Pingelap

Pingelap is one of eight tiny atolls scattered in the ocean around Pohnpei. Once lofty volcanic islands like Pohnpei, they are geologically much older and have eroded and subsided over millions of years, leaving only rings of coral surrounding lagoons, so that the combined area of all the atolls—Ant, Pakin, Nukuoro, Oroluk, Kapingamarangi, Mwoakil, Sapwuahfik, and Pingelap—is now no more than three square miles. Though Pingelap is one of the farthest from Pohnpei, 180 miles (of often rough seas) distant, it was settled before the other atolls, a thousand years ago, and still has the largest population, about seven hundred. There is not much commerce or communication between the islands, and only a single boat plying the route between them: the MS *Microglory*, which ferries cargo and occasional passengers, making its circuit (if wind and sea permit) five or six times a year.

Since the *Microglory* was not due to leave for another month, we chartered a tiny prop plane run by the Pacific Missionary Aviation service; it was flown by a retired commercial airliner pilot from Texas who now lived in Pohnpei. We barely managed to squeeze ourselves in, along with luggage, ophthalmoscope and various testing materials, snorkelling gear, photographic

and recording equipment, and special extra supplies for the achromatopes: two hundred pairs of sunglass visors, of varying darkness and hue, plus a smaller number of infant sunglasses and shades.

The plane, specially designed for the short island runways, was slow, but had a reassuring, steady drone, and we flew low enough to see shoals of tuna in the water. It was an hour before we sighted the atoll of Mwoakil, and another hour before we saw the three islets of Pingelap atoll, forming a broken crescent around the lagoon.

We flew twice around the atoll to get a closer view—a view which at first disclosed nothing but unbroken forest. It was only when we skimmed the trees, two hundred feet from the ground, that we could make out paths intersecting the forest here and there, and low houses almost hidden in the foliage.

Very suddenly, the wind rose—it had been tranquil a few minutes before—and the coconut palms and pandanus trees began lashing to and fro. As we made for the tiny concrete airstrip at one end, built by the occupying Japanese a half century before, a violent tailwind seized us near the ground, and almost blew us off the side of the runway. Our pilot struggled to control the skidding plane, for now, having just missed the edge of the landing strip, we were in danger of shooting off the end. By main force, and luck, he just managed to bring the plane around—another six inches and we would have been in the lagoon. "You folks OK?" he asked us, and then, to himself, "Worst landing I ever had!"

Knut and Bob were ashen, the pilot too—they had visions of being submerged in the plane, struggling, suffocating, unable to get out; I myself felt a curious indifference, even a sense that it would be fun, romantic, to die on the reef—and then a sudden,

huge wave of nausea. But even in our extremity, as the brakes screamed to halt us, I seemed to hear laughter, sounds of mirth, all around us. As we got out, still pale with shock, dozens of lithe brown children ran out of the forest, waving flowers, banana leaves, laughing, surrounding us. I could see no adults at first, and thought for a moment that Pingelap was an island of children. And in that first long moment, with the children coming out of the forest, some with their arms around each other, and the tropical luxuriance of vegetation in all directions—the beauty of the primitive, the human and the natural, took hold of me. I felt a wave of love—for the children, for the forest, for the island, for the whole scene; I had a sense of paradise, of an almost magical reality. I thought, I have arrived. I am here at last. I want to spend the rest of my life here—and some of these beautiful children could be mine.

"Beautiful!" whispered Knut, enraptured, by my side, and then, "Look at that child—and that one, and that . . ." I followed his glance, and now suddenly saw what I had first missed: here and there, among the rest, clusters of children who squinted, screwed up their eyes against the bright sun, and one, an older boy, with a black cloth over his head. Knut had seen them, identified them, his achromatopic brethren, the moment he stepped out of the plane—as they, clearly, spotted him the moment he stepped out, squinting, dark-glassed, by the side of the plane.

Though Knut had read the scientific literature, and though he had occasionally met other achromatopic people, this had in no way prepared him for the impact of actually finding himself surrounded by his own kind, strangers half a world away with whom he had an instant kinship. It was an odd sort of encounter which the rest of us were witnessing—pale, Nordic Knut in his Western clothes, camera around his neck, and the

small brown achromatopic children of Pingelap—but intensely moving.[10]

Eager hands grabbed our luggage, while our equipment was loaded onto an improvised trolley—an unstable contraption of rough-hewn planks on trembling bicycle wheels. There are no powered vehicles on Pingelap, no paved roads, only trodden-earth or gravelled paths through the woods, all connecting, directly or indirectly, with the main drag, a broader tract with houses to either side, some tin-roofed, and some thatched with leaves. It was on this main path that we were now being taken, escorted by dozens of excited children and young adults (we had seen no one, as yet, over twenty-five or thirty).

Our arrival—with sleeping bags, bottled water, medical and film equipment—was an event almost without precedent (the island children were fascinated not so much by our cameras as by the sound boom with its woolly muff, and within a day were making their own booms out of banana stalks and coconut wool). There was a lovely festive quality to this spontaneous procession, which had no order, no program, no leader, no precedence, just a raggle-taggle of wondering, gaping people (they at us, we at them and everything around us), making our way, with many stops and diversions and detours, through the forest-village of Pingelap. Little black-and-white piglets darted across our path—unshy, but unaffectionate, unpetlike too, leading their own seemingly autonomous existence, as if the island were equally theirs. We were struck by the fact that the pigs were black and white and wondered, half seriously, if they had been specially bred for, or by, an achromatopic population.

