INTRODUCTION

Writing in 1837, Edward Newman (1801–1876), the editor and printer of the *Entomological Magazine* (1832–1838), remarked upon the proliferation of natural history periodicals:

> The whole world of naturalists are now editors. Every one who can string ten lines together must announce himself as the editor, or the half-editor, or the third-part editor, or the quarter-editor, of some magazine, designed to teach the science of natural history. Our table, positively, groans with Transactions of Zoological, Natural History, Entomological, &c. Societies, with Naturalists, and Field-Naturalists, and Zoological Magazines, and Magazines of Zoology, and Natural History Magazines, and Magazines of Natural History, *et genus id omne* [and everything of that kind].[1]

This publishing phenomenon was the result of two factors. Firstly, nineteenth-century Britain saw a rapid expansion of the periodical marketplace, with a multiplicity of magazines dedicated to specific subjects ranging from gardening to stamp collecting, and addressing a variety of readerships distinguished by age, gender, and class. Secondly, the study of natural history, which has been broadly defined as the search for "systematic understanding of natural objects," was becoming increasingly popular as both a science and

a means of rational recreation, pursued by factory workers, the urban middle classes, country clergymen, and the landed gentry alike.[2] It is unsurprising, therefore, that this growing and avid audience of naturalists were provided with a variety of periodicals devoted to their specialist interests.

Edward Newman (fig. I.1) has been cited as a typical example of a "popular science" periodical editor.[3] After the *Entomological Magazine* was discontinued, he went on to establish and edit numerous other periodicals in various branches of natural history, most notably the long-running *Zoologist* (1843–1916), which survived him by forty years. These publications were characterized by Newman's strong belief that science was something in which anyone could participate, regardless of their social background or education. He stated in the introductory address of the *Zoologist* that "every one who subscribes a single fact is welcome—nay, more than that—has a direct claim to be admitted as a contributor."[4] Newman was not the first, nor the last, editor to actively invite readers to contribute their own notes, queries, and observations for publication, which provided him with a free source of content but also fostered a lively dialogue among devotees of natural history who would otherwise have been unaware of each other's existence. This policy of printing almost anything he received may seem at odds with our present-day expectations regarding a scientific journal, which has become the preserve of professional scientists, embodying their claim to authoritative knowledge. However, as recent scholarship has increasingly demonstrated, we must not take the apparent dichotomy between scientific practitioners and the nonscientific public for granted, but rather examine the contingent processes that have shaped this perception.[5]

The *Entomological Magazine* was the first of its kind in Britain, a periodical dedicated solely to the subject of collecting and studying insects. It was one of the earliest British periodicals devoted to a single branch of natural history, and the first relating to a distinct class of animals. The *Entomological Magazine* lasted for six years, but throughout the nineteenth century other periodicals would take its place: the *Entomologist* (1840–1842 and 1864–1973), the *Entomologist's Weekly Intelligencer* (1856–1861), the *Weekly Entomologist* (1862–1863), the *Entomologist's Monthly Magazine* (1864–), and the *Entomologist's Record and Journal of Variation* (1890–). The similarity in titles is misleading (not to say confusing), as it implies a widely accepted definition of *entomology* and agreement as to who was an entomologist. However, the editors of each periodical imagined their readership in dif-

