Introduction

MICHAEL R. CANFIELD

THOSE WHO STUDY NATURE are bound by a shared curiosity and common traditions. Whether tracking gorillas in the Congo or terns above the Arctic Circle, those who take to the field seek information on how organisms live and behave, how they interact, and how the world has been shaped by the forces of nature. This work is rich not only because of the immeasurable diversity of life, but also because of the human experience that inevitably arises with the study, adventure, and once-in-a-lifetime sightings that take place in the field. Along with these intellectual and aesthetic ties, field scientists share time-honored traditions of inquiry: careful observation, patient and arduous experimentation, and persistence in the face of monsoons, parasites, and insults from snakes and urticating plants. Field scientists also have a common set of tools that include binoculars and hand lenses, field guides, good footwear, and the most fundamental and simple of all field equipment: paper and pencil. These final implements are perhaps the most important, and are required for continuing the tradition of recording the science and narrative of the field in notebooks and journals. Authors in this book have varying opinions about the usefulness of modern record-keeping technologies in the field, but nearly all would agree that paper and pencil remain the standard because of their simplicity and reliability.

Meticulous record keeping is at the heart of good science, and this is especially true for field scientists and naturalists. However, the status of field record keeping has come into question in the recent age of technological proliferation, and the first principles of field recording are rarely

taught. Little guidance exists to help individuals develop this foundational skill, except perhaps for the ample and often accessible examples of notable nineteenth- and twentieth-century scientists. A brief search in almost any bookstore, new or used, will turn up the field records of the patron saint of field workers, Charles Darwin, published in *The Voyage of the* Beagle. This expansive field narrative has been reprinted under a variety of titles since it first appeared in 1839, though here I'll refer to it as the *Voyage*.[1] It can be daunting to hold up one's own records to Darwin's accounts, though to do so is an exercise that is both inspiring and misleading.

In the *Voyage*, Darwin provides an account, starting on October 8, 1835, in the Galápagos Islands, that describes his observations of the birds and reptiles of the archipelago, including the marine iguana, *Amblyrhynchus cristatus:*

> It is easy to drive these lizards down to any little point overhanging the sea, where they will sooner allow a person to catch hold of their tail than jump into the water. They do not seem to have any notion of biting; but when much frightened they squirt a drop of fluid from each nostril. One day I carried one to a deep pool left by the retiring tide, and threw it in several times as far as I was able. It invariably returned in a direct line to the spot where I stood . . . I several times caught this same lizard, by driving it down to a point, and though possessed of such perfect powers of diving and swimming, nothing would induce it to enter the water; and as often as I threw it in, it returned in the manner above described. Perhaps this singular piece of apparent stupidity may be accounted for by the circumstance, that this reptile has no enemy whatever on shore, whereas at sea it must often fall a prey to the numerous sharks.[2]

A close examination of this passage reveals the *Voyage* not as an example of notes, but rather a travel narrative Darwin honed and polished from the actual field notes he kept in his zoological notebooks and diary while aboard the HMS *Beagle*.[3] It is a relief that we should not necessarily expect our notebooks to read like a passage from the *Voyage*, with Darwin's artful, frank, and probing language. However, a view of the actual passage in his zoological notebooks that led to this description suggests that Darwin kept copious and detailed notes in the field that allowed him to produce such a complete and fulfilling narrative of his work:

> Yet it is remarkable, that when shuffling over the tidal rocks it is scarcely possible to drive them into the water. From this reason, it is easy to catch them by the tail, after driving them on a point.— They have no idea of biting, & only sometimes when frightened squirt a drop of fluid from each nostril.— Having seized a large one by the tail, I threw him it several times into a good distance into a deep pool left by the retiring tide.— Invariably the Lizard it returned to the in the same direction from which it was thrown to the spot I stood. Its motion was rapid, swimming at the bottom of the water & occasionally helping itself by its feet on the stones.— As soon as it was near the margin, it either tried to conceal itself in the seaweed or entered some hole or crack. As soon as it thought the danger was over it crawled out on the dry stones, & again would sooner be caught than voluntarily enter the water.— What can be the reason of this? are its habitual enemies sharks or other marine animals?[4]

Undoubtedly, much can be learned about field notes and much else from studying Darwin. However, the process of fieldwork has drastically changed since Darwin boarded the *Beagle* in 1831.

When I went to the field as a graduate student, I spent many long nights chasing moths. The following mornings I worked to record my observations and experiments in notebooks. Like many others who study in the field, my work combined elements of both science and natural history. I had read Darwin's *Voyage* and seen fragments of Henry Walter Bates's journals, but when I considered the scratches and scribbles in my field notebooks, they seemed inadequate. Discouraged, I began looking for models to analyze as I worked to hone my ability to create useful and organized documentation of my fieldwork. These were surprisingly elusive. It was not until late on the night before an ant-collecting expedition, as I lay awake on a foldout couch in Roger Kitching's study, that I found a different model for how a modern naturalist and field scientist keeps his notes. In the shadow of his trophy collection of field guides, I perused the bank of field notebooks that he had invited me to consider that afternoon. I stayed up late into the night paging through the detailed notes of biological adventures and sketches of specimens that were contained in his field journals. As I finally drifted off to sleep in the muggy Australian evening, I realized that viewing the actual field notes

Anthy: Rhynchus

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of another scientist gave me new ideas about how I would construct my own.