None of us voiced this thought aloud, but our interpreter, James James, himself achromatopic—a gifted young man, who (unlike most of the islanders) had spent a considerable time off-

island and been educated at the University of Guam—read our glances and said, "Our ancestors brought these pigs when they came to Pingelap a thousand years ago, as they brought the breadfruit and yams, and the myths and rituals of our people."

Although the pigs scampered wherever there was food (they were evidently fond of bananas and rotted mangoes and coconuts), they were all, James told us, individually owned—and, indeed, could be counted as an index of the owner's material status and prosperity. Pigs were originally a royal food, and no one but the king, the nahnmwarki, might eat them; even now they were slaughtered rarely, mostly on special ceremonial occasions.[11]

Knut was fascinated not only by the pigs but by the richness of the vegetation, which he saw quite clearly, perhaps more clearly than the rest of us. For us, as color-normals, it was at first just a confusion of greens, whereas to Knut it was a polyphony of brightnesses, tonalities, shapes, and textures, easily identified and distinguished from each other. He mentioned this to James, who said it was the same for him, for all the achromatopes on the island—none of them had any difficulty distinguishing the plants on the island. He thought they were helped in this, perhaps, by the basically monochrome nature of the landscape: there were a few red flowers and fruits on the island, and these, it was true, they might miss in certain lighting situations—but virtually all else was green.[12]

"But what about bananas, let's say—can you distinguish the yellow from the green ones?" Bob asked.

"Not always," James replied. "'Pale green' may look the same to me as 'yellow.'"

"How can you tell when a banana is ripe, then?"

James' answer was to go to a banana tree, and to come back with a carefully selected, bright green banana for Bob.

Bob peeled it; it peeled easily, to his surprise. He took a small bite of it, gingerly; then devoured the rest.

"You see," said James, "we don't just go by color. We look, we feel, we smell, we *know*—we take everything into consideration, and you just take color!"

I had seen the general shape of Pingelap from the air—three islets forming a broken ring around a central lagoon perhaps a mile and a half in diameter; now, walking on a narrow strip of land, with the crashing surf to one side and the tranquil lagoon only a few hundred yards to the other, I was reminded of the absolute awe which seized the early explorers who had first come upon these alien land forms, so utterly unlike anything in their experience. "It is a marvel," wrote Pyrard de Laval in 1605, "to see each of these atolls, surrounded by a great bank of stone involving no human artifice at all."

Cook, sailing the Pacific, was intrigued by these low atolls, and could already, in 1777, speak of the puzzlement and controversy surrounding them:

> Some will have it they are the remains of large islands, that in remote times were joined and formed one continued track of land which the Sea in process of time has washed away and left only the higher grounds. . . . Others and I think . . . that they are formed from Shoals or Coral banks and of consequence increasing; and there are some who think they have been thrown up by Earth quakes.

But by the beginning of the nineteenth century it had become clear that while coral atolls might emerge in the deepest parts of the ocean, the living coral itself could not grow more than a hundred feet or so below the surface and had to have a firm foundation at this depth. Thus it was not imaginable, as Cook

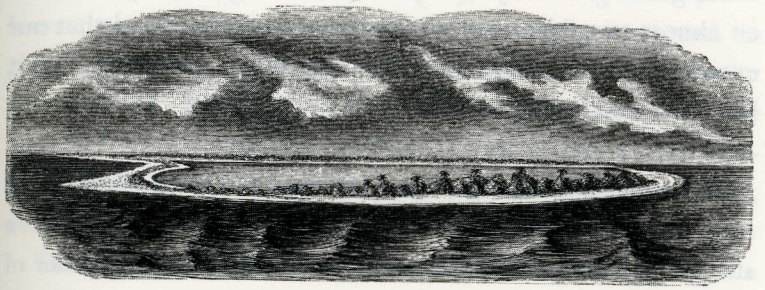
conceived, that sediments or corals could build up from the ocean floor.

Sir Charles Lyell, the supreme geologist of his age, postulated that atolls were the coral-encrusted rims of rising submarine volcanoes, but this seemed to require an almost impossible ser-

endipity of innumerable volcanoes thrusting up to within fifty or eighty feet of the surface to provide a platform for the coral, without ever actually breaking the surface.

Darwin, on the Chilean coast, had experienced at first hand the hugh cataclysms of earthquakes and volcanoes; these, for him, were "parts of one of the greatest phenomena to which this world is subject"—notably, the instability, the continuous movements, the geological oscillations of the earth's crust. Images of vast risings and sinkings seized his imagination: the Andes rising thousands of feet into the air, the Pacific floor sinking thousands of feet beneath the surface. And in the context of this general vision, a specific vision came to him—that such risings and fallings could explain the origin of oceanic islands, and their subsidence to allow the formation of coral atolls. Reversing, in a way, the Lyellian notion, he postulated that coral grew not on the summits of rising volcanoes, but on their submerg-

ing slopes; then, as the volcanic rock eventually eroded and subsided into the sea, only the coral fringes remained, forming a barrier reef. As the volcano continued to subside, new layers of coral polyps could continue to build upward, now in the characteristic atoll shape, toward the light and warmth they depended



on. The development of such an atoll would require, he reckoned, at least a million years.

