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Precursor Novelties

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Matt has developed a unique style and writing method. Removing all age, gender, ethnicity, physical appearance etc… only leaving words and actions to define a character.

This story, like all of Matt's stories, was written out of home, never at a desk, never stationary.(Matt's original rule was 'only while walking outside' but was revised into 'must be moving through earth based coordinate space' this allows occasional exceptions for trains, buses, etc..). Everything is written with pen and paper, then put into a document with voice-to-text, and finally edited and polished by Matt alone, no other human or AI is involved.

Matt is fascinated and enjoys using AI, but is a firm believer that we should label content.
Human only, AI generated, AI assisted, AI collaboration, etc…

Matt does play with AI in some writing content, like AI assisted poetry (great practice and learning tool to improve writing skills, vocab, cadence, etc..), or AI dialogues as artistic experimentation.
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“So you just tap here to open the canvas view, then sketch the outline and key features. You can use several brush types, thicknesses, and colors.” Hery explains while quickly scribbling a rough doodle of a dragonfly. “Then just tap the identify button.” A quick tap on the round icon of a magnifying glass then a ‘search in progress’ animation spins for a few seconds. An image of a dragonfly pops up, it's labeled “Dragonfly” in bold on top. “And, voila!” Hery announces proudly.

The huddled group of classmates are silent. There is a needy child within Hery that begins to get anxious, craving approval but the expected praise hasn't come, instead a sharp voice provides barbed criticism. “Just dragonfly? No species or variety in particular? Just dragonfly?”

“If you tap here – on the ‘list’ icon – it will give you a list of matching species.” A quick tap, and a long scrollable list appears. Hery taps on the top entry, then an image pops up of an amber colored dragonfly with several labels– ’Pantala Flavescens’, ‘Wandering Glider’, and ‘Globe Skimmer’.

“The drawing you made doesn't resemble the Wandering Glider in particular, no more than it resembles a hundred other species.” That same classmate snaps back without missing a beat. “The Wandering Glider is the most common dragonfly of all, it's no coincidence that it picked that particular dragonfly as the top result. This app isn't precisely matching the specific features of a species. It's just picking the most common and popular ones, isn't it?”

“Well, I kind of rushed that demo. It can match a specific species, let me show you.” Returning to the drawing canvas, this time Hery selects a pink color from the color palette and draws a pink dragonfly, then taps the search button. A couple seconds later an image pops up of a bright pink dragonfly with the labels ‘Orthemis Ferruginea’ and ‘Roseate Skimmer’. Then Hery shows everyone boldly saying. “Voila!” Announcing success with pride.

“Oh come on! That's easy, it's just recognizing the famous pink dragonfly by its distinctive color.” This classmate seems to have it out for Hery, nothing seems to be good enough. “If someone wanted to identify that one it would be easier to just search for ‘pink dragonfly’. I think it's obvious my intended meaning was that I don't think it's capable of differentiating and classifying intricate physical characteristics of a body plan.”

“Oh, it can recognize features and body plans.” Hery repeats the process, this time using the color blue and then drawing very long black legs. The search returns an image of a blue dragonfly with long black legs, the titles are ‘Pachydiplax Longipennis’ and ‘Blue Dasher’. “See! It identifies distinguishing characteristics and finds the closest match.”

“It's a novelty, hardly useful.” This time a different classmate chimes in, smug and disparaging in words and tone. “This silly thing would be useless for real application, any entomologist would not need what it can do, and it wouldn't be able to do anything they actually need.” Grabbing the smartphone and scribbling. “I'm trying to sketch the venation patterns of a Giant Petaltail, but the interface and drawing tools are not precise enough.” Looking around at the other classmates to confirm they are paying attention. “The Giant Petaltail, or Petalura Ingentissima, is considered

a living fossil, its most distinguishing characteristic is its venation patterns. The branching network of veins in the wings of the Petaluridae family are very unique, their venetian structure has remained virtually unchanged for roughly a couple hundred million years, since the Jurrasic. But look… It's impossible to draw the intricate venation lines in the wings, this whole concept of sketch pad drawings can't achieve the level of detail that would be required for a tool like this." Showing everyone a cluttered mess of thick scribbles.

Hery looks at the screen and tries to argue in defense. "With a bigger screen, or a zoom feature, or thinner brushes…" Hery is cut off.

