

Table 6. Part of Speech Frequency – *Vergil*

| Part of Speech | Frequency | % of total |
|-----------------------|-----------|---------------|
| Noun | 26 | 29.21 |
| Verb | 27 | 30.34 |
| Adjective | 28 | 31.46 |
| Participle | 5 | 5.62 |
| Adverb | 2 | 2.25 |
| Attributive Statement | 1 | 1.12 |
| Total | 89 | 100.00 |

Table 7. Part of Speech Frequency – *Apuleius*

| Part of Speech | Frequency | % of total |
|-----------------------|-----------|---------------|
| Noun | 15 | 22.73 |
| Verb | 20 | 30.30 |
| Adjective | 27 | 40.91 |
| Participle | 3 | 4.55 |
| Adverb | 0 | 0.00 |
| Attributive Statement | 1 | 1.52 |
| Total | 66 | 100.00 |

Table 8. Part of Speech Frequency – *Statius*

| Part of Speech | Frequency | % of total |
|-----------------------|-----------|---------------|
| Noun | 20 | 36.4 |
| Verb | 12 | 21.8 |
| Adjective | 17 | 30.9 |
| Participle | 5 | 9.1 |
| Adverb | 1 | 1.8 |
| Attributive Statement | 0 | 0.0 |
| Total | 55 | 100.00 |

Table 9. Sound-Term Type Frequency – *SAALL Corpus*

| Sound-Term Type | Frequency | % of total |
|-----------------|-------------|---------------|
| Denotative | 641 | 63 |
| Attributive | 299 | 29 |
| Self-Qualifying | 66 | 6 |
| Evocation | 14 | 1 |
| Total | 1020 | 100.00 |

Table 10. Sound-Term Type Frequency – *Pliny the Elder*

| Sound-Term Type | Frequency | % of total |
|-----------------|------------|---------------|
| Denotative | 169 | 64 |
| Attributive | 74 | 28 |
| Self-Qualifying | 20 | 8 |
| Evocation | 1 | 0 |
| Total | 264 | 100.00 |

Table 11: Sound-Term Type Frequency – *Ovid*

| Sound-Term Type | Frequency | % of total |
|-----------------|------------|---------------|
| Denotative | 93 | 61 |
| Attributive | 47 | 31 |
| Self-Qualifying | 10 | 7 |
| Evocation | 2 | 1 |
| Total | 152 | 100.00 |

Table 12. Sound-Term Type Frequency – *Vergil*

| Sound-Term Type | Frequency | % of total |
|-----------------|-----------|---------------|
| Denotative | 56 | 63 |
| Attributive | 27 | 30 |
| Self-Qualifying | 5 | 6 |
| Evocation | 1 | 1 |
| Total | 89 | 100.00 |

Table 13. Sound-Term Type Frequency – *Apuleius*

| Sound-Term Type | Frequency | % of total |
|-----------------|-----------|---------------|
| Denotative | 38 | 58 |
| Attributive | 24 | 36 |
| Self-Qualifying | 4 | 6 |
| Evocation | 0 | 0 |
| Total | 66 | 100.00 |

Table 14. Sound-Term Type Frequency – *Statius*

| Sound-Term Type | Frequency | % of total |
|-----------------|-----------|---------------|
| Denotative | 34 | 62 |
| Attributive | 17 | 31 |
| Self-Qualifying | 3 | 5 |
| Evocation | 1 | 2 |
| Total | 55 | 100.00 |

Table 15. Latin Author Sound-Term Frequency – *Insects*

| Author / Work | Frequency | % of total |
|----------------------|------------------|-------------------|
| Pliny | 48 | 35.56 |
| Vergil | 28 | 20.74 |
| Columella | 10 | 7.41 |
| Appendix Vergiliana | 9 | 6.67 |
| Phaedrus | 9 | 6.67 |
| Varro | 6 | 4.44 |
| Statius | 5 | 3.70 |
| <i>Laus Pisonis</i> | 5 | 3.70 |
| Martial | 3 | 2.22 |
| Apuleius | 2 | 1.48 |
| Calpurnius Siculus | 2 | 1.48 |
| Ovid | 2 | 1.48 |
| Petronius | 2 | 1.48 |
| Silius Italicus | 2 | 1.48 |
| Cicero | 1 | 0.74 |
| Horace | 1 | 0.74 |
| Total | 135.00 | 100.00 |

Table 16. Part of Speech Frequency – *Insects**

| Part of Speech | Frequency | % of total |
|-----------------------|------------------|-------------------|
| noun | 47 | 37 |
| verb | 36 | 28 |
| adjective | 33 | 26 |
| participle | 7 | 5 |
| adverb | 5 | 4 |
| Total | 128 | 100.00 |

*This table does not include attributive statements (6), and a denotative statement (1).

Table 17. Sound-Term Type Frequency – *Insects*

| Sound-Term Type | Frequency | % of total |
|------------------|------------|---------------|
| Denotative | 85 | 63 |
| Attributive | 40 | 30 |
| Qualified | 6 | 4 |
| <i>Evocation</i> | 4 | 3 |
| Total | 135 | 100.00 |

Table 18. Sound Quality Frequency – *Insects*

| Sound Quality | Frequency | % of total |
|------------------|-----------|---------------|
| Acoustic | 64 | 70 |
| Aesthetic | 14 | 15 |
| <i>Affective</i> | 13 | 14 |
| Total | 91 | 100.00 |

Table 19. Emitter Frequency* – *Insects*

| Sound-Emitter | Frequency |
|------------------------|------------|
| <i>apis</i> | 60 |
| <i>cicada</i> | 42 |
| <i>culex</i> | 9 |
| <i>insecta</i> | 9 |
| <i>locusta</i> | 5 |
| <i>gryllus</i> | 3 |
| <i>musca</i> | 2 |
| <i>asilus</i> | 1 |
| <i>examina</i> | 1 |
| <i>scarabeus</i> | 1 |
| <i>pullus</i> | 1 |
| <i>vermiculus</i> | 1 |
| Reference Total | 135 |

Table 20. Latin Author Sound-Term Frequency – *Reptiles and Amphibians*

| Author | Frequency | % of total |
|---------------------|---------------|---------------|
| Pliny | 26 | 19.55 |
| Ovid | 18 | 13.53 |
| Silius Italicus | 15 | 11.28 |
| Statius | 15 | 11.28 |
| Vergil | 10 | 7.52 |
| Lucan | 8 | 6.02 |
| Seneca | 6 | 4.51 |
| Phaedrus | 7 | 5.26 |
| Valerius Flaccus | 6 | 4.51 |
| Appendix Vergiliana | 5 | 3.76 |
| Apuleius | 4 | 3.01 |
| Columella | 3 | 2.26 |
| Suetonius | 3 | 2.26 |
| Petronius | 2 | 1.50 |
| Propertius | 2 | 1.50 |
| Cicero | 1 | 0.75 |
| Martial | 1 | 0.75 |
| Varro | 1 | 0.75 |
| Total | 133.00 | 100.00 |

Table 21. Part of Speech Frequency – *Reptiles and Amphibians*

| Part of Speech | Frequency | % of total |
|-----------------------|------------------|-------------------|
| noun | 54 | 41 |
| verb | 35 | 26 |
| adjective | 33 | 25 |
| participle | 9 | 7 |
| adverb | 2 | 2 |
| Total | 133 | 100.00 |

Table 22. Sound-Term Type Frequency – *Reptiles and Amphibians*

| Sound Quality | Frequency | % of total |
|----------------------|------------------|-------------------|
| Denotative | 92 | 69 |
| Attributive | 28 | 21 |
| Self-Qualifying | 13 | 10 |
| <i>Evocation</i> | 0 | 0 |
| Total | 133 | 100 |

Table 23. Sound Quality Frequency – *Reptiles and Amphibians*

| Sound Quality | Frequency | % of total |
|----------------------|------------------|-------------------|
| Acoustic | 45 | 59 |
| Aesthetic | 13 | 17 |
| Affective | 18 | 24 |
| Total | 76 | 100.00 |

Table 24. Emitter Frequency (Animal Type) – *Reptiles and Amphibian*

| Sound Emitter (Animal Type) | Frequency |
|--------------------------------|------------|
| <i>Snakes</i> | 90 |
| <i>Frogs</i> | 41 |
| <i>Lizards</i> | 2 |
| <i>Tortoise</i> | 1 |
| Total* | 134 |

*one reference of dual categories *erinyes* and *cerastes*

Table 25. Emitter Frequency (Latin Name) – *Reptiles and Amphibian*

| Sound Emitter (Latin Name) | Frequency |
|-------------------------------|------------|
| <i>rana</i> | 41 |
| <i>serpentes</i> | 37 |
| <i>angues</i> | 21 |
| <i>erinyes</i> | 8 |
| Cerberus | 6 |
| <i>hydra</i> | 4 |
| <i>cerastae</i> | 4 |
| <i>colubri</i> | 4 |
| <i>galeotes</i> | 2 |
| <i>basiliscus</i> | 2 |
| <i>serpentes colchian</i> | 2 |
| <i>chelydri</i> | 1 |
| <i>viperæ</i> | 1 |
| <i>testudo</i> | 1 |
| Total* | 134 |

