



## The Life of the Naturalist, Jean Henri Casimer Fabre, 1823-1915

— Meredith Fuller Luyten

*Peace the love of the process of our lives.*  
—Muriel Rukeyser

*In a word, all those vague, unconscious, rudimentary  
and almost nameless little lives which surround us on  
every side and which we contemplate with eyes that  
are amused, but already thinking of other things.....*

— Maurice Maeterlinck

There is a street in Cambridge, Massachusetts, named for the botanist who established a system of nomenclature for the natural sciences. Eight years ago, I was sitting in a library on one side of Linnaean Street, attempting to re-establish a writer's routine. On the other side of the street was an apartment where my first baby was being cared for. I was excited and anxious, unable to think wholly of the child or my work. Restive from conflicting stimulations, I turned to the stacks behind

me and pulled out a book with the interesting title, *The Life Of The Spider*. I glanced at the chapters. Chapter III, "The Narbonne Lycosa", began, "The Epeira, who displays such astonishing industry to give her eggs a dwelling-house of incomparable perfection, becomes, after that, careless of her family."

Thus I first met Jean Henri Fabre, the French entomologist whom Charles Darwin called "the incomparable observer." Who was this man who wrote so compellingly of the insect and of himself that I felt I had

studied by his side in the dusty fields of Provence? His style was anecdotal, discursive and his vivid descriptions of insects were often anthropomorphic. Biology flowed into philosophy without shame. Who was more attractive — the writer, the entomological teacher or the struggling paterfamilias? Fabre was a teller of stories. Instinctively, he wove the events of his life together with his scientific observations to form a cloth that was whole but distinct in detail. It did not occur to me at the time that this is a characteristic of all great naturalists.

Fabre was one of the first great behavioral scientists. Edwin Way Teale says of him, "He produced some of the basic studies of the nature of instinct. All students of insect behavior, of comparative psychology, of experimental biology are indebted to Fabre." His observations provided overwhelming evidence for the complex sequences of instinctive behavior in insects. His intuitive powers made him suspect biological mechanisms that could only be isolated a hundred years later by molecular biology. When I first heard of pheromone communication, in which chemicals secreted by an animal operate at great distances to stimulate a response in another animal, I remembered a passage from Fabre on the courtship of moths: "but what are we to say of the Great Peacock and the Banded Monk, making their way to the female..... they hasten from the ends of horizon. What do they perceive at that distance? Is it really an odor, as our physiology understands the word?..... It would be tantamount to reddening a lake with an atom of carmine, to filling immensity with nothing." This is an excellent analogy for the dispersion of potent pheromone molecules. Fabre's experiments convinced him that there was "an unknown sense" mechanism in operation, and he guessed accurately that the moths' antennae were the "scent" receptors.

Throughout his life, Fabre was interested in mechanisms of perception. How, he asked, do creatures know their worlds? "Inclined as we are — and it could not well be otherwise — to judge all things by our standard, the only one in any way known to us, we attribute to animals our own means of perception and do not dream that they might easily possess others..... Cannot certain properties of matter, which have no perceptible action upon us, find a receptive echo in animals, which are differently equipped?"

How do we as human beings know our world? Konrad Lorenz has made this observation about behavioral studies of animals, or the field of ethology: "*it is essential to conduct an extensive period of general observation, which must precede the performance of experiments.* He who maintains that he has no time for such observation, which is at first not directed at a particular goal, should leave animal

psychology well alone." The italics are Lorenz's own.

Like Lorenz, Fabre confessed that often his most important observations were fortuitous, his best experiments accidentally conceived. He called this experience his "method of ignorance", by which he meant that observations made without prior expectation or hypothesis are particularly trustworthy in behavioral studies. Long before the advent of ethology Fabre knew that only patient field observations of long duration can establish the normative relationships of animals within their ecosystem.

Descriptive observation is still essential in many sciences. But observation, more than experiment perhaps, is inherently subjective and impossible to duplicate. Although journals of behavioral science read as if method and terminology can remove the subjective element from observation this is only an unwieldy linguistic illusion. Fabre's writing offers another response to language. He leans into the subjective life of his mind, revealing his person. He would have agreed with Lorenz's statement that observations can only be evaluated when the observers know each other and know how and what each other tends to perceive. There are styles of perception which are mirrored in styles of communication. But how *can* observers know each other? How can personality and its style become a vehicle for accurate communication?

In a recent article in *Science* magazine, called, "Hubris in Science", Lewis Thomas describes a new response to the modern problem of sheer quantity of scientific research:

"So, communication has become a serious problem not only between the scientists and the public, but among the scientists themselves. How do the investigators cope with the problem? Not, I think, by relying on computerized library services, although increasingly clever systems for retrieving more or less current information have come into existence in recent years. Nor are the journals themselves used as extensively as they used to be as sources of new information.

"What is happening is that there is much more reliance on word of mouth for the transmission of scientific data than ever before in my memory..... There is a new system at work, which I do not understand. I have the impression that a great body of information is getting around by a mechanism that can only be termed gossip."

Thomas is talking about the telephone, but he is also talking about the rediscovery of person-to-person "gossip", and the odd reliability which dealing directly with the person of the investigator seems to have for us.

Were the discursive, autobiographical, anecdotal and anthropomorphic elements of Fabre's writing naive and outdated as techniques for scientific

writers of today? Could it be that, on the contrary, these are essential characteristics of his contribution to science? A look at Fabre's life and writing might provide an answer to these questions.