"Patchwork hacks won't change much. The problem is fundamental." A stern rejection from that classmate shuts down Hery's attempt to defend the app. "The fact is that any serious entomologist would never use this. It probably wouldn't even be beneficial to an amateur or student. A touch screen is too brutish for the intricate details required."

The truth is that Hery had already grappled with this stumbling block, and the current version of the app already embodies Hery's best efforts to overcome those impediments. "I know it has some limitations but…"

"Camera and image-based recognition systems are already far better than this, I don't see any use case for it. The functionality might have had a window of time where it would have made sense – before we had AI image recognition – back then it might have been a precursor of what was coming. But it's too late now, it's just a useless novelty by today's standards. Anyways, I've got a class to get to." The first classmate jumped back in to deliver another blow. "If you still want more input, then we can pick this up again later."

As the group disperses Hery is left feeling disheartened and disappointed, the expectation and thirst for approval is unsatisfied, instead beaten down by disparaging and belittling criticism. One student lingers until everyone else is gone and says. "I think it's really cool. I might not study entomology like the rest of you, but I like it. And wow, that's a creative idea, plus a really nice app. There is a lot of great stuff here, don't let them get to you." Then touches Hery on the shoulder.

The consolation does feel good for a moment, then it begins tasting like pity. Hery pulls back as if to spit it out, politely yet abruptly saying. "Thanks, I got to go, see you later. " And heads off to class.

Unable to focus in class, Hery spends the whole time replaying those events. Constructing clever counter arguments that could have been used and wondering if they are right about this being a useless novelty, a defunct would-be precursor. Barely noticing the end of class, lingering in that seat, aware that everyone is leaving but still stuck in those obsessive ruminations. The room is almost empty when Hery is suddenly snapped out of this daze by the professor who is already standing right there gazing down. "Hery, I hear you got that app project working, the one you told me about. I would love to see it."

“Ah… Umm, I don't know.” Caught off guard, Hery replies in a quiet and timid voice. “It's not very good. I think I'll just scrap the whole thing. It probably wouldn't be useful to anyone.”

“Oh, That's too bad. I'd still like to see it though.” The prof is playing along, employing great effort not to sound like an adult trying to console a sad child. “...The concept seemed great to me when we spoke about it. I'm curious to see what problems I failed to foresee.”

Opening the app, Hery proceeds to run through a few examples to demonstrate the inability to draw and identify minute and intricate details, then echoes the criticisms from those classmates and says “So, yeah… You see?”

“Is that all?” Professor Rada says in surprise. “This is an absolutely wonderful app. Those aren't crippling faults, just soft limitations in scope.”

“They aren't so soft, there isn't any way to really resolve them, other than carrying around a huge expensive tablet with a stylus.” Hery is now emphatically arguing against it, channeling those critical classmates. “And even then, image recognition is so good already, you could just use your camera and image based tools to achieve better results. Even if I had made it years earlier, it would still just be a novelty, a precursor to the truly useful tools we have nowadays. There is no point to this project.”

“I see.” Professor Rada sits down. “You are saying that it would not be helpful, that professionals and academics would find it ineffective and inapplicable to research, that it could not help advance the field of study.”

“Exactly!” Hery jumps to agree. “It's just a silly app. I guess it was a good project to practice programming, so at least it's not a total loss.”

“Recapitulation theory was covered in your evolutionary development courseware, right?” The prof asks.

“Umm… Yes… The question catches Hery off guard, it feels so out of the blue. “Why?”

“Recapitulation theory suggested that as embryos develop they replay various evolutionary stages and ancestral body plans.” Pausing to watch Hery scanning memories until seeing that little spark of recognition, then the professor continues. “Let's see how much you remember. What's the first stage?”

“Zygote, but I always felt that was kind of meaningless.” Hery answers without hesitation, offering up some critique. “Of course it starts with a single cell, that's like saying that all lists of numbers begin with zero because there is nothing before the first item.”

“I suppose that's a valid point, but I think of it more like how zero is the first element ID of an array. Programmers famously ‘start counting at zero’ because the variable itself already points to a place in memory, ‘x + 0 is the first position’. Our single-celled ancestors were not just any single cells, they have specific commonalities with us. The zygote stage isn't just a single cell, it resembles a precise type of single-cell, specifically it resembles our single-celled ancestors.” Presenting the counter point in a playful way, ensuring not to sound argumentative. “But anyways, if that one is such an ‘easy cheat’, then what comes next?”

