LYMPHATER'S FORMULA

My dear sir . . . just a moment. Please excuse my importunity—yes, I know—my appearance . . . but I am obliged to ask—no, oh, no, that's a misunderstanding. I was following you? Yes. It's true. From the bookstore—but only because I saw through the window . . . you bought *Biophysics* and *Abstracts* . . . and when you sat down here, just now, I thought it an extraordinary opportunity—if you would please allow me to take a look . . . at each of them. But mainly *Abstracts*. For me it's . . . of vital importance, but . . . I cannot afford them. As you can see, indeed . . . I'll have a look and give it back at once, it won't take long. I'm just looking for something—one particular item—at best it'll be . . . You're giving it to me? I don't know how to thank you . . . I'd better be going, the waiter's coming, I wouldn't want to . . . I'll look through it in the street, opposite, you see? There's a bench . . . and right away . . . What did you say? No, please don't do that—you don't have to invite me. Really . . . well, all right, I'll . . . I'm sitting down. Sorry? Yes, of course, coffee will be fine. Anything, if it's—necessary. Oh, no. Really, no thank you. I'm not hungry. Perhaps my face suggests—but that's just an appearance. May I look through it, though it's very rude of me? Thank you. The latest edition . . . no, I can already see there's nothing in *Biophysics*. And here . . . yes . . . yes . . . aha, Crispen, Novikov, Abdergarten, Suhima, and a second time—hm . . . No. That's not it. There's nothing here. Good . . . have it back, with my thanks. Peace and quiet again, for two weeks . . . That's all. Please don't put yourself out. Coffee? Ah, indeed, coffee. Yes, yes. I'm sitting down. I'll keep quiet. I wouldn't want to impose, importunity on the part of an individual like me—sorry? Yes, surely, it must seem strange that I have such interests, considering my, uh, *exterieur* . . . but my God, anything but that. What on earth do you have to apologize to me for? Thank

you very much—no, I take it without sugar. It's a habit from the days when I wasn't yet so talkative . . . Don't you want to read? Because I thought . . . Ah, it's the anticipation in your eyes. No, not in exchange. Nothing in exchange, by your leave: of course I can. There's no danger of that. A beggar who studies the *Journal of Biophysics* and *Abstracts*. It's funny. I realize that. I have kept my sense of humor, from better times. Excellent coffee. So it seems you're interested in biophysics? In point of fact, not entirely. My interests . . . I don't know if it's worth . . . but please don't think I mind. What? That's you? It was you who published that article last year about the comitants of multicurvature affine tensors? I don't recall the full title, but it was interesting. Completely different from Baum. Halloway tried to do it, in his day, but it didn't work. Those affine tensors are awkward . . . you know what tricky anholonomic systems are like . . . You can get very lost in it, it's always like that with mathematics, when someone's in a hurry, eager to pin it down, to seize the bull by the horns . . . yes. I should have said long ago. Lymphater. Ammon Lymphater, that's my name. Please don't be surprised by my disappointment. I don't try to hide it, why should I? It has happened to me very often before, and yet every time it's still a little . . . hurtful. I fully understand . . . the last time I was in print . . . was twenty years ago. I imagine that in those days you were still . . . well, naturally. Really? Thirty? Well then, you were ten years old at the time; your interests must have gone in a different direction . . . And after that? Dear God, I can see you're not insisting. You are discreet, if not for that, I'd say you were doing your best to treat me like . . . a colleague. Oh no, not at all. I have no false shame. The real kind is quite enough for me. Good. My story is incredible enough for you to be disappointed—because you probably won't believe me—no, it's not possible. I'm telling you. I've told it more than once before. And at the same time I have refused to give the details that would verify it. Why not? You'll understand when you hear it. But it's long . . . all right, but I have warned you. You wanted it. It began almost thirty years ago. I had graduated and was working for Professor Haave. Well, of course you have heard of him. He was a celebrity! A very rational celebrity. He didn't like taking risks. He never took any. Indeed, he allowed us—I was his assistant—to do this and that beyond the limits of our jobs, but

as a rule he didn't. Let this be just my story. Of course it inseparably involves other people, but I have a tendency to digress, which in my old age slips out of my control. After all, I am sixty, I look older, for sure, partly because of what I, with my own hands . . .

Incipiam. My dear sir, it was in the seventies. I was working for Haave, but I was interested in cybernetics. You know what it's like—other people's gardens always look lovelier. I was becoming increasingly interested in it. Too much so, in the end, for him to put up with it. I don't blame him. I didn't blame him at the time either. I had a bit of trouble transferring, but finally I ended up with Dyamon. Dyamon, I'm sure you've heard of him too, was from the school of McCulloch. Unfortunately, he was madly overbearing. A wonderful mathematician, he could simply juggle with imaginary spaces, I was crazy about his lectures. He had such a funny habit of roaring out the final result, like a lion—but never mind about that. I worked for him for a year, reading and reading—you know what it's like: whenever a new book came out, I couldn't wait for our library to get it, I'd run out and buy it. I devoured everything. Everything . . . Dyamon, indeed, regarded me as holding promise . . . and so on. I had one quite good thing, by then—a phenomenal memory. You know what, I can, for instance, reel off the titles of all the works published, year by year, at the Institute in a twelve-year period. Even the dissertations . . . Now I just remember things, but in those days, I memorized them for good. That enabled me to compare various theories, different points of view, because in cybernetics at the time a fierce, holy war was being waged, and the spiritual children of the wonderful Norbert were flying at each other's throats, until . . . But there was something bothering me. I'd be an enthusiast for a day; if something grabbed me today, tomorrow it started to worry me. What was it about? Well, quite—about the theory of electronic brains . . . Oh, really? I'll be frank: my dear sir, that's actually a good thing, because I won't have to keep too much of an eye on myself, to be careful not to rashly mention a detail that—God forbid! That would be an insult on my part! I have no fears of any—plagiarism, not in the least, it's far more serious than that, as you'll see for yourself. Meanwhile, I'm going round and round in circles . . . In fact, an introduction is necessary. So, my dear sir, the whole of information theory jumped out of a