Beginning an autobiographical essay, Fabre said, "Since Darwin bestowed upon me the title of 'incomparable observer', the epithet has often come back to me, from this side and from that, without my yet understanding what particular merit I have shown. It seems to me so natural, so much within everybody's scope, so absorbing to interest one's self in everything that swarms around us! However, let us pass on and admit that the compliment is not unfounded.

"My hesitation ceases if it is a question of admitting my curiosity in matters that concern the insect.... yes, I confess that I am an enthusiastic observer of the animal. How was this characteristic propensity, at once the torment and delight of my life, developed?"

J. Henri Fabre was born on December 22, 1823, in the village of Saint-Léons in Provence. He remembered his parents as stern and harassed people, but not as unkind ones. They were so poor that they sent the young child, known as Henri, to live with his paternal grandparents, on their farm near Malaval. In Fabre's words, "They were people of the soil, whose quarrel with the alphabet was so great that they had never opened a book in their lives; and they kept a lean farm on the cold granite ridge of the Rouerge table-land. The house, standing alone among the heath and broom, with no neighbour for many a mile around and visited at intervals by wolves, was to them the hub of the universe..... In this wild solitude, the mossy fens, with their quagmires oozing with iridescent pools, supplied the cows, the principal source of wealth, with rich, wet grass. In summer, on the short swards of the slopes, the sheep were penned day and night, protected from beasts of prey by a fence of hurdles propped up with pitchforks.... In the centre was the shepherd's rolling hut, a straw cabin. Two watch-dogs, equipped with spiked collars, were answerable for the tranquillity if the thieving wolf appeared in the night from out the neighbouring woods.

"Padded with a perpetual layer of cow-dung, in which I sank to my knees, broken up with shimmering puddles of dark-brown liquid manure, the farm-yard also boasted a numerous population. Here the lambs skipped, the geese trumpeted, the fowls scratched the ground and the sow grunted with her swarm of little pigs hanging to her dugs."

This is the setting of Fabre's earliest memories. He identified with these grandparents, especially his grandmother, more than with his own parents. He remembered his grandmother's warmth, her abundant meals, good humor and her capable strength as a

farmer's wife. She was of a practical temperament, but, to the small intense domain of the farmyard, she added her gifts as a story-teller. Her stories were often of wolves, as heroic and fantastic as dragons. "I should very much have liked to see this wolf," Fabre wrote, "but the shepherd always refused to take me into his straw hut, in the middle of the fold, at night." Added to Fabre's sharp observations of real animals were the exploits of fantastic animals. His first books were to be an ABC bestiary and La Fontaine's *Fables*.

Often alone, the young Henri had time for reflection and observation. He soon learned that his curiosity about animals was met with amusement or impatience, because it went beyond the practical needs of his grandparents as farmers. Early in his childhood, natural history became a pleasure which Fabre's secrecy protected from ridicule. He had to put his questions directly to his animals. He began to search and experiment and he gives us this extraordinary account of one of his earliest memories — a test of perception:

"I was five or six years old.... I can see myself plainly, clad in a soiled frieze frock flapping against my bare heels; I remember the handkerchief hanging from my waist by a bit of string....

"There I stand one day, a pensive urchin, with my hands behind my back and my face turned to the sun. The dazzling splendour fascinates me. I am the Moth attracted by the light of the lamp. With what am I enjoying the glorious radiance: with my mouth or my eyes? That is the question put by my budding scientific curiosity.... I open my mouth wide and close my eyes: the glory disappears. I open my eyes and shut my mouth: the glory reappears. I repeat the performance, with the same result. The question's solved: I have learnt by deduction that I see the sun with my eyes. Oh, what a discovery! That evening I told the whole house all about it. Grandmother smiled fondly at my simplicity; the others laughed at it."

In childhood, Fabre's only teachers of natural history were other children. Inherited superstitions coupled or clashed with his private observations and stimulated his curiosity further. Children, not adults, valued gratuitous bits of information — such as methods for hypnotizing a goose, where to find bird eggs, or that the grasshopper's hind leg has a "pleasant shrumpy flavor."

When Fabre was eight years old, he was returned to his parents. To help the family income he was given the job of raising a flock of ducklings. He herded them down the stoney paths of the village, beyond the houses, to a pond where they could find food. Here he spent hours exploring the shores of the pond. He found gold-dust, diamonds and a tiny ram's horn turned to stone. Coming home with bulging pockets,

he was scolded for ruining his clothes and was told to throw his treasures away. Was it fortunate or regrettable that there was no one to tell him that what he really had found was mica, rock crystals and a fossilized snail, common to that area? As with most children, Fabre's fantasies only whetted his appetite for more experience of the actual world. This paradox would one day enrich his writings as a naturalist.

As an old man, Fabre remembered this pond of his childhood and a succession of ponds connecting a child's and a scientist's sense of wonder:

"I will return to the pond, but not that of the small ducks, a pond aflower with illusions. Those ponds do not occur twice in a lifetime. For luck like that, you must be in all the new glory of your first breeches and your first ideas.

"Many another have I come upon since that distant time, ponds very much richer and, moreover, explored with the ripened eye of experience. Enthusiastically I searched them with the net, stirred up their mud, ransacked their trailing weeds. None in my memories comes up to the first, magnified in its delights and mortifications by the marvellous perspective of the years.

"Nor would any of them suit my plans of today. Their world is too vast. I should lose myself in their immensities, where life swarms freely in the sun. Like the ocean, they are infinite in their fruitfulness..... What I want is a pond on an extremely reduced scale, sparingly stocked in my own fashion, an artificial pond standing permanently on my study table."