“Gastrulation, all the cells are identical when it's just a ball or hollow sphere, but once it folds inwards and creates layers then there are distinct groups and cellular lineages.” Hery answers immediately, taking a few seconds before elaborating. “Three layers for us animals, the outer ectoderm becomes skin, the middle mesoderm is stuff like bones, muscles, and blood, finally the inner endoderm is the digestive system and organs like liver and kidneys… Everything else comes from these layers too, but I didn't memorize them all.”

“That's already plenty, not many people bother memorizing which layer every single part comes from.” Professor Rada commends that answer and grins proudly until it becomes infectious and Hery smiles back. “There are exceptions though. Most animals are triploblasts – as you describe – with three layers, but others like jellyfish are diploblasts, with only two layers instead of three. It would seem that animals first evolved into dual layer diploblasts, then triploblasts emerged. We triploblasts are arguably more successful, but the diploblasts continued down a different path that they are still exploring today… So what comes next?”

“Neurulation, the outer layer folds to create a tube structure, and that tube becomes the nervous system.” Hery then squints in a quizzical way. “I always thought of nerves as the innermost system. But it's actually the reverse– brains, spinal cords, and nerves are a branch of the outer wall. It kinda feels backwards, the outer layer is skin, and our skin is a sacrificial shield, it's always growing and dying to pile up a protective barrier of dead cells. Nerves are delicate networks of adaptive permanent cells, we almost never grow new ones, they also reorganize and restructure themselves. Nerves reach out feeling around for neighbors, talking to them, connecting and disconnecting, they act like a colony of independent organisms. But skin is pretty much the opposite.”

“That's a very insightful perspective. There is an answer to your question though– the precursor to nervous systems are sensory functions, which came before nerves. Senses were a part of the outer layer first. The outer layer developed sensory abilities, later nerves connected them. Nerves are an extension of senses, not the other way around… But… In 1924, Speman and Mangold’s experiments with BMP stimulus demonstrated that the nervous cells only develop if they receive signals from the mesoderm below. So it's not crazy to interpret that as ‘the muscles recruit some of the skin cells to become nerves’.” Professor Rada watches quietly as Hery visibly enjoys those ideas and framings. “But there are exceptions, of course. Define any rule and the octopus will break it, hahaha. Invertebrates usually employ different signal pathways, and for some – like our friend the octopus – the messenger is FGF signals instead, and they come from the ectoderm itself. Their skin coordinates its own nervous system development and

it forms ganglia, a network of nodes and tendrils. People are still debating if life shares a single ancestral nervous system or if nerves evolved independently multiple times. Regardless, triploblasts developed multiple blueprints for nervous systems and some still continue down those alternate paths today. So, what is the next stage?"

"Phylotypic, the embryo develops key features of its phylum. For humans we are phylum chordata – basically vertebrates – some fundamental structures take form, like spine, gills, and tail…" Hery quickly remembers to add to that. "But we repurpose the gill arches into stuff like jaws and hearing bones, also the tail is reabsorbed, like evolution clicking the undo button."

"Well, a minor technicality should be clarified. The embryo forms a notochord and nerve cord, which –can– develop into a spine, spinal cord, and brain, but there isn't a spine yet." A quick glance to confirm Hery isn't apprehensive about that correction, before adding to it. "Not all chordates are vertebrates, the notochord is only a precursor that can become a spine. For some it develops into something else, and others reabsorb it – or 'undo' it, in your words. You have an excellent memory, only a few more left. Do you remember the rest?"

"Limb buds are next. Tetrapods like reptiles, amphibians, birds, and mammals all grow four small protrusions that will develop into limbs. Then the mammalian stage where we form some key features that differentiate us from other classes, like middle ear bones, hair follicles, lung alveoli, and other mammalian specific features. Finally primate and human traits emerge, opposable thumbs, binocular vision, large brains. The spine optimizes for bipedal posture, the olfactory bulbs shrink and sense of smell is diminished with emphasis instead put on the visual cortex…" Hery takes a break and decides that should be enough. "I appreciate your time and you really did help me refine my grasp on some stuff, but what does recapitulation theory have to do with my app?"

