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on
the
average

by . . . Frank B. Bryning

Critics of Dr. Rhine's famed ESP experiments have eyed the Law of Averages with skepticism. In space those critics may triumph.

ANCHORED TO THE floor by his magnetic soles, Ted Price, B. Chem., sat back on his heels in the effortless, knee-hugging posture which was so easy to sustain in free orbit, where his weight was nil. And made brief notations on his check list. Before him and on either side the ladder-connected racks of the storage bay in Laboratory 4 spiraled up from floor to ceiling. Guard rails and wall clips embraced row upon row of gallon-capacity carboys of liquid chemicals, each scrupulously labeled.

Suddenly Price ducked and crouched lower at the sound, instant-short but menacing, of rupturing metal, shattering glass, and a high-pitched, brief whistle. Breaking foot contact, he flattened himself to the floor and pushed against the rack in front of him.

Backwards, an inch or two above the floor, he floated, until his feet touched the bulkhead beyond the open end of the storage bay, and he got them under him again. Keeping low, he peered cautiously upwards between fingers held over

When a proud ship is in dire peril in the gulfs between the planets it takes a navigator of heroic mold to bring her safely to port without a single waste motion. Happily waste motions are seldom encountered in the interplanetary sagas of F. B. Bryning, for he has little patience with the wreckers and destroyers of space opera science fiction. In Mr. Bryning's unforgettable yarns men either stand or fall by their inner resources, chronicled with a documentary-type realism that adds a new side to the bright, prophetic horizons of tomorrow.

his eyes—and blanched at what he saw.

Drifting and spinning in the air were a myriad fragments of broken glassware and globules of potent liquids ranging in size from fine raindrops to large oranges. Like soap bubbles from a child's pipe the liquids floated in the zero gravity interior of the space vehicle, moving here and there at random—grazing, touching, colliding, coalescing, hissing, fuming, and rapidly filling the confined space of the storage bay with gases of unguessable composition.

A glance showed Price that six carboys—three on one shelf and three further along on the shelf below—had disintegrated, as if a slash had been made at them, diagonally, across the shelving. Then his view was obscured by a white fog as, right before his face, a large globule of ammonia collided with another of hydrochloric acid, and enveloped him in an acrid cloud of irritating, stinging, ammonium chloride.

Shutting his eyes tightly he swung away, coughing and gasping, to blunder into a grape-like cluster of ether globules.

"Dr. Waddy!" he choked, as he groped his way along the bulkhead. "Look out for ammonia . . . ether . . . Look out . . ."

On the laboratory side of the storage bay partition Senior Chemist Charles Waddy gave no sign of having heard. With his feet gripped by floor loops, he swayed about

before his bench, limply upright, a blood-red groove ploughed skull-deep across his scalp.

In Laboratory 3, next door, chemists Brocklehurst and Wright, who had been making quite a little noise on their own account with a grinding wheel and glass tubing, had noticed nothing amiss. After a few minutes, however, Wright found Brocklehurst regarding him intently.

"Something's wrong with our air," said Brocklehurst. "Your earlobe gauge shows an oxygen deficiency. How's mine?"

"Yours too," confirmed Wright. "And it's getting cold in here. We're losing air!" Slipping his feet from the floor loops he dived across to the intercom. "I'll report."

Brocklehurst remained where he was, his eyes scanning the wall to his left, which was the outer wall of Vehicle Five—Chemistry—on Satellite Space Station Commonwealth Two. After twenty seconds he, too, slipped his foot loops, dived across the room, and jerked open a small drawer built into the wall bench.

"Report also a half-inch perforation in outer wall of Lab Three," he called to Wright as he took a four-inch disk of rubber from the drawer.

Levitating across to the perforation through which the air was hissing, he first explored its edge with a fingertip. Then he peeled the calico from the adhesive underside of the rubber disk and slapped

the patch over the hole. Dimpled in the middle by the air pressure, and sealed by the cement of its underside, it remained rigidly in position.

Facing about, Brocklehurst studied the bulkhead to his right for several seconds.

"And there's another hole—same size—in the bulkhead between Labs Three and Four!"

Meanwhile, Dr. Frank Thomas, Chief Chemist, and Officer Commanding Vehicle Five—Chemistry—had begun to make the "all lines" connection on his intercom on his own initiative.

"General emergency!" he announced before Wright had quite finished his report. "Attention all personnel, Vehicle Five! Prepare to get airtight! Prepare—to—get—airtight!"