This is more than a prologue to experimentation. These ponds become a metaphor for changing perception. As the observer becomes more skilled, the world becomes more complex. The pond of this passage is the evolving human eye.

Until adolescence, when Fabre assumed responsibility for his own education, his formal schooling was haphazard. From the age of seven to ten, he studied in his godfather's village school, which was also his godfather's bedroom and kitchen. The room was warm only because a fire was maintained to cook the pigs' mash. Piglets and chickens wandered in and out. His godfather was benignly inattentive. Study was readily interrupted so that the doves could be cleaned or snails crushed by the children in the estate gardens. For Fabre's grandfather "managed the property of an absentee landowner..... He had under his care an old castle with four towers", and he also worked as the village barber, bell-ringer, choir-singer and the winder of the village clock. "This was his proudest function," Fabre writes. "Giving a glance at the sun, to ascertain the time more or less nearly, he would climb to the top of the steeple, open a huge cage of rafters and find himself in a maze of

wheels and springs whereof the secret was known to him alone." This picture suggests the medieval quality of Saint-Léons in Fabre's childhood, a town in which the small rounds of life were as self-contained and unquestioned as the inner workings of his grandfather's clock.

Fabre's family moved to the larger town of Rodez. His education here was erratic, interrupted by the financial needs of his family. Eventually he won a scholarship at the *École Normale Primaire* in Avignon. Fabre trained to become a teacher, concentrating on math and physics. He could foresee no post as a teacher of natural science, and he relegated his natural history books "to the bottom of a trunk." But during his adolescence Fabre gained confidence in his ability to teach himself and to learn by teaching others. When a chemistry lesson ended in a disastrous explosion, Fabre was stimulated to repeat the experiment correctly a year later. He remarked with good humor that teaching is, after all, only "the fulminate awakening the slumbering explosives."

Fabre acquired a teaching position in Corsica. Here at last he met two naturalists who could encourage his study of plants and insects. Moquin-Tandon especially encouraged Fabre to study the living animal, and he restored Fabre's ambition to pursue a career as a teacher of natural history.

In 1852 Fabre became a teacher at the lycée of Avignon. He meanwhile was laying his plans toward a university professorship, not knowing that he would hold this teaching position at the lycée for eighteen years. He prepared his thesis for "doctorat es sciences naturelles," which he defended in Paris. In 1854 he was galvanized by his discovery of the entomological work of Léon Dufour. Dufour was publishing behavioral observations of insects and Fabre realized that he himself was capable of making a contribution to Dufour's work on wasps. He began to publish his findings and in 1856 he received an award from the Institut de France for his work in experimental physiology. By now Fabre had a large family. He was never free from financial worry. Although he had attracted the attention of such famous men as Darwin and Pasteur, he was unable to accept a position on the faculty of Poitiers University simply because he lacked the necessary private income. This was a bitter lesson in the inequities of an educational system. How was he to work and still have the time for his entomological studies? For a while, he turned all his attention to gaining economic independence. After much work, he developed a cheap method for the production of madder dye, a dye which was very important to the textile industry of his region. He received an award from Napoleon III for this work, but then the development of artificial alizarin destroyed his dye's market.

In yet another area, success was to be followed by mishap and thwarted ambition. Fabre's gifts as a teacher had long been recognized by Victor Duruy, Napoleon's enlightened minister of education. During official tours of the provinces, Duruy had encouraged Fabre to enlarge his goals and offer his liberal ideas in education to the community of Avignon. In the 1860's, Fabre gave free public lectures in natural history at the old Abbey of Saint Martial, the abbey in which he had long ago witnessed the disastrous explosion of chemicals in a badly managed experiment. In the Abbey of Saint Martial, he at last had a forum for his ideas and, perhaps, a broader forum than a university professorship could have given him. His lectures provided an open university system, free to all. He was making education available to any age and economic background; he was providing secondary education for girls; he was giving natural history a central place in the curriculum of country school children. Fabre attracted large audiences and, in so doing, he also caused alarm in this provincial town. He made enemies, particularly among the clergy. In 1870, he lost his job at the lyc ee and at the same time he was evicted from his house, for which he held no lease. John Stuart Mill, who then resided in Avignon, gave Fabre generous financial help that enabled him to establish a new household in Orange.

Fabre seemed to have lost his teaching career, but instead he now began a new, more important stage of it. He turned to the writing of popular scientific books as a means of support. Some of these books, which Fabre made more acceptable to clerics through the inclusion of frequent pious sentiments, became texts for school children. Others were intended to provide adult education to farming communities, offering principles of household hygiene and practical information on animal husbandry and the life-cycles of pesty and helpful insects. Through this period of prodigious writing, Fabre gained the experience as a stylist which he brought to his later volumes of entomology. He continued his work in the fields with insects, but he felt increasingly harassed by his dependency on public byways and lands that were not his own. It became his ambition to acquire a piece of land where his experiments and observations would be undisturbed by passers-by.

In 1879 Fabre had enough royalties from his books to purchase a little less than three acres of land in S erignan, Provence. Poor, untilled land, suitable only for occasional grazing, such a piece was known as a *barmas*. On this *barmas* there was a house, a small pond, and dry, thistly fields abounding with insects.

Fabre reached his *barmas* in a state of exhaustion and grief. His promising son and working companion, Jules, had just died at the age of fifteen. Fabre himself had almost died in a bout with pneumonia.