*one reference of dual categories *erinyes* and *cerastes*

Table 26. Denotative Sound-Term Diversity – *Snakes*

| Part of Speech | Unique Lexical Items | Frequency | Ratio |
|----------------|----------------------|-----------|----------------|
| Noun | 6 | 39 | 6.5 : 1 |
| Verb | 11 | 22 | 2.0 : 1 |
| Participle | 1 | 4 | 4.0 : 1 |
| Total | 18 | 65 | 3.6 : 1 |

Table 27. Denotative Sound-Term Diversity – *Frogs*

| Part of Speech | Unique Lexical Items | Frequency | Ratio |
|----------------|----------------------|-----------|----------------|
| Noun | 7 | 14 | 2.0 : 1 |
| Verb | 9 | 10 | 1.1 : 1 |
| Participle | 2 | 2 | 1.0 : 1 |
| Total | 18 | 26 | 1.4 : 1 |

Table 28. Most Frequently Used Sound-Terms – *Pliny the Elder*

| Sound-Terms | Frequency | % of Total |
|-----------------------|-----------|------------|
| <i>vox, vocis</i> | 26 | 10 |
| <i>cantus, -ūs</i> | 16 | 6 |
| <i>cano, -ere</i> | 12 | 5 |
| <i>stridor, -oris</i> | 8 | 3 |
| <i>vocalis, -e</i> | 8 | 3 |
| <i>mutus, -a, -um</i> | 6 | 2 |
| <i>sonus, -i</i> | 6 | 2 |
| <i>clangor, -oris</i> | 5 | 2 |
| <i>latro, -are</i> | 5 | 2 |
| <i>murmur, -uris</i> | 5 | 2 |

Table 29. Sound Quality Frequency – *Pliny the Elder*

| Sound Quality | Frequency |
|---------------|-----------|
| Acoustic | 96 |
| Aesthetic | 17 |
| Affective | 19 |

Table 30. Emitter Frequency (Animal Type) – *Pliny the Elder*

| Sound Emitter | References |
|--------------------------------|------------|
| <i>Birds</i> | 131 |
| <i>Insects</i> | 48 |
| <i>Mammals</i> | 41 |
| <i>Reptiles and Amphibians</i> | 26 |
| <i>Mythological creatures</i> | 9 |
| <i>Fish and Crustaceans</i> | 8 |
| <i>Animals</i> | 1 |

Table 31. Most Frequent Sound-Emitters (Latin Name) – *Pliny the Elder*

| Sound Emitter (Latin Name) | Frequency |
|-------------------------------|-----------|
| <i>luscinae</i> | 37 |
| <i>ranae</i> | 16 |
| <i>cicadae</i> | 13 |
| <i>apes</i> | 14 |
| <i>galli</i> | 12 |
| <i>aves</i> | 11 |
| <i>insecta</i> | 9 |
| <i>canes</i> | 8 |
| <i>pulli</i> | 8 |
| <i>corvi</i> | 7 |
| <i>elephantes</i> | 7 |
| <i>serpentes</i> | 7 |

Table 32. Lexical Diversity* – *Pliny the Elder*

| Part of Speech | Unique Lexical Items | Frequency | Ratio |
|----------------|----------------------|-----------|---------|
| noun | 33 | 110 | 3.3 : 1 |
| verb | 33 | 58 | 1.8 : 1 |
| adjective | 39 | 62 | 1.6 : 1 |
| participle | 17 | 17 | 1.0 : 1 |
| adverb | 1 | 1 | 1.0 : 1 |
| Total | 123 | 248 | 2.0 : 1 |

*This calculation does not include attributive or denotative statements.

Table 33. Lexical Diversity* – *Ovid*

| Part of Speech | Unique Lexical Items | Frequency | Ratio |
|----------------|----------------------|-----------|---------|
| noun | 28 | 54 | 1.9 : 1 |
| verb | 28 | 40 | 1.4 : 1 |
| adjective | 26 | 46 | 1.8 : 1 |
| participle | 7 | 8 | 1.1 : 1 |
| adverb | 3 | 3 | 1.0 : 1 |
| Total | 92 | 151 | 1.6 : 1 |

*This calculation does not include attributive statements.

Table 34. Lexical Diversity* – *Vergil*

| Part of Speech | Unique Lexical Items | Frequency | Ratio |
|----------------|----------------------|-----------|---------|
| noun | 18 | 26 | 1.4 : 1 |
| verb | 19 | 27 | 1.4 : 1 |
| adjective | 21 | 28 | 1.3 : 1 |
| participle | 2 | 5 | 2.5 : 1 |
| adverb | 2 | 2 | 1.0 : 1 |
| Total | 62 | 88 | 1.4 : 1 |

*This calculation does not include attributive statements.

Table 35. Lexical Diversity* – *Apuleius*

| Part of Speech | Unique Lexical Items | Frequency | Ratio |
|----------------|----------------------|-----------|----------------|
| noun | 10 | 15 | 1.5 : 1 |
| verb | 18 | 20 | 1.1 : 1 |
| adjective | 26 | 27 | 1.0 : 1 |
| participle | 3 | 3 | 1.0 : 1 |
| adverb | 10 | 15 | 1.5 : 1 |
| Total | 57 | 65 | 1.1 : 1 |

Table 36. Lexical Diversity* – *Statius*

| Part of Speech | Unique Lexical Items | Frequency | Ratio |
|----------------|----------------------|-----------|----------------|
| noun | 13 | 20 | 1.5 : 1 |
| verb | 8 | 12 | 1.5 : 1 |
| adjective | 14 | 17 | 1.2 : 1 |
| participle | 3 | 5 | 1.7 : 1 |
| adverb | 1 | 1 | 1.0 : 1 |
| Total | 39 | 55 | 1.4 : 1 |

Table 37. Lexical Variation - *Latin Authors*

| Author | Unique lexical items | Sound-Term Total | Ratio |
|----------|----------------------|------------------|---------|
| Apuleius | 57 | 65 | 1.1 : 1 |
| Statius | 39 | 55 | 1.4 : 1 |
| Vergil | 62 | 88 | 1.4 : 1 |
| Ovid | 92 | 151 | 1.6 : 1 |
| Pliny | 123 | 248 | 2.0 : 1 |

Table 38. Revised Sound-Term Weight – *Pliny the Elder Natural History VIII to XI*

| Author | Total Words | Sound-Term Count | Weight (%) |
|--------|-------------|------------------|------------|
| Pliny | 49,410 | 234 | 0.47561 |