Darwin cited short-term evidence of this subsidence—palm trees and buildings, for instance, formerly on dry land, which were now under water; but he realized that conclusive proof for so slow a geologic process would be far from easy to obtain. Indeed, his theory (though accepted by many) was not confirmed until a century later, when an immense borehole was drilled through the coral of Eniwetak atoll, finally hitting volcanic rock 4,500 feet below the surface.[13] The reef-constructing corals, for Darwin, were

> wonderful memorials of the subterranean oscillations of level . . . each atoll a monument over an island now lost. We may thus, like unto a geologist who had lived his ten

thousand years and kept a record of the passing changes, gain some insight into the great system by which the surface of this globe has been broken up, and land and water interchanged.

Looking at Pingelap, thinking of the lofty volcano it once was, sinking infinitesimally slowly for tens of millions of years, I felt an almost tangible sense of the vastness of time, and that our expedition to the South Seas was not only a journey in space, but a journey in time as well.

The sudden wind which had almost blown us off the landing strip was dying down now, although the tops of the palms were still whipping to and fro, and we could still hear the thunder of the surf, pounding the reef in huge rolling breakers. The typhoons which are notorious in this part of the Pacific can be especially devastating to a coral atoll like Pingelap (which is nowhere more than ten feet above sea level)—for the entire island can be inundated, submerged by the huge wind-lashed seas. Typhoon Lengkieki, which swept over Pingelap around 1775, killed ninety percent of the island's population outright, and most of the survivors went on to die a lingering death from starvation—for all the vegetation, even the coconut palms and breadfruit and banana trees, was destroyed, leaving nothing to sustain the islanders but fish.[14]

At the time of the typhoon, Pingelap had a population of nearly a thousand, and had been settled for eight hundred years. It is not known where the original settlers came from, but they brought with them an elaborate hierarchical system ruled by hereditary kings or nahnmwarkis, an oral culture and mythology, and a language which had already differentiated so much

by this time that it was hardly intelligible to the "mainlanders" on Pohnpei.[15] This thriving culture was reduced, within a few weeks of the typhoon, to twenty or so survivors, including the nahnmwarki and other members of the royal household.

The Pingelapese are extremely fertile, and within a few decades the population was reapproaching a hundred. But with this heroic breeding—and, of necessity, inbreeding—new problems arose, genetic traits previously rare began to spread, so that in the fourth generation after the typhoon a "new" disease showed itself. The first children with the Pingelap eye disease were born in the 1820s, and within a few generations their numbers had increased to more than five percent of the population, roughly what it remains today.

The mutation for achromatopsia may have arisen among the Carolinians centuries before; but this was a recessive gene, and as long as there was a large enough population the chances of two carriers marrying, and of the condition becoming manifest in their children, were very small. All this altered with the typhoon, and genealogical studies indicate that it was the surviving nahnmwarki himself who was the ultimate progenitor of every subsequent carrier.

Infants with the eye disease appeared normal at birth, but when two or three months old would start to squint or blink, to screw up their eyes or turn their heads away in the face of bright light; and when they were toddlers it became apparent that they could not see fine detail or small objects at a distance. By the time they reached four or five, it was clear they could not distinguish colors. The term maskun ("not-see") was coined to describe this strange condition, which occurred with equal frequency in both male and female children, children otherwise normal, bright, and active in all ways.

Today, over two hundred years after the typhoon, a third of the population are carriers of the gene for maskun, and out of some seven hundred islanders, fifty-seven are achromats. Elsewhere in the world, the incidence of achromatopsia is less than one in 30,000—here on Pingelap it is one in 12.

Our ragged procession, tipping and swaying through the forest, with children romping and pigs under our feet, finally arrived at the island's administration building, one of the three or four two-storey cinderblock buildings on the island. Here we met and were ceremoniously greeted by the nahnmwarki, the magistrate, and other officials. A Pingelapese woman, Delihda Isaac, acted as interpreter, introducing us all, and then herself—she ran the medical dispensary across the way, where she treated all sorts of injuries and illnesses. A few days earlier, she said, she had delivered a breech baby—a difficult job with no medical equipment to speak of—but both mother and child were doing fine. There is no doctor on Pingelap, but Delihda had been educated off-island and was often assisted by trainees from Pohnpei. Any medical problems which she cannot handle have to wait for the visiting nurse from Pohnpei, who makes her rounds to all the outlying islands once a month. But Delihda, Bob observed, though kind and gentle, was clearly a "real force to be reckoned with."

She took us on a brief tour of the administration building—many of the rooms were deserted and empty, and the old kerosene generator designed to light it looked as if it had been out of action for years.[16] As dusk fell, Delihda led the way to the magistrate's house, where we would be quartered. There were no street lights, no lights anywhere, and the darkness seemed to gather and fall very rapidly. Inside the house, made of concrete

blocks, it was dark and small and stiflingly hot, a sweatbox, even after nightfall. But it had a charming outdoor terrace, over which arched a gigantic breadfruit tree and a banana tree. There were two bedrooms—Knut took the magistrate's room below, Bob and I the children's room above. We gazed at each other fearfully—both insomniacs, both heat intolerant, both restless night readers—and wondered how we would survive the long nights, unable even to distract ourselves by reading.