We left for the bush early the next day—too soon, for I wished that I could return and again page through those vignettes, anecdotes, and sketches. This book is the result of my pursuit of other examples of field notes from working scientists and naturalists. Thirteen who represent diverse disciplines have contributed to this volume. These authors have been asked to provide excerpts from their field notes along with their perspectives on how field notes could or should be kept, problems and solutions they have encountered, and lore from the field. The following chapters provide examples and advice from eminent living field scientists and naturalists on how to keep field notes and on the possible ways to construct records across disciplines. This book is not a methods manual but rather offers a glimpse into the lives of some well-known naturalists and their diverse ways of recording nature. But before delving in, let's briefly consider the scope of the topic. So what are "field notes"? For that matter, what is "the field"?

Those who head to the field have their own understanding of its location and character. To some it evokes somewhere remote, to others it is close to home. This usage of "the field" first appears in a letter written to Gilbert White in response to his publication of one of the most important books in natural history, *The Natural History and Antiquities of Selborne* (1789), which describes the nature of his home parish in southern England.[5] Despite its eighteenth-century beginning, "the field" only came into common usage toward the end of the nineteenth century after such scientists as Darwin, Henry Walter Bates, and Alfred Russel Wallace took to the field to collect specimens and understand the principles of nature. The scope of field science widened at the beginning of the twentieth century, and so solidified the field as a place for study away from home or lab. Since this place mixes scientific pursuits with exposure to new terrain, languages, and peoples, and has an inseparable aspect of adventure, a narrative of the field has also emerged. The

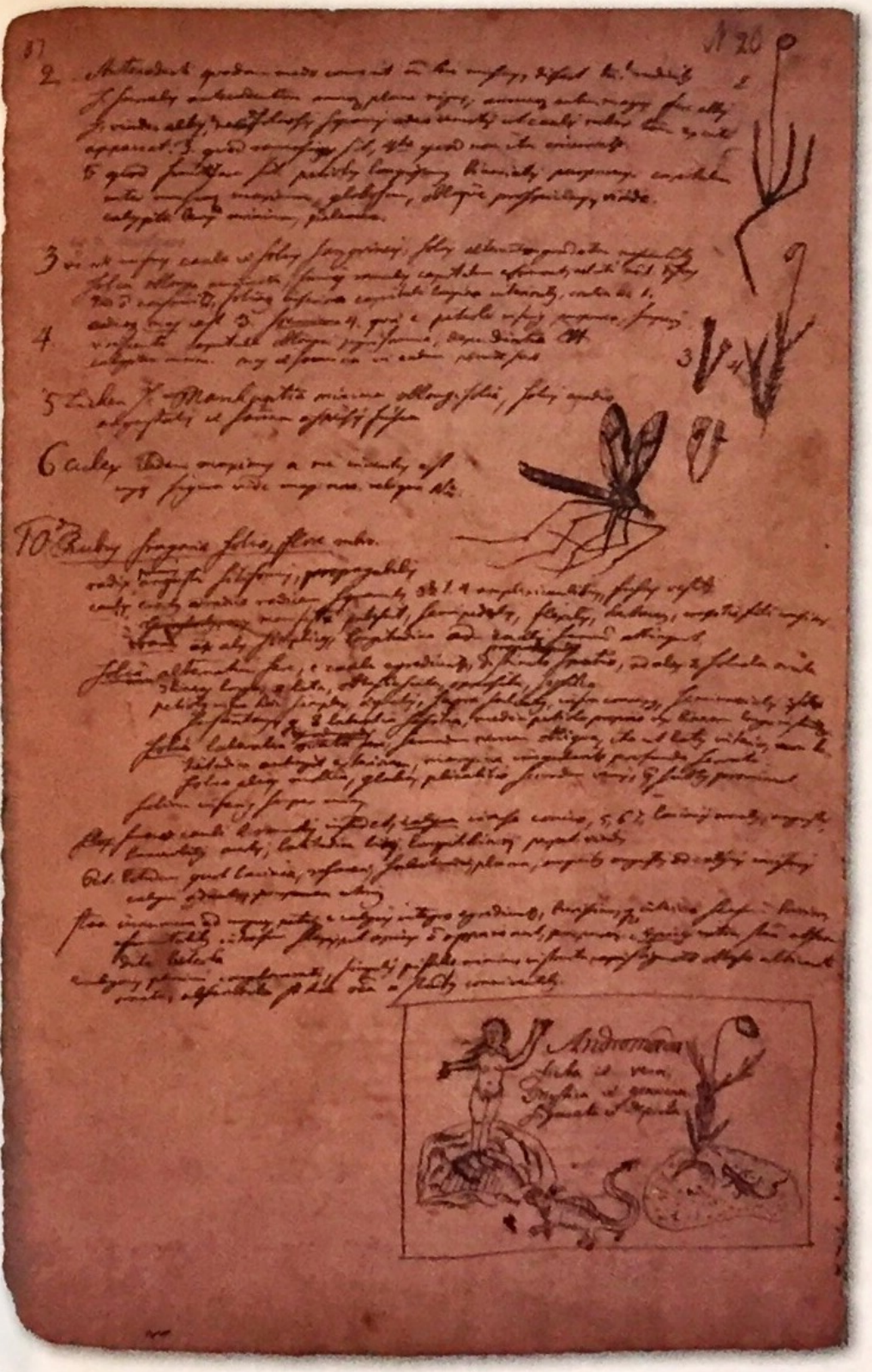
(*opposite*) **Excerpt from Charles Darwin's zoological notebook concerning the behavior of the marine iguana (*Amblyrhynchus cristatus*) in the Galápagos Islands. The last passage, continued on the following notebook page, reads: "What can be the reason of this? are its habitual enemies sharks or other marine animals?"** Reproduced by the kind permission of the Syndics of the Cambridge University Library, manuscript DAR.31.2.