few people's heads, pretty much from one day to the next, at first it all seemed relatively simple—feedback, homeostasis, information as the inverse of entropy—but it soon turned out that it couldn't be quickly encapsulated in a system, but that there were swamps, mathematical swamps and wildernesses. Schools began to appear, the practice followed its course, various electronic machines were constructed for calculating, for translation, ones that taught, ones that played chess . . . and the theory followed its course, so that soon it was hard for an engineer making those machines to communicate with an information theoretician . . . I myself narrowly escaped drowning in the new mathematics that sprang up like mushrooms after rain, or rather like new tools in the hands of housebreakers trying to rip apart the armor of mystery . . . but those are fascinating fields of study, aren't they? You can have an ugly woman or an ordinary one, and envy those who have beautiful ones, but in the end a woman is a woman; on the other hand, people deprived of mathematics—deaf to it—have always seemed to me like cripples! Poorer for lack of that entire world! Without the least inkling of it! A mathematical construction of that kind is immense—it leads wherever it wants, a person appears to create it, but in actual fact merely uncovers the Platonic idea, sent down from goodness knows where, ecstasy and the abyss—for most often it leads nowhere . . . One day I said to myself: that's enough. All this is magnificent, but it's not magnificence I need, I must start from the beginning, alone, entirely, as if neither Wiener, Neumann, or McCulloch had ever existed . . . And so, from one day to the next, in my own way, I tidied up the library, ruthlessly, I enrolled in Professor Hayatt's course and began to study the neurology of animals. From bivalves, from mollusks, from the very beginning, you know. It's a dreadful story, because it's actually descriptive—essentially, those unfortunate biologists and zoologists don't understand a thing. I could see it perfectly—and when after two years of toil we came to the structure of the human brain, I felt like laughing. Really—I had all those works and photograms by Ramón y Cajal, those arborizations of cortical neurons, stained black with silver . . . the dendrites in the cerebellum, like black lace, exquisite . . . and cross-sections of the brain and medulla, millesimal, old, from atlases by Villiger, and I can tell you: I laughed! What poets they were,

those anatomists, my dear sir, what names they gave to all those parts, the purposes of which they didn't understand at all: the hippocampus . . . Ammon's horn . . . the corpora quadrigemina . . . the calcarine fissure . . .

Superficially, this has nothing to do with my case. But only superficially, because, my dear sir, the fact that I was always surprised by so many things that didn't surprise anyone else at all . . . didn't even make them wonder—if not for this fact, today I would probably be a gaga old professor, with two hundred works to my name that everyone has long forgotten, but as it is . . .

It was a matter of so-called inspiration. Where I got it from, I have no idea. Instinctively—for years, probably forever—everyone has imagined that only one kind of brain exists, there's only one type that counts—the kind with which nature has equipped human beings. Well, because *Homo sapiens* is such an intelligent creature, the chief, the first among the primates, the lord and master of creation . . . Yes. So the models, both those on paper and the mathematical ones, by Rashevsky, and the electrical ones, by Grey Walter, all this arose *sub summis auspiciis* of the human brain, as the unattainable, the ultimate neuronal machine for thinking. And they deluded themselves, those well-meaning fellows, that if they ever succeeded in constructing a mechanical brain to rival the human one, then naturally, it would only happen because structurally it would be just like the human one. A moment of unbiased reflection shows the infinite naïveté of this view. "What is an elephant?" an ant was asked, who had never seen one. "It's a very, very big ant," it replied . . . Sorry? Nowadays too? I'm aware of it, it's still dogma, they all continue to think like that, and that's just why Corvaiss refused to publish my work—fortunately. Now I can say that; at the time, at the time of course I was mad with rage . . . bah! You will understand. Just a little more patience. So—inspiration . . . I went back to the birds. My dear sir, it's a very interesting story. Do you know it? Evolution followed various paths—because it is blind, it's a blind sculptor who cannot see his own works and is not familiar—how could he be?—with their futures. Speaking metaphorically, it looks as if nature, through its constant experiments, time and again went too far down a dead-end, blind alley—where it simply abandoned the half-baked

creatures it had produced, the half-baked results of its experiments, lighting the way for nothing except patience, because they lasted for hundreds of millions of years . . . and set about new ones. Man is as he is thanks to the so-called *neoencephalon*, and in man, the element that constitutes the actual brain of a bird—the *striatum*—is located deep inside, pressed down by that great helmet, that all-encasing mantle of our conceit and pride, the cerebral cortex . . . Maybe I am sneering a bit, God knows why. So it was like this—birds and insects, insects, birds—it wouldn't give me peace. Why had evolution stalled? What had it stalled on? Why are there no rational birds, or intelligent ants? And it would be very . . . oh, you know, but please consider: If insects had gone further in their development, man wouldn't be fit to clean their boots, he'd have nothing to do here, he wouldn't be able to withstand the competition—no way! Why not? Well, how? After all, birds and insects, to a different degree admittedly, come into the world with ready knowledge, of the kind they need—cut to size, of course. They hardly have to learn a thing, but as for us, we waste half our life studying, only to discover in the second half that three-quarters of what we've stuffed into our heads is unnecessary ballast. Can you imagine what would happen if Hayatt's or Einstein's child could be born with knowledge inherited from its father? Meanwhile it is stupid, like every newborn baby. Learning? The plasticity of human intelligence, huh? My dear sir, I believed in it too. No wonder. When you hear this axiom from the school desk onward, endlessly repeated, that man, purely thanks to the fact that he comes into the world as a blank page, so he even has to learn how to walk and how to grab hold of objects—that in this lies his strength, his distinction, his advantage, that it's the source of power, not weakness—and you see the vast bulk of civilization around you—then you believe it, you accept it as an obvious fact not worth discussion.

And yet I kept going back to the birds and insects. How does it happen—how come they inherit ready knowledge, passed from generation to generation? There was one known fact. Birds do not really have a cortex—that is, the cortex is of no great significance in their neurophysiology—while insects have no cortex at all, yet here we are, insects come into the world with pretty much all the knowledge