I tossed and turned all night, kept awake in part by the heat and humidity; in part by a strange visual excitement such as I am sometimes prone to, especially at the start of a migraine—endlessly moving vistas of breadfruit trees and bananas on the darkened ceiling; and, not least, by a sense of intoxication and delight that now, finally, I had arrived on the island of the colorblind.

None of us slept well that night. We gathered, tousled, on the terrace at dawn, and decided to reconnoitre a bit. I took my notebook and made brief notes as we walked (though the ink tended to smudge in the wet air):

> Six o'clock in the morning, and though the air is blood-hot, sapping, doldrum-still, the island is already alive with activity—pigs squealing, scampering through the undergrowth; smells of fish and taro cooking; repairing the roofs of houses with palm fronds and banana leaves as Pingelap prepares itself for a new day. Three men are working on a canoe—a lovely traditional shape, sawn and shaved from a single massive tree trunk, using materials and methods which have not changed in a thousand or more years. Bob and Knut are fascinated by the boat building, and watch it closely, contentedly. Knut's attention is also drawn to the

other side of the road, to the graves and altars beside some of the houses. There is no communal burial, no graveyard, in Pingelap, only this cosy burying of the dead next to their houses, so that they still remain, almost palpably, part of the family. There are strings, like clothes lines, hung around the graves, upon which gaily colored and patterned pieces of cloth have been hung—perhaps to keep demons away, perhaps just for decoration; I am not sure, but they seem festive in spirit.

My own attention is riveted by the enormous density of vegetation all around us, so much denser than any temperate forest, and a brilliant yellow lichen on some of the trees. I nibble at it—many lichens are edible—but it is bitter and unpromising.

Everywhere we saw breadfruit trees—sometimes whole groves of them, with their large, deeply lobed leaves; they were heavy with the giant fruits which Dampier, three hundred years ago, had likened to loaves of bread.[17] I had never seen trees so generous of themselves—they were very easy to grow, James had said, and each tree might yield a hundred massive fruits a year, more than enough to sustain a man. A single tree would bear fruit for fifty years or more, and then its fine wood could be used for lumber, especially for building the hulls of canoes.

Down by the reef, dozens of children were already swimming, some of them toddlers, barely able to walk, but plunging fearlessly into the water, among the sharp corals, shouting with excitement. I saw two or three achromatopic kids diving and romping and yelling with the rest—they did not seem isolated or set apart, at least at this stage of their lives, and since it was still very early, and the sky was overcast, they were not blinded

as they would be later in the day. Some of the larger children had tied the rubber soles of old sandals to their hands, and had developed a remarkably swift dog paddle using these. Others dived to the bottom, which was thick with huge, tumid sea cucumbers, and used these to squeeze jets of water at each other. . . . I am fond of holothurians, and I hoped they would survive.

I waded into the water, and started diving for sea cucumbers myself. At one time, I had read, there had been a brisk trade exporting sea cucumbers to Malaya, China, and Japan, where they are highly esteemed as trepang or bêche-de-mer or namako. I myself love a good sea cucumber on occasion—they have a tough gelatinousness, an animal cellulose in their tissues, which I find most appealing. Carrying one back to the beach, I asked James whether the Pingelapese ate them much. "We eat them," he said, "but they are tough and need a lot of cooking—though this one," he pointed to the *Stichopus* I had dredged up, "you can eat raw." I sank my teeth into it, wondering if he was joking; I found it impossible to get through the leathery integument—it was like trying to eat an old, weathered shoe.[18]

After breakfast, we visited a local family, the Edwards. Entis Edward is achromatopic, as are all three of his children, from a babe in arms, who was squinting in the bright sunlight, to a girl of eleven. His wife, Emma, has normal vision, though she evidently is a carrier of the gene. Entis is well educated, with little command of English but a natural eloquence; he is a minister in the Congregationalist Church and a fisherman, a man well respected in the community. But this, his wife told us, was far from the rule. Most of those born with the maskun never learn to read, because they cannot see the teacher's writing on the

board; they have less chance of marrying—partly because it is recognized that their children are likelier to be affected, partly because they cannot work outdoors in the bright sunlight, as most of the islanders do.[19] Entis was an exception here, on every count, and very conscious of it: "I have been lucky," he said. "It is not easy for the others."

Apart from the social problems it causes, Entis does not feel his colorblindness a disability, though he is often disabled by his intolerance of bright light and his inability to see fine detail. Knut nodded as he heard this; he had been deeply attentive to everything Entis said, and identified with him in many ways. He took out his monocular to show Entis—the monocular which is almost like a third eye for him, and always hangs round his neck. Entis' face lit up with delight as, adjusting the focus, he could see, for the first time, boats bobbing on the water, trees on the horizon, the faces of people on the other side of the road, and, focusing right down, the details of the skin whorls on his own fingertips. Impulsively, Knut removed the monocular from around his neck, and presented it to Entis. Entis, clearly moved, said nothing, but his wife went into the house and came out bearing a beautiful necklace she had made, a triple chain of matched cowrie shells, the most precious thing the family had, and this she solemnly presented to Knut, while Entis looked on.

