Talks on Astronomy

THE CONSTITUTION OF THE STARS

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IT would seem an almost impossible task to determine anything about conditions in the interior of a star when our knowledge about its visible surface is so limited and so difficult of attainment, and when it is absolutely impossible to explore beneath the surface by any present means at our command.

Our knowledge about the stars consists chiefly of what has been deduced from the nearest star, the sun, and from a very limited range and quantity of knowledge about the dimensions and temperatures of a few other stars. We know, for example, that the stars vary in mass between bodies of about one-third to one-fourth the mass of the sun and bodies of about twenty times the mass of the sun, with a single example of a star about eighty times the solar mass. The diameters of these bodies vary between about one-half that of the sun and some three or four hundred times the sun, while the densities range between about a millionth, and two or three times the sun, between about a thousandth the density of our atmosphere and the density of five or six times that of water. At the same time, we know that the temperatures of the outer radiating surfaces of these enormous furnaces vary between about 5,000 degrees and 30,000 degrees Fahrenheit, temperatures in general much beyond those attainable in any terrestrial laboratories.

Difficult Problems

To deduce from these facts, which have only been gathered with the greatest difficulty and which seem to represent almost the pinnacle of man's achievements in science, how these bodies were formed, what causes the differences in dimensions and temperature, and how the tremendous output of energy continuously radiated out into space from the stars can be maintained, seem almost insoluble problems.

And yet, although we can not speak positively about any inferences deduced from observational facts, it seems highly probable that we can form a mental picture of the conditions in the interior of the stars which at least explains satisfactorily the observed facts. The final development of this picture we owe mainly to an English mathematical astronomer and physicist, Professor A. G. Eddington, who in the last five or six years has done a great deal of work along this line. But like every scientific advance, the honors have to be shared by other physicists and astronomers who paved the way for the final investigation.

Curiously enough, though the constitution of a star is certainly an astronomical problem, the means of arriving at the conclusions are almost wholly physical, another example of the interrelation of the various branches of science to which much of present-day progress is due. It seems almost certain that the stars have originated in clouds of dust or meteoric particles very highly attenuated or scattered, so that the quantity of material from which a star was formed originally extended over a vast region of space several thousand million miles in diameter. Notwithstanding this attenuation or the smallness of the particles, each of them attracted the other, with the result that the cloud began to condense. An inevitable result of this condensation, familiarly exemplified by the heating of the air when an automobile tire is blown up, is an increase of temperature, while the continuance of the condensing process finally results in the cloud taking a spherical form and becoming incandescent; in other words, it becomes a star.

Formation of Stars

This theory of the formation of a star has been held for more than a century, but the advance due to Eddington has consisted in the calculation of the temperatures and pressures in the interior and the determination of the causes that limit the amount of material in the stars to the rather narrow range of one-third to about twenty times the solar mass.

Before, however, discussing these questions, it may be of interest to briefly state the present idea of the process of evolution of these bodies. We have already arrived at a spherical cloud, originally of dust particles, but now heated by condensation, until visible as a deep-red star, with a resultant temperature at the outside of 4,000 or 5,000 degrees Fahrenheit and a consequent vaporization of most of the matter, so that the sphere is now practically entirely gaseous. The star is now of a very low density, certainly more attenuated than our atmosphere, and consequently of very expanded diameter compared to our sun, on the average about ten times, but in certain cases, such as Antares and Betelgense, two or three hundred times the diameter of the sun, with a density only about a thousandth as great as our atmosphere.

Condensation proceeds, heat is produced faster than it can be radiated out, and the star grows hotter, passing through the yellow stage of stars, like Arafuries and Capella, to the white and blue stages of stars, like Vega, Sirius and Rigel. In all these stages, although the stars are becoming more and more condensed, they are still of relatively low density, probably not more than one-tenth that of water, and are great expanded masses of highly tenuous, highly heated gas reaching temperatures on the outer surface of more than 30,000 degrees Fahrenheit. The characteristic name given to these bodies is that of "grant stars," on account of their relatively great dimensions. Most of the stars visible to the unaided eye are grants, not because they are more numerous than the "dwarfs," but because they are so much brighter as to outshine the latter even at greater distances.