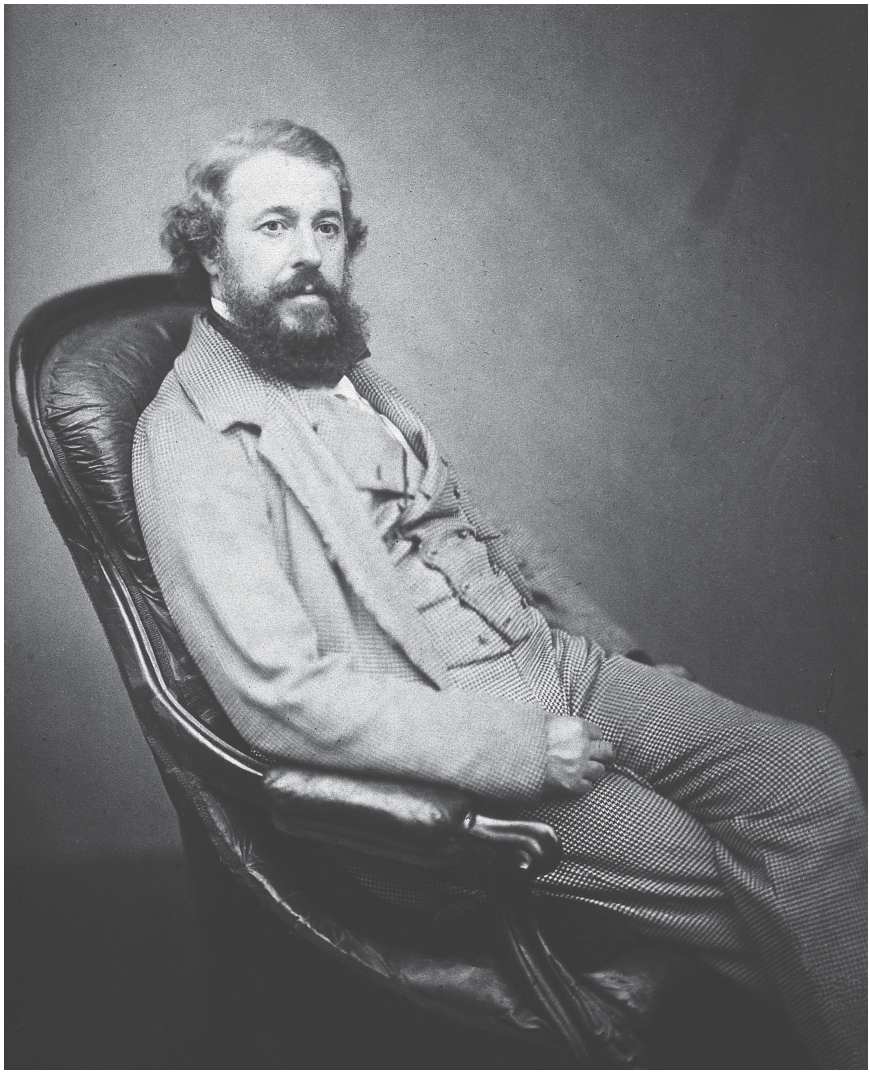

Figure I.1. Edward Newman (date unknown). Photograph by Maull & Polyblank. Wellcome Collection. Attribution 4.0 International (CC BY 4.0).

ferent ways, and consciously sought to shape communities through their publications according to their own values. Likewise, the entomologists who read these periodicals were diverse individuals, with differing backgrounds and expectations. At a time when there was no such thing as a professional entomologist, and no formal qualifications in the subject, an entomologist

could be a Sheffield factory worker who collected butterflies in his spare time, or an independently wealthy gentleman of science. Both could contribute to the same periodical, and therefore participate in a form of scientific community, but their motivations for doing so may have differed as much as their respective incomes.

This book is about the imagined communities of readers, contributors, and editors of entomology periodicals during the nineteenth century. These communities were imagined because the vast majority of these individuals never met or directly communicated in any way, but nevertheless identified themselves as part of a group who shared interests in collecting and describing insects. The term *imagined community*, first proposed by Benedict Anderson in his influential work on the origins of nationalism, is now frequently applied to all forms of community in which the constituent individuals are not personally known to each other.[6] In this book I contend that periodicals were a key medium through which different and competing conceptions of scientific communities were articulated and given form. Fundamentally, I address the question of who was included and excluded from participation in science and key debates regarding the meanings and history of "popular science," which was an emergent and contested concept in nineteenth-century Britain. Closely related to this development were the efforts of certain scientific practitioners to establish their authority as experts at a time when "scientist" was not a recognized profession, nor even a word in common usage. Unlike other public forms of science communication that were common in the nineteenth century, such as the lecture or the society meeting, periodicals are not restricted to a specific locality or social setting. The periodical was not necessarily a more open and democratic medium, but it nevertheless provided new ways in which the publics and practitioners of science were considered in relation to one another.