He had four young children and an aged father to care for. Shortly after the move, his wife, Marie, died. Fierce pride had carried him through misfortunes and lonely struggles to this hard-bitten piece of land. He recognized his own life in the solitude of the *barmas*. In an impassioned essay of that title, he defended his life's choices and his purpose in taking refuge on this bit of land:

"Come here, one and all of you — you, the sting-bearers, and you, the wing-cased armour-clads — take up my defence and bear witness in my favour. Tell of the intimate terms on which I live with you, of the patience with which I observe you, of the care with which I record your actions. Your evidence is unanimous: yes, my pages, though they bristle not with hollow formulas nor learned smatterings, are the exact narrative of facts observed..... and whoso cares to question you in his turn will obtain the same replies.

"And, then, my dear insects, if you cannot convince those good people, because you do not carry the weight of tedium, I, in my turn, will say to them:

'You rip up the animal and I study it alive; you turn it into an object of horror and pity, whereas I cause it to be loved..... natural history, youth's glorious study, has, by dint of cellular improvements, become a hateful and repulsive thing. Well, if I write for men of learning, for philosophers, who, one day, will try to some extent to unravel the tough problem of instinct, I write also, I write above all things for the young.'

"When shall we have an entomological laboratory for the study not of the dead insect, steeped in alcohol, but of the living insect; a laboratory having for its object the instinct, the habits, the manner of living, the work, the struggles, the propagation of that little world, with which agriculture and philosophy have most seriously to reckon?..... While waiting for the fashion to change, I open my *barmas* laboratory of living entomology; and this laboratory shall not cost the ratepayers one farthing."

Though Fabre became known as "the hermit of S erignan", this picture of him must be balanced by recollections of Fabre's friends and passages of Fabre's own reminiscences which reveal a personality of considerable charm and warmth.

Fabre was a devoted father and husband. He married a second time and eventually had seven children. His desire to improve the quality of education for girls arose naturally from the equality with which he treated his children, most of whom were daughters. His collector's walks were also spirited family outings. His wife and children often shared his excitement or patience in making a new observation in the fields. Or late at night they would rush to his laboratory, summoned by his elation with a new discovery. One



biographer and friend said, "It was not with Fabre as with some intellectuals, whose thoughts and life remain almost strangers to the home which they establish one day as though in a moment of distraction, and who divide their lives into two parts."

Fabre made innumerable farmers and their wives, village urchins, servants and shopkeepers into enthusiastic as well as invaluable collectors of cocoons and insects for his laboratory. The pleasure which he found in his work was infectious and still is infectious to us today as we find it in his writing. On one occasion, Fabre invited his family and friends to join him in testing the edibility of the oak caterpillar. He had read in Pliny that these were considered by the Romans to be a delicacy. With characteristic wit, he set the experiment for a Shrove Tuesday meal, since Shrove Tuesday is a "reminiscence of the ancient Saturnalia" of the Romans. He gives us the following portrait of his guests:

"One of these is the schoolmaster. Since he permits it and does not fear the comments of the foolish, if by chance the secret of our feast should be divulged, we will call him by his name, Julian. A man of broad views and reared upon science, his mind is open to truth of every kind.

"The second, Marius Guigne, is a blind man who, a carpenter by profession, handles his plane and saw in the blackest darkness with the same sureness of hand as that of a skillful sighted person in broad daylight. He lost his sight in his youth, after he had known the joys of light and the wonders of colour. As a compensation for perpetual darkness he has acquired a gentle philosophy, always smiling; and ardent desire to fill, as far as possible, the gaps in his meagre primary education; a sensitiveness of hearing able to seize the subtle delicacies of music; and a fineness of touch most extraordinary in fingers calloused by the labours of the workshop. During our conversations, if he wishes to be informed as to this or that geometrical property, he holds out his widely-opened hand. This is our blackboard. With the tip of my forefinger, I trace on it the figure to be constructed; accompanying my light touches with a brief explanation. This is enough; the idea is grasped, and the saw, plane and lathe will translate it into reality.

"On Sunday afternoons, in winter especially, when three logs flaming on the hearth form a delicious contrast to the brutalities of the Mistral, they meet in my house. The three of us form the village Athenaeum, the Rural Institute, where we speak of everything....."

In this description of Marius, the blind carpenter, I am again struck by Fabre's interest in matters of perception. With people as well as with insects, as a teacher and as a behavioralist, he always asks himself how a being with endowments different from his own experiences the world. What common ground, he wonders, might we have? In recording his own investigations, he frequently uses imagery that evokes the world of the blind, a world of darkness in which he gropes and moves forward hesitantly; and a world in which each creature's domain is finally private:

"I sally forth in the night, with a lantern, to spy out the land. Around me, a circle of faint light enables me to recognize the broad masses fairly well, but leaves the fine details unperceived. At a few paces' distance, the modest illumination disperses, dies away. Farther off still, everything is pitch-dark. The lantern shows me — and but very indistinctly — just one of the innumerable pieces that compose the mosaic of the ground.....

"The domain of this Weevil is... a slender thistle, not devoid of elegance, harsh-looking though it be. Its heads, with their tough, yellow-varnished spokes, expand into a fleshy mass, a genuine heart, like an artichoke's, which is defended by a hedge of savage folioles broadly welded at the base. It is at the centre of this palatable heart that the larva is established, always singly.

"Each has its exclusive demesne, its inviolable ration....."