field has no geographical or physical bounds, but is defined by those who go there to investigate, study, or commune with nature. To a young naturalist, the field may come to life with unbounded imagination in an undeveloped lot. Others may find the field after long hours in a dug-out canoe, dangerous river crossings, or battles with tropical diseases. Given the diversity of people and concepts of the field, there is no rigid formula for documenting the discoveries and adventures that happen there. However, a genre of record keeping—field notes—exists as a critical component of the study and experience of the field.

The emergent tradition of field notes is evident in the nascent stages of natural science. The history of field notes has not been written, nor will it be written here. However, the notes of some historical naturalists are available either as published accounts or as online archives, and these documents reveal something of the antecedents of modern field notes. For example, Carl Linnaeus, in addition to devising the classification system that we now use to describe all living things, kept a careful journal on his field excursions to Lapland and other parts of Sweden. The copious notes and sketches contained in Linnaeus's Lapland journal show his attention to detail and dedication to creating thorough records while in the field.[6]

Linnaeus himself only spent part of his time in the field and relied on the findings of the early naturalist-explorers who combed the globe for collections and new insights on nature. One of the earliest and most colorful of these was certainly the pirate-naturalist William Dampier. At the end of the seventeenth century, Dampier traveled with a pirate band that ransacked villages and plundered unlucky merchant ships.[7] In his free time, he observed birds and animals, kept detailed meteorological records, and eventually circumnavigated the globe a record three times. While his compatriots spent their evenings sharpening sabers and drinking rum, Dampier wrote copious field notes that he eventually published in *A New Voyage Round the World* and several other texts. Dampier recounts his dedication to his records while in Central America in 1681:

> Foreseeing a necessity of wading through Rivers frequently in our Land-march, I took care before I left the Ship to provide my self a large Joint of Bambo, which I stopt at both ends, closing it with Wax, so as to keep out any Water. In this I preserved my Journal and other Writings from being wet, tho' I was often forced to swim.[8]



A page of Linnaeus's Lapland journal entries from June, 1732, concerning his observations of mosses, a lichen, a fly; also, detailed descriptions of several plants and a sketch of Andromeda (facsimile in *Iter Lapponicum: Lappländska resan 1732. Vol. III*). Used by permission from the Linnean Society of London.

Dampier's original journals have since been lost, but his example should cause contemporary naturalists to pause before grumbling about any environmental trials that prevent good record keeping. The notes Dampier took, and the publications that resulted, were important for both the meteorological data they contained and for their natural history. Indeed, Darwin makes frequent references to "old Dampier" in his notebooks and *Voyage*.[9]