This focus on entomology in Britain raises questions, of course, as to the extent to which such a model of analysis can be applied more widely to different branches of science or other national contexts. A comprehensive survey of all natural history periodicals of this period is beyond the scope of this book, and Britain was not representative of all trends in the rest of Europe or North America. However, through a detailed study of particular periodicals and individuals, all deserving greater historical attention in their own right, I explore how scientific communities are renegotiated as developments in communications technology change the criteria through

which claims to knowledge are made and assessed.[7] The rich archival materials that form the basis of this study—relating specifically to the *Entomologist's Weekly Intelligencer* and *Entomologist's Monthly Magazine*—are a rare survival. There are few comparable "behind the scenes" sources for nineteenth-century periodicals on any subject, and they are unrivaled by any science periodicals other than the records of the Royal Society's *Philosophical Transactions*. These archives therefore give us a view into the experience of historical actors engaged in the both the practices of science and the debates surrounding it.

Periodicals, Publics, and Popular Science

Historians and literary scholars are still grappling with the sprawling growth of the British periodical marketplace during the nineteenth century.[8] As technological advances allowed the increasingly rapid, low-cost production of print on an unprecedented scale during this period, serial publications became a part of everyday life.[9] The multiplicity of titles, genres, and readerships defies a unified approach, but this very fragmentation is what makes periodicals such a rich field of study. Science was ubiquitous in the nineteenth-century press, and by no means confined to specialist journals. The reading public engaged with scientific subjects through a wide variety of periodicals, including the literary *Cornhill Magazine*, the satirical *Punch*, and children's publications such as the *Boy's Own Paper*.[10] Until recently, the periodicals dedicated specifically to science have not received the same degree of sustained attention as have their more generalized counterparts.[11] Aside from the groundbreaking research published by Susan Sheets-Pyenson in the 1980s, to which this book owes a great debt, very little attention has been paid specifically to "popular" natural history periodicals.[12]

It has now become a historiographical commonplace that scientific knowledge is not simply produced by elite practitioners and disseminated to a wider public, and it is needless to subject this "diffusion" model to further critique. In this book I build on the growing body of scholarship engaged in reformulating our understanding of popular science in Britain during the nineteenth century, bringing to light the rich and varied social topography of scientific practice and participation in this period.[13] Furthermore, we no longer consider the audiences of science to be passive, but recognize the act of communication as inherent to the construction of knowledge.[14] Consequently, *popular science* itself has been called into question as a useful category

of historical analysis, as it obscures the shifting meanings of this term across different periods and contexts. As I aim in this book to reconstruct divergent conceptions of science participation in the nineteenth century, I employ the term *popular science* only as an actor's category, paying close attention to the specific connotations implied by its usage.[15]

Alternatives to the term *popular science* have been suggested. *Commercial science* is appropriate in certain contexts, but implies that all such transactions were motivated by profit, which does not adequately account for the many complex motives of those who sought to popularize science in this period.[16] Establishing a natural history periodical in nineteenth-century Britain was often a far more efficient way to lose money than to make it, yet Newman and many others devoted much of their lives and finances to supporting publications that were rarely remunerative. *Low science* is another alternative, first suggested by Sheets-Pyenson in her pioneering work on science periodicals of the kind edited by Newman. In seeking contributions from readers regardless of social status or scientific credentials, "low science" periodicals were characterized by the attempt to "establish their own canons of scientific investigation, criticism, and explanation."[17] More recent scholarship has perpetuated Sheets-Pyenson's usage, and *low science* (sometimes used interchangeably with other terms such as *ethnoscience* or *vernacular science*) is employed to indicate "an expectation of being involved in the creation of new knowledge."[18] While Sheets-Pyenson's work remains highly valuable, the hierarchic distinction implied by such loaded terms as *high* and *low* are problematic and in need of revision. It may appear simple to draw a distinction between the "high" science of the metropolitan learned societies and the "low" science of working-class naturalists, but closer analysis of natural history periodicals demonstrates that there were no such stable boundaries between these two worlds.