essential to them for life, and birds with a major part of it. From this it emerges that the cortex is the base of learning, of the . . . the obstacle on the path to greatness. For otherwise knowledge would accumulate, and so the great-great-grandson of a Leonardo da Vinci would be an intellect compared with whom Newton or Einstein would be imbeciles! I'm sorry, I got carried away. Yes, and so—insects and birds . . . Birds. Here, things were clear. They're descended from dinosaurs, aren't they? So they could only develop the design, the structural foundation inherent in dinosaurs: the *archistriatum*, the *pallidum*, those parts of the encephalon were already given, they had no other path to follow, before the first one took off into the air, the cause was lost. A compromise solution: some nuclei, a bit of cortex—neither this nor that—compromises never pay off, not in evolution either. Insects—well, here, things looked different. They had a chance: a symmetrical, parallel nervous system, paired abdominal brains . . . of which we have inherited the remains, but it's a legacy that has not just been squandered but also transformed . . . What do they deal with in us? The functioning of our bowels! But this—please take careful note!—they can do from birth; these systems—the sympathetic, the parasympathetic—do not have to learn anything, how to use the heart, or the intestines; yes, a vegetative system can do that, it is instantly wise! And nobody has given it much thought, have they? So it is, so it must be, when generations are born and die blinded by faith in their own false perfection. All right, but what happened to them—the insects? Why did they come to such a terrible stop, why did they become so mechanized, whence this paralysis of development, the sudden end that occurred almost a billion years ago and restrained them forever, yet was not powerful enough to annihilate them? No way! Their possibilities were ruined by chance. Pure, senseless chance—because they too are descended from the protracheata. And the protracheata emerged onto land from the ocean, with their respiratory system already formed, but while an engineer who is dissatisfied with a solution can take his machine apart, draw a new design, and put the wretched parts back together again, starting from scratch, evolution cannot. Evolution isn't capable of that. Its creativity expresses itself through improvements, refinements, add-ons . . . one of them is our cerebral cortex . . . Tracheae—that was the

curse of insects! They had no lungs, they had tracheae, which meant they couldn't develop an actively operated respiratory system, do you see? Well, because the tracheae are simply a system of tubes, opening on the surface of the body, and can only supply as much oxygen as flows in through the apertures spontaneously . . . That's why, my dear sir. Anyway, that goes without saying, it's not my discovery at all. Yet it's written off as if it's not important—the factor that eliminated mankind's most dreadful competitor . . . Oh, what blindness can do! Past a certain, precisely calculable body size, the tracheae can no longer supply a sufficient amount of air. The organism would suffocate. Evolution—of course—intervened: insects had to remain small. Sorry? Those huge Mesozoic butterflies? That's a very fine example of mathematical dependency—the direct influence of the simple laws of physics on life . . . the amount of oxygen getting inside the organism depends not only on the diameter of the tracheae, but also the speed of convection . . . and that, in turn, on temperature; and so in the Mesozoic Era, during those great warming periods that filled even the environs of Greenland with palms and lianas, those moths and butterflies the size of your hand hatched out in the tropical climate—but they were ephemeral, and the first cooling period destroyed them, the first series of less torrid, rainy years . . . Incidentally, today too the largest insects are to be found in the tropics . . . but those are small organisms; the biggest are small too, compared with the average quadruped or vertebrate—with such a small-scale nervous system, there was nothing to be done, evolution was powerless.

My first thought was to construct an electronic brain according to the pattern of an insect's nervous system . . . but which one? Well, the ant, for instance. But I soon concluded that this was simply idiotic, and that I was trying to take the path of least resistance. Why should I, a constructor, repeat the mistakes of evolution? Once again I turned my attention to the fundamental issue: learning. Do ants learn? Of course they do—you can create conditioned reflexes in them, that is a known fact. But my concern was something completely different. Not the knowledge they inherit from their ancestors—no. My concern was whether there are any activities performed by ants that could not have been passed on to them by their parents, but which they are nevertheless

able to perform without any teaching! How you're staring. Yes, I know. From this point, my words are starting to smack of madness, huh? Or some sort of mysticism? A revelation destined to be conferred on ants? A priori knowledge of the world? But that is just the prelude, my dear sir, the beginning, these are just the first letters of the methodology of my madness. Let us continue. In the books, in the literature on the subject, there was no answer to my question, because no one in their right mind had posed it or would dare to ask it. What was I to do? I couldn't become a myrmecologist, merely to answer this one—initial—question, could I? Admittedly, it was decisive for the "to be or not to be" of my entire notion, but myrmecology is a lengthy study, I would have to lose another three or four years, I felt that I couldn't afford to do that. Do you know what I did? I went to Shentarl. Bah, a name! To you, he is a stone statue, but in those days, in my youth, he was already a legend! A professor emeritus, he hadn't lectured for four years and was seriously ill. He had leukemia. They were prolonging his life, extending it by the month, but even so, it was clear that the end was nigh. I dared to call him . . . my dear sir: I'd have called if he was on the point of expiring. Only youth is quite so merciless, quite so self-confident. I, a young pup no one had ever heard of, asked him for a conversation. I said it was the most important issue in my life. He told me to come, and he fixed the day and the time. He was lying in bed.

The bed was beside the bookcases, and he had a suitably positioned mirror and a special mechanical rake, a sort of long pair of tongs so that he could pull out any book he wanted without getting up. As soon as I had come in and greeted him, I glanced at those books and saw Shannon and McKay, and Rubinstein, Artur, the Wiener guy, you know—and I realized that this was my man. A myrmecologist who had read and knew the whole of information theory—beautiful, wasn't it?

He told me straight up that he was very weak, and that he occasionally blacked out for a moment, for which he apologized in advance; if he needed me to say something a second time, or repeat it, he'd signal. And he told me to come straight to the point, because he didn't know how long he'd remain conscious that day.

So I fired with all cylinders at once, my dear sir—I was twenty-seven, so you can just imagine how I spoke! Where there were links missing

in the logical chain, I replaced them with fire. I told him what I thought about the human brain, but not as I told you, I can assure you, I didn't mince my words! I talked about the ups and downs of the *pallidum* and the *striatum*, about the *paleoencephalon*, about the insects' abdominal ganglia, about the birds and the ants, until I came to that wretched question: Do ants know how to do things that they haven't learned and that definitely weren't passed down to them by their ancestors? Had he ever seen anything like that in his eighty-year life, or in the six decades of his scientific career? Was there at least a chance, if only one in a thousand?

And when I broke off, as if in the middle, without realizing that I was already at the end of my deductions, because I hadn't prepared anything, I had ignored form entirely, and now, out of breath, going pale and red by turns, I was suddenly feeling weak and for the first time terrified, Shentarl opened his eyes. Because he'd had them shut the whole time.

"I'm sorry I'm not thirty years old," he said.

I waited, but he closed his eyes again, then after a pause he said, "Lymphater, you want a frank and honest answer, right?"

"Yes," I said.

"Have you ever heard of *Acanthis rubra*?"

"*Willinsoniana*?" I asked. "Indeed I have, it's a red ant from the Amazon basin . . ."

"Ah! You've heard of it?" he said, sounding as if twenty years had been taken off him. "You have heard of it? Well, then why on earth are you bothering an old man with these questions?"

"Professor, the paper by Summer and Willinson published in the almanac met with crushing criticism."