10.2. Figures

Figure 1. Part of Speech Totals – *SAALL Corpus*

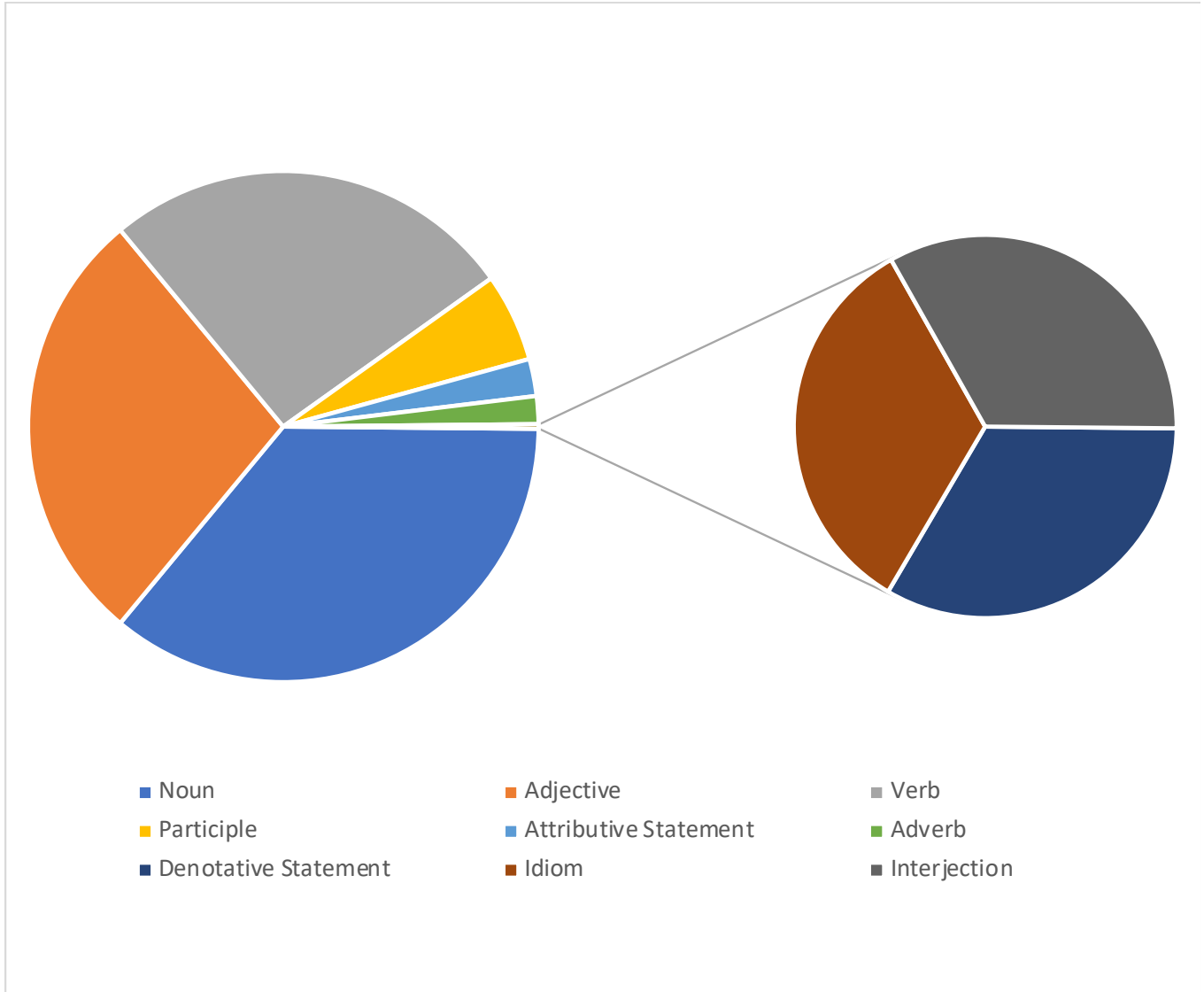


Figure 2. Part of Speech Totals – *Latin Authors*

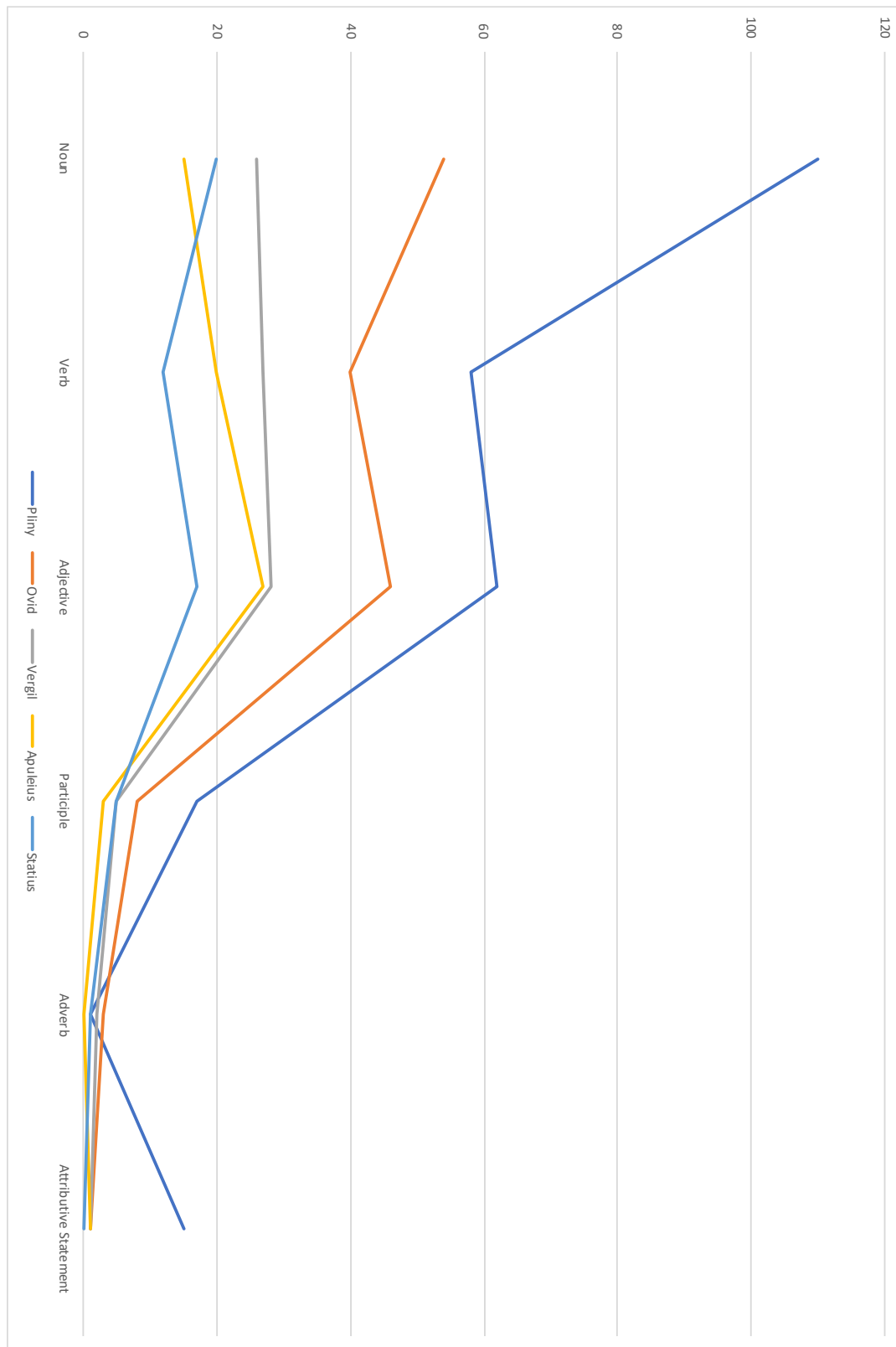


Figure 3. Part of Speech Totals – *SAALL Corpus*

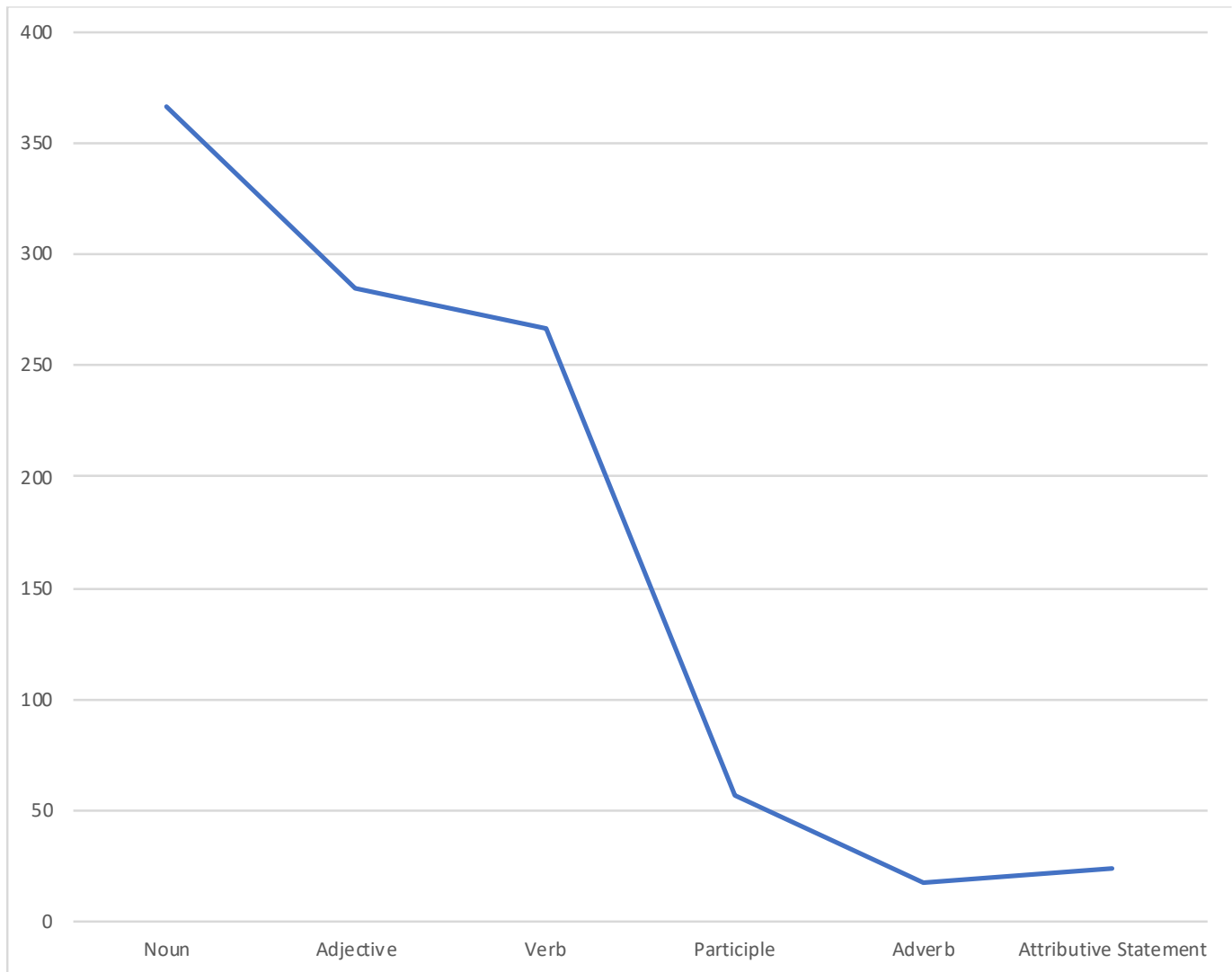


Figure 4. Part of Speech Frequency – *Insects*

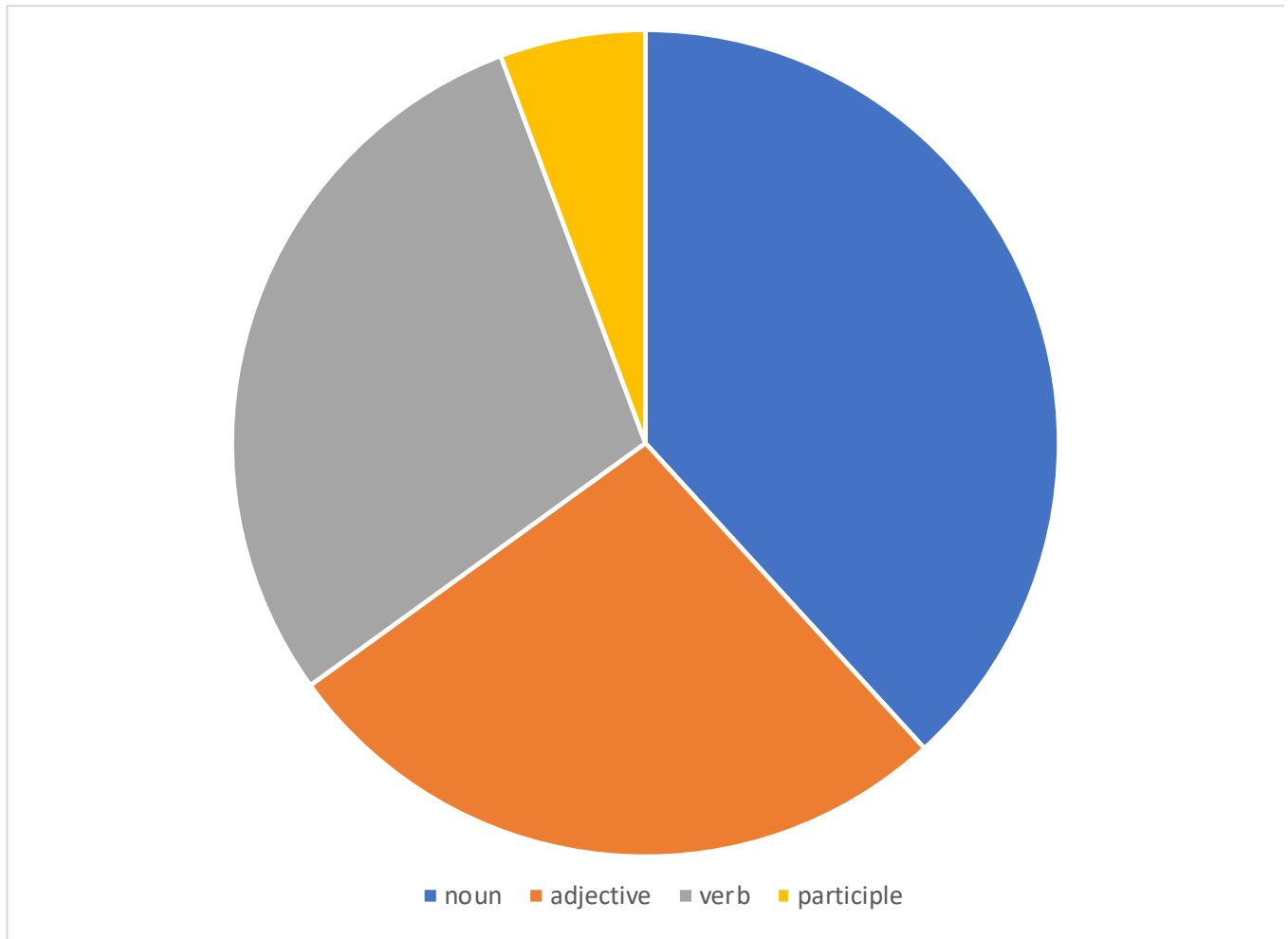


Figure 5. Sound Emitter Frequencies (Latin Names)– *Insects*

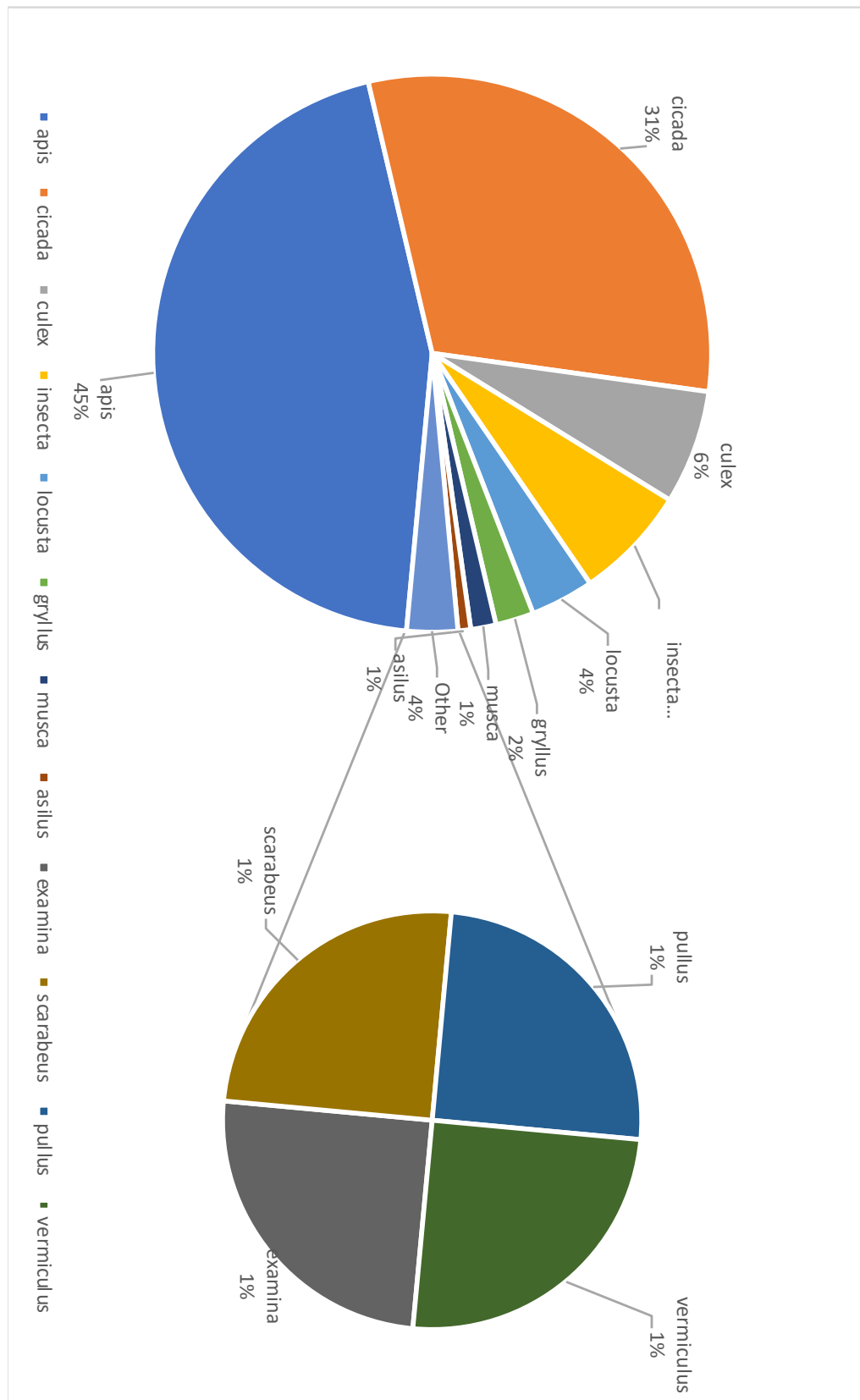


Figure 6. Part of Speech Totals – *Reptiles and Amphibians*