The vital role of the periodical press in shaping emergent conceptions of scientific expertise—against which "popular" forms of science are generally juxtaposed—has been elucidated by Thomas Broman and Alex Csiszar. The former proposed that the eighteenth-century Enlightenment ideal of critical judgment exercised through public opinion remained a persistent influence through the nineteenth and twentieth centuries. As science increasingly became the preserve of specialized communities, the expertise claimed by these practitioners nevertheless depended on the principle of public consensus. Furthermore, Broman argues that the periodical press was crucial

in bringing about and articulating this sense of a universal, enlightened public.[19] Broman's work draws specifically on the context of Germany in the eighteenth century, and Csiszar has developed this hypothesis further with regards to nineteenth-century Britain and France, demonstrating how and why the scientific journal came to be the primary medium through which claims to knowledge are legitimized. In these two countries, learned societies that claimed to embody scientific authority responded to the perceived threat of a rapidly expanding commercial periodical press. In order to maintain their elite status, these intuitions sought to compete in the print marketplace, producing journals and instigating methods for assessing claims to knowledge, asserting priority, and establishing intellectual property rights.[20] The modern, peer-reviewed scientific journal therefore emerged in response to a particular set of political and economic exigencies, with the aim of securing the favorable judgment of an imagined, critical public.

Csiszar's analysis is wide-ranging, and provides an excellent framework through which to understand the changing role of formats and genres in the judgment and validation of scientific expertise. However, with regards to natural history periodicals, at least in nineteenth-century Britain, there is considerable room for further examination. Natural history, in its broadest sense, is a science based on highly localized and seasonal observations. Even as elite practitioners sought to legitimize their claims to knowledge, they equally relied on a wider community of observers and collectors to supply the raw facts and specimens that formed the basis of their research. The fruitful interactions between aristocratic or gentlemanly naturalists and their socially less fortunate counterparts has a rich tradition in natural history, but the expansion of cheap print from the early nineteenth century onward resulted in the emergence of natural history as a form of popular science.[21] Throughout this period and beyond, the claim that natural history was a science to which anyone could contribute remained particularly persistent, even as its various branches, including entomology, became increasingly specialized. Periodicals offered a means through which this involvement could be enabled, but also posed problems of authority and control. In the 1820s through the 1860s, the publics of natural history were emergent, and every periodical was in some sense an experiment in how scientific communities could be imagined.

As Csiszar has argued that in uncovering the "surprising social diversity of those who engaged in scientific inquiry," we must not "neglect the processes through which their marginalization came to appear natural to later

observers."[22] In other words, it is not inherently remarkable that a Sheffield cutler or Manchester cotton weaver took an active part in the production of scientific knowledge, but it is highly significant that it was subsequently taken for granted that such individuals were excluded from participation in science. As Anne Secord has demonstrated, this erasure began in the nineteenth century, the result of a dominant middle-class ideology that either denigrated working-class claims to knowledge or lauded individual artisan practitioners as heroic and exceptional.[23] Therefore, in this book I adopt an approach that uncovers the lives and experiences of those otherwise neglected in accounts of this period, but also examines how expertise was often constructed at the their expense.

The proliferation of "citizen science" projects in the last decade, facilitated by rapid developments in communications technology, has given rise to a recent interest among scholars in the historical precedents of scientific participation among "the public."[24] The internet and near-ubiquity of personal computers and smartphones in most Western societies has allowed scientists to gather and process vast datasets via willing volunteers who require no specialist expertise, training, or equipment. These "citizen scientists," variously termed the "lay public" or "amateurs," are contrasted directly with the professional, expert scientists who analyze the results of such projects, draw conclusions, and publish the work in scientific journals. This apparent divide between scientists and the public is largely taken for granted, but the distinction is of relatively recent provenance. The nineteenth century gave us the word *scientist*, and although the terminology did not become widely accepted until early in the twentieth century, it was in this period that the widely perceived separation between scientific practitioners and the public began to coalesce.