Development Processes

The star has now reached a stage where it no longer acts entirely like a gas, when the heat produced by condensation is no longer greater than that radiated, the temperature begins to fall and the star goes through the same color and temperature stages as before, but in the reverse order, is now a relatively dense body of the density of water or greater, and of contracted diameter like the sun. The stars are now called "dwarfs," and finally become so dense and cool as to be invisible, liquid or solid stats. Our sun is a dwarf yellow star at a temperature on the outside of about 10,000 deg. Fahrenheit, and is hence reaching an advanced age in stellar life.

This theory of stellar evolution is mainly due to an eminent American astronomer, Prof. Russell, of Princeton, and is of quite recent origin, not more than ten years, and is now generally accepted. Russell, however, did not attempt to directly explain the details of this process of development, and it is due to Eddington, as previously stated, that we have a probable picture of the conditions in the interior and of the causes which lead to the limiting range of masses of these bodies and maintain their output of energy. In a typical giant star the material is entirely gaseous, and is believed to obey the well-known gas laws. Condensation of the material exerts pressure which increases towards the centre, and this pressure is combated by the elasticity of the gas dependent upon the temperature. Eddington has calculated taking account of the factors of elasticity and other causes, the resulting temperatures and pressures in the interior of a typical giant star which is assumed to have a mass one and a half times the sun, and an average density about one five-hundredth that of water. The diameter of this star would be almost exactly ten times the sun and the temperature of the outer surface about 12,000 degrees. The temperature at the centre would be about 8,500,000 degrees, and the density about one-tenth that of water. Halfway from the centre to the surface the corresponding temperatures and pressures would be 2,500,000 degrees, and one one-hundred and fiftieth the density of water. In stars of greater mass the central temperature might reach over 30,000,000 degrees, and in less massive stars perhaps only 3,000,000 degrees.

Factors in Development

But the great importance of Eddington's work consists in his showing that pressure and temperature do not tell the whole story, that there are other factors at work, the most important of these being radiation, pressure and the dissociation of the atoms in the interior ath these tremendous temperatures. It has long been known that light exerts pressure a familiar example being the phenomena of comets' tails which are produced by the pressure of light from the sun repelling the smaller particles and forming the tail, which is always pointed away from the sun. At the temperatures of millions of degrees in the interior of a star the radiation pressure becomes an important factor as well as the ordinary elasticity in overcoming the pressure due to condensation, to the gravitation of the mass. It is chiefly the delicate balance of the gravitation pressure on the one hand, and the elasticity and the radiation pressure on the other which confines the masses of stars to such a relatively small range. If a star had a greater mass than about twenty—or at the outside one hundred times the sun, the temperature, and consequently the radiation pressure would become so high that it would blow out and diffuse, while, on the other hand, if the mass were smaller than one-third or so of the sun, the temperature could not become sufficiently high to make the star visible.

Eddington has further shown that it is practically certain that the atoms must be dissociated in the interior of the stars to such an extent that the average atomic weight of the matter in the interior of a giant star cannot be much greater than about three as compared with the thirty or forty times greater atomic weight of average ordinary matter. This dissociation is also an important factor in the calculation of the densities and temperatures in the interior, in the balance of factors which limit the masses and especially in the maintenance of the radiation of energy into outer space.

It has long been known that the energy produced by the condensation of the stars is quite insufficient to keep them shining for the aeons of time required in celestial evolution, and although various attempts, such as the energy from radio active matter have been made to explain the discrepancy, these were without success. Although Professor Eddington at first brought forward this hypothesis tentatively, he now more definitely states that the amount of energy required, in addition to that given by condensation, to maintain the supply of radiation given out can be obtained by the building up of the dissociated atoms again with elements. He has definitely calculated that if only five per cent of the star consists of hydrogen, and that this is turned with helium as the first stage in the formation of more complex elements that sufficient energy would be thereby produced to maintain the output of energy undiminished. We do not know how to do this terrestrially, but if we could find out there would be no need to worry about our depleting supplies of coal and oil. Incidentally, it shows how important scientific research, even astronomical studies, which are usually considered so far removed from everyday affairs, may become in the practical concerns of life.