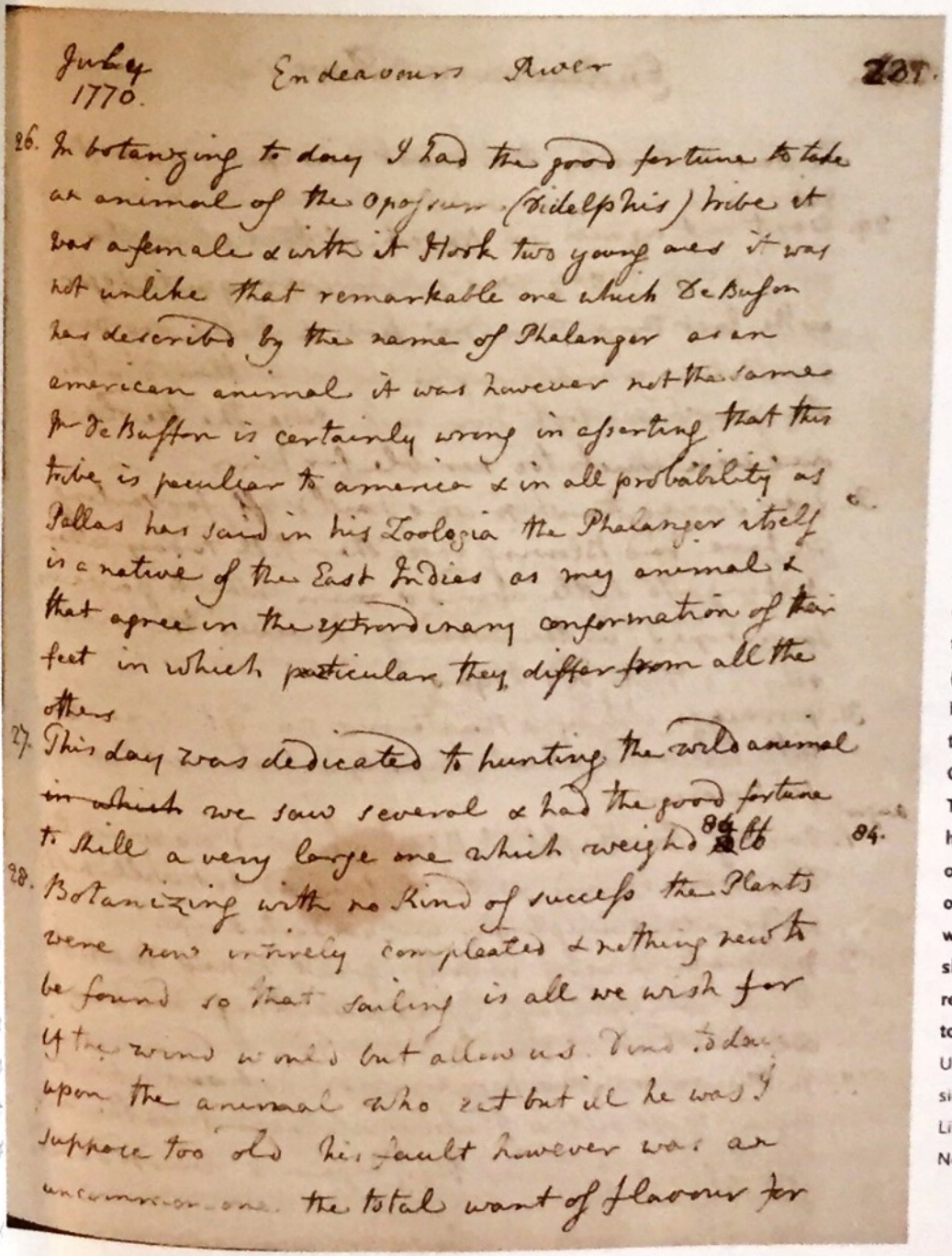
The work of Dampier was also carefully noted by Captain James Cook, who led one of the most important early expeditions from 1768–1771 aboard the HMS *Endeavour*. The naturalist Joseph Banks was recruited to document the natural findings during that journey, which he did in his own careful field notes as well as with the help of several artists. On July 26, 1770, Banks recounts:

> In botanizing to day I had the good fortune to take an animal of the Opossum (*Didelphis*) tribe: it was a female and with it I took two young ones. It was not unlike that remarkable one which De Bufon has decribd by the name of Phalanger as an American animal; it was however not the same for De Buffon is certainly wrong in asserting that this tribe is peculiar to America; and in all probability, as Pallas has said in his *Zoologia*, the Phalanger itself is a native of the East Indies, as my animal and that agree in the extrordinary conformation of their feet in which particular they differ from all the others.[10]

Other eminent nineteenth-century scientists kept careful field notes, and many such as Richard Spruce, Alfred Russel Wallace, and Henry Walter Bates published accounts of their journals.[11] *Field Notes on Science & Nature* picks up the tradition of field recording in the twentieth century, when field workers benefited from new access to remote locations and an array of increasingly quantified approaches. Elements of the tradition of naturalists' journals are still relevant to those who study in the field, and new approaches necessitate a reevaluation of how information should be captured while away from home or lab. Even as field notes themselves have a rich history, so too do the ways in which field note methodologies have been communicated.

Ever since the concept of the field became rooted at the time of Gilbert White, there have been attempts to communicate note-taking methodology. One of the earliest was Daines Barrington's *The Naturalist's Journal*.[12]

Initially published in 1767, Barrington's notebook lays out a template spreadsheet of daily weather conditions and observations on plants and animals to be filled in by the owner. Even White adopted this system after Barrington sent him a copy of his *Journal*, and he used it consistently until his death.