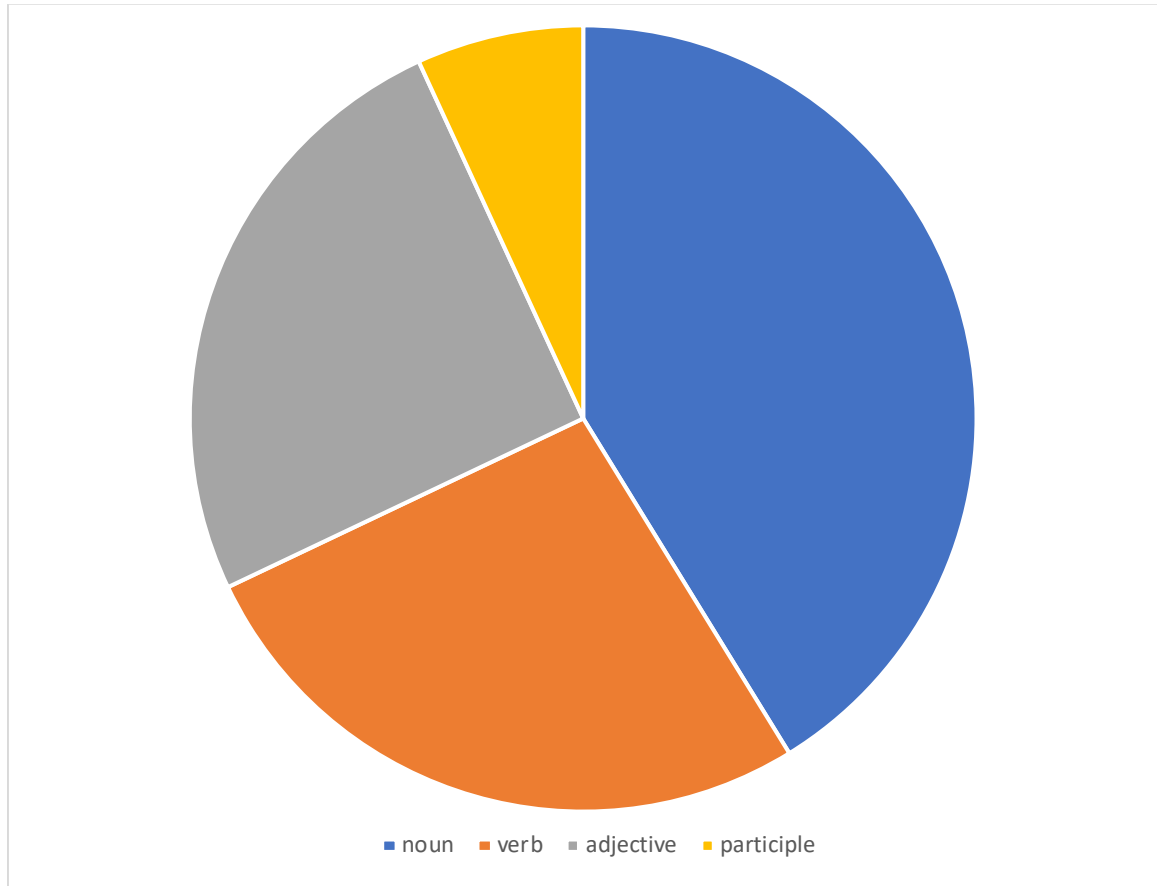


Figure 7 Sound Emitter Frequencies (Animal Type) – *Reptiles and Amphibians*

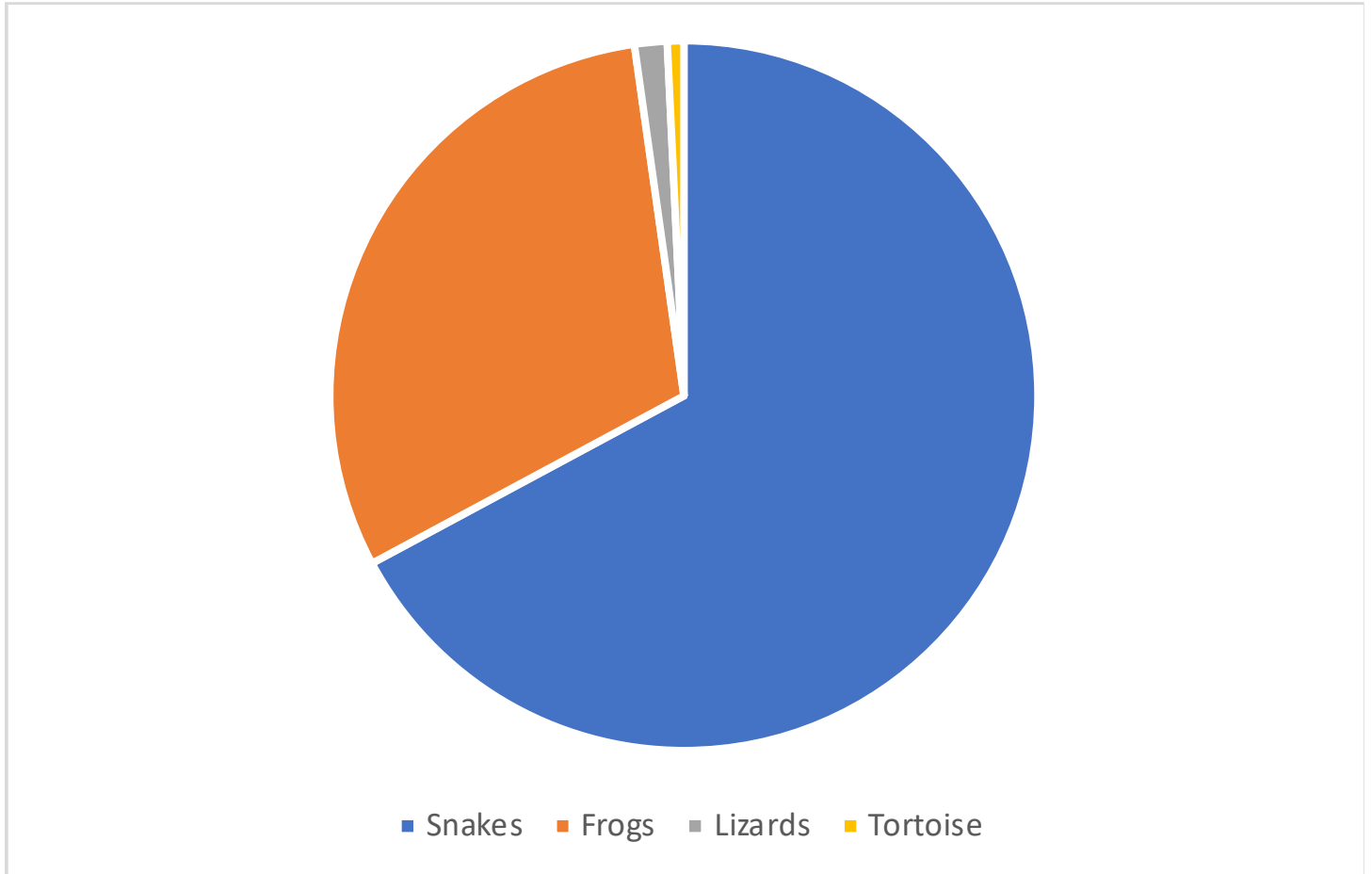
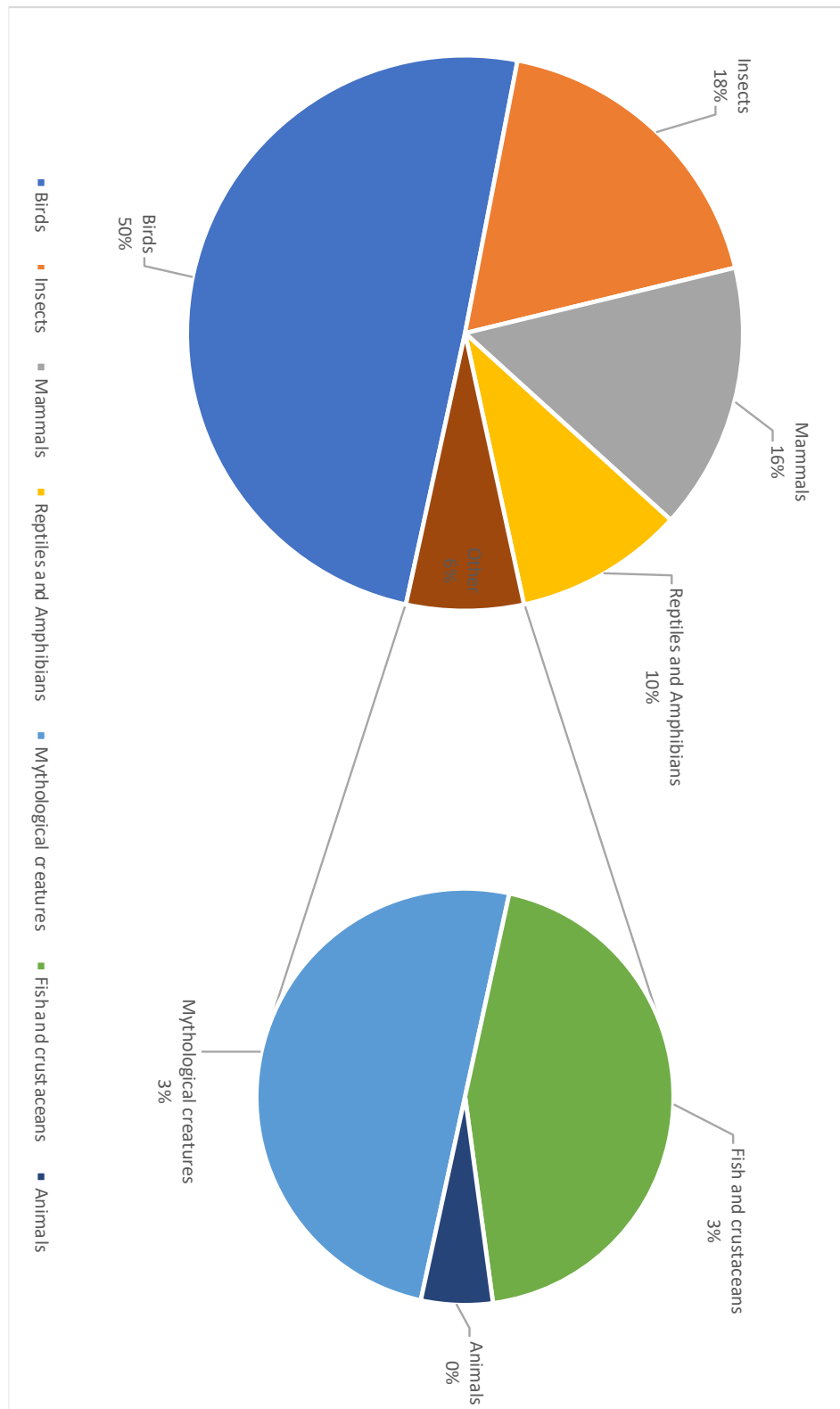


Figure 8. Emitter Frequencies – *Pliny the Elder*



10.3. SAALL Dataset Construction

The first step in constructing the *SAALL* dataset was to identify a wide range of Latin terms that were used to denote sound. A broad keyword search of the *OLD* for words such as: ‘sound’, ‘noise’, ‘animal’, ‘bird’ and ‘insect’, identified 417 unique Latin terms. This collection was further condensed by removing words that refer simply to the process of hearing, or sensory reception, rather than transcribing textural descriptions of sounds.⁸⁴⁷ This reduced sound-term list of some 330 Latin terms provided a useful starting point to an investigation into their usage over the chosen time period. A number of approaches were then applied to gather references to these sound-terms from the Latin corpus, starting with close examinations of selected texts, and moving onto more focused concordance searches.