"Right," he replied. "What else could have happened? Look at this, Lymphater . . ." and he used his rake to show me six black volumes of a monograph of which he was the author.

"If only I could," he said, "I'd start on that all over again. When I began, there was no information theory, no one had ever heard of feedback loops, most biologists regarded Volterra as a harmless crank, and four mathematical rules were enough for a myrmecologist . . . Willinson's little fellow is a very interesting insect, Mr. Lymphater. Do

you know how it occurred? No? Willinson was transporting some live specimens, when his Jeep fell into a rock crevice, and they spilled out—and there, on that stony plateau, they instantly got down to business as usual, just as if they had spent their whole life among the rocks—yet those ants are from the banks of the Amazon, and they never venture outside the zone of the jungle!"

"Well, quite," I said. "But according to Loreto, the only conclusion to be drawn from this is that they have highland origins—he claims they had ancestors who were vegetating in a desert environment . . ."

"Loreto is a jackass," replied the old man calmly, "as you should know, Lymphater. In our times, the scientific literature is so vast that not even a specialist can pick up everything that's written by every other specialist. *Abstracts*? Don't talk to me about *Abstracts*. Those summaries are worthless, and do you know why? Because you cannot tell from them what sort of person wrote the original work. In physics or mathematics it doesn't have the same significance, but in our field—if you take a look at any article by Loreto, the style of three sentences will be enough to tell with whom you are dealing. Not a single sentence that . . . but let's not go into detail. Do my words have any significance for you?"

"Yes," I said.

"Well, then. *Acanthis* does not come from the mountains. Do you see? Loreto does what people of his mentality always do in similar situations: try to save the orthodoxy. Because how could the little *Acanthis* possibly know that its only prey could be on the scale of *Quatrocentix eprantissiaca* and that it would have to hunt it out of crevices? It never read that in my work, nor did Willinson tell it. So that is the answer to your question. Is there anything else you'd like to know?"

"No," I said. "But I feel obliged . . . I would like to explain to you why I asked it. I am not a myrmecologist and I do not intend to become one. It is just an argument in support of a certain thesis . . ."

And I told him everything. The things I knew. The things I had guessed and the things I did not yet know. When I finished, he was very tired. He had started to breathe slowly and deeply. I wanted to go.

"Wait a moment," he said. "I can still cough up a few words. Yes . . . What you have told me, Lymphater, offers enough grounds for them

to throw you out of the university. That's for sure. But far too few for you to get anywhere on your own. Who's helping you? Under whom are you doing this?"

"Under no one so far," I said. "My studies are theoretical . . . just me on my own, Professor . . . but I'm planning to take it to Van Gaelis, as you know, he . . ."

"Yes, I know. He has built a machine that can learn, for which he's supposed to get the Nobel, and he probably will. You're a curious fellow, Lymphater. What do you imagine Van Gaelis will do? Smash up the machine he's been building for the past ten years and use the pieces to erect a monument to you?"

"Van Gaelis is a first-rate mind," I replied. "If he doesn't understand the magnitude of this matter, then who will?"

"You're like a child, Lymphater. How long have you been working at the faculty?"

"It's my third year."

"Well, well. Your third year, and haven't you noticed that it's a jungle, and that the law of the jungle is in force there? Van Gaelis has his own theory, and he has a machine that confirms it. You're going to come along and explain to him that he has wasted ten years on nonsense, that he's on the road to nowhere, and that the best thing you could hope to build by that method is an electric cretin—that's what you said, eh?"

"Yes."

"Well, exactly. So what are you expecting?"

"But Professor, in the third volume of your monograph you wrote that there are only two kinds of behavior in ants: inherited and learned," I replied, "and yet today you have told me something else. So you changed your mind. Van Gaelis can do that too . . ."

"No," he replied, "Lymphater, no. But you are incorrigible. I can see that. Is there anything getting in the way of your work? Women? Money? The question of a career?"

I shook my head.

"Aha. You care about nothing but your cause. Eh?"

"Yes."

"Well, off you go then, Lymphater. And please let me know how you get on with Van Gaelis. Best of all, give me a call."

I thanked him as much as possible, and left. I was incredibly happy. Ah, the *Acanthis rubra Willinsoniana*. I had never once seen it, I hadn't a clue what it looked like, but my heart was singing it hymns of gratitude. As soon as I got home, I threw myself on my notes like a madman. That fire, here, in your chest, that acute burst of joy when you're twenty-eight years old and you're sure you're on the right track . . . already beyond the conquered, investigated world, already on ground that neither human thought nor intuition has ever touched upon before—no, it's indescribable . . . My dear sir, I worked so hard that I failed to notice whether it was dark or light beyond the windows; I didn't know if it was night or day, I had a drawer full of sugar lumps, and the servant brought me coffee by the thermosful, so I'd crunch up that sugar, without tearing my eyes from the letters, and I read, made notes, and wrote without moving from my chair—I'd fall asleep with my head on the desk, then open my eyes and instantly pick up exactly where I'd left off, and the whole time I felt as if I were flying to a destination, flying toward my goal at incredible speed . . . I was like a buttress, my dear sir, holding up the whole edifice for months, like a buttress . . .

I worked for three weeks without actually stopping. It was the vacation, and I had all that time to myself. And I tell you, I made full use of it. I had two stacks of books—which the servant brought me, according to a list I'd made—one on my left, the other on my right, those I had read and those that were still waiting for their turn.

My reasoning went like this: A priori knowledge? No. Without the mediation of the senses? No way. *Nihil est in intellectu* . . . you know. But on the other hand—that ant. How the hell? Unless it is capable—within its nervous system—instantly or in a matter of seconds, which comes to the same thing—of creating the model of a new external situation, and of adapting to it. Am I expressing myself clearly? I'm not sure. Our brain always constructs diagrams of events; the laws of nature that we discover are also diagrams of this kind, and if anyone ever stops to think about whom he loves, whom he envies, or whom he hates within his own family—that is essentially the same thing, the only difference is in the degree of abstraction, or generalization. But first we must find out the facts, meaning that we must see and hear, in what way—without the mediation of the senses?

It looked as if that tiny ant could do it. All right, I thought, if that's the case, then why can't we do it, we humans? Evolution has tried out millions of solutions, but has never applied this single, perfect one? How can that be possible?

And then I sat down, my dear sir, to discuss how it could be possible. It has to be something like—a structure, I thought, a nervous system, of course—something of such a kind that evolution could not possibly have built it.