He swung towards the wall and closed two switches. "All emergency airtight doors and air-duct cut-offs now closing. All air control sectors now isolated. Suspect we have been holed by a meteorite of approximately half-inch diameter in region of Laboratory Three. All personnel check condition of air and report to Air Control . . . Laboratory Three personnel, please attend—"

"Laboratory Three acknowledging," came Wright's voice at once.

"Lab Three personnel please check perforations and estimate path of meteorite through section of Vehicle—and report. Proceed."

Thomas turned from his intercom to call Vehicle Two—Admin-

istration — by radio-phone. But Wright again broke in: "Reporting from Lab Three. There's a seepage of irritant gas from Lab Four through perforation in bulkhead. Smells like ammonium chloride, mainly—"

Thomas whirled back to the intercom, his face tense. "Get into oxygen helmet and skin protecting gloves—you and Brocklehurst," he snapped, dropping the impersonal form of address. "Find out what's wrong in Lab Four and get Waddy and Price out if they're in trouble. Also bring out sample of contaminated air. Hurry!"

He cut in Air Control, who were calling him.

"All sections reported except Laboratory Four," said Air Control. "No reply from Lab Four to our repeated call. Labs Three and Five report lowered air pressure. All other sections normal. Further report from Lab Three. Gas percolating from Lab Four through—"

Thomas cut off Air Control and flipped two other keys.

"Personnel Laboratories One and Eight get into space suits with radios immediately and report to me in person before fixing helmets," he ordered. "Hurry! Please be in my office in five minutes. This is urgent!"

Cutting off, Thomas swung again to the inter-vehicle radio-phone and called Administration.

"Emergency!" he announced. "Vehicle Five—Chemistry—calling! O. C. Thomas speaking. Medi-

cal assistance required urgently. Please relay—and hurry! Vehicle Five penetrated by half-inch meteorite. Personnel of Lab Four evidently incapacitated. Injuries won't be known until they are evacuated from Lab. Evacuation now proceeding. Suspect two men overcome by gases known to be polluting air of Lab Four. Possible skin damage also. For Medical Officer's information, ammonium chloride has been recognized as principal gas. Please rush medical aid. Emergency decontamination and maintenance required also. But medical aid gets first priority."

From his desk, close by the after observation ports of Vehicle Two—Administration—Commander Mark Fraser, simply by turning his head, could look down upon the other eighteen Vehicles which made up Satellite Space Station Commonwealth Two. By sunlight, moonlight, or starlight the gleaming backs of the other units of his command were clearly visible to the unaided eye—in the assorted forms of spheres, drums, torpedoes, turreted disks, "doughnuts," and spoked wheels, according to their respective functions.

In two hanging echelons they circled Earth every ninety minutes with astronomical precision. From Administration Vehicle at the apex of the upper and leading echelon, they stretched away to port and starboard, each pair a step lower than the pair ahead—like an ever-

widening staircase down to Earth below.

As Fraser listened intently to the radio speaker on his desk, relaying requests from O. C. Thomas and instructions from Administration for the relief of Vehicle Five, he swung his chair around to face directly aft.

Second in line away to his left—two 300-foot spaces back and two 200-foot spaces down—Vehicle Five was a disk eighty feet in diameter and fifteen feet high. From its center projected two cylindrical turrets, one above and one below, each supplied with an airlock. Serenely, Vehicle Five rode in the formation, revealing no sign of the turmoil within.

Commander Fraser attended carefully to each maneuver in the battle being waged by Frank Thomas in the defense of his vehicle and his men. He had no intention of taking part—except, if need be, to speed up some retarded operation by the weight of his authority.

Thomas, the man on the spot, would know what the moves should be—he far better than anyone else. For the time being the resources of the entire Station would be at that hard-pressed spaceman's call, for Commander Fraser knew that his most effective immediate role was to stand by and make sure that Vehicle Five got what it needed without delay.

It was, perhaps, ironical that this should happen to Thomas, whose preoccupation with the probabilities

of meteorite collisions—the main hazard to space-going vehicles and personnel — was notorious. For Frank Thomas was one spaceman who had no faith whatever in the so-called periods of immunity implied by the statistics.