Pliny’s *Natural History* was a useful starting point for examination. Books VIII to XI are particularly relevant as they relate to mammals and reptiles, fish, birds, and insects respectively. These volumes were manually examined for references to the sounds of animals. This was a precise and labour-intensive approach, but it ultimately led to the collation of a sizeable initial dataset of some 231 references to animal sounds in these four books alone. This process provided a wide-ranging survey of sound-terms that were applied by Pliny *specifically* to the sounds of animals, which further scoped down the initial field of Latin sound-terms.

⁸⁴⁷ Examples include the Latin verbs *accido* meaning “to fall on (the ears of), be heard”, and *accipio*, “to receive sense impressions to hear”, see. *OLD* 1968, 20, s.v. “*accido*”; 21-22. s.v. “*accipio*”. These sensory verbs provide little, if any, detail regarding the qualities of sound as perceived by the author, but future analysis of these terms would be of interest to the field.

This early manual research method was followed by more practical approaches to data collection, through executing online database searches based on ‘sound-emitter type’ (i.e. the type of animal producing the sound) and characteristic ‘sound-terms’ themselves. To facilitate preliminary analysis for the first chapter in the thesis, I focussed on terms used by Pliny to denote and characterise insects sounds. By consulting the Packard Humanities Institute's online Latin database, a simple concordance search can identify all textual references to the desired search term. The results for these concordance searches display ancient text passage numbers and corresponding excerpts that match the search parameters. This resource was previously available on CD-ROM, but in its current online form, virtually all surviving Latin literary sources written before 200 AD are accessible in their original Latin. The only real issue occurs when searching for a term with over 500 matches. If the search results exceeds this maximum, 500 results are randomly sampled from the total, and are then sorted and displayed.

These references, organised by sound-term, were then collated into a spreadsheet, that was ordered by columns for: ‘author’, ‘work’, ‘section and line number’, ‘the original Latin text’ and ‘keywords’, to easily identify general patterns of usage. With an average of around 200 references per sound-term in concordance searches on the *PHI* Latin database, manual identification of relevant passages was challenging and considerably time-consuming. For many of the identified sound-terms, the primary definition of the term relates to non-animal sounds. For example, of the 319 references to *stridor* (and its related cognates), only around 20% were used to denote the sounds of animals, with 65 references in total.

Due to the sheer-bulk of sonorous references in the Latin corpus, these ‘sound-term’ based searches were supplemented with a more focused ‘sound-emitter’ search, based on the Latin terms for specific types of sound-emitters. The initial ‘sound-emitter’ search that was undertaken was for the first chapter in this thesis, on the sounds of insects. The ‘noisiest’ Roman insects were identified as *muscae* and *asili* (flies and biting-flies), *apes* (bees), *culices* (mosquitoes, biting-midges and gnats), *cicadae* (crickets and cicadae), and *locusta* (locusts). Searching by sound-emitter provided a much more reasonable sample-size and in several cases identified important one-off uses of sound-terms, that would have otherwise been significantly more difficult to find. An excellent example of this is the use of the term *acerbus* relating to the shrill, buzzing sound of an *asilus* in Vergil’s *Georgics*.⁸⁴⁸ The *OLD* lists at least 8 distinct definitions for *acerbus*, and a preliminary concordance search on the *PHI* Latin database of its adjectival form returns 257 results. Another example is the unique use of *rhonchus* in the denotation of a frog’s snore-like croaking in Apuleius’ *Metamorphoses*.⁸⁴⁹

After completing these searches, and identifying the relevant references to insect sounds, the references were then collated into a central ‘Sound Characteristic Dataset’. Through a brief trial-by-spreadsheets, I established three initial datasets for the collection and categorisation of the evidence: i) Sound-Terms Dataset, containing identified sound-terms from the *OLD*; ii) insect-term dataset, containing references organised by insect type; and iii) the Sound Characteristics Dataset, containing all collated references to animal sound, which formed the early basis for the *SAALL*.

⁸⁴⁸ VERG.*G.*3.147

⁸⁴⁹ APUL.*Met.*1.9.

For chapters 5 and 6, further datasets were created for ordering references to sound by reptile and amphibian types, and distinct types of birds, respectively. A method was also devised to assist with the screening of relevant references from the *PHI* concordance searches. All references from a 'sound-emitter' concordance search could be subsequently filtered against a list of stems of identified sound-terms. And conversely, 'sound-term' concordance searches could also be filtered by a list of stems for the Latin names for animal sound-emitters. Through the application of conditional formatting based on these lists of stems in the respective Excel datasets, the number of concordance results could be drastically reduced to highlight only potentially relevant sound-term references. This significantly reduced research and collation times, and was consistently effective with a high rate of success. These filtered concordance searches enabled me to sift through high volumes of data from the PHI concordance searches. By doing so, I was able to find a much wider range of references than would have been possible if I were to proceed entirely manually.

A number of texts that were of key thematic importance to the work were reviewed extensively for references to the sounds of animals, and I am confident that I have found a high percentage of these references. For clarity, some of the texts that were surveyed manually in full include: Pliny the Elder's *Natural History* books VIII to XI, the agricultural works of Varro, and Columella, Vergil's *Georgics* and *Eclogues*, and a number of poems in the *Appendix Vergiliana*.

I do acknowledge however that there are certainly references that may have been overlooked, and that are not included in the dataset. Following near exhaustive surveys of the sound-terms applied to insects, birds, and reptiles and amphibians, it was not achievable within the given limits of this doctoral dissertation to also execute a full survey of Latin references to the sounds of mammals. I have included numerous references to mammalian sounds that were found incidentally throughout this process; either through the manual identification in relevant sources (i.e. Columella's *De Re Rustica* or Grattius' *Cynegetica*), or by association with a common sound-term (such as *mugitus* or *gemitus*). But for all intents and purposes the *SAALL* dataset is a functional “core sample” of references to animal sound-terms in ancient Latin literature.

10.4. Animal Sound Recordings

The following is a list of animal recordings gathered from the [Tierstimmen Archiv](#), and the [Macauley Library](#). Recordings from the Macauley library can be streamed online directly from the URLs provided. The online recordings are also accompanied by a video spectrogram.

All of the recordings from the Tierstimmen Archiv are available for academic use under Creative Commons licensing, and are attached as supplementary files to this thesis. Each recording in this list that is taken from the Tierstimmen Archiv will include a filename that corresponds to its number in the supplemental ‘*Animal Sound Recordings*’ list. URLs to the Tierstimmen Archiv have also been provided and hyperlinked, but server access issues have been noted subsequently. Nevertheless, operating the search function on the website will allow you to find the original source of the sound.

I have organised the sounds by animal type, and species, and have provided bibliographical material below each caption heading.

Insects

Sound Recording 1: Death-watch beetle (*Xestobium rufovillosum*) drumming sounds.

Filename: ‘SR_01 Xestobium_rufovillosum_Arth0127_01’
TEMBROCK, G. 1969. *Xestobium rufovillosum*_Arth0127_01. [Sound Recording].
[Accessed 5 January 2020]. Available from:
[https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:Xestobium rufovillosum Arth 127 1 1](https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:Xestobium_rufovillosum_Arth_127_1_1)

Sound Recording 2: Death watch beetle (*X. rufovillosum*) drumming sounds II.

Filename: 'SR_02 2056_Bunter_Pochkaefer_Klopfrhythmen'
TEMBROCK, G. 1969. *2056_Bunter_Pochkaefer_Klopfrhythmen*. [Sound Recording]. [Accessed 5 January 2020]. Available from:
https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:2056_Bunter_Pochkaefer_Klopfrhythmen

Sound Recording 3: European honey bee (*Apis mellifera*) - swarming sounds, outside of the hive.

Filename: 'SR_03 0585_Honigbiene_Voelker_am_Stock'
TEMBROCK, G. [no date]. *0585_Honigbiene_Voelker_am_Stock*. [Sound Recording]. [Accessed 5 January 2020]. Available from:
https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:0585_Honigbiene_Voelker_am_Stock

Sound Recording 4: Queen bee (*Apis mellifera*) - 'quacking', 'tooting' or 'piping'.

Filename: 'SR_04 0584_Honigbiene_Tueten_einer_Koenigin'
TEMBROCK, G. [no date]. *0584_Honigbiene_Tueten_einer_Koenigin*. [Sound Recording]. [Accessed 5 January 2020]. Available from:
https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:0584_Honigbiene_Tueten_Koenigin

Sound Recording 5: Single honey bee (*Apis mellifera*) - solitary buzzes.

File Name: 'SR_05 *Apis mellifera* V1776_38'
TEMBROCK, G. 1989. *Apis mellifera* V1776_38. [Sound Recording]. [Accessed 5 January 2020]. Available from:
https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:Apis_mellifera_V_1776_38_2

Sound Recording 6: Cicada (*Cicada orni*) - stridulations from an olive grove in Vasilikos, Greece

File Name: 'SR_06 Cicada_orni_DIG0153_02'
FROMMOLT, KH. 2012. *Cicada_orni_DIG0153_02*. [Sound Recording]. [Accessed 5 January 2020]. Available from:
https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:Cicada_orni_DIG_153_2_1

Sound Recording 7: Cicadae (*Cicada cretensis*) - stridulations from an olive grove in Knossos, Greece.