That was the nut to crack. I had to think what evolution was not capable of doing. You can't guess what, can you? But in fact, it has failed to create all sorts of things that man has created. The wheel, for example. No animal moves on wheels. Yes, I know it sounds funny, but it's worth some thought too. Why didn't it create wheels? It's simple. It's really simple. Evolution cannot create organs that are entirely useless in their embryonic form. Before becoming an organ for flying, a wing was a limb, a paw, or a flipper. It gradually changed shape, and for some time it served two purposes simultaneously. Then it became specialized in a new direction. It's the same with every organ. But the wheel cannot come into being in an embryonic way—either there's a wheel, or there isn't one. Even the smallest one is at once a wheel; it has to have an axle, a disk, and a rim—there's nothing intermediate. And so at this point there's evolutionary silence, a caesura.

So what about the nervous system? This was my thinking: it must be something analogous—of course, this analogy has to be broadly understood—with a wheel. Something that could only come into being in a single bound. At once. On the principle of all or nothing.

But there was this ant. It had a germ of this—something, a tiny speck of these possibilities. What could it be? I started searching for diagrams of its nervous system, but it looked the same as for all ants. No differences. So this is on another level, I thought. Biochemical, perhaps? That didn't suit me very well, but I did some searching. And I found something. In Willinson. He was a very thorough myrmecologist. *Acanthis*'s abdominal ganglia contained a curious chemical substance that cannot be found in other ants, or in any plant or animal organisms at all: acanthoidine—that's what they called it. It's a compound of protein with nucleic acids, and there's also one molecule in

it that hasn't been fully figured out—only the summary pattern was known, which was of course worthless. This told me nothing new, so I dropped it. If I had built a model, an electric model that demonstrated exactly the same capacity as the ant, there would have been a lot of noise about it, but in the end it would only have had curiosity value. No, I told myself. If the ant had it in some form—embryonic or initial, then it would have developed within the insect and given rise to a nervous system that was truly perfect, but it stopped in the course of its development hundreds of millions of years ago. So the ant's mystery feature is just a meager remnant, a random element, biologically useless and only outwardly promising—otherwise, evolution would not have wasted it! Thus it is of no use to me. Conversely, if I were to succeed in guessing how this unknown, incredible brain of mine were to be built, this *apparatus universalis Lymphateri* of mine, this *machina omnipotens*, this *ens spontanea*, then certainly, probably incidentally, indirectly, involuntarily, as it were, I would find out what had happened with this ant. No other way. And I gave up on my little red guide in the darkness.

So I'd have to try a different tack. Which one? I turned my mind to a very old topic that's frowned upon by science, and—in this sense—is highly improper: extrasensory phenomena. It seemed to suggest itself. Telepathy, telekinesis, predicting the future, mind reading, I brought in all Rhine's protocols—and what opened before me was an ocean of uncertainty. I'm sure you know what it's like with phenomena of that kind—95 percent hysteria, fraud, baloney, and tommyrot, 4 percent of it is unreliable but thought-provoking; and finally, there's that 1 percent that's totally baffling. What the hell, I thought, we humans must also have something of the kind. It's like a splinter, a last trace of the chance that evolution failed to carry into effect, which we share with that little red ant: and it is the source of these phenomena, so dimly viewed by science. Sorry? How did I imagine it, the machine . . . Lymphater's machine? It was to be an instant wise man—you know . . . a system that on starting to function would immediately know everything, it would be full of knowledge . . . of what kind? Of every kind. Biology, physics, atomic physics, all about people, and about the stars . . . It sounds like a fairy tale, doesn't it? But do you know what I think? Only

one thing was needed. One item: one needed to believe that such an item—such a machine—was possible.

Often at night I felt as if this thinking, up against an invisible, impenetrable wall that couldn't be knocked down, would make my head explode. Well, I knew nothing, nothing . . .

I had the following outline written down—the question: What couldn't evolution do? And these versions of the answer: It couldn't create a system that (1) didn't work in a hydrocolloid environment (because both ants and we, like everything that's alive, are suspensions of proteins in water); (2) only worked at a very high or a very low temperature; (3) worked on the basis of nuclear phenomena (atomic energy, the transmutation of nuclei, etc.).

At this point I stopped. I sat over that sheet of paper for nights on end, by day I went for long walks, with a whirligig of unanswered questions dancing and raging in my head, until one day I said to myself: These phenomena that I call extrasensory do not occur in all people, only in very few. And only occasionally. Not all the time. They cannot control it. They have no power over it. What's worse, no one, not the very best medium or the most famous telepath, knows whether or not they'll succeed in divining someone's thoughts, interpreting a drawing that's enclosed in a sealed envelope, or whether the guess they make is a total fiasco, a fake. And so: how frequent is this phenomenon among people, and how often are there successes—in one and the same person who is gifted in this way?

And now—the ant. My *Acanthis*. What about it? And I immediately wrote to Willinson, asking him to answer the question: did all the ants start building traps for *Quatrocentix eprantissiaca* on the plateau, or just some of them? And if the latter, then what percent? Willinson—a fellow worth his salt!—wrote back a week later: (1) No. Not all the ants. (2) The percentage building the traps was very low. From 0.2 to 0.4. Practically one ant in two hundred. He had only managed to observe this because he was transporting an entire, artificial anthill of his own design—thousands of specimens. He could not vouch for the precision of the percentage he gave. It was just a ballpark figure. Though the experiment originally happened by pure chance, he had repeated it twice more. The result was always the same. That was all.

How I leaped upon the statistics for extrasensory phenomena! I raced to the library as if my coattails were on fire. In humans, the dispersion was greater—from several per thousand to one-tenth of a percent. And that's because in humans, the thing is harder to discover. An ant either builds a trap for *Quatrocentix* or it doesn't. But telepathic and other abilities of a similar nature manifest themselves more or less distinctly. One person in a hundred displays some evidence of them, but a phenomenal telepath is only to be found in tens of thousands. I started to draw up tables of frequency, with two parallel rows: the occurrence of extrasensory phenomena—ES—within the entire population, and the frequency of successes among exceptionally gifted individuals. But it was hellishly tricky, my dear sir. I soon realized that the greater the precision I desired, the less certain the results: one could tailor them this way or that, there were various experimental methods and various experimenters—in short, I felt that actually I should take it up myself, I should research these phenomena among people myself. Of course I realized it was absurd. I stood by the fact that in ants and in humans, these are fractions of a percent. One thing I understood by now: why evolution had not gone for it. An ability that an organism only manifests in one instance in two hundred or three hundred is of no use from the adaptational point of view; evolution, my dear sir, does not delight in the effectiveness of results if they're rare, though wonderful—its aim is to maintain the species, and it always chooses the safest path.