Not that he seriously challenged the statistics themselves. Worked out on paper in the middle nineteen-sixties, they had been confirmed rather than modified by fifty years of intervening practical experience. They had, indeed, been a kind of manual of arms for operating satellite stations and space rockets since Satellite Space Station Commonwealth One had been established in this very ninety-minute orbit.

But Thomas did question certain glib assumptions which were supposed to be based on the statistics, and he could always be relied upon to put up a strenuous argument when his point of view was challenged.

According to the calculations a space-going vehicle presenting a target of approximately one thousand square feet might reasonably expect to be hit by a meteoritic particle of about thirteen millimeters' diameter or larger about once in 611,874 years. Or it might be struck by a particle of some five point twenty millimeters' diameter or larger once in 23,858 years. Or it might even collide with a meteorite the size of a fine sand grain—"1.12 millimeters' diameter," the

statistics said—once in 233 years, on the average.

Fortunately most spacemen anticipated spending little more than ten or twelve years of their lives in space—a few, perhaps, up to twenty years. So they quite naturally rated their chances of never meeting even a sand-grain meteorite as better than an average sailor's chances of never being shipwrecked. According to the statistics, their anticipations were sound enough . . .

"*On the average!*" Frank Thomas would always insist. "Don't forget—the statistics mean nothing if they don't also mean an occasional inevitable hit as well as long periods of immunity! And don't forget, either, that the smallest vehicle here in 'Two' is more than *two* thousand square feet in longitudinal section. I refer to Station Commonwealth One, as you know. Most of us are bigger than three thousand square foot targets. Chemistry Vehicle is five thousand or more. *We* must divide those years of immunity, so called, by five! Our two hundred and thirty-three years become less than fifty!"

"One grain of sand in fifty years!" someone had once protested.

"Traveling at a hundred thousand miles an hour, or more," Thomas had retorted, "even that would sting a bit! And don't forget that 'One' was out here only thirty-two years when something as big as your fist went right through her!"

"According to the statistics," was the reply, given with a grin, "that should make this vicinity safe for anything up to a half million years!"

At that point Thomas would throw up his hands in bitter protest. It was just the kind of gratuitous assumption which never failed to exasperate him.

"*On the average!*" his companions would chorus, knowing what he had in mind to say. And he would grin back, and not say it.

For he had explained too often that, although "once in a thousand years *on the average*" could mean that you might go a thousand years, or two thousand, without a hit, it could just as easily mean that you might collect the quota for two or three thousand years in one day—or one hour. And he had pointed out that if your one meteorite happened to be from a swarm like the Leonids or the Giacobinids, in the season, there would almost certainly be others close by, in space or time . . .

It was therefore inevitable, as Commander Fraser appreciated full well, that from time to time a fragment of cosmic stone or nickel-iron large enough to survive the impact without volatilizing, would whip through one or another of his nineteen vehicles like a bullet through a cardboard box, and then continue on its way.

So a standard procedure for such an emergency had been worked out long since, and personnel had been

drilled in it. And so here he was at his post like any ship's captain on his bridge, in command while the well-planned techniques went into operation.

With pencil and pad he made occasional notes, for there were things to be learned in watching the system function and in observing such innovations as were called forth by the special circumstances of a particular occasion. His confidence in his crews was considerable, and this time he felt reassured because it was Frank Thomas in charge, a man whose special preoccupation with meteorite hazards should make him the right one to handle the emergency.

A movement on the outside of Vehicle Eleven—Medical—which headed the lower echelon, caught his eye. Two space-suited figures, each with a bulky satchel at his back, had emerged through the airlock and were hurrying around to the point nearest Vehicle Five. In a beeline they blasted off without delay.

Realizing that now there was something he could do, Commander Fraser called Communications. "Which Maintenance Vehicle is preparing emergency decontamination and repairs for Vehicle Five?" he asked.

"Vehicle Sixteen," was the reply.

"Get me Officer Commanding Vehicle Seventeen by radio-phone, please . . ."

LIKE BABES in arms the casualties

from Laboratory 4 were brought out by Brocklehurst and Wright and handed over, limp and weightless, to First Aid. Hastily dumping their helmets in wall clips the rescuers reported in person, with the sample of contaminated air, to O. C. Thomas, who had with him Senior Chemist Harrison from Laboratory Seven.

"Here's your sample, Harrison," said Thomas, nodding towards the stoppered flask brought in by Wright. "Give me a quick opinion before the Medical Officer gets here—then a detailed analysis as soon as you can do it."