Space forbids to enter more into details of this fascinating investigation, how it practically reconciles all the observed data of the stars, which, after all, forms our only test, the correctness of any theory. I cannot do better in conclusion than give you Professor Eddington's own words at the conclusion of a semi-popular address on the subject:

"We need not be greatly concerned as to whether these rude attempts to explore the interior of a star have brought us to anything like the final truth. The partial results already attained correspond well enough with what is observed to encourage us to think we have begun at the right end in disentangling the difficulties, and we do not anywhere come against difficulties which appear to be insuperable. The fact is that gaseous matter at very high temperatures is the simplest kind of substance for a mathematical physicist to treat. To understand all that is going on in the material of a desk, for example, is a really difficult problem almost beyond the aspirations of present day sciance; but it does not seem to sanguine to hope that in a not distant futura we shall be able to understand fully so simple a thing as a star."

According to Charles P. Steinmetz: "Pull the electric wires out of the world today and our civilization would look like a sieve."

John Ruskin

D. C. in Montreal Gazette

If origin, if early education and habits of life, if tastes, and character, and associations fix a man's nationality, then John Ruskin must be reckoned as a Scotsman. He was born in London, but his family was from Scotland. He was brought up in England, but the friends and teachers, the standards and influences of his early life were chiefly Scottish. The writers who directed him into the main lines of his thought and work were Scotsmen—from Sir Walter Scott and Lord Lindsay and Principal Forbes to the master of his later studies of men and the means of life, Thomas Carlyle.

A Scotch Heritage

The religious instinct so conspicuous in him was a heritage from Scotland; thence the combination of shrewd commonsense and romantic sentiment; the oscillation between levity and dignity, from caustic jest to tender earnest; the restlessness, the fervor, the impetuosity—all these are the tokens of a Scotsman of parts, and were highly developed in John Ruskin. In the days of Auld Lang Syne the Rhins of Galloway — that hammer-headed promontory of Scotland which looks towards Belfast Lough—was the home of two great families, the Agnews and the Adairs —a descendant of whom was Robin Adair. John Ruskin was born in 1819, and was described as a fine, healthy baby, who at four months old began to show that he knew what he wanted, and would insist on having it, if crying and passion were able to achieve anything.

At Five a Bookworm

When he could read, John Ruskin was given regular morning exercises in Bible study, and recitations of Scotch paraphruees of the Psalms in verse, which proved an excellent memory test for the boy. At five he was a bookworm, and the books he read fixed him in certain grooves of thought, or rather an interest which arose from his character of mind. He was no milksop or weakling, the same Ruskin, and as a lad was full of pranks and fun, and indeed so little afraid of animals that he meddled with the Newfoundland dog Lion, attached to the home, "which bit him in the mouth and spoiled his looks." At seven he began to imitate the books he was reading.

The Boy Poet

His first dated "poem" was written a month before little John Ruskin reached the age of seven. It is a tale of a mouse in seven octosyllable couplets, "The Needless Alarm," ratchet-like only for an unexpected correctness in its rhyme, rhythm and reason. Critics who are least disposed to give Ruskin credit for his artistic doctrines or economical theories, unite in allowing that he taught his generation to look at nature, and especially at the sublime in nature—at storms and sunrises, and the forests and snows of the Alps. At Oxford he distinguished himself. Of all the prizes that this university could bestow the Newdigate used to be the most popular. Its fortunate winner was an admitted poet in an age when poetry was read. John Ruskin was definitely meant for the Church and he went up to Oxford in the avowed hope of getting the Newdigate if nothing else. In 1838 he was hard at work on a new poem, but despite all his care and pains he was beaten by a friend, and with a poem which his own sympathy and assistance had helped to perfect.

Graduated at Oxford

He became a graduate of Oxford in 1841, specially distinguishing himself in divinity, theology and mathematics. From 1841 to 1860 Ruskin turned out a most amazing and prolific abundance of writing, developing an interest and a knowledge of art that made him a leading critic. Some of his most wonderful pen pictures were "The Seven Lamps," "Modern Painters," in several volumes; "Pre-Raphaelism," "Christian Art," "Turner and the Ancients," and a host of others. At forty years of age Ruskin finished "Modern Painters." From that time art was sometimes his text, rarely his theme. He used it as the opportunity; the vehicle, so to speak, for teachings of wider range and deeper import, teachings about life as a whole, conclusions in ethics and economics and religion to which he sought to lead others as he was led by the way of art. Until he was forty, John Ruskin was a writer on art; after that his art was secondary to ethics. Until he was 40 he was a believer in English Protestantism; afterwards he could not reconcile current beliefs with the facts of life as he saw them, and had to reconstruct his creed from the foundations.