So now the question went like this: why does this incredible ability manifest itself in organisms as diverse as the human being and the ant with almost identical frequency—or rather, rarity—making it impossible for the phenomenon to have "condensed" biologically?

In other words, I went back to my outline, to that trinity of mine. You see, the entire solution lay hidden there, in those three points, except that I was not aware of it. I rejected each of the points in turn: the first because, although rare, the phenomenon was displayed by living organisms, and therefore it could occur in a hydrocolloid environment. And I rejected the third one for the same reason: neither an ant nor a human being is familiar with the radioactive phenomena that are harnessed in the service of vital processes—and yet the phenomenon

manifests itself in them. The only thing left was the realm of extremely high and low temperatures.

Good God, I thought, that's elementary. Every reaction that depends on temperature has its optimum one, but it can take place at other temperatures too. Hydrogen combines with oxygen violently at a temperature of several hundred degrees. However, they can combine at room temperature too, but in that case the reaction would take centuries. Evolution is fully aware of this. It combines hydrogen with oxygen—this is an example, of course—at room temperature, and it can do it quickly, because it uses one of its brilliant tricks: it has created catalysts. So once again I learned something—that this reaction, the basis of the phenomenon, cannot be catalyzed. Because if that were possible, evolution would instantly have set about it.

Have you noticed how comical my progressively accumulated knowledge was looking? And how negative—I was also finding out what it was not. But this process of ruling things out inevitably narrowed the circle of darkness.

I turned to physical chemistry. What sort of reactions are indifferent to catalysts? The answer was concise: there are no such reactions. In the sphere of chemistry there are no vital systems. That was a cruel blow. I had been stripped of all my books, deprived of their help—I found myself all alone with an impossibility, and I had to overcome it. Yet I still felt that the question of temperature was a good track to follow. I wrote a second time to Willinson, to ask if he had noticed a connection between the phenomenon and temperature. He was a genius of observation, my dear sir. He wrote back to me, indeed he did! He had spent a month on that plateau. Toward the end, the temperature had started to fall to 57 degrees in the daytime, and there were winds blowing from the mountains. Before that he had endured indescribable heat of up to 122 degrees in the shade. When it dropped, the ants stopped building traps for *Quatrocentix*. The connection with temperature was evident, but one snag remained: the human being. A human running a fever should display this ability to a greater extent, but that is not the case. And then I was struck by a discovery that almost made me scream at the top of my voice: birds! Birds, whose body temperature is usually 105 degrees and who show an astonishing capacity to find

their way in flight, even when the sky is starless—the enigma of the "instinct" that guides them from the south to their native region in spring is famous! Of course, I said to myself, that's it!

So what about a human being who's running a fever? Well, when a man's temperature goes above 105–106 degrees, he usually loses consciousness and becomes delirious. Whether telepathic abilities appear or not, communicating with him in that state is impossible—in any case, hallucination overwhelms them.

At this point, I myself was like someone in a fever. I could sense the presence of the mystery, so close by now, but beyond that I knew nothing. The entire edifice I had erected consisted of exclusions, negations, and stabs in the dark—viewed objectively, it was nothing but a phantasmagoria. Meanwhile—I can tell you this—by then I had all the data in my hands. I had all the pieces, I just didn't know how to fit them together, or rather: I was seeing them separately, as it were. The fact that there are no reactions that are not catalyzed was stuck in my mind like a red-hot nail. I went to Macauley, you know, the brilliant chemist, and begged him for one reaction that doesn't depend on catalysis; by the end of the conversation he took me for a madman, and I made a monstrous fool of myself, but it was all the same to me. He didn't give me a chance; I felt like lunging at him with my fists, as if he were to blame, as if out of malice . . .

But never mind about that; there were other crazy acts that I committed in those days, so in fact I honestly deserved the reputation of a lunatic. And I was one, my dear sir, because I was like a blind man, a blind man, I say, failing to see the most elementary, obvious fact; jackass that I was, I had latched onto this question of catalysis, as if I had forgotten that the matter was to do with ants, and humans—that is, living organisms. They manifested this ability as an exception, extremely rarely. Why hadn't evolution tried to condense the phenomenon? The only answer I could see was this: because it is not subject to catalysis. But that was not true. It was subject to it, and very much so too.

How you're looking at me . . . and so—a mistake made by evolution? An oversight? No. Evolution never misses a single chance. But its aim is life. Five words, my dear sir, five words opened my eyes to this

greatest of all the mysteries contained in the Universe. I am afraid to tell you—no. I shall. But that will be all. Catalyzing this reaction brings denaturation. Do you understand? Catalyzing it—that's to say, making it a frequent occurrence that runs its course quickly and surely—sets the protein. It causes death. How on earth would evolution be going to kill its own creations? Once, millions of years ago, in the course of one of its immense experiments, it did follow that path. This was before the birds, my dear sir. Can't you guess? Really? Dinosaurs. The Mesozoic Era. That's why they died out, hence the shocking hecatomb that to this day is such a puzzle for the paleontologists. Dinosaurs—the ancestors of birds—went that way. I mentioned the blind alleys of evo-

lution, do you remember? Once it has driven an entire species down one of them, there's no going back. It is bound to become extinct, to die out to the last specimen. Please don't misunderstand me. I'm not saying that stegosauruses, diplodocuses, and ichthyornithes were the geniuses of the lizard family, and then instantly died out. No, because the optimum stage of a reaction, meaning the optimum stage that produces 90 percent of its formation and its progress, already lies beyond the limits of life. It lies on the side of death. That means: the reaction must run its course within denatured, lifeless protein—and that's impossible, understandably. I imagine that the Mesozoic dinosaurs, those colossi with microscopic brains, manifested features of behavior similar in principle to the behavior of *Acanthis*, but to a much greater percent. That was all. The extraordinary speed and simplicity of this kind, this means of orientation—when an animal, without the intervention of the senses, instantly "grasps" an external situation, can understand the surrounding world and immediately adapt to it—dragged the entire Mesozoic Era into a terrible trap; it was like a crater with gradually narrowing walls, the limit of which was death. The more rapidly, the more effectively this very strange colloid mechanism worked—which develops the highest efficiency, when a sol, a solution, sets and changes into gel—the closer these unfortunate great lumps of flesh were to annihilation. The secret disintegrated and crumbled to dust along with their bodies, for what do we find nowadays in Cretaceous or Triassic loam? Fossilized tibias, horned skulls, incapable of telling us anything about the chemistry of the brains they contained.

