

you'd have drawn a picture of civil war going on here between the nomads and the Commission. Blowing up your own car with a small bomb attached to the starter was just one more item. By the way, were you going to do it yourself? Or did you intend to allow one of our mechanics to kill himself?"

She flushed. "Don't be ridiculous. No one would have been hurt. The bomb is a very small one. More smoke and flash than anything else."

"Well, thanks for small favors," Derek said sarcastically.

**SHE** gave up. "Very well," she snapped. "There is nothing you can do. This whole project, as I said before, is nothing but American boondoggling, a way of plowing endless resources into a hole. Your real motivation is an attempt to prevent depression and unemployment in your country."

Pierre Marimbert said softly, "So you admit to this whole scheme to discredit us?"

"Why not?" She turned to the door. "I will still write my articles. It's my word or yours."

Derek grinned at her. "I think I could fall in love with you, honey," he said. "Life would provide few dull moments. However, you didn't notice how nice and automated this office is. Card

machines, electric typewriters, all the latest—including tape recorders for office conversations. You talked too much, honey."

"Cochon!" she shrieked at him. She whirled and was through the door.

Johnny turned to Mohammed Mohmoud. "I guess the best thing for you would be to turn in your commission, Captain."

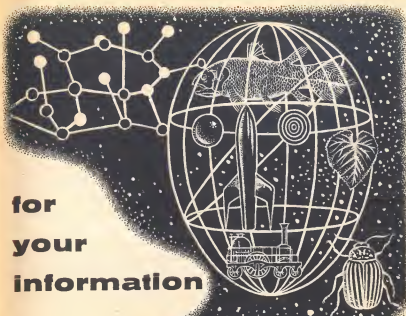
Dark eyes snapped. "And if I say no?"

Johnny shook his head. "The Mali Federation passed some awfully strict laws when it was drawing up its constitution. Among them was one involving capital punishment for anyone destroying a source of water in the desert. Miss Desage did the actual work but you were hand in glove with her. I'd hate to have to report that to your superiors."

Derek jumped forward quickly. His hand snaked out and chopped the other's forearm. The heavy military pistol fell to the floor, and the Canadian kicked it to one side. "Shucks," he drawled, "the hired hand sure is tricky, ain't he?"

"Good Lord," Johnny McCord said disgustedly, "I didn't say I was going to report you. Just threatened to if you didn't resign. Now get out of here, we've got work to do. I'm three days behind on my reports!"

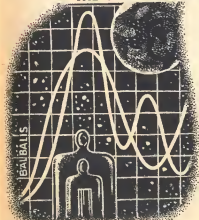
— MACK REYNOLDS



for  
your  
information

BY WILLY LEY

THE STRAIT NAMED AFTER VITUS BERING



**E**NGINEER Pyotr Mikhailovitch Borisov is, as his name clearly indicates, a Russian. Professionally he is a mining engineer who has specialized in oil wells. He hopes to be an innovator. And he is a man with an obsession: cold weather. Cold weather, to him, is personified by the Arctic Ocean.

When he speaks about cold weather or the Arctic Ocean he grows eloquent—one might even say heated. "Look at this," he

recently said to one of the editors of the *Literaturnaya Gazyeta*, pointing to a map of the Arctic Ocean, "here in the north the Soviet Union is wide open to the cold air masses blowing in from the Arctic Basin. That is why almost half — in fact, 47 per cent — of Soviet earth is occupied by zones of eternal frost. Over three quarters of our territory the temperature may drop to minus 40 degrees. 15 per cent is nothing but uninhabited wild tundra . . . The cold weather is a beast of prey that devours huge sums of money. The building of factories, power plants and mines in the northeast of the Soviet Union — and in other countries where the climate is identical — is one and a half times or twice as expensive as in districts with a more temperate climate. In the U.S.S.R. cold weather eats up, on the average, 10 per cent of the country's investments."

And what about the losses sustained yearly by the cessation of marine and river transport during the winter? Not to mention the northern sea route, the most labor-consuming and most expensive marine communication in the world?

"The Arctic Ocean is to blame, in the main, for the fact that rice frequently fails to ripen in North Japan and that the north part of

the Yellow Sea freezes over . . . More than any other country, except the U.S.S.R., the United States suffers from the frigid blasts blowing down from the Arctic Ocean. Alaska is a land of severe frosts. The chilly climate of the Arctic Basin pierces the very heart of the United States . . . Then there is Canada with its vast areas of tundras and eternal frosts."

