tary character of Russian rule and contrasts this with the organization of the British government's India Office. Anybody interested in the comparison of colonial policies or in the history of development plans should refer to the original edition of Schuyler's work. Schuyler, a very perceptive individual, writes of the "too rapid introduction of Western institutions without adequate preparation" at a time when such ideas were not core considerations in plans for change.

This book has appeal for those interested in Central Asia, in Russian imperialistic policy, and in the very informative notes of an extraordinary and outstanding American diplomat who may be better known in this country for his book *American Diplomacy and the Furtherance of Commerce.*

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Life in Wytham Woods

The Pattern of Animal Communities. CHARLES S. ELTON. Methuen, London; Wiley, New York, 1966. 432 pp., illus. $14.

Charles S. Elton, of the Bureau of Animal Population at Oxford, has perhaps done more than any other person now living to bring recognition to the science of ecology. A substantial part of the generation that dominates the field today was introduced to the subject through his *Animal Ecology* (1927). It is noteworthy that he was able to make headway in advancing ecology in those years when other fields of biology, especially genetics, were the "in" subjects and natural history and taxonomy were old-fashioned. Consequently, when shortly after his retirement publication was announced of an imposing volume by him bearing the title *The Pattern of Animal Communities*, we naturally assumed that here was the *magnum opus*, the substance of all that Elton had learned in a long and exceptionally productive career characterized by exceptional insight. Unfortunately for those of us who would like to read such a *magnum opus* by Elton, this is not that kind of book.

Wytham Woods is an estate of 3400 acres very near to the city of Oxford and owned by Oxford University. This book is an account ("records a modest beginning") of an ecological survey and of miscellaneous pieces of ecological research begun there in 1942 and supported since 1951 by grants from the Nature Conservancy, a government agency to be envied by Americans, which has now adopted the procedures developed by Wytham Woods for its management of Natural Nature Reserves.

The Woods is surrounded by farmland which is bounded on three sides by the Thames River; it includes two wooded hills and a variety of diverse habitats including marshes, perennial springs, arable land, and meadows. Its soils are calcareous, and heath, moor, and bog habitats are absent; nevertheless, present tabulations suggest that the two square miles intensively surveyed to date harbor 15 to 20 percent of the total animal species occurring in the British Isles.

The history of the use of the land has been traced, more or less, back to medieval times, and it is known that, in the interest of promoting forest regeneration, part of the major study area was fenced against grazing mammals in the 16th century. It has not been virgin terrain for a millennium: parts have been grazed by cattle, parts cut for lumber and then used temporarily for agriculture; rocks have been quarried, and exotic species have invaded—most notably, perhaps, the sycamore tree, the European rabbit, and the American gray squirrel.

Into this long-disturbed area, which, as Elton realizes, must distress an American ecologist who can still obtain access to what has been called "quasi-virgin forest," have come numerous talented investigators, each analyzing a bit of the kaleidoscopic complexity. There is, I think, reason to believe that Americans appreciated Elton's special qualities before the British did, and Americans who went to England expressly to be associated with him are very much in evidence in this volume; indeed, it is dedicated to "Thomas Park whose laboratory experiments have thrown so much light on Nature."

This is an esoteric book but one that must be read by anyone contemplating an ecological survey. We may not want to classify habitats or punch cards in the same way, but the great variety of techniques that has been used at Wytham cannot fail to provide ideas to others.

From place names and colloquialisms, I judge that the book was not originally written for export. It did not enlighten me, for example, to learn that a survey was done "of a sand-dune complex running along the distal four miles of the remarkable narrow tongue of Spurn Penninsula, on the Yorkshire side of the Humber estuary." I didn't know what kinds of substrata were meant by "shingle" and "drifted sea-wrack," and I still don't know what a "marchair" is. The signal/noise level is lower here than in any previous Elton book I have read, and I was startled by teleological expressions such as a reference (p. 329) to insects "on their travels to find another corpse, to collect fuel or to go into hibernation for the following year's work." A quick check seems to confirm my memory that Elton's previous books were not written like this. The suspicion is that this was written for mature professionals who wouldn't be corrupted. In support of this view we note that a reader would be lost or overwhelmed if he had to stop to look up "staphylins," "composites," "psocids," and the like. But it is to be hoped that many amateur naturalists and conservationists will be persistent, because there is much for them diffused throughout this volume. Elton is a great generalist and never hesitates to draw on foreign literature as necessary to interpret local phenomena. His long-admired insight flashes brilliantly into view at times. Various ecologists have recognized that individual species of plants have special attributes, usually chemical defenses, which force the animals that exploit them to become specialists, but Elton derives this conclusion and documents it by a unique route; as the material is transformed from living vegetation to litter and finally soil, the faunas exploiting different species become progressively more similar. Any naturalist will be fascinated to learn what the European rabbit has been doing to English vegetation; the magnitude of its influence could not be fully appreciated until the myxomatosis pandemic of 1954. And here we have an intensive ecological survey spanning the period of transition!

As is usual with Elton's books, this one is replete with fascinating natural-history observations. One cannot find

here the modern quantitative approaches and mathematical theories of community composition and species diversity, but what one does find is a paradigm of the sort of study that will ultimately determine the survival or failure of new approaches.