Antagonism to the World

He became a hermit, and then he began to take up an attitude of antagonism to the world—he who had been the kindly helper and minister of delightful art. He began to call upon those who had ears to hear to come out and be separate from the cant and hypocrisy of Vanity Fair. Its respectabilities, its orthodoxies, he could no longer abide. Orthodox religion, orthodox morals and politics, orthodox art and science, alike he rejected—and was himself rejected by each of them as a brawler, a babbler, a fanatic, a heretic. And even when kindly Oxford gave him a quasi-academical position, it did not bring him, as it brings many a heretic, back to the fold. In this period of storm and stress he stood alone. But in 1870, as professor and prophet, he came into his own with his "First Oxford Lectures," "Fors Begun," "Oxford Teaching," "Deucalion," "St. George and St. Mark," and other highly meritorious literature. Ruskin's health broke down under the strain of shocks and anxieties and worries, and despite the numerous journeys he made for recruiting his health, he did not regain possession of that vigor he had hoped for, his last hours being full of depression, feebleness and depression, wearied to death, awaiting the end.

His Last Days

All scholars honor, revere and cherish the name of John Ruskin, one of the greatest men of his day and generation; one who left the world a great deal better than he found it, in multitudinous directions. At different dates he was elected to various societies—geological, sociological, architectural, horticultural, historical, anthropological, metaphysical, as well as to Alpine and Athanaeum clubs. He was elected honorary member of the Academy of Arts of Florence, of Venice, of Antwerp, and of Brussels, as well as of the American Academy of Arts. The first Ruskin Society was founded in 1879 at Manchester, and was followed by the societies of London, Glasgow and Liverpool—a more striking form of distinction than titles could possibly convey. Many classes and clubs for the study of Ruskin have been in operation in the United States not only since Ruskin's decease, but throughout his life. He died full of years and honors, his end coming suddenly though peacefully. There was no struggle, there were no words. Westminster Abbey was offered by a grateful nation as the highest honor in death Britain can give her glorious departed. But Ruskin had made previous arrangements. He had said: "If I die here bury me at Coniston. I should have liked to lie with my father and mother, if I had died in London, just as I should have wished if I died in the Alps to be buried in the snow."

Tributes to His Memory

Tokens of affection and respect were heaped upon his coffin—from the wreath of Princess Louise down to the tributes of humble dependants —above one hundred and twenty-five —some of them of the costliest to that of the village tailor, with this on its label: "There was a man sent from God, and his name was John." Ruskin sleeps in peace. Over his grave hang the thick fir trees—his favorite pine. And behind the church, shut in with its dark yews, rise the crags of Coniston, those that he wearied for in his boyhood, beneath which he prayed in sickness to lie down and rest.

Ancient City Just Uncovered

Of the buried cities of Ceylon, the most fully excavated to date is Anuradhapura. Not that excavation can be said to be at all complete, but at the present stage startling facts are revealed.

Here was an ancient city, a contemporary of Rome, which for extent quite dwarfs it. "Road-centreing Rome" was builded on seven small hills—Anuradhapura's splendid structures cover an area at least sixteen miles square. At least—for neither the outer city walls nor its exact boundaries have as yet been determined. Decipherable "Asoka" characters place its founding as a royal city at 437 B.C.; its desertion as such did not take place until late in the ninth century.

Twelve hundred years of puissance, of luxury, of splendid architecture—and yet the Western world knows of it nothing. Attacked by the jungle the moment the nightfires of civilization flickered out, like the vast ruins of Aztec culture in Yucatan, its part is as legendary, its wonders as mythical as Ilium, Troy, or pent-up Utica.

The Valley Today

Today one walks through the valley of Anuradhapura as though through a fine old English wood. Pastured cattle keep a lawnlike floor beneath stalwart live oaks, banyans, teak and ficus trees. Monkeys, parrots and endless sorts of smaller feathered jewels pass forever above you.