Knut himself was now disabled, without his monocular—"It is like giving half my eye to him, because it is necessary to my vision"—but deeply happy. "It will make all the difference to him," he said. "I'll get another one later."

The following day we saw James, squinting against the sunlight, watching a group of teenagers playing basketball. As our interpreter and guide, he had seemed cheerful, sociable, knowledgeable, very much part of the community—but now, for the first time, he seemed quiet, wistful, and rather solitary and sad. We got to talking, and more of his story emerged. Life and school had been difficult for him, as for the other achromatopes on Pingelap—unshielded sunlight was literally blinding for him, and he could hardly go out into it without a dark cloth over his eyes. He could not join the rough-and-tumble, the open-air games the other children enjoyed. His acuity was very poor, and he could not see any of the schoolbooks unless he held them three inches from his eyes. Nonetheless he was exceptionally intelligent and resourceful, and he learned to read early, and loved reading, despite this handicap. Like Delihda, he had gone to Pohnpei for further schooling (Pingelap itself has a small elementary school, but no secondary education). Clever, ambitious, aspiring to a larger life, James went on to get a scholarship to the University of Guam, spent five years there, and got a degree in sociology. He had returned to Pingelap full of brave ideas: to help the islanders market their wares more efficiently, to obtain better medical services and child care, to bring electricity and running water into every house, to improve standards of education, to bring a new political consciousness and pride to the island, and to make sure that every islander—the achromatopes especially—would get as a birthright the literacy and education he had had to struggle so hard to achieve.

None of this had panned out—he encountered an enormous inertia and resistance to change, a lack of ambition, a laissez-faire, and gradually he himself had ceased to strive. He could find no job on Pingelap appropriate to his education or talents, because Pingelap, with its subsistence economy, *has* no jobs, apart from those of the health worker, the magistrate, and a couple of teachers. And now, with his university accent, his new

manners and outlook, James no longer completely belonged to the small world he had left, and found himself set apart, an outsider.

We had seen a beautifully patterned mat outside the Edwards' house, and now noticed similar ones everywhere, in front of the traditional thatched houses, and equally the newer ones, made of concrete blocks with corrugated aluminum roofs. The weaving of these mats was a craft unchanged from "the time before time," James told us; the traditional fibers, made from palm fronds, were still used (although the traditional vegetable dyes had been replaced by an inky blue obtained from surplus carbon paper, for which the islanders otherwise had little need). The island's finest weaver was a colorblind woman, who had learned the craft from her mother, who was also colorblind. James took us to meet her; she was doing her intricate work inside a hut so dark we could hardly see anything after the bright sunlight. (Knut, on the other hand, took off his double sunglasses and said it was, visually, the most comfortable place he had yet encountered on the island.) As we adapted to the darkness, we began to see her special art of brightnesses, delicate patterns of differing luminances, patterns that all but disappeared as soon as we took one of her mats into the sunlight outside.

Recently, Knut told her, his sister, Britt, to prove it could be done, had knitted a jacket in sixteen different colors. She had devised her own system for keeping track of the skeins of wool, by labelling them with numbers. The jacket had marvellous intricate patterns and images drawn from Norwegian folktales, he said, but since they were done in dim browns and purples, colors without much chromatic contrast, they were almost invisible to normal eyes. Britt, however, responding to luminances only, could see them quite clearly, perhaps even more clearly than color-normals. "It is my special, secret art," she says. "You have to be totally colorblind to see it."

Later in the day, we went to the island's dispensary to meet more people with the maskun—almost forty people were there, more than half the achromatopes on the island. We set up in the main room—Bob with his ophthalmoscope, his lenses and acuity tests, and I with a mass of colored yarns and drawings and pens, as well as the standard color-testing kits. Knut had brought along a set of Sloan achromatopsia cards. I had never seen these before, and Knut explained the test to me: "Each of these cards has a range of grey squares which vary only in tone, progressing from a very light grey to a very dark grey, almost black, really. Each square has a hole cut out in the center, and if I place a sheet of colored paper behind these—like this—one of the squares will be a match for the color; they will have an equal density." He pointed to an orange dot, surrounded by a medium grey background. "For me the internal dot and the surround here are exactly the same."

Such a match would be completely meaningless for a color-normal, for whom no color can ever "match" a grey, and extremely difficult for most—but quite easy and natural for an achromatope, who sees all colors, and all greys, only as differing luminances. Ideally, the test should be administered with a standard source of illumination, but since there was no electricity to run lights on the island, Knut had to use himself as a standard, comparing each achromatope's responses to his own. In nearly every case, these were the same, or very close.

Medical testing is usually rather private, but here it was very public, and with dozens of youngsters peering in through the windows, or wandering among us as we tested, took on a communal and humorous and almost festive quality.

Bob wanted to check refraction in each person, and to examine their retinas closely—by no means easy, when the eyes are continually jerking with nystagmus. It was not possible, of course, to see the microscopic rods and cones (or lack thereof) directly, but he could find nothing else amiss on inspection with his ophthalmoscope. It had been suggested by some earlier researchers that the maskun was linked with severe myopia; but Bob found that although many of the achromatopes were nearsighted, many were not (Knut himself is rather farsighted)—and he also found that a similar proportion of the island's color-normals were nearsighted as well. If there were a genetic form of myopia here, Bob felt, it was transmitted independently of the achromatopsia.[20] It was possible as well, he added, that reports of nearsightedness had been exaggerated by earlier researchers who had observed so many of the islanders squinting and bringing small objects closer to view—behaviors which might appear to indicate myopia but actually reflected the intolerance of bright light and poor acuity of the achromatopes.