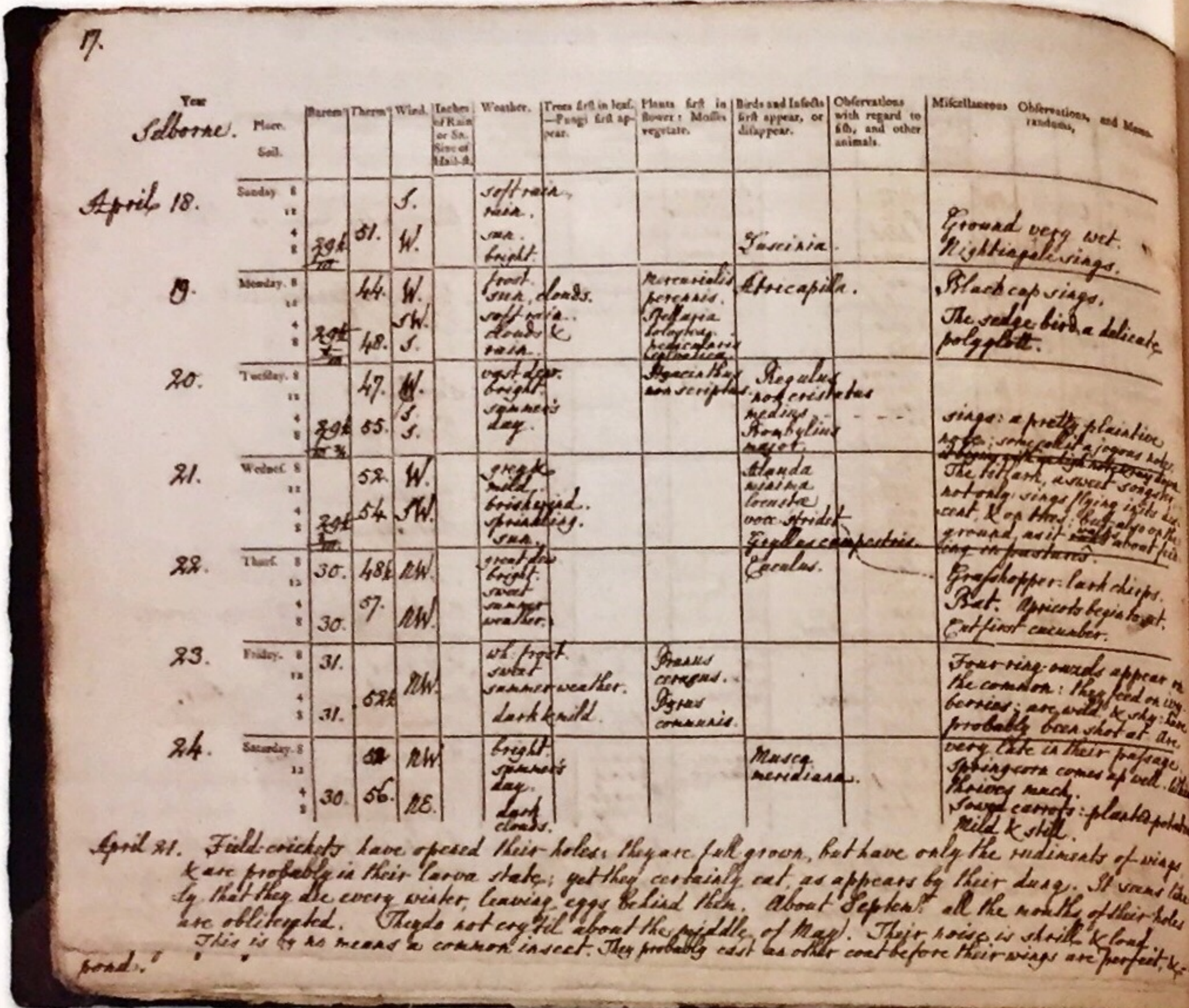
July 1770. Endeavours River 207.

26. In botanizing to day I had the good fortune to take an animal of the Opossum (Didelphis) tribe it was a female & with it took two young ones it was not unlike that remarkable one which De Buffon has described by the name of Phalanger as an american animal it was however not the same M^r De Buffon is certainly wrong in asserting that this tribe is peculiar to america & in all probability as Pallas has said in his Zoologia the Phalanger itself is a native of the East Indies as my animal & that agree in the extraordinary conformation of their feet in which particular they differ from all the others

27. This day was dedicated to hunting the wild animal in which we saw several & had the good fortune to kill a very large one which weighed 84 lb 84.

28. Botanizing with no kind of success the Plants were now intirely compleated & nothing new to be found so that sailing is all we wish for if the wind would but allow us. Dined to day upon the animal who eat but ill he was I suppose too old his fault however was an uncommon one. the total want of flavour for

Joseph Banks's notes from July 26, 1770, on what he called the Endeavours River (now known as the Endeavour River) in the northern part of Queensland, Australia. The HMS *Endeavour* had been damaged on a coral reef just outside the river six weeks before, and the ship and crew had remained in the inlet to make repairs. Used with permission from the Mitchell Library, State Library of New South Wales.



A page from Gilbert White's notes from April 18–22, 1773. White recorded his field notes in these standard-format journals that were published by Daines Barrington in 1767 as *The Naturalist's Journal* (the initial edition was anonymous). By permission of the British Library, manuscript Add.31846, f.161v.

Instructions for documentation were also given in letters. The third U.S. president Thomas Jefferson wrote to Captain Meriwether Lewis on June 20, 1803, with explicit instructions to notice all manner of plants, animals, and minerals on his westward journey, and suggested that "Your observations are to be taken with great pains & accuracy, to be entered distinctly & intelligibly for others as well as yourself" and "that one of these copies be on the paper of the birch, as less liable to injury from damp than common paper."[13] Even those field naturalists who stayed closer to home, such as Henry David Thoreau, kept careful field notes. In the 1850s, Thoreau received a circular from Louis Agassiz that described information he should record in his field notes on fish:

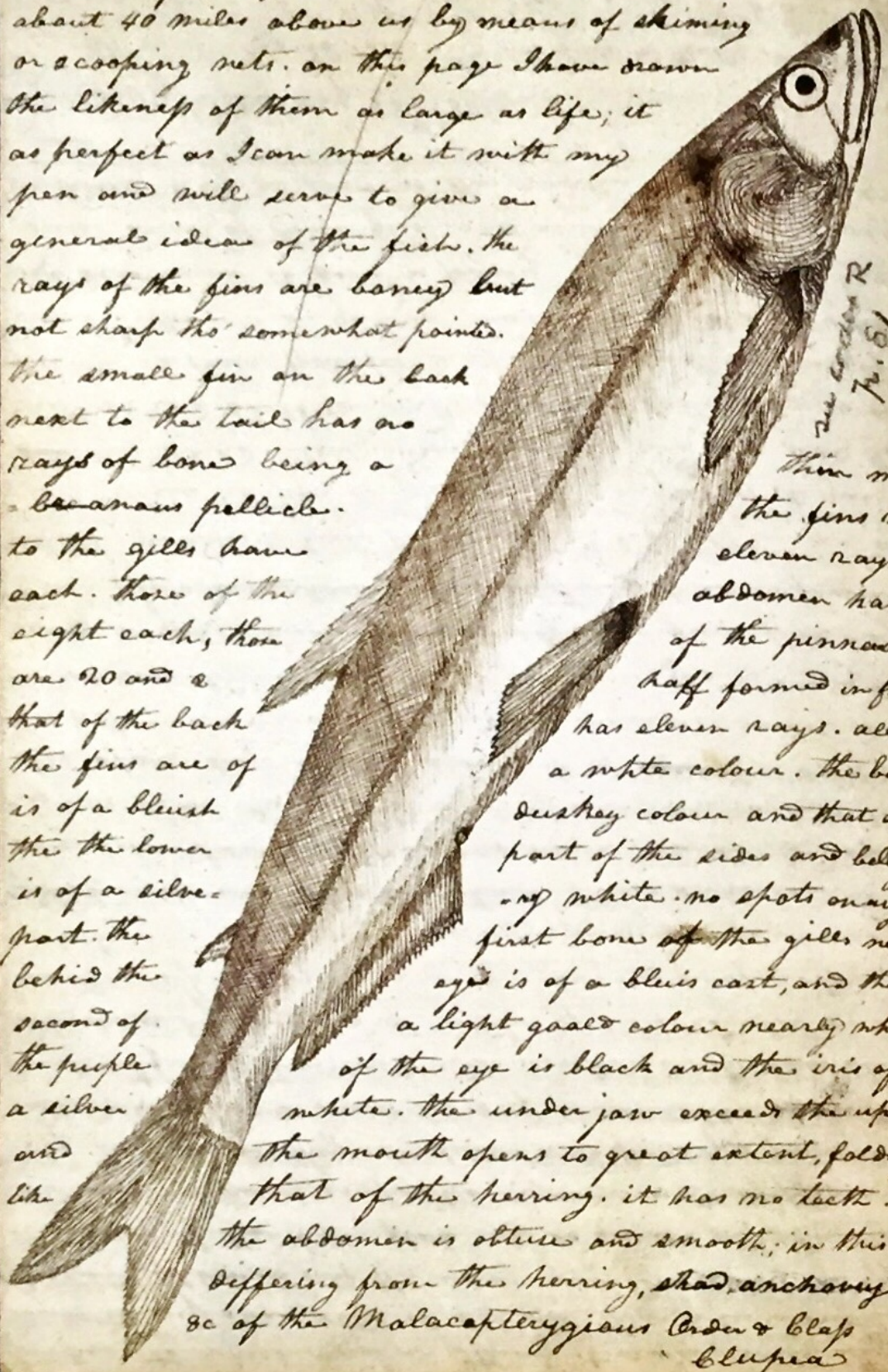
> A notice of the physical character of the localities where specimens have been collected would be a valuable addition to the collection itself. Respecting the land it should mention: the height above the level of the sea, if known, the nature of the soil, whether dry, moist or swampy, muddy, sandy or rocky, &c. Respecting the waters: the mean and extreme temperatures, if ascertained, whether clear or muddy, and of what color, deep or shallow, stagnant or current; of rivers especially, the rapidity of the current, and also whether subject to great rise or fall.[14]

Since Thoreau's time, other systems for documenting natural history observations have been published for birds, insects, and general natural history.[15] There is also a wealth of recent books on how to keep "nature journals," which generally include sketches and basic observations.[16] Some field guides even offer simple instructions on how to keep field notes. Even considering the materials available, a serious naturalist-scientist is still left to ponder how field notes can be recorded efficiently and effectively. The answer, clearly, is specific to the nature of the author and the need addressed, which is why this book offers twelve different opinions on these topics.

These myriad approaches to field recording balance certain common variables. Much can be learned from those who have worked to keep careful records, and even Darwin's notebooks reveal this tension between fact and theory, data and narrative. In many of Darwin's early notebooks, such as his zoology notes aboard the *Beagle*, his accounts are largely descriptive. He fills the pages with many observations and facts, and his questions on evolution emerge between the cracks (as his contemplation of the evolution of marine lizards quoted earlier illustrates). Later notebooks, such as his infamous Red Notebook, move from observations to theory.[17] This notebook was started at the end of his *Beagle* journey. In it he moves from documenting his field observations to considering the underlying principles on evolution that were fleshed out in his subsequent notebooks.