As Harrison left with the flask Thomas called in the four men standing by in space suits. Then he spoke to Brocklehurst. "What happened to Waddy and Price?"

"They're both unconscious," answered Brocklehurst. "Dr. Waddy has a scalp wound and might be both stunned and gassed. Price apparently gassed. By the smell—you can probably get it now from our clothing—both ammonium chloride and ether are present in quantity. The atmosphere in Lab Four is a white fog, typical of—" He mentioned an equation— NH_4Cl .

"Any idea how it happened?"

"Apparently the meteorite went through their stores bay, smashing some bottles. The air is filled with broken glass, globules of liquids, and—fog."

Thomas called again to Administration. "Please hurry medical aid. We are standing by airlock in Tur-

ret One to take in medical personnel."

"Doctors Buchanan and Seddon approaching your Vehicle now," replied Administration. "They will reach you in about forty seconds."

Thomas nodded to the four men in space suits, who were still holding their helmets in their hands.

"You heard? Get space-tight and proceed, please."

Before the two doctors were properly out of their space suits Brocklehurst had briefed them and handed Harrison's preliminary analysis of the sample of polluted atmosphere to Senior Medical Officer Buchanan.

In the sick bay, with his nostrils twitching at the sting of ammonia, and his eyes keenly scanning the faces of the victims, Buchanan opened his kit at once and took out a rubber bulb syringe and a bladder of sterile water.

"Eyes first," he said to Dr. Seddon. "Wash by squirting water."

Inserting the syringe in the twisted neck of the bladder he filled the syringe. Seddon did likewise with his own equipment. Returning the water bladder Buchanan took out a wad of cotton wool and bent over Price.

"Flush the eyes and then dry quickly," he intoned, suiting his actions to the words. "Flush again, and repeat several times. Never mind where the spray flies as long as it goes away from the eyes."

Drying Price's eyes for the fifth time he returned syringe and cotton

wool to his kit and brought out a tube of ointment.

"Apply anti-burn ointment generously to the eyes," he advised, demonstrating on Price. Then he handed the ointment to Dr. Seddon, wiped his hands on some cotton wool, and drew on sterile rubber gloves.

"Now, while I inspect that scalp wound on your patient, Dr. Seddon, will you please clean up the face and exposed skin of this one and apply a smear of ointment? He's had the worse dose of gas."

"His breathing sounds worse, too," agreed Dr. Seddon. "Much more bubbling."

"Mucous discharge in lungs and bronchial tubes, as we might expect. Better stop it immediately with a shot of atropin—for both of them."

"A hundredth for the worse case — something less for the other?"

"Yes. Say a hundred-and-fiftieth for the lesser one. Or possibly a little more."

Both doctors worked in silence for some minutes. When Dr. Buchanan straightened up from his examination of Dr. Waddy's wound he looked grimly at Brocklehurst.

"Please request Administration to send a workshop tender as an ambulance—and urgently. We'll have to take both patients over to Medical." He turned to Dr. Seddon. "Dr. Waddy has sustained a depressed fracture. Pressure on the parietal lobe, I feel certain. We'll have to trephine. We'll take Price

also—for observation and treatment."

Brocklehurst was already calling O. C. Thomas by intercom. A few moments later he turned to Dr. Buchanan.

"Ambulance tender now making corridor seal with airlock in Turret Two of this Vehicle. We will be ready to receive patients in three minutes."

"Good!" exclaimed Buchanan, and turned again to his patient. Then he straightened up once more. "But surely not—yet? How—so soon?"

Brocklehurst shrugged. "The tender has been standing by alongside for some minutes. With Commander Fraser's compliments. He anticipated the possible need . . ."

Commander Fraser watched as the Chemistry Vehicle's concertina-like corridor tube was unsealed from the ambulance tender's airlock and retracted. Lines fore and aft were cast off and drawn into the tender, and the two space-suited men from Laboratory Eight slowly manhandled the tender away from Vehicle Five.

Slowly the egg-like tender swung about in response to its trimming gyroscopes until its attitude was correct for approach to Vehicle Eleven—Medical. Its jets fluttered for a few seconds only, and as it drifted down towards Medical it slowly turned about again, to approach jets foremost. Precisely the same measured few seconds of firing brought it to a near-stop with-

in yards of Vehicle Eleven, where now three space-suited figures awaited it.