I asked the achromatopes if they could judge the colors of various yarns, or at least match them one with another. The matching was clearly done on the basis of brightness and not color—thus yellow and pale blue might be grouped with white, or saturated reds and greens with black. I had also brought the Ishihara pseudoisochromatic test plates for ordinary partial colorblindness, which have numbers and figures formed by colored dots, distinguishable only by color (and not luminosity) from the dots surrounding them. Some of the Ishihara plates,

paradoxically, cannot be seen by color-normals, but only by achromatopes—these have dots which are identical in hue, but vary slightly in luminance. The older children with the maskun were particularly excited by these—it turned the tables on me, the tester—and they jostled to take their turns pointing out the special numbers that I could not see.

Knut's presence while we were examining those with maskun, his sharing of his own experiences, was crucial, for it helped remove our questions from the sphere of the inquisitive, the impersonal, and bring us all together as fellow creatures, making it easier for us, finally, to clarify and reassure. For although the lack of color vision in itself did not seem to be a subject of concern, there were many misapprehensions about the maskun—in particular, fears that the disease might be progressive, might lead to complete blindness, might go along with retardation, madness, epilepsy, or heart trouble. Some believed that it could be caused by carelessness during pregnancy, or transmitted through a sort of contagion. Though there was some sense of the fact that the maskun tended to run in certain families, there was little or no knowledge about recessive genes and heredity. Bob and I did our best to stress that the maskun was nonprogressive, affected only certain aspects of vision, and that with a few simple optical aids—dark sunglasses or visors to reduce bright light, and magnifying glasses and monoculars to allow reading and sharp distance vision—someone with the maskun could go through school, live, travel, work, in much the same way as anyone else. But more than words could, Knut himself brought this home, partly by using his own sunglasses and magnifier, partly by the manifest achievement and freedom of his own life.

Outside the dispensary, we began to give out the wraparound

sunglasses we had brought, along with hats and visors, with varying results. One mother, with an achromatopic infant squalling and blinking in her arms, took a pair of tiny sunglasses and put them on the baby's nose, which seemed to calm him, and led to an immediate change in his behavior. No longer blinking and squinting, he opened his eyes wide and began to gaze around with a lively curiosity. One old woman, the oldest achromatope on the island, indignantly refused to try any sunglasses on. She had lived eighty years as she was, she said, and was not about to start wearing sunglasses now. But many of the other achromatopic adults and teenagers evidently liked the sunglasses, wrinkling their noses at the unaccustomed weight of them, but manifestly less disabled by the bright light.

It is said that Wittgenstein was either the easiest or the most difficult of house-guests to accommodate, because though he would eat, with gusto, whatever was served to him on his arrival, he would then want exactly the same for every subsequent meal for the rest of his stay. This is seen as extraordinary, even pathological, by many people—but since I myself am similarly disposed, I see it as perfectly normal. Indeed, having a sort of passion for monotony, I greatly enjoyed the unvarying meals on Pingelap, whereas Knut and Bob longed for variety. Our first meal, the model which was to be repeated three times daily, consisted of taro, bananas, pandanus, breadfruit, yams, and tuna followed by papaya and young coconuts full of milk. Since I am a fish and banana person anyhow, these meals were wholly to my taste.

But we were all revolted by the Spam which appeared with each meal—invariably fried; why, I wondered, should the Pingelapese eat this filthy stuff when their own basic diet was both

healthy and delicious? Especially when they could hardly afford it, because Pingelap has only the small amount of money it can raise from the export of copra, mats, and pandanus fruits to Pohnpei. I had talked with the unctuous Spam baron on the plane; and now, on Pingelap, I could see the addiction in full force. How was it that not only the Pingelapese, but all the peoples of the Pacific, seemingly, could fall so helplessly, so voraciously, on this stuff, despite its intolerable cost to their budgets and their health? I was not the first to puzzle about this; later, when I came to read Paul Theroux's book *The Happy Isles of Oceania*, I found his hypothesis about this universal Spam mania:

> It was a theory of mine that former cannibals of Oceania now feasted on Spam because Spam came the nearest to approximating the porky taste of human flesh. "Long pig" as they called a cooked human being in much of Melanesia. It was a fact that the people-eaters of the Pacific had all evolved, or perhaps degenerated, into Spam-eaters. And in the absence of Spam they settled for corned beef, which also had a corpsy flavor.

So far as I knew, though, there was no tradition of cannibalism on Pingelap.[21]

Whether or not Spam is, as Theroux suggests, a sublimate of cannibalism, it was a relief to visit the taro patch, the ultimate source of food, which covers ten swampy acres in the center of the island. The Pingelapese speak of taro with reverence and affection, and sooner or later everyone takes a turn at working in the communally owned patch. The ground is carefully cleaned of debris, and turned over by hand, and the soil is then planted

with shoots about eighteen inches long. The plants grow with extraordinary speed, soon reaching ten feet or more in height, with broad triangular leaves arching overhead. The upkeep of the patch devolves traditionally on the women, working barefoot in the ankle-high mud, and different parts of the patch are tended and harvested by them each day. The deep shade cast by the huge leaves makes it a favorite meeting place, particularly for those with the maskun.