Amateurs and Professionals

As Lynn Nyhart has discussed, natural history has a "bifurcated" image that is largely the result of nineteenth-century developments. On the one hand, natural history denotes the attempt to exhaustively catalogue and classify organisms, primarily through the study of dead specimens (or more recently DNA sequences). Conversely, it embraces the study of living animals and plants in their habitats, recording behavior and interactions, or simply enjoying nature as a spectacle. The former has come to be closely associated with specialist and professional practice, while the latter is largely seen as a

more popular mode pursued by enthusiastic amateurs. With particular reference to nineteenth-century Germany, Nyhart argues that this latter form of public-oriented natural history, focused on living organisms, emerged from institutions such as the zoo and natural history museums, parallel to the growth of hobbyist natural history pursuits, including aquarium keeping and birdwatching.[25] I would argue that in Britain, at least, the process of differentiation between specialist and popular forms of natural history was largely determined by changes in the economics of print, particularly the proliferation of serial publication from the 1830s onward. Furthermore, this distinction was complicated by the continued interaction between scientific and recreational naturalists throughout this period and beyond.

As periodicals engaged new audiences with natural history, elite practitioners increasingly considered it necessary to distinguish their practices from those of the wider public. Systematic classification was therefore elevated to the status of specialist science, while anecdotal observation and collecting for its own sake were relegated to the rank of hobby (*rational recreation* would be a term more suited to the first half of the nineteenth century). A similar process occurred in all branches of natural history, but was particularly pronounced in entomology. However, the production of scientific knowledge in natural history has always relied on complex networks of individuals with widely differing motives and agendas. The *Entomologist's Weekly Intelligencer* was read and contributed to by both systematic entomologists and those who collected butterflies for purely aesthetic reasons, yet both benefited from the interaction. Likewise, a citizen scientist can enjoy counting moths in their garden, but nevertheless make a valuable contribution to records of biodiversity that address urgent questions of climate change and ecological collapse. Despite the supposedly clear boundaries between professional and amateur practice—science and recreation—they remain deeply entangled.

The elision between specialism, expertise, and professionalism in science during this period is another generalization that must be addressed. The 1860s are considered a pivotal decade in the development of scientific periodicals, with new formats and genres emerging that both reflected and shaped how scientific communities were imagined.[26] For example, the journal *Nature* was established in 1869; it was originally intended to circulate scientific news among a wide readership but instead became a medium through which researchers communicated with each other and a place in which these practitioners debated what science is and what it meant to be a scientist.[27] Closely

related to these developments in publishing was the increasing ubiquity of science in everyday life and the professionalization of scientific work, with popular science serving new purposes. Sheets-Pyenson has suggested that the open, "participatory ideal" of science that characterized the periodicals edited by Newman gave way to a more exclusive conception of the scientific community in which the republic of active participants was reconfigured as passive supporters of a new generation of professionals.[28] However, the subsequent work of historians has demonstrated that professionalization was by no means a linear process, and natural history in particular retains a strong amateur tradition to the present.

The second half of the nineteenth century saw increased professionalization within the life sciences, and an attendant growth in institutions, standardization, and specialism. In the case of entomology, for example, economic and imperial imperatives led to the emergence of salaried experts whose role was to conduct research and advise upon insects injurious to agriculture and human health.[29] However, it is important not to consider professionalization as a teleological process, or a master narrative though which we understand the period. It does not necessarily follow that all entomologists (or those in any other branch of the sciences) aspired to professional standing. Instead, professionalization is best approached as one among a number of strategies adopted by practitioners in the pursuit of scientific status.[30] Thomas Henry Huxley and his fellow members of the X Club are often invoked as the primary driving force behind science professionalization in Britain as they sought to establish science as a viable career and imbue it with cultural authority, leading to the marginalization of "amateurs" in the practice of science. This narrative has now been thoroughly critiqued, with Ruth Barton instead advocating for closer attention to the "intertwined themes of hierarchy, class, and social status and to the interaction between scientific expertise and social status."[31] Numerous examples demonstrate the complex relationship between emergent professionals and their peers. John Lubbock (1834–1913)—a banker, politician, and entomologist (in that order)—was an "amateur" member of the X Club, suggesting that his lack of professional qualifications was less important than his gentlemanly status and commitment to the group's shared aims. Furthermore, Joseph Dalton Hooker (1817–1911), a man who held a professional scientific post as director of the Royal Botanic Gardens in Kew, was at pains to present himself as a "philosophical" botanist rather than a salary-dependent worker.[32] Clearly