Throughout the 256 square miles of this parklike domain, now interspersed with marble bathing pools, now overdowered by soaring dagobas, stand—and, also lie—unnumbered thousands of square stone columns, unique to that far-off period of Ceylon. The characteristic feature of Indian architecture is obviously the massy pillar (varying in cross section as it rises) crowdedly, profusely carved with a minute attention to detail. Of Egyptian, the lintel, the lotus column and the colossal half relief figure. Of Greek, the four "classic," perfect columns and the lofty pediment. Of Arabic, the "Moorish" arch, dome and minaret. Of Chinese, curving roofs, ornamental roof-trees, and upward piled stories, progressively recessive to the top. Of Japanese the wooden building in modified Chinese style, heavily lacquered and gilded. Of ancient Ceylon, this unique feature is the vertical standing, square monolith, square-capitaled (if capitaled at all, which is not common) in rows supporting a superstructure which has disappeared from knowledge. These monoliths of every girth and height are everywhere here. Springing from wide marble platforms, or embedded in the soil; once supporting canopies or upper floors; they present a feature the most casual visitor cannot fail to find impressive. And remember, they are hand hewn, man handled monoliths; though much smaller than those used by the Egyptians. The "Brazen Palace (erected about 160 B.C.) had 1600 pillars supporting the second story.

The structures so made appear to have been mainly for two uses—as monasteries and their adjuncts, and as precincts of royalty. Indeed, it seems as if the wide range of Anuradhapura had been given over to the highly active, recently introduced Buddhism as a sort of spiritual exposition ground, a national Acropolis and Chautauqua together, in the glory and learning of which royalty, semi-deified, had a natural palace.

Huge Dagobas

The royal establishment had many elaborate bathing "tanks" (a Sanacrit word) round-about, and there were many others of a ritual nature scattered throughout the city. These unc anopied, al fresco, some of them yet holding water, have been excavated by acres, their ancient splendor easily discernible. Another of the particular features of this vanished civilization, of this buried metropolis, is a half dozen sky-scraping dagobas. Four are of tremendous size; the Abhayagiriya having a height of probably 280 feet and a base diameter of 252 feet. A dagoba is a memorial structure (solid usually, occasionally also a rellquary) inspired somehow by Buddhism; is generally conical, and is found of a characteristic type in each country—becoming the well-known pagoda in China and Japan.

The "moonstone" of Ceylon is not a "precious stone"—until its quaint carving has made it so. These so-called moonstones are of granite, serving as the ground step at the bottom of a flight of stairs. They are semi-circular with a flat side from three to six fat long, carved in concentric circles showing animal processions, scrolls and the like. They are found nowhere else outside Ceylon; Anuradhapura has several of Ceylon's few remaining stones.

One of the most interesting of these granite half-moons marks the gate to the most sacred of all Bo Trees—one of Anuradhapura's greatest attractions for pilgrims. It is exceedingly impressive to stand beneath "the oldest historical tree in existence," as it undoubtedly is, and muse upon philosophies, ancient and modern; to build a bridge of popier wood back across the centuries to Budda Gautama himself; to consider what this one tree has meant to aspiring humanity.

Anniversary of Famous Church

Comparatively few people know anything about the Church of the Transfiguration in New York City. It is a small building and is only seventy-five years old. Yet we think it is the most famous church in this hemisphere, when mentioned by the name Joe Jefferson gave it, "The Little Church Around the Corner." It is one of the sights of New York to the visitor. It is a household word with actors all over the world. Hundreds of them are married there every year, some coming from foreign countries to honor the little church that showed itself the friend of actors many years ago. They send their children to be baptized in the church, and perhaps later to be married there. It has a special Sunday school for the children of stage folks. The seventy-fifth anniversary of the church will soon be celebrated, and we can be certain that the celebration will be a notable one, for actors know all that is to be known about celebrations.

Only Two Rectors

Another notable thing about the Little Church Around the Corner is that until last April it had but two rectors in all its history. The founder of the church was Rev. George Hendrick Houghton, who conducted the services for almost half a century. The other was his nephew, Dr. George Clarke Houghton, who succeeded him in 1897. They were Anglicans and inclined to be High church. After the church had been adopted by the actors they always refused to marry any person who had not been baptized. If the bride is young she must have her mother's consent. The Houghtons would not marry any divorced person, and divorced persons are perhaps commoner in the theatrical profession than in any other. The rectors sought to discourage hasty marriages; they would not permit their church to become a sort of Gretna Green. In other words, they did not seek to make their church popular. They did not try to cater to actors or to any other class. It just happened that they had certain ideas of Christian brotherhood which appealed to actors particularly, and that is why the actors generally swear by this little Anglican church, no matter what may be their religious denomination.