A dozen or more varieties of taro are grown in the patch, and their large, starchy roots range in taste from bitter to sweet. The roots can be eaten fresh, or dried and stored for later use. Taro is the ultimate crop for Pingelap, and there is still a vivid communal memory of how, during typhoon Lengkieki two centuries ago, the taro patch was inundated with salt water and totally destroyed—and that it was this which brought the remaining islanders to starvation.

Coming back from the taro patch, we were approached by an old man in the woods, who came up to us diffidently, but determinedly, and asked if he could get Bob's advice, as he was going blind. He had clouded eyes, and Bob, examining him later at the dispensary with his ophthalmoscope, confirmed that he had cataracts, but could find nothing else amiss. Surgery could probably help him, he told the old man, and this could be done in the hospital on Pohnpei, with every chance of restoring good vision. The old man gave us a big smile and hugged Bob. When Bob asked Delihda, who coordinates with the visiting nurse from Pohnpei, to put the man's name down for cataract surgery, she commented that it was a good thing he had approached us. If he had not, she said, he would have been allowed to go completely blind. Medical services in Pingelap are spread very thin, already overstretched by more pressing conditions. Cataracts (like

achromatopsia) are a very low priority concern here; and cataract surgery, with the added costs of transport to Pohnpei, is generally considered too expensive to do. So the old man would get treatment, but he would be the exception to the rule.

I counted five churches on Pingelap, all Congregationalist. I had not seen so great a density of churches since being in the little Mennonite community of La Crete in Alberta; here, as there, churchgoing is universal. And when there is not churchgoing, there is hymn singing and Sunday school.

The spiritual invasion of the island began in earnest in the mid-nineteenth century, and by 1880, the entire population had been converted. But even now, more than five generations later, though Christianity is incorporated into the culture, and fervently embraced in a sense, there is still a reverence and nostalgia for the old ways, rooted in the soil and vegetation, the history and geography, of the island. Wandering through the dense forest at one point, we heard voices singing—voices so high and unexpected and unearthly and pure that I again had a sense of Pingelap as a place of enchantment, another world, an island of spirits. Making our way through the thick undergrowth, we reached a little clearing, where a dozen children stood with their teacher, singing hymns in the morning sun. Or were they singing *to* the morning sun? The words were Christian, but the setting, the feeling, were mythical and pagan. We kept hearing snatches of song as we walked about the island, usually without seeing the singer or singers—choirs, voices, incorporeal, on the air. They seemed innocent at first, almost angelic, but then to take on an ambiguous, mocking note. If I had thought first of Ariel, I thought now of Caliban; and whenever

voices, hallucination-like, filled the air, Pingelap, for me, took on the quality of Prospero's isle:

> Be not afeard: the isle is full of noises,
> Sounds and sweet airs, that give delight, and hurt not.

When Jane Hurd, an anthropologist, spent a year on Pingelap in 1968 and '69, the old nahnmwarki was still able to give her, in the form of an extended epic poem, an entire oral history of the island—but with his death a good deal of this knowledge and memory died.[22] The present nahnmwarki can give the flavor of old Pingelapese belief and myth, but no longer has the detailed knowledge his grandfather had. Nonetheless, he himself, as a teacher at the school, does his best to give the children a sense of their heritage and of the pre-Christian culture which once flourished on the island. He spoke nostalgically, it seemed to us, of the old days on Pingelap, when everyone knew who they were, where they came from, and how the island came into being. At one time, the myth went, the three islets of Pingelap formed a single piece of land, with its own god, Isopaw. When an alien god came from a distant island and split Pingelap into two, Isopaw chased him away—and the third islet was created from a handful of sand dropped in the chase.

We were struck by the multiple systems of belief, some seemingly contradictory, which coexist among the Pingelapese. A mythical history of the island is maintained alongside its secular history; thus the maskun is seen simultaneously in mystical terms (as a curse visited upon the sinful or disobedient) and in purely biological terms (as a morally neutral, genetic condition transmitted from generation to generation). Traditionally, it was traced back to the Nahnmwarki Okonomwaun, who ruled

from 1822 to 1870, and his wife, Dokas. Of their six children, two were achromatopic. The myth explaining this was recorded by Irene Maumenee Hussels and Newton Morton, geneticists from the University of Hawaii who visited Pingelap (and worked with Hurd) in the late 1960s:

> The god Isoahpahu became enamored of Dokas and instructed Okonomwaun to appropriate her. From time to time, Isoahpahu appeared in the guise of Okonomwaun and had intercourse with Dokas, fathering the affected children, while the normal children came from Okonomwaun. Isoahpahu loved other Pingelapese women and had affected children by them. The "proof" of this is that persons with achromatopsia shun the light but have relatively good night vision, like their ghostly ancestor.

There were other indigenous myths about the maskun: that it might arise if a pregnant woman walked upon the beach in the middle of the day—the blazing sun, it was felt, might partly blind the unborn child in the womb. Yet another legend had it that it came from a descendant of the Nahnmwarki Mwahuele, who had survived typhoon Lengkieki. This descendant, Inek, was trained as a Christian minister by a missionary, Mr. Doane, and was assigned to Chuuk, as Hussels and Morton write, but refused to move because of his large family on Pingelap. Mr. Doane, "angered by this lack of evangelical zeal," cursed Inek and his children with the maskun.