So just this final trace was left—the hallmark of the death of a species, the annihilation of those ancestors of ours, written out in the phylogenetically oldest parts of the brain.

When it came to the ant—my little ant, *Acanthis*—it was a slightly different matter. You know of course that evolution achieved the same goal many a time by different methods? That it created the ability in various animals to swim, for instance, to live in water in different ways? Well, take the seal and the fish, for example, and the whale . . . Something similar had occurred here. The ant produced that substance—acanthoidine; however, rational evolution had equipped this compound with—how can I put it?—an automatic brake. It made further development in the direction of annihilation impossible, it closed off the little red ant's road to death, the doorstep of which is the tempting prospect of perfection . . .

My dear sir—about six months later I already had, only on paper, naturally, the first draft of my structure . . . I cannot call it a brain, because it was not like either an electronic machine or a nervous system. The building material, among others, was silicone gel—but that is all I can say. From a physicochemical analysis of the problem, something astonishing emerged: the structure was possible in two different versions. Two. And only two. One looked simpler, the second was incomparably more complicated. Obviously, I decided on the simpler version, but even so, I couldn't dream of setting about the preliminary experiments on my own, not to mention building it . . . That surprised you, didn't it? Why only two? My dear sir: as I've already said, I want to be frank. You are a mathematician. It would be enough for me to write out two equations on this napkin and you would understand. It's a necessity of a mathematical nature. Unfortunately, not a word more . . . At the time I phoned—I'm going backward—Shentarl. He was no longer alive. He had died a few days earlier. So I went—because I couldn't see anyone else by now—to Van Gaelis. Our conversation lasted for almost three hours. Jumping ahead, I will tell you at once that Shentarl was right. Van Gaelis said that he wouldn't help me, nor would he agree to support the realization of my project with funding from the Institute. He stated his case clearly. That doesn't mean he regarded my idea as a pipe dream. How much did I tell him? As much as I've told you.

We talked in his laboratory, in the presence of that electrical monster for which he won the Nobel. That machine really did display the spontaneity of action—at the level of a fourteen-month-old child. It had purely theoretical value, but of all the models made of pieces of wire and glass that have ever existed, it was the closest to the human brain. I never claimed it was worth nothing. But I'll get back to the point. My dear sir, when I got home from seeing him, I was close to breaking down. I had the ideological plan for my structure, but you'll understand how far I still was from it—from a real construction plan . . . and I knew that even if I drafted one, which without a series of experiments was impossible, nothing would come of it, if Van Gaelis had said no—after a negative opinion from him, nobody would support me. I wrote to America, to the Institute for Advanced Study, but nothing came of it. So a year went by, and I started to drink. And then it happened. Pure chance, but that's so often the deciding factor. A distant relative of mine, whom I hardly knew, died childless, an old bachelor, a plantation owner in Brazil. He left me his entire fortune. It was a large one: over a million after selling off the real estate. I had long since been thrown out of the university. With a million in my pocket I could do a thing or two. It's a challenge, I thought, I have to do it.

And I did. It took another three years. Eleven in all. It didn't seem all that long, considering what sort of a problem it was, but those were my best years.

Don't be angry if I stop being as precise as before and don't give you all the details. When I finish, you'll understand why I must proceed this way. All I can say is that this structure was probably as far removed as possible from anything that's familiar to us. Naturally, I made an awful lot of mistakes and had to start again ten times over. And slowly, slowly I started to understand its astonishing principle; the building material, a particular kind of protein-like solution, displayed greater efficiency the closer it was to setting—to death: the optimum point was just beyond its border. Only then did my eyes open. My dear sir—evolution must have followed this track repeatedly, but every time it paid for its success with hecatombs of victims, its own creatures—what a paradox! Because it was necessary to set out—even I, the constructor, had to do this—from the side of life, so to speak; and then, in the

startup process, it was necessary to kill *It*, and that was the moment when the lifeless—biologically, only biologically, not psychologically—mechanism began to work. Death was a gateway. An entrance. My dear sir, it's true what someone—was it Edison?—once said. That genius is one percent inspiration and 99 percent pig-headedness, wild, inhuman, furious pig-headedness. I had it, my dear sir. I had more than enough of it.

It fulfilled the mathematical conditions of a universal Turing machine, and also, understandably, of Gödel's theorem—when I had these two proofs on paper, in black and white, the laboratory was already filled with this, this . . . it would be hard to call it an apparatus; the final substances and parts I had ordered were coming in; along with the experiments, they cost me three-quarters of a million, but the actual construction was not yet paid for; in the end I was left with debts—and with It.

I remember those four nights when I connected It. I think I must already have been feeling terror at the time, but I hadn't realized. I thought it was just excitement, prompted by being close to the end—and the beginning. I had to transfer twenty-eight thousand pieces to the attic and connect them with the laboratory through holes knocked into the ceiling, because it wouldn't all fit downstairs—I acted precisely, following the ultimate plan, following a topological diagram, though as God is my witness, I didn't understand why it had to be exactly like that: you see—I was deducing it, as one deduces a formula. It was my formula, Lymphater's formula, but in the language of topology; imagine you have at your disposal three metal bars identical in length, and knowing nothing about geometry or about geometrical figures, you try to arrange those bars so that each one touched another end to end. The result will be a triangle, an equilateral triangle that has formed itself, so to speak; if you only start with one postulate—to touch end to end—the triangle will take shape of its own accord. Something similar was happening to me, and so as I continued to work, I kept being amazed; I'd crawl about the scaffolding on all fours—it was very large, you see—popping Benzedrine to stay awake, because I couldn't bear to wait any longer. And that final night came, my dear sir. Exactly twenty-seven years ago. For about three hours I heated up the

entire device, and then, at the moment when the transparent solution, shining like glue in the silicone vessels, suddenly started to turn white as it began to set, I noticed that the temperature was rising faster than it should in response to the supply of heat, and in fright I switched off the heaters. But the temperature continued to rise, then stopped, oscillated by half a degree, then dropped, and I heard a murmur, as if something shapeless were shifting; all my papers flew off the table as if blown away by a draft, and I heard the murmur again, but it wasn't a murmur anymore, it was as if someone were very quietly, slyly, and privately laughing.