The vivid strength of such a passage evokes Fabre's own lifetime identification with the solitary struggles of common people, the strong weeds who "have no history," but whose individual efforts contain great drama nevertheless. Again and again, in the teeming instinctual world of insects, he creates vivid portraits of individual effort. And these portraits derive energy from and lend support to the struggles of his own life.

Between 1879 and 1910, the ten volumes of Fabre's *Souvenirs Entomologiques* were published. They did not attract great attention. Then in the last five years of his life Fabre was officially discovered. The French government and scientific institutions of France and other countries honored him with a jubilee in Sérignan, in 1910. He received Stockholm's Linnæan Medal and he was nominated for the Nobel Prize. But Fabre found this fame that came so late to be exhausting and ironic. When his eyesight was failing, he was deluged with expensive microscope and laboratory equipment which he had never had the benefit of before. Again he was to find himself surprised and bemused by differences of perception. Shortly before his death in 1915, he learned that a statue of himself was to be erected in his village.

He said to a friend, "I shall see myself, but shall I recognize myself? I've had so little time for looking at myself!"

A friend and biographer of Fabre gives this description of the aged naturalist, confined by old age to his chair and almost totally blind:

"To see him in the twilight of his diningroom where he silently finished his life, majestically leaning back in his arm-chair, with his best shirt and old-fashioned necktie, his eyes still bright in his emaciated face, his lips fine and still mobile, but thin with age and at moments trembling with emotion, or moved by a sudden inspiration — to see him thus, would you not say that he was still observing?"

Fabre may not have had much time for looking at himself, but in his writing he gave us his life as a vehicle with which we join him in observation of the world. He made his life into an epic journey, emblematic of the life journeys of all creatures. Maeterlinck called Fabre the Homer of insects, a poet of science. The opening lines of *The Odyssey* could serve as an invocation for Fabre's own epic, the *Souvenirs*. It might indeed be an invocation from all of Fabre's personable insects:

Sing in me, Muse, and through me tell the story  
of that man skilled in all ways of contending,  
the wanderer, harried for years on end.....

\* \* \* \* \*

If there is a persistent quality to be found in Fabre's work it is the quality of empathy. Empathy is much more of a discipline than that related emotion, sympathy. Empathy enables a person to identify with another life without confusion, without ceasing to respect the separateness of lives. It is a response very similar to generous love. If this sounds a bit far from the pragmatic routines of a student of animal behavior, consider the following words of Konrad Lorenz from his book, *Studies in Animal and Human Behavior*:

"Ethology is the *comparative* study of behavior.... [to become an expert in this field] it is necessary to become thoroughly familiar with a group of related animal species. Such familiarity is not easily achieved. In fact, it seems necessary to become emotionally involved to the point of 'falling in love' with such a group in the way many bird-lovers and.... other kinds of 'amateurs' do. Without this emotional motivation, no thorough knowledge of the comparable behavioral traits of any group of animals could ever be gained. Were it not for the unaccountable gloating pleasure some of us take in watching 'our' animals, not even a person endowed with the supernatural patience of a yogi could bring himself to stare at a fish, a bird or an ape with

the unremitting perseverance which is necessary in order to perceive the governing principles prevailing in the behavior of an animal."

Fabre was a great writer and naturalist because he had what one biographer called "the gift of correspondence." A truly great naturalist brings some aspect of nature into sharper focus *not by isolating it but by clarifying its relationships*, its place in nature. This is really an unromantic view of naturalists, because it makes their function that of go-betweens. Like a translator or a diplomat, a naturalist can reduce the barriers between intelligent systems of life that speak somewhat different languages.

Niko Tinbergen, in arguing for the eventual partnership of psychology and biology, wrote in 1951, "introspection brings us into contact with an aspect of behaviour that is out of reach of objective study. We know that both aspects belong to one reality, but somehow the scientist's mind is unable to synthesize them into one harmonious picture." Fabre's writing intuitively conveys this harmony. And in the 1970's we have more scientific evidence, which may simply mean more scientific willingness, with which to understand this harmony.

Lewis Thomas and Edwin Land are two scientists of different disciplines who recently have written about the partnership of inner and outer orders which forms human experience. As a medical researcher, Lewis Thomas provides us with a new paradigm for understanding disease. Disease has been understood as the invasion of an organism by another foreign organism. It might better be understood as a biological misunderstanding or misinterpretation of boundaries between organisms that *can* understand or misunderstand one another only because they have a long evolutionary association. To even *see* one another, let alone interact with one another, different organisms must share some order or language.

Research into mechanisms of visual perception has enabled Edwin Land of the Polaroid Corporation to draw a related conclusion about the interaction of the human eye and the 'outer world' it sees. Land's research provides a synthesis for our ideas of subjective and objective perception that Tinbergen hoped for. And since his study of the eye illuminates the complimentary skills of observation and communication that a good naturalist possesses, I will let Land speak for himself. Compare his reminiscence from childhood with Fabre's childhood experiment with perception:

"In my hometown library, the chief delight of the younger patrons was not the books but the Brewster stereoscope. Through its lenses, children saw boats and bridges and canals and mountains, and the best of all three-dimensional subjects, grottoes. The stereoscope transport-

ed the child through the interplay of stalagmites and stalactites into the distant depths of the caves, having converted two slightly faded sepia, flat, dull photographs into a vivid reality. You could hear the dripping water, smell the dampness, fear the darkness as you sat with your legs crossed under you..... *Where did this new reality exist? In your eyes, or rather did you exist in it? A toy? Or the most powerful metaphysical clue to emerge in three thousand years? .....* the child and the three-dimensional space he rejoined in seeing comprised one single union of mind and matter..... In this particular pre-Darwinian period [when the stereoscope was invented], no one could have had the courage to imagine what, in the next two hundred years, would become the scientific basis of an unpartitioned reality.”