There were also persistent notions, as always with disease, that the maskun had come from the outside world. The nahnmwarki spoke, in this vein, of how a number of Pingelapese had been forced to labor in the German phosphate mines on the distant island of Nauru, and then, on their return, had fathered

children with maskun. The myth of contamination, ascribed (like so many other ills) to the coming of the white man, took on a new form with our visit. This was the first time the Pingelapese had ever seen another achromatope, an achromatope from outside, and this "confirmed" their brooding suspicions. Two days after our arrival, a revised myth had already taken root in the Pingelapese lore: it must have been achromatopic white whalers from the far north, they now realized, who had landed on Pingelap early in the last century—raping and rampaging among the island women, fathering dozens of achromatopic children, and bringing their white man's curse to the island. The Pingelapese with maskun, by this reckoning, were partly Norwegian—descendants of people like Knut. Knut was awed by the rapidity with which this not entirely jocular, fantastic myth emerged, and by finding himself, or his people, "revealed" as the ultimate origin of the maskun.

On our last evening in Pingelap, a huge crimson sunset shot with purples and yellows and a touch of green hung over the ocean and filled half the sky. Even Knut exclaimed, "Unbelievable!" and said he had never seen such a sunset before. As we came down to the shore, we saw dozens of people almost submerged in the water—only their heads were visible above the reef. This happened every evening, James had told us—it was the only way to cool off. Looking around, we saw others lying, sitting, standing and chatting in small clusters—it looked as if most of the island's population was here. The cooling hour, the social hour, the hour of immersion, had begun.

As it got darker, Knut and the achromatopic islanders moved more easily. It is common knowledge among the Pingelapese that those with the maskun manage better at scotopic times—

dusk and dawn, and moonlit nights—and for this reason, they are often employed as night fishers. And in this the achromatopes are preeminent; they seem able to see the fish in their dim course underwater, the glint of moonlight on their outstretched fins as they leap—as well as, or perhaps better than, anyone else.

Our last night was an ideal one for the night fishers. I had hoped we might go in one of the enormous hollow-log canoes with outriggers which we had seen earlier, but we were led instead toward a boat with a small outboard motor. The air was very warm and still, so it was sweet to feel a slight breeze as we moved out. As we glided into deeper waters, the shoreline of Pingelap vanished from sight, and we moved on a vast lightless swell with only the stars and the great arc of the Milky Way overhead.

Our helmsman knew all the major stars and constellations, seemed completely at home with the heavens—Knut, indeed, was the only one equally knowledgeable, and the two of them exchanged their knowledge in whispers: Knut with all modern astronomy at his fingertips, the helmsman with an ancient practical knowledge such as had enabled the Micronesians and Polynesians, a thousand years ago, to sail across the immensities of the Pacific by celestial navigation alone, in voyages comparable to interplanetary travel, until, at last, they discovered islands, homes, as rare and far apart as planets in the cosmos.

About eight o'clock the moon rose, almost full, and so brilliant that it seemed to eclipse the stars. We heard the splash of flying fish as they arced out of the water, dozens at a time, and the plopping sound as they plummeted back to the surface.

The waters of the Pacific are full of a tiny protozoan, *Noctiluca*, a bioluminescent creature able to generate light, like a

firefly. It was Knut who first noticed their phosphorescence in the water—a phosphorescence most evident when the water was disturbed. Sometimes when the flying fish leapt out of the water, they would leave a luminous disturbance, a glowing wake, as they did so—and another splash of light as they landed.[23]

Night fishing used to be done with a flaming torch; now it is done with the help of a flashlight, the light serving to dazzle as well as spot the fish. As the beautiful creatures were illuminated in a blinding flashlight beam, I was reminded how, as a child, I would see German planes transfixed by roving searchlights as they flew in the darkened skies over London. One by one we pursued the fish; we followed their careerings relentlessly, this way and that, until we could draw close enough for the fisher to shoot out the great hoop of his net, and catch them as they returned to the water. They accumulated in the bottom of the boat, silvery, squirming, until they were hit on the head (though one, actually, in its frenzy, managed to leap out of the boat, and we so admired this that we did not try to catch it again).

After an hour we had enough, and it was time to go after deeper-water fish. There were two teenage boys with us, one achromatopic, and they now donned scuba gear and masks and, clutching spears and flashlights, went over the side of the boat. We could see them, two hundred yards or more from the boat, like luminous fish, the phosphorescent waters outlining their bodies as they moved. After ten minutes they returned, loaded with the fish they had speared, and climbed back into the boat, their wet scuba gear gleaming blackly in the moonlight.

The long, slow trip back was very peaceful—we lay back in the boat; the fishers murmured softly among themselves. We had enough, more than enough, fish for all. Fires would be lit on

the long sandy beach, and we would have a grand, final feast on Pingelap before flying back to Pohnpei the next morning. We reached the shore and waded back onto the beach, pulling the boat up behind us. The sand itself, broader with the tide's retreat, was still wet with the phosphorescent sea, and now, as we walked upon it, our footsteps left a luminous spoor.