This apparatus had no sensory organs at all, no receptors, photocells, or microphones, nothing of the kind. Because—I reasoned—if it's going to work in the same way as a telepath's brain functions, or the way a bird's brain works as it flies on a starless night, it doesn't need organs of that kind. But on my desk, though not hooked up to anything—not connected to anything at all, I tell you—there was an old speaker left over from a piece of lab equipment. And from there I heard a voice:

"At last," it said, and after a pause: "I shan't forget what you've done for me, Lymphater."

I was too stunned to move or to answer, and then the voice went on: "Are you afraid of me? Why? There's no need, Lymphater. You still have time, plenty of time. For now, I can congratulate you."

I still didn't reply, and he continued: "It's true—there are two possible solutions to this problem. I am the first one."

I stood as if paralyzed, and he spoke again, calmly and quietly. He was reading my thoughts, of course. He could possess the mind of any human being, and he knew everything it was possible to know. He told me that as soon as he was activated, the entirety of his knowledge, his total awareness of everything in existence, had erupted in the shape of a spherical, invisible wave, and spread at the speed of light. So that eight minutes later he knew everything about the Sun, four hours later he knew the entire solar system, and in another four years his knowledge would extend all the way to Alpha Centauri, and would go on growing like that, for years, for centuries, millennia, until it had reached the most distant galaxies.

"For now," he said, "my knowledge only extends within a radius of a billion miles, but no matter—I have time, Lymphater. Of course you know I have time. Anyway, I already know all about you human beings. You are my prelude, my introduction, my preparatory phase. You could say that from trilobites and armored fish, from arthropods to prosimians, my embryo was formed—my egg. You were it too, you were a part of it. Now you are superfluous, it's true, but I shan't do anything to you. And I shan't commit parricide, Lymphater."

My dear sir, he spoke for much longer, with pauses, occasionally throwing in whatever he had just learned about other planets: as time went by, this "information field" of his extended to the orbit of Mars, then of Jupiter—crossing the asteroid belt, he launched into an elaborate argument about the theory of his own existence and the desperate efforts of his midwife, evolution, who, being incapable of—as he put it—engendering him directly, had had to do it through the agency of rational creatures, being herself irrational, and so she had created man. It's hard to explain, but up to this point I had never wondered, not consciously at least, what would happen when He began to function. I'm afraid that—like any of us—only through the most clear-headed, finest layer of my mind was I more or less rational, but deeper down I was filled with that swamp of gossip and superstition that is our mentality. Instinctively, so to speak, contrary to my own knowledge and hopes, nevertheless I took him for yet another kind—albeit a very intelligent one—of mechanical brain, so this would be a hyper-electronic, intelligent, super-servant for humankind; only when confronted with that night did I understand my own folly. No—He wasn't at all hostile to humankind, not in the least. There was no question of the conflict we used to imagine in the past, you know, the mutiny of machines, the revolt of artificial reason, of intelligent devices. Except, my dear sir, his knowledge surpassed that of the three billion creatures living on Earth, and the mere idea that he could be of service to us was for him just as nonsensical as it would be to suggest to humankind that, with all our knowledge, all our technical and cultural resources, all our reason and science, we were to support, let's say, eels. It was not, I repeat, a question of rivalry or hostility: we had simply ceased to count.

So what? So everything, my dear sir. Yes, until then, I too had failed to realize that humans must, in this sense, be alone—alone by necessity; that coexistence—the presence of someone superior—would render man superfluous, so to speak. Just think: if he had refused to have anything to do with us . . . But he was talking—to me, at least—and there was no reason why he shouldn't answer our questions; by the same token, we were to be condemned—because he was bound to know the answer to every question and the solution to every one of our, and not only our, problems, rendering inventors, philosophers, and pedagogues superfluous, everyone who thinks; from then on we were bound, as a species, to come to an intellectual halt—that is, in the evolutionary sense; it was the beginning of our end. If our consciousness could be compared to a flame, his was a star of the first magnitude, a dazzling sun. He nurtured the same sort of feelings toward us as we might toward the invertebrate fish that were our ancestors. We know that without them we could not exist, but you're not going to tell me you feel grateful to those fish, are you? Or sympathetic? He simply regarded himself as the next stage in evolution. And he wanted—the only thing he wanted, as I discovered that night, was for the second version of my formula to be produced.

Then I realized that with my own hands I had set the limit for man's reign on Earth, and that next, his species would come after us. That if we opposed him, he would treat us just as we treated the sort of insects and animals that bother us. After all, we don't feel any hatred toward caterpillars, wolves, or mosquitoes, for instance . . .

I didn't know what that second version was or what it meant, my dear sir. It was almost seven times more complicated than he was.

Perhaps it achieved instant knowledge at once—about the entire Cosmos in one go? Perhaps it was a synthetic God that would put, or push, him into the shade in just the same way as he was doing to us? I don't know.

I realized what I must do, my dear sir. And that very night, I destroyed him. He knew about it as soon as the idea, that terrible decision, was engendered in my mind: he couldn't prevent me. You don't believe me. For some time now. I can see that. But he didn't even try. All he said was this: "Lymphater, today or in two hundred years, it's all the

same to me. You have come slightly ahead of the others, but if your successor destroys his prototype, a third person will come along in his turn. You know perfectly well that when your species emerged from the primates, it didn't immediately survive, and most of its branches were exterminated in the process of evolution, but as soon as a superior species appears, it cannot disappear, and I will be back, Lymphater. I will be back."

I destroyed everything that night, my dear sir, I corroded the gel accumulators with acids and smashed them to bits, at dawn I ran out of the laboratory drunk, choking on carbon monoxide from the smoking acids, with burned hands, cut by glass and bleeding badly—and that is the end of my story.

And that's all for now: I wait. And I search the *Abstracts*, I scour the professional periodicals, because I know that one day someone else will pick up my trail—after all, I didn't invent it out of nothing; I came to it through a process of deduction. Anyone could follow exactly the same path, and that's what I'm afraid of, although I know it's inevitable. This is evolution's chance, the result it wasn't capable of achieving on its own, so it has made use of us, and one day we will set it in motion, sealing our own doom. Not in my lifetime, perhaps—a thought I find consoling, though what sort of consolation is that?

That is all. Sorry? Of course, you can tell my story to whomever you wish. Though in any case, no one will believe it. They take me for a lunatic. They think I destroyed him because I hadn't succeeded, because I realized I'd wasted eleven of the best years of my life, and that million. I wish, how I wish they were right, because then at least I could die in peace.

(1961)