We have evolved, Land says, “in a polar partnership with the world.” He continues:

“there really is no outside world and no inside world. There is just one world. It is, perhaps, a little bit like moss growing on a rock, clinging to it, the tendrils penetrating the crevices in the rock and the cavities of the rock, where the rock/moss combination is the object and not the rock or the moss separately.”

It is, then, as Fabre said, “so much within everyone’s scope” to be observers of the world. Perception is an act of unification available to us all every time we open our eyes. A naturalist is exceptional in raising this endowment to an art, to an act of celebration.

The interests of a naturalist are usually understood by their own time to be interdisciplinary, unifying separate fields of study. In its own time, Fabre’s behavioral approach to the insect was a radical integration of psychology and morphology. Great naturalists provide data for the “unpartitioned reality” of nature. But few scientists would consider a narrative style to be an integral part of scientific contribution. Fabre’s writing is not just a ‘means’ of conveying data. It is itself data, and some of the very best data, for the unity of mind and nature.

It is not fortuitous that Lorenz, Tinbergen, Thomas and Land are all good writers. Between people, between species, between our minds and the world around us there can be a rigid or a supple interface. Our language can emphasize isolation or relationship. In general, the best naturalists are also specialists in some scientific field. However, they are specialists who have the ability as writers or artists to overcome the alien associations of inaccessibility and loneliness which the word specialist has come to have. A good scientist has entered strange and possibly frightening territory. A good writer provides us with the necessary empathy, the necessary relationship, to follow on that journey. A good writer sustains our participation in his or her

world. When Land begins an article with a childhood reminiscence he is giving us a way in. And when he begins to talk about rock and moss he is turning to a writer’s most powerful tool: metaphoric language.

Metaphoric language is one of the ultimate human expressions of trust in the unpartitioned reality of mind and matter. Metaphor is “language that implies a relationship.” An ordinary metaphor is merely illustrative, but a great metaphor is organic and forms “a fresh relationship.” The formation of metaphor in the human mind is analogous to the increasing complexity of an ecosystem in nature: definitions of lives arise more and more from their relationships. The filling of specific ecological ‘niches’ also might be compared to the development of more precise language with which to express our commonality.

Journals of science reveal a fear and distrust of the richness of language. Language is indeed hazardous. Words with the briefest of histories are subject to alchemical transformations, mutations and emotional colorations. Language seems to insist on its right to cross-pollination if it is to remain fertile. It has a life of its own. Yet it is the tendency of scientific writing to coin new technical words and attempt to fix the usage of old ones, for ambiguity is felt to be a disability in sharing scientific investigations. Consistent usage and rigid definition are shibboleths to protect against misreading. Of course, this fixity of language has genuine uses. Essentially it replaces what Lorenz pointed out to be the necessary first-hand relationship between observers that makes them able to understand each other’s findings. It is interesting to note how the usefulness of a fixed vocabulary is analogous to the usefulness of instinctive behavior: It requires no imaginative interpretation, but it is easily made obsolescent by a change of environment. The paranoia of many behavioral scientists about verbal ambiguity seems to be a self-defeating tendency, and certainly a quixotic one. Lovers of language value its hazardous nuances and would no more discard a word’s layers of association than an antique dealer would scrub the patina off an old brass pot. The treacherous fluidity of language ultimately cannot be avoided by a scientist any more than it can by a poet. It offers a precision in communication which is of a different order. Metaphor is a precise and subtle tool for describing reality.

Fabre once said that “in the world of creatures, as in the world of men, the story precedes and outlives history.” He developed the ability of a fabulist to make an animal expressive and to turn the behavior of animals into narrative. But he realized that for fabulists such as Aesop and LaFontaine the animal was “little more than a pretext for comparisons and moral narratives.” It became merely illustrative of human foibles. This is unabashed anthropomor-



phism in its most manipulative form. But consider this passage in which Fabre describes the encounter of a Praying Mantis and a hunting wasp, or Sphex, returning to her burrow with a paralyzed grasshopper:

“When entering her shelter under the rock, where she has made her burrow, the Sphex finds, perched on a blade of grass, a Praying Mantis, a carnivorous insect which hides cannibal habits under a pious appearance. The danger threatened by this robber ambushed on her path must be known to the Sphex, for she lets go her game and pluckily rushes upon the Mantis, to inflict some heavy blows and dislodge her, or at all events frighten her and inspire her with respect. The robber does not move, but closes her lethal machinery, the two terrible saws of the arm and fore-arm. The Sphex goes back to her capture, harnesses herself to the antennae and boldly passes under the blade of grass whereon the other sits perched. By the direction of her head we can see that she is on guard and that she holds the enemy rooted, motionless, under the menace of her eyes. Her courage meets with the reward which it deserves: the prey is stored away without further mishap.