How It Was Named

How the Church of the Transfiguration received its new name is a story that has often been told. George Holland, a celebrated actor, had died. He was a member of the Church of England, and his friend, Joseph Jefferson, went to the Episcopal church that stood on the corner of Madison Avenue and Twenty-eighth street to arrange that the funeral should take place from the church. To his amazement, the rector refused, for the probable reason that he considered all actors more or less disreputable. He added, however, "There is a little church around the corner where they do such things." To which Jefferson retorted, "God bless the little church around the corner." Thereupon he sought out the Rev. Dr. Houghton and Holland was buried from his church in Twenty-ninth street. It is worth noting that the large, important church has long since disappeared, overwhelmed in the northward sweep that has been proceeding on Manhattan island for so many years. Yet the despised little church remains, and will remain, we dare say, as long as its rector wills it. The actors in America will not see it swamped.

Financed by Actors

Joe Jefferson's phrase spread rapidly and soon the whole profession knew that in Dr. Houghton there stood a friend for anybody who needed a friend. Actors who had not gone to church for years somehow or other felt it incumbent on them to attend the services in the Church of the Transfiguration. It is related that on one Sunday Dr. Houghton announced that he was in need of several thousand dollars for parish work. In one of the pews sat an actor who was also a member of the Lambs Club. That night at the club, when he may have been hoisting a highball for all anybody knows to the contrary, he said, "Look here, boys, the old doctor is out of money. He had to ask for it in church today. That will never do. Let's chip in." So the actors chipped in to the extent of $12,000, and the next Sunday Dr. Houghton announced with a smile, "The congregation need not contribute to the fund mentioned last Sunday. My actor friends have sent me much more money than I need."

A Great Padre

But Dr. George Houghton had shown what quality of man he was long before the actors adopted him and his church. One day in the Civil war when there were race riots in New York a mob pursued a number of negroes through Twenty-ninth street. They sought refuge in the church. Dr. Houghton sprang to the door and holding a cross aloft held the mob at bay. All that night the negroes remained under his protection. For years he maintained a bread line at the rectory gate. In another period of hard times he opened a number of soup kitchens. In the early days of free clinics when it was difficult for the poor to get medical attention, he established a free clinic. His church was not far from the old Tenderloin district and close to the morgue. He would enter a house of prostitution to administer the last sacrament, and anybody in the morgue might be rescued and buried from his church with benefit of clergy if a friend asked him.

Insurance rates on electric trucks are 25 per cent less than on gasoline trucks. This fact was emphasized at the Electric Truck Show held recently in the exhibition rooms of the New York Edison Company. The same reduction in insurance rates is allowed on garages housing electric trucks.

Twenty-two gas illumined schools in Washington, D.C., are to have complete electric lighting systems installed during the summer. This improvement has been brought about through the earnest efforts of the Parents' and Teachers' Association, which has been pleading for some time for the best lighting for children's eyes. At present only forty-two of the city schools are lighted wholly or in part by electricity, eighty-six being otherwise illuminad. School buildings that have evening classes will be given first consideration in the matter of electric installation.

Yarns They Spin at the Old Shack

By Richard L. Pocock

"I WAS listening to a couple of fellows down at the club the other day, boys, telling yarns about their hunting experiences and how they'd bagged this, that and the other, how they'd brought off this double and that extra long shot, what a great day one of 'em had had among the pheasants, and what a wonderful running shot the other one had made at a big buck—the biggest buck, sir—oh! you know the kind of stuff. 'Twas amusing to listen to, interesting enough, some of it, but all the time they were talking, there wasn't once that either of 'em told of having made a bad miss or failed in a hard attempt to get his game.

"Maybe it's natural, too, that they shouldn't; success is more interesting than failure, you'll tell me, and yet, somehow, I don't know if it's because I'm a contrary kind of a cuss with something peculiar in my maksup, but it seems to me that there are times when the story of a failure is even more interesting than the story of a success; at any rate, it often teaches a fellow more, and that's a fact."

Old Dick was prosing away up at the Old Shack, not apparently noticing or caring much whether the other two were listening to him very closely. His mind was evidently back on some old experiences, and he did not wait for any urging or encouragement to proceed on his rambling narrative.