"I just wanted to lay a bit of groundwork, patience is a virtue, haha." The professor chuckles. "Humor me just a bit more, and tell me, what do you know about Franz Mesmer?"

"Mesmer…" Hery thinks, but nothing comes to mind. "I don't know… Is there a connection to the word 'mesmerize'?"

"Yes. Mesmer pioneered many principles of hypnosis and the power of suggestion, Mesmer is to hypnosis as alchemy is to chemistry. His story and ideas are complicated, but long story short– he did discover, experiment, and refine, however it was more pseudoscience than rigorous science. The french king ordered that his claims be investigated. He had built his work on an idea he called 'animal magnetism', the scientific community falsified this specific concept, and Mesmer's story ended with him in exile." Professor Rada would like to elaborate, but is trying to keep tangents short now. "I can see you find this a bit interesting, but I imagine you are ready to ask me how all of this ties together."

"Yes." Hery responds immediately… "Yeah, it's interesting, but I am wondering if we are ever going to arrive at a thesis."

“I often see students glorifying acknowledgment and fantasizing about making great advancements, Mesmer chased those same things and his digging did strike gold. But he misinterpreted and mislabeled the flakes of gold as ‘pixie dust’, so all of his work was thrown out. It wasn't until much later that people realized he had discovered the foundations of things like hypnosis and altered states of consciousness. He even accidentally foreshadowed the placebo effect and psychosomatic effects, Mesmer's patients often did recover or feel better.” The prof pauses, looks at Hery and waits for eye contact. “Progress and discovery are great goals, but advancing our knowledge can come in many forms, often it's not that idealized image of a rigorous scientist who intentionally identifies and excavates a great discovery.”

“I don't get it.” Hery looks confused with a hint of being offended. “Are you saying that my app is like pseudoscience?”

“No no! I'm saying that Mesmer made discoveries beyond current understandings of the time, some intentionally and others accidentally. Much of his work even had an application, hypnosis and the placebo effect are very real, but his work didn't fit neatly into the current paradigm so it ended up shelved, and was only later reanimated. His work became the seeds for whole new fields and theories.” Seeing that Hery's expression hasn't changed yet professor Rada sighs, then reproaches. “Einstein made undeniable discoveries that progressed our understanding by leaps and bounds, but he ended up going off on an unproductive tangent, chasing unified field theory for 30 years to no avail.”

As the professor pauses, suddenly Hery's face lights up. “Oh, when we went through recapitulation theory you kept mentioning how life went down many other paths, that life explored alternate tangents which don't lead to us. Are you comparing science to evolution? Like saying that Einstein is both an evolutionary step, but then also a branch down a tangent?”

“Yes. If you look at scientific progress from today's perspective Einstein's contributions were a huge step forward, but then also a deviation down a dead end. Mesmer is like an abandoned feature that gets reabsorbed and repurposed later. There are so many stories of greats who went down tangents or got obsessed with notions that we discarded.” Tapping on the table a few times for emphasis. “The contributions that matter are often just a tiny fraction of their life's work, and those tiny pieces are like the stages of recapitulation theory. A paradigm shattering evolution eventually just ends up as one small feature in the growth of an embryo. An earth-shattering lifelong masterpiece eventually ends up as a chapter in children's textbooks.”

“What?” Hery looks a bit shocked. “General relativity is crazy difficult, solving those equations takes years of study, it's not in children's textbooks.”

“Ha! Space-time curvature analogies of rubber sheets and heavy balls are taught to 5-year-olds.” The professor laughs. “... And in a few centuries kids might be learning applications of general relativity the same way they do now using calculators and basic trig. It took so many people dedicating lifetimes to develop trigonometry, now we teach it to kids. Plus,

maybe in the future people will live so long that 50 years old is equivalent to an adolescent today, hehe.”

First quiet and pensive, then a gloomy expression starts to emerge on Hery's face. “I wasn't delusional, I never thought that my app was on the level of great science. I just thought it could be a tool that might be useful.” Hery is hunched over using a depressed tone of voice. “I know I'm not exceptional enough to play music alongside the greats, but I kinda thought… Maybe, I could design an instrument to be played in the symphony.” There is such sadness in those words. It's obvious to the professor that this musical metaphor was not spontaneous, Hery had organized a lot of hope and identity into that metaphorical idea, a hopeful dream of crafting instruments as a way of participating in the orchestra. “Today I realized that the instrument I made isn't good enough for the musicians. Hearing you say that those great musicians will be lucky to play even a single correct note doesn't help me feel better, if anything it just makes me feel worse.”