“A word more on the Praying Mantis, or, as they say in Provence, *lou Prégo Diéou*, the Pray-to-God. Her long, pale-green wings, like spreading veils, her head raised heavenwards, her folded arms, crossed upon her breast, are in fact a sort of travesty of a nun in ecstasy. And yet she is a ferocious creature, loving carnage. Though not her favourite spots, the work-yards of the various Digger-wasps receive her visits pretty frequently. Posted near the burrows, on some bramble or other, she waits for chance to bring within her reach some of the arrivals, forming a double capture for her, as she seizes both the huntress and her prey. Her patience is long put to the test: the Wasp suspects something and is on her guard; still, from time to time, a rash one gets caught. With a sudden rustle of wings half-unfurled as by the violent release of a clutch, the Mantis terrifies the newcomer, who hesitates for a moment, in her fright. Then, with the sharpness of a spring, the toothed fore-arm folds back on the toothed upper arm; and the insect is caught between the blades of the double saw. It is as though the jaws of a Wolf-trap were closing on the animal that had nibbled at its bait. Thereupon without unloosing the cruel machine, the Mantis gnaws her victim by small mouthfuls. Such are the ecstasies, the prayers, the mystic meditations of the *Prégo Diéou*.”

Fabre is not crediting the Mantis with the human faculty of hypocrisy; nor is the Mantis a vehicle for anticlerical diatribe. Fabre is using a wide number of common associations to stimulate our perception of this moment, and to form a relationship between the insects and ourselves. The words “robber”, “lethal machinery”, “enemy”, “reward”, “nun”, “patience”, and the marvelous use of “clutch” and “Wolf-trap” do not make this scene a human drama, but they do make it comprehensible to us through our dramatic faculties as human beings. This is an important distinction. Fabre is not making value judgments that *deflect* attention from the insects; he is establishing some correspondence in order to focus our attention and empathy. Rather than being naive, he is deftly prodding us when he asks, “Why is the Sisyphus Beetle a hard-working paterfamilias and the Sacred Beetle an idle vagabond?” Wit, not morality, defines his narratives.

For communication to occur between species, an innate distrust of the strange must be overcome. For us this is particularly true in the case of insects. Fabre makes sophisticated use of the close relationship between fear and fascination, repulsion and attraction, to arrive at our underlying identification with insects. His fluid use of language expresses a courageous, vigorous encounter with the strange:

“To emerge from underground after the perfect insect is hatched, the Bluebottle’s device consists in disjuncting her head into two movable halves, which, each distended with its great red eye, by turns separate and reunite. In the intervening space, a large, glassy hernia rises and disappears, disappears and rises. When the two move asunder, with one eye forced back to the right, the other to the left, it is as though the insect were splitting its brain-pan in order to expel the contents. Then the hernia rises, blunt at the end and swollen into a great knob. Next, the forehead closes and the hernia retreats, leaving visible only a kind of shapeless muzzle. In short, a frontal pouch, with deep pulsations momentarily renewed, becomes the instrument of deliverance, the pestle wherewith the newly-hatched Bluebottle bruises the sand and causes it to crumble.”

Fabre has magnified the scale of the insect so that we can feel the power and precision of the fly’s minute head and experience its emergence as a herculean effort. It is this image of effort, as well as the sexual quality of the description, in human terms, that holds us. Fabre stimulates feelings in us, rather than crediting the insect with these feelings. He is giving us the necessary interest for close attention. If this is trickery

it is sublime trickery. Who is receiving Fabre's attention and lavish description? Ourselves or the insect? As a scientist, Fabre had the intuition to see this as one and the same process. It is essential for an observer to risk identification, and his language tells us that.

Empathy, true knowledge, requires the participation of all levels of our minds. Fabre is bold enough to engage the power of the unconscious, which expresses itself through imagery. His imagery strikes the mind with the force that only archetypal imagery can have. Rational and irrational elements join in Fabre's most inspired descriptions. This is particularly fascinating in a writer who is a student of instinctive behavior. Because a compelling image in the human mind is analogous to the power of instinct in its ability to trigger a response. This relationship between imagery and the conscious mind has been explored by Jungians, and particularly by Erich Neumann. It is succinctly stated in the following passage by him:

"The function of the image symbol in the psyche is always to produce a compelling effect on consciousness. Thus, for example, a psychic image whose purpose it is to attract the attention of consciousness, in order, let us say, to provoke flight, must be so striking that it cannot possibly fail to make an impression. The archetypal image symbol corresponds, then, in its expressiveness, significance, energetic charge, and numinosity, to the original importance of instinct for man's existence."

Before retiring to bed one night, Fabre put a newly-hatched female Noctuid moth under a screen bell-jar. In the light of Neumann's words, consider the charged mystery in Fabre's description of the events which ensued:

"It was a memorable night! I will name it the Night of the Great Peacock. Who does not know this superb moth, the largest of all our European butterflies, with its livery of chestnut velvet and its collar of white fur? The greys and browns of the wings are crossed by a paler zig-zag, and bordered with smokey white; and in the centre of each wing is a round spot, a great eye with a black pupil and variegated iris, resolving into concentric arcs of black, white, chestnut and purplish red....

"I was richly rewarded. About nine o'clock that evening, when the household was going to bed, there was a sudden hubbub in the room next to mine. Little Paul, half undressed, was rushing to and fro, running, jumping, stamping, and overturning the chairs as if possessed. I heard him call me. "Come quick!" he shrieked; "come and see

these butterflies! Big as birds! The room's full of them!"

"I ran. There was that which justified the child's enthusiasm and his hardly hyperbolic exclamation. It was an invasion of giant butterflies; an invasion hitherto unexampled in our house.....

"Candle in hand, we entered the room. What we saw is unforgettable. With a soft *flic-flac* the great night-moths were flying around the wire-gauze cover, alighting, taking flight, returning, mounting to the ceiling, re-descending. They rushed at the candle and extinguished it with a flap of the wing; they fluttered on our shoulders, clung to our clothing, grazed our faces. My study had become a cave of the necromancer, the darkness alive with creatures of the night! Little Paul, to reassure himself, held my hand much tighter than usual."