the identities we now ascribe to the amateur-professional divide were fluid in this period, and require more careful interpretation. Furthermore, the above examples are drawn from a small, albeit highly influential number of metropolitan practitioners, and in this book I deal with those who operated outside of this select coterie.

Another narrative, often perceived as concomitant with the professionalization of the life sciences, is the rise of biology as a discipline distinct from the older mode of natural history. Just as systematic naturalists sought to differentiate themselves from mere collectors, in the late nineteenth century they would find themselves denigrated by a new generation of biologists, who dismissed their neat rows of dried and pinned specimens and instead focused on laboratory work and experimentation. Biology become closely associated with professional science, with natural history dismissed as "stamp collecting." This strict dichotomy is, of course, an oversimplification. Although a comprehensive history of the "biological perspective" in Britain is beyond the scope of this book, the *Entomologist's Record and Journal of Variation* provides further evidence to suggest that biology was by no means the strict preserve of professionals, nor were its practices distinct from those of amateur natural history. In the twenty-first century, field-based ecological research draws on many of the same practices of observing, classifying, and recording that formed the basis of nineteenth-century natural history, to the extent that periodicals such as the *Entomologist's Weekly Intelligencer* are now mined for historical biodiversity data. If the perceived gap between scientists and the public is to be bridged, it is worth understanding how the idea of such a distinction was constructed.

In discussing professionalization, it is necessary to briefly discuss terminology. Any study of popular participation in science during this period must contend with the vexed issue of how to define the varied persons who engaged in such activity, both individually and collectively. The word *scientist* would be an anachronism in almost all cases, and although its usage grew toward the end of the period, it remained a much-contested term well into the twentieth century.[33] A more appropriate alternative employed by many historians is *man of science*, denoting those who dedicated much of their lives to science without holding a salaried position.[34] However, this leaves a great deal unaccounted for. The obvious gendering of such a phrase precludes the women who actively participated in science during this period. Even among the men who formed the majority of the communities examined in this book,

there is enough variety to defy easy categorization. They included clerks, civil servants, clergymen, doctors, handloom weavers, cutlers, and plumbers. All pursued natural history in the leisure hours outside of their working lives.

The range of personal circumstances represented by these individuals makes any collective descriptor problematic, as considerable differences in social class alone point to a gulf in experience between (for example) a rural parish vicar and an urban factory worker. Indiscriminately labeling these individuals as amateurs is misleading, as the term only came into more common usage from the 1860s onward, when the increase of paid positions in science made such a distinction necessary. As discussed above, the difference was not necessarily considered to be significant as a marker of scientific credentials. Furthermore, the meaning ascribed to the word *amateur* varied between different contexts and historical moments across the period, taking on the pejorative connotation that is often implied by its current usage.[35] Even if we assume that *amateur* simply denotes a nonprofessional, which accounts for the vast majority of scientific practitioners during the nineteenth century, this definition encompasses a spectrum ranging from beginners to expert researchers, thereby rendering it practically meaningless. Charles Darwin himself, the most well-known of nineteenth-century naturalists, could be classed as an amateur in that he never held a salaried position, and yet his independent wealth allowed him to pursue extensive research and become embedded in a scientific community that centered on the clubbability of metropolitan learned societies. The second half of the nineteenth century may have seen a decline in such "gentleman amateurs," but the continued existence and influence of these individuals well into the twentieth century, particularly in entomology, cannot be denied. The example of the banker-zoologist Walter Rothschild (1868–1937) amply demonstrates that wealth and patronage remained a significant factor in natural history.[36]