The conclusion to be drawn from these facts is simple to Engineer Borisov: "We must melt the ice sheet of the Arctic Ocean."

As to how this ice sheet formed, he has his own theory too: "It is not because the waters of the oceans are so cold. The fault lies not with the ocean itself, but with the rivers that flow into it: the Ob, Lena and Yenisei, among others. Their fresh waters are lighter than the salty water of the ocean . . . they form an upper mixed layer which freezes over and forms an ice sheet blocking the warmth of the deeper waters."

His idea is that, once this ice sheet is melted and the Arctic Ocean is open water, the solar radiation which is normally reflected by the ice and snow would be absorbed by the water. This, of course, would not transmute the Arctic Ocean into a warm sea. But it should ameliorate the climate of all the coun-

tries that reach beyond or even near the Arctic Circle.

UP to this point everybody is more or less in agreement with Borisov. If the Arctic Ocean were open water, the climate would improve. Nor would there be much danger of flooding, because the ice in question is piled high on land masses, like the Greenland ice and the ice of Antarctica, but is floating on water. So the volume change if it were melted would be rather minor.

The disagreement begins at the next stop, which is whether it can be done at all and how it could be done.

Borisov thinks that the solution is a dam across the Bering Strait. The width of the Bering Strait is 46 miles and the average depth is about 150 feet. Borisov admits that this would be a big dam. (His estimate of the cost is 70 billion rubles of the old Soviet currency. In the new Soviet currency it would be 7 billion rubles or 14 billion rubles, depending on whether you go by the proclaimed value or by the gold content.) But he is firm in asserting that it would not be an impossible dam.

But the dam would be only the first phase. It is meant to be a barrier stopping uncontrolled flow through the Bering Strait. After the dam has been built,

Borisov wants to install gigantic pumps in several places — the published versions of his idea are by no means clear about the locations of these pumps — which are to remove large amounts of water from the Arctic Ocean. This removal should be made in such a manner that the cold currents now impeding the Gulf Stream would disappear, or at least be greatly weakened, so that the Gulf Stream can enter the Arctic Ocean between Greenland and Norway and melt the surface ice.

Borisov's compatriot, scientist D. A. Drogaytsev, writing in the journal *Priroda* ("Nature"), doesn't think that scheme could possibly work. The only thing that probably could be done would be to build the dam itself. But this would cause "irreparable harm." To the north of the dam the Arctic ice would clog the sea completely and make it unnavigable all year round. The ice would also clog up all the north-flowing rivers of Siberia, and thus destroy the value as transport arteries which they now possess except during the winter months. More, the accumulation of ice along the North Siberian coast would chill the land and extend the Gobi desert and other Asian deserts all the way north to the coastline, destroying areas now fertile. Such tampering with na-

ture, Drogaytsev is positive, can only be bad.

Whether this will stop the discussion is something I would not dare to predict. But I want to add that another discussion about the Bering Sea, in the United States, interested as important a scientist as Charles P. Steinmetz.

Interestingly enough, the idea to which Steinmetz devoted some time (I do not know whether it was completely his own) is the precise opposite of Borisov's plan. Instead of closing the Bering Strait with a dam it should be opened wider.

Look at a map of the Arctic. Both the American continent and the Asian continent extend peninsulas, the Seward Peninsula on the American side and the Chukotski Peninsula on the Siberian side. The narrowest distance between them is 46 miles, as has been mentioned. And to the south of the Bering Strait there is St. Lawrence Island, looking almost like a displaced stopper.

Now, it was said, the fairly warm Japan current comes up from the South, passing by the Japanese Islands and flowing in such a way that it would go into the Arctic Ocean, if St. Lawrence Island and the two peninsulas did not block its way.

If the island and large portions of the two peninsulas could be removed, widening Bering Strait

from 46 to about 200 miles, the Japan current would keep going North. Probably it would split into two currents, one going eastward around Alaska, the other bearing westward along the Siberian coast. In time the waters of this current would melt the floating ice and make the Arctic Ocean an open sea.

Of course the job of removing hundreds of square miles of land is even bigger than Borisov's dam. But there might be a chance of helping the Japan current in a more gentle manner, such as dredging flow channels for it, or even helping the flow along by artificial means.

At any event the Bering Strait — and what might, or should, or should not, be done with it — is going to be a lively theme in years to come.

## ONE WORLD — ONE LANGUAGE

That piece, in the February 1960 issue, brought a great deal of comment and for the first time in my life did I *really* understand that sign which you can see in some stores: "If you are displeased, tell us; if you are pleased, tell others." The ones who agreed with me did so loudly, wholeheartedly and so forth, in person. But I did not get a single letter of agreement. However, I got a fair number of letters bawling

me out. Of those who bawled me out one defended Interlingua and five or six defended Esperanto — or rather attacked me for not being in love with it.

One of these was Harry Harrison, whose letter follows here in full. I have something to say about his arguments in four places, so marginal notes follow after that.

One planet — one language! I agree with you that it would be a nice idea if this were possible. I also agree with you that we will probably never have a single "Earth language." (1)

But there is a language that may be spoken by all Earthmen that is already in use today — and succeeding quite well. I am speaking of Esperanto, which language got quite a kicking around in your article. In the name of fair play I would like to present the other side of the case, some facts about Esperanto that are rarely heard.

Esperanto is a constructed language that aims to replace no other languages. It works side-by-side with national languages. When you say it *does not work*, I am forced to state blankly that it *does*. In this single case I claim superior knowledge (I would be hard-pressed to find another one!) because I have used it successfully for over fifteen years. I can write and speak it with an automatic ease I have never been able to capture in any language other than my native English. I have sat in groups of up to twelve people

where no *two* people shared the same national language, yet all enjoyed perfect communication with Esperanto. I subscribe to a half dozen magazines from all over the world — out of the eighty-nine listed in the Esperanto yearbook. When I travel I find Esperantists in every city I visit. We are friends as soon as we meet, and speak a common language.

The only thing wrong with Esperanto is that it is new. The world has a high resistance to new ideas. In the U.S. we recognize the value of the decimal system and laugh at the density of the English with their shillings (divide by twenty) and pence (divide by twelve). Then we turn around and do our measuring in yards, feet and inches. How long has the metric system been in use? (2)

You have two arguments against Esperanto, and I think they are both personal ones. When you read Esperanto it, "... sounded too silly." To whom? Finnish is a nightmare to anyone but a Finn. Danes all sound like they are strangling to death when they talk. Esperanto has a *J* for the *Y* sound. *Yes* is spelled *Jes* — and is pronounced and means the same as in English. The people in the linguistic groups that are used to pronouncing *J* this way won't find it strange. It is impossible to make every letter look familiar to every group. This goes for the supersigns as well. In English we say *such* and *sure*, making the letter *S* stand for two different sounds. In Esperanto the *such S* is *S*. The sound that starts *sure* is *S*. Isn't it easier to memorize one new letter than count-

less words? These supersign letters (and there are only six) give Esperanto an exotic look that doesn't exist in reality. Spoken, it sounds very much like Italian or Spanish. (3)

The second thing you have against Esperanto is that most Esperantists "... can probably speak something else that I can." Probably true — if they are Europeans. But how is your Cantonese, Arabian, Japanese or Serbo-Croatian? I have met and enjoyed pleasant conversation with native speakers of these languages — whose only second language was Esperanto. I have a good friend in Italy who speaks fair English. About as good as my Italian. We talk always in Esperanto — though we have both put in thousands of hours of studying each other's native language. (4)

That's the real kicker. You can learn Esperanto in no time flat. Both to read and to speak. It is simple but completely flexible. Irregular forms don't make a language interesting — they just make it hard to learn. In Esperanto you take ten seconds to memorize the fact that the endings of *all* verbs in the past, present and future tenses are *is, as and os* respectively. Then you can use the saved time to increase your word knowledge and familiarity with the language.

Esperanto may not be the world language — but it *is* the successful language the world could speak!

— HARRY HARRISON

Here are my notes to Harry Harrison's letter:

(1) I could say right here that we have no argument at all, since my discussion was about a language, natural or artificial, which would become the "earth language."

(2) The resistance to new ideas exists, of course, but it is not universal. It seems to depend on whether there is a feeling that this new idea is not really needed. In science (and also in commerce) new ideas are accepted rather fast, if the new idea is one which makes the recipients feel that they needed it.

(3) A few supersigns over letters do not disturb me at all, but it *does* disturb me when one of your Esperantists writes me a letter which begins *Kara amigo*. I shall not accept any explanation of any kind; this is wrong. Either I am male (which happens to be the case) and then the address should be *Karo amigo*. Or else, if I were female, it should read *Kara amiga*. If *Kara amigo* is "right" Esperanto grammar, then its "right" grammar is wrong!

(4) Harry, you are an intelligent man. You cannot have spent "thousands of hours" learning Italian. I can prove it, too. You'll admit that if you concentrate ten minutes a day on learning three words of a language you have learned them so thoroughly that you'll never forget

them again. This, in one year, will net you a vocabulary of 1095 words. In reality, because of the existence of identical or very similar words, your vocabulary will be around 1250 words. Then, at the end of the year, you can learn any grammar, even a complicated one, in a 40-hour week. Hence you spend 61 hours learning 1250 words plus 40 hours learning the grammar which enables you to read a newspaper.

The actual expenditure in time was 100 hours of concentration in the course of one year. Whether this could be done in 100 consecutive hours is something I can't judge since I have never tried it. But you cannot possibly have spent "thousands of hours" on Italian and still feel uncertain when subjected to it!

#### RE-TAKE OF THE DECEMBER COLUMN

JUDGING from the response, the column in the December issue proved extraordinarily popular. Many readers had something to say about it, and a fair number were able to contribute something which I would have liked to have known when I wrote it. Taking them in their original order, we first had the marine worm, the *palolo* which mates when the moon is right.

You may remember that the

islanders talked to Mr. Powell about *Mbalolo levu* and *Mbalolo lailai*, the "minor" and the "major" appearance. I'll freely admit that my sources phrased their sentences in such a way that one could not tell which word meant which and I had the definite impression that they were not sure. Preferring to be unambiguous, I took a shot in the dark as to which meant "major" and which meant "minor." Professor (of Linguistics and Anthropology) Charles F. Hockett, at the moment Carnegie Visiting Professor at the University of Hawaii, informed me that I missed:

"The words *levu* and *lailai* are Fijian, and their meanings are just the reverse of what you assign in the article. *Levu* is 'big' or 'major'; compare *Viti levu*, 'Major Fiji,' the name of the largest island in the archipelago ... In Fiji, at any rate, the 'small' appearance (*lailai*) precedes the 'large' (*levu*). Two students of mine will be in Fiji for the *Mbalolo levu* season this year; with luck we can find out what they taste like."

I am grateful to Prof. Hockett for the correction — and envious of his students.

The response to the second section, *Slow Lightning*, consisted of half a dozen letters which all read as if they had been written by the same person. In each case

the man (or woman) who wrote the letter said, "Thank you for the article. About fifteen years ago, when I lived in — I saw such a lightning ball but nobody ever believed me. I didn't even talk about it any more, but now that I have this article . . ."

The stories themselves were just typical, as the following example (written by Mr. H. A. J. in Westfield, N. J.) shows:

"Thirty-five years ago I was a camper in a boys camp in Chicopee, Pennsylvania. It was mid or late afternoon. I was sitting on my bunk next to an open window, looking outside at the general area of the camp quadrangle which had just been inundated by a severe thunderstorm. Because of the storm we were in our cabins rather than at an activity. All the windows of these cabins were usually kept open. Suddenly, I saw coming directly toward me a ball of fire, yellow golden in color, about the size of a basketball. It was moving fairly quickly . . . in retrospect I would guess that it was travelling 25 or 30 miles per hour. As I saw it heading toward my window I pulled my head back away from the opening in time to see it pass by my head, go through the cabin to the other side and out an opposite window . . . There was no damage to anyone in the cabin or to the cabin

itself. The ball did not follow a conductor, at least I do not recall any wiring going in the same direction. Perhaps the electrical inlet for the cabin was outside my window. I do not know. There was no noise whatsoever. This I do remember."

Another letter from a Canadian pilot added something new.

He wrote me that a friend (presumably fellow pilot) of his was flying a fast fighter jet over British Columbia at an altitude of 48,000 feet. They were flying so high to avoid the tops of spectacular cumulonimbus towers which were building up over the area. Because the cloud formations were so spectacular the friend of my correspondent took pictures. In a black thundercloud they saw (and photographed) a luminous object. "The second shot shows it obscured by a tongue of cloud but shining through it. The ball must have been about the size of an aircraft [remember that fighter planes are under discussion, not passenger liners] if the visual clues are consistent. Although it appeared to the eye to have well-defined edges, according to the witnesses, the photo shows it definitely fuzzy. Maybe they radiate in the ultraviolet or higher as well."

Apparently in the thundercloud building up a lightning ball did form. That there happened

to be somebody around to see and to photograph it is a lucky coincidence but not new in itself. Lightning balls have been seen to fall out of clouds; hence they must have been in the clouds before. What is new is the estimate of size, which is about a dozen or more times larger than any lightning ball observed near the ground.

Are they larger when forming and contract as they age?

Or does the size correspond more or less to the ambient air pressure? Since the planes were at 48,000 feet to clear the tops of the towers this lightning ball may well have been at 42,000 feet or thereabouts, where the air pressure is down to about 130 millimeters of mercury.

Too bad that with such a fascinating subject we have to depend on luck only!

WITH reference to the third section, *Pinwheels under Water*, Mr. Charles R. Tanner of Cincinnati, Ohio, wrote: "Dig up Charles Fort's *Book of the Damned* Chapter XXI. It seems remarkable to me that the two phenomena should be noted in the same part of the world. When I first read the *Book of the Damned* I remember being impressed by this letter, which seemed to have a ring of truth that not one in a thousand of

Fort's phenomena do have. It stuck in my mind all these years for that reason."

Naturally I reached for Fort's book. I have the one-volume edition published by Henry Holt in 1941. In that edition the twenty-first chapter of the *Book of the Damned* begins, on p. 270, with a letter that appeared in the now defunct magazine *Knowledge* on Dec. 28, 1883. With very minor condensations it reads as follows: "I am tempted to ask for an explanation of the following which I saw when on board the British India Company's steamer *Patna*, while on a voyage up the Persia Gulf. In May, 1880, on a dark night, about 11:30 P.M., there suddenly appeared on each side of the ship an enormous luminous wheel, whirling around, the spokes of which seemed to brush the ship along. The spokes would be 200 or 300 yards long . . . Each wheel contained about sixteen spokes, and, although the wheels must have been some 500 or 600 yards in diameter, the spokes could be distinctly seen all the way round. The phosphorescent gleam seemed to glide along flat on the surface of the sea, no light being visible in the air above the water . . . I may mention that the phenomenon was also seen by Captain Avern, of the *Patna*, and Mr. Manning, third officer."



The signature was "Lee Fore Brace," and below that was a P.S. reading: "The wheels advanced along with the ship for about 20 minutes."

It was probably the silly signature which inspired somebody signing himself "A. Mc. D." to write a letter to the editor which contained the requested explanation: "It is that before 11:30 P.M. there had been numerous accidents to the 'main brace' and that it had required splicing so often that almost any ray of light would have taken a rotary motion."

In the issue dated January 25, 1884, the original correspondent, now signing his letter. "J. W. Robertson," complained: "I do think it's rather unjust to say a man is drunk because he sees something out of the common."

Charles Fort, after meandering around for several pages in his characteristic and intensely annoying manner, then does quote a few more cases of the same sort of phenomenon.

One (the source is identified as *Journal of the Royal Meteorological Society*, 28-29) states that Captain Hoseason of the ship *Kilwa* saw vast "ripples" of light appeared suddenly. "Ripple" followed upon "ripple." The light was faint, appeared suddenly and died out gradually in about fifteen minutes. Time and place:

April 4, 1901, about 8:30 P.M. in the Persian Gulf.

Another one (from *Nature*, 20-291) is a report by Captain Evans that Commander J. E. Pringle of H. M. S. *Vulture* had seen rapidly moving luminous waves or pulsations in the water. "On looking toward the east, that appearance was that of a revolving wheel with a center on that bearing, and whose spokes were illuminated, and, looking toward the west, a similar wheel appeared to be revolving, but in the opposite direction." (Commander Pringle considered the second wheel an optical illusion but was firm about the first one. He estimated the width of each shaft of light about 25 feet, the spaces between them about 100 feet. Duration of the phenomenon: about 35 minutes. Time: 9:40 P.M. Location: Lat. 26°26' N., Long. 53°11' E., in the Persian Gulf. The date was May 15, 1879.

**F**ORT stated that the *Journal of the Royal Meteorological Society* (32-280) contained excerpts from a letter written by Mr. Douglas Carnegie saying that in 1906 he saw a bank of apparently quiet phosphorescence. But when the ship came close, "shafts of brilliant light came sweeping across the ship's bows . . . These light bars were about 20 feet apart and most regular . . . They

first struck us on our broadside and I noticed that an intervening ship had no effect on the light beams: they started away from the lee sides of the ship just as if they had travelled right through it."

The place was the Gulf of Oman, the entrance to the Persian Gulf.

Fort has two more cases, one with the date of June 5, 1880, off the coast of Malabar and one with the date of March 14, 1907, in the Malacca Strait. The Malabar coast is the western coast of the Indian Peninsula, the direct continuation of the coastline which is the eastern shore of the Persian Gulf and the Gulf of Oman. The Malacca Strait is the water separating the Malay Peninsula from Sumatra.

I wish to state that I did not have the time to check the sources given by Fort. It is therefore possible that Fort, by condensing and shortening the reports, left out detail which to other eyes than his would have been significant. He does mention that Mr. Carnegie scooped up a bucket of water during the event and later examined samples under a microscope without finding anything unusual. He also mentions that Commander Pringle reported the sea "before and after the display" as having floating patches of fish spawn.

Of the seven cases just mentioned (the seventh is, of course, the one reported by Commander Bodler and quoted in the December issue) just one is geographically far removed from the other six, the one from the Malacca Strait. It differs from others also as to the time of day, or rather of night, since it was seen at 2 A.M. All others were seen before midnight.

From the few reports available a few patterns emerge. One has just been mentioned: the phenomenon is usually seen between the beginning of darkness and midnight.

The second pattern is the time of the year. The one seen from the ship *Kilwa* occurred on April 4; the one seen from board of the *Vulture* on May 15. The one seen from the ship *Patna* was also in May. The phenomenon off the Malabar coast dates June 5. The one from the Gulf of Oman is undated, except for the year. Commander Bodler's case occurred on November 14, 1949. It is the only one in Fall. All others that are dated (including the Malacca Strait case which was in March) were seen in Spring or late Spring.

But the most interesting pattern is the geographical one.

Of a total of seven known, four were seen in the Persian Gulf, one in the Gulf of Oman (a di-

rectly adjacent body of water) and one off the Malabar coast—which is still an adjacent body of water, though a considerable distance away when expressed in miles. Does the Persian Gulf differ in any respect from other bodies of water? Yes, there is one difference. It has a higher salinity. The three bodies of water with the highest salinity are the Dead Sea in Palestine, the Great Salt Lake in the United States and the Bay of Kara-Bogaz-Gol, on the eastern shore of the Caspian Sea. But they are all unconnected with the oceans. The Persian Gulf has the highest salinity of any body of water accessible from the ocean. And, of course, it has a hot climate.

The concentration of the sightings in a very salty arm of the sea and the concentration in the Spring may be of importance. As I said in the December issue, it is my impression that it was a biological phenomenon which was seen.

But even this suggestion is in the nature of a wild guess.

The only truthful thing one can say is that we don't know.

#### ANY QUESTIONS?

Please find enclosed an article about radiation danger in space from today's *New York Times*

(Nov. 27, 1960.) I would appreciate it very much if you told me your personal opinion of whether radiation danger in space will prevent manned space travel.

Elizabeth, New Jersey  
Dorothy Steinfeld.

Well, my personal opinion about this (and a few other things) is that the purpose of a difficulty is that it should be overcome. But for the sake of the readers generally it should be explained that we are dealing with several sources of radiation in space. To begin with, our Sun (and probably every other star) emits X-rays along with visible radiation, heat rays and radio waves. But our Sun is a very weak X-ray star. There may be other stars which are powerful X-ray stars; but that is a problem for the next generation. In short, the direct X-rays from our sun will be stopped by the skin of the vessel.

The second source of radiation in space is what physicists still call by the German name of *Bremsstrahlung*. The term was originally coined by the discoverer of the X-rays, Prof. Dr. Konrad Röntgen and since so few physicists dealt with this phenomenon on the one hand, and since it is hard to translate on the other hand, nobody bothered to

invent an English term. The one I have used in magazine articles, namely "impact radiation," seems to come closest. What happens is that X-rays are produced when an electron is stopped in its flight by a solid body. (That is what the German term coined by Dr. Röntgen means: *Strahlung* means "radiation" while *bremesen* means "to brake" or "to bring to a stop.") Such impact radiation will be produced by any solid body, including spaceships, in the Van Allen belt. However, Dr. James A. Van Allen, after whom the belts are named, believes that his outer belt could be penetrated fast enough so that comparatively little shielding would be needed. In fact the skin of the ship, plus its meteor bumper, would probably be thicker than is needed to make a radiation shield for this particular danger.

What has just been said was mainly with reference to the outer of the two Van Allen belts. The inner belt is likely to be nastier. But it can easily be avoided, since it reaches only from about 40° northern to about 40° southern latitude.

The current worry deals with sudden outbursts of protons from our sun. Satellite *Explorer VII*, in November 1960, ran into a proton burst where an average of 10,000 protons per square centimeter per second were encountered.

Earlier bursts, also reported by *Explorer VII*, had ranged from 10 to 200 protons per square centimeter per second. That heavy burst amounted to about 50 roentgens of radiation — an awful lot, since 450 roentgens is the dose which kills half of its victims within 30 days of exposure.

The real problem, then, is these outbursts from the sun—partly because they can be lethal, partly because they do not seem predictable. Of course one can shield against them, but it would be a heavy weight which the ship would have to carry around. Some scientists have suggested what they half-jokingly called "storm cellars," heavily shielded capsules aboard the ship, metal cocoons into which the crew members would slip as soon as the detectors begin to chatter. The unsolved problem here is whether these outbursts which come from the Sun just disappear into space or whether they are reflected back by magnetic fields far from the Sun, possibly outside the solar system. If they just come from the Sun and disappear into space with no reflection worth mentioning, the radiation shield could be very much like an old warrior's shield, a heavy slightly curved metal plate which is always held over the sunward side of the ship.

Naturally a single shield of this kind would weigh much less than "storm cellars" for every crew member. And it would not interfere with operations, either.

To find out whether we deal with a shielding problem in all direction or in one direction only is a special project called *Project Ranger*, which is slated to get underway in midsummer of 1961.

In the past you have often written about forthcoming space events in your column. I notice that you don't do this any more. Why?

Albert Reznicek  
Hollywood, Calif.

In the past *Galaxy* was a monthly, which meant that less time went by between writing my column and its appearance on the newsstands. Also, in the past space events were much rarer than they are now.

Just look what happened in August, 1960: *Discoverer XIII* was, as its name says, the 13th satellite that was fired into a polar orbit with the intent to recover its capsule. That this was intended was announced from the first shot on; but who could foretell that number thirteen would be the first one where recovery would be successful? (The capsule was fished from the ocean.) That shot was made on

August 10. On August 12 *Echo* went into orbit. *Echo* had also been in the planning stage for a long time. On August 18 *Discoverer XIV* went into orbit, and its capsule was promptly recovered the next day. And on that day the Russians put *Sputnik V* into orbit — then recovered it (as a whole, even though the animal capsule was separated with a parachute after re-entry) on August 20. Only the daily paper can keep up now. And even the daily paper will limp somewhat behind on occasion.

But I can tell you about space events which are planned sufficiently far ahead so that you'll be able to read this before the newspapers make headlines out of them:

The manned capsule (*Project Mercury*) is due in Fall, 1961; though the program has shown some slippage it may still meet its own deadline. For 1962, several interplanetary unmanned probes are planned (*Project Mariner*) for both Mars and Venus. For 1963, *Project Surveyor* is planned. This involves the "soft" landing of a 600-pound instrument capsule on the moon. Most likely Wernher von Braun's *Saturn* will put communications satellites into the 24-hour orbit during the same year. For 1964, *Project Voyager* is foreseen, larger and more sophisticated probes to

Mars and Venus with the hope that they can be actually landed. For 1965, we have *Project Prospector*, the landing of a small mobile tank-like vehicle on the moon which can be directed to move around and TV-scan whatever gets in its way. For 1966 or 1967 we expect *Project Rover*, the nuclear-powered rocket, to go into space; and for 1967 or 1968 we expect *Project Apollo* to do

its job, which is a manned flight around the moon without landing.

And we better hurry *Project Apollo* (and everything else) . . . or one of the pictures taken by the crew of *Project Apollo* will be a nice sharp photograph of a lunar structure with a name like Ziolkovsky Base or Soviet Outpost No. 1.

— WILLY LEY



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