Quickly the lines fore and aft were ejected, made fast, and the tender warped in. Another space-tight corridor connection was made for transfer of the patients.

Back on Vehicle Five two writhing, sausage-like forms ballooned suddenly forth from the outer hatches of two space-cupboards of Laboratory Four, as the polluted air was evacuated from inside.

The outside men removed the two bladders, moored them to the hull of Vehicle Five, and affixed two others. These, a short time later, were similarly inflated, although less tightly than the former two, as the space-suited men inside Laboratory Four operated the hatches in the diminishing, rarefying, and chilling atmosphere.

After six filled envelopes were moored to the outside, both space-cupboards of Laboratory Four were opened to space, and the last faint remnants of the attenuated atmosphere were allowed to go to waste.

The six envelopes of contaminated air had contracted to twisted, rigid "ropes" by the time Commander Fraser returned to his desk six hours later. Having radiated their heat away into space, their contents had contracted, liquified, and frozen into solid incrustations which would later be retrieved, separated chemically, and re-bottled.

Even the broken glass trapped by the wire mesh screens across the

inner hatches of the space-cupboards would be re-melted and blown into laboratory glassware again. For the economics of space-going vehicles is such that it is important to conserve every ounce of material once transported into space rather than expend rocket fuel, in the costly mass-ratios involved in the Earth-to-Satellite ferry services, on one unnecessary ounce.

On Commander Fraser's desk was clipped a brief report and a transcript of the major intercom, radio-telephone, and video conversations recorded during the episode aboard Vehicle Five. After perusing these documents and an up-to-the-minute medical report from Dr. Buchanan, Fraser called Communications.

"Leave a message with Vehicle Five asking O. C. Thomas to call me when he returns to duty," he requested.

Moments later, Communications called back. "O. C. Thomas on Vehicle Five is on duty now, Commander. Shall we—?"

"Get him please—on video."

As the screens to the right of their desks cleared simultaneously, Commander Fraser and O. C. Thomas looked one another in the eyes. Thomas was drawn and weary looking.

"Have you rested during the past six hours, Dr. Thomas?" Fraser demanded.

"Well sir—I wanted to be sure everything was ship-shape before—"

"As from now, my boy, you go

off duty for twenty-four hours and get some rest. I'll arrange your relief."

"Thank you, Commander. But I should first inspect the repairs to—"

"Nonsense! Don't be so damned conscientious, Thomas! You can leave those things in charge of the maintenance captain now. He'll have to report to you in any event, later."

"I know sir. But I feel responsible—"

"Your responsibilities on this occasion have been fully discharged long since—and superlatively well, too. Thanks to your prompt handling of the emergency both Waddy and Price will come out of it without permanent injury."

"I am very glad of that news, Commander. Thank you."

"And your Vehicle has been ably defended and commanded," Fraser went on determinedly. "You are to be commended on your handling of the situation. When you are back on duty you can elaborate on some of these notes, and we'll gain a few points to improve Standard Procedure. Your improvisations were excellent, without exception."

"You flatter me, sir. I feel that I merely reacted to each problem as it arose. I had nothing preconceived except Standard Procedure."

"Other than your well-known preoccupation with this very subject! But we'll take that up later. Meanwhile you must go off duty. That is an order!"

Thomas saluted in acquiescence.

"I have only to pass on to Maintenance this requisition for immediate replacement of oxygen and helium lost, or temporarily fouled in flushing Laboratory Four," he said. "We are right out of reserves, so may I count on you, sir, to approve and relay it as urgent? In case of emergency we would be—"

"I shall, of course!" said the commander promptly. "But don't tell me you expect another emergency within twenty-four hours or so!"

Thomas gave a tired grin in answer to the quizzical gleam in his superior's eye. "My obsession on that point is well known, I admit, sir. But it could quite easily—"

The sound of a single, sharp smack, and the sight of the loosely-held papers fluttering from Fraser's hand startled both of them. Withdrawing his hand from his cheek, where it had gone automatically to touch a sharp, stinging burn, Commander Fraser looked in horror at his fingertips.

"Blood!" His eyes again met those of the younger spaceman. Catching a floating sheet of paper he examined it, then held it up to show Thomas a neat, pea-sized hole drilled through it. "I see what you mean!"

Whacking the paper down on his desk he flipped a row of intercom keys.

"Emergency! Attention all personnel, Vehicle Two! Prepare to get airtight! Prepare—to—get—airtight . . .!"