In order to understand how amateur and professional identities emerged and subsequently came to be taken as self-evident categories, greater sensitivity is required. In the interests of clarity, I propose the word *practitioner* as a comprehensive and less value-laden term that can be usefully applied to all the individuals under discussion. It is not an actor's category (or at least not commonly so), and although replacing one anachronism with another may seem counterproductive, the strategic use of ahistorical terminology can nevertheless be a useful analytical tool.[37] Not least, it provides a helpful shorthand without sacrificing clarity. Modern usage of *practitioner* tends

to be associated with professionals, particularly in medicine or law, but it is not intended to carry such an implication here.[38] For the purposes of this book, the definition is taken simply to mean someone who was engaged in the practices of natural history. It thereby places the emphasis on what these individuals had in common, while also allowing for a more nuanced account of their differences.

Practicing Natural History

In examining the long history of natural history, historians have paid increasing attention to the material practices of science, producing many detailed studies of the skills and techniques employed in a variety of contexts.[39] In this book I follow Jim Endersby's definition of *practice* as "the action of doing something," with the added stipulation that "this work or doing must involve tangible, material objects."[40] In the nineteenth century, the terms *natural history* and *entomology* encompassed a broad spectrum of activities and individuals with varying goals and motivations, including dedicated men and women of science who carried out painstaking studies of living organisms, but also those who took pleasure in collecting and observing the natural world as a hobby. Despite these differences in motivation, naturalists nevertheless had key practices in common. For example, acquiring a collection of insect specimens by capturing, killing, drying, and setting these creatures involved a set of practices common to nearly all entomologists of this period. However, for some, acquiring such specimens was an end in itself, while for others it was a means toward the endeavor of taxonomic classification. Individuals did not necessarily need to share the same goals in order to participate in a community. Focusing on practice is therefore key to determining how these communities formed, and who was included or excluded.

In this book I examine four key practices—observing, corresponding, collecting, and classifying—each forming the subject of a chapter. The chapters also proceed in chronological order, covering a period from the 1820s to the 1890s, providing a narrative account of natural history periodical publishing that spans the nineteenth century, with a particular focus on the field of entomology. A study of practices allows us to recover the experience of a far greater range of naturalists from this period, and also provides us with a way to analyze how scientific communities were constructed. Questions of practice were key to the fashioning of identities among those who engaged

in natural history. Whether someone was considered to be a member of a community or excluded from it largely depended on criteria relating to that individual's practice, and whether it conformed to the standards prescribed by that community. Through her work on the practices of artisan botanists in early nineteenth-century Lancashire, Secord has demonstrated the rich possibilities of such an analysis.[41] In this book I adopt a similar approach, looking beyond high-profile practitioners to reveal a wider range of sites and participants. The underpinning methodology and emphasis on practices should serve as a useful basis of comparison for case studies with a different disciplinary or regional scope. The practices of observing, corresponding, collecting, and classifying were shared by naturalists of all types, such as botanists and geologists. Indeed, many of the entomologists discussed in the following chapters were embedded in broader communities of natural history, and some of the issues debated among these practitioners were applicable regardless of whether their preferred subjects were butterflies, ferns, or fossils.

In chapter 1 I survey a period spanning the 1820s to the 1840s, which saw the first natural history periodicals established in Britain, and examine the different ways in which scientific communities were imagined by periodical editors. I follow Edward Newman from his first forays into print as a contributor to the *Magazine of Natural History* (1828–1840), his role in founding the *Entomological Magazine* and the Entomological Society of London, and conclude with the commencement of the *Zoologist* in 1843. In this period natural history became popular in both senses of the word. The study of natural objects was pursued by a growing number of people, as a means of recreation and as a science (the two motivations were certainly not mutually exclusive). Furthermore, the genre of popular natural history emerged within a rapidly expanding print market, a range of works that were both more affordable and written to engage with a wide audience, encouraging readers to develop their observational skills by looking at natural objects for themselves. John Claudius Loudon (1783–1843), editor of the *Magazine of Natural History*, invited the submission of even the most "trifling" observations, claiming that a single fact represented a valuable contribution to knowledge. However, this "popular" mode was increasingly juxtaposed with "scientific" natural history, particularly among metropolitan practitioners who sought to claim scientific authority at a time when the life sciences did not enjoy the same prestige as the physical sciences. In 1838 the *Annals of Natural History* (later

the *Annals and Magazine of Natural History*, 1841–1976) was a conscious attempt to publish a periodical that distanced itself from its popular rivals and thereby legitimize the expertise of its contributors. Nevertheless, the *Zoologist*, a "popular miscellany of natural history," indicates that the circulation of observations among a diverse community of practitioners was central to the project of natural history.