“Oh, no! I only meant to encourage you to look beyond the allure of direct discovery. But I now see that you were already past that, you've already discovered the beauty and purpose in supportive roles.” Professor Rada touches Hery on the shoulder and meets those sad eyes, then says in a very gentle and consoling voice. “If I had known you were already past that hang-up I would have skipped that bit, and started with the important part instead. Do you know why myelination evolved?”

“Important part?” Hery digests that, first curious. What could the ‘important part’ be? Then processing the question. “Myelination?... Nerve cells evolved myelination to accelerate signals.”

“That's correct.” A quick confirmation. “But why? What was the driving evolutionary pressure?”

“Isn't signal speed enough of a purpose?” Hery looks over, but only gets a silent head tilt from the professor, then thinks about it for a while. “Oh, reflex speed!” The professor gives a quick nod. “Faster signals grant faster reflexes, responding quicker than competitors, being faster than prey, and more agile evasion of predators, reflex speed probably provided strong evolutionary pressures.”

“And what about mirror neurons?” The prof asks without explaining the purpose of the previous question. “Why did we originally evolve mirror neurons?”

“If I remember correctly… they aren't a specific cluster or structure, they are more like language skills but even more decentralized and less discreetly clustered, and… We believe they emerged in jawed fish.” Hery doubts the answer but looks to the prof and sees another nod of confirmation. “I think the most popular hypothesis is that they originated in jawed fish for action recognition and prediction. The original function was likely to coordinate and react to the movement of their own species. We think it was used for things like coordinated group movements, such as schooling, predator evasion, and competitive interactions like territorial or mating behavior.”

“Well said. So, myelination developed to accelerate sensory and motor reflex, and if mirror neurons evolved for movement coordination and competition, then what do they have in common?” Professor Rada was about to stop, then realizes something and jumps back in to add a qualifier. “Asides from them both being nervous system adaptations, of course. I'm asking what they have in common for us today – looking at them retrospectively – with the context of how they fit into the longer-term picture.”

“umm…” Hery thinks long and hard. “Obviously they are both neurological adaptations, they both play critical roles in the central nervous system and high level thought, which are some of the defining features of humanity. But you specifically asked what they have in common besides the nervous system, and I can't think of anything.”

“X marks the spot and you're standing right on top of the X, but you just won't look down to see it, haha.” Professor Rada laughs with a friendly smile. “Sorry, I don't mean to laugh. I should be used to this, as a teacher I see this kind of thing all the time. Students often discover the answers they sought, but fail to realize it's right there in front of them.” Taking a calm and serious demeanor now. “You've got it right, all you need to do is strip away the references to the nervous system.”

“But all I did was reference their importance in the nervous system. If I take away the references to it, then there's basically nothing left, just…” Hery's face lights up with realization. “Oh, they are both critical precursors for higher-level developments.”

“Exactly! Myelination allows signals to travel further and faster, it facilitates centralized networks in large bodies, without it larger brains couldn't communicate quickly between distant separated regions. Myelination was an adaptation originally for reflexes in small animals, but it was also a critical precursor for big smart brains.” A short pause to let that sink in before continuing. “Mirror neurons originally enabled simple predictive physical movement behaviors, but now they are crucial to uncountable high level cognitive abilities, like empathy, strategic planning, visualization, memory recall, and so much more. Mirror neurons infuse pretty much every part of our cognition with embodiment, with them our thoughts are not just abstract, our thoughts are also felt, simulated, and experienced internally. Mirror neurons bridge the gap between seeing and doing, between thinking and feeling.” Noticing a look of intense interest in Hery's expression, the prof decides to start taking this in for a landing. “Mirror neurons and myelination are groundbreaking features that are vital to the cognitive jewel in the crown of humanity. But they arose as adaptations trained earlier for preliminary fundamentals, this is how I see your app.”