Ducks Were Scare

"Now there was the time down on the Kootsney, below Nelson, when I and young Tom Bilton went after those mallards. We were quite a bit younger then than now, both of us, or maybe we wouldn't have gone after them, because you see it was something of a trip just to get one shot or a couple at best, with a good chance of not getting a shot at all, but we were young then, and mighty keen. Besides, up to then I'd never had any duck shooting at all, and, as I think I've told you fellows before, there has always been a special fascination for me in trying to get the first of any kind of game—just a little peculiarity again, I suppose.

"You see these ducks were quite a piece below Nelson, six miles I should say, at the very least. There was a sort of small sandbar at the mouth of one of the creeks, Forty-nine Creek I think it was called, or it may have been lower down. Anyhow, so far as we knew, this was about the only place for miles where there ever were any mallards at that time of year, but we knew that there was a bunch of them there, and we also knew that it would be quite a job to get a shot at them. That, of course, was what made it interesting.

"One shot, supposing they were there, would put 'em up, and there was no other place near where they would settle; they'd just go on right up into the lake and come back when the coast was clear and not before. We made up our minds we were going to have a try at any rate, Tommy had a Peterboro, and we started down the river in that. We couldn't go the whole way in the canoe, not more than about half, if you know the Kootenay River about those parts you'll know why—after that we had to walk two or three miles. Well, we started off in the afternoon, allowing enough time to get us to where the ducks were, or should be, late in the afternoon, and we made the water part of the journey without mishap, landed and started on the hike along the trail which followed the river.

All Mapped Out

"We knew the lay of the land—and the water—pretty well, and we had made a plan of campaign before we started. You see, we'd seen those ducks there from the other side of the river, and we'd noted which way they flew when they were put up. They were out too far from the bush for the fellow who stalked them to have anything of a chance, and we hadn't got time to build a blind and wait for them to come back, but we'd noticed that when they flew they went within a few yards of a certain high point of rock on the river bank. We tossed up to see which of us would hide at that point of rock and which would sneak on the ducks and put them up. Well, I was the lucky one. When we came to the point I found a nice easy place to hide while Tom went on to do his part of the job. It was agreed that when the ducks flew he was to fire a shot in any case, whether they were within his range or not, so as to be a signal for me to be ready to receive the enemy.

"It was about a quarter of a mile from the point to the mouth of the creek where the ducks were, or so we hoped, and it seemed a dickens of a time before I heard a shot, in fact, I was just beginning to curse the luck and think we had made our journey all for nothing when I heard Tom's old ten-bore go off. I peered out of my shelter, and I didn't have to wait long then, believe me, it don't take mallards on the wing long to cover a quarter of a mile, and when they've got that far with the sound of a ten-bore behind them to lend 'em speed, believe me they're going a bit.

"Well, boys, everything worked out right according to schedule. There was a big bunch of them, and they flew just the way we wanted them to, all bunched together, or so it seemed as they passed me at a range of about ten yards, I should say. I was ready for them all right, my gun was loaded in both barrels, and I didn't forget to push the safety catch off or anything of that kind. No, boys, I got off the two barrels all right, except that I suppose I didn't hold them right. Fired into the brown like a damson jam fool and missed the blooming lot; didn't even see a feather drop!

Had No Chance

"Well, boys, I hoped then as hard as a man could hope, that Tom had had a real shot at them and bagged something, but not a bit of it. He'd not been able to get within range before they flew, and had just fired a signal shot. He was a good young sportsman, a real good one, I'd have felt better if he'd called me two or three kinds of a fool, but no, he took it like a young philosopher, though he must have had an awful contempt for my marksmanship, and we started back on the long hike and upstream paddle, getting home long hours after dark. And the moral of that is, boys, never fire into the brown, it's bad sportsmanship, and it seldom pays. But when you come to think of it, wouldn't we have thought a whole lot of a couple of mallards if we'd got 'em that time that way? Six miles canoeing and six miles walking there and back, and probably a swim in cold water to retrieve them if I had hit them, 'cause we had no dog, and the canoe was cached three miles away. Hardly worth it, I suppose some fellows would say, but don't you believe it, that was real sport, and we took a real sporting chance, or so I figure it.

Funnily enough, it was in almost the same little bit of country that I made another trip which was quite a big trip in proportion to the results obtained, but this time I was successful. I don't know at that whether it was quite such a sporting trip, I don't think it was. I fancy now I look back at it that there was quite a little desire in the back of my mind to be able to say 'I told you so,' and then again I'm a pig-headed sort of cuss, and I hate to give in when I've started in to do a thing.