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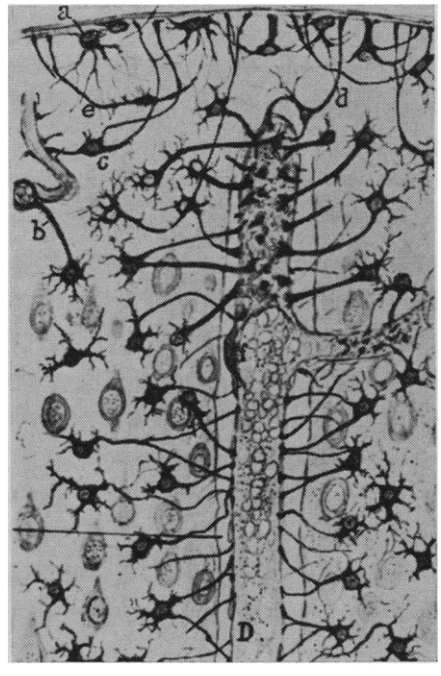
Cajal

Recollections of My Life. SANTIAGO RAMÓN Y CAJAL. Translated from the third Spanish edition (1923) by E. Horne Craigie and Juan Cano. M.I.T. Press, Cambridge, Mass., 1966. 650 pp., illus. $10. Reprinted from *Memoirs of the American Philosophical Society*, vol. 8, 1937.

Santiago Ramón y Cajal, born in 1852, spent his boyhood and youth in a small village in the foothills of the Pyrenees. The ruins of a glorious past contrasted sharply, it seems, with the rapidly changing world beyond the province of Huesca. In the first part of his autobiography Cajal recounts, with candor and the detached and lonely wisdom of an aging man, the escapades of the childhood and youth of a congenital rebel: protest against the single-minded, domineering father, boredom and conflicts with the teachers in school, boyish pranks and punishments, and constant scrapes with bullies, each defeat feeding his will to get the better of adversities. As would any youngster, Cajal identified himself with the literal rather than the metaphoric side of the character of Cervantes' Knight of La Mancha: "I took the figure of Don Quixote seriously and so felt keenly the damaged state in which the valiant knight emerged from nearly all his quarrels and adventures." After a stint as a cobbler's apprentice and another as a barber's assistant, Cajal, at age 16, took up the study of medicine at Saragossa.

The second part of the book is a record of Cajal's discoveries in the histology of the nervous system, of the reverses and grievances of "academic scrapes" for priorities, and of his major battle, and greatest victory, in proving, against a formidable array of authorities (Golgi, Bethe, Marchand, Monckeberg, O. Schultze) who held to the then prevalent theory of the protoplasmic continuity of the neuronal reticulum, that the neuron is a structural and functional unit. This part of the autobiography gives an interesting insight into the intellectual climate that prevailed in the academic world in Europe between the Franco-Prussian War of 1870 and the war of 1914–18, a period in which the political and economic center of gravity, and with it the center of scientific authority and prestige, was shifting from Latin to Germanic Europe. The technological revolution in scientific methods and instrumentation had its beginning in those decades. Cajal was not a technological inventor; he was, however, his own technician, and an unexcelled one. Cajal regarded himself as an artist, and if paternal intransigence and his own insatiable curiosity about nature had not deflected him, he would have become a painter. He defined his own cerebral constitution as "visual," in William James's term. In school he was a poor listener and exulted in visual demonstrations. In his work as a scientific observer, the images which he sought and found in a section of brain tissue under a microscope provided him with an esthetic pleasure. He went after this inchoate "constellation of the unknowns" with the obsession of an artist seeking a perfect image of visual reality. His scientific writings were meticulously yet often laboriously worded; he was most eloquent and explicit in the exquisite drawings with which he illustrated the text. His startling conclusions followed inexorably from what he saw. These conclusions were statements of a new empirical reality which contradicted the accepted notions—that is, theories—of reality. Such is the essence of true discovery.



One of Cajal's drawings, a sectional view of the molecular layer and the area of small pyramidal cells of the cerebrum of a cat. [Reproduced from the third Spanish edition of *Recuerdos de Mi Vida*, Madrid, 1923, by courtesy of the National Library of Medicine]

Cajal's first opportunity to present his discoveries to the scientific world came in 1889, on the occasion of the meeting of the German Anatomical Society in Berlin:

> Among those who showed most interest in my demonstration I should mention His, Schwalbe, Retzius, Waldeyer, and especially Kölliker. . . . these savants, then world celebrities, began their examination [of Cajal's preparations] with more skepticism than curiosity. . . . However, when there had been paraded before their eyes in a procession of irreproachable images of the utmost clearness, the axons of the granules of the cerebellum, the pericellular basket-endings, the mossy and climbing fibres, the bifurcations and ascending and descending branches of the sensory roots, the long and short collaterals of the columns of white matter, the terminations of the retinal fibres in the optic lobes, etc., the supercilious frowns disappeared. Finally the prejudice against the humble Spanish anatomist vanished and warm and sincere congratulations burst forth.

From the pages of this autobiography emerges the figure of a great man who embodied all the strengths and weaknesses of his race—uncompromising dedication and fanatical loyalty to an ideal, frugality and an indomitable courage to endure adversities, and, in the guise of humility, an immense personal pride. Cajal is almost unique as a great scientist, and his life as a scientist reveals the features of the dedicated conquistador, militant saint, and poetic adventurer in the unknown.

Usually aloof and chary of reference to his private life, Cajal allows an intimate and revealing paragraph when recalling a difficult period of his life in 1891, when his child was dying:

> Perchance in such distressing circumstances anguish was the sovereign sharpener of my wits. Continuously awake, exhausted with fatigue and distress, I developed the habit of drowning sorrows during small hours of the night in the light of the microscope, so as to lull my cruel tortures. And one bitterly fateful night, when the shadows were beginning to fall on an innocent being, there suddenly blazed forth on my mind the splendor of a new truth.

Portraits of Cajal as he appeared in later life remind one of the ascetic verticality of the saints and ecclesiastics in El Greco's paintings.

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