“What?” Hery is shocked, it takes a few seconds to formulate a response. “How can you say that? You took me on a long winding talk about recapitulation theory, highlighting the small but pivotal and groundbreaking innovations that mark progress. Then you talk about how some early fundamentally important adaptations can enable higher level emergent developments. But my app is none of these, in the evolution of human knowledge and understanding this silly app

plays no part. It's not an adaptation, at best it's just an insignificant novel mutation that could have been a precursor to something else, but now plays no role, destined to be lost in the infinite scrap heap of meaningless random DNA sequences that are abandoned and disappear in time."

"Oh, you misunderstand. You've already passionately embraced the supportive role, just take one more step in that direction." Hery seems puzzled hearing this. "Stop seeing only the steps of technical and academic progress, switch from looking at discoveries and inventions, and instead focus on the people who make that progress."

"Huh?" Hery looks even more confused. "That's already what I was doing. I wanted to create a tool to assist research and investigation."

"Sorry, that's my fault, I wasn't clear. I should have said 'generations of people' instead." Face still painted with confusion, but now Hery's eyes are darting around in deep thought, searching unsuccessfully to decipher the intended meaning. "The depth of our understanding and knowledge doesn't just advance in steps of discovery. Can you tell me what calculus and natural selection have in common?"

"Another riddle?" Hery says in frustration. "I don't know… I guess calculus is ubiquitous, so it's probably used in evolutionary research, just like every other field."

"Okay, I've been a bit too enigmatic. Sorry for acting sphinx-like, it's just a playful habit of mine. Calculus was invented simultaneously by Newton and Leibniz, while natural selection was simultaneously discovered by Darwin and Wallace. They are examples of an extremely common phenomenon– multiple discovery or simultaneous invention." Professor Rada pauses, but only briefly, to avoid letting that linger or seem enigmatic. "Once the conditions and precursors exist, that's when the theory of inevitability in scientific progress is activated. That is how I imagine this app of yours can play a part."

"…" Hery is still lost. "How? We've been over this several times. At best it's a precursor that came too late, after something better already exists. Now it's just a novelty that…"

"Generations! Some progress requires precursors and building blocks that are information and tools, but there are other steps of progress that require precursors which are people." The prof looks at Hery with a beaming smile. "Even the greatest leaps forward by senior experts are inextricably connected to people. People are the culminations of their learning and growth, and all of that starts in childhood. Today's children don't just go to school and learn the academic building blocks, just as importantly – perhaps more importantly – they play educational games and watch infotainment shows."

"Oh, I get it!" Hery exclaims, as this all starts to make sense. "You mean my app would be good for kids. That makes sense, I suppose it might actually be useful to children, they would want to identify simpler insects by using larger general features. It can do that."

“Yes, that is true… but there's also so much more.” Professor Rada continues with enthusiasm. “It's also a great way to practice drawing the insects, which includes fine motor control and artistic skills. Trying to draw an insect also requires identifying the features, which builds visual and conceptual recognition. They could even just draw from imagination and find the closest real life match, engaging a plethora of creative skills. This wouldn't just be two birds with one stone, it's a whole flock of educational value and skill development.”

Hery's face lights up with joy. Looking down at the app. Silence hangs as Hery fills with hope and pride.

“We always use Newton's quote – ‘If I have seen further, It Is by standing on the shoulders of giants’ – and that is so true, for every person in every field of human progress. But they also climb higher and climb faster because they had better playgrounds as children, better ways to learn and practice climbing.” Professor Rada slows down to pause and takes a more serious tone. “Your app won't make you the next Einstein, nor will it be used to make a great discovery by the next Darwin. You can choose to throw it away and try again, to chase that glory, or… You can tweak it and contribute to the playground for the next generation. You can add precursors for their coming round of inevitable inventions. It's your choice.”

“I'm going to make it the best educational and inspirational toy I can.” Hery doesn't hesitate to respond.

“Good choice.” The professor nods in approval with a proud smile. “I think it will not only help inspire the next generation of kids with interest in entomology, it has the potential to contribute to so many other fields by helping fill a new generation with more precursors of skill, creativity, passion, invention, and discovery.”

“Thank you…” Eyes still fixed on the app, which is still glowing on the screen. “I'm going to work hard on this.” Locking eyes with the professor for a prolonged moment, then suddenly the right words pop into Hery's head, and as they are spoken they feel perfect. “I'm going to pour my heart and soul into cultivating inevitable progress by sowing seeds of precursor novelties.”