In chapter 2 I examine the *Entomologist's Weekly Intelligencer*, established in 1856 as the first weekly periodical dedicated to natural history (and specifically entomology). I use the personal archive of Henry Tibbats Stainton (1822–1892), the *Intelligencer*'s editor, revealing how readers and contributors engaged with the periodical through corresponding. In this chapter I demonstrate how Stainton consciously emulated the conventions of personal correspondence through the periodical in order to construct a scientific community of entomologists in which a wide range of practitioners could interact in mutually beneficial ways despite significant differences in social status, expertise, and motivations. I argue that the *Intelligencer* represented the application of nineteenth-century technologies to a far older, more established form of communication, which I describe as the "industrialization" of correspondence. I explore the implications of this innovation, particularly the greater potential for wider participation in natural history. Among Stainton's professed aims was to encourage the pursuit of entomology among the working classes, and the *Intelligencer* played a vital role in achieving this goal.

In chapter 3 I remain with the *Intelligencer*, but switch my attention to the practice of collecting. The very raison d'être of Stainton's periodical was to provide collectors with week-by-week updates regarding which species were emerging as the season progressed, and making them aware of what information needed to be circulated. It is perhaps the clearest example of a periodical being directly informed by a scientific practice, but also of the periodical altering the fieldwork practices of its readers. Furthermore, in this chapter I turn to the subject of specimen exchange, which was mediated through the periodical. Building upon the previous chapter, I contend that by permitting collectors to actively participate in the circulation of specimens, the *Intelligencer* enabled a more broadly construed scientific community to cohere. However, for the very same reason, anxiety and controversy regarding exactly who should be permitted to participate in the exchange of specimens demonstrate how the boundaries of this community were negotiated and enforced.

I begin chapter 4 with the end of the *Intelligencer* in 1861—in part due to the controversy described in chapter 3—and go on to deal with the attempts made to fill the void it left. Drawing further on Stainton's correspondence, I focus on his collaborative efforts to establish the *Entomologist's Monthly Magazine* in 1864. Taking Stainton's death in 1892 as an endpoint allows us to trace the considerable changes that took place within natural history and scientific publishing over these thirty years. As in chapter 3, I trace attitudes to a particular practice—classifying, in this case—in order to understand how entomologists constructed their identities. Disagreement over exactly who was a true entomologist and who was merely a collector often hinged on the practice of classifying, the predominant mode of "scientific" entomology during this period. I contend that the *Monthly Magazine* was a site for the construction of a more exclusive kind of scientific community, very different from that of the *Intelligencer*, and that classification was a means by which this elitism was maintained. A rival periodical, the *Entomologist*, edited by Newman, serves as an instructive comparison to Stainton's new publication. I conclude the chapter with the establishment of another periodical in 1890, the *Entomologist's Record and Journal of Variation*, which is representative of the biological turn entomology took in the closing decade of the nineteenth century. However, continuities between the practices of the nascent discipline and the older form of natural history became apparent.

Over the course of this book I demonstrate the range of individuals who engaged in entomology during the nineteenth century, bringing to light their motives, attitudes, and their lived experience of practicing science in the field and at home. The boundaries of scientific communities in natural history were in a constant state of negotiation throughout the period, with periodicals playing a central role in this process. The necessity of enlisting diverse practitioners in the production of scientific knowledge was often in direct tension with the desire to claim authority and control, and periodicals served both to include and to exclude certain groups from active participation. Understanding how these communities were imagined and constructed provides a valuable insight into the complex and multivocal history of "popular" science participation and the hierarchies we have come to take for granted.