In this passage, Fabre has interwoven the sexual excitement of the arriving male moths and the excitement of Fabre's son, Paul, so that the evening becomes the combined discovery of insect, child, and ourselves.

Frequently Fabre's essays open with this quality of urgency or immediacy. We are invited to join him on some epic journey and we are quickly introduced to the protagonists of the adventure:

"The month of March comes to an end; and the departure of the youngsters begins, in glorious weather, during the hottest hours of the morning. Laden with her swarming burden, the mother *Lycosa* is outside her burrow, squatting on the parapet at the entrance."  
(from *The Narbonne Lycosa: The Climbing Instinct*)

or to take another passage:

"It happened like this. There were five or six of us: myself, the oldest, officially their master but even more their friend and comrade; they, lads with warm hearts and joyous imaginations, overflowing with that youthful vitality which makes us so enthusiastic and so eager for knowledge. We started off one morning down a path fringed with elder and hawthorn, whose clustering blossoms were already a paradise for the Rosechafer ecstatically drinking in their bitter perfumes. We talked as we went. We were going to see whether the Sacred Beetle had yet made his appearance in the sandy plateau of Les Angles, whether he was rolling that pellet of dung in which ancient Egypt beheld an image of the world."

Fabre has a strong element of play and pleasure in his observations which suggests a trustful awareness of the world. His style has a feminine sensuality, diffuse as well as specific, always fertile in associations, bountiful in details. It is exciting for us today, on a new wave of feminism, to see that the traditionally feminine strengths are essential to a good naturalist: a receptive and inclusive eye, an intuitive perception of relationships between living things, an ability to conserve and use all experience. And Fabre's writing about the insect world constantly evokes the age-old mythic polarities of nature: the nurturing mother and the devouring mother.

Whether he is uncovering the dark or the luminous aspects of nature, he speaks in the voice of the psalmist, inviting and celebratory. He says of a young shepherd who has led him to the nest of Scarab Beetle, "he laughed in response to my smile and was happy in my gladness." Fabre says to us, across a hundred years, "Pass the tip of your finger over the Moth's head. You will feel a few very rough wrinkles," and we do feel those wrinkles; like the carpenter, Marius, who was Fabre's friend, we touch the moth blindly but sensitively.

When we are reading about Fabre's insects, we are entering the connective tissue of the naturalist's life, a very human life, in which the harsh exigencies of conflicting roles and conflicting stimulations are conserved and made workable. Human and insect lives have their myriad characters, playing different ecological roles that jostle and define one another. Living things translate each other. The paradox of Fabre's anthropomorphism is, as he says, that "no one can sound an existence outside his own." So he gives us his whole experience as an intelligible vehicle for the journey he wishes us to make. We are sustained by the design of his perceptions, which is the natural design of his life. We read him and for a while we ourselves become incomparable observers. Maybe we even can carry a little of his gift with us into our own time, our own science. His language is a reminder that scientific models are based on analogies, and those analogies are always human.

*I celebrate myself, and sing myself,  
And what I assume you shall assume.  
For every atom belonging to me as good belongs to you.*

—Walt Whitman

#### BIBLIOGRAPHY

The main sources of Fabre's own writing have been:

*The Insect World of J. Henri Fabre.* Introduction and interpretive comments by Edwin Way Teale. New York: Dodd, Mead and Co., 1949.

*Social Life in the Insect World.* Translated by Bernard Miall. New York: The Century Co., 1914.

Serial collections of Fabre's essays, published by Dodd, Mead and Co. (New York), between 1910 and 1925 including *The Life of the Fly*, *The Hunting Wasps*, etc., translated by Alexander Teixeira de Mattos.

Horizon Press (New York) has reprinted in paperback an edition of *The Life of the Spider* which includes the famous essay on Fabre by Maurice Maeterlinck; 1971 edition.

Fabre, Augustin. *The Life of Jean Henri Fabre, The Entomologist.* Translated by Bernard Miall. New York: Dodd, Mead and Co., 1921.

*Fabre, Poet of Science.* Dr. G. V. Legros, Preface by J. Henri Fabre, translated by Bernard Miall. London: T. Fisher Unwin, 1913.

Other sources for this article include:

Lorenz, Konrad. *Studies in Animal and Human Behaviour*, Volume I. Translated by Robert Martin. Cambridge, Massachusetts: Harvard University Press, 1970.

Tinbergen, N. *The Study of Instinct.* London: Oxford University Press, 1951.

Frances, Robert. *Come Out Into the Sun.* Amherst: University of Massachusetts, 1968.

Thomas, Lewis. *The Lives of a Cell.* New York: Viking Press, 1974.

Thomas, Lewis. "Hubris In Science," *Science*, Volume 200, June 30, 1978.

Land, Edwin. "Our Polar Partnership With the World Around Us," *Harvard Magazine*, Volume 80, Number 3, January-February, 1978. (See his article, "The Retinex Theory of Color Vision," *Scientific American*, Volume 237, Number 6, December 1977, for research basis of this article)

Deutsch, Babette. *Poetry Handbook.* New York: Grosset and Dunlap, 1957.

Neumann, Erich. *The Great Mother.* Princeton: Princeton University Press, 1955.

Rukeyser, Muriel. *Waterlily Fire: Poems, 1935-1962.* New York: MacMillan, 1962.

Whitman, Walt. *Leaves of Grass.* New York: The New American Library, 1960.