Notebooks of modern field scientists still balance this compositional tension, and the continuum of information contained in field notes, balanced differently depending on goals and discipline, can be divided into several loose categories: diary, journal, data, and catalogs. Diary entries record information on mundane daily occurrences, such as meals,

of small fish which now begin to run and are taken in great quantities in the Columbia R about 40 miles above us by means of skiming or scooping nets. on the page I have drawn the likeness of them as large as life, it as perfect as I can make it with my pen and will serve to give a general idea of the fish. the rays of the fins are bony but not sharp tho somewhat pointed. the small fin on the back next to the tail has no rays of bone being a membranous pellicle. to the gills have each. those of the eight each, those are 20 and 8 that of the back the fins are of is of a bleish the the lower is of a silver part. the behid the second of the purple a silver and like



Columbia R. 7. 61

three men. the fins rest eleven rays abdomen have of the pinnacular half formed in front has eleven rays. all a white colour. the back dusky colour and that of part of the sides and belly white. no spots on any first bone of the gills next eye is of a bleis cast, and the a light gold colour nearly white of the eye is black and the iris of white. the under jaw exceeds the upper the mouth opens to great extent, folding that of the herring. it has no teeth. the abdomen is obtuse and smooth; in this differing from the herring, shad, anchovy &c of the Malacapterygious Order & Class Clupea

expenses, and meetings with others; journal accounts include weather conditions, daily movements and geographic locations, and basic observations of plants and animals. Data entries encompass substantial behavioral observations, factual records, and experimental results; and catalogs record things collected and observed. Although their boundaries are porous, such categories are useful when examining how field notes vary. In some disciplines such as systematic collecting, cataloging information on species and collections may be primary and other ecological information deemphasized. In more empirical undertakings such as ecological studies, the balance of content may shift to elements of experimental design and data, with these composing the majority of the notes. In paleontological notes, records of particular facts and locations of objects can be essential. Certainly, the authors in this volume consider the ways that field notes are cohesive documents composed of facts, theory, data, and narrative.

Across disciplines, a related balance is struck in how information in notes is organized. Some pursuits accommodate a free-form approach in which ideas range widely, whereas others require consistency and standardization. Some types of information find their home in bound journals while others rely on uniform field cards and data sheets. Recording diverse types of data is possible in our technological era, but determining the best method of doing so still requires thought and a long view of one's goals. One persistent tension in organizing field observations is that some of these categories are inherently chronological and some are not. Diary and journal information fits a daily protocol, but data and experiments may be collected intermittently over large periods of time and may not be relevant to the diary entries of those same days. Darwin kept small field notebooks and a diary along with dedicated zoological and geological notebooks. The authors in this book provide a range of different methods—from systems with a free-flowing journal to those with dedicated diaries, journals, and catalogs. Many keep a small pocket notebook in which they jot small notes during the day that are then transcribed more fully, as Darwin did, into formal journals.

(*opposite*) **Meriwether Lewis's journal notes of the Eulachon fish (*Thaleichthys pacificus*), made on February 24, 1806, while Lewis was near Fort Clatsop, Oregon.** Used by permission of the American Philosophical Society.

Modern field scientists may pursue a variety of organizational solutions for integrating the information collected in the field, from the paper and pencil method that arose from the followers of Joseph Grinnell to relational databases.

As field workers address these issues of content and organization, they must also consider the ultimate value of these notes in relation to their objectives. Since human memory is transitory and things that are not written down may slip away quickly, field documentation is critical. However, there is clearly an opportunity cost to taking field notes. Every minute spent taking notes is a minute that could be invested in something else. Experiments, specimen preparation, and sleep often take priority over making notes, and since one cannot possibly record everything, an appropriate level of investment in notes can be essential for the success of fieldwork. Certainly, some eminent field scientists have been successful without keeping integrated notes at all. Regardless, deciding how much energy to put into field notes requires determining what information is worth recording.

The value of taking field notes lies both in the actual information that is recorded as well as in what is gained in the process of recording itself. Darwin's collection lists that accompany his zoological notes still have scientific value in that they describe exactly what he collected and where. His records of observations provided information he later required to write his *Voyage*. Field notes provide written records both for the scientist and for future generations. Careful records on experimental design and theory can be scoured to reveal possible mistakes or missteps, or for protocols that allowed for important discoveries. Location data provide specific information on how to find organisms centuries in the future. It is impossible to predict the future relevance of any one page of notes. Yet it is clear that meticulous and organized records form the foundations of field science, and, like laboratory notebooks for our indoor relatives, are the most basic tool for studying the science of nature. Although the content of field notes has incredible value, the act of recording field notes has benefits that are less apparent and often underestimated. Darwin's field notes, for instance, proved indispensable for the information they contained, but did they also force him to reconsider previously formed ideas?

Charles L. Hogue — COLLECTING NOTES — No. CLH 1649

Locality 2 mi. S. Little Rock Dam (M) San Gabriel Mts. Coords. 118°1'-34°27'
District CALIFORNIA Sub. Los Angeles County Country U.S.A.
Date 15 May 1965 Time 1 PM Elevation 3800'
Collected by C.L. Hogue Method net

SITE

TERRESTRIAL Visiting flowers of Salix sp growing by small, sluggish stream

Weather almost clear, hot day (third in a series of three following mild storms)
Temperature 85 deg. F Humidity 16 rel. % Barometric pressure 29.6 rise ✓ fall
Clouds sparse, high Wind intmt. breezes force 0-10 mph direction S-SSE
Terrain gravelly, boulder strewn wash slope level direction

AQUATIC Small ground pool in a shallow depression beneath edge of a large Baccharis shrub (P)

Size oval, 6' x 2' Flow none - stagnant
Salinity none (by taste) Other solutes not determined
Temperature 73 deg. F Color clear Surface light bacterial scum
Bottom algae covered granite rocks Shade partial
Vegetation abundant & thick masses of Spirogyra; sparse grass near edge

ANIMAL HOST Wood rat
Species Neotoma fuscipes macrotis det. C.L. Hogue
Age adult Size 388-191-39-32 Sex ♂
Situs base of tail Preserved: yes ✓ no Museum LACM no. 28621

OTHER

GENERAL ENVIRONMENT

Artificial
Natural Shadscale Scrub (Munz & Keck)

COLLECTIONS

No.	Identification	Remarks
A	Autographa californica	2 - centiped, laid 60 eggs (over)
B	blue Megachilid bee	exhibited peculiar feeding behavior *
C	large tachinid	
D	Andrena sp.	
E	Culiseta incidens	2 blooded ♀♀; both confined, #1 laid 30 eggs, #2 " 40

✓ * See supplemental sheets for additional notes. ✓ (P) Photographs ✓ (M) Maps

FIG. 1.—Field-note form, front. Hypothetical examples are inserted for all categories under "Site." Under actual conditions, only 1 category would be completed for each collection.

An example of a standardized field-note form for insects presented by Charles Hogue in his paper, "A field-note form for general insect collecting" (Hogue, 1966). Used by permission.

Taking time to write out an idea or observation forces us to pause and consider. Recording the daily unfolding of experiments—their success or failure—encourages an honest assessment of how each day's work fits within the underlying goals and theory of the project. It takes time to create a narrative of experiments, events, and observations, but it eventually pays dividends because it forces thorough examination, which is a common characteristic of science across disciplines. In Darwin's description of the marine iguana, for example, we can imagine him on board the *Beagle*, penning his zoological notes and pondering the origin of their "apparent stupidity."

In contrast to these seemingly timeless dilemmas about the value of records, other challenges have presented themselves with the rise of technological solutions for collecting information in the field. The use of many kinds of digital media have made keeping field notes both easier and more complex. Computer sensors, handheld devices, and digital cameras and microphones can all capture huge quantities of information in seconds, but these volumes of unstructured information are not cohesive field notes, though they may provide a false sense of completeness. Such data are not naturally integrated, and are often scattered among multiple devices, each requiring specific technology to access. The raw information lacks both a narrative and a record of how and where information was recorded. Providing this record is the role of field notes. When deciding how to record work in the field, consider this: Are there documents that explain what, how, and where things happened that are accessible to an independent reader?

Certainly technology plays a role in keeping field notes. Many field workers find a way to transfer their notes to an editable format in a digital medium. Emerging technological applications include digital pens that record a duplicate virtual copy and digital journaling software.[18] Relational databases allow data and virtual notes to be electronically linked for quick and powerful access and searches. Whether our pens are digital or ballpoint, however, the goals of keeping field notes remain unchanged.

Authors in this book consider different technological approaches to field notes, and these varied perspectives raise questions about what may be gained or lost with the implementation of digital notes. What are the differences between an entry recorded in a word processor or a digi-

tal camera and one recorded as written text and sketches? What might a young naturalist who records notes in a blog or digital slideshow learn from seeing how an earlier generation took notes? Are there elements of science that are more thoroughly documented when recorded by hand? Regardless of how they are created, the tradition of creating field notes remains of critical value to scientists and natural historians.

The objectives of most field workers contain elements of both science and natural history, but in different measures depending on each field worker's research goals. The evolutionary biologist Naomi Pierce once recounted how Bert Hölldobler, the eminent sociobiologist, had encouraged her to not simply record observations but to focus on quantifying them. If we are coming to the field with the aim of investigating interactions empirically, it is incredibly valuable to record information systematically in data sheets and notes so that it can be subject to rigorous comparisons later on. In contrast, if we are approaching the field to make general observations or study a new fauna or flora, we may instead benefit from the open forum that a blank journal page provides. I don't intend to referee between various approaches or to determine the nature of "real" field notes. Instead, it is my hope that the perspectives offered in this book will provide choices and encourage consideration of other systems. Aspiring field scientists might do well to consider how recording diary information, in addition to keeping data sheets, might serve them when undertaking the rigorous accounting often required of scientific grants, or how a journal might provide a wide-angle forum for more general reflection on experiments and organisms, or even how it might have personal value later on when reflecting on their adventures in the field. Similarly, those who more closely follow the tradition of the historical naturalists might benefit from reflecting on how an increased emphasis on quantified observations might make their work more powerful.

Ultimately, this book allows anyone a chance to peer over the shoulders of outstanding field scientists and naturalists and into the pages of their journals. These specific examples are methods that can be adopted wholesale or tweaked to fit a multitude of agendas, and can also be used as starting points for anyone interested in the natural world. These authors raise both unique and universal issues that emerge across disciplines, though the individual quirks, eccentricities, and real-life adventures they record are part of what fit these documents into the broader

topic of doing science. Taken together, they emerge at the intersection of person and place to reveal how naturalists think and work in the field.

The tradition of field notes that grew into its own genre over the past three centuries is still relevant to anyone who studies nature. Although the diversification of field pursuits and the complexity of their studies have expanded the scope and methods for field documentation, the basic role and importance of field notes are unchanged. The examples, thoughts, and instruction provided in this book are only a first step in maintaining the valuable tradition of field notes, and are meant to encourage more rigorous and long-lasting documentation of our natural world.