File Name:: 'SR_07 Cicada_cretensis_V2011_09'
TEMBROCK, G. 1996. *Cicada_cretensis_V2011_09*. [Sound Recording]. [Accessed 5 January 2020]. Available from:
https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:Cicada_cretensis_V_2011_9_2

Sound Recording 8: Field Cricket (*Gryllus campestris*) stridulations.

File Name:: 'SR_08 1721_Feldgrille_Stridulation'
GNENSCH, A. [no date]. *1721_Feldgrille_Stridulation*. [Sound Recording]. [Accessed 5 January 2020]. Available from:
https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:1721_Feldgrille_Stridulation

Reptiles and Amphibians

Sound Recording 9: European tree frog (*Hyla arborea*) - solo advertisement calls.

File Name:: 'SR_09 Hyla_arborea_DIG_176_51_0'
FROMMOLT, KH. 2014. *Hyla_arborea_DIG_176_51_0*. [Sound Recording]. [Accessed 5 January 2020]. Available from:
https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:Hyla_arborea_DIG_176_51_0

Sound Recording 10: European tree frog (*Hyla arborea*) - calls of multiple frogs.

File Name:: 'SR_10 Hyla_arborea_DIG_156_04'
FROMMOLT, KH. 2014. *Hyla_arborea_DIG_156_04*. [Sound Recording]. [Accessed 5 January 2020]. Available from:
https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:Hyla_arborea_DIG_156_4_1

Sound Recording 11: European tree frog (*Hyla arborea*) - solo advertisement calls II.

File Name:: 'SR_11 0778_Laubfrosch_Rufe'
TEMBROCK, G. [no date] *0778_Laubfrosch_Rufe*. [Sound Recording]. [Accessed 5 January 2020]. Available from:
https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:0778_Laubfrosch_Rufe

Sound Recording 12: European tree frogs (*Hyla arborea*) - calls of multiple frogs II.

File Name:: 'SR_12 2500_Hyla_arborea_call'
FROMMOLT, KH. [no date]. *2500_Hyla_arborea_call*. [Sound Recording].
[Accessed 5 January 2020]. Available from:
https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:2500_Hyla_arborea_call

Sound Recording 13: Two Marsh frogs (*Pelophylax ridibundus*) calling.

File Name:: 'SR_13 Rana_ridibunda_DIG0037_05'
FROMMOLT, KH. 2001. *Rana_ridibunda_DIG0037_05* [Sound Recording].
[Accessed 5 January 2020]. Available from:
https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:Rana_ridibunda_DIG_37_5_1

Sound Recording 14: Vocalisations of pool frogs (*Pelophylax lessonae*).

File Name:: 'SR_14 2500_Pelophylax_lessonae_call'
GÜNTHER, R. [no date]. *2500_Pelophylax_lessonae_call*. [Sound Recording].
[Accessed 5 January 2020]. Available from:
https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:2500_Pelophylax_lessonae_call

Birds

Sound Recording 15: Common crane (*Grus grus*) vocalisations.

CHARTERS, R. 2010. *Common Crane Grus grus ML205661*. [Sound Recording].
[Accessed 5 January 2020]. Available from:
<https://macaulaylibrary.org/asset/205661>

Sound Recording 16: Common cranes (*Grus grus*) calling during flight.

File Name:: 'SR_16 Grus_grus_DIG0148_07'
FROMMOLT, KH. 2012. *Grus_grus_DIG0148_07*. [Sound Recording]. [Accessed 5 January 2020]. Available from:
https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:Grus_grus_DIG_148_7_1

Sound Recording 17: Mute swan (*Cygnus olor*) - rhythmic wing beats.

File Name:: 'SR_17 Cygnus_olor_DIG0148_02'
FROMMOLT, KH. 2012. *Cygnus_olor_DIG0148_02*. [Sound Recording].
[Accessed 5 January 2020]. Available from:
https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:Cygnus_olor_DIG_148_2_1

Sound Recording 18: Mute swan (*Cygnus olor*) - whistling wing tones.

File Name:: 'SR_18 Cygnus_olor_DIG0090_14'
FROMMOLT, KH. 2008. *Cygnus_olor_DIG0090_14*. [Sound Recording].
[Accessed 5 January 2020]. Available from:
https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:Cygnus_olor_DIG_90_14_1

Sound Recording 19: Whooper swan (*Cygnus cygnus*) vocalisations.

File Name: 'SR_19 Cygnus_cygnus_Lue0063_02'
LÜTGENS, H. [no date]. *Cygnus_cygnus_Lue0063_02*. [Sound Recording].
[Accessed 5 January 2020]. Available from:
https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:Cygnus_cygnus_Lue_63_2_1

Sound Recording 20: Whooper swans (*C. cygnus*) - duet between two birds.

File Name: 'SR_20 1275_Singschwan_Duett'
TEMBROCK, G. [no date]. *1275_Singschwan_Duett*. [Sound Recording].
[Accessed 5 January 2020]. Available from:
https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:1275_Singschwan_Duett

Sound Recording 21: Whooper swans (*C. cygnus*) - musical phrase commencing at 1'22".

File Name: 'SR_21 ac_SP0055_RTJ2521GA'
RADIOTJÄNST. [no date]. *ac_SP0055_RTJ2521GA*. [Sound Recording]. [Accessed 5 January 2020]. Available from:
https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=SP:ac_SP0055_RTJ2521GA

Sound Recording 22: Common blackbird (*Turdus merula*) - variation of calls.

File Name: 'SR_22 Turdus_merula_Rid_6302'

RIDDETT, P. 2016. *Turdus_merula_Rid_6302*. [Sound Recording]. [Accessed 5 January 2020]. Available from:

https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:Turdus_merula_Rid_6302

Sound Recording 23: Common blackbird (*Turdus merula*) calls during a 'dawn-chorus'

File Name: 'SR_23 Common_Blackbird_Turdus_merula'

CROSS, R. 2019. [Sound Recording].

Sound Recording 24: Lesser spotted eagle (*Aquila pomarina*) calls.

File Name:: 'SR_24 2500_Aquila_pomarina_call'

SCHUBERT, M. [no date]. *2500_Aquila_pomarina_call*. [Sound Recording].

[Accessed 5 January 2020]. Available from:

https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:2500_Aquila_pomarina_call

Sound Recording 25: Imperial Eagle (*Aquila heliaca*) – cries at its nest.

Filename: 'SR_25 0644_Kaiseradler_Paar'

TEMBROCK, G. [no date]. *0644_Kaiseradler_Paar*. [Sound Recording]. [Accessed 5 January 2020]. Available from:

https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:0644_Kaiseradler_Paar

Sound Recording 26: Carrion Crow (*Corvus corone*) – croaking sounds.

Filename: 'SR_26 Corvus_corone_V2011_10'

TEMBROCK, G. 1996. *Corvus_corone_V2011_10*. [Sound Recording]. [Accessed 5 January 2020]. Available from:

https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:Corvus_corone_V_2011_10_2

Sound Recording 27: Northern Raven (*Corvus corax*) - contact call.

Filename: 'SR_27 0723_Kolkrabe_Kontaktlaute'

TEMBROCK, G. [no date]. *0723_Kolkrabe_Kontaktlaute*. [Sound Recording].

[Accessed 5 January 2020]. Available from:

https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:0723_Kolkrabe_Kontaktlaute

Sound Recording 28: Northern Raven (*Corvus corax*) - croaking, hyoidal sounds, "Zungenbeinlaute".

Filename: 'SR_28 0725_Kolkrabe_Zungenbeinlaute'

TEMBROCK, G. [no date]. 0725_Kolkrabe_Zungenbeinlaute. [Sound Recording]. [Accessed 5 January 2020]. Available from:
https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:0725_Kolkrabe_Zungenbeinlaute

Sound Recording 29: Eurasian eagle owl (*Bubo bubo*) - 'bu-bu' calls.

Filename: 'SR_29 2500_Bubo_bubo_call'

TEMBROCK, G. [no date]. 2500_Bubo_bubo_call. [Sound Recording]. [Accessed 5 January 2020]. Available from:
https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:2500_Bubo_bubo_call

Sound Recording 30: Western barn owl (*tyto alba*) - harsh screeches.

Filename: 'SR_30 Tyto_alba_V2095_11'

TEMBROCK, G. 2001. Tyto_alba_V2095_11. [Sound Recording]. [Accessed 5 January 2020]. Available from:
https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:Tyto_alba_V_2095_11_1

Sound Recording 31: Western barn owl (*tyto alba*) - harsh calls.

Filename: 'SR_31 Tytalb19'

MEYER, H. [no date]. Tytalb19. [Sound Recording]. [Accessed 5 January 2020]. Available from:
https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:Tyto_alba_M_103_15_2

Sound Recording 32: Little owl (*Athene noctua*) - advertisement call "tyto - tyto".

Filename: 'SR_32 1322_Steinkauz_Rufe'

TEMBROCK, G. [no date]. 1322_Steinkauz_Rufe. [Sound Recording]. [Accessed 5 January 2020]. Available from:
https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:1322_Steinkauz_Rufe

Sound Recording 33: Eurasian Collared Dove (*Streptopelia decaocto*) – flight sound and feather tonal-whistles at 0'7".

Filename: 'SR_33 *Streptopelia decaocto* DIG0137_22'
FROMMOLT, KH. 2011. *Streptopelia decaocto* DIG0137_22. [Sound Recording]. [Accessed 5 January 2020]. Available from:
https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:Streptopelia_decaocto_DIG_137_22_1

Sound Recording 34: Australian Crested Pigeon (*Ocyphaps lophotes*) - feather whistles, fleeing a predator.

Filename: 'SR_34 recording-of-a-pigeon-fleeing-from-a-replica-predator-credit-trevor-murray'
MURRAY, T. 2017. *Recording of a pigeon fleeing from a predator*. [Sound Recording]. [Accessed 5 January 2020]. Available from:
<https://theconversation.com/those-noisy-crested-pigeons-use-their-unique-feathers-to-sound-an-alarm-87085>

Sound Recording 35: Australian Crested Pigeon (*O. lophotes*) - feather whistles, normal take-off.

Filename: 'SR_35 recording-of-a-pigeon-take-off-normally-from-a-feeder-credit-trevor-murray.mp3'
MURRAY, T. 2017. *Recording of a pigeon take-off normally from a feeder*. [Sound Recording]. [Accessed 5 January 2020]. Available from:
<https://theconversation.com/those-noisy-crested-pigeons-use-their-unique-feathers-to-sound-an-alarm-87085>

Sound Recording 36: Stork (*Ciconia ciconia*) - bill-clattering, "schnabelklappern".

Filename: 'SR_36 *Ciconia ciconia* M0007_38'
MEYER, H. [no date]. *Ciconia ciconia* M0007_38. [Sound Recording]. [Accessed 5 January 2020]. Available from:
https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:Ciconia_ciconia_M_7_38_2

Sound Recording 37: Stork (*Ciconia ciconia*) - bill-clattering, "schnabelklappern" II.

Filename: 'SR_37 1344_Storch_Paar_Schnabelklappern'
TEMBROCK, G. [no date]. *1344 Storch Paar Schnabelklappern*. [Sound Recording]. [Accessed 5 January 2020]. Available from:
https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:1344_Weiss_Storch_Paar_Schnabelklappern

Sound Recording 38: Stork (*Ciconia ciconia*) - bill-clattering, "schnabelklappern" III.

Filename: 'SR_38 *Ciconia_ciconia_V1829_08*'

TEMBROCK, G. 1991. *Ciconia_ciconia_V1829_08*. [Sound Recording]. [Accessed 5 January 2020]. Available from:

https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:Ciconia_ciconia_V_1829_8_1

Sound Recording 39: Greater spotted woodpecker (*D. major*) - beak drumming sounds.

Filename: 'SR_39 *Picoides_major_DIG0073_04*'

FROMMOLT, KH. 2006. *Picoides_major_DIG0073_04*. [Sound Recording]. [Accessed 5 January 2020]. Available from:

https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:Picoides_major_DIG_73_4_1

Sound Recording 40: Lesser spotted woodpecker (*Dendrocopos minor*) beak drumming.

Filename: 'SR_40 Lesser_Spotted_Woodpecker_(Dryobates minor)'

CROSS, R. 2019. [Sound Recording].

Sound Recording 41: Thrush nightingale (*Luscinia luscinia*) - song I.

Filename: 'SR_41 *1308_Sprosser_Gesang*'

FISCHER, S. [no date]. *1308_Sprosser_Gesang*. [Sound Recording]. [Accessed 5 January 2020]. Available from:

https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:1308_Sprosser_Gesang

Sound Recording 42: Thrush nightingale (*Luscinia luscinia*) - song II.

Filename: 'SR_42 *2500_Luscinia_luscinia_song*'

FROMMOLT, KH. [no date]. *2500_Luscinia_luscinia_song*. [Sound Recording]. [Accessed 5 January 2020]. Available from:

https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:2500_Luscinia_luscinia_song

Sound Recording 43: Cory's Shearwater (*Calonectris borealis*) calls.

File Name: 'SR_43 *Calonectris_borealis_Lue0051_01_short*'

LÜTGENS, H. 1985. *Calonectris_borealis_Lue0051_01_short*. [Sound Recording]. [Accessed 5 January 2020]. Available from: <https://www.tierstimmenarchiv.de/>

webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:Calonectris_borealis_Lue_51_1_0

Sound Recording 44: European Bittern (*Botaurus stellaris*) - calls I

File Name: 'SR_44 1655_Rohrdommel_Rufe_short'.
FROMMOLT, K-H. [no date]. *1655_Rohrdommel_Rufe_short*. [Accessed 5 January 2020]. Available from: https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:1655_Rohrdommel_Rufe

Sound Recording 45: European Bittern (*Botaurus stellaris*) - calls II.

File Name: 'SR_45 1028_Rohrdommel_Rufreihe_short'.
TEMBROCK, G. [no date]. *1028_Rohrdommel_Rufreihe_short*. [Sound Recording]. [Accessed 5 January 2020]. Available from: https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:1028_Rohrdommel_Rufreihe

Sound Recording 46: Western Yellow Wagtail (*Motacilla flava*) - chirping call.

File Name: 'SR_46 Motacilla_flava_DIG0116_04_short'.
FROMMOLT, K-H. 2010. *Motacilla_flava_DIG0116_04*. [Sound Recording]. [Accessed 5 January 2020]. Available from: https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:Motacilla_flava_DIG_116_4_1

Mammals

Sound Recording 47: Indian rhino (*Rhinoceros unicornis*) - male bellowing.

Filename: 'SR_47 *Rhinoceros unicornis*_S0335_01'
TEMBROCK, G. 1960. *Rhinoceros unicornis*_S0335_01. [Sound Recording]. [Accessed 5 January 2020]. Available from: https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:Rhinoceros_unicornis_S_335_1_1

Sound Recording 48: Juvenile Indian rhino (*Rhinoceros unicornis*) – short grunts.

Filename: 'SR_48 0612_Indisches_Panzernashorn_Jungtier'
TEMBROCK, G. [no date]. *0612_Indisches_Panzernashorn_Jungtier*. [Sound Recording]. [Accessed 5 January 2020]. Available from:

https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:0612_Indisches_Panzernashorn_Jungtier

Sound Recording 49: Highland Bull (*Bos taurus f. taurus*) - bellowing, "mugitus".

Filename: 'SR_49_1182_Schottisches_Hochlandrind_Bulle_Rufe'
TEMBROCK, G. [no date]. *1182_Schottisches_Hochlandrind_Bulle_Rufe*. [Sound Recording]. [Accessed 5 January 2020]. Available from:
https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:1182_Schottisches_Hochlandrind_Bulle_Rufe

Sound Recording 50: Brown Hyena (*H. brunnea*) - defense call, low guttural sounds.

Filename: 'SR_50_Hyaena_brunnea_S0560_02'
TEMBROCK, G. [no date]. *Hyaena_brunnea_S0560_02*. [Sound Recording]. [Accessed 5 January 2020]. Available from:
https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:Parahyaena_brunnea_S_560_2_1

Sound Recording 51: Brown Hyena (*Hyaena brunnea*) - calls in the distance.

MCCHESENEY, M. P. 1967. *Brown Hyena Hyaena brunnea ML126379*. [Sound Recording]. [Accessed 5 January 2020]. Available from:
<https://macaulaylibrary.org/asset/126379>

Sound Recording 52: Spotted Hyena (*Crocuta crocuta*) - calls in the distance.

MOYER, D. C. [no date]. *Spotted Hyena Crocuta crocuta ML37217*. [Sound Recording]. [Accessed 5 January 2020]. Available from:
<https://macaulaylibrary.org/asset/37217>

Sound Recording 53: Striped Hyena (*Hyaena hyaena*) - growling attack sounds.

Filename: 'SR_53_Hyaena_hyaena_S0348_01'
REPORTER, V. 1960. *Hyaena_hyaena_S0348_01*. [Sound Recording]. [Accessed 5 January 2020]. Available from:
https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:Hyaena_hyaena_S_348_1_0

Sound Recording 54: Northern Fur Seal, male (*Callorhinus ursinus*) - defense sounds.

Filename: 'SR_54_0059_Baerenrobbe_Drohlaut'

FROMMOLT, KH. [no date]. *0059_Baerenrobbe_Drohlaut*. [Sound Recording]. [Accessed 5 January 2020]. Available from: https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:0059_Baerenrobbe_Drohlaut

Sound Recording 55: South American Fur Seal (*A. australis*) - aggressive sounds.

Filename: 'SR_55 1357_Suedamerikanischer_Seebaer_agonistische_Laute'
TEMBROCK, G. [no date]. *1357_Suedamerikanischer_Seebaer_agonistische_Laute* [Sound Recording]. [Accessed 5 January 2020]. Available from: https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:1357_Suedamerikanischer_Seebaer_agonistische_Laute

Sound Recording 56: Bottlenose Dolphin (*Tursiops truncatus*) - whistles and clicks.

Filename: 'SR_56 Tursiops_truncatus_V2064_10'
TEMBROCK, G. 1998. *Tursiops_truncatus_V2064_10*. [Sound Recording]. [Accessed 5 January 2020]. Available from: https://www.tierstimmenarchiv.de/webinterface/contents/showdetails.php?edit=-1&unique_id=TSA:Tursiops_truncatus_V_2064_10_2

Sound Recording 57: Bottlenose Dolphin (*Tursiops truncatus*) - responding to 'sing'.

STEIN, R.C. 1963. *Bottlenose Dolphin Tursiops truncatus ML125036*. [Sound Recording]. [Accessed 5 January 2020]. Available from: <https://macaulaylibrary.org/asset/125036>