A Sporting Bet

"'Twasn't ducks this time, it was blue grouse. There was a few of them in the saloon in Nelson talking about game and things, and a great big Eastern Canadian with whom I'd got a bit chummy began saying that there wasn't much game just around there, and what he'd give for a nice fat eastern 'patteridge' he called it, I guess he meant a ruffled grouse.

"'Well,' says I, 'how would a big fat blue grouse suit you, what's the matter with that?'

"'Nothing the matter,' says he, 'but where d'ya think a fellow's going to get one.'

"'Oh, that's easy,' says I, boastful like, 'I'll bet I can get you one any day down on that mountain there. Why, I'll get you one tomorrow if you really want one.'

"'Now, I'll just bet you a dollar you can't,' says my big friend, and that of course put my back up.

"I didn't have a shotgun, my uncle was taking care of it for me for a while just then, but I'd still hung on to Batsy Ann, the old rifle, and had a few cartridges for it. Times were hard, and a dollar was a dollar. I knew where there was nearly always some blue grouse on that mountain, and I didn't mind a bit of a climb to get them.

"Well, I very nearly got left that time. Any man who thinks he can make sure of finding blue grouse any time he goes after them in the same place is taking a big chance. I got up that mountain to where I expected to find some by about noon the next day, and not a feather of one did I see for ever so long. I was just about ready to hit the back trail and give it best when I almost trod on an old hooter. Up he got and made for a fir tree. I managed to keep my eye on him and spotted him pretty high on a limb. Remember I told you I had only a rifle, and I couldn't hit a grouse on the wing with that. Besides, I'd got to produce a bird that my friend could eat, and that meant hitting him in the head or neck with old Betsy Ann. Otherwise I'd only have a bunch of feathers and perhaps a bit of skin to prove I really had hit one.

Quite Accommodating

"Of course the timber there ain't so big as on the Coast, and the grouse are generally not very wild. When you get them up a tree they generally give you plenty of time to take aim and the let you get fairly close up to the tree, too. So it ain't anything to brag about when I tell you that I made no mistake with that shot. A little low, perhaps, but most of the bird was there when he hit the ground, and there was plenty of him for one man's meal—that is if he had good teeth. As a matter of fact, though the bet was paid, and I did have the satisfaction of proving that I could get grouse when I want after them, or a grouse at any rate, that chap told me it was about the toughest old bird he ever tried to eat, and I'm not doubting his word.

"And the moral this time, boys, is never be too cocksure. I felt pretty certain I could run into a whole lot of grouse up on that mountain, and I didn't hardly deserve to win that bet, it was sheer luck, because that was the only grouse I saw that day, and I would never have bet on myself to do it again another day.

"Talking of being too cocksure, I remember well how it was I missed my first deer. Most fellows miss their first through buck fever, but I can honestly say I don't think I did. I'd seen three deer feeding in a sort of basin with some patches of bush and timber in it when I was a few hundred yards from camp, and had nothing better in my hand than a prospecting pick. I hurried back to camp and got the rifle. Then I went back and took another look over a bluff into that basin, but I couldn't spot the deer, so I started to walk through it. I hadn't gone very far when I suddenly spied a nice buck standing behind a bush looking at me from about ten yards away. I froze and slowly raised the rifle. I took plenty of time, and deliberately aimed at its head, and I tell you, boys, I could hardly believe it when the smoke had cleared—black powder in those days, boys—when I couldn't find the carcase or any sign of a kill. That deer had just vanished in the smoke, and is going yet for all I know.

Allowance for Error

"When I told my partner about it he said, 'Always aim at a deer where he looks biggest, boy; you may spoil a little meat, but you'll more often get it than if you try any fancy bull's-eyes.' That failure taught me a lesson too, boys, and I followed old Jack's advice next time and it worked pretty good. Still that wouldn't have done with the old blue grouse at all, there wouldn't have been any meat in camp if I'd hit him where he looked biggest, and that's a fact.

"No, boys, failure ain't always disgraceful, certainly not in sport. A good loser's often a better fellow than a good winner, and if we always got what we went after without any trouble, where'd be the fun in it?"

"Nobody today or ever can fix the limits to which the use of electricity may go," says the Wizard of the General Electric. "We can say only that it will go as far as human need for energy goes. Electricity is energy and energy is